WARMWATER STREAM FISHERIES REPORT REGION IV 1996

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April, 1997

Development of this report was financed in part by funds from Federal Aid in Fish and Wildlife Restoration (TWRA Project 4321 and 4330) (Public Law 91-503) as documented in Federal Aid Project FW-6.

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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 tenth 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. 96-4. A total of 13 streams were sampled and are included in this report. Stream surveys were conducted from May to August, 1996. Thirteen fish samples and 13 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. Sample lengths ranged from approximately 100 m to 300 m 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. This has been accomplished by plotting species richness for a number of sites against watershed areas and/or stream orders (Fausch et al. 1984). We chose to use watershed area (km^2) to develop our relationships as this variable has been shown to be a more reliable variable for predicting maximum species richness. 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 13 IBI samples collected in 1996.

FISH COLLECTIONS

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 3 or 4.5 x 1.3 meter seine was used to make hauls in shallow pool and run areas in smaller streams (< 6 m mean width). In larger streams, a 6 x 1.3 m 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., 3 m x 3 m) 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 (m^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. Anomalies (e.g., parasites, deformities, eroded fins, lesions, or tumors) were noted along with occurrences of hybridization. After processing, the captured fish were either held in captivity or released into the stream where they could not be recaptured.

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 1996 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 (*Micropterus dolomieu*), spotted bass (*M. punctulatus*), largemouth bass (*M. salmoides*), and rock bass (*Ambloplites rupestris*) for age and growth analysis in those streams considered to support 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 1996 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 (EPT).

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 1996 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 streams. 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 each reach we were surveying. The scoring scheme is based on a 200 point scale and is partitioned into four categories. Categories and scoring ranges for both riffle/run prevalent streams and pool/glide prevalent streams are as follows:

Category	Score Range
Optimal	200-160
Suboptimal	159-110
Marginal	109-60
Poor	59-0

Our habitat assessment procedure involved three individuals **(performed by the same investigators on each stream)** making assessments for each 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 1996 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. Scoring criteria for the twelve metrics were modified according to watershed size. Watersheds draining less than 13 km^2 were assigned different scoring criteria than those draining greater areas. This was done to accommodate the inherent problems associated with small stream samples (e.g., lower catch rates and species richness). Young-of-the-Year fish and non-native species were excluded from the IBI calculations. After calculating a final score, an integrity class was assigned to the stream reach 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 of 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.

Benthic data collected for the 1996 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 (Excellent)	<5.14	>33
4.6	5.14-5.18	32-33
4.4	5.19-5.23	30-31
4 (Good)	5.24-5.73	26-29
3.6	5.74-5.78	24-25
3.4	5.79-5.83	22-23
3 (Fair-Good)	5.84-6.43	18-21
2.6	6.44-6.48	16-17
2.4	6.49-6.53	14-15
2 (Fair)	6.54-7.43	10-13
1.6	7.44-7.48	8-9
1.4	7.49-7.53	6-7
1 (Poor)	>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

Hinds Creek

One IBI fishery survey was conducted on Hinds Creek in June 1996:

Location and Length - Tributary to the Clinch River. The sample area was located in close proximity to the confluence of Hinds Creek and Brushy Creek (stream mile 1.4). The sample are extended upstream from the confluence and was approximately 200 m in length. The site was sampled on 4 June 1996.

Sampling Methodology - This site was sampled with a 4.5 m 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 did conduct surveys in this stream at two localities in 1987 (Bivens 1988).

A total of 319 fish representing 27 species was collected in our survey. Ten game fish and six non-game fish species were collected (see Figure 1 for length frequency distribtuions of rock bass, smallmouth bass, spotted bass, and largemouth bass). These included 20 rock bass (*Ambloplites rupestris*) (all sacrificed for otoliths), 13 rebreast sunfish (*Lepomis auritus*), three green sunfish (*L. cyanellus*), ten bluegill (*L. macrochirus*), one longear sunfish (*L. megalotis*), one smallmouth bass (*Micropterus dolomieu*) (sacrificed for otoliths), five spotted bass (*M. punctulatus*) (sacrificed for otoliths), six largemouth bass (*M. salmoides*) (sacrificed for otoliths), three white bass (*Morone chrysops*), and four rainbow trout (*Oncorhynchus mykiss*). The collection of rainbow trout from this stream was most likely a result of immigration from the Clinch River tailwater. Non-game species included one yellow bullhead (*Ameiurus natalis*), three common carp (*Cyprinus carpio*), 13 northern hogsucker (*Hypentelium nigricans*), one channel catfish (*Ictalurus punctatus*), two black redhorse (*Moxostoma duquesnei*), and three golden redhorse (*M. erythrurum*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and bluntnose minnow (*Pimephales notatus*). Together these two species accounted for 42.9% of all fish collected in our sample. Four darter species were also collected from this site. These included greenside darter (*Etheostoma blennioides*), redline darter (*E. ruflineatum*), snubnose darter (*E. simoterum*), and logperch (*Percina caprodes*). The 1987 sample (stream mile 10.0) in closest proximity to ours accounted for 19 species. The only darter species encountered in 1987 that was not collected in our survey was the blueside darter (*E. jessiae*).

