WARMWATER STREAM FISHERIES REPORT REGION IV 1995

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TENNESSEE WILDLIFE RESOURCES AGENCY
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INTRODUCTION

The fish fauna of Tennessee is the most diverse in the United States, with approximately 297 species of native fish and about 26 to 29 introduced species (Etnier and Starnes 1993). Region IV has 4,871 mi of streams that total approximately 14,111 acres in 21 east Tennessee counties. There are approximately 800 mi classified as coldwater streams (TWRA 1994). Streams in Region IV, except for a few in Anderson, Campbell, and Claiborne counties (Cumberland River System streams) are in the Ridge and Valley and Blue Ridge physiographic provinces of the upper Tennessee River drainage basin. The main river systems in the region are the Clinch, Powell, Little Tennessee, mainstream Tennessee River, French Broad, and Holston.

Streams and rivers across the state are of considerable value as they provide a variety of recreational opportunities. These include fishing, canoeing, swimming, and other riverine activities that are unmatched by other aquatic environments. Streams and rivers are also utilized as water sources both commercially and domestically. The management and protection of this resource is recognized by Tennessee Wildlife Resources Agency (TWRA) and has been put forth in the Strategic Plan (TWRA 1994) as a primary goal.

This is the ninth annual report on stream fishery data collection in TWRA's Region IV. The main purpose of this project is to collect baseline information on fish and macroinvertebrate populations in the region. This baseline data is necessary to update and expand our Tennessee Aquatic Database System (TADS) and aid in the protection and management of the resource.

Efforts to survey the region's streams has led to many cooperative efforts with other state and federal agencies. These have included the Tennessee Department of Environment and Conservation (TDEC), Tennessee Valley Authority (TVA), U.S. Forest Service (USFS), Oak Ridge National Laboratory (ORNL), and the National Park Service (NPS).

The information gathered for this project is presented in this report as stream accounts. These accounts include a general summary of the survey work that took place along with the data collected and a management recommendations section for each stream. Sample site location maps and field data are also included.

METHODS

The streams to be sampled and the methods required are outlined in TWRA field request No. 95-4. A total of 17 streams were sampled and are included in this report. Stream surveys were conducted from June to August, 1995. Nineteen fish samples and 19 benthic samples were collected.

SAMPLE SITE SELECTION

Sample sites were selected that would give the broadest picture of impacts to the watershed. We typically, located our sample site in close proximity to the mouth of a stream to maximize resident species collection. However, we did position survey sites far enough upstream in order to decrease the probability of collecting transient species. In some streams (i.e., Old Town Creek and South Indian Creek) where an accurate evaluation of watershed conditions could not be made with one site, multiple sites were surveyed along the length of the stream. Sample lengths ranged from approximately 500 ft to 2,300 ft and included all habitat types characteristic to the survey reach. Sampling locations were delineated in the field on 7.5 minute topographical maps and then digitally re-created using a commercially available software package. These maps have been included in each stream account and include the Tennessee Aquatic Database System (TADS) river reach number and quadrangle map coordinates. Map coordinates were obtained with a Motorola Traxar handheld GPS unit.

WATERSHED ANALYSIS

Watershed size and/or stream order has historically been used to create relationships for determining maximum expected species richness in a given stream when species richness for a number of sites are plotted against watershed areas (Fausch et al. 1984). We chose to use watershed area (mi^2) to develop our relationships as this variable

has been shown to be a more reliable variable for predicting maximum species richness (Charles Saylor, Tennessee Valley Authority, personal communication). Watershed areas **(the area upstream of the survey site)** were determined by digitizing delineated watershed boundaries from USGS 1:24,000 scale maps. A GTCO Inc. Digipad in combination with the Earth Retrieval Data Analysis System (ERDAS) software were used to produce watershed area measurements for 18 of the fish sample sites where IBI samples were conducted.

FISH COLLECTIONS

For most streams fish data were collected by employing a slightly modified (Saylor and Alstedt 1990) Index of Biological Integrity (Karr et al. 1986). Fish were collected with standard electrofishing (backpack) and seining techniques. Typically, a 10 or 15 x 4 foot seine was used to make hauls in shallow pool and run areas in smaller streams (< 20 ft mean width). In larger streams, a 20 x 4 ft seine was used. Riffle and deeper run habitats were sampled with a seine in conjunction with a backpack electrofishing unit (100-600 VAC). An area approximating the length of the seine^2 (i.e., 15' x 15') was electrofished in a downstream direction. A person with a dipnet assisted the person electrofishing in collecting those fish which did not freely drift into the seine. Timed (5-min duration) backpack electrofishing runs were used to sample shoreline habitats. In both cases (seining or shocking) an estimate of area (ft^2) covered on each pass was calculated. Fish collections were made in all habitat types within the selected survey reach. Collections were made repeatedly for each habitat type until no new species was collected for three consecutive samples for each habitat type. All fish collected from each sample were enumerated and in the case of game fish, lengths and weights obtained after being anesthetized with MS-222 (tricaine methansulfonate). Anomalies (e.g., parasites, deformities, eroded fins, lesions, or tumors) were noted along with occurrences of hybridization. Young-of-the-year (YOY) fish were not included in the IBI scoring,

however, their occurrence was noted. After processing, the captured fish were either held in captivity or released into the stream where they could not be recaptured.

One quantitative survey of Indian Creek was made in order to gather population data on one of Region IV better smallmouth/rock bass streams. The three-pass removal technique, which is the sampling methodology typically used to gather quantitative data from streams was used in a pre-determined section of stream. Three underlying assumptions of the technique are that (1) the population being sampled is closed; (2) sampling effort is constant among passes; (3) all members of the population have equal catchability which remains constant among passes (Raleigh and Short 1981).

The sample length guidelines for this stream (> 21 ft mean width) was 656 ft, but was adjusted to take advantage of any stream channel features that were capable of obstructing fish movement. Blocknets were set at both ends of the sample area in order to maintain a closed population. Electrofishing units were used a the rate of one for every 10 to 12 ft of mean stream width (Habera et al. 1992). The same number of electrofishing units were employed on each pass and their voltage settings remained constant to ensure equal sampling effort.

All fish captured were anesthetized with MS-222 and processed after each electrofishing pass. All game fish were individually measured to the nearest millimeter total length and weighed to the nearest gram on electronic scales. Nongame fish were enumerated, batch weighed by species, and a length range was obtained. After processing all fish were held in live cages outside the sample area. The length and weight data were later converted to equivalent English units for the purpose of this report.

Generally, fish were identified in the field and released. Problematic specimens were preserved in 10% formalin and later identified in the lab or taken to Dr. David A. Etnier at the University of Tennessee Knoxville (UTK). Most of the preserved fish collected in the 1995 samples were catalogued into our reference collection or deposited in the University of Tennessee Research Collection of Fishes. Common and scientific names of fishes used in this report are after Robins et al. (1991) and Etnier and Starnes (1993).

AGE and GROWTH

In order to address management questions pertaining to the age and growth characteristics of stream dwelling smallmouth bass, spotted bass, and rock bass populations collection of otolith samples was initiated in 1995 by each regional stream crew. Otoliths were extracted from smallmouth bass, spotted bass, and rock bass for age and growth analysis in those streams considered to contain a fishery. Efforts were made to collect a total of 25 to 30 otolith samples representing each size class present , including any Young-of-the-Year (YOY) we captured. Age determinations for the fish collected during 1995 are being made by Frank Fiss (Biologist, Nashville Office).

BENTHIC COLLECTIONS

Qualitative benthic samples were generally collected from each fish sample site. These were taken with aquatic insect nets, by rock turning, and by selected pickings from as many types of habitat as possible within the sample area. Taxa richness and relative abundance are the primary considerations of this type of sampling. Taxa richness reflects the health of the benthic community and biological impairment is reflected in the absence of pollution sensitive taxa such as Ephemeroptera, Plecoptera, and Trichoptera.

Large particles and debris were picked from the samples and discarded in the field. The remaining sample was preserved in 50% isopropanol and later sorted in the laboratory. Organisms were enumerated and attempts were made to identify specimens to species level when possible. Many were identified to genus, and most were at least identified to family. Dr. David A. Etnier (UTK), examined problematic specimens and either made the determination or confirmed our identifications. Comparisons with identified specimens in our aquatic invertebrate collection were also useful in making determinations. For the most part, nomenclature of aquatic insects used in this report follows Brigham et al. (1982) and Louton (1982). Names of stoneflies (Plecoptera) are after Stewart and Stark (1988), from which many of the determinations were made. Benthic results are presented in tabular form with each stream account. Crayfish collected from stream surveys conducted during 1995 are reported in Appendix D.

HABITAT QUALITY ASSESSMENT

Stream habitat conditions were evaluated by employing a visually based habitat assessment technique developed by Barbour and Stribling (1995). This technique has been adopted by TDEC and is being implemented as a component of their monitoring protocols. We were primarily interested in assessing human-induced perturbations to the physical structure of the stream. The technique permitted us to focus on a select set of habitat parameters that allowed us to make an integrated assessment of the habitat quality in the reach we were surveying.

Our habitat assessment procedure involved three individuals **(performed by the same investigators on each stream)** making assessments for the survey reach. The three scores generated form these evaluations were then averaged for an overall score for that reach. The mean scored obtained from the evaluations is reported in item 13 of the

physicochemical and site location form. Examples of the habitat assessments forms used for the 1995 surveys have been included in Appendix E.

WATER QUALITY MEASUREMENTS

Basic water quality data were taken at most sites in conjunction with the fishery and benthic samples. The samples included dissolved oxygen (DO), temperature, pH, and conductivity. Data were taken from midstream and mid-depth at each site, using a YSI model 58 DO meter and a YSI model 33 S-C-T meter. Scientific Products™ pH indicator strips were used to measure pH. Both wide (4.5-10.0 x 0.5 units) and narrow range (6.0-7.7 and 5.1-7.2 x 0.3 units) indicators were used in order to obtain the most accurate measurement. Stream velocities were measured with a Marsh-McBirney Model 201D current meter. The Robins-Crawford "rapid crude" technique (as described by Orth 1983) was used to estimate flows. Water quality parameters were recorded on physicochemical data forms and are included with each stream account.

DATA ANALYSIS

Twelve metrics described by Karr et al. (1986) were used to determine an IBI score for each stream surveyed. These metrics were designed to reflect insights into fish community health from a variety of perspectives (Karr et al. 1986). Given that IBI metrics were developed for the midwestern United States, many state and federal agencies have modified the original twelve metrics to accommodate regional differences. Such modifications have been developed for Tennessee primarily through the efforts of the TVA and Tennessee Tech University. In developing our scoring criteria for the twelve metrics we reviewed pertinent literature [North American Atlas of Fishes (Lee et al. 1980), The Fishes of Tennessee (Etnier and Starnes 1993), various TWRA Annual Reports and unpublished data] to establish historical and more recent accounts of fishes expected to occur in the drainages we sampled. Furthermore, we consulted with Charles Saylor of

TVA who aided us in establishing criteria and creating maximum expected species list for the streams sampled during 1995. Scoring criteria for the twelve metrics were modified according to watershed size. Watersheds draining less than 5 mi^2 were assigned different scoring criteria than those draining greater areas. This was done do accommodate the inherent problems encountered when sampling smaller streams (e.g., lower catch rates and species richness). Young-of-the-Year fish and non-native species were excluded from the IBI calaculations. After calculating a final score, an integrity class was assigned to the stream based on that score. The classes used follow those described by Karr et al. (1986) and are as follows:

Total IBI score (sum of the 12 metric ratings)	**Integrity Class**	**Attributes**
58-60	Excellent	Comparable to the best situations without human disturbance; all regionally expected species for the habitat and stream size, including the most intolerant forms, are present with a full array if size classes; balanced trophic structure.
48-52	Good	Species richness somewhat below expectation, especially due to the loss of the most intolerant forms; some species are present with less than optimal abundance or size distributions; trophic structure

		shows some signs of stress.
40-44	Fair	Signs of additional deterioration include loss of intolerant forms, fewer species, highly skewed trophic structure (e.g., increasing frequency of omnivores and green sunfish or other tolerant species); older age classes of top predators may be rare.
28-34	Poor	Dominated by omnivores, tolerant forms, and habitat generalists; few top carnivores; growth rates and condition factors commonly depressed; hybrids and diseased fish often present.
12-22	Very poor	Few fish present, mostly introduced or tolerant forms; hybrids common; disease, parasites, fin damage, and other anomalies regular.
	No fish	Repeated sampling finds no fish.

The data collected in the quantitative three-pass electrofishing survey (Indian Creek) was subjected to statistical analysis using ***Microfish 3.0***, a software package that

generates various population statistics from electrofishing removal data (VanDeventer and Platts 1989). From these calculations, standing crop (lb/acre) and density (#/acre) were determined.

Benthic data collected for the 1995 surveys were also subjected to a similar type of biotic index that rates stream condition based on the overall taxa tolerance values and the number of EPT taxa present. The North Carolina Division of Environmental Management (NCDEM) has developed a bioclassification index and associated criteria for the southeastern United States (Lenat 1993) . This technique rates water quality according to scores derived from taxa tolerance values and EPT taxa richness values. The final derivation of the water quality classification is based on the combination of scores generated from the two indices. The criteria used to generate the biotic index values and EPT values are as follows:

Score	Bitoic Index Values	EPT Values
5	<5.14	>33
4.6	5.14-5.18	32-33
4.4	5.19-5.23	30-31
4	5.24-5.73	26-29
3.6	5.74-5.78	24-25
3.4	5.79-5.83	22-23
3	5.84-6.43	18-21
2.6	6.44-6.48	16-17
2.4	6.49-6.53	14-15
2	6.54-7.43	10-13
1.6	7.44-7.48	8-9
1.4	7.49-7.53	6-7
1	>7.53	0-5

The overall result, is an index of water quality that is designed to give a general state of pollution regardless of the source (Lenat 1993). Taxa tolerance rankings were based on

those given by NCDEM (1995) with minor modifications for taxa which did not have assigned tolerance values.

STREAM ACCOUNTS

Hickory Creek

One IBI fishery survey was conducted on Hickory Creek in June 1995:

Location and Length - Tributary to the Clinch River. The sample area was located at the bridge crossing on Yarnell Road.. The sample area extended upstream and downstream of the bridge and was approximately 1,300 ft in length. The site was sampled on 14 June 1995.

Sampling Methodology - This site was sampled with a 10 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 446 fish representing 13 species was collected in our survey. Four game fish and two non-game fish species were collected. These included 12 rock bass (*Ambloplites rupestris*), one redbreast sunfish (*Lepomis auritus*), four bluegill (*L. macrochirus*), one spotted bass (*Micropterus punctulatus*), three white suckers (*Catostomus commersoni*), and 15 northern hogsuckers (*Hypentelium nigricans*). The most abundant forage species were fantail darter (*Etheostoma flabellare*) and blacknose dace (*Rhinichthys atratulus*). Together these two species comprised 68.1% of the total number of fish collected. This stream was unique from most of the streams sampled during 1995 in that it did have substantial groundwater influence which was reflected in the observed pH and conductivity values.

Our Index of Biotic Integrity analysis indicated that this stream was in "fair to good" condition based on an IBI score of 46. The two metrics that had the greatest negative effect on the overall score were the lack of headwater intolerant species and the relatively high percentage of the fish community being composed by two species.

Benthic macroinvertebrates from our sample included Baetidae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies, Capniidae and Perlidae stoneflies, Hydropsychidae, Limnephilidae, Philopotamidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 35.3% of the total sample. Gastropods were second most abundant with 21.6%. Plecopterans accounted for 6.2%, while coleopterans and ephemeropterans contributed 7.7% and 7.0% , respectively. A

total of 38 taxa was collected from this site of which 13 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Hickory Creek was assigned a bioclassification of "fair to good".

As was the case with Burnett Creek, this portion of Hickory Creek is suffering from non-point sedimentation and to a lesser extent riparian zone removal. Our habitat analysis indicated that this stream could be categorized in the lower sub-optimal range based on the overall habitat score of 120.

Management Recommendations:

1. As with most other streams, non-point source agricultural pollution appears to be having the greatest impact on this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	HICKORY CREEK
WATERSHED	CLINCH RIVER
SITE	@ YARNELL RD. X-ING
COUNTY	KNOX
QUADRANGLE	LOVELL 138 NW
LAT-LONG	355331N-841322W
REACH	06010207-4.0
LENGTH	~ 1300 FT
AREA (SQ. MI.)	4.3
ELEVATION	870 FT
DATE	6-14-95
TIME	0928

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER,
C.E. WILLIAMS AND D. BIVENS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
15.6	0.6	1.9

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	10	35	15	5	20

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	40	35	5	5

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
20 %	40 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 3.1 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND MILD; AIR TEMP 72 F @ 0930

10. PAST WEATHER (last 24 hrs)

SUNNY AND COOL

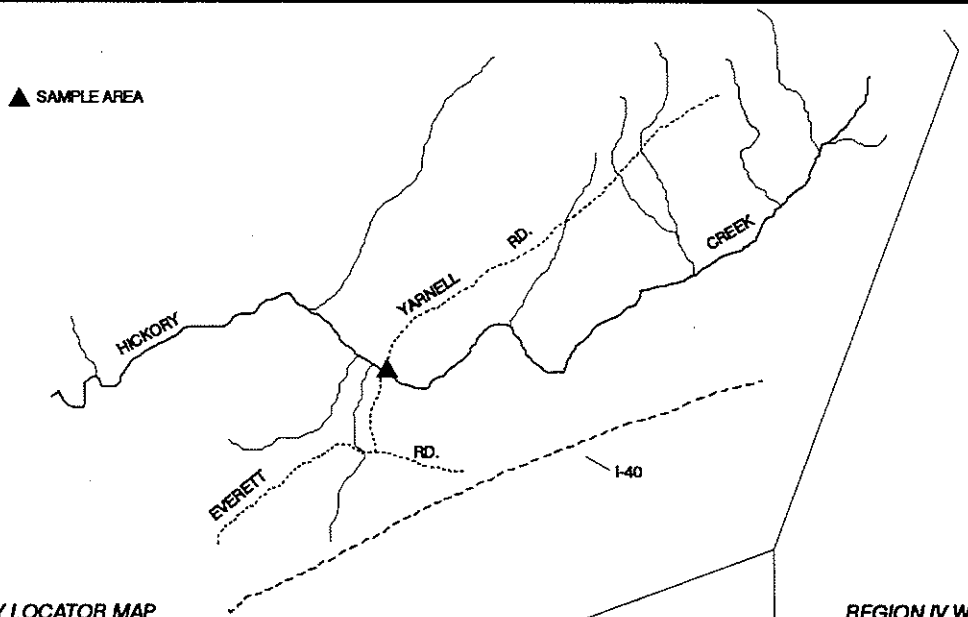
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	60 F	290	9.1	90.0

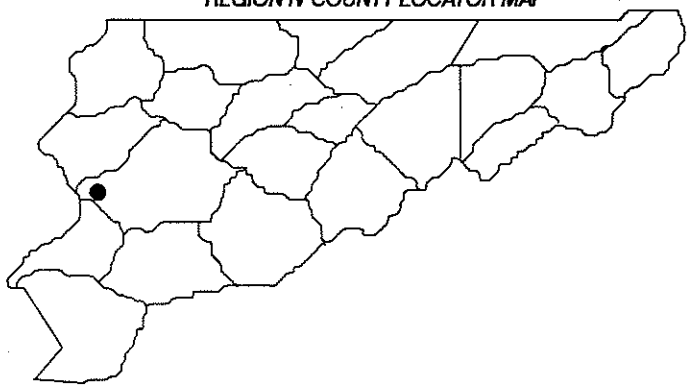
12. COMMENTS

SAMPLE AREA LOCATED AT YARNELL RD. X-ING. PERIWINKLE SNAILS FAIRLY ABUNDNANT. CREEK APPARENTLY RECIEVING ALOT OF INPUT FROM SPRINGS. SOME RUBISH IN AND ALONG STREAM.

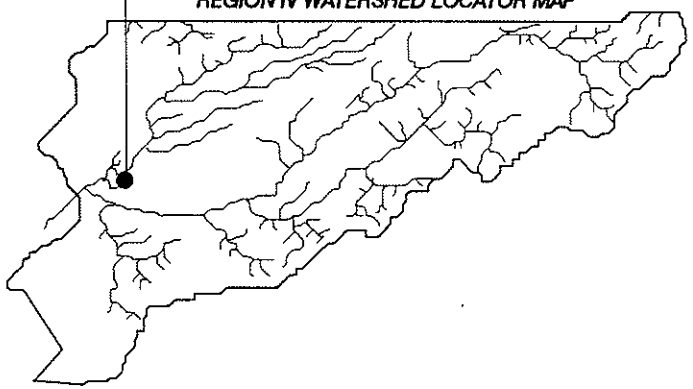
13. X HABITAT ASSESSMENT SCORE 120



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



HICKORY CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	12	2-7	1.2	
Campostoma anomalum	45	20			
Catostomus commersoni	195	3			
Cottus carolinae	322	28			
Etheostoma flabellare	411	39			
Etheostoma simoterum	435	30			
Hypentelium nigricans	207	15			
Lepomis auritus	346	1	3	0.02	
Lepomis macrochirus	351	4	2-5	0.5	
Luxilus chrysocephalus	89	24			
Micropterus punctulatus	363	1	3	0.01	
Rhinichthys atratulus	184	265			
Semotilus atromaculatus	188	4			
		SUM: 446			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<5	5-10	>10	15	12	5	
NUMBER OF RIFFLE SP.	<2	2-3	>3	5	3	3	
NUMBER OF POOL SP.	<3	3-5	>5	9	6	5	
% DOMINANCE (COMBINED % OF TWO MOST DOMINANT SP.)	>84	84-69	<69		68.3	1	
NUMBER OF INTOLERANT HEADWATER SP.	<2	2-3	>3	5	0	1	
PERCENT OF INDIVIDUALS AS TOLERANT	>38	38-19	<19		6.9	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>50	50-25	<25		10.5	5	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<10	10-20	>20		15.4	3	
PERCENT OF INDIVIDUALS AS PISCIVORES	0	Tr	>1		2.9	5	
CATCH RATE	<32	32-65	>65		39.7	3	
PERCENT OF INDIVIDUALS AS SIMPLE LITHOPHILIC SPAWNERS	<25	25-50	>50		75.5	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.4	5	
						46	**FAIR-GOOD**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

HICKORY CREEK BENTHIC DATA **TAXA RICHNESS = 38**
FIELD COLLECTION # 674 **EPT TAXA RICHNESS = 13**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = FAIR-GOOD**

TAXA			NUMBER	PERCENT
AMPHIPODA				7.3
	Gammaridae		41	
COLEOPTERA				7.7
	Elmidae	*Optioservus* larvae,adults	20	
		Stenelmis larvae,adults	12	
	Psephenidae	*Psephenus herricki*	11	
DIPTERA				2.5
	Chironomidae		9	
	Tabanidae	*Tabanus*	2	
	Tipuliidae	*Antocha*	1	
		Pedicia	1	
		Tipula	1	
EPHEMEROPTERA				7
	Baetidae	*Baetis*	4	
	Heptageniidae	*Stenacron*	12	
		Stenonema	9	
	Leptophlebiidae	*Habrophlebiodes*	1	
	Oligoneuriidae	*Isonychia*	13	
GASTROPODA				21.6
	Physidae	*Physa*	1	
	Pleuroceridae		120	
HEMIPTERA				3
	Gerridae	*Gerris remigis*	6	
	Veliidae	*Rhagovelia obesa*	11	
ISOPODA				1.2
	Asellidae	*Lirceus*	7	
MEGALOPTERA				1.4
	Corydalidae	*Corydalus cornutus*	2	
		Nigronia serricornis	4	
	Sialidae	*Sialis*	2	
ODONATA				5.7
	Aeshnidae	*Basiaeshna janata*	2	
		Boyeria vinosa	1	
	Calopterygidae	*Calopteryx*	2	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Corduliidae early instar		1	
	Gomphidae	*Gomphus* early instar	15	
		Gomphus lividus	5	
		Hagenius brevistylus	5	
PELECYPODA				0.9
	Corbiculidae	*Corbicula fluminea*	5	
PLECOPTERA				6.2
	Capniidae		1	
	Perlidae	*Perlesta*	34	
TRICHOPTERA				35.3
	Hydropsychidae	*Cheumatopsyche*	71	
		Hydropsyche betteni/depravata	56	
	Limnephilidae	*Goera calcarata*	1	
		Pycnopsyche	12	
	Philopotamidae	*Chimara*	12	
	Uenoidae	*Neophylax*	46	
		TOTAL	**560**	

White Creek

One IBI fishery survey was conducted on White Creek in June 1995:

Location and Length - Tributary to the Clinch River. The sample area encompassed the old TVA gaging station below the first road crossing on White Creek Road, Chuck Swan WMA. Sampling was conducted upstream and downstream of the gaging station. The sample area was approximately 1,000 ft in length and was sampled on 6 June1995.

Sampling Methodology - This site was sampled with a 10 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

A total of 290 fish representing five species was collected in our survey. One game fish, rainbow trout (*Oncorhynchus mykiss*) was collected in our sample. Forty-five rainbow trout ranging from 1 to 15 inches (see Fig. 1 for length frequency distribution) was collected in our sample. Approximately 300 six inch rainbow trout were originally stocked into this stream in 1951 by the Tennessee Game and Fish Commission. This stream remained on the stocking list and was stocked sporadically up through the early 1990's. Apparently, the rainbow trout have been able to successfully spawn as we collected 41 Young-of-the-Year (YOY) trout. Although reproduction is apparently possible, recruitment of trout to larger size classes appears to be relatively unsuccessful based on our catch of four adult fish. Worth noting however, was the collection of one adult male rainbow trout measuring 15 inches. Scale samples were taken from this fish and the age was later determined to be 5+ years. This represents the oldest scale aged rainbow trout ever collected to date in the wild including those aged as part of the UT Wild Trout Project (Jim Habera, personal communication). Other species collected in our sample included banded sculpin (*Cottus carolinae*), central stoneroller (*Campostoma anomalum*), blacknose dace (*Rhinichthys atratulus*), and snubnose darter (*Etheostoma simoterum*). The two most abundant species in our sample were banded sculpin and blacknose dace. Together these two species comprised 81.3% of the total number of fish collected. The water quality of this stream appeared to be excellent, which was not surprising given the majority of the flow is contributed by springs. This could explain the relatively low species diversity and the ability of the trout to survive and reproduce in this low elevation stream.

Our Index of Biotic Integrity analysis indicated that this stream was in "poor" condition based on an IBI score of 34. This evaluation probably does not reflect the true water quality conditions of this stream. The fact that this is a spring creek would typically

lower the species diversity than what would be expected in other streams. Therefore, the IBI analysis of this stream is misleading and does not accurately reflect the quality of this stream. These findings indicate that we should not use this technique in spring creek habitats where species diversity is being regulated by factors other than environmental degradation. Furthermore, it does encourage the development of "coldwater" IBI scoring criteria similar to those recently described by Lyons et al. (1996) for Wisconsin coldwater streams.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Capniidae, Peltoperlidae, Perlidae, and Perlodidae stoneflies; Glossosomatidae, Hydropsychidae, Leptoceridae, Lepidostomatidae, Limnephilidae, Molannidae, Philopotamidae, Rhyacophilidae, and Uenoidae caddisflies. Amphipods were the most abundant organisms in our survey, comprising 31.3% of the total sample. Trichopterans were second most abundant with 22.5%. Ephemeropterans and gastropods were the next most abundant groups, contributing 13.6% and 9.3%, respectively. Plecopterans only accounted for 7.7% of the total sample. A total of 50 taxa was collected from this site of which 25 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of White Creek was assigned a bioclassification of "good".

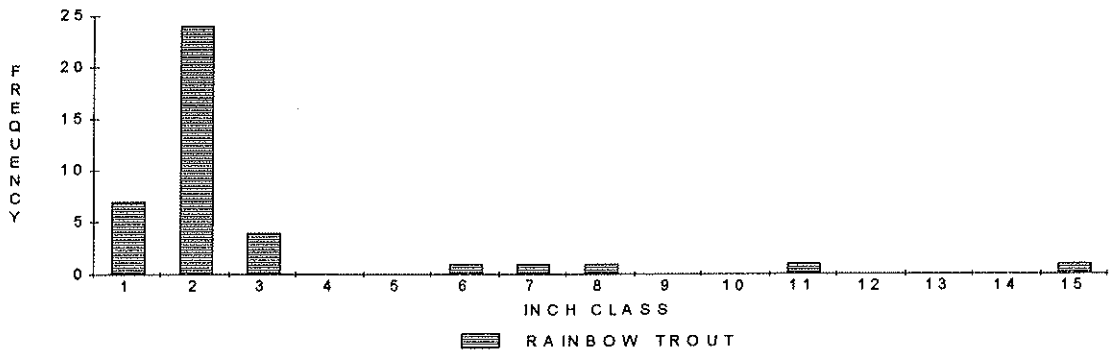
Our habitat analysis of this site indicated that this portion of White Creek could be classified as "sub-optimal" based on the mean habitat index score of 159. This stream is typical of spring fed streams in species diversity and water quality characteristics. The physical habitat appeared to be adequate to sustain viable populations although the amount of habitat for adult rainbow trout seemed to be lacking.

Management Recommendations:

1. Since this stream falls within the boundaries of Chuck Swan Wildlife Management Area best management practices are being used within the watershed.

2. The occurrence of *Ceratopsyche etnieri* is of special interest, as this is the first record from this county and the second from the Clinch River system. Further collections of this stream should be made in order to determine relative abundance of this species. Distributional trends of this species are currently being researched by the University of Tennessee.

Figure 1. LENGTH FREQUENCY DISTRIBUTION FOR RAINBOW TROUT COLLECTED IN WHITE CREEK DURING 1995



PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	WHITE CREEK
WATERSHED	CLINCH RIVER
SITE	@ GAGING STATION
COUNTY	UNION
QUADRANGLE	WHITE HOLLOW 145 SW
LAT-LONG	362050N-835345W
REACH	06010205-170.0
LENGTH	~ 1000 FT
AREA (SQ. MI.)	3.01
ELEVATION	1100 FT
DATE	6-6-95
TIME	0947

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
17.4	0.4	N/A

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	5	40	35	10	5

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	40	50	5	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
20 %	40 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 2.1 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY; AIR TEMP. 77 F @ 0958

10. PAST WEATHER (last 24 hrs)

SCATTERED T-STORMS; MILD

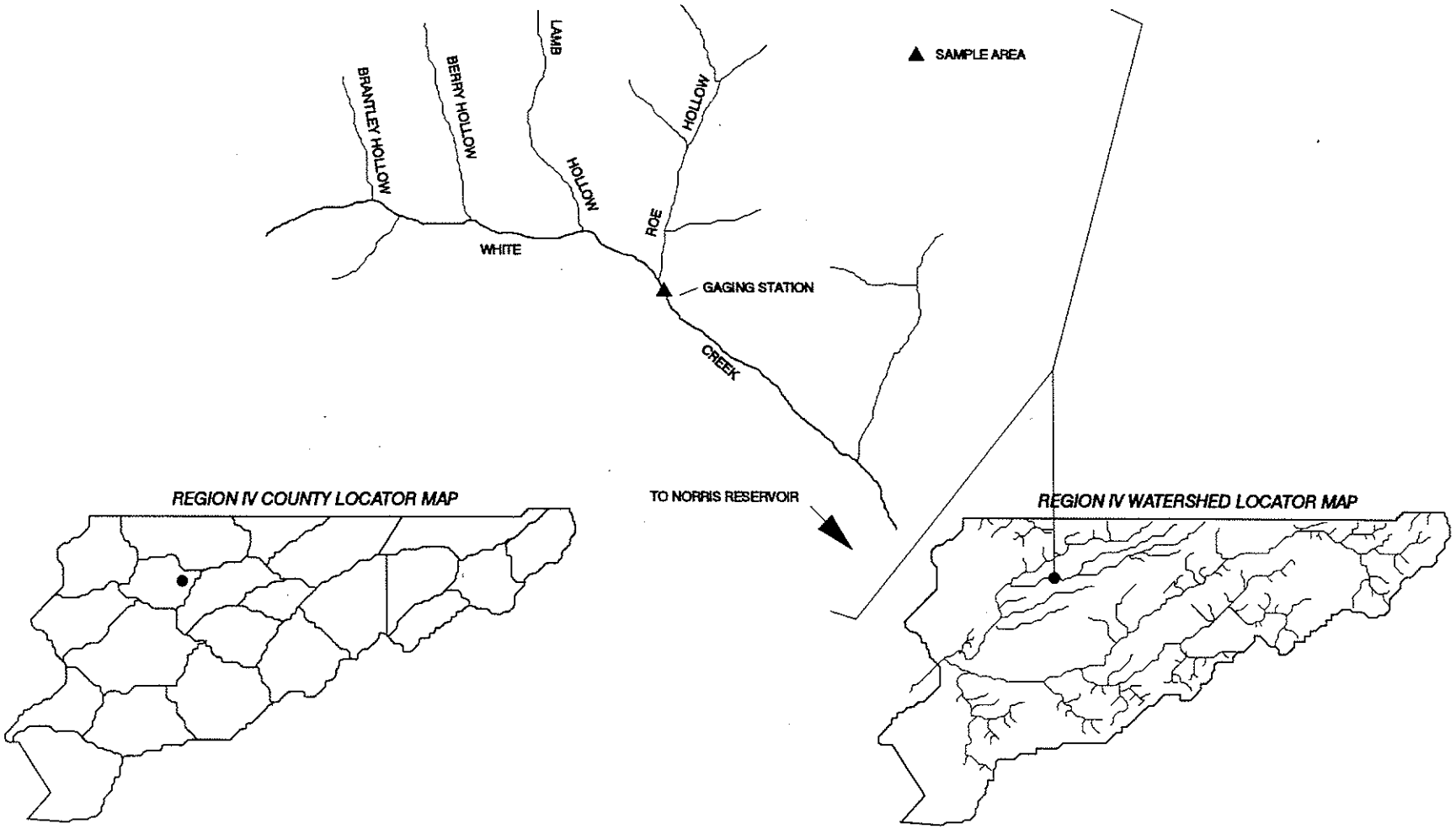
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	57 F	205	9.8	96.0

12. COMMENTS

WATER CLARITY EXCELLENT. HIGH DENSITY OF PERIWINKLE SNAILS. SOME BANK EROSION BELOW WEIR DAM.

13. HABITAT ASSESSMENT SCORE 159



WHITE CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Campostoma anomalum	45	7			
Cottus carolinae	322	76			
Etheostoma simoterum	435	2			
Oncorhynchus mykiss	279	45	1-15	2.9	
Rhinichthys atratulus	184	160			
	SUM:	290			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<3	3-6	>6	10	4	3	
NUMBER OF RIFFLE SP.	<2	2	>2	4	2	3	
NUMBER OF POOL SP.	<2	2-4	>4	7	0	1	
% DOMINANCE (COMBINED % OF TWO MOST DOMINANT SP.)	>85	85-72	<72		96.3	1	
NUMBER OF INTOLERANT HEADWATER SP.	<2	2	>2	4	0	1	
PERCENT OF INDIVIDUALS AS TOLERANT	>38	38-19	<19		0	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>50	50-25	<25		2.8	5	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<9	9-18	>18		0.8	1	
PERCENT OF INDIVIDUALS AS PISCIVORES	0	Tr	>1		0	1	
CATCH RATE	<30	30-60	>60		33.2	3	
PERCENT OF INDIVIDUALS AS SIMPLE LITHOPHILIC SPAWNERS	<25	25-50	>50		66.1	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5	
						34	**POOR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

WHITE CREEK BENTHIC DATA **TAXA RICHNESS = 50**
FIELD COLLECTION # 670 **EPT TAXA RICHNESS =25**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

TAXA			NUMBER	PERCENT
AMPHIPODA				31.3
	Gammaridae	*Gammarus*	145	
ANNELIDA				0.2
	Oligochaeta		1	
COLEOPTERA				6
	Dryopidae	*Helichus* adults	1	
	Elmidae	*Optioservus* larvae	4	
		Optioservus ampliatus adults	8	
		Oulimnius latiusculus	2	
		Stenelmis	3	
	Eubriidae	*Ectopria* larvae	4	
	Psephenidae	*Psephenus herricki* larvae	5	
	Ptilodachtylidae	*Anchytarsus bicolor*	1	
DIPTERA				1.9
	Blephariceridae	*Blepharicera* larvae, pupa	2	
	Simuliidae	*Simulium*	1	
	Tipulidae	*Hexatoma*	2	
		Tipula	4	
EPHEMEROPTERA				13.6
	Baetidae	*Baetis*	3	
	Ephemerellidae	*Ephemerella*	1	
		Eurylophella funeralis	2	
		Eurylophella minemella	1	
	Ephemeridae	*Ephemera*	12	
	Heptageniidae	*Epeorus rubidus/subpallidus*	5	
		Stenonema prob. *ithaca*	4	
		Stenonema	18	
	Oligoneuriidae	*Isonychia*	17	
GASTROPODA				9.3
	Pleuroceridae		43	
HEMIPTERA				4.7
	Corixidae	*Sigara*	5	
	Gerridae	*Gerris remigis* adult	1	
		Gerris nymphs	4	
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa	11	
ISOPODA				0.4
	Asellidae	*Lirceus*	2	
MEGALOPTERA				0.2
	Sialidae	*Sialis*	1	
ODONATA				1.7
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx maculata/dimidiata*	2	
	Cordulegastridae	*Cordulegaster maculata*	2	
	Gomphidae	*Lanthus vernalis*	2	
		Stylogomphus albistylus	1	
PLECOPTERA				7.7
	Capniidae		12	
	Peltoperlidae	*Peltoperla*	14	
	Perlidae	*Agnetina sp.*	4	
	Perlodidae	*Isoperla holochlora*	6	
TRICHOPTERA				22.5
	Glossosomatidae	*Glossosoma*	4	
	Hydropsychidae	*Cheumatopsyche*	3	
		Ceratopsyche etnieri	1	
		C. sparna	1	
		Diplectrona modesta	70	
	Leptoceridae	*Triaenodes*	1	
	Lepidostomatidae	*Lepidostoma*	6	
	Limnephilidae	*Pycnopsyche lucalenta* group	9	
		Pycnopsyche scabripennis group	1	
	Molannidae	*Molanna blenda*	1	
	Philopotamidae	*Dolophilodes distinctus*	1	
	Rhyacophilidae	*Rhyacophila fuscula*	1	
	Uenoidae	*Neophylax auris/etnieri*	5	
		TOTAL	**462**	

Little Sycamore Creek

One IBI fishery survey was conducted on Little Sycamore Creek in June 1995:

Location and Length - Tributary to Sycamore Creek (Clinch River). The sample area was located at Hurst Mill approximately 0.2 mi downstream of the mill dam. The sample area was approximately 1,000 ft in length and was sampled on 7 June 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 100 VAC.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 322 fish representing 17 species was collected in our survey. Two game fish and two non-game fish were collected. These included one rock bass (*Ambloplites rupestris*), one bluegill (*Lepomis macrochirus*), two northern hogsuckers (*Hypentelium nigricans*), and five white suckers (*Catostomus commersoni*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and banded sculpin (*Cottus carolinae*). Together these two species comprised 65.5% of the total number of fish collected. An additional qualitative survey upstream from our IBI sample (362752N-832919W, area upstream of Surber Rd.) revealed similar species composition as our lower sample, however the relative abundance of rock bass was somewhat higher at this site. The only species collected at this site that was not observed at the lower site was the common carp (*Cyprinus carpio*).

Our Index of Biotic Integrity analysis indicated that this stream was in "fair" condition based on the fish community present. The derivation of this score was primarily contributed to the overall high percentage of omnivores, the low percentage of top carnivores, and the relatively low catch rate. The area we surveyed appeared to have suitable habitat for game fish, although only two species was collected (rock bass and bluegill).

Benthic macroinvertebrates from our sample included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies, Capniidae/Leuctridae and Perlidae stoneflies, Glossosomatidae, Hydropsychidae,

Leptoceridae, Philopotamidae, Polycentropodidae, Rhyacophilidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 39.7% of the total sample. Ephemeropterans were second most abundant with 19.9%. Plecopterans accounted for 0.9%, while coleopterans and dipterans contributed 8% and 4.7% , respectively. Physidae and Pleuroceridae snails were also collected. A total of 57 taxa was collected from this site of which 27 were EPT taxa. Of special interest was the collection of the maylfy *Brachycercus*. Although the fish community appeared to be depressed the benthic community appeared to be in good condition. Based on the benthic community present, a bioclassifcation of "good to excellent" was assigned to this reach of stream. Based on the fish and benthic community evaluations there appears to be some limiting factors for the fish that are not negatively influencing the benthic community.

Overall the physical habitat in the stream and the condition of the riparian zone appeared to be good. Our visual evaluation of the overall habitat quality in the survey reach was determined to be in the sub-optimal category although the score of 158 was approaching the optimal category.

Management Recommendations:

1. Consider stocking smallmouth bass into this stream as it appears to be suitable for this species.

2. Any action that could address non-point source pollution would be of benefit to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE SYCAMORE CREEK
WATERSHED	CLINCH RIVER
SITE	@ HURST MILL
COUNTY	CLAIBORNE
QUADRANGLE	TAZWELL 154 NE
LAT-LONG	362551N-833124W
REACH	06010205-62.0
LENGTH	~ 1000 FT
AREA (SQ. MI.)	12.1
ELEVATION	1070 FT
DATE	6-7-95
TIME	0902

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
20.4	0.5	2.4

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	10	10	30	35	

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	15	20	30	30	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
40 %	40 %	20 %

7. SHADE OR CANOPY COVER GOOD OVER 85 %

8. FLOW (CFS) 14.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY AND MILD; AIR TEMP. 68 F @ 0906

10. PAST WEATHER (last 24 hrs)

SCATTERED T-STORMS; HOT AND HUMID

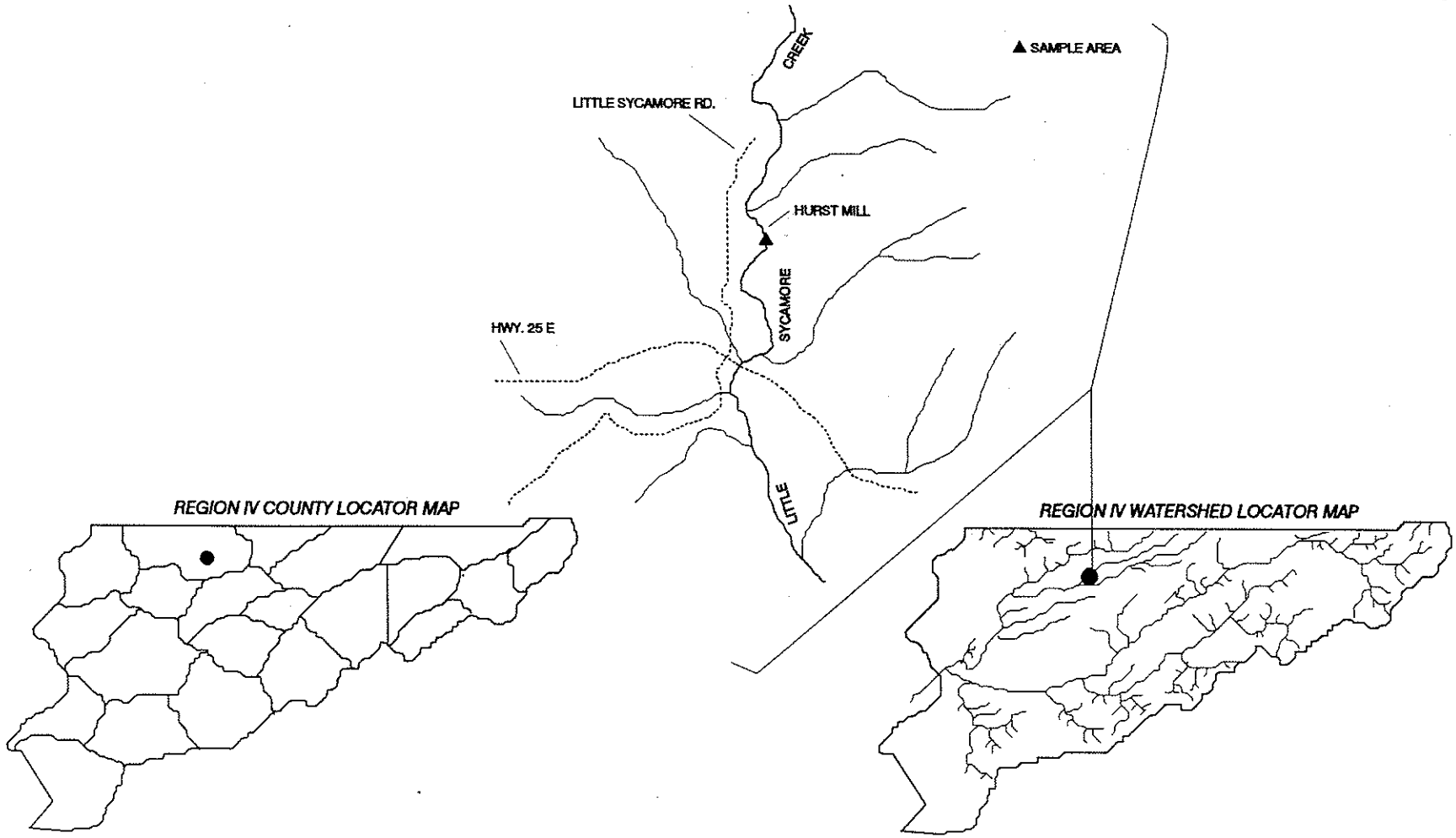
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	66 F	295	9.8	105

12. COMMENTS

STATION BEGAN @ HURST MILL ~ 0.2 MI. DOWNSTREAM OF DAM. SOME RESIDENTIAL REFUSE IN AND ALONG STREAM.

13. X HABITAT ASSESSMENT SCORE 158



LITTLE SYCAMORE CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	1	5	0.1	
Campostoma anomalum	45	144			
Catostomus commersoni	195	5			
Cottus carolinae	322	67			
Etheostoma caeruleum	401	4			
Etheostoma flabellare	411	9			
Etheostoma ruflineatum	431	11			
Etheostoma simoterum	435	30			
Hybopsis amblops	79	3			
Hypentelium nigricans	207	2			
Lepomis macrochirus	351	1	5	0.1	
Luxilus chrysocephalus	89	5			
Notropis sp. (sawfin shiner)	144	1			
Percina caprodes	464	1			
Pimephales notatus	176	6			
Rhinichthys atratulus	184	30			
Semotilus atromaculatus	188	2			
		SUM: 322			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<7	7-14	>14	23	17	5
NUMBER OF DARTER SP.	<2	2-3	>3	6	5	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2	>2	4	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>34	34-17	<17		3.7	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>43	43-22	<22		49.6	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<14	14-28	>28		18.3	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		0.3	1
CATCH RATE	<27	27-55	>55		19.9	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.6	5
						40 **FAIR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

LITTLE SYCAMORE CREEK BENTHIC DATA **TAXA RICHNESS = 57**
FIELD COLLECTION # 671 **EPT TAXA RICHNESS = 27**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD-EXCELLENT**

TAXA			NUMBER	PERCENT
ANNELIDA				0.2
	Oligochaeta		1	
COLEOPTERA				8
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Dubiraphia* larva,adults	5	
		Macronychus glabratus adults	3	
		Optioservus larva,adults	12	
		Promoresia adult	1	
		Stenelmis larva, adults	5	
	Psephenidae	*Psephenus herricki*	15	
DIPTERA				4.7
	Athericidae	*Atherix lantha*	4	
	Chironomidae		15	
	Simuliidae		1	
	Tipuliidae	*Antocha*	3	
		Hexatoma	2	
EPHEMEROPTERA				19.9
	Baetidae	*Baetis*	25	
	Caenidae	*Brachycercus*	1	
		Caenis	2	
	Ephemerellidae	*Ephemerella*	3	
		Eurylophella	7	
	Ephemeridae	*Ephemera*	5	
		Hexagenia	2	
	Heptageniidae	*Epeorus*	20	
		Heptagenia	3	
		Stenonema	22	
	Leptophlebiidae	*Habrophlebiodes*	2	
	Oligoneuriidae	*Isonychia*	13	
GASTROPODA				5.7
	Physidae	*Physa*	2	
	Pleuroceridae	sp. # 1 (form elongated)	4	
		sp. # 2 (form broad and short)	24	
HEMIPTERA				0.6
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa	2	
ISOPODA				9.3
	Asellidae	*Lirceus*	49	
MEGALOPTERA				2.8
	Corydalidae	*Corydalus cornutus*	5	
		Nigronia serricornis	10	
ODONATA				7.8
	Aeshnidae	*Basiaeshna janata*	1	
		Boyeria vinosa	2	
	Calopterigidae	*Calopteryx*	5	
	Coenagrionidae	*Argia*	9	
		Enallagma	3	
	Gomphidae	*Hagenius brevistylus*	3	
		Gomphus early instar	7	
		Gomphus (genus A) *consaguis*	3	
		G. lividus	8	
PELECYPODA				0.4
	Sphaeriidae	*Sphaerium*	2	
PLECOPTERA				0.9
	Capniidae/Leuctridae		1	
	Perlidae	*Neoperla*	1	
		Paragnetina media	2	
		Perlesta	1	
TRICHOPTERA				39.7
	Glossosomatidae	*Glossosoma* pupa	1	
	Hydropsychidae	*Ceratopsyche bronta*	19	
		C. sparna	117	
		Cheumatopsyche	3	
		Hydropsyche betteni/depravata	13	
	Leptoceridae	*Triaenodes*	9	
	Philopotamidae	*Chimara*	27	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhyacophila sp. carolina* group	1	
		Rhyacophila fuscula	4	
	Uenoidae	*Neophylax*	14	
		TOTAL	**527**	

Big War Creek

One IBI fishery survey was conducted on Big War Creek in August 1995:

Location and Length - Tributary to the Clinch River. The sample area was located at the bridge crossing on Paw Paw Road. The sample area extended downstream and upstream from the bridge crossing and was approximately 1,500 ft in length. The site was sampled on 15 August 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream, develop a fish species diversity list for TADS, and to collect otoliths from smallmouth bass and rock bass for age and growth analysis. The Agency did conduct a qualitative survey of this stream at this same locality in 1990 (Bivens and Williams 1991).

A total of 569 fish representing 23 species was collected in our survey. Five game fish and two non-game fish were collected. These included 41 rock bass (*Ambloplites rupestris*) ranging from 1-9 inches, 13 smallmouth bass (*Micropterus dolomieu*) ranging from 1-12 inches (see Fig. 2 for length frequency distributions), four redbreast sunfish (*Lepomis auritus)*, one green sunfish (*L. cyanellus*), one longear sunfish (*L. megalotis*), 12 northern hogsuckers (*Hypentelium nigricans*), and five black redhorse (*Moxostoma duquesnei*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and Tennessee shiner (*Notropis leuciodus*). Together these two species comprised 42.5% of the total number of fish collected. Our survey in 1995 compares quite well with the survey conducted in 1990. We collected a total of 23 species in 1995, while a total of 27 species was collected in 1990. Species collected in 1990 but not in 1995 included largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), bluntnose minnow (*Pimephales notatus*), creek chub (*Semotilus atromaculatus*), wounded darter (*Etheostoma vulneratum*), and banded darter (*Etheostoma zonale*). Two species collected in 1995 that were not found in 1990 were the sawfin shiner (*Notropis sp.*) and green sunfish (*Lepomis cyanellus*).

Our Index of Biotic Integrity analysis indicated that this stream was in "good" condition based on an IBI score of 50. The relatively high percentage of omnivorous species in the community had the greatest negative influence on the overall score. Overall this stream was one of the "better" ones sampled during 1995.

Benthic macroinvertebrates from our sample included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, Oligoneuriidae, and Tricorythodes mayflies; Perlidae stoneflies; Hydropsychidae, Leptoceridae, Philopotamidae, Polycentropodidae, and Uenoidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 34.8% of the total sample. Coleopterans were second most abundant with 24.6%. Trichopterns and plecopterans accounted for 14.0% and 0.2% , respectively. Pleuroceridae snails and the Asian clam *Corbuicula fluminea* were also collected. A total of 57 taxa was collected from this site of which 22 were EPT taxa. Based on the benthic community present, a bioclassifcation of "good" was assigned to this reach of stream.

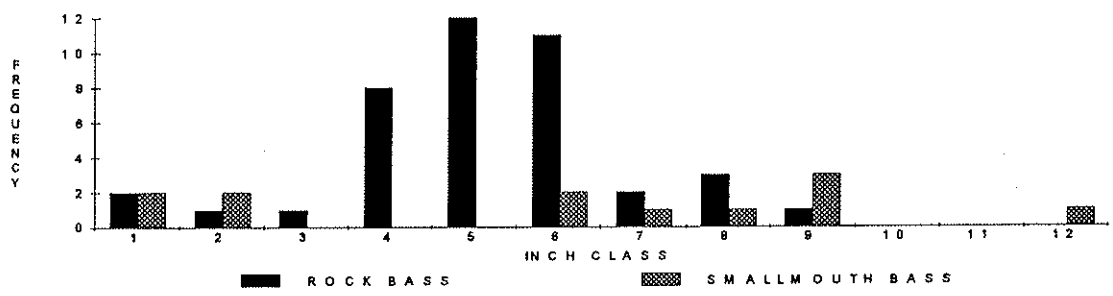
Overall the physical habitat in the stream and the condition of the riparian zone appeared to be in good condition. Our visual evaluation of the overall habitat quality in the survey reach was determined to be in the sub-optimal category based on a mean index score of 152.

Management Recommendations:

1. Consider conducting a three pass depletion survey on this stream in order to collect more quantitative information on the sport fishery.

2. Any action that would address protection of the riparian zone and non-point source pollution would be of benefit.

Figure 2. LENGTH FREQUENCY DISTRIBTUIONS FOR ROCK BASS AND SMALLMOUTH BASS COLLECTED IN BIG WAR CREEK DURING 1995



PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BIG WAR CREEK
WATERSHED	CLINCH RIVER
SITE	PAW PAW RD. BRIDGE
COUNTY	HANCOCK
QUADRANGLE	SWAN ISLAND 162 NE
LAT-LONG	362534N-832052W
REACH	06010205-14.0
LENGTH	~ 1500 FT
AREA (SQ. MI.)	41.6
ELEVATION	1105 FT
DATE	8-15-95
TIME	0900

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
29.2	1.3	3.9

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	15	20	10	20

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	5	20	30	20	15

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
40 %	40 %	20 %

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 7.5 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 82 F @ 1023

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

11. WATER QUALITY

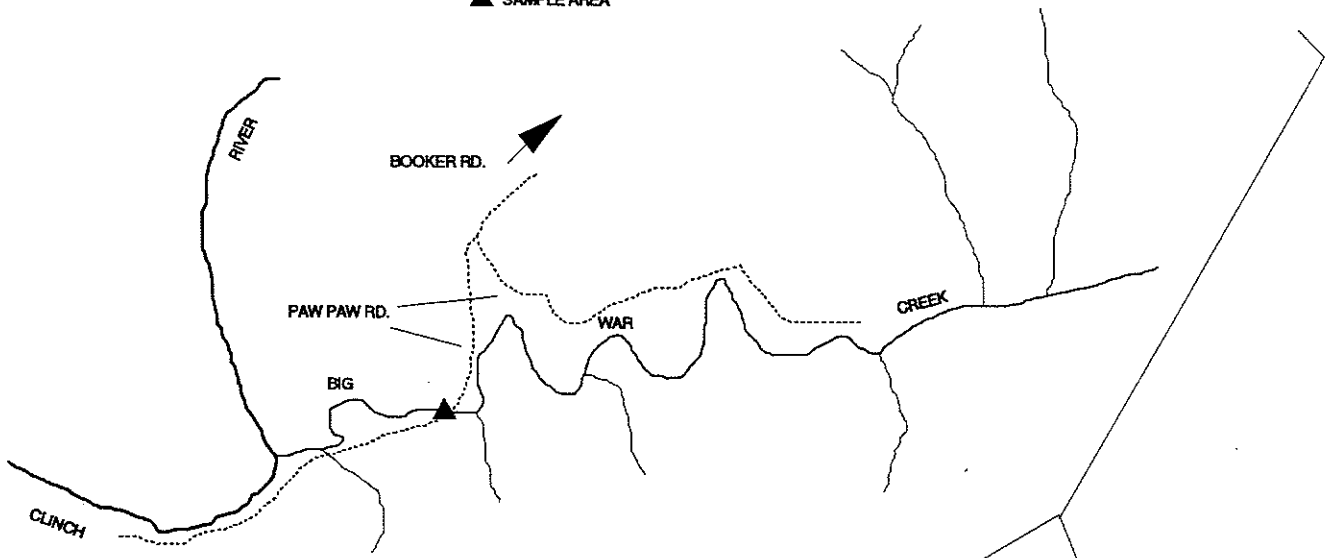
pH	TEMP	COND.	D.O.	% SAT.
7.0	76 F	360	7.7	91.1

12. COMMENTS

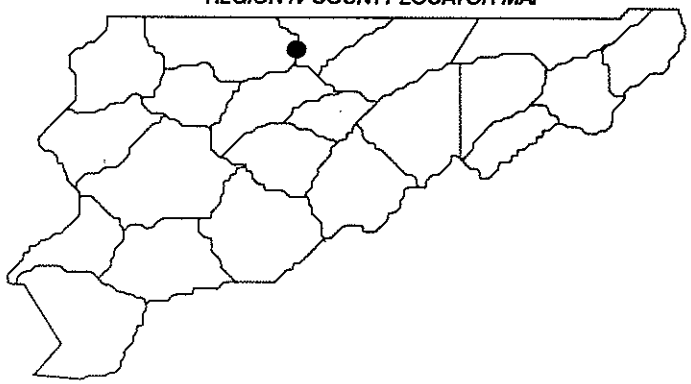
COLLECTED BENTHOS FOR 3 PERSON HOURS. EXTRACTED OTOLITHS FROM ROCKBASS AND SMALLMOUTH BASS.

13. X HABITAT ASSESSMENT SCORE 152

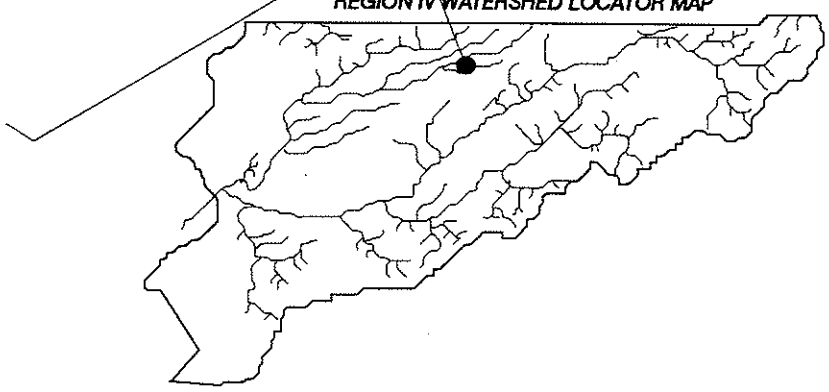
▲ SAMPLE AREA



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



BIG WAR CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	41	1-9	6.3	ONLY 37 INCLUDED IN IB
Campostoma anomalum	45	148			
Cottus carolinae	322	9			
Cyprinella galactura	54	1			
Etheostoma blennioides	398	9			
Etheostoma flabellare	411	1			
Etheostoma ruflineatum	431	24			
Etheostoma simoterum	435	10			
Hybopsis amblops	79	14			
Hypentelium nigricans	207	12			
Lepomis auritus	346	4	N/A	N/A	
Lepomis cyanellus	347	1	N/A	N/A	
Lepomis megalotis	353	1	N/A	N/A	
Luxilus chrysocephalus	89	30			
Luxilus coccogenis	90	41			
Micropterus dolomieu	362	13	1-12	3.2	ONLY 9 INCLUDED IN IBI
Moxostoma duquesnei	224	5			
Nocomis micropogon	110	22			
Notropis leuciodus	128	93			
Notropis sp. (sawfin shiner)	144	2			
Notropis telescopus	138	78			
Percina caprodes	464	3			
Phenacobius uranops	159	7			
	SUM:	569			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<11	11-22	>22	35	22	3	
NUMBER OF DARTER SP.	<2	2-4	>4	7	5	5	
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	6	3	3	
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3	
NUMBER OF INTOLERANT SP.	<2	2-3	>3	5	4	5	
PERCENT OF INDIVIDUALS AS TOLERANT	>28	28-14	<14		5.5	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>35	35-17	<17		35.9	1	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<20	20-41	>41		50.6	5	
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		8.2	5	
CATCH RATE	<20	20-40	>40		28.7	5	
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.8	5	
						50	**GOOD**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

BIG WAR CREEK BENTHIC DATA **TAXA RICHNESS = 57**
FIELD COLLECTION # 706 **EPT TAXA RICHNESS = 22**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

TAXA			NUMBER	PERCENT
COLEOPTERA				24.6
	Dryopidae	*Helichus* adults	4	
	Elmidae	*Dubiraphia* larvae, adults	3	
		Macronychus glabratus	3	
		Microcylloepus pusillus	1	
		Optioservus ovalis	1	
		Optioservus trivitatus adults	9	
		Promoresia adult	1	
		Stenelmis larvae, adults	74	
	Eubriidae	*Ectopria* larvae	3	
	Gyrinidae	*Dineutus* adult	1	
	Psephenidae	*Psephenus herricki* larvae	11	
DIPTERA				5.1
	Athericidae	*Atherix lantha*	17	
	Chironomidae		3	
	Simuliidae		2	
	Tabanidae	*Chrysops*	1	
EPHEMEROPTERA				34.8
	Baetidae	*Baetis*	15	
	Caenidae	*Caenis*	1	
	Ephemerellidae	*Ephemerella*	1	
		Serratella	6	
	Ephemeridae	*Ephemera*	1	
		Hexagenia	1	
	Heptagenlidae	*Heptagenia*	8	
		Stenacron interpunctatum	7	
		Stenonema early instars	58	
		Stenonema mediopunctatum	2	
		S. prob. modestum	4	
		S. prob. pulchellum	1	
	Oligoneuriidae	*Isonychia*	50	
	Tricorythidae	*Tricorythodes*	2	
GASTROPODA				5.5
	Pleuroceridae		25	
HEMIPTERA				2.9
	Gerridae	*Gerris conformis*	1	
		Metrobates herperius	1	
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa	10	
ISOPODA				0.4
	Asellidae	*Lirceus*	2	
MEGALOPTERA				4.9
	Corydalidae	*Corydalus cornutus*	10	
		Nigronia serricornis	12	
ODONATA				6.4
	Aeshnidae	*Basiaeshna janata*	5	
		Boyeria vinosa	7	
	Calopterygidae	*Calopteryx*	1	
	Coenagrionidae	*Argia*	1	
	Corduliidae	*Neurocordulia*	1	
	Gomphidae	*Dromogomphus spinosus*	1	
		Gomphus consanguis	2	
		G. lividus	5	
		Hagenius brevistylus	2	
	Macromiidae	*Macromia*	4	
PELECYPODA				1.1
	Corbiculidae	*Corbicula fluminea*	3	
	Sphaeriidae	*Sphaerium*	2	
PLECOPTERA				0.2
	Perlidae	*Paragnetina media*	1	
TRICHOPTERA				14
	Hydropsychidae	*Ceratopsyche cheilonis*	7	
		Cheumatopsyche	18	
		Hydropsyche betteni/depravata	13	
		H. frisoni	2	
	Leptoceridae	*Triaenodes*	4	
	Philopotamidae	*Chimara*	16	
	Polycentropodidae	*Polycentropus*	2	
	Uenoidae	*Neophylax auris/etnieri*	1	
		TOTAL	**451**	

North Fork Clinch River

One IBI fishery survey was conducted on North Fork Clinch River in August 1995:

Location and Length - Tributary to the Clinch River. The sample area was located at Manis Ford off of Manis Circle Road. Sampling was conducted upstream and downstream of the ford. The sample area was approximately 1,200 ft in length and was sampled on 4 August 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to document any changes from the 1991 sample conducted here by Bivens et al. (1992). The headwaters of this stream are located in Virginia and flow southwest into Tennessee where it joins the Clinch River at mile 192.0.

A total of 515 fish representing 32 species was collected in our survey. Six game fish and four non-game fish species were collected. These included 33 rock bass (*Ambloplites rupestris*) (28 sacrificed for otoliths, see Fig. 3 for length frequency distribution), 11 redbreast sunfish (*Lepomis auritus*), two bluegill (*L. macrochirus*), 19 longear sunfish (*L. megalotis*), five smallmouth bass (*Micropterus dolomieu*) (all sacrificed for otoliths, see Fig 3 for length frequency distribution), six spotted bass (*M. punctulatus)* (all sacrificed for otoliths, see Fig. 3 for length frequency distribution), 18 northern hogsuckers (*Hypentelium nigricans*), one longnose gar (*Lepisosteus osseus*), three black redhorse (*Moxostoma duquesnei*), and five golden redhorse (*M. erythrurum*) . The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocephalus*). Together these two species comprised 37.6% of the total number of fish collected. Species richness comparisons between the 1991 sample and the 1995 sample indicated that the number of species in the community had not changed from the 1991 sample. However, the species composition of the community had changed considerably. A total of eight species were encountered in 1991 that were not observed in our 1995 survey. These included yellow bullhead (*Ameiurus natalis*), channel catfish (*Ictalurus punctatus*), mountain madtom (*Noturus eletherus*), mountain shiner (*Lythrurus lirus*), bluntnose minnow (*Pimephales notatus*), fantail darter (*Etheostoma flabellare*) blueside darter (*E. jessiae*) sawfin shiner (*Notropis sp. cf. N. spectrunculus*), and tangerine darter (*Percina aurantiaca*). Three of these species are considered to be intolerant , which raises some concern over the changes in this stream between 1991 and 1995. Our observations indicated that there was some

increases in the amount of fine sediment in the substrate and an overall higher degree of turbidity.

Our Index of Biotic Integrity analysis indicated that this stream was in "fair to good" condition based on an IBI score of 46. The strongest negative influences on the overall score were the relatively high percentage of trophic generalists, and the overall high percentage of anomalies among the fish (predominantly blackspot).

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Brachycentridae, Hydropsychidae, Leptoceridae, and Polycentropodidae caddisflies. No stoneflies were collected in the sample. Ephemeropterans were the most abundant organisms in our survey, comprising 26.2% of the total sample. Trichopterans were second most abundant with 24.5%. Gastropods and odonates were the next most abundant groups, contributing 14.9% and 14.4%, respectively. A total of 49 taxa was collected from this site of which 15 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of North Fork Clinch River was assigned a bioclassification of "good". Overall there was an increase in the number of taxa collected when compared to the 1991 survey (49 vs. 45), however, the EPT taxa richness did decline by one (16 vs. 17).

Our physical habitat evaluation of this portion of the stream indicated that it could be categorized a sub-optimal based on a average index score of 147. There was some concern over the increases in sediment since this stream was surveyed in 1991. However, there did appear to be adequate habitat available to maintain viable populations.

Management Recommendations:

1. Any actions that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

2. Consider conducting a three-pass depletion survey in order to gather more quantitative data on the sport fishery.

Figure 3. LENGTH FREQUENCY DISTRIBTUIONS FOR ROCK BASS, SMALLMOUTH BASS, AND SPOTTED BASS COLLECTED IN NORTH FORK CLINCH RIVER DURING 1995

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	N. FORK CLINCH RIVER
WATERSHED	CLINCH RIVER
SITE	@ MANIS FORD
COUNTY	HANCOCK
QUADRANGLE	LOONYS GAP 179 SE
LAT-LONG	363523N-835947W
REACH	06010205-56.0
LENGTH	~ 1200 FT
AREA (SQ. MI.)	61.7
ELEVATION	1140 FT
DATE	8-4-95
TIME	0846

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER,
C.E. WILLIAMS AND J. McAFEE

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
30.0	1.1	2.9

2. ESTIMATED % OF STREAM IN POOLS IS 60

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	25	20	10	10

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	10	60	10	5	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
40 %	30 %	30 %

7. SHADE OR CANOPY COVER GOOD OVER 85 %

8. FLOW (CFS) 12.0 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY AND HUMID; AIR TEMP. 73F @ 0849

10. PAST WEATHER (last 24 hrs)

SUNNY AND HOT

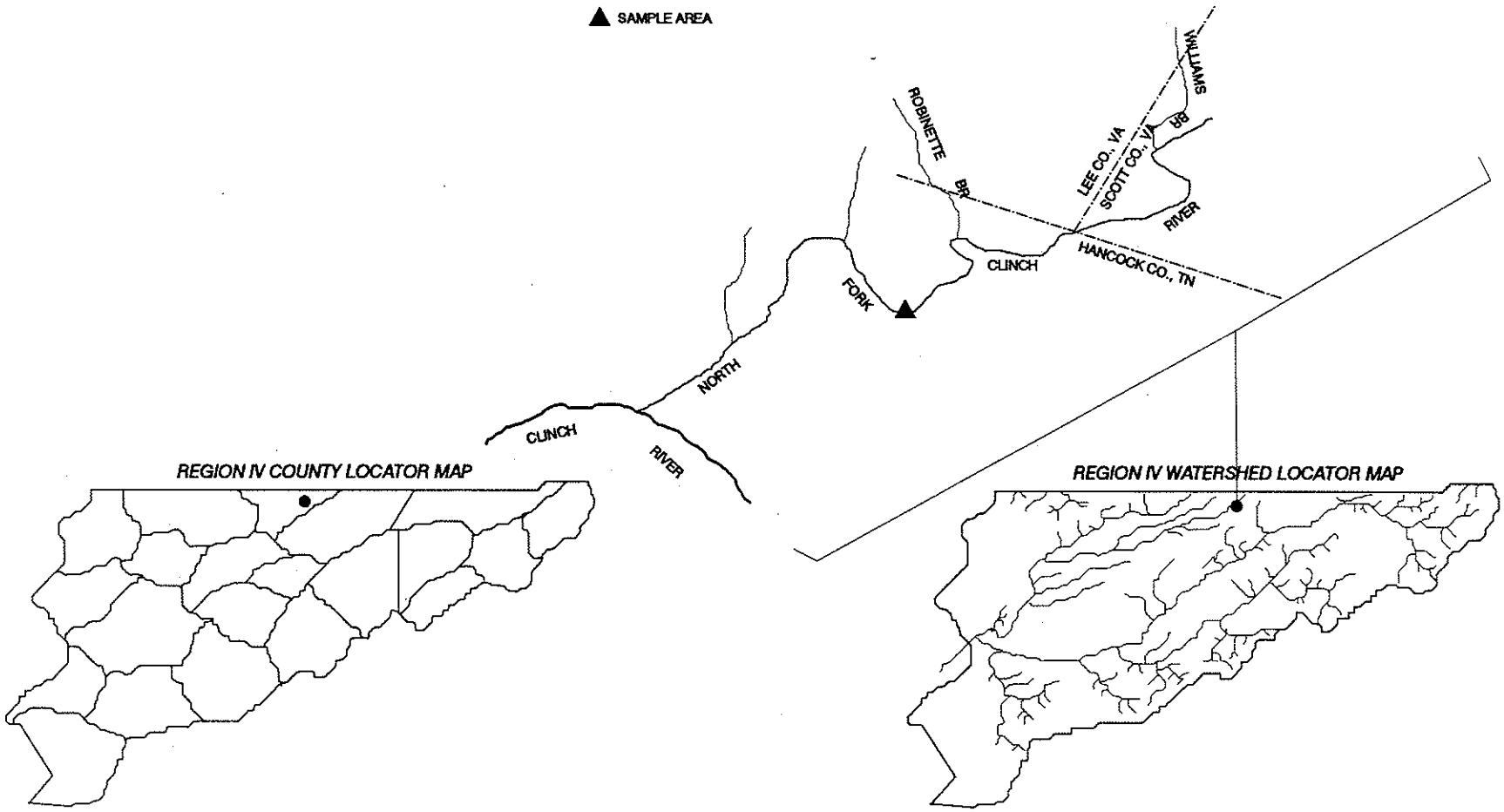
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	72 F	305	7.1	83.4

12. COMMENTS

SAMPLE STATION LOCATED AT MANIS FORD.

13. HABITAT ASSESSMENT SCORE 147



NORTH FORK CLINCH RIVER

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	33	1-7	2.9	ONLY 32 INCLUDED IN IB
Campostoma anomalum	45	147			
Cottus carolinae	322	39			
Cyprinella spiloptera	57	1			
Erimystax dissimilis	67	4			
Etheostoma blennioides	398	4			
Etheostoma ruflineatum	431	18			
Etheostoma simoterum	435	2			
Hybopsis amblops	79	13			
Hypentelium nigricans	207	18			
Lepisosteus osseus	23	1			
Lepomis auritus	346	11	2-7	1	
Lepomis macrochirus	351	2	2	0.03	
Lepomis megalotis	353	19	3-5	1.2	
Luxilus chrysocephalus	89	45			
Luxilus coccogenis	90	29			
Micropterus dolomieu	362	5	1-6	0.3	ONLY 3 INCLUDED IN IBI
Micropterus punctulatus	363	6	1-11	1.7	ONLY 3 INCLUDED IN IBI
Moxostoma duquesnei	224	3			
Moxostoma eurythrurum	225	5			
Nocomis micropogon	110	26			
Notropis leuciodus	128	42			
Notropis rubellus	131	1			
Notropis sp. (sawfin shiner)	144	6			
Notropis telescopus	138	17			
Notropis volucellus	140	1			
Percina caprodes	464	2			
Percina evides	467	5			
Percina sciera	475	1			
Phenacobius uranops	159	2			
Rhinichthys atratulus	184	3			
Semotilus atromaculatus	188	4			
		SUM: 515			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<12	12-23	>23	37	31	5
NUMBER OF DARTER SP.	<2	2-4	>4	7	6	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	6	3	3
NUMBER OF SUCKER SP.	<2	2	>2	3	3	5
NUMBER OF INTOLERANT SP.	<2	2-3	>3	5	5	5
PERCENT OF INDIVIDUALS AS TOLERANT	>27	27-13	<13		10.2	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>33	33-17	<17		43.7	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<22	22-44	>44		28.3	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		7.8	5
CATCH RATE	<17	17-35	>35		17.9	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		5.6	1
					46	**FAIR-GOOD**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

N. FORK CLINCH RIVER BENTHIC DATA **TAXA RICHNESS = 49**
FIELD COLLECTION # 702 **EPT TAXA RICHNESS = 16**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

TAXA			NUMBER	PERCENT
COLEOPTERA				10.1
	Dryopidae	*Helichus* adults	5	
	Elmidae	*Dubiraphia* adults	2	
		Macronychus glabratus adults	16	
		Microcylloepus pusillus adult	1	
		Optioservus adult	1	
		Stenelmis adults	5	
	Eubriidae	*Ectopria*	1	
	Gyrinidae	*Dineutus* larva	1	
		Dineutus discolor	2	
	Psephenidae	*Psephenus herricki* larva,adult	2	
DIPTERA				2.8
	Athericidae	*Atherix lantha*	2	
	Chironomidae		7	
	Simuliidae		1	
EPHEMEROPTERA				26.2
	Baetidae	*Baetis*	3	
	Ephemerellidae	*Serratella*	4	
	Ephemeridae	*Hexagenia*	6	
	Heptageniidae	*Stenacron*	12	
		Stenonema early instars	18	
		Stenonema sp.	4	
		Stenonema mediopunctatum	3	
	Oligoneuriidae	*Isonychia*	43	
GASTROPODA				14.9
	Ancylidae	*Ferrissia*	2	
	Pleuroceridae	elongated spiral form species	33	
		Anculosa subglobosa	18	
HEMIPTERA				1.1
	Gerridae	*Trepobates*	1	
	Nepidae	*Ranatra*	1	
	Veliidae	*Rhagovelia obesa*	2	
MEGALOPTERA				5.1
	Corydalidae	*Corydalus cornutus*	4	
		Nigronia serricornis	11	
	Sialidae	*Sialis*	3	
ODONATA				14.4
	Aeshnidae	*Basiaeshna janata*	6	
		Boyeria vinosa	22	
	Coenagrionidae	*Argia*	1	
	Gomphidae	*Dromogomphus spinosus*	4	
		Gomphus sp. early instars	4	
		Gomphus Genus A *consanguis/rogersi*	2	
		Hagenius brevistylus	4	
		Stylogomphus ablistylus	1	
		Stylurus early instars	2	
		Stylurus spiniceps	1	
	Macromiidae	*Macromia*	4	
PELECYPODA				0.8
	Corbiculidae	*Corbicula fluminea*	1	
	Sphaeriidae	*Sphaerium*	2	
TRICHOPTERA				24.5
	Brachycentridae	*Brachycentrus*	2	
	Hydropsychidae	*Ceratopsyche bronta*	11	
		Cheumatopsyche	10	
		Hydropsyche betteni/depravata	39	
		H. frisoni	1	
	Leptoceridae	*Triaenodes*	15	
	Polycentropodidae	*Neuroclipsis crepuscularis*	1	
		Polycentropus	8	
		TOTAL	**355**	

Old Town Creek

Two IBI fishery surveys were conducted on Old Town Creek in June 1995:

Location and Length - Tributary to the Powell River. Sample site 1 was located approximately 0.2 mi upstream from the mouth and was approximately 700 ft in length. Sample site 2 was located approximately 2.0 mi upstream from the mouth at the residence of Mr. Petite. The sample area was approximately 1,300 ft in length and extended upstream and downstream of the Petite residence. Both sites were sampled on 23 June 1995.

Sampling Methodology - Both sites were sampled with a 15 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physiochemical and sample site location forms)

Benthos Collection - (See benthic collection forms)

Fish Collected - (See fish data form for species list and IBI analyses)

Comments - This stream was sampled in cooperation with TDEC to investigate the effects of extensive logging and riparian vegetation removal from the lower portion of this stream. Two sample areas, one inside the impact area and one outside were selected assess any changes in the fish or benthic communities between the two areas. Violation notices were issued to the landowner by TDEC for unauthorized action in the stream (no permit) which is under review for civil penalties and mitigation actions (Amy Mulliken , TDEC, personal communication).

A total of 733 fish representing 26 species was collected in our survey at site 1. Four game and non-game fish species were collected at this site. These included nine rock bass (*Ambloplites rupestris*), 17 bluegill (*Lepomis macrochirus*), one hybrid sunfish (*Lepomis sp.*), two spotted bass (*Micropterus punctulatus*), one largemouth bass (*M. salmoides*), one white sucker (*Catostomus commersoni*), 15 northern hogsuckers (*Hypentelium nigricans*), nine black redhorse (*Moxostoma duquesnei*), two golden redhorse (*M. erythrurum*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and banded sculpin (*Cottus carolinae*). Together these two species comprised 63.8% of the total number of fish collected.

A total of 570 fish representing 19 species was collected in our survey at site 2. Four game and two non-game fish species were collected at this site. These included 17 rock bass, four bluegill, one spotted bass, three smallmouth bass (*Micropterus dolomieu*), ten northern hogsuckers, eight black redhorse, and six unidentified redhorse (*Moxostoma sp.*). The most abundant forage species were central stoneroller and striped shiner (*Luxilus*

chrysocephalus). Together these two species comprised 56.6% of the total number of fish collected.

Our Index of Biotic Integrity analysis indicated that the stream condition at site 1 was "fair" based on a score of 40. Conditions at site 2 were not much improved as this site received the same classification although the score (42) was slightly higher. In both cases the fish community attributes that had the most negative impact on the overall score were the high percentage of omnivores in the community, the low percentage of trophic specialists, and the high percentage of anomalies on the fish. One apparent difference in the sites was the lower percentage of piscivores at the downstream site where much of the instream habitat had been removed. Additionally, we feel that the lower site would have probably scored lower had it not been in close proximity to the Powell River. We did observe some species that we felt were transients from the main river , which in this case, may have elevated the overall score for this site.

Benthic macroinvertebrates from our sample at site 1 included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Leuctridae and Perlidae stoneflies, Hydropsychidae, Hydroptilidae, Limnephilidae, Philopotamidae, Rhyacophilidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 37.3% of the total sample. Ephemeropterans were second most abundant with 31.5%. Plecopterans accounted for 0.5%, while coleopterans and dipterans contributed 5.6% and 11.6% , respectively. Physidae and Pleuroceridae snails were also collected. A total of 52 taxa was collected from this site of which 20 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this site was assigned a bioclassification of "good".

Benthic macroinvertebrates from our sample at site 2 included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Leuctridae and Perlidae stoneflies, Hydropsychidae, Leptoceridae, Limnephilidae, Polycentropodidae, Rhyacophilidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 34.2% of the total sample. Ephemeropterans were second most abundant with 19.7%. Plecopterans accounted for 4.9%, while coleopterans and odonates contributed 12.7% and 9.7% , respectively. Pleurocerid snails were the only gastropods collected at this site. A total of 60 taxa was collected from this site of which 23 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this site was assigned a bioclassification of "good" although the overall score was slightly higher than at site 1.

Our habitat evaluation indicated the downstream site (site 1) to be in relatively poor condition given that most of the riparian zone and instream habitat had been removed. This site scored a 72 which corresponds to a classification of "marginal". The upstream site was a typical, relatively undisturbed section that received an overall score of 151 which corresponds to a sub-optimal classification. The increase in habitat heterogeneity at this site was further substantiated by the higher occurrence of piscivorous fish which were almost absent at the lower site.

Management Recommendations:

1. Riparian mitigation efforts should be initiated to stabilize stream banks at site 1.

2. Any action that could address non-point source pollution in the watershed would be of benefit to the stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	OLD TOWN CK (SITE 1)
WATERSHED	POWELL RIVER
SITE	NEAR MOUTH
COUNTY	CLAIBORNE
QUADRANGLE	MIDDLESBORO S. 153 SW
LAT-LONG	363015N-834153W
REACH	06010206-47.0
LENGTH	~ 700 FT
AREA (SQ. MI.)	11.6
ELEVATION	1030 FT
DATE	6-22-95
TIME	1023

COLLECTOR(S)

B.D. CARTER, M.T. FAGG AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
36.0	0.8	1.8

2. ESTIMATED % OF STREAM IN POOLS IS 30

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	20	10	5	30

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	50	20	5	10

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
10 %	15 %	75 %

7. SHADE OR CANOPY COVER GOOD OVER 5 %

8. FLOW (CFS) 7.3 — COMPARED TO NORMAL: LOW | NORMAL: X | HIGH

9. PRESENT WEATHER

PT. CLOUDY AND MILD; AIR TEMP. 74 F @ 1028

10. PAST WEATHER (last 24 hrs)

SCATTERED T-STORMS

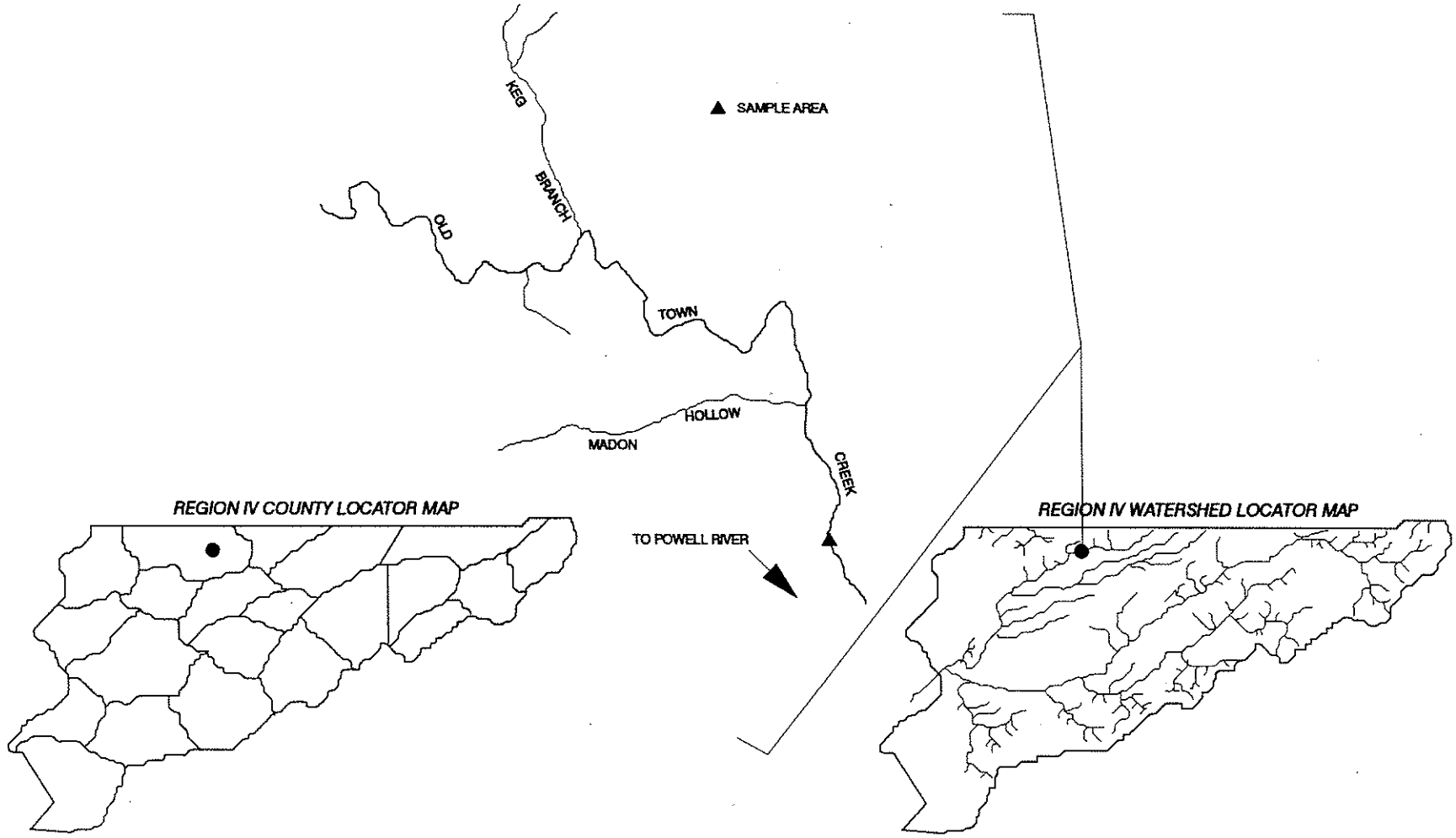
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	66 F	235	11.6	126.0

12. COMMENTS

SEVERE IMPACT TO RIPARIAN ZONE. ALMOST ALL TREES REMOVED. MUCH OF THE INSTREAM HABITAT REMOVED. SOME CHANELIZATION IN SURVEY REACH.

13. HABITAT ASSESSMENT SCORE 72



OLD TOWN CREEK FISH DATA (SITE 1)

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	9	1-7	1.4	
Campostoma anomalum	45	292			
Catostomus commersoni	195	1			
Cottus carolinae	322	176			
Erimystax dissimilis	67	1			
Etheostoma blennioides	398	11			
Etheostoma caeruleum	401	2			
Etheostoma flabellare	411	2			
Etheostoma ruflineatum	431	5			
Etheostoma simoterum	435	14			
Hybopsis amblops	79	10			
Hypentelium nigricans	207	15			
Lepomis macrochirus	351	17	2-5	0.5	
Lepomis sp. (hybrid)	345	1	4	0.07	
Luxilus chrysocephalus	89	66			
Luxilus coccogenis	90	21			
Micropterus punctulatus	363	2	8	0.4	
Micropterus salmoides	364	1	6	0.1	
Moxostoma duquesnei	224	9			
Moxostoma erythrurum	225	2			
Moxostoma sp.	220	11			
Nocomis micropogon	110	2			
Notropis leuciodus	128	4			
Notropis sp. (sawfin shiner)	144	5			
Notropis telescopus	138	44			
Percina caprodes	464	5			
Pimephales notatus	176	3			
Rhinichthys atratulus	184	2			
	SUM:	733			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<7	7-14	>14	23	26	5
NUMBER OF DARTER SP.	<2	2-3	>3	6	6	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	4	5
NUMBER OF INTOLERANT SP.	<2	2	>2	4	5	5
PERCENT OF INDIVIDUALS AS TOLERANT	>35	35-17	<17		9.1	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		49.6	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<14	14-28	>28		16.9	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		1.6	1
CATCH RATE	<27	27-55	>55		49.3	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0.1	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		14.8	1
						40 **FAIR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

OLD TOWN CK BENTHIC DATA (SITE 1) TAXA RICHNESS = 52
FIELD COLLECTION # 679 EPT TAXA RICHNESS = 20
EFFORT = 3.0 PERSON HOURS BIOCLASSIFICATION = GOOD

TAXA			NUMBER	PERCENT
COLEOPTERA				5.6
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Dubiraphia* larva,adult	2	
		Macronychus glabratus larva, adults	4	
		Microcylloepus adult	1	
		Optioservus larva,adult	2	
		Promoresia larva,adults	4	
		Stenelmis larva, adults	5	
	Haliplidae	*Peltodytes* adult	1	
	Hydrophilidae adult		1	
	Psephenidae	*Psephenus herricki* larvae, adults	10	
DIPTERA				11.6
	Athericidae	*Atherix lantha*	20	
	Chironomidae		36	
	Empididae		1	
	Simuliidae		7	
EPHEMEROPTERA				31.5
	Baetidae	*Baetis*	121	
	Caenidae	Caenis	1	
	Ephemerellidae	*Eurylophella*	11	
		Serratella	2	
	Ephemeridae	*Ephemera*	3	
		Hexagenia	4	
	Heptageniidae	*Stenacron*	1	
		Stenonema	10	
	Oligoneuriidae	*Isonychia*	20	
GASTROPODA				4.5
	Physidae	*Physa*	3	
	Pleuroceridae		22	
HEMIPTERA				3.3
	Corixidae		11	
	Gerridae nymph		1	
	Veliidae	*Microvelia* nymph	1	
		Rhagovelia obesa	5	
ISOPODA				0.2
	Asellidae	*Lirceus*	1	
MEGALOPTERA				1.5
	Corydalidae	*Corydalus cornutus*	1	
		Nigronia serricornis	5	
	Sialidae	*Sialis*	2	
ODONATA				4
	Aeshnidae	*Boyeria vinosa*	6	
	Calopterigidae	*Calopteryx*	2	
	Coenagrionidae	*Argia*	2	
		Enallagma	4	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus* (Genus *A*) *consanguis/rogersi*	3	
		Gomphus lividus	3	
		Hagenius brevistylus	1	
PLECOPTERA				0.5
	Leuctridae	*Leuctra*	2	
	Perlidae	*Perlesta*	1	
TRICHOPTERA				37.3
	Hydropsychidae	*Ceratopsyche cheilonis*	46	
		C. sparna	42	
		Cheumatopsyche	11	
		Hydropsyche betteni/depravata	76	
		Unidentified pupae	2	
	Hydroptilidae	*Hydroptila*	1	
	Limnephilidae	*Pycnopsyche*	4	
	Philopotamidae	*Chimara*	10	
	Rhyacophilidae	*Rhyacophila fuscula*	4	
	Uenoidae	*Neophylax*	9	
		TOTAL	550	

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	OLD TOWN CK (SITE 2)
WATERSHED	POWELL RIVER
SITE	@ PETITE RESIDENCE
COUNTY	CLAIBORNE
QUADRANGLE	MIDDLESBORO S, 15S SW
LAT-LONG	363055N-834203W
REACH	06010206-47,0
LENGTH	~ 1300 FT
AREA (SQ. MI.)	10.7
ELEVATION	1055 FT
DATE	6-22-95
TIME	1315

COLLECTOR(S)

B.D. CARTER, M.T. FAGG AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
37.0	0.8	1.4

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	10	10	20	20	25

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	20	25	15	25

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
30 %	30 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 85 %

8. FLOW (CFS) 9.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY AND MILD; AIR TEMP. 76 F @ 1321

10. PAST WEATHER (last 24 hrs)

SCATTERED T-STORMS

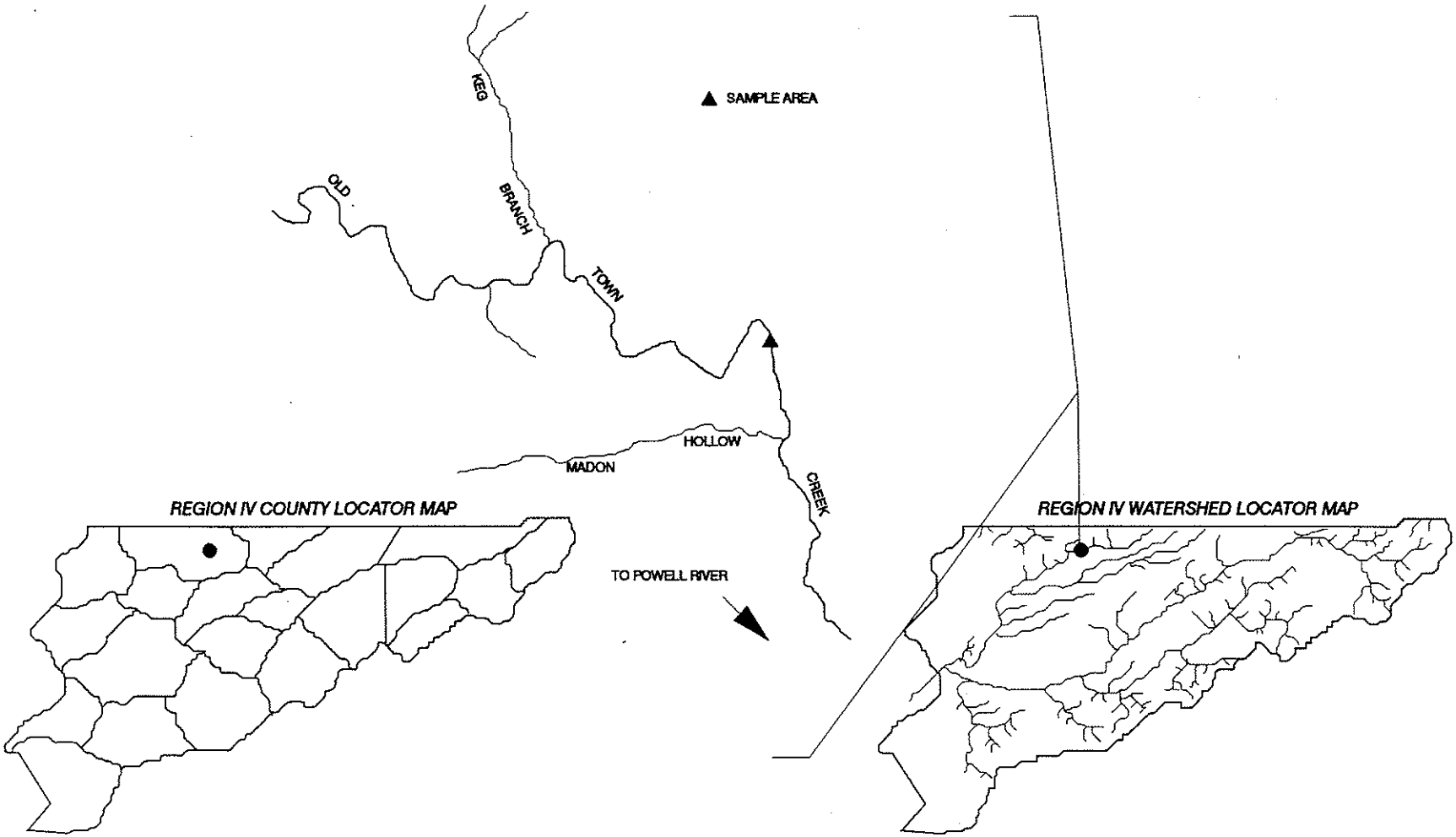
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	66 F	230	9.4	101.1

12. COMMENTS

PERIWINKLE SNAILS VERY ABUNDANT. BENTHOS COLLECTED FOR 3 PERSON HOURS. MADE AN ADDITIONAL BENTHIC COLLECTION IN SEEP AREA ADJACENT TO CREEK.

13. HABITAT ASSESSMENT SCORE 151



OLD TOWN CREEK FISH DATA (SITE 2)

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	17	4-8	3.3	
Campostoma anomalum	45	232			
Cottus carolinae	322	31			
Cyprinella galactura	54	7			
Etheostoma flabellare	411	2			
Etheostoma ruflineatum	431	2			
Etheostoma simoterum	435	9			
Hybopsis amblops	79	3			
Hypentelium nigricans	207	10			
Lepomis macrochirus	351	4	2	0.03	
Luxilus chrysocephalus	89	91			
Luxilus coccogenis	90	21			
Micropterus dolomieu	362	3	6-10	0.9	
Micropterus punctulatus	363	1	N/A	N/A	
Moxostoma duquesnei	224	8			
Moxostoma sp.	220	6			
Nocomis micropogon	110	1			
Notropis telescopus	138	54			
Percina caprodes	464	6			
Rhinichthys atratulus	184	62			
	SUM:	570			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<7	7-14	>14	23	19	5	
NUMBER OF DARTER SP.	<2	2-3	>3	6	4	5	
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	2	3	
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3	
NUMBER OF INTOLERANT SP.	<2	2	>2	4	4	5	
PERCENT OF INDIVIDUALS AS TOLERANT	>35	35-17	<17		15.9	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		56.8	1	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<14	14-28	>28		17	3	
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		3.6	3	
CATCH RATE	<27	27-55	>55		35.3	3	
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		5.6	1	
						42	**FAIR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

OLD TOWN CK BENTHIC DATA (SITE 2)
FIELD COLLECTION # 680
EFFORT = 3.0 PERSON HOURS

TAXA RICHNESS = 60
EPT TAXA RICHNESS = 23
BIOCLASSIFICATION = GOOD

TAXA			NUMBER	PERCENT
AMPHIPODA				0.4
	Gammaridae		1	
	Talitridae	*Hyalella azteca*	1	
ANNELIDA				0.2
	Hirudinea		1	
COLEOPTERA				12.7
	Dryopidae	*Helichus* adults	2	
	Dytiscidae	*Hydroporus* adults	2	
	Elmidae	*Dubiraphia* larva,adults	3	
		Macronychus glabratus adults	2	
		Optioservus adults	2	
		Promoresia larvae	2	
		Stenelmis larva, adults	12	
	Eubriidae	*Ectopria*	1	
	Hydrophilidae adult		1	
	Psephenidae	*Psephenus herricki* larvae, adults	33	
DIPTERA				4.9
	Athericidae	*Atherix lantha*	5	
	Chironomidae		6	
	Simuliidae		11	
	Tabanidae	*Chrysops*	1	
EPHEMEROPTERA				19.7
	Baetidae	*Baetis*	7	
	Ephemerellidae	*Ephemerella*	2	
		Eurylophella	13	
		Serratella	3	
	Ephemeridae	*Ephemera*	4	
		Hexagenia	1	
	Heptageniidae	*Epeorus*	5	
		Stenacron	2	
		Stenonema	24	
	Oligoneuriidae	*Isonychia*	32	
GASTROPODA				4.9
	Pleuroceridae		23	
HEMIPTERA				3.8
	Corixidae		5	
	Gerridae	*Gerris remigis*	2	
	Veliidae	*Microvelia*	4	
		Rhagovelia obesa	7	
HYDRACARINA			1	0.2
ISOPODA				0.2
	Asellidae	*Lirceus*	1	
MEGALOPTERA				4
	Corydalidae	*Corydalus cornutus*	3	
		Nigronia serricornis	13	
	Sialidae	*Sialis*	3	
ODONATA				9.7
	Aeshnidae	*Boyeria vinosa*	11	
	Calopterigidae	*Calopteryx*	5	
	Coenagrionidae	*Argia*	3	
		Enallagma	1	
	Cordulegastridae	*Cordulegaster maculata*	2	
	Gomphidae	*Gomphus* (Genus A) *consanguis*	12	
		Gomphus lividus	6	
		Hagenius brevistylus	5	
		Stylogomphus albistylus	1	
PELECYPODA				0.2
	Sphaeriidae	*Sphaerium*	1	
PLECOPTERA				4.9
	Leuctridae	*Leuctra*	7	
	Perlidae	*Perlesta*	16	
TRICHOPTERA				34.2
	Hydropsychidae	*Ceratopsyche cheilonis*	1	
		C. sparna	38	
		Cheumatopsyche	5	
		Hydropsyche betteni/depravata	62	
	Leptoceridae	*Ceraclea* early instar	1	
		Ceraclea ancylus/flava	4	
		Triaenodes	22	
	Limnephilidae	*Goera calcarata*	3	
		Pycnopsyche	2	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhyacophila fuscula*	7	
	Uenoidae	*Neophylax*	16	
		TOTAL	**473**	

Indian Creek

One quantitative fishery survey was conducted on Indian Creek in June 1995:

Location and Length - Tributary to the Powell River. The sample area was located approximately 1.2 mi. upstream of the bridge crossing on Hwy. 63, near stream mile 4.8. The sample area was 528 ft in length, averaged 52 ft in width and had a surface area of 27,201 ft^2. The site was sampled on 19 June 1995.

Sampling Methodology - Three electrofishing passes were made through the site with backpack units operating side by side. Block nets were used at the downstream and upstream ends of the sample area to prevent fish movement in or out of the area. Five backpack units were used to sample the area. Four units operated at 125 VAC while one was used at a setting of 400 VDC.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and population statistics)

Comments - This stream was sampled to gather quantitative information on the sport fishery and to collect otolith samples from rock bass and smallmouth bass for age and growth analysis. The Agency previously made a qualitative survey of this site in 1992 (Bivens et al. 1993).

A total of 2,940 fish representing 25 species was collected in our survey. Five game fish and two non-game fish were collected. These included 42 rock bass (*Ambloplites rupestris*) ranging form 3 to 9 inches (see Fig. 4), one bluegill (*Lepomis macrochirus*), one green sunfish (*Lepomis cyanellus*), 17 smallmouth bass (*Micropterus duquesnei*) ranging from 3 to 15 inches (see Fig. 4), eight rainbow trout (*Oncorhynchus mykiss*) (stocked fish) ranging from 8 to 12 inches (see Fig. 4), 34 northern hogsuckers (*Hypentelium nigricans*), and 65 black redhorse (*Moxostoma duquesnei*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and Tennessee shiner (*Notropis leuciodus*). Together these two species comprised 64.7% of the total number of fish collected. The species richness encountered between 1992 and 1995 compares quite well. We collected a total of 25 species in 1995 compared to 24 in 1992. The species composition encountered during the two surveys, however, was different. We collected four species in 1995 that were not observed in 1992. These included mountain shiner (*Lythrurus lirus*), rainbow trout (*Oncorhynchus mykiss*), green sunfish (*Lepomis cyanellus*), and blacknose dace (*Rhinichthys atratulus*). Species encountered in 1992 that were not collected in 1995 included redear sunfish (*Lepomis microlophus*), longnose gar (*Lepisosteus osseus*), and bluntnose minnow (*Pimephales notatus*).

Of the game fish collected rock bass had the highest density (80/acre) and biomass (14 lb/ac). Smallmouth bass were the second most abundant game species comprising 27.2% (8.1 lb/ac) of the total game fish biomass and 22.1% (27/ac) of the total game fish density. Stocked rainbow trout contributed almost as much (7.5 lb/ac) to the total game fish biomass as smallmouth bass, however their density estimate was less than half that of smallmouth bass estimate. Only one bluegill and one green sunfish were collected making their overall contribution to the game fish biomass and density insignificant. There appeared to be a decline in the number of rock bass collected between 1992 and 1995 (63

vs. 42). In comparison, however, the total number of smallmouth bass collected at this site during 1992 and 1995 increased slightly (11 vs. 17). However, the 1992 effort was much less intense than the one conducted in 1995 which would indicate an overall depression in these two populations of game fish. This could be related to the 1994 floods which severely depressed fish populations all over the region. Combined, non-game fish comprised the bulk of the fish density and biomass observed. Together they represented 84.1% of the biomass and 98.1% of the density of all fish collected. Overall density of fish was 6,493.5 fish/ac, while overall biomass was estimated at 187.6 lb/ac.

Benthic macroinvertebrates from our sample included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Peltoperlidae and Perlidae stoneflies, Helicopsychidae, Hydropsychidae, Leptoceridae, Limnephilidae, Philopotamidae, Rhyacophilidae, and Uenoidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 39.1% of the total sample. Trichopterans were second most abundant with 21.0%. Plecopterans accounted for 2.7%, while coleopterans and dipterans contributed 7.1% and 6.9% , respectively. Physidae and Pleuroceridae snails were also collected. A total of 59 taxa was collected from this site of which 25 were EPT taxa. Based on the tolerance values assigned to the taxa collected and the EPT taxa richness value this reach of Indian Creek was assigned a bioclassifcation of "good". Of special interest was the collection of five mussel species (relics only) from this reach.

Overall the physical habitat in the stream and the condition of the riparian zone appeared to be good. Our visual evaluation of the overall habitat quality in the survey reach was determined to be in the optimal category based on a mean index score of 160.

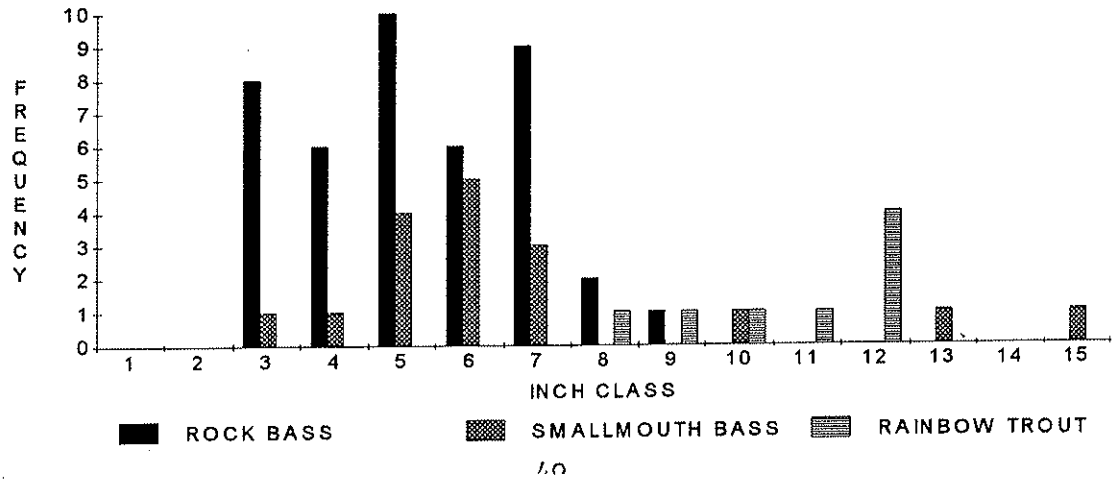
Management Recommendations:

1. Any action that could address non-point source pollution would be of benefit to this stream.

2. This is one of the regions better smallmouth/rock bass fishery, any actions to enhance and protect this stream should be of upmost importance.

3. Consider follow-up sampling to monitor population trends.

Figure 4. LENGTH FREQUENCY DISTRIBUTIONS FOR ROCK BASS, SMALLMOUTH BASS, AND RAINBOW TROUT COLLECTED IN INDIAN CREEK DURING 1995



PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	INDIAN CREEK
WATERSHED	POWELL RIVER
SITE	@ RIVER MILE 4.8
COUNTY	CLAIBORNE
QUADRANGLE	WHEELER 153 SE
LAT-LONG	363543N-833555W
REACH	06010206-24.0
LENGTH	525 FT
AREA (SQ. FT.)	27,201
ELEVATION	1140 FT
DATE	6-19-95
TIME	1419

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER
C.E. WILLIAMS, AND REG. 1,2,3 CREWS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
41.5	0.9	2.6

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	20	30	10	25

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	30	40	25	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
50 %	30 %	20 %

7. SHADE OR CANOPY COVER GOOD OVER 65 %

8. FLOW (CFS) COPMARED TO NORMAL

FLOW (CFS)	LOW	NORMAL	HIGH
25.2		X	

9. PRESENT WEATHER

CLOUDY /W SCATTERED T-STORMS; AIR TEMP. 78 F @ 1413

10. PAST WEATHER (last 24 hrs)

SCATTERED T-STORMS; MILD

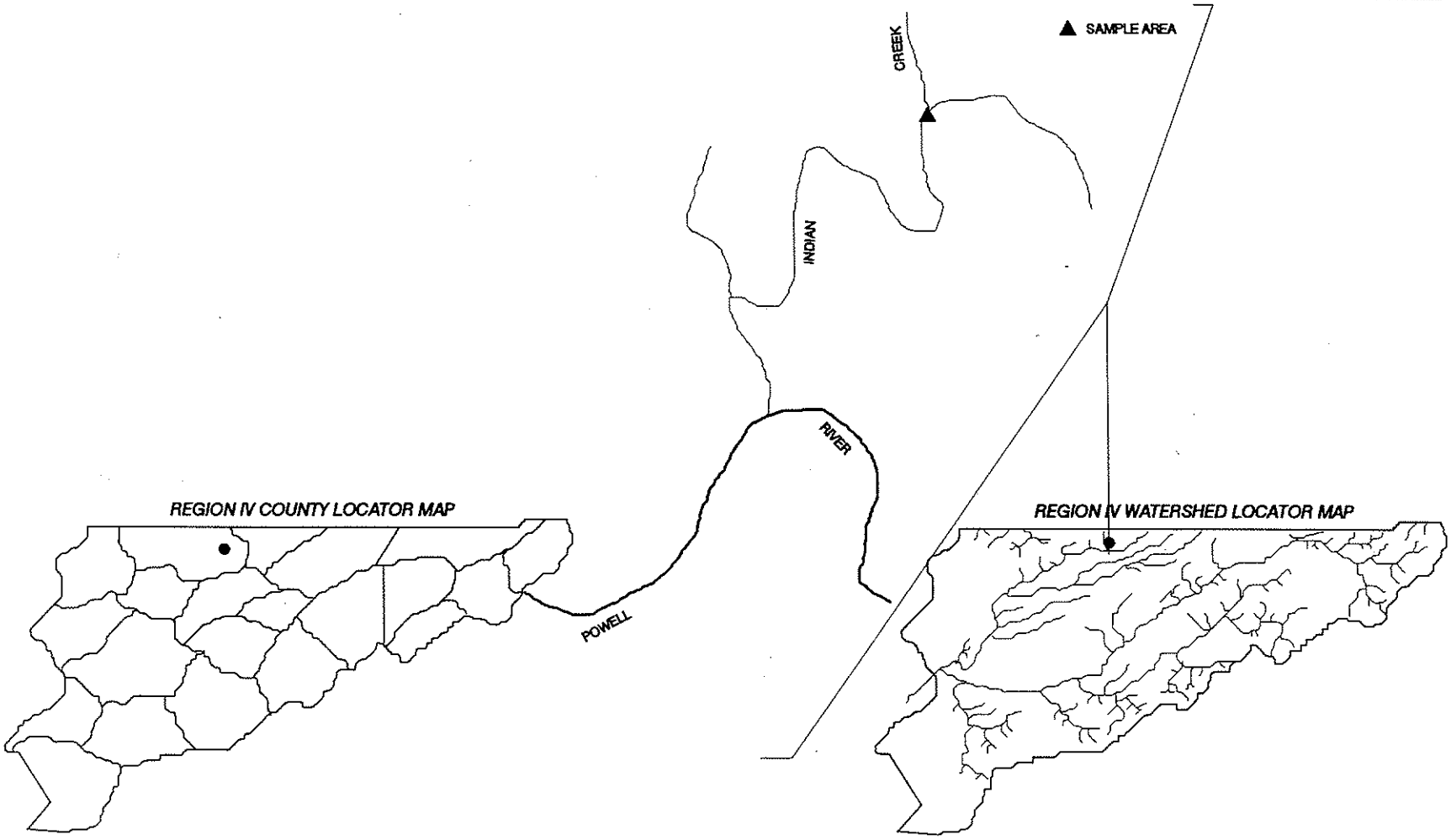
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	66 F	260	10.4	112.8

12. COMMENTS

THIS WAS A THREE-PASS QUANTITATIVE ELECTRO-FISHING SURVEY. CREWS FROM THE OTHER THREE REGIONS ASSISTED WITH THE SAMPLE. OTOLITHS WERE TAKEN FROM ROCKBASS AND SM. MOUTH.

13. X HABITAT ASSESSMENT SCORE 160



Summary of population statistics for fish collected in Indian Creek during 1995

SPECIES	SITE	CAPTURE PROB.	POP. ESTIMATE (95% CI)	MEAN LENGTH (95% CI)	MEAN WEGHT (95% CI)	BIOMASS (LB/AC)	DENSITY (NO/AC)
Ambloplites rupestris	1	0.44	50 (42-64)	5.8 (5.3-6.3)	0.17 (0.13-0.21)	14 15.6	80
Campostoma anomalum		0.44	1803 (1720-1186)	n/a	0.02	85.2 95.4	2886
Cottus carolinae		0.2	200 (98-358)	n/a	0.02	6.5 7.2	320.1
Cyprinella galactura		0.75	3 (3-4)	n/a	0.02	0.09 0.1	4.8
Etheostoma blennioides		0.41	86 (69-109)	n/a	0.01	2 2.2	137.6
Etheostoma caeruleum		0	1 (1-1)	n/a	0.004	0.007 .0067	1.6
Etheostoma flabellare		0.08	113 (26-659)	n/a	0.003	0.7 0.8	180.8
Etheostoma ruflineatum		0.22	123 (67-219)	n/a	0.007	1.5 1.7	196.9
Etheostoma simoterum		0.33	51 (36-81)	n/a	0.003	0.3 0.3	81.6
Etheostoma zonale		0	6	n/a	0.003	0.03	9.6
Hybopsis amblops		0.34	62 (45-91)	n/a	0.007	0.7	99.2
Hypentelium nigricans		0.75	34 (34-36)	n/a	0.17	9.5	54.4
Lepomis cyanellus		0	1 (1-1)	2.7	0.01	0.02	1.6
Lepomis macrochirus		0	1 (1-1)	4.3	0.05	0.08	1.6
Luxilus chrysocephalus		0.11	439 (133-1080)	n/a	0.02	17.3	702.7
Luxilus coccogenis		0.4	279 (239-322)	n/a	0.01	4.5	446.6
Lythrurus lirus		0	1 (1-1)	n/a	0.006	0.01	1.6
Micropterus dolomieu		0.68	17 (17-19)	7.3 (5.7-9.0)	0.29 (0.04-0.55)	8.1	27.2
Moxostoma duquesnei		0.62	68 (65-74)	n/a	0.17	19.2	108.8
Nocomis micropogon		0.5	95 (84-109)	n/a	0.04	6.7	152
Notropis leuciodus		0.39	516 (456-576)	n/a	0.003	2.7	826
Notropis telescopus		0.37	76 (58-103)	n/a	0.004	0.6	121.6
Onchorhynchus mykiss		0.61	8 (8-10)	11.3 (10.0-12.6)	0.60 (0.40-0.79)	7.5	12.8
Percina caprodes		0.61	11 (11-14)	n/a	0.01	0.3	17.6
Rhinichthys atratulus		0.68	13 (13-15)	n/a	0.003	0.08 0.089	20.8 51.3
TOTAL			**3706**			**187.6**	**6493.5**

The above is a summary of population statistics generated from a three-pass depletion survey conducted in cooperation with Regions 1-3. Sampling was accomplished by utilizing five backpack electrofishing units (4 @ 125 VAC, 1 @ 400 VDC). Collectors: R. Bivens, B. Carter, C. Williams, C. Simpson, J. Mayer, J. Swearengin, S. Webb, F. Fiss R. Wiggins, D. Bernd, J. Prestwich, M. Fagg, and J. Strom.

INDIAN CREEK BENTHIC DATA
FIELD COLLECTION # 676
EFFORT = 3.0 PERSON HOURS

TAXA RICHNESS = 59
EPT TAXA RICHNESS = 25
BIOCLASSIFICATION = GOOD

TAXA			NUMBER	PERCENT
AMPHIPODA				0.7
	Talitridae	*Hyalella azteca*	5	
COLEOPTERA				7.1
	Dryopidae	*Helichus* adults	7	
	Elmidae	*Dubiraphia* adults	3	
		Macronychus glabratus larvae, adult	3	
		Microcylloepus pusillus adult	1	
		Optioservus trivitatus	1	
		Stenelmis larvae,adults	22	
	Psephenidae	*Psephenus herricki* larvae,adults	13	
DIPTERA				6.9
	Athericidae	*Atherix lantha*	9	
	Chironomidae		18	
	Dixidae	*Dixella*	1	
	Simuliidae		21	
EPHEMEROPTERA				39.1
	Baetidae	*Baetis*	35	
	Caenidae	*Caenis*	1	
	Ephemerellidae	*Ephemerella*	3	
		Eurylophella	21	
		Serratella	10	
	Ephemeridae	*Hexagenia*	1	
	Heptageniidae	*Epeorus rubidus/subpallidus*	8	
		Stenacron	1	
		Stenonema early instars	10	
		Stenonema (prob. *modestum*)	5	
		S. (prob. *pulchellum*)	1	
	Oligoneuriidae	*Isonychia*	180	
GASTROPODA				6.4
	Physidae	*Physa*	2	
	Pleuroceridae	sp. with elongated form	20	
		Anculosa subglobosa	21	
	Viviparidae	*Campeloma*	2	
HEMIPTERA				1.3
	Corixidae		2	
	Gerridae	*Gerris remigis*	1	
	Veliidae	*Rhagovelia obesa*	6	
ISOPODA				7.2
	Asellidae	*Lirceus*	51	
MEGALOPTERA				0.4
	Corydalidae	*Corydalus cornutus*	3	
ODONATA				5.2
	Aeshnidae	*Basiaeshna janata*	1	
		Boyeria vinosa	9	
	Calopterygidae	*Calopteryx*	9	
	Coenagrionidae	*Argia*	3	
		Enallagma	2	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus* early instars	2	
		Gomphus Genus A (prob. *consanguis*)	1	
		Gomphus lividus	2	
		Hagenius brevistylus	1	
		Ophiogomphus mainensis	1	
		Stylogomphus albistylus	5	
PELECYPODA				2
	Corbiculidae	*Corbicula fluminea*	4	
	Sphaeriidae	*Sphaerium*	10	
PLECOPTERA				2.7
	Peltoperlidae	*Peltoperla*	4	
	Perlidae	*Paragnetina sp.*	11	
		Perlesta	4	
TRICHOPTERA				21
	Helicopsychidae	*Helicopsyche borealis* pupa w/ case	1	
	Hydropsychidae	*Ceratopsyche cheilonis*	33	
		C. sparna	4	
		Cheumatopsyche	2	
		Hydropsyche betteni/depravata	70	
		H. (prob. *frisoni*)	7	
	Leptoceridae	*Triaenodes*	6	
	Limnephilidae	*Pycnopsyche*	2	
	Philopotamidae	*Chimara*	7	
	Rhyacophilidae	*Rhyacophila fuscula*	15	
	Uenoidae	*Neophylax*	1	
		TOTAL	**706**	

Sweetwater Creek

One IBI fishery survey was conducted on Sweetwater Creek in July 1995:

Location and Length - Tributary to the Tennessee River. The sample area was located at the bridge crossing at the Loudon City Park. Sampling was conducted upstream and downstream of the bridge crossing. The sample area was approximately 600 ft in length and was sampled on 25 July 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 130 fish representing 15 species was collected in our survey. Five game fish and three non-game fish species were collected. These included three rock bass (*Ambloplites rupestris*), two redbreast sunfish (*Lepomis auritus*), six bluegill (*L. macrochirus*), one green sunfish (*L. cyanellus*), one redear sunfish (*L. microlophus*), three drum (*Aplodinotus grunnieins*), 11 northern hogsuckers (*Hypentelium nigricans*), and one golden redhorse (*Moxostoma erythrurum*) . The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and banded sculpin (*Cottus carolinae*). Together these two species comprised 68.4% of the total number of fish collected. Only one darter species, the logperch (*Percina caprodes*) was collected from this site. We made an additional qualitative survey at a site further upstream in Monroe Co. (353440N-842913W) on 24 July 1995. A total of 86 fish representing ten species was collected from this site from this site. We did collect three species of fish that were not found at the downstream site. These included snubnose darter (*Etheostoma simoterum*), spotted sucker (*Minytrema melanops*), and common carp (*Cyprinus carpio*).

Our Index of Biotic Integrity analysis indicated that this stream was in "poor" condition based on an IBI score of 30. The strongest negative influences on the overall score were the lack of darter species, the low number of intolerant species in the sample, the relatively high percentage of trophic generalists, the low percentage of trophic specialists and piscivores, the extremely low catch rate, and the high percentage of fish with anomalies (predominantly blackspot). Our observations indicate that this stream had severe non-point source pollution problems, mainly in the form of silt. Most of the

substrate was covered with a fine layer of silt. This is not surprising, as most of the watershed has been subjected to some form of development (residentail and agricultural).

Benthic macroinvertebrates from our sample included Baetidae, Heptageniidae, and Oligoneuriidae mayflies; Hydropsychidae, Hydroptilidae, and Leptoceridae caddisflies. No stoneflies were collected in the sample. Ephemeropterans were the most abundant organisms in our survey, comprising 39.4% of the total sample. Trichopterans were second most abundant with 34.5%. Dipterans contributed 8.5%, while *Corbicula fluminea* accounted for 4.9% of the total number of organisms collected. Additionally, pleurocerid snails were collected from this site. A total of 34 taxa was collected from this site of which 14 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Sweetwater Creek was assigned a bioclassification of "fair to good".

The physical habitat evaluation at this site revealed that person induced impacts had substantially altered the physical structure of the stream as well as the riparian zone. This reach of Sweetwater Creek received a sub-optimal categorization even though the score of 117 was approaching the marginal category.

Management Recommendations:

1. Any actions that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	SWEETWATER CREEK
WATERSHED	TENNESSEE RIVER
SITE	@ LOUDON CITY PARK
COUNTY	LOUDON
QUADRANGLE	PHILADELPHIA 131 NW
LAT-LONG	354324N-842251W
REACH	06010201-15,0
LENGTH	~ 600 FT
AREA (SQ. MI.)	41.9
ELEVATION	780 FT
DATE	7-25-95
TIME	0923

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, C.E. WILLIAMS S. SEYMOUR, AND R. WIGGINS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
40.8	1.4	2.7

2. ESTIMATED % OF STREAM IN POOLS IS 60

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	20	25	15	10	10

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	40	30	15	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
20 %	30 %	50 %

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) COMPARED TO NORMAL

FLOW (CFS)	LOW	NORMAL	HIGH
32.9		X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 82 F @ 0941

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

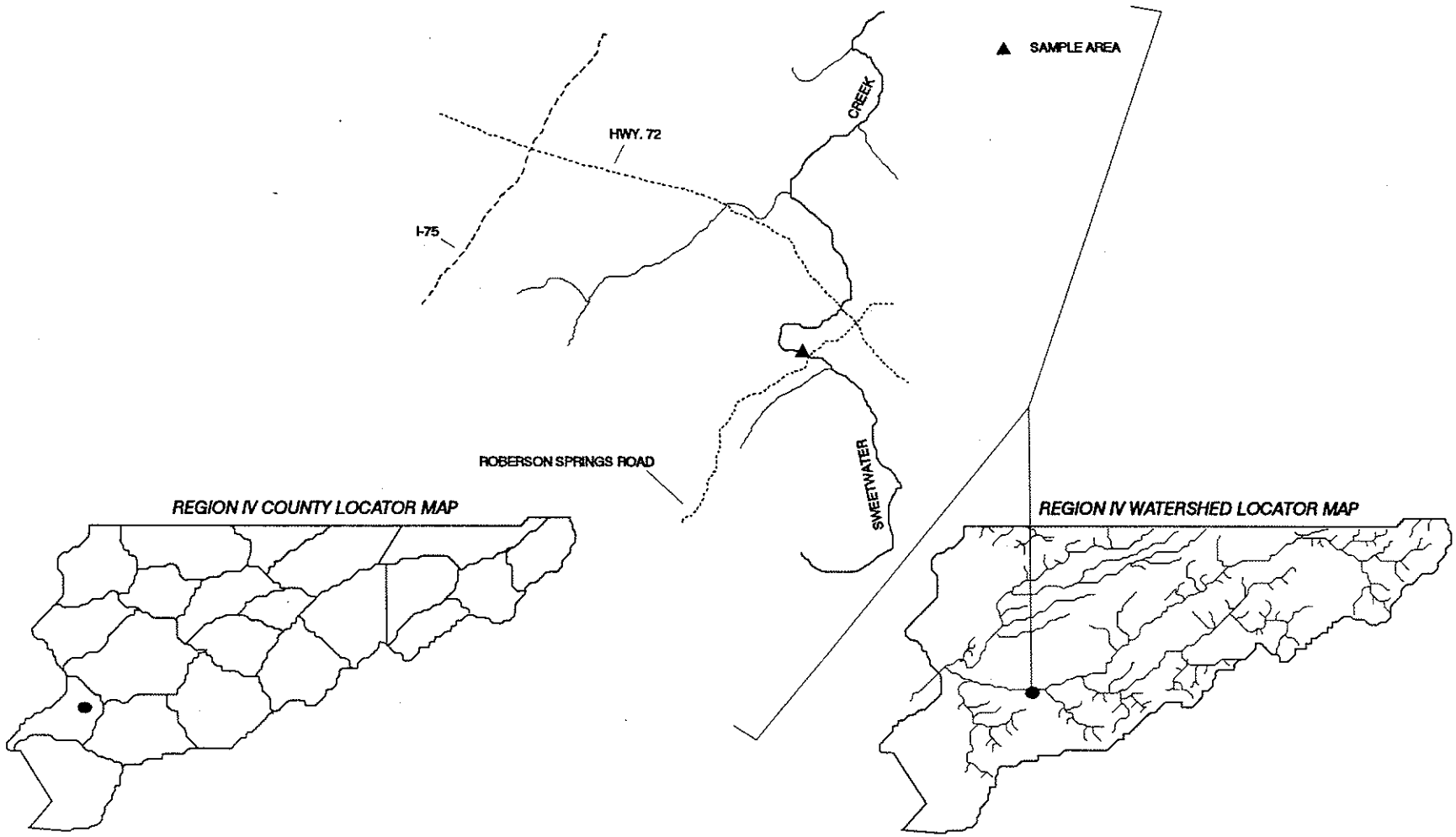
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	73 F	308	7.3	85.0

12. COMMENTS

SAMPLE AREA LOCATED AT BRIDGE CROSSING AT LOUDON CITY PARK. HEAVY SEDIMENT DUE TO AGRICULTURAL AND RESIDENTIAL DEVELOPMENT UPSTREAM OF SURVEY REACH.

13. X HABITAT ASSESSMENT SCORE 117



SWEETWATER CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	3	4-7	0.5	
Aplodinotus grunniens	496	3			
Campostoma anomalum	45	66			
Cottus carolinae	322	23			
Gambusia affinis	309	1			
Hypentelium nigricans	207	11			
Lepomis auritus	346	2	3-6	0.2	
Lepomis cyanellus	347	1	4	0.06	
Lepomis macrochirus	351	6	2-5	0.4	
Lepomis microlophus	354	1			
Luxilus chrysocephalus	89	2			
Moxostoma erythrurum	225	1			
Nocomis micropogon	110	4			
Percina caprodes	464	5			
Rhinichthys atratulus	184	1			
	SUM:	130			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<11	11-22	>22	35	13	3
NUMBER OF DARTER SP.	<2	2-4	>4	7	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	6	4	5
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2-3	>3	5	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>29	29-15	<15		3.1	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>34	34-18	<18		56.3	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<22	22-43	>43		3.9	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		2.3	3
CATCH RATE	<20	20-40	>40		5.4	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		7.8	1
					30	**POOR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

SWEETWATER CREEK BENTHIC DATA **TAXA RICHNESS = 34**
FIELD COLLECTION # 697 **EPT TAXA RICHNESS = 14**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = FAIR-GOOD**

TAXA			NUMBER	PERCENT
AMPHIPODA			4	0.7
ANNELIDA				0.8
	Oligochaeta		5	
COLEOPTERA				2.9
	Elmidae	*Ancyronyx variegatus* adults	2	
		Macronychus glabratus larva, adults	9	
		Stenelmis larva,adult	6	
	Gyrinidae	*Gyrinis* larva	1	
DIPTERA				8.5
	Chironomidae		52	
EPHEMEROPTERA				39.4
	Baetidae	*Baetis*	68	
	Heptageniidae	*Stenacron*	15	
		Stenonema early instars	74	
		Stenonema sp. > 10 max. cr. hairs, no proj.	3	
		Stenonema exiguum	1	
		S. mediopunctatum	8	
	Oligoneuriidae	*Isonychia*	73	
GASTROPODA				0.2
	Pleuroceridae		1	
HEMIPTERA				3.9
	Corixidae		10	
	Gerridae	*Gerris remigis*	2	
	Veliidae	*Rhagovelia obesa*	12	
ISOPODA				0.3
	Asellidae	*Asellus*	2	
MEGALOPTERA				1.8
	Corydalidae	*Corydalus cornutus*	4	
		Nigronia serricornis	2	
	Sialidae	*Sialis*	5	
ODONATA				2.1
	Aeshnidae	*Boyeria vinosa*	7	
	Calopterygidae	*Calopteryx*	1	
		Hetaerina americana	4	
	Coenagrionidae	*Argia*	1	
PELECYPODA				4.9
	Corbiculidae	*Corbicula fluminea*	30	
TRICHOPTERA				34.5
	Hydropsychidae	*Ceratopsyche cheilonis*	3	
		Cheumatopsyche	49	
		Hydropsyche betteni/depravata	139	
		H. frisoni	12	
	Hydroptilidae	*Leucotrichia*	1	
	Leptoceridae	*Triaenodes*	1	
	Polycentropodidae	*Neureclipsis crepuscularis*	2	
		Polycentropus	5	
		TOTAL	**614**	

Burnett Creek

One IBI fishery survey was conducted on Burnett Creek in June 1995:

Location and Length - Tributary to the French Broad River. The sample area was located at the Burnett Creek Baptist Church on Burnett Creek Road. The sample area extended upstream and downstream of the church and was approximately 600 ft in length. The site was sampled on 15 June 1995.

Sampling Methodology - This site was sampled with a 10 ft seine and one backpack electrofishing unit.

Water Quality - (See physiochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 417 fish representing 11 species was collected in our survey. Three game fish and one non-game fish species were collected. These included 11 rock bass (*Ambloplites rupestris*), 29 redbreast sunfish (*Lepomis auritus*), four bluegill (*L. macrochirus*), and 25 white suckers (*Catostomus commersoni*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and blacknose dace (*Rhinichthys atratulus*). Together these two species comprised 54.6 % of the total number of fish collected.

Our Index of Biotic Integrity analysis indicated that this stream was in "fair to good" condition based on an IBI score of 46. The derivation of this score was primarily contributed to the overall high percentage of omnivores, the relative lack of riffle species, the high percentage of anomalies, and the relatively low number of headwater intolerant species. Overall, this stream appeared to be suffering from non-point source sedimentation. There was one area in close proximity to our survey site that was being excavated for expansions at Burnett Creek Baptist Church. This work was contributing some sediment to the creek as no erosion control measures had been taken. TDEC was notified of the situation and they in turn notified the church, explaining corrective actions for the construction site.

Benthic macroinvertebrates from our sample included Baetidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies, Capniidae/Leuctridae and Perlidae stoneflies, Hydropsychidae, Limnephilidae, and Uenoidae caddisflies.

Ephemeropterans were the most abundant organisms in our survey, comprising 30.2% of the total sample. Trichopterans were second most abundant with 26.9%. Plecopterans accounted for 2.6%, while coleopterans and odonates contributed 16.4% and 7.7% , respectively. A total of 40 taxa was collected from this site of which 15 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Burnett Creek was assigned a bioclassification of "fair to good".

Our evaluation of the physical instream habitat and the riparian zone indicated that this portion of Burnett Creek could be categorized as sub-optimal (mean score 120) as much of the substrate had been impacted by fine sediment. Some of the riparian zone had been removed from the stream bank, especially in the vicinity of the church construction.

Management Recommendations:

1. Any action that would address non-point source pollution in the watershed would be of benefit to the stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BURNETT CREEK
WATERSHED	FRENCH BROAD RIVER
SITE	@ BURNETT CK BAPTIST
COUNTY	KNOX
QUADRANGLE	SHOOKS GAP 147 NE
LAT-LONG	355540N-834938W
REACH	06010107-
LENGTH	~ 600 FT
AREA (SQ. MI.)	2.8
ELEVATION	860 FT
DATE	6-15-95
TIME	1145

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
20.9	0.8	1.8

2. ESTIMATED % OF STREAM IN POOLS IS 60

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	10	20	25	15	10

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	10	25	10	40

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
20 %	30 %	50 %

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) 3.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND MILD; AIR TEMP. 72 F @ 1200

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

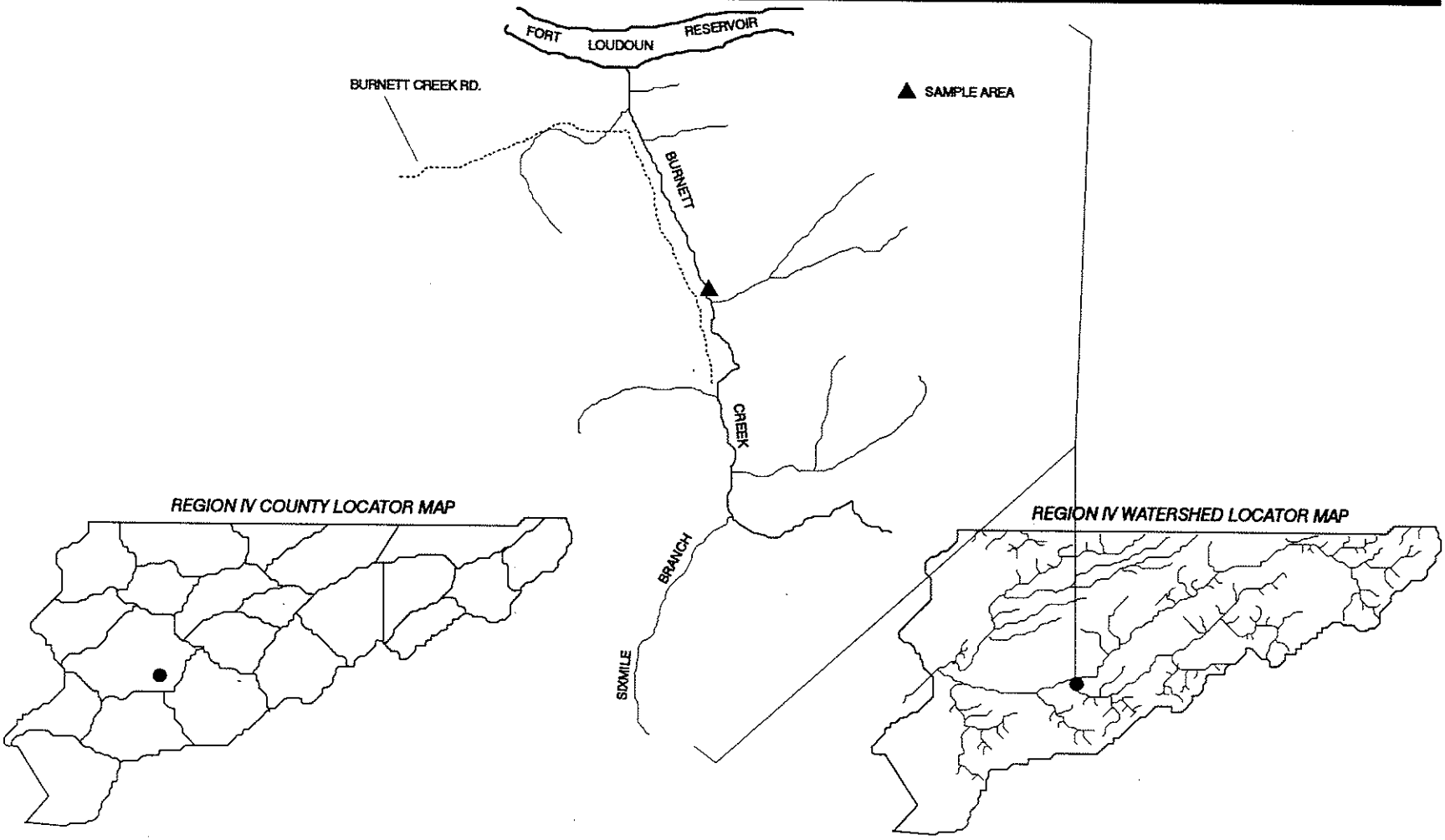
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	64 F	390	10.0	105.5

12. COMMENTS

SAMPLED UPSTREAM AND DOWNSTREAM OF BURNETT CREEK BAPTIST CHURCH. CONSTRUCTION WORK JUST UPSTREAM OF CHURCH WAS IMPACTING STREAM. TDEC NOTIFIED.

13. X HABITAT ASSESSMENT SCORE 120



BURNETT CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10 FT SEINE AND ONE BACKPACK UNIT

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	11	3-8	1.5	
Campostoma anomalum	45	111			
Catostomus commersoni	195	25			
Etheostoma kennicotti	418	24			
Etheostoma simoterum	435	80			
Lepomis auritus	346	29	2-8	2.3	
Lepomis macrochirus	351	4	3-5	0.2	
Notropis stramineus	137	12			
Pimephales notatus	176	3			
Rhinichthys atratulus	184	117			
Semotilus atromaculatus	188	1			
		SUM: 417			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<4	4-8	>8	12	10	5	
NUMBER OF RIFFLE SP.	<2	2	>2	4	1	1	
NUMBER OF POOL SP.	<2	2-4	>4	7	6	5	
% DOMINANCE (COMBINED % OF TWO MOST DOMINANT SP.)	>85	85-73	<73		58.7	5	
NUMBER OF INTOLERANT HEADWATER SP.	<2	2	>2	4	0	1	
PERCENT OF INDIVIDUALS AS TOLERANT	>38	38-19	<19		6.7	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>50	50-25	<25		35.8	3	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<8	8-17	>17		29.8	5	
PERCENT OF INDIVIDUALS AS PISCIVORES	0	Tr	>1		2.8	5	
CATCH RATE	<35	35-70	>70		96.6	5	
PERCENT OF INDIVIDUALS AS SIMPLE LITHOPHILIC SPAWNERS	<25	25-50	>50		66.4	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		5.9	1	
						46	**FAIR-GOOD**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

BURNETT CREEK BENTHIC DATA **TAXA RICHNESS = 40**
FIELD COLLECTION # 675 **EPT TAXA RICHNESS = 15**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = FAIR-GOOD**

TAXA			NUMBER	PERCENT
ANNELIDA				0.2
	Oligochaeta		1	
COLEOPTERA				16.4
	Elmidae	*Dubiraphia* adults	4	
		Macronychus glabratus adults	2	
		Microcylloepus pusillus adults	2	
		Optioservus larvae,adults	7	
		Stenelmis larvae,adults	43	
	Psephenidae	*Psephenus herricki* larvae,adults	12	
DIPTERA				4.7
	Chironomidae		10	
	Tabanidae	*Tabanus*	3	
	Tipuliidae	*Antocha*	2	
		Hexatoma	3	
		Tipula	2	
EPHEMEROPTERA				30.2
	Baetidae	*Baetis*	9	
	Ephemeridae	*Ephemera*	1	
	Heptageniidae	*Heptagenia*	16	
		Stenacron	9	
		Stenonema	41	
		Stenonema mediopunctatum	5	
	Leptophlebiidae	*Habrophlebiodes*	4	
	Oligoneuriidae	*Isonychia*	39	
HEMIPTERA				4.2
	Gerridae	*Gerris remigis*	11	
	Veliidae	*Rhagovelia obesa*	7	
ISOPODA				3.3
	Asellidae	*Lirceus*	14	
MEGALOPTERA				3.3
	Corydalidae	*Corydalus cornutus*	10	
		Nigronia serricornis	4	
ODONATA				7.7
	Aeshnidae	*Boyeria vinosa*	2	
	Calopterygidae	*Calopteryx*	2	
	Coenagrionidae	*Argia*	11	
	Cordulegastridae	*Cordulegaster maculata*	14	
	Corduliidae	*Somatochlora*	1	
	Gomphidae	*Gomphus lividus*	1	
		Lanthus early instars	2	
PELECYPODA				0.5
	Corbiculidae	*Corbicula fluminea*	2	
PLECOPTERA				2.6
	Capniidae/Leuctridae		2	
	Perlidae	*Perlesta*	9	
TRICHOPTERA				26.9
	Hydropsychidae	*Cheumatopsyche*	47	
		Diplectrona modesta	1	
		Hydropsyche betteni/depravata	59	
	Limnephilidae	*Pycnopsyche*	1	
	Uenoidae	*Neophylax*	7	
		TOTAL	**422**	

Jockey Creek

One IBI fishery survey was conducted on Jockey Creek in June 1995:

Location and Length - Tributary to Big Limestone Creek (Nolichucky River). The sample area was located at bridge entrance of Estepp meat processing across from Mt. Bethel Church. Sampling was conducted upstream and downstream of the bridge. The sample site was approximately 600 ft in length and was sampled on 25 June 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 100 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 181 fish representing 10 species was collected in our survey. Four game fish and two non-game fish species were collected. These included two rock bass (*Ambloplites rupestris*), nine redbreast sunfish (*Lepomis auritus*), one bluegill (*L. macrochirus*), four largemouth bass (*Micropterus salmoides*), 52 white suckers (*Catostomus commersoni*), and 12 northern hogsuckers (*Hypentelium nigricans*). The most abundant forage species were snubnose darter (*Etheostoma simoterum*) and warpaint shiner (*Luxilus coccogenis*). Together these two species comprised 50.8% of the total number of fish collected. Of special interest was the collection of a warpaint shiner that measured 6.1 inches total length. This collection represents a new length record for this species as previous records indicate a maximum total length of 4.7 inches (Etnier and Starnes 1993).

Our Index of Biotic Integrity analysis indicated that this stream was in "poor" condition based on an IBI score of 34. The strongest negative influences on the overall score were the lack of darter species, the low number of intolerant species, the high percentage of tolerant species and omnivores in the population, and the low catch rate. It was obvious that this stream was suffering from some type of organic enrichment as filamentous algae was quite abundant in the stream. Further investigation revealed a few dairy operations upstream of our survey site. This in combination with the extensive agriculture being conducted in the watershed has undoubtedly had an adverse effect on this stream.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Hydropsychidae and Uenoidae caddisflies. Unsurprisingly no stoneflies were collected. Trichopterans were the most abundant organisms in our survey, comprising 49.1% of the total sample. Of special interest was the occurence of the caddisfly *Hydropsyche rotosa* which was abundant at this site. The collection of this species in this stream brings the documented distribution to 10 streams within three watersheds. Ephemeropterans were second most abundant with 15.5%. Dipterans and isopods each contributed 8.8%to the overall sample. Gastropods included representatives from the families Ancylidae, Physidae, and Pleuroceridae. A total of 34 taxa was collected from this site of which 10 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Jockey Creek was assigned a bioclassification of "fair to good" even though many of the EPT taxa were more tolerant forms

Our habitat evaluation indicated that this stream could be categorized as sub-optimal based on a index score of 117. Agricultural run-off and sedimentation were the most notable factors governing this stream.

Management Recommendations:

1. Any action that could address protection of riparian zones and effluent from agricultural operations would be of benefit to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	JOCKEY CREEK
WATERSHED	NOLICHUCKY RIVER
SITE	@ MT. BETHEL CHURCH
COUNTY	GREENE
QUADRANGLE	CHUCKEY 190 NW
LAT-LONG	361402N-823852W
REACH	06010108-80.0
LENGTH	~ 600 FT
AREA (SQ. MI.)	17.0
ELEVATION	1450 FT
DATE	6-25-95
TIME	1030

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER
C.E. WILLIAMS AND J. McAFEE

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
46.5	1.0	1.8

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
30	15	15	20	10	10

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	15	5	20	10	40

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
30 %	30 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 14.6 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 78 F @ 1033

10. PAST WEATHER (last 24 hrs)

SUNNY WITH SCATTERED T-STORMS

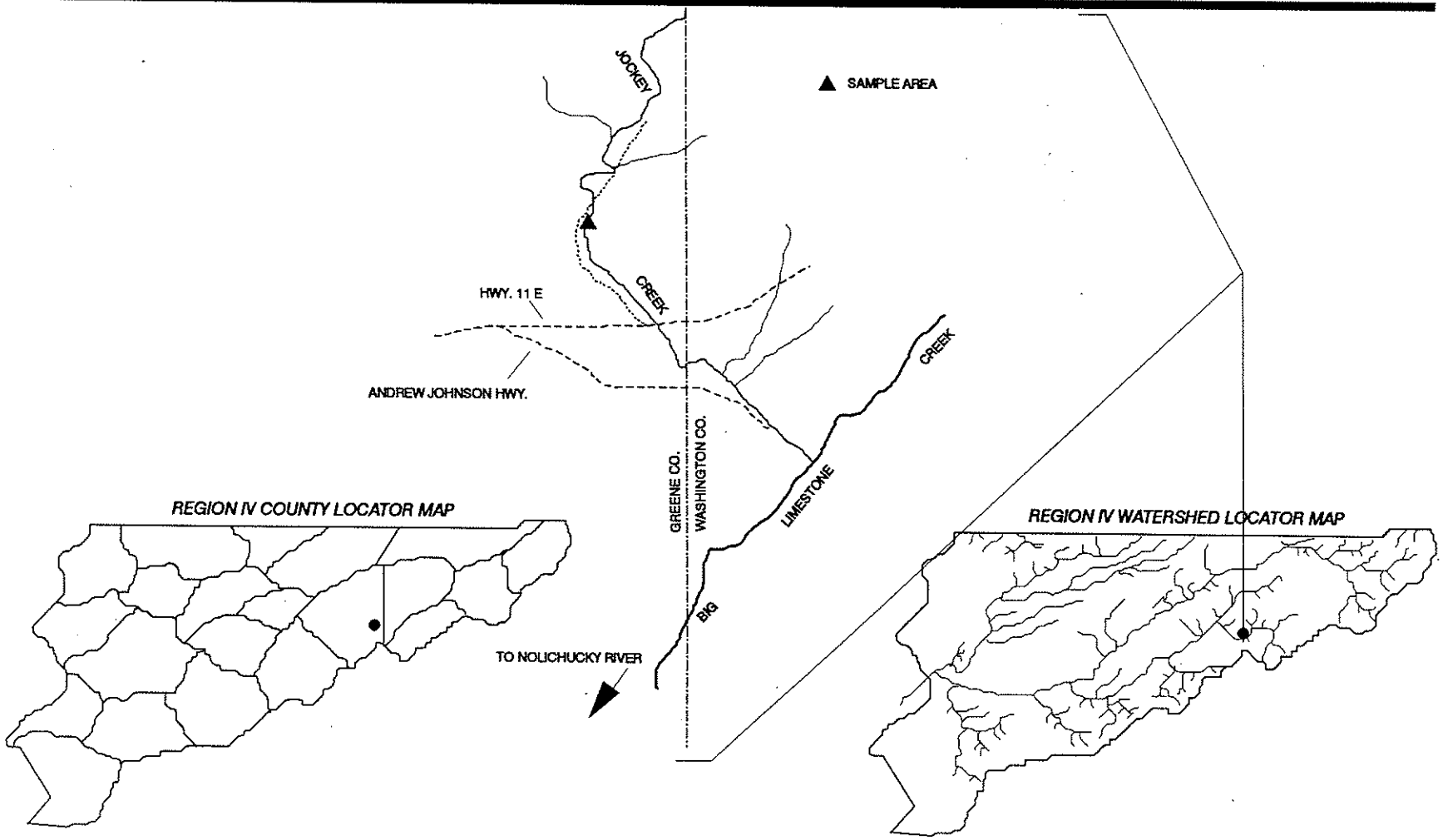
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
8.0	69 F	385	8.1	89.0

12. COMMENTS

SAMPLE STATION LOCATED @ ESTEPP SLAUGHTER. HOUSE ACROSS FROM MT. BETHEL CHURCH. WATER TURBID AT TIME OF SAMPLE. SEVERAL DAIRY FARMS UPSTREAM OF SITE. ALGAE ABUNDANT.

13. X HABITAT ASSESSMENT SCORE 117



JOCKEY CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	2	5-7	0.4	
Catostomus commersoni	195	52			
Cottus carolinae	322	6			
Etheostoma simoterum	435	82			
Hypentelium nigricans	207	12			
Lepomis auritus	346	9	4-7	1.4	
Lepomis macrochirus	351	1	4	0.05	
Luxilus coccogenis	90	10			
Micropterus salmoides	364	4	5-7	0.4	
Nocomis micropogon	110	3			
		SUM: 181			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<9	9 -17	>17	27	9	3
NUMBER OF DARTER SP.	<2	2-3	>3	6	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2	>2	4	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>31	31-15	<15		30.2	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>40	40-20	<20		31.9	3
PERCENT OF INDIVIDUALS AS SPECIALISTS	<17	17-34	>34		53.4	5
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		3.4	3
CATCH RATE	<22	22-45	>45		9.9	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		4.6	3
						34 **POOR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

JOCKEY CREEK BENTHIC DATA
FIELD COLLECTION # 687
EFFORT = 3.0 PERSON HOURS

TAXA RICHNESS = 34
EPT TAXA RICHNESS = 10
BIOCLASSIFICATION = FAIR-GOOD

TAXA			NUMBER	PERCENT
ANNELIDA				0.3
	Oligochaeta		2	
COLEOPTERA				6.6
	Elmidae	*Dubiraphia* adults	3	
		Macronychus glabratus adults	5	
		Microcylloepus pusillus larvae,adults	4	
		Stenelmis larvae,adults	26	
	Hydrophilidae adult		1	
DIPTERA				8.8
	Chironomidae		32	
	Simuliidae		18	
	Tipuliidae	*Hexatoma*	1	
		Tipula	1	
EPHEMEROPTERA				15.5
	Baetidae	*Baetis*	30	
	Ephemerellidae	*Ephemerella*	3	
	Ephemeridae	*Hexagenia*	30	
	Heptageniidae	*Stenacron*	12	
		Stenonema	14	
	Oligoneuriidae	*Isonychia*	2	
GASTROPODA				2.9
	Ancylidae	*Ferrissia*	1	
	Physidae	*Physa*	1	
	Pleuroceridae		15	
HEMIPTERA				1.9
	Corixidae		1	
	Veliidae	*Microvelia* nymph	1	
		Rhagovelia obesa	9	
ISOPODA				8.8
	Asellidae	*Lirceus*	52	
MEGALOPTERA				0.3
	Corydalidae	*Corydalus cornutus*	1	
	Sialidae	*Sialis*	1	
ODONATA				3.6
	Aeshnidae	*Boyeria vinosa*	11	
	Calopterygidae	*Calopteryx*	9	
	Coenagrionidae	*Argia*	1	
PELECYPODA				2
	Corbiculidae	*Corbicula fluminea*	2	
	Sphaeriidae	*Sphaerium*	10	
TRICHOPTERA				49.1
	Hydropsychidae	*Cheumatopsyche*	57	
		Hydropsyche betteni/depravata	209	
		H. rotosa	22	
	Uenoidae	*Neophylax*	1	
		TOTAL	**588**	

South Indian Creek and Spivey Creek

Three fishery IBI surveys were conducted in the South Indian Creek watershed during 1995. Two were conducted in South Indian Creek and one on a tributary (Spivey Creek) to South Indian Creek:

Location and Length - Tributaries to the Nolichucky River. Two sites were selected on South Indian Creek, Site 1 was located near Sandy Bottoms and site 2 at the community of Ernestville. The sample site on Spivey Creek was located ~ 0.25 mi upstream of the mouth. The sample length at the Sandy Bottoms site was ~ 1,740 ft, sample length at the Ernestville site was ~ 1,840 ft, and the estimated sample length of the Spivey Creek sample area was ~ 1,940 ft. Both sites on South Indian Creek were sampled on 22 August 1995. The Spivey Creek site was sampled on 23 August 1995.

Sampling Methodology - These sites were sampled with a 10 and 15 ft seine and one backpack electrofishing unit.

Water Quality - (No water quality data collected)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analyses)

Comments - In 1991 the Tennessee Department of Transportation (TDOT) began road construction on the I-181 connector between Johnson City, TN and Asheville, NC. Cooperative IBI sampling efforts between TWRA, Tennessee Valley Authority (TVA), and the Department of Environment and Conservation (TDEC) were intiated in 1991 to assess impacts to South Indian Creek. Two sites were chosen on South Indian Creek in order to monitor any changes in the fish or benthic community as a result of the road construction. An additional site on Spivey Creek was selected as a control monitoring station. Prior to the initiation of these investigations TDOT construction activities had substantially increased sediment loads to South Indian Creek, which resulted in charges by TDEC for water quality violations (Fagg 1993). Further investigations by Fish and Wildlife Associates, Inc. began in 1992 and have continued through 1994 (Bryan et al. 1995). We revisited the sample sites in 1995 to do follow-up sampling of the benthic and fish communities and to evaluate the relative health of the stream based on IBI criteria established at the initiation of the monitoring.

A total of 691 fish representing 22 species was collected from the Sandy Bottoms site on South Indian Creek. Two game species , rock bass (*Ambloplites rupestris*) and brown trout (*Salmo trutta*) were collected at this site. One non-game species the northern hog sucker (*Hypentelium nigricans*) was also collected here. The two most abundant forage species included the central stoneroller (*Campostoma anomalum*) and Tennessee shiner (*Notropis leuciodus*). Together these two species represented 53.2% of all fish collected. Fish community composition at the Ernestville site within South Indian Creek included a total catch of 442 fish representing 18 species. Two game fish were collected from this site, which included rock bass and rainbow trout (*Oncorhynchus mykiss*). Two non-game species were also collected here. These included the white sucker (*Catostomus commersoni*) and the northern hogsucker. The two most abundant species at this site

were the mottled sculpin (*Cottus bairdi*) and Tennessee shiner. Together these two species accounted for 52.9% of the total number of fish collected.

A total of 559 fish representing 20 species was collected during our survey of Spivey Creek. The 1995 survey is the second survey conducted by TWRA on this stream since the initiation of the monitoring project. Three game species and one non-game species was collected in our sample. These included rock bass, rainbow trout, smallmouth bass (*Micropterus dolomieu*), and northern hogsucker. The two most abundant species collected in Spivey Creek were central stoneroller and saffron shiner (*Notropis rubricroceus*). Together these two species comprised 51.6% of the total number of fish collected. Apparently, rainbow trout were able to reproduce in this stream during 1995 as young-of-the-year (YOY) were collected. The species composition we observed at all three sites in 1995 compares quite well with previous surveys conducted by TVA and TWRA (Bivens and Williams 1990) and those completed by Fish and Wildlife Associates, Inc. (Bryan et al. 1995).

Our Index of Biotic Integrity scores were based on criteria established at the initiation of the monitoring project in 1990. The 1995 scores for the Sandy Bottoms, Ernestville, and Spivey Creek samples were 38, 44, and 54, respectively. The score at each respective site was within the range observed for previous surveys (38-42 Sandy Bottoms, 38-44 Ernestville, and 54 in 1990 for Spivey Creek). Of interest was the improvement of the Ernestville score by six points over the 1994 score which resulted in a classification of "fair" for this site. This was encouraging as this site was closest in proximity to the road construction. The most downstream site (Sandy Bottoms) scored the same as the previous year and was still down four points when compared to the initial score in 1991. Although some of the depression may have been caused by the road construction, it is speculated that this site is being influenced by other non-point source problems given its lower location in the watershed. The Spivey Creek score was identical to the score observed in 1990, unfortunately, there was no data recorded between 1991-94 making trend analysis impossible. Overall, there appeared to be a general trend of degradation at the Sandy Bottoms site form 1991 to 1995. Conversely, the trend for the upstream Ernestville site was one of improvement over the same time period. Given the relative lack of data for Spivey Creek trends could not be ascertained over this time period, however, the scores obtained in 1990 and 1995 would indicate that this stream has remained in good to excellent condition.

Benthic macroinvertebrates from the Sandy Bottoms site of South Indian Creek included Baetidae, Heptageniidae, and Oligoneuriidae mayflies; Leuctridae, Peltoperlidae, Perlidae, Perlodidae, and Pteronarcyidae stoneflies; Hydropsychidae, Hydroptillidae, Leptoceridae, Limnephilidae and Polycentropodidae caddisflies. Trichopterans accounted for the highest percentage (27.7%) of the total sample followed by ephemeropterans (21.8%) and plecopterans (15.9%). Odonates (11.8%) and dipterans (10.5%) were the next most abundant groups in our sample. A total of 44 taxa was collected from this site of which 20 were EPT. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of South Indian Creek was assigned a bioclassification of "good".

Benthic macroinvertebrates from the Ernestville site of South Indian Creek included Baetidae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Peltoperlidae, Perlidae, Perlodidae, and Pteronarcyidae stoneflies; Hydropsychidae,

Hydroptillidae, Polycentropodidae, Rhyacophilidae, and Uenoidae caddisflies. Trichopterans accounted for the highest percentage (31.8%) of the total sample followed by ephemeropterans (19.7%) and plecopterans (14.6%). Odonates (10.2%) and coleopterans (9.6%) were the next most abundant groups in our sample. A total of 38 taxa was collected from this site of which 20 were EPT. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of South Indian Creek was assigned a bioclassification of "good".

Benthic macroinvertebrates from our sample of Spivey Creek included Baetidae, Ephemerellidae, Heptageniidae, Neoephemeridae, and Oligoneuriidae mayflies; Leuctridae, Peltoperlidae, Perlidae, Perlodidae, and Pteronarcyidae stoneflies; Hydropsychidae, Hydroptillidae, Leptoceridae, Limnephilidae, Philopotamidae, and Rhyacophilidae caddisflies. Trichopterans accounted for the highest percentage (28.1%) of total sample followed by ephemeropterans (19.9%) and plecopterans (19.1%). Odonates (9.8%) and dipterans (9.0%) were the next most abundant groups in our sample. A total of 44 taxa was collected from this site of which 23 were EPT. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Spivey Creek was assigned a bioclassification of "good".

Based on the available data there appears to be no significant impact to South Indian Creek as a result of the road construction. Based on the stability of the fish and benthic assemblages in South Indian Creek. The continuing development of the watershed and the lack of pre-construction data make it difficult to associate any observed declines in IBI scores or benthic community diversity to the road construction. However, it does appear that there has been a slight overall improvement in the IBI scores at the Ernestville site (site closest to construction) and an overall increase in the individual distribution among benthic macroinvertebrate taxa in South Indian Creek (Bryan et al. 1995).

Management Recommendations:

1. Follow-up monitoring may be beneficial to ascertain any improvements that may occur following the completion of construction and the stabilization of the riparian zones in the watershed.

2. Any action addressing protection of riparian zones and non-point source pollution would be of benefit to this watershed.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	SOUTH INDIAN CREEK
WATERSHED	NOLICHUCKY RIVER
SITE	SANDY BOTTOMS
COUNTY	UNICOI
QUADRANGLE	CHESTOA 199 SW
LAT-LONG	360700N-822742W
REACH	06010108-13.0
LENGTH	~ 1000 FT
AREA (SQ. MI.)	76.1
ELEVATION	1740 FT
DATE	8-22-95
TIME	N/A

COLLECTOR(S)

D. McKINNEY, R. KIRK, D. WILSON, R. BIVENS, M. FAGG, C. WILLIAMS, B. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
N/A	N/A	N/A

2. ESTIMATED % OF STREAM IN POOLS IS N/A

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
N/A	N/A	N/A	N/A	N/A	N/A

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
N/A	N/A	N/A	N/A	N/A	N/A

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
N/A %	N/A %	N/A %

7. SHADE OR CANOPY COVER GOOD OVER N/A %

8. FLOW (CFS) N/A COMPARED TO NORMAL (LOW / NORMAL / HIGH)

9. PRESENT WEATHER

N/A

10. PAST WEATHER (last 24 hrs)

N/A

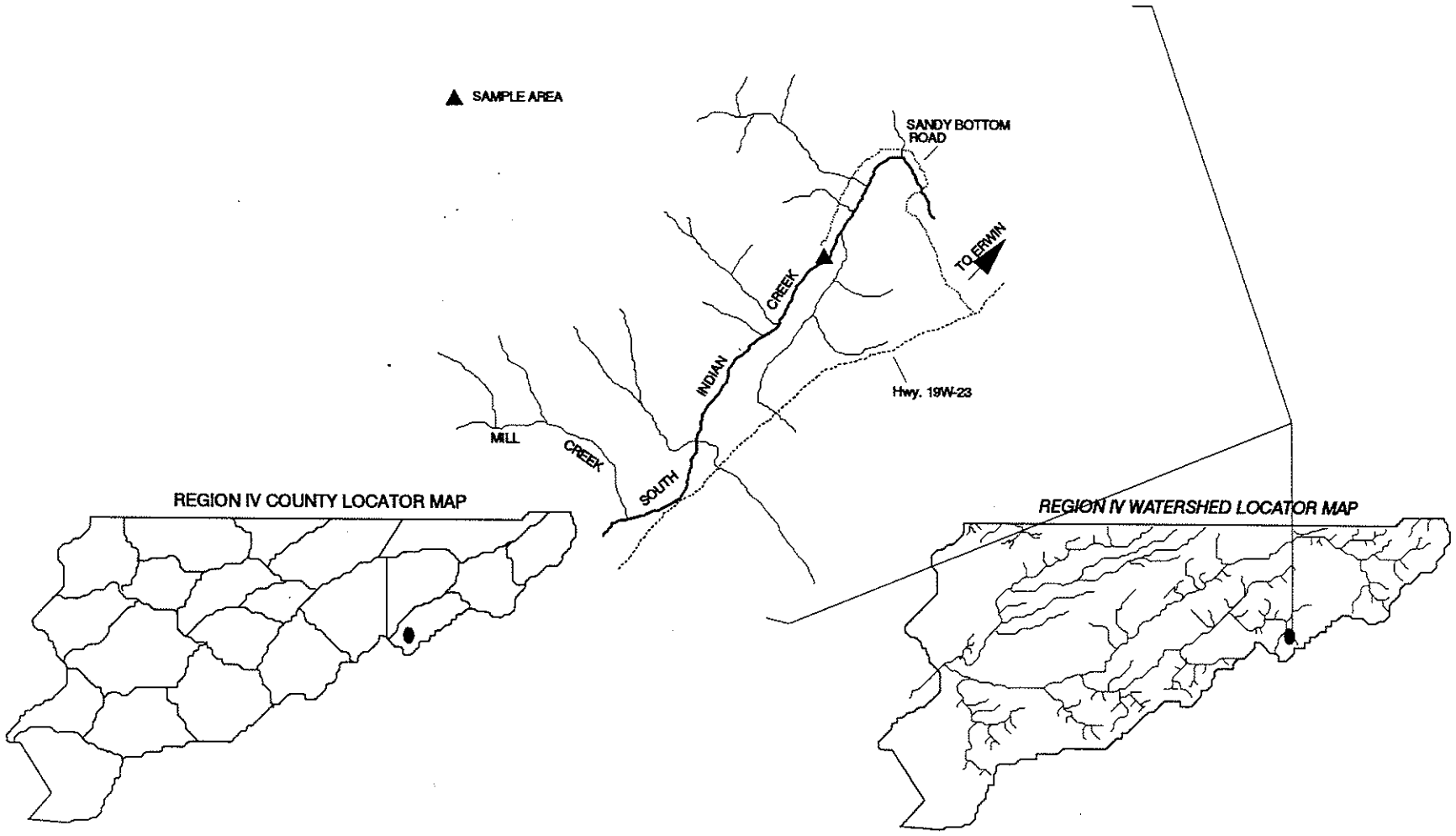
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
N/A	N/A	N/A	N/A	N/A

12. COMMENTS

THIS WAS PART OF THE CONTINUING MONITORING TO ASSESS IMPACTS TO SOUTH INDIAN CREEK AS A RESULT OF HIGHWAY CONSTRUCTION. NO PHYSICOCHEMICAL DATA COLLECTED.

13. X HABITAT ASSESSMENT SCORE N/A



SOUTH INDIAN CREEK FISH DATA (SANDY BOTTOMS)

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	4	3-5		
Campostoma anomalum	45	229			
Cottus bairdi	321	97			
Cyprinella galactura	54	18			
Erimystax insignis	68	9			
Etheostoma blennioides	398	4			
Etheostoma chlorobranchium	403	9			
Etheostoma flabellare	411	4			
Etheostoma simoterum	435	4			
Etheostoma swannanoa	442	1			
Hybopsis amblops	79	13			
Hypentelium nigricans	207	36			
Luxilus coccogenis	90	23			
Nocomis micropogon	110	23			
Notropis leuciodus	128	139			
Notropis rubellus	131	4			
Notropis telescopus	138	17			
Percina evides	467	38			
Phenacobius crassilabrum	157	5			
Rhinichthys atratulus	184	3			
Rhinichthys cataractae	185	10			
Salmo trutta	284	1	12		
	SUM:	691			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<13	13-25	>25	39	21	3
NUMBER OF DARTER SP.	<4	4-7	>7	11	6	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	1	1
NUMBER OF SUCKER SP.	<2	2	>2	3	1	1
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		0	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>30	30-15	<15		4.6	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		39.6	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-5	>5		0.7	1
CATCH RATE	<8	8-16	>16		32.9	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		10.5	1
					38	**POOR-FAIR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

SOUTH INDIAN CK (SANDY BOTTOMS) TAXA RICHNESS = 44
FIELD COLLECTION # 708 EPT TAXA RICHNESS = 20
EFFORT = 2.0 PERSON HOURS BIOCLASSIFICATION = GOOD

TAXA			NUMBER	PERCENT
COLEOPTERA				5.5
	Dryopidae	*Helichus* adults	5	
	Elmidae	*Macronychus glabratus* adults	1	
	Gyrinidae	*Dineutus discolor*	3	
	Psephenidae	*Psephenus herricki* larvae, adults	3	
DIPTERA				10.5
	Athericidae	*Atherix lantha*	8	
	Blephariceridae	*Blepharicera*	1	
	Chironomidae		9	
	Simuliidae		5	
EPHEMEROPTERA				21.8
	Baetidae	*Baetis*	7	
	Heptageniidae	*Heptagenia*	2	
		Stenonema	25	
		Stenonema ithaca	5	
	Oligoneuriidae	*Isonychia*	9	
GASTROPODA				1.4
	Planorbidae		2	
	Physidae	*Physa*	1	
HEMIPTERA				1.4
	Veliidae	*Rhagovelia obesa*	3	
HYDRACARINA			2	0.9
MEGALOPTERA				3.2
	Corydalidae	*Corydalus cornutus*	4	
		Nigronia serricornis	2	
	Sialidae	*Sialis*	1	
ODONATA				11.8
	Aeshnidae	*Basiaeschna janata*	1	
		Boyeria vinosa	6	
	Calopterygidae	*Calopteryx*	9	
	Gomphidae	*Gomphus* early instar	1	
		Hagenius brevistylus	1	
		Lanthus vernalis	1	
		Stylogomphus albistylus	4	
		Stylurus scudderi	1	
		S. spiniceps	1	
	Macromiidae	*Macromia* early instar	1	
PLECOPTERA				15.9
	Leuctridae	*Leuctra*	2	
	Peltoperlidae	*Peltoperla*	6	
	Perlidae	*Acroneuria abnormis*	5	
		Paragnetina immarginata	11	
	Perlodidae	*Malirekus hastatus*	1	
	Pteronarcyidae	*Pteronarcys*	10	
TRICHOPTERA				27.7
	Hydropsychidae	*Ceratopsyche bronta*	23	
		C. chelonis	1	
		C. morosa	5	
		C. sparna	27	
	Hydroptilidae	*Leucotrichia*	1	
	Leptoceridae	*Oecetis* (prob. *inconspicua*)	1	
		Triaenodes	1	
	Limnephilidae	*Pycnopsyche pupa*	1	
	Polycentropodidae	*Polycentropus*	1	
		TOTAL	**220**	

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	SOUTH INDIAN CREEK
WATERSHED	NOLICHUCKY RIVER
SITE	ERNESTVILLE
COUNTY	UNICOI
QUADRANGLE	FLAG POND 190 SE
LAT-LONG	360415N-823007W
REACH	06010108-13.1
LENGTH	~ 1200 FT
AREA (SQ. MI.)	58.4
ELEVATION	1840 FT
DATE	8-22-95
TIME	N/A

COLLECTOR(S)

D. McKINNEY, R. KIRK, D. WILSON, R. BIVENS, C. WILLIAMS, M. FAGG, B. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
N/A	N/A	N/A

2. ESTIMATED % OF STREAM IN POOLS IS N/A

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
N/A	N/A	N/A	N/A	N/A	N/A

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
N/A	N/A	N/A	N/A	N/A	N/A

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
N/A %	N/A %	N/A %

7. SHADE OR CANOPY COVER GOOD OVER N/A %

8. FLOW (CFS) N/A COMPARED TO NORMAL (LOW / NORMAL / HIGH)

9. PRESENT WEATHER

N/A

10. PAST WEATHER (last 24 hrs)

N/A

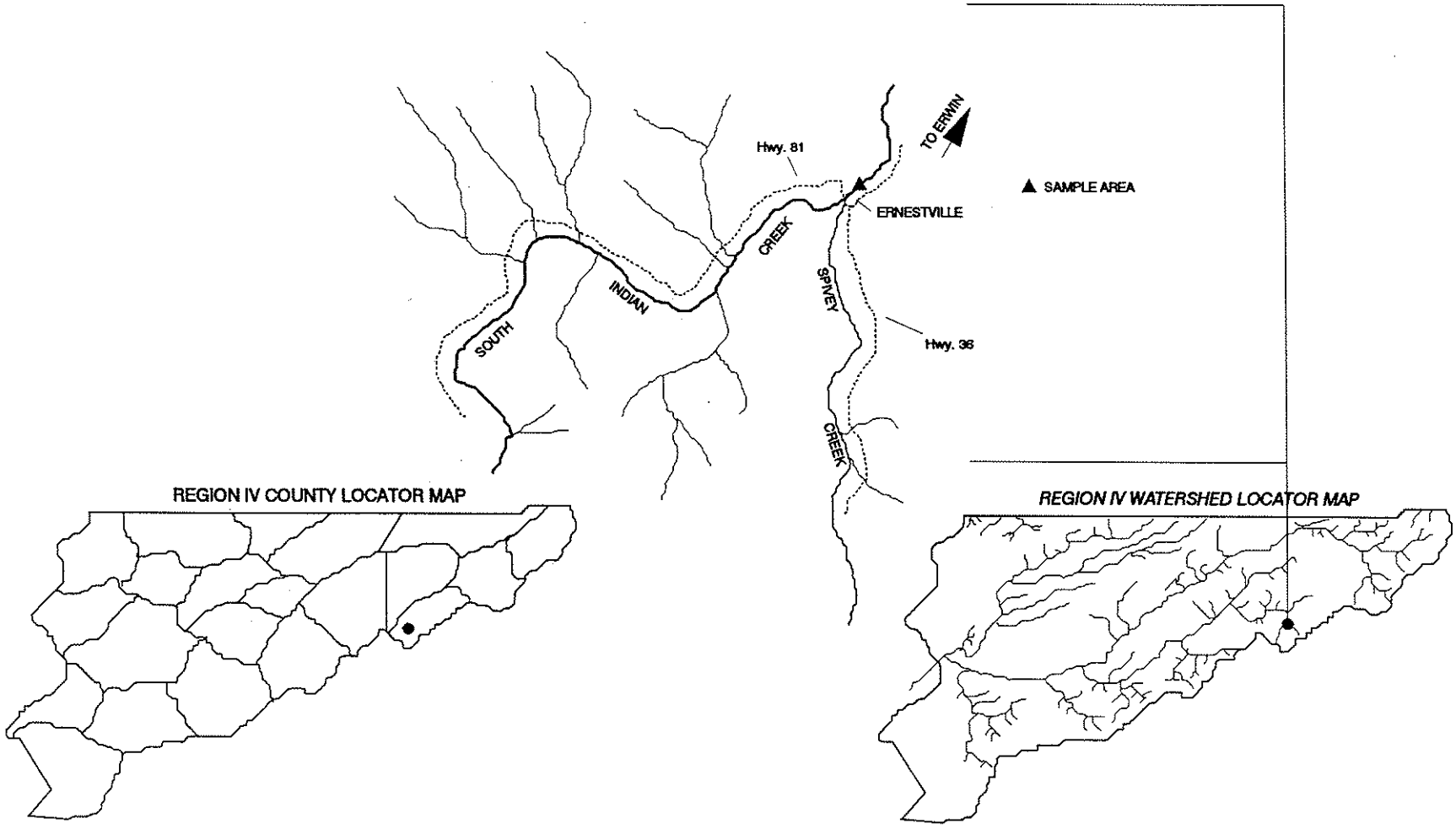
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
N/A	N/A	N/A	N/A	N/A

12. COMMENTS

THIS WAS PART OF THE CONTINUING MONITORING TO EVALUATE HIGHWAY CONSTRUCTION IMPACTS TO SOUTH INDIAN CREEK. NO PHYSICOCHEMICAL DATA WAS COLLECTED.

13. X HABITAT ASSESSMENT SCORE N/A



SOUTH INDIAN CREEK FISH DATA (ERNESTVILLE)

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Amblopites rupestris	342	3	5-6		
Campostoma anomalum	45	33			
Catostomus commersoni	195	1			
Cottus bairdi	321	182			
Etheostoma blennioides	398	1			
Etheostoma chlorobranchium	403	6			
Etheostoma simoterum	435	4			
Hybopsis amblops	79	1			
Hypentelium nigricans	207	8			
Luxilus coccogenis	90	27			
Nocomis micropogon	110	18			
Notropis leuciodus	128	52			
Notropis rubricroceus	132	44			
Notropis telescopus	138	48			
Oncorhynchus mykiss	279	1	3		
Percina evides	467	1			
Rhinichthys atratulus	184	5			
Rhinichthys cataractae	185	7			
	SUM:	442			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<13	13-25	>25	39	17	3
NUMBER OF DARTER SP.	<4	4-7	>7	11	4	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	1	1
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		0.2	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>30	30-15	<15		4.2	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		44.3	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-5	>5		0.6	1
CATCH RATE	<8	8-16	>16		24.5	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		1.5	5
					44	**FAIR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

SOUTH INDIAN CREEK (ERNESTVILLE) TAXA RICHNESS = 38
FIELD COLLECTION # 709 EPT TAXA RICHNESS = 20
EFFORT = 2.0 PERSON HOURS BIOCLASSIFICATION = GOOD

TAXA			NUMBER	PERCENT
ANNELIDA				0.6
	Oligochaeta		1	
COLEOPTERA				9.6
	Dryopidae	*Helichus* adults	10	
	Elmidae	*Macronychus glabratus*	1	
	Psephenidae	*Psephenus herricki*	4	
DIPTERA				8.3
	Athericidae	*Atherix lantha*	5	
	Chironomidae		3	
	Simuliidae		5	
EPHEMEROPTERA				19.7
	Baetidae	*Baetis*	5	
		Centroptilum	1	
	Heptageniidae	*Epeorus*	2	
		Heptagenia	1	
		Stenacron	2	
		Stenonema	12	
		S. ithaca	2	
	Leptophlebiidae	*Habrophleboides*	1	
	Oligoneuriidae	*Isonychia*	5	
GASTROPODA				0.6
	Pleuroceridae		1	
HEMIPTERA				1.3
	Veliidae	*Rhagovelia obesa*	3	
MEGALOPTERA				3.2
	Corydalidae	*Corydalus cornutus*	3	
		Nigronia serricornis	1	
	Sialidae	*Sialis*	1	
ODONATA				10.2
	Aeshnidae	*Boyeria vinosa*	8	
	Calopterygidae	*Calopteryx*	5	
	Gomphidae	*Lanthus vernalis*	2	
		Stylogomphus albistylus	1	
PLECOPTERA				14.6
	Peltoperlidae	*Peltoperla*	4	
	Perlidae	*Acroneuria abnormis*	2	
		A. carolinensis	2	
		Paragnetina immarginata	7	
		P. media	1	
	Perlodidae	*Malirekus hastatus*	1	
	Pteronarcyidae	*Pteronarcys*	7	
TRICHOPTERA				31.8
	Hydropsychidae	*Ceratopsyche bronta*	24	
		C. morosa	3	
		C. sparna	14	
	Hydroptilidae	*Leucotrichia*	2	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhyacophila fuscula* pupae	3	
	Uenoidae	*Neophylax*	1	
		TOTAL	**157**	

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	SPIVEY CREEK
WATERSHED	NOLICHUCKY RIVER
SITE	NEAR MOUTH
COUNTY	UNICOI
QUADRANGLE	FLAG POND 190 SE
LAT-LONG	360400N-823005W
REACH	06010108-62,0
LENGTH	~ 1200 FT
AREA (SQ. MI.)	17.7
ELEVATION	1940 FT
DATE	8-23-95
TIME	0930

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, R. KIRK,
C.E. WILLIAMS, AND D. WILSON

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
N/A	N/A	N/A

2. ESTIMATED % OF STREAM IN POOLS IS N/A

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
N/A	N/A	N/A	N/A	N/A	N/A

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
N/A	N/A	N/A	N/A	N/A	N/A

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
N/A %	N/A %	N/A %

7. SHADE OR CANOPY COVER GOOD OVER N/A %

8. FLOW (CFS) N/A COMPARED TO NORMAL (LOW / NORMAL / HIGH)

9. PRESENT WEATHER

N/A

10. PAST WEATHER (last 24 hrs)

N/A

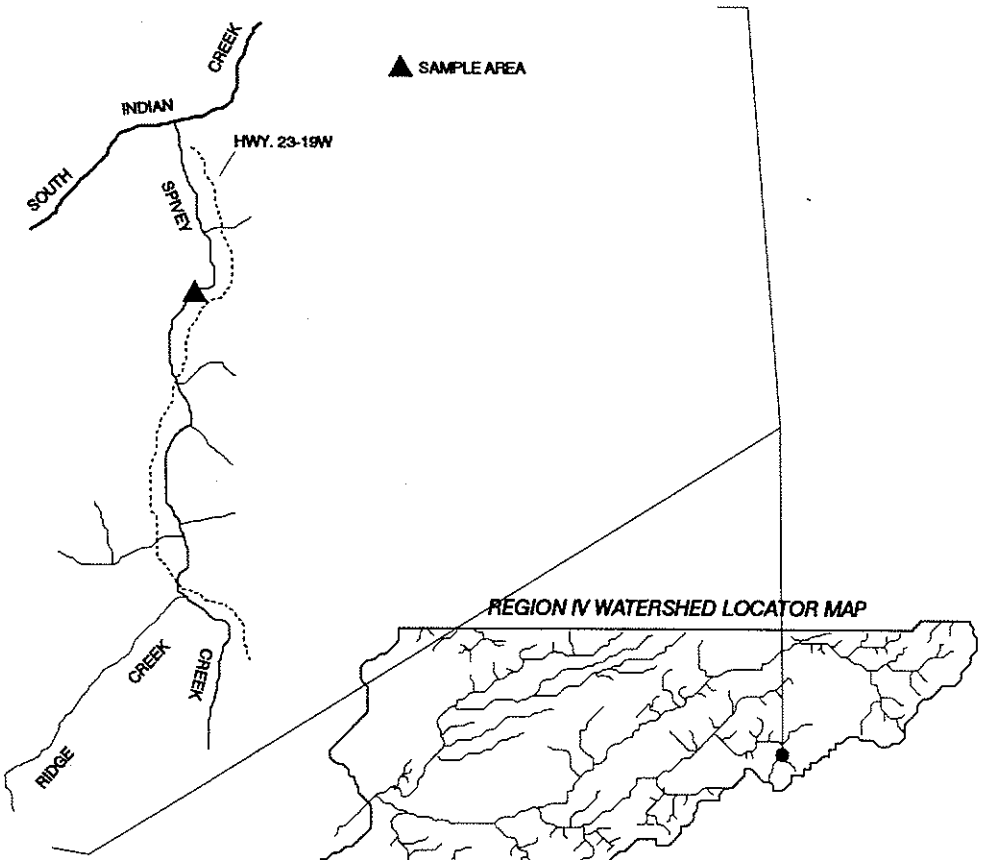
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
N/A	N/A	N/A	N/A	N/A

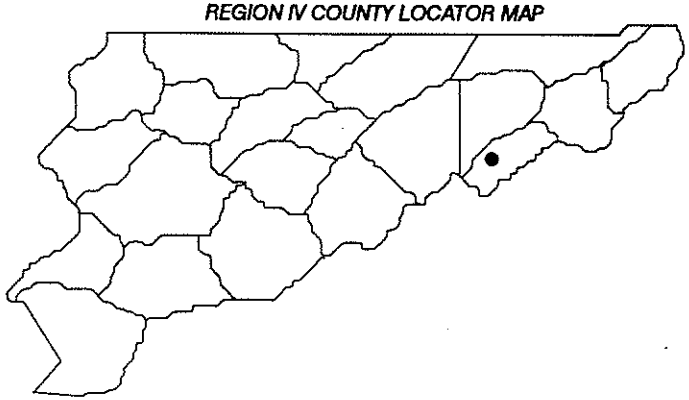
12. COMMENTS

THIS SURVEY WAS PART OF THE MONITORING PROGRAM ASSESSING THE IMPACTS OF ROAD CONSTRUCTION TO SOUTH INDIAN CREEK.

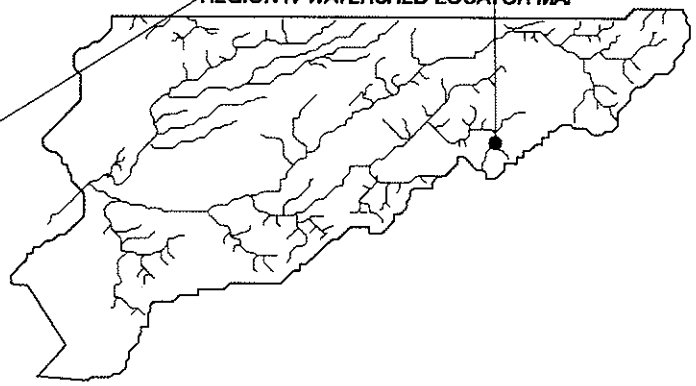
13. X HABITAT ASSESSMENT SCORE N/A



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



SPIVEY CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10 FT SEINE AND ONE BACKPACK UNIT

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	5	4 > 5"		
Campostoma anomalum	45	139			
Cottus bairdi	321	70			
Cyprinella galactura	54	1			
Etheostoma blennioides	398	1			
Etheostoma chlorobranchium	403	3			
Etheostoma flabellare	411	2			
Etheostoma simoterum	435	13			
Etheostoma swannanoa	442	15			
Hybopsis amblops	79	3			
Hypentelium nigricans	207	12			
Luxilus coccogenis	90	64			
Micropterus dolomieu	362	3	7		only one length recorded
Nocomis micropogon	110	38			
Notropis leuciodus	128	4			
Notropis rubricroceus	132	150			
Notropis telescopus	138	19			
Oncorhynchus mykiss	279	8	3-13		
Rhinichthys atratulus	184	5			
Rhinichthys cataractae	185	4			
		SUM: 559			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<7	7-13	>13	21	19	5
NUMBER OF DARTER SP.	<2	2	>2	4	5	5
NUMBER OF SUNFISH SP. *less Micropterus*	0		1	1	1	5
NUMBER OF SUCKER SP.	<2	2	>2	3	1	1
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>59	59-30	<30		0	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		6.8	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<16	16-32	>32		51.3	5
PERCENT OF INDIVIDUALS AS PISCIVORES	0	Tr	>1		1.4	5
CATCH RATE	<8	8-16	>16		23.9	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.9	5
					54	**GOOD-EXCELLENT**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

SPIVEY CREEK BENTHIC DATA
FIELD COLLECTION # 710
EFFORT = 2.0 PERSON HOURS

TAXA RICHNESS = 44
EPT TAXA RICHNESS = 23
BIOCLASSIFICATION = GOOD

TAXA			NUMBER	PERCENT
COLEOPTERA				7.4
	Dryopidae	*Helichus* adults	4	
	Elmidae	*Macronychus glabratus larvae,adults*	6	
		Optioservus adult	1	
	Psephenidae	*Psephenus herricki*	7	
	Ptilodactylidae	*Anchytarsus bicolor*	1	
DIPTERA				9
	Athericidae	*Atherix lantha*	6	
	Blephariceridae	*Blepharicera*	2	
	Chironomidae		5	
	Simuliidae		7	
	Tipuliidae	*Antocha*	3	
EPHEMEROPTERA				19.9
	Baetidae		1	
		Baetis	4	
	Ephemerellidae	*Eurylophella*	2	
	Heptageniidae	*Epeorus*	4	
		E. rubidus/subpallidus	14	
		Stenonema	8	
		S. ithaca	2	
	Neoephemeridae	*Neoephermera purpurea*	1	
	Oligoneuriidae	*Isonychia*	15	
GASTROPODA				3.9
	Physidae	*Physa*	2	
	Pleuroceridae		8	
HEMIPTERA				0.4
	Veliidae	*Rhagovelia obesa* nymph	1	
MEGALOPTERA				2
	Corydalidae	*Corydalus cornutus*	4	
		Nigronia serricornis	1	
NEMATOMORPHA				0.4
	Gordioidea		1	
ODONATA				9.8
	Aeshnidae	*Boyeria vinosa*	7	
	Calopterygidae	*Calopteryx*	12	
	Cordulegastridae	*Cordulegaster* early instar	2	
	Gomphidae	*Lanthus vernalis*	1	
		Stylogomphus albistylus	3	
PLECOPTERA				19.1
	Leuctridae		2	
	Peltoperlidae	*Peltoperla*	8	
	Perlidae	*Acroneuria abnormis*	5	
		A. carolinensis	1	
		Paragnetina immarginata	23	
	Perlodidae	*Malirekus/Yugus*	1	
	Pteronarcyidae	*Pteronarcys*	9	
TRICHOPTERA				28.1
	Hydropsychidae	*Ceratopsyche bronta*	13	
		C. morosa	2	
		C. sparna	35	
		Cheumatopsyche	3	
	Hydroptilidae	*Leucotrichia*	2	
	Leptoceridae	*Triaenodes*	2	
	Limnephilidae	*Pycnopsyche*	8	
	Philopotamidae	*Dolophilodes distinctus*	5	
	Rhyacophilidae	*Rhyacophila fuscula*	2	
		TOTAL	**256**	

Little Flat Creek

One IBI fishery survey was conducted on Little Flat Creek in June 1995:

Location and Length - Tributary to the Holston River. The sample area was located at the bridge crossing on Idumea Road. The sample area extended upstream and downstream of the bridge and was approximately 1,400 ft in length. The site was sampled on 30 June 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 100 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 235 fish representing 19 species was collected in our survey. Three game fish and three non-game fish species were collected. These included 23 rock bass (*Ambloplites rupestris*), 25 redbreast sunfish (*Lepomis auritus*), and six bluegill (*L. macrochirus*), one white sucker (*Catostomus commersoni*), six northern hogsuckers (*Hypentelium nigricans*), and two black redhorse (*Moxostoma duquesnei*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocephalus*). Together these two species comprised 31.1% of the total number of fish collected. Additionally, four darter species were collected from this site. These included greenside darter (*Etheostoma blenniodes*), blueside darter (*E. stigmaeum jessiae*), redline darter (*E. ruflineatum*), and snubnose darter (*E. simoterum*).

Our Index of Biotic Integrity analysis indicated that this stream was in "fair" condition based on an IBI score of 42. The strongest negative influences on the overall score were the high percentages of tolerant species and omnivores in the community, the low percentage of trophic specialists, and the relatively low catch rate. It was obvious that this stream was suffering from non-point source sedimentation as there was a fine layer of silt on the substrate. Other investigations of Little Flat Creek by the TVA Holston River Watershed Action Team revealed finding similar to our observations (TVA 1996). The IBI that TVA performed on this stream resulted in a score of 40 which was only slightly lower than our score.

Benthic macroinvertebrates from our sample included Baetidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Nemouridae and Perlidae stoneflies; Hydropsychidae, Leptoceridae, Limnephilidae and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 26.3% of the total sample. Ephemeropterans were second most abundant with 18.1%. Odonates and megalopterans contributed 14.7% and 9.2%, respectively. Gastropods included representatives from the families Ancylidae and Pleuroceridae. A total of 42 taxa was collected from this site of which 13 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Little Flat Creek was assigned a bioclassification of "fair to good" even though many of the EPT taxa were more tolerant forms. Likewise, the TVA analysis of the benthic community was similar to our as they categorized it to be in "fair" condition based on the EPT taxa collected (TVA 1996).

Habitat analysis of this reach of Little Flat Creek indicated that this portion of the stream was in the sub-optimal category based on the index score of 130. Non-point source sedimentation appeared to be having the greatest influence on this stream as most of the substrate was covered with silt.

Management Recommendations:

1. Any action that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE FLAT CREEK
WATERSHED	HOLSTON RIVER
SITE	IDUMEA RD. BRIDGE
COUNTY	KNOX
QUADRANGLE	LUTTRELL 155 NW
LAT-LONG	360748N-834458W
REACH	06010104-56.0
LENGTH	~ 1400 FT
AREA (SQ. MI.)	16.1
ELEVATION	1040 FT
DATE	6-30-95
TIME	1052

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, C.E. WILLIAMS, AND J. McAFEE

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
20.0	0.9	2.3

2. ESTIMATED % OF STREAM IN POOLS IS 70

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
25	40	20	10	5	

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	15	20	40	15	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
30 %	30 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 75 %

8. FLOW (CFS) 10.4 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY AND HUMID; AIR TEMP. 79 F @ 1127

10. PAST WEATHER (last 24 hrs)

SCATTERED T-STORMS; HOT AND HUMID

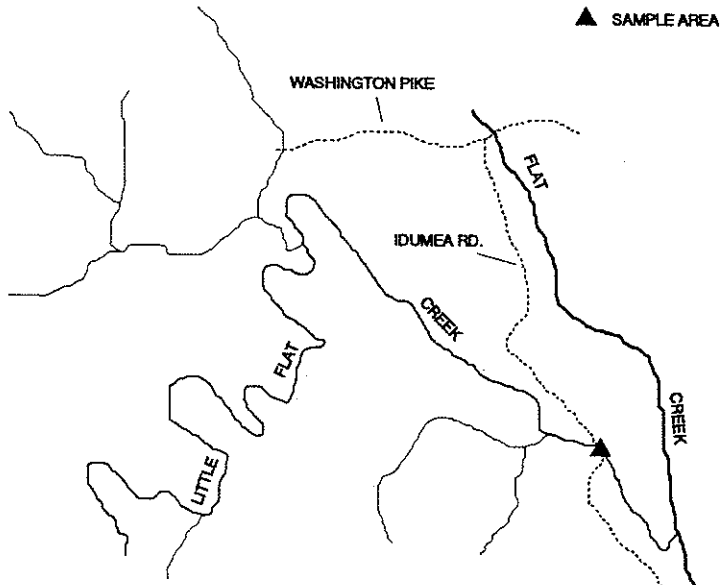
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	70 F	360	7.2	79.1

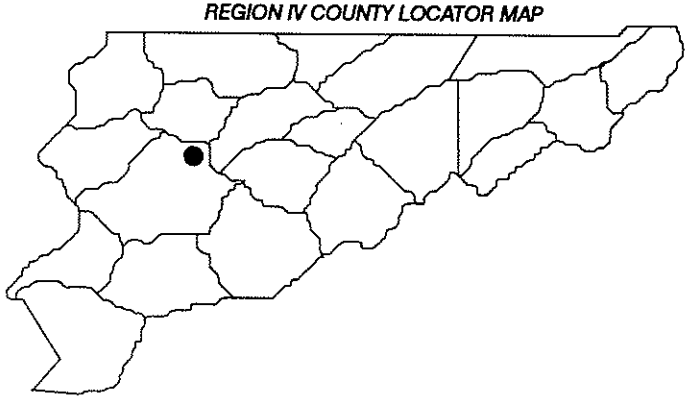
12. COMMENTS

SAMPLE AREA WAS LOCATED UPSTREAM AND DOWNSTREAM OF IDUMEA RD. CROSSING.

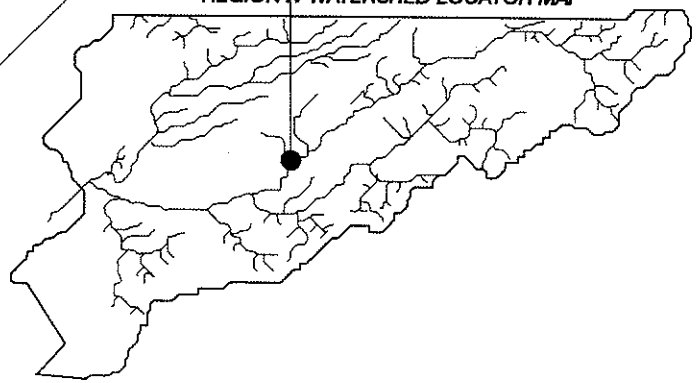
13. HABITAT ASSESSMENT SCORE 130



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



LITTLE FLAT CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT. SEINE AND ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	23	2-7	3.9	
Campostoma anomalum	45	21			
Catostomus commersoni	195	1			
Cottus carolinae	322	14			
Cyprinella galactura	54	8			
Etheostoma blenniodes	398	8			
Etheostoma stigmaeum jessiae	416	3			
Etheostoma ruflineatum	431	11			
Etheostoma simoterum	435	17			
Hypentelium nigricans	207	6			
Lepomis auritus	346	25	2-7	1.7	
Lepomis macrochirus	351	6	2-6	0.6	
Luxilus chrysocephalus	89	52			
Luxilus coccogenis	90	5			
Moxostoma duquesnei	224	2			
Notropis stramineus	137	1			
Pimephales notatus	176	14			
Rhinichthys atratulus	184	17			
Semotilus atromaculatus	188	1			
	SUM:	235			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<9	9 -17	>17	27	18	5
NUMBER OF DARTER SP.	<2	2-3	>3	5	4	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	3	5
NUMBER OF INTOLERANT SP.	<2	2	>2	4	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>33	33-17	<17		25.7	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>40	40-21	<21		41.9	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<19	19-36	>36		21.4	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		10.9	5
CATCH RATE	<22	22-45	>45		11.3	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		6.6	1
					42	**FAIR**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

LITTLE FLAT CREEK BENTHIC DATA
FIELD COLLECTION # 688
EFFORT = 3.0 PERSON HOURS

TAXA RICHNESS = 42
EPT TAXA RICHNESS = 13
BIOCLASSIFICATION = FAIR-GOOD

TAXA			NUMBER	PERCENT
ANNELIDA				0.7
	Oligochaeta		2	
COLEOPTERA				5.5
	Elmidae	*Dubiraphia* adults	2	
		Macronychus glabratus adults	5	
		Microcylloepus pusillus larva,adults	3	
		Stenelmis adults	4	
	Hydrophilidae larva		1	
	Psephenidae	*Psephenus herricki* adult	1	
DIPTERA				2.7
	Chironomidae		3	
	Empididae		1	
	Tipulidae sp.		1	
		Hexatoma	2	
		Tipula	1	
EPHEMEROPTERA				18.1
	Baetidae	*Baetis*	5	
	Ephemeridae	*Hexagenia*	12	
	Heptageniidae	*Stenacron*	18	
		Stenonema	13	
	Leptophlebiidae	*Habrophlebiodes*	1	
	Oligoneuriidae	*Isonychia*	4	
GASTROPODA				16
	Ancylidae	*Ferrissia*	1	
	Pleuroceridae		46	
HEMIPTERA				1
	Gerridae	*Gerris* nymph	2	
	Veliidae	*Rhagovelia obesa* nymph	1	
ISOPODA				1
	Asellidae	*Lirceus*	3	
MEGALOPTERA				9.2
	Corydalidae	*Nigronia serricornis*	11	
	Sialidae	*Sialis*	16	
ODONATA				14.7
	Aeshnidae	*Basiaeschna janata*	1	
		Boyeria vinosa	4	
	Coenagrionidae	*Argia*	21	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Corduliidae	early instar	1	
	Gomphidae	*Gomphus* (Genus A) early instars	10	
		Gomphus (Genus A prob. *consanguis*)	3	
		Hagenius brevistylus	1	
	Macromiidae	*Macromia* early instar	1	
PELECYPODA				4.1
	Corbiculidae	*Corbicula fluminea*	10	
	Sphaeriidae	*Sphaerium*	2	
PLECOPTERA				0.7
	Nemouridae	*Amphinemura*	1	
	Perlidae	early instar	1	
TRICHOPTERA				26.3
	Hydropsychidae	*Cheumatopsyche*	30	
		Hydropsyche betteni/depravata	39	
	Leptoceridae	*Triaenodes*	1	
	Limnephilidae	*Pycnopsyche*	6	
	Uenoidae	*Neophylax*	1	
		TOTAL	293	

Beech Creek

One IBI fishery survey was conducted on Beech Creek in July 1995:

Location and Length - Tributary to the Holston River. The sample area was located at first road crossing on Beech Creek Road (Hwy. 347, river mile ~ 14.5). Sampling was conducted downstream and upstream of the road crossing. The sample area was approximately 2,300 ft in length and was sampled on 20 July 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 100 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream, develop a fish species diversity list for TADS, and collect otoliths from rock bass and smallmouth bass for age determination. The Agency did make a qualitative survey of this stream in 1990 (Bivens and Williams 1991).

A total of 1194 fish representing 23 species was collected in our survey. Five game fish and three non-game fish species were collected. These included 72 rock bass (*Ambloplites rupestris*) (30 sacrificed for otoliths, see Fig. 5 for length frequency distribution), 35 redbreast sunfish (*Lepomis auritus*), one bluegill (*L. macrochirus*), one longear sunfish (*L. megalotis*), and nine smallmouth bass (*Micropterus dolomieu*) (eight sacrificed for otoliths, see Fig. 5 for length frequency distribution), 12 northern hogsuckers (*Hypentelium nigricans*), four black redhorse (*Moxostoma duquesnei*), and one golden redhorse (*M. erythrurum*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocephalus*). Together these two species comprised 63.9% of the total number of fish collected in our sample. The fish species collected from the 1990 survey and the 1995 survey compare quite well. A total of 23 species was collected in 1995 compared to 19 in 1990 (Bivens and Williams 1991). We did not collect white sucker (*Catostomus commersoni*), mimic shiner (*Notropis volucellus*), or blacknose dace (*Rhinichthys atratulus*) in the 1995. Species encountered in 1995 that were not observed in 1990 survey of this site included blueside darter (*Etheostoma stigmaeum jessiae*), bigeye chub (*Hybopsis amblops*), bluegill, longear sunfish, black redhorse, golden redhorse, and creek chub (*Semotilus atromaculatus*). The relatively high abundance of rock bass, redbreast sunfish, and the occurrence of smallmouth bass in this stream indicate a significant fishery that warrants extra protection from habitat degradation.

Our Index of Biotic Integrity analysis indicated that this stream was in "good" condition based on an IBI score of 48. The only metrics that strongly influenced the overall score were the relatively high percentage trophic generalists in the sample (primarily stonerollers and striped shiners) and the high percentage of anomalies on the fish. At the upstream end of our survey we did observe some residential effluent coming into the stream as well as fairly substantial amount of fine sediment accumulation on the

substrate. Bivens and Williams (1991) indicated that this stream was in "good to excellent" condition at the time of their survey based on the fish and benthic community present. Our re-evaluation of this creek five years later would indicate that some watershed degradation has occurred based on the visual increase of sediment in the stream. However, this observed difference has apparently not impacted the stream biota as benthic and fish species diversity increased from the survey taken in 1990. Index of Biotic Integrity analysis by TVA of this same stream reach indicated that the stream was in "fair" condition based on a score of 44 (TVA 1996). Additional IBI work by TVA downstream in the watershed indicated that the IBI score degraded slightly in the lower reaches of this stream (IBI Score 42 at river mile 3.5).

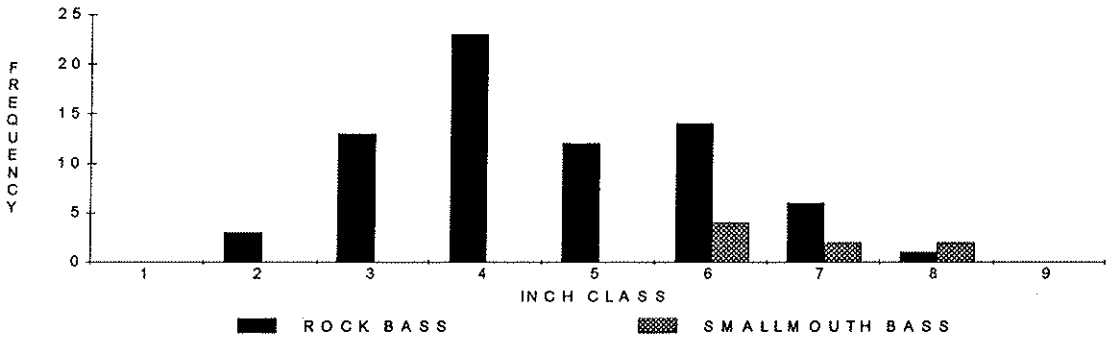
Benthic macroinvertebrates from our sample included Baetidae, Caenidae Ephemerellidae, Ephemeridae, Heptageniidae, Oligoneuriidae, and Tricorythodes mayflies; Peltoperlidae and Perlidae stoneflies; Hydropsychidae, Leptoceridae, Odontocerdiae, and Philopotamidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 31.2% of the total sample. Ephemeropterans were second most abundant with 21.3%. Coleopterans and odonates were the next most abundant groups, contributing 15.4% and 13.0%, respectively. Plecopterans only accounted for 1.2% of the total sample. A total of 64 taxa was collected from this site of which 21 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Beech Creek was assigned a bioclassification of "good". Furthermore, our 1995 survey revealed a substantially more diverse benthic community (64 taxa vs. 39 taxa) when compared to the 1990 survey (same collection technique used for both samples). TVA benthic analysis at this site indicated that this reach was in "fair" condition based on the EPT families present (TVA 1996).

Management Recommendations:

1. Any actions that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

2. Consider conducting a three-pass depletion survey in order to gather more quantitative data on the sport fishery.

Figure 5. LENGTH FREQUENCY DISTRIBUTIONS FOR ROCK BASS AND SMALLMOUTH BASS COLLECTED IN BEECH CREEK DURING 1995



PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BEECH CREEK
WATERSHED	HOLSTON RIVER
SITE	@ BEECH CK RD. X-ING
COUNTY	HAWKINS
QUADRANGLE	STONY POINT 180 NE
LAT-LONG	362341N-824737W
REACH	06010104-12.1
LENGTH	~ 2300 FT
AREA (SQ. MI.)	16.0
ELEVATION	1250 FT
DATE	7-20-95
TIME	0942

COLLECTOR(S)

B.D. CARTER, C.E. WILLIAMS AND M.T. FAGG

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
12.8	0.9	1.9

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	20	20	10	15

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	15	20	35	10	10

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
X		

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
30 %	40 %	30 %

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 1.7 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 80 F @ 1036

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

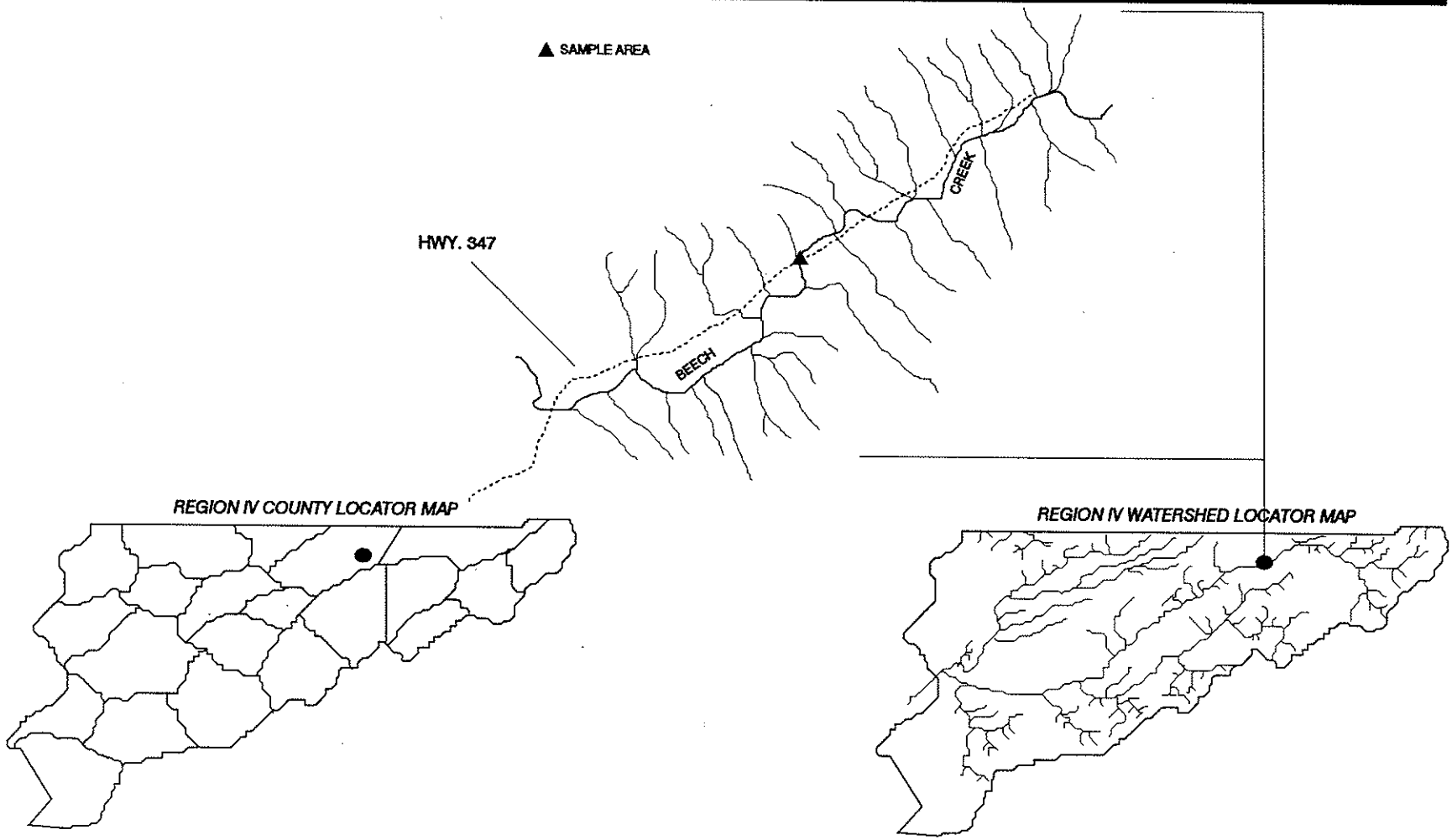
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	72 F	300	7.0	80.1

12. COMMENTS

SAMPLE AREA LOCATED AT FIRST BEECH CREEK RD. X-ING (HWY 347 UPSTREAM OF VAN HILL RD. INTERSECTION). OTOLITHS WERE TAKEN FROM ROCKBASS AND SMALLMOUTH BASS.

13. X HABITAT ASSESSMENT SCORE 137



BEECH CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	72	2-8	7.4	
Campostoma anomalum	45	586			
Cyprinella galactura	54	5			
Etheostoma blenniodes	398	8			
Etheostoma flabellare	411	46			
Etheostoma stigmaeum jessiae	416	2			
Etheostoma ruflineatum	431	11			
Etheostoma simoterum	435	67			
Hybopsis amblops	79	6			
Hypentelium nigricans	207	12			
Lepomis auritus	346	35	3-6	2.6	
Lepomis macrochirus	351	1	2	0.01	
Lepomis megalotis	353	1	N/A	N/A	
Luxilus chrysocephalus	89	178			
Luxilus coccogenis	90	21			
Lythrurus ardens	93	57			
Micropterus dolomieu	362	9	6-8	1.3	
Moxostoma duquesnei	224	4			
Moxostoma erythrurum	225	1			
Notropis stramineus	137	2			
Notropis telescopus	138	60			
Pimephales notatus	176	7			
Semotilus atromaculatus	188	3			
	SUM:	1194			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<9	9 -17	>17	27	22	5
NUMBER OF DARTER SP.	<2	2-3	>3	5	5	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	3	3
NUMBER OF SUCKER SP.	<2	2	>2	3	3	5
NUMBER OF INTOLERANT SP.	<2	2	>2	4	5	5
PERCENT OF INDIVIDUALS AS TOLERANT	>33	33-16	<16		15.6	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>42	42-22	<22		66.5	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<17	17-33	>33		24.1	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		6.9	5
CATCH RATE	<22	22-45	>45		56.6	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		12.5	1
					48	**GOOD**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

BEECH CREEK BENTHIC DATA **TAXA RICHNESS = 64**
FIELD COLLECTION # 694 **EPT TAXA RICHNESS = 21**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

TAXA			NUMBER	PERCENT
ANNELIDA				1.6
	Hirudinea		7	
	Oligochaeta		1	
COLEOPTERA				15.4
	Dryopidae	*Helichus* adults	3	
	Elmidae	*Dubiraphia* adults	10	
		Macronychus glabratus	2	
		Microcylloepus pusillus	3	
		Optioservus adults	2	
		Stenelmis larvae,adult	51	
	Eubriidae	*Ectopria*	1	
	Haliplidae	*Peltodytes* adult	1	
	Psephenidae	*Psephenus herricki* larvae,adult	3	
DIPTERA				5.7
	Athericidae	*Atherix lantha*	18	
	Chironomidae		5	
	Simuliidae		2	
	Tipulidae	*Antocha*	1	
		Hexatoma	1	
		Tipula	1	
EPHEMEROPTERA				21.3
	Baetidae	Unidentified	3	
		Baetis	15	
	Caenidae	*Caenis*	1	
	Ephemerellidae	*Serratella*	3	
	Ephemeridae	*Hexagenia*	5	
	Heptageniidae	*Heptagenia*	3	
		Stenacron	4	
		Stenonema early instars	30	
		Stenonema femoratum	1	
		S. mediopunctatum	1	
		S. modestum	1	
	Oligoneuriidae	*Isonychia*	36	
	Tricorythidae	*Tricorythodes*	2	
GASTROPODA				1.6
	Physidae	*Physa*	1	
	Pleuroceridae		7	
HEMIPTERA				3.6
	Corixidae		1	
	Gelastocoridae	*Gelastocoris oculatus*	1	
	Hydrometridae	*Hydrometra*	4	
	Nepidae	*Ranatra* nymphs	7	
	Veliidae	*Microvelia*	2	
		Rhagovelia obesa	3	
MEGALOPTERA				3.4
	Corydalidae	*Corydalus cornutus*	7	
		Nigronia serricornis	4	
	Sialidae	*Sialis*	6	
ODONATA				13
	Aeshnidae	*Basiaeshna janata*	5	
		Boyeria vinosa	14	
	Calopterygidae	*Calopteryx*	1	
		Hetaerina americana	3	
	Coenagrionidae	*Argia*	18	
		Enallagma	1	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Corduliidae		1	
	Gomphidae	*Gomphus* early instars	1	
		Gomphus (Genus A *consanguis/rogersi*)	8	
		G. lividus	3	
		Ophiogomphus mainensis	2	
		Stylurus early instar	1	
	Macromiidae	*Macromia*	5	
PELECYPODA				2
	Corbiculidae	*Corbicula fluminea*	4	
	Sphaeriidae	*Sphaerium*	6	
PLECOPTERA				1.2
	Peltoperlidae	*Peltoperla*	4	
	Perlidae	*Acroneuria* prob. *abnormis*	1	
		A. prob. *evoluta*	1	
TRICHOPTERA				31.2
	Hydropsychidae	*Ceratopsyche sparna*	2	
		Cheumatopsyche	42	
		Hydropsyche betteni/depravata	86	
	Leptoceridae	*Oecetis*	5	
		Triaenodes	12	
	Odonticeridae	*Psilotreta labida*	5	
	Philopotamidae	*Chimara*	2	
		TOTAL	**494**	

Big Creek

One IBI fishery survey was conducted on Big Creek in August 1995:

Location and Length - Tributary to the Holston River. The sample area was located at first bridge crossing on W. Bear Hollow Road (stream mile 2.0). Sampling was conducted downstream of the bridge. The sample area was approximately 700 ft in length and was sampled on 11 August 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

A total of 606 fish representing 23 species was collected in our survey. Five game fish and two non-game fish species were collected. These included 37 rock bass (*Ambloplites rupestris*) (29 sacrificed for otoliths, see Fig. 6 for length frequency distribution), 16 redbreast sunfish (*Lepomis auritus*), four bluegill (*L. macrochirus*), six smallmouth bass (*Micropterus dolomieu*) (all sacrificed for otoliths, see Fig. 6 for length frequency distribtuion), one rainbow trout (*Oncorhynchus mykiss*), 18 northern hogsuckers (*Hypentelium nigricans*), and five black redhorse (*Moxostoma duquesnei*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and Tennessee shiner (*Notropis leuciodus*). Together these two species comprised 46.9% of the total number of fish collected in our sample. Of special interest was the collection of one specimen of the blotchside logperch (*Percina burtoni*) in our sample. The collection of this specimen in this stream represents a new locality record for this species. This species is a Tennessee and Cumberland River inhabitant that is typically found in better quality streams. Although it is fairly common in the Tennessee drainage it is often rare and localized where it occurs (Etnier and Starnes 1993).

Our Index of Biotic Integrity analysis indicated that this stream was in "fair to good" condition based on an IBI score of 46. The only metric that strongly influenced the overall score was the relatively high percentage of trophic generalists in the sample. There were some indications of organic enrichment as filamentous algae was observed in the stream. Index of Biotic Integrity sampling by TVA in the same vicinity as our sample in 1995 revealed similar findings. Their IBI evaluation resulted in a score of 42 which was somewhat lower than our score (TVA 1996).

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, Leptophlebiidae, Oligoneuriidae, and Tricorythodes mayflies; Perlidae stoneflies; Helicopsychidae, Hydropsychidae, Leptoceridae, Limnephilidae, Odontoceridae, Philopotamidae, and Polycentropodidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 31.3% of the total sample. Trichopterans were second most abundant with 25.4%. Coleopterans and gastropods were the next most abundant groups, contributing 12.7% and 10.2%, respectively. Plecopterans only accounted for 0.2% of the total sample. A total of 56 taxa was collected from this site of which 22 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Big Creek was assigned a bioclassification of "good". TVA's evaluation of the benthic community at this site resulted in a "fair" classification based on the number of EPT families present (TVA 1996).

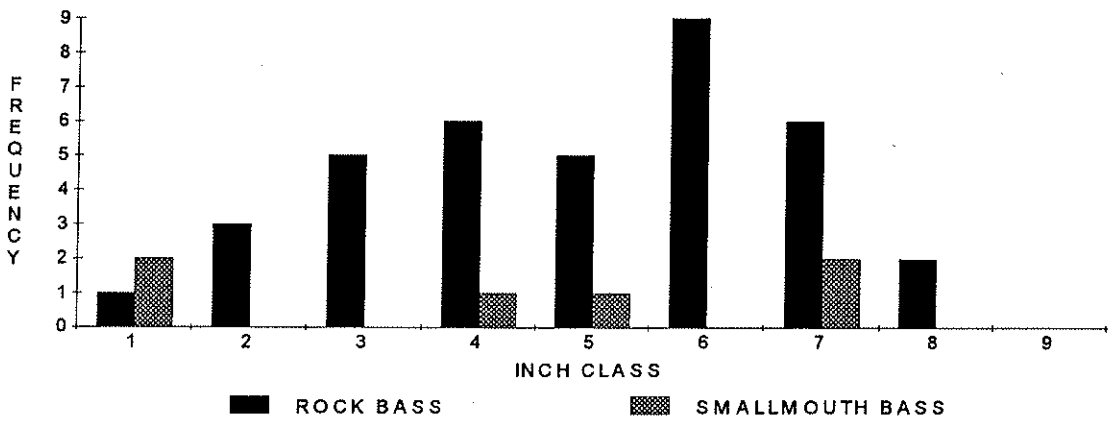
Our physical habitat evaluation of this portion of Big Creek indicated that it could be categorized a sub-optimal based on the mean index score of 150. There was some indication of sedimentation as much of the substrate was covered with a fine layer of silt. However, it was considerable less prevalent than in some other streams surveyed during 1995. Overall, the habitat here was adequate to support viable populations.

Management Recommendations:

1. Any actions that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

2. Consider conducting a three-pass depletion survey in order to gather more quantitative data on the sport fishery.

Figure 6. LENGTH FREQUENCY DISTRIBUTIONS FOR ROCK BASS AND SMALLMOUTH BASS COLLECTED IN BIG CREEK DURING 1995



PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BIG CREEK
WATERSHED	HOLSTON RIVER
SITE	BEAR HOLLOW RD. X-ING
COUNTY	HAWKINS
QUADRANGLE	BUREM 180 NW
LAT-LONG	362531N-825706W
REACH	06010104-15.0
LENGTH	~ 700 FT
AREA (SQ. MI.)	41.3
ELEVATION	1130 FT
DATE	8-11-95
TIME	0920

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
33.9	1.0	2.9

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	20	15	15	10	25

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	15	30	15	15	20

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
X		

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
30 %	30 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 50 %

8. FLOW (CFS) 7.8 COMPARED TO NORMAL: LOW | NORMAL X | HIGH

9. PRESENT WEATHER

OVERCAST AND MILD; AIR TEMP. 72 F @ 0925

10. PAST WEATHER (last 24 hrs)

SUNNY; HOT AND HUMID

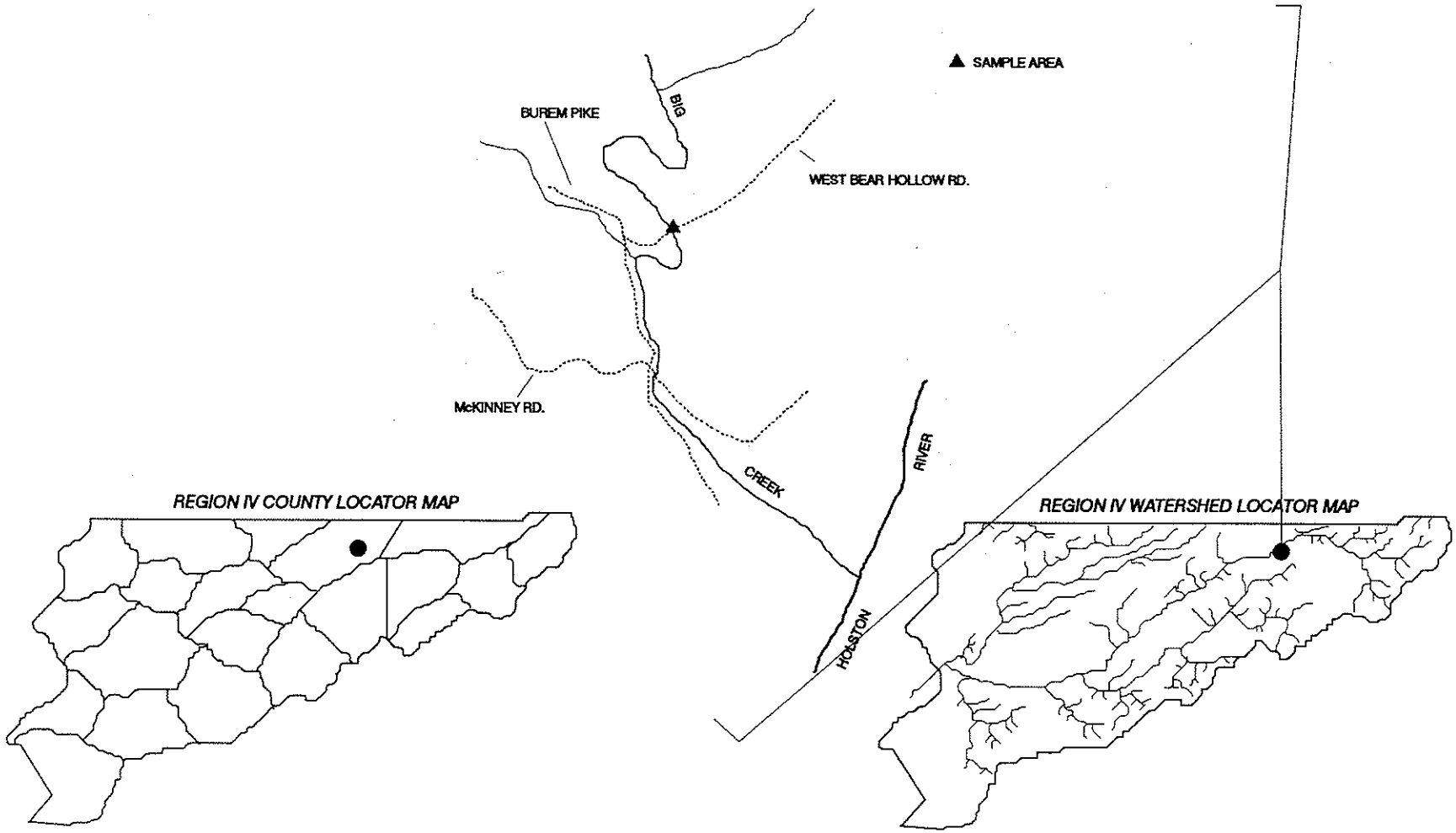
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	73 F	340	7.9	92.0

12. COMMENTS

SAMPLE AREA LOCATED AT FIRST BRIDGE X-ING ON W. BEAR HOLLOW RD. SOME FILAMENTOUS ALGAE PRESENT. MODERATE OCCURENCE OF REFUSE ALONG STREAM MARGINS.

13. X HABITAT ASSESSMENT SCORE 150



BIG CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	37	1-8	6.5	
Campostoma anomalum	45	203			
Cottus carolinae	322	7			
Cyprinella galactura	54	3			
Etheostoma blenniodes	398	7			
Etheostoma ruflineatum	431	14			
Etheostoma simoterum	435	12			
Hybopsis amblops	79	15			
Hypentelium nigricans	207	18			
Lepomis auritus	346	16	3-7	1.3	
Lepomis macrochirus	351	4	3-4	0.2	
Luxilus chrysocephalus	89	13			
Luxilus coccogenis	90	77			
Lythrurus ardens	93	8			
Micropterus dolomieu	362	6	1-7	0.4	ONLY 4 INCLUDED IN IBI
Moxostoma duquesnei	224	5			
Nocomis micropogon	110	34			
Notropis leuciodus	128	80			
Notropis telescopus	138	32			
Notropis volucellus	140	12			
Onchorhynchus mykiss	279	1	13		
Percina burtoni	463	1			
Rhinichthys atratulus	184	1			
	SUM:	606			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<11	11-22	>22	35	21	3
NUMBER OF DARTER SP.	<2	2-3	>3	6	4	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	6	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2-3	>3	5	3	3
PERCENT OF INDIVIDUALS AS TOLERANT	>29	29-15	<15		2.2	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>34	34-18	<18		42.5	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<22	22-43	>43		43.8	5
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		6.2	5
CATCH RATE	<20	20-40	>40		45	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		2	3
						46 **FAIR-GOOD**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

BIG CREEK BENTHIC DATA **TAXA RICHNESS = 56**
FIELD COLLECTION # 705 **EPT TAXA RICHNESS = 22**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

	TAXA		NUMBER	PERCENT
ANNELIDA				0.4
	Oligochaeta		2	
COLEOPTERA				12.7
	Dryopidae	*Helichus* adults	4	
	Elmidae	*Dubiraphia* adult	1	
		Optioservus trivitatus adults	3	
		Promoresia adult	1	
		Stenelmis larvae, adults	33	
	Hydrophilidae		1	
	Psephenidae	*Psephenus herricki* larvae,adult	17	
DIPTERA				6.6
	Athericidae	*Atherix lantha*	16	
	Chironomidae		5	
	Simuliidae		8	
	Tipulidae	*Antocha*	2	
EPHEMEROPTERA				31.3
	Baetidae	*Baetis*	20	
	Ephemerellidae	*Serratella*	18	
	Ephemeridae	*Hexagenia*	5	
	Heptageniidae	*Heptagenia*	12	
		Stenacron	7	
		Stenonema	32	
	Leptophlebiidae	*Choroterpes*	1	
	Oligoneuriidae	*Isonychia*	52	
	Tricorythidae	*Tricorythodes*	1	
GASTROPODA				10.2
	Physidae	*Physa*	2	
	Pleuroceridae	elongate spiral form	30	
		Anculosa subglobosa	15	
	Viviparidae	*Campeloma*	1	
HEMIPTERA				1
	Gerridae	*Gerris conformis*	2	
	Veliidae	*Rhagovelia obesa*	3	
ISOPODA				0.2
	Asellidae	*Lirceus*	1	
MEGALOPTERA				4
	Corydalidae	*Corydalus cornutus*	9	
		Nigronia serricornis	5	
	Sialidae	*Sialis*	5	
ODONATA				4.8
	Aeshnidae	*Basiaeschna janata*	6	
		Boyeria vinosa	6	
	Calopterygidae	*Calopteryx*	1	
	Coenagrionidae	*Enallagma*	1	
	Gomphidae	*Gomphus* (Genus A *consanguis/rogersi*)	3	
		G. lividus	2	
		Hagenius brevistylus	1	
		Hylogomphus	1	
		Stylogomphus albistylus	1	
	Macromiidae	Macromia	1	
PELECYPODA				1.7
	Corbiculidae	*Corbicula fluminea*	3	
	Sphaeriidae	*Sphaerium*	5	
PLECOPTERA				0.2
	Perlidae	*Acroneuria evoluta*	1	
		Neoperla	7	
TRICHOPTERA				25.4
	Helicopsychidae	*Helicopsyche borealis*	1	
	Hydropsychidae	*Ceratopsyche cheilonis*	24	
		Cheumatopsyche	23	
		Hydropsyche betteni/depravata	33	
		H. frisoni	13	
	Leptoceridae	*Oecetis*	1	
		Triaenodes	1	
	Limnephilidae	*Goera*	1	
	Odonticeridae	*Psilotreta labida*	6	
	Philopotamidae	*Chimara*	15	
	Polycentropodidae	*Polycentropus*	1	
		TOTAL	**472**	

Alexander Creek

One IBI fishery survey was conducted on Alexander Creek in July 1995:

Location and Length - Tributary to the Holston River. The sample area was located at the bridge crossing on Red Goose Hollow Road. Sampling was conducted upstream and downstream of the bridge crossing. The sample area was approximately 750 ft in length and was sampled on 26 July 1995.

Sampling Methodology - This site was sampled with a 10 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 361 fish representing 11 species was collected in our survey. Four game fish and one non-game fish species were collected. These included four rock bass (*Ambloplites rupestris*), four redbreast sunfish (*Lepomis auritus*), three bluegill (*L. macrochirus*), one rainbow trout (*Oncorhynchus mykiss*), and two northern hogsuckers (*Hypentelium nigricans*). The most abundant forage species in our sample were blacknose dace (*Rhinichthys atratulus*) and banded sculpin (*Cottus carolinae*). Together these two species comprised 69.2% of the total number of fish collected. Only one darter species, the snubnose darter (*Etheostoma simoterum*) was collected from this site.

Our Index of Biotic Integrity analysis indicated that this stream was in "poor" condition based on an IBI score of 34. The strongest negative influences on the overall score were the relative absence of darter species, the low number of intolerant and sucker species in the sample, the relatively low percentage of trophic specialists, and the low percentage of piscivorous species in the community. The IBI survey conducted by TVA in 1993 indicated that this stream was in "fair" condition based on a score of 42 (TVA 1996).

Benthic macroinvertebrates from our sample included Baetidae, Epehmerellidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Peltoperlidae stoneflies; Brachycentridae, Glossosomatidae, Hydropsychidae, Hydroptilidae Leptoceridae, Limnephilidae, Philopotamidae, Polycentropodidae, Rhyacophilidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey,

comprising 29.8% of the total sample. Of special interest was the collection of the caddisfly *Hydropsyche rotosa* which was fairly common in the reach we surveyed. Ephemeropterans were second most abundant with 19.4%. Plecopterans and coleopterans contributed 6.3% and 13.2%, respectively. Additionally, pleurocerid snails were collected from this site. A total of 53 taxa was collected from this site of which 22 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Alexander Creek was assigned a bioclassification of "good". The TVA benthic assessment for this stream in 1993 indicated that the benthic community was in "fair" condition based on the EPT taxa collected (TVA 1996).

Habitat analysis of this portion of Alexander Creek resulted in a classification of sub-optimal based on a average index score of 143. Overall this stream appeared to be suffering from sedimentation as a result of livestock access to the stream and general agricultural practices being conducted in the watershed.

Management Recommendations:

1. Any actions that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	ALEXANDER CREEK
WATERSHED	HOLSTON RIVER
SITE	@ RED GOOSE HLW RD.
COUNTY	HAWKINS
QUADRANGLE	CHURCH HILL 188 SW
LAT-LONG	363207N-824309W
REACH	06010104-
LENGTH	~ 750 FT
AREA (SQ. MI.)	6.7
ELEVATION	1260 FT
DATE	7-26-95
TIME	1002

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, C.E. WILLIAMS, S. SEYMOUR, AND R. WIGGINS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
12.1	0.5	N/A

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	20	30	10	5

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	15	30	40	10	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
20 %	30 %	50 %

7. SHADE OR CANOPY COVER GOOD OVER 75 %

8. FLOW (CFS) COMPARED TO NORMAL

	LOW	NORMAL	HIGH
2.7		X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 77 F @ 1004

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

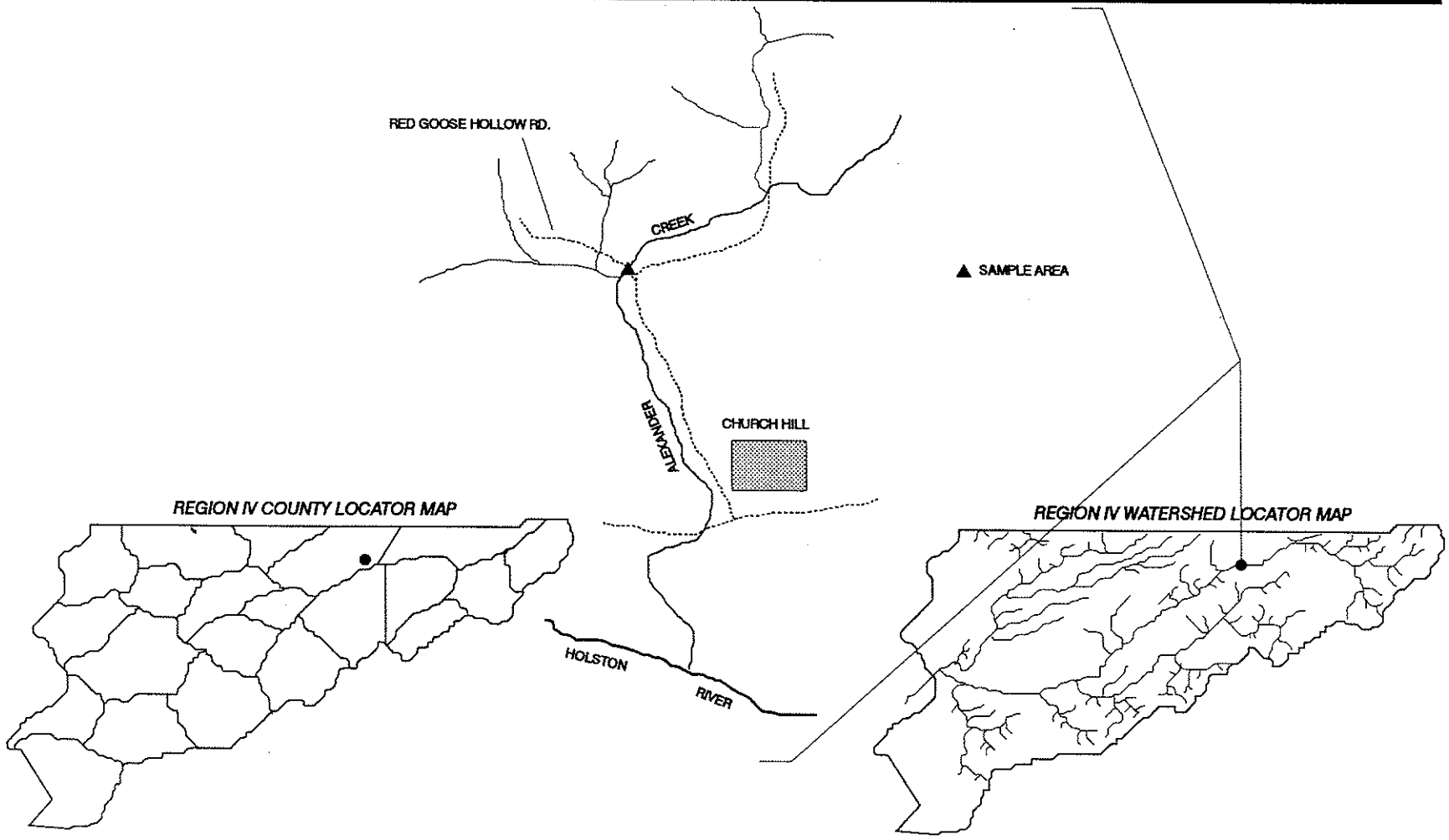
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	71 F	351	8.4	94.2

12. COMMENTS

SAMPLED AT RED GOOSE HOLLOW RD. BRIDGE X-ING. OBSERVATIONS INDICATED THAT THIS STREAM BECAME MORE DEGRADED DOWNSTREAM OF OUR SAMPLE AREA.

13. X HABITAT ASSESSMENT SCORE 143



ALEXANDER CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	4	4-8	0.8	
Campostoma anomalum	45	33			
Cottus carolinae	322	97			
Etheostoma simoterum	435	20			
Hypentelium nigricans	207	2			
Lepomis auritus	346	4	4-6	0.3	
Lepomis macrochirus	351	3	5-6	0.4	
Lepomis sp. (hybrid)	345	1	3	0.02	
Notropis rubricroceus	132	19			
Oncorhynchus mykiss	279	1	12	N/A	
Rhinichthys atratulus	184	153			
Semotilus atromaculatus	188	24			
		SUM: 361			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<6	6-13	>13	20	9	3
NUMBER OF DARTER SP.	<2	2	>2	4	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	2	3
NUMBER OF SUCKER SP.	0	1	>1	2	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>38	38-19	<19		6.7	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-23	<23		9.2	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<12	12-24	>24		10.9	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		1.1	1
CATCH RATE	<30	30-60	>60		46.9	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0.2	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.2	5
						34 **POOR**

IBI RANGE:	0	12-22	28-34	40-44	48-52	58-60
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

ALEXANDER CREEK BENTHIC DATA **TAXA RICHNESS = 53**
FIELD COLLECTION # 698 **EPT TAXA RICHNESS = 22**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

TAXA			NUMBER	PERCENT
AMPHIPODA				4
	Gammaridae		25	
ANNELIDA				0.2
	Oligochaeta		1	
COLEOPTERA				13.2
	Elmidae	*Dubiraphia* adults	2	
		Macronychus glabratus adults	5	
		Microcylloepus pusillus	1	
		Optioservus larvae,adults	11	
		Promoresia larvae,adults	10	
		Stenelmis larvae,adults	5	
	Eubriidae	*Ectopria*	1	
	Psephenidae	*Psephenus herricki* larvae	38	
	Ptilodactylidae	*Anchytarsus bicolor* larvae	9	
DIPTERA				3.5
	Chironomidae		10	
	Simuliidae		10	
	Tabanidae	*Tabanus*	1	
	Tipulidae	*Tipula*	1	
EPHEMEROPTERA				19.4
	Baetidae	*Baetis*	2	
	Ephemerellidae	*Serratella*	43	
	Ephemeridae	*Ephemera*	2	
		Hexagenia	4	
	Heptageniidae	*Stenacron*	8	
		Stenonema	44	
	Leptophlebiidae	*Habrophlebiodes*	1	
		Paraleptophlebia	1	
	Oligoneuriidae	*Isonychia*	15	
GASTROPODA				7.9
	Pleuroceridae		49	
HEMIPTERA				3.2
	Corixidae		2	
	Gerridae	*Gerris remigis*	6	
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa	11	
ISOPODA				0.8
	Asellidae	*Lirceus*	5	
MEGALOPTERA				2.4
	Corydalidae	*Corydalus cornutus*	2	
		Nigronia serricornis	12	
	Sialidae	*Sialis*	1	
ODONATA				7.4
	Aeshnidae	*Boyeria vinosa*	5	
	Calopterygidae	*Calopteryx*	2	
	Gomphidae	*Gomphus* early instars	5	
		Gomphus (Genus A *consanguis/rogersi*)	9	
		G. lividus	8	
		Hagenius brevistylus	3	
		Ophiogomphus mainensis	14	
PELECYPODA				1.8
	Corbiculidae	*Corbicula fluminea*	11	
PLECOPTERA				6.3
	Peltoperlidae	*Peltoperla*	39	
TRICHOPTERA				29.8
	Brachycentridae	*Micrasema*	4	
	Glossosomatidae	*Glossosoma*	1	
	Hydropsychidae	*Cheumatopsyche*	42	
		Hydropsyche betteni/depravata	1	
		H. rotosa	12	
	Hydroptilidae	prob. *Hydroptila*	1	
	Leptoceridae	*Triaenodes*	2	
	Limnephilidae	*Goera calcarata*	1	
	Philopotamidae	*Chimara*	72	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhycophila fuscula*	8	
	Uenoidae	*Neophylax*	40	
		TOTAL	**620**	

Thomas Creek

One IBI fishery survey was conducted on Thomas Creek in July 1995:

Location and Length - Tributary to the South Fork Holston River. The sample area was located at the pumping station for Bristol Water Works. The sample area extended upstream and downstream of the pumping station and was approximately 1,000 ft in length. The site was sampled on 19 July 1995.

Sampling Methodology - This site was sampled with a 15 ft seine and one backpack electrofishing unit operating at 125 VAC.

Water Quality - (See physicochemical and sample site location form)

Benthos Collection - (See benthic collection form)

Fish Collected - (See fish data form for species list and IBI analysis)

Comments - This stream was sampled to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

A total of 887 fish representing 19 species was collected in our survey. Four game fish and two non-game fish species were collected. These included 37 rock bass (*Ambloplites rupestris*), two green sunfish (*Lepomis cyanellus*), 12 bluegill (*L. macrochirus*), four largemouth bass (*Micropterus salmoides),* five rainbow trout (*Oncorhynchus mykiss*), one brown trout (*Salmo trutta*), 16 white suckers (*Catostomus commersoni*), and 18 northern hogsuckers (*Hypentelium nigricans*). The most abundant forage species were central stoneroller (*Campostoma anomalum*) and saffron shiner (*Notropis rubricroceus*). Together these two species comprised 57.8% of the total number of fish collected. Additionally, three darter species were collected from this site. These included fantail darter (*Etheostoma flabellare*), snubnose darter (*E. simoterum*), and logperch (*Percina caprodes*).

Our Index of Biotic Integrity analysis indicated that this stream was in "good to excellent" condition based on an IBI score of 54. However, It was obvious that this stream was suffering from non-point source sedimentation as there was a fine layer of silt on the substrate. Additionally, there was some evidence of organic enrichment as filamentous algae was fairly common. Index of Biotic Integrity surveys conducted by TVA compared quite well with our IBI evaluation. The 1995 score derived by from the TVA sample was 50 which was similar to our score of 54 (TVA 1996).

Benthic macroinvertebrates from our sample included Baetidae, Epehmerellidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Peltoperlidae

and Perlidae stoneflies; Hydropsychidae, Leptoceridae, Limnephilidae, Philopotamidae, Polycentropodidae, Rhyacophilidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 33.8% of the total sample. Of special interest was the collection of the caddisfly *Hyrdopsyche rotosa.* Coleopterans were second most abundant with 22.1%. Ephemeropterans and plecopterans contributed 21.2% and 1.4%, respectively. Gastropods included representatives from the families Physidae and Pleuroceridae. A total of 57 taxa was collected from this site of which 24 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Thomas Creek was assigned a bioclassification of "good". Our benthic community analysis differed somewhat from that reported by TVA. Our benthic collection and subsequent analysis indicated that this reach of stream was in "good" condition whereas it was only rated as "fair" by TVA (TVA 1996).

Like many of the streams surveyed during 1995, Thomas Creek received a habitat quality index score of 136. This corresponds to a mid-range sub-optimal categorization, indicating stable habitat for population maintenance but with some degradation.

Management Recommendations:

1. Any actions that could address protection of riparian zones and non-point source pollution would be of benefit to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	THOMAS CREEK
WATERSHED	S. FORK HOLSTON RIVER
SITE	@ BRISTOL WATER WKS
COUNTY	SULLIVAN
QUADRANGLE	HOLSTON VALLEY 206 SE
LAT-LONG	363140N-820647W
REACH	06010102-
LENGTH	~ 1000 FT
AREA (SQ. MI.)	8.6
ELEVATION	1480 FT
DATE	7-19-95
TIME	1018

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, AND C.E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
19.9	1.0	2.9

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	10	25	10	20

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	10	25	40	10	10

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
30 %	30 %	40 %

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 4.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 78 F @ 1040

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

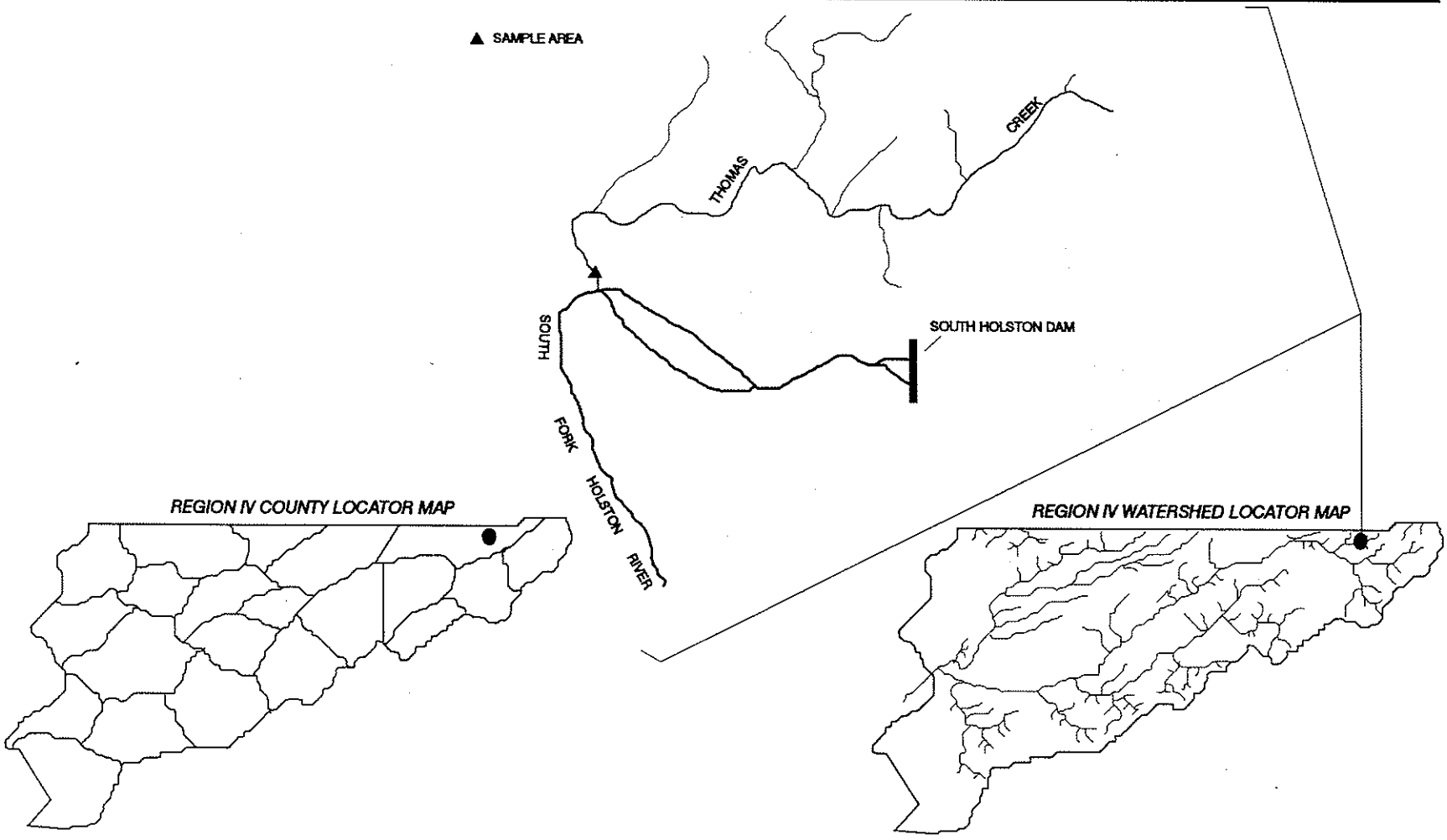
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.5	69 F	385	8.3	91.9

12. COMMENTS

WATER SLIGHTLY TURBID AT TIME OF SAMPLE. SURVEY SITE LOCATED AT PUMPING STATION FOR BRISTOL WATER WORKS. BLUE-GREEN AND FILAMENTOUS ALGAE PRESENT.

13. X HABITAT ASSESSMENT SCORE 136



THOMAS CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15 FT SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	37	2-9	7	
Campostoma anomalum	45	338			
Catostomus commersoni	195	16			
Cottus carolinae	322	35			
Etheostoma flabellare	411	60			
Etheostoma simoterum	435	66			
Hypentelium nigricans	207	18			
Lepomis cyanellus	347	2	2-5	0.1	
Lepomis macrochirus	351	12	2-6	0.5	
Luxilus chrysocephalus	89	17			
Luxilus coccogenis	90	62			
Micropterus salmoides	364	4	2	0.02	
Nocomis micropogon	110	23			
Notropis rubricroceus	132	177			
Oncorhynchus mykiss	279	5	7-9	1.1	
Percina caprodes	464	6			
Rhinichthys atratulus	184	1			
Salmo trutta	284	1	7	0.1	
Semotilus atromaculatus	188	7			
	SUM:	887			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<6	6-13	>13	20	17	5
NUMBER OF DARTER SP.	<2	2	>2	4	3	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	3	5
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>37	37-19	<19		4.7	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>46	46-24	<24		44.9	3
PERCENT OF INDIVIDUALS AS SPECIALISTS	<15	15-28	>28		42.3	5
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4		4.2	5
CATCH RATE	<30	30-60	>60		71	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.7	5
					54	**GOOD-EXCELLENT**

IBI RANGE:	**0**	**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

THOMAS CREEK BENTHIC DATA **TAXA RICHNESS = 57**
FIELD COLLECTION # 693 **EPT TAXA RICHNESS = 24**
EFFORT = 3.0 PERSON HOURS **BIOCLASSIFICATION = GOOD**

TAXA			NUMBER	PERCENT
ANNELIDA				0.4
	Hirudinea		1	
	Oligochaeta		1	
COLEOPTERA				22.1
	Elmidae	*Dubiraphia* adults	4	
		Macronychus glabratus	3	
		Optioservus ovalis adult	1	
		O. trivitatus	1	
		Promoresia larva,adult	2	
		Stenelmis larvae,adult	67	
	Haliplidae	*Peltodytes* adults	3	
	Psephenidae	*Psephenus herricki* larvae,adult	42	
	Ptilodactylidae	*Anchytarsus bicolor*	2	
DIPTERA				5.5
	Chironomidae		18	
	Simuliidae		4	
	Tipulidae	*Antocha*	8	
		Hexatoma	1	
EPHEMEROPTERA				21.2
	Baetidae	*Baetis*	36	
	Ephemerellidae	*Ephemerella*	9	
		Serratella	2	
	Ephemeridae	*Hexagenia*	3	
	Heptageniidae	*Heptagenia*	1	
		Stenacron	13	
		Stenonema	34	
	Leptophlebiidae	*Habrophlebiodes*	2	
	Oligoneuriidae	*Isonychia*	20	
GASTROPODA				6.9
	Physidae	*Physa*	2	
	Pleuroceridae		37	
HEMIPTERA				1.2
	Gerridae	*Trepobates pictus*	1	
	Veliidae	*Rhagovelia obesa* nymphs	6	
MEGALOPTERA				1.1
	Corydalidae	*Corydalus cornutus*	5	
	Sialidae	*Sialis*	1	
ODONATA				6.4
	Aeshnidae	*Basiaeschna janata*	1	
		Boyeria vinosa	6	
	Calopterygidae	*Calopteryx*	1	
	Coenagrionidae	*Argia*	5	
	Cordulegastridae	*Cordulegaster maculata*	3	
	Gomphidae	*Gomphus* early instars	6	
		Gomphus (Genus A *consanguis/rogersi*)	1	
		G. lividus	5	
		Hagenius brevistylus	1	
		Ophiogomphus mainensis	4	
		Stylogomphus albistylus	1	
		Stylurus laurae/scudderi	1	
	Macromiidae	Macromia	1	
PLECOPTERA				1.4
	Peltoperlidae	*Peltoperla*	2	
	Perlidae	*Paragnetina media*	6	
TRICHOPTERA				33.8
	Hydropsychidae	*Ceratopsyche bronta*	12	
		C. slossonae	1	
		C. sparna	1	
		Cheumatopsyche	61	
		Hydropsyche betteni/depravata	2	
		H. rotosa	39	
	Leptoceridae	*Oecetis*	1	
		Triaenodes	1	
	Limnephilidae	*Pycnopsyche*	1	
	Philopotamidae	*Chimara*	46	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhyacophila fuscula*	5	
	Uenoidae	*Neophylax*	20	
		TOTAL	**565**	

SUMMARY

Our 1995 stream surveys comprised 19 fish samples and 19 benthic samples. Index of Biotic Integrity scores for the fish samples ranged from 34 to 54 (poor to good-excellent) with an average score of 43. Ratings for the benthic macroinvertebrate samples ranged from 3 to 4.5 (fair-good to good-excellent) with an average rating of 3.7 (see appendix A). Of the 18 IBI fish surveys conducted 22.2% (4) scored "poor" or below, 5.5% (1) scored "poor to fair", 27.7% (5) scored "fair", 22.2% (4) scored "fair to good", 11.1% (2) scores "good", and 11.1% (2) scored "good to excellent". Based on the analysis of the benthic macroinvertebrate ratings collected during 1995, 27.7% (5) of the samples were categorized as "fair to good", 66.6% (12) received a classification of "good", while only one sample (5.5%) could be considered "good to excellent". In either case, none of the streams surveyed during 1995 could be categorized as "excellent".

The one quantitative survey (Indian Creek) revealed rock bass standing crop of 14 lbs/acre while the density was estimated at 80 fish/acre. Estimated smallmouth bass standing crop was somewhat lower at 8.1 lbs/acre as was the estimated density of 27 fish/acre. This collection of quantitative data regarding the rock bass/smallmouth bass sport fishery in Indian Creek represents the first of its kind in Region IV. This data will serve as a bench mark for future surveys as this stream is considered one of the better smallmouth/ rock bass streams in the region.

In regards to streams that supported game fish populations that would provide adequate angling opportunities, we concluded that about five of the 19 streams surveyed contained adequate angling opportunities for one or more species of game fish. These included Big War Creek, Beech Creek, Big Creek, North Fork Clinch River, and Indian

Creek. More quantitative information should be collected on these streams and their value as sport fisheries promoted.

As is the case in many areas of east Tennessee, streams are suffering primarily from residential/commercial development and agricultural practices. The primary product of these activities that is ultimately regulating many streams is sedimentation. This component of habitat degradation had the most consistent negative influence on our instream habitat analysis for the streams we surveyed in 1995.

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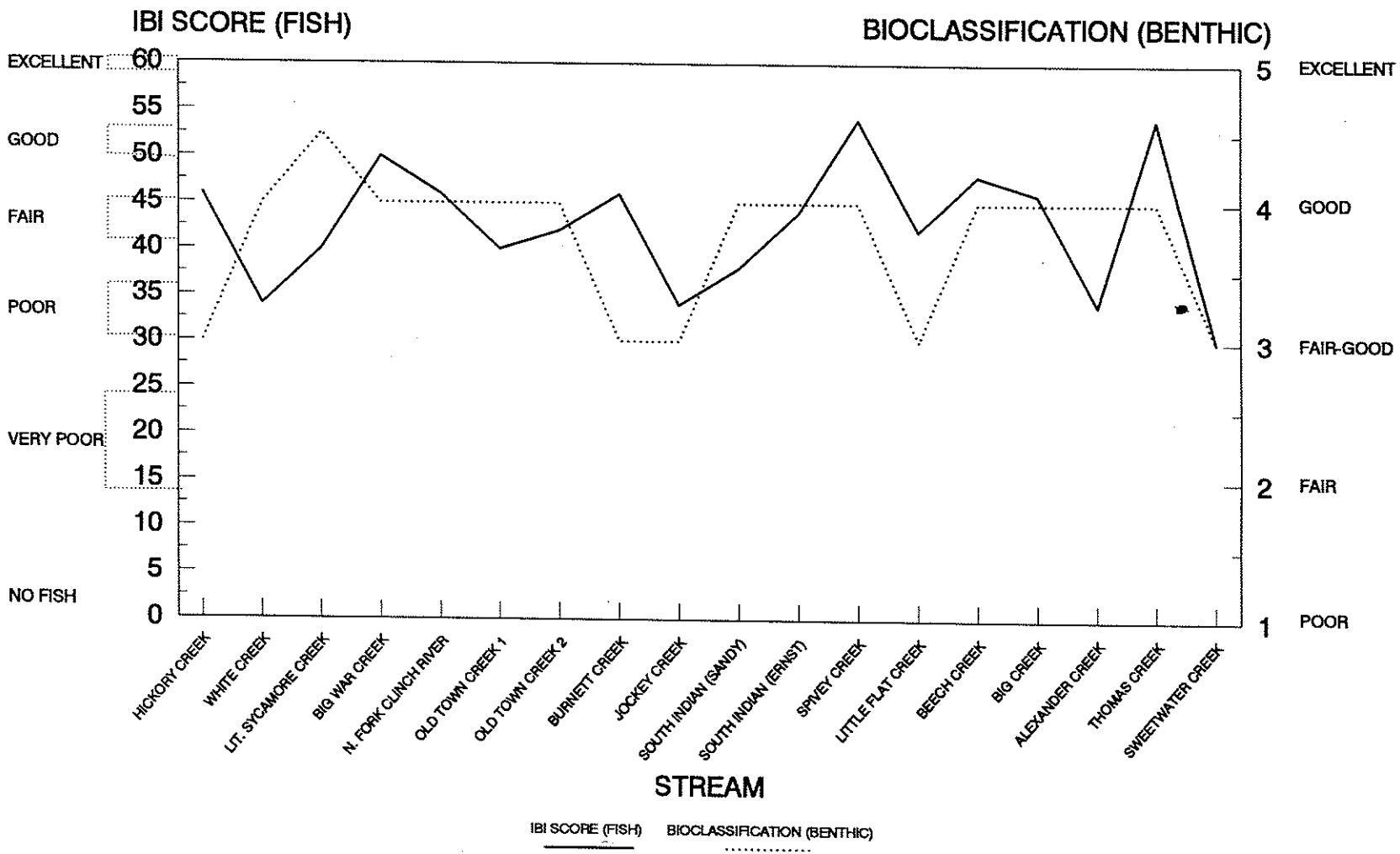
APPENDIX A

Trends in IBI Fish Scores and Biotic Index Values Calculated for Benthic Macroinvertebrate Samples Collected during 1995

Trends in IBI Fish Scores and Biotic Index Values Calculated for Benthic Macroinvertebrate Samples Collected during 1995



APPENDIX B

Fish Species Collected during 1995 with Desigantions for Trophic Guild, Reproductive Guild, Tolerance, and Headwater Habitat

Fish Species Collected during 1995 with Designations for Tolerance, Trophic Guild, Reproductive Guild, and Headwater Habitat

		Tolerance	Trophic Guild	Reproductive Guild	Headwater Habitat
CATOSTOMIDAE	*Catostomus commersoni*	TOL	OM	L	P
	Hypentelium nigricans			L	
	Moxostoma duquesnei	INT		L	P
	Moxostoma erythrurum			L	P
	Moxostoma sp.				
CENTRARCHIDAE	*Ambloplites rupestris*	INT	TC		P
	Lepomis auritus				
	Lepomis cyanellus	TOL			P
	Lepomis macrochirus				
	Lepomis megalotis	HI			P
	Lepomis microlophus				P
	Lepomis sp. (hybrid)				
	Micropterus dolomieu	TC			P
	Micropterus punctulatus	TC			P
	Micropterus salmoides	TC			P
COTTIDAE	*Cottus bairdi*				R
	Cottus carolinae				R
CYPRINIDAE	*Campostoma anomalum*	OM			
	Cyprinella galactura				P
	Cyprinella spiloptera	TOL			P
	Erimystax dissimilis	INT	SP	L	
	Erimystax insignis		OM	L	R
	Hybopsis amblops	HI	SP	L	P
	Luxilus chrysocephalus	TOL	OM	L	P
	Luxilus coccogenis	HI	SP	L	P
	Lythrurus ardens		SP	L	P
	Lythrurus lirus		SP	L	
	Nocomis micropogon		OM		P
	Notropis leuciodus	HI	SP	L	P
	Notropis rubellus		SP	L	
	Notropis rubricroceus	HI	SP	L	P
	Notropis sp. (sawfin shiner)		SP	L	
	Notropis stramineus		SP	L	P
	Notropis telescopus	INT	SP	L	P
	Notropis volucellus		SP	L	
	Phenacobius crassilabrum		SP	L	
	Phenacobius uranops		SP	L	R
	Pimephales notatus		OM		P
	Rhinichthys atratulus			L	
	Rhinichthys cataractae	HI	SP	L	R
	Semotilus atromaculatus	TOL			P
LEPISOSTEIDAE	*Lepisosteus osseus*	TOL	TC		
PERCIDAE	*Etheostoma blennioides*		SP	L	R
	Etheostoma caeruleum		SP	L	R
	Etheostoma chlorobranchium		SP	L	
	Etheostoma flabellare	INT	SP		R
	Etheostoma jessiae	INT	SP	L	P
	Etheostoma kennicotti		SP	L	P
	Etheostoma ruflineatum		SP	L	R
	Etheostoma simoterum		SP	L	R
	Etheostoma swannanoa		SP	L	
	Etheostoma zonale		SP	L	R
	Percina burtoni		SP	L	
	Percina caprodes		SP	L	P
	Percina evides	INT	SP	L	R
	Percina sciera		SP	L	P
POECILIIDAE	*Gambusia affinis*	TOL			P
SALMONIDAE	*Oncorhynchus mykiss*				
	Salmo trutta	TC			
SCIAENIDAE	*Aplodinotus grunniens*				

INT = INTOLERANT HI = HEADWATER INTOLERANT ONLY SP = SPECIALIST L = SIMPLE LITHOPHIL
TOL = TOLERANT OM = OMNOVORE TC = TOP CARNIVORE P = POOL, R = RIFFLE

APPENDIX C

Distribution of Fishes Collected during 1995 Stream Surveys

	Distribution of Fishes Collected during 1995 Stream Surveys																					
	Watershed		**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**	**C**	**D**	**D**	**D**	**D**	**E**	**E**	**E**	**E**	**F**	**G**	
			HICKORY CREEK	WHITE CREEK	LITTLE SYCAMORE CK	BIG WAR CREEK	NF CLINCH RIV	OLD TOWN CREEK 1	OLD TOWN CREEK 2	INDIAN CREEK	BURNETT CREEK	JOCKEY CREEK	SOUTH INDIAN CK SANDY	SOUTH INDIAN CK ERNST	SPIVEY CREEK	LITTLE FLAT CREEK	BEECH CREEK	BIG CREEK	ALEXANDER CREEK	THOMAS CREEK	SWEETWATER CREEK	
FAMILY	SCIENTIFIC NAME	STATUS																				
CATOSTOMIDAE	*Catostomus commersoni*		X		X			X			X	X		X		X				X		
	Hypentelium nigricans		X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	
	Moxostoma duquesnei					X	X	X	X	X						X	X	X				
	Moxostoma erythrurum						X	X									X				X	
	Moxostoma sp.							X	X													
CENTRARCHIDAE	*Ambloplites rupestris*		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Lepomis auritus		X			X	X				X	X				X	X	X	X		X	
	Lepomis cyanellus					X				X										X	X	
	Lepomis macrochirus		X		X		X	X	X	X	X	X				X	X	X	X	X	X	
	Lepomis megalotis					X	X										X					
	Lepomis microlophus																				X	
	Lepomis sp. (hybrid)							X											X			
	Micropterus dolomieu					X	X		X	X					X		X	X				
	Micropterus punctulatus		X				X	X	X													
	Micropterus salmoides							X				X									X	
COTTIDAE	*Cottus bairdi*												X	X	X							
	Cottus carolinae		X	X	X	X	X	X	X	X		X				X		X	X	X	X	
CYPRINIDAE	*Campostoma anomalum*		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	
	Cyprinella galactura					X			X	X			X		X	X	X	X				
	Cyprinella spiloptera						X															
	Erimystax dissimilis						X	X														
	Erimystax insignis												X									
	Hybopsis amblops				X	X	X	X	X	X			X	X	X		X	X				
	Luxilus chrysocephalus		X		X	X	X	X	X	X						X	X	X		X	X	
	Luxilus coccogenis					X	X	X	X	X		X	X	X	X	X	X	X		X		
	Lythrurus ardens																X	X				
	Lythrurus lirus									X												
	Nocomis micropogon					X	X	X	X	X		X	X	X	X			X		X	X	
	Notropis leuciodus					X	X	X		X			X	X	X			X				
	Notropis rubellus						X						X									
	Notropis rubricroceus													X	X				X	X		
	Notropis sp. (sawfin shiner)				X	X	X	X														
	Notropis stramineus										X					X	X					
	Notropis telescopus					X	X	X	X	X			X	X	X		X	X				
	Notropis volucellus						X											X				
	Phenacobius crassilabrum												X									
	Phenacobius uranops					X	X															
	Pimephales notatus				X			X			X					X	X					
	Rhinichthys atratulus		X	X	X		X	X	X	X	X		X	X	X			X	X	X	X	
	Rhinichthys cataractae												X	X	X							
	Semotilus atromaculatus		X		X		X				X					X	X		X	X		
LEPISOSTEIDAE	*Lepisosteus osseus*						X															
PERCIDAE	*Etheostoma blennioides*					X	X	X		X			X	X	X	X	X	X				
	Etheostoma caeruleum				X			X		X												
	Etheostoma chlorobranchium												X	X	X							
	Etheostoma flabellare		X		X	X		X	X	X			X		X		X			X		
	Etheostoma jessiae															X	X					
	Etheostoma kennicotti										X											
	Etheostoma ruflineatum				X	X	X	X	X	X						X	X	X				
	Etheostoma simoterum		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
	Etheostoma swannanoa												X		X							
	Etheostoma zonale									X												
	Percina burtoni																	X				
	Percina caprodes				X	X	X	X	X	X										X	X	
	Percina evides						X						X	X								
	Percina sciera						X															
POECILIIDAE	*Gambusia affinis*																				X	
SALMONIDAE	*Oncorhynchus mykiss*			X						X				X	X			X	X	X		
	Salmo trutta												X							X		
SCIAENIDAE	*Aplodinotus grunniens*																				X	

ST = STATE THREATENED, FT = FEDERALLY THREATENED, INM = IN NEED OF MANAGEMENT

A = CLINCH RIVER WATERSHED
B = POWELL RIVER WATERSHED
C = FRENCH BROAD RIVER WATERSHED
D = NOLICHUCKY RIVER WATERSHED
E = HOLSTON RIVER WATERSHED
F = SOUTH FORK HOLSTON RIVER WATERSHED
G = TENNESSEE RIVER WATERSHED

APPENDIX D

Distribution of Crayfishes Collected during 1995 Stream Surveys

Distribution of Crayfishes Collected during 1995 Stream Surveys																
	Watershed	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**C**	**D**	**E**	**E**	**E**	**E**	**F**	**G**
		HICKORY CREEK	WHITE CREEK	LITT SYCAMORE	BIG WAR CREEK	N FORK CLINCH	OLD TOWN CREEK	INDIAN CREEK	BURNETT CREEK	JOCKEY CREEK	LITTLE FLAT CK	BEECH CREEK	BIG CREEK	ALEXANDER CK	THOMAS CREEK	SWEETWATER CK
FAMILY	SCIENTIFIC NAME															
CAMBARIDAE	*Cambarus angularis*		X	X			X	X								
	C. bartonii	X								X					X	
	C. dubius	X	X				X			X						
	C. girardianus	X		X	X		X	X	X	X	X		X	X	X	X
	C. sp. cf. C. striatus								X							
	C. thomai	X							X							
	Orconectes erichsonianus				X	X		X	X	X	X	X				
	O. forceps				X				X							
	O. rusticus						X						X			
	O. virilis															X

A = Clinch River Watershed
B = Powell River Watershed
C = French Broad River Watershed
D = Nolichucky River Watershed
E = Holston River Watershed
F = South Fork Holston River Watershed
G = Tennessee River Watershed

APPENDIX E

Visual-Based Habitat Assessment Forms Used to Evaluate Stream Habitat during 1995

HABITAT ASSESSMENT FIELD DATA SHEET — *GLIDE/POOL PREVALENT STREAMS*

STREAM _____ DATE _____

SITE _____ INVESTIGATOR _____

Glide/Pool Prevalent Streams are those in low to moderate gradient landscapes that have velocities rarely greater than 1 ft/sec, except during storm events. Natural streams have substrates of fine sediment or infrequent aggregations of coarser (gravel or larger) sediment particles along stream reaches.

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Bottom Substrate/ Available Cover	Greater than 50% mix of snags, submerged logs, undercut banks, rubble or other stable habitat and at stage to allow full colonization potential (i.e., logs/ snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not get prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal, sinuous pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yrs) may be present, but recent channelization is not present.	New embankments present on both banks; channelization may be extensive, usually in urban areas or drainage areas of agriculture lands; and >80% of stream reach channelized and disrupted.	Extensive channelization; banks shored with gabion or cement; heavily urbanized areas; instream habitat greatly altered or removed entirely.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Less than 20% of bottom affected; minor accumulation of fine and coarse material at snags and submerged vegetation; little or no enlargement of islands or point bars.	20-50% affected; moderate accumulation; substantial sediment movement only during major storm event; some new increase in bar formation.	50-80% affected; major deposition; pools shallow, heavily silted; embankments may be present on both banks; frequent and substantial sediment movement during storm events.	Channelized; mud, silt, and/or sand in braided or nonbraided channels; pools almost absent due to deposition.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note -- channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of stream-bank vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ____

HABITAT ASSESSMENT FIELD DATA SHEET ***RIFFLE/RUN PREVALENT STREAMS***

STREAM _____ DATE _____

SITE _____ INVESTIGATOR _____

Riffle/Run Prevalent Streams are those in moderate to high gradient landscapes that sustain water velocities of approximately 1 ft/sec or greater. Natural streams have substrates primarily composed of coarse sediment particles (i.e., gravel or larger) or frequent coarse particulate aggregations along stream reaches.

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	Greater than 50% mix of snags, submerged logs, undercut banks, or other stable habitat.	30-50% mix of stable habitat; adequate habitat for maintenance of populations.	10-30% mix of stable habitat; habitat availability less than desirable.	Less than 10% mix of stable habitat; lack of habitat is obvious.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.	Riffles or runs virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat is key. In the highest gradient streams (e.g., headwaters), riffles are continuous, and placement of boulders or other large, natural obstruction is evaluated as providing habitat diversity.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score ____

APPENDIX F

1995 Summary of Strategic Plan Activities

1995 SUMMARY OF STREAM STRATEGIC PLAN ACTIVITIES

ACTIVITY	COMPLETED	NUMBER
Identified land for purchase and/or lease of stream easements from landowners for habitat protection (I-1)	NO	
Participation in stream restoration projects (I-4)	NO	
Development of a watershed management plan (II-1)	NO	
Stream surveys (II-2)	YES	19
Implemented a creel and/or user survey (II-3)	NO	
Identification of stream fishing access sites for purchase and/or lease (III-1)	NO	
Cooperation with organized groups for stream habitat development and cleanup (III-3)	NO	
Design and implementation of stream habitat enhancement programs (IV-1)	NO	
Evaluation of stream habitat enhancement (IV-2)	NO	
Public education about stream fishing (VI-1)	YES	20
Locations for potential land purchases or leases: **Tackett Creek Watershed (Campbell and Claiborne Co.)**	YES	