Our Index of Biotic Integrity analysis indicated that this stream was in "poor to fair" condition based on an IBI score of 36. The strongest negative influences on the overall score were the low number of intolerant species in the sample, the relatively low percentage of trophic specialists, the high percentage of trophic generalists, the low CPUE, and the high incidence of anomalies on the fish. Although this stream has a reputation of transporting heavy sediment loads, we found the substrate to be less impacted than speculated.

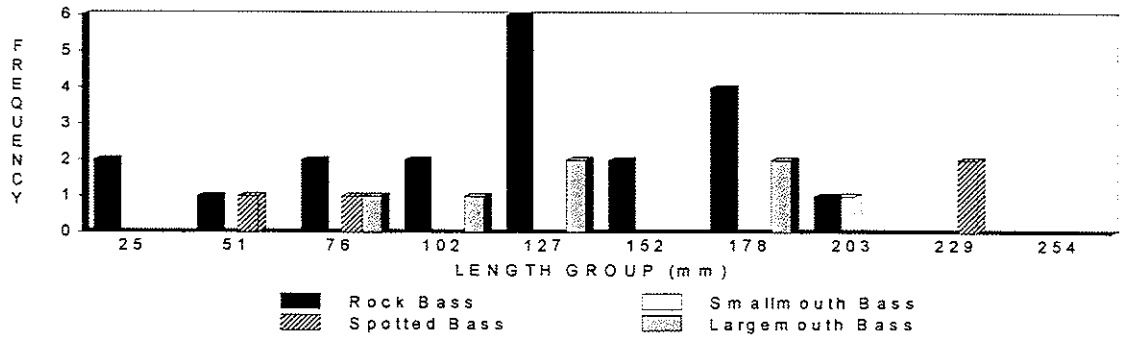
Benthic macroinvertebrates from our sample included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Perlidae stoneflies; and Hydropsychidae, Leptoceridae, Limnephilidae, and Uenoidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 29.9% of the total sample. Trichopterans were second most abundant with 27.1%. Plecopterans only contributed 1.1% to the total sample. Coleopterans and odonates accounted for 11.9% and 7.9% of the total sample, respectively. A total of 43 taxa was collected from this site of which 18 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Hinds Creek was assigned a bioclassification of "fair to good".

Habitat analysis for this portion of Hinds Creek resulted in a classification of sub-optimal based on a average index score of 123. There was a high occurrence of bank instability in the reach we surveyed.

Management Recommendations:

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

Figure 1. *Length Frequency Distributions for Rock Bass, Smallmouth Bass, Spotted Bass, and Largemouth Bass Collected in Hinds Creek during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	HINDS CREEK
WATERSHED	CLINCH RIVER
SITE	DIANE KLINK PROPERTY
COUNTY	ANDERSON
QUADRANGLE	NORRIS 137 NE
LAT-LONG	360747N-840612W
REACH	06010207-16.0
LENGTH	~ 200 m
AREA (SQ. KM.)	161.3
ELEVATION	805 FT
DATE	6-4-96
TIME	1350

COLLECTOR(S)

R.D. BIVENS, B.D. CARTER, C.E. WILLIAMS T. MCDONOUGH, AND D. BOWLIN

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
13.3 m	0.4 m	1.2+ m

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
25	10	30	15	10	10

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	15	50	15	5	5

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) 49.1 COPMARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 22 C @ 1404

10. PAST WEATHER (last 24 hrs)

SUNNY AND MILD; SCATTERED T-STORMS OVERNIGHT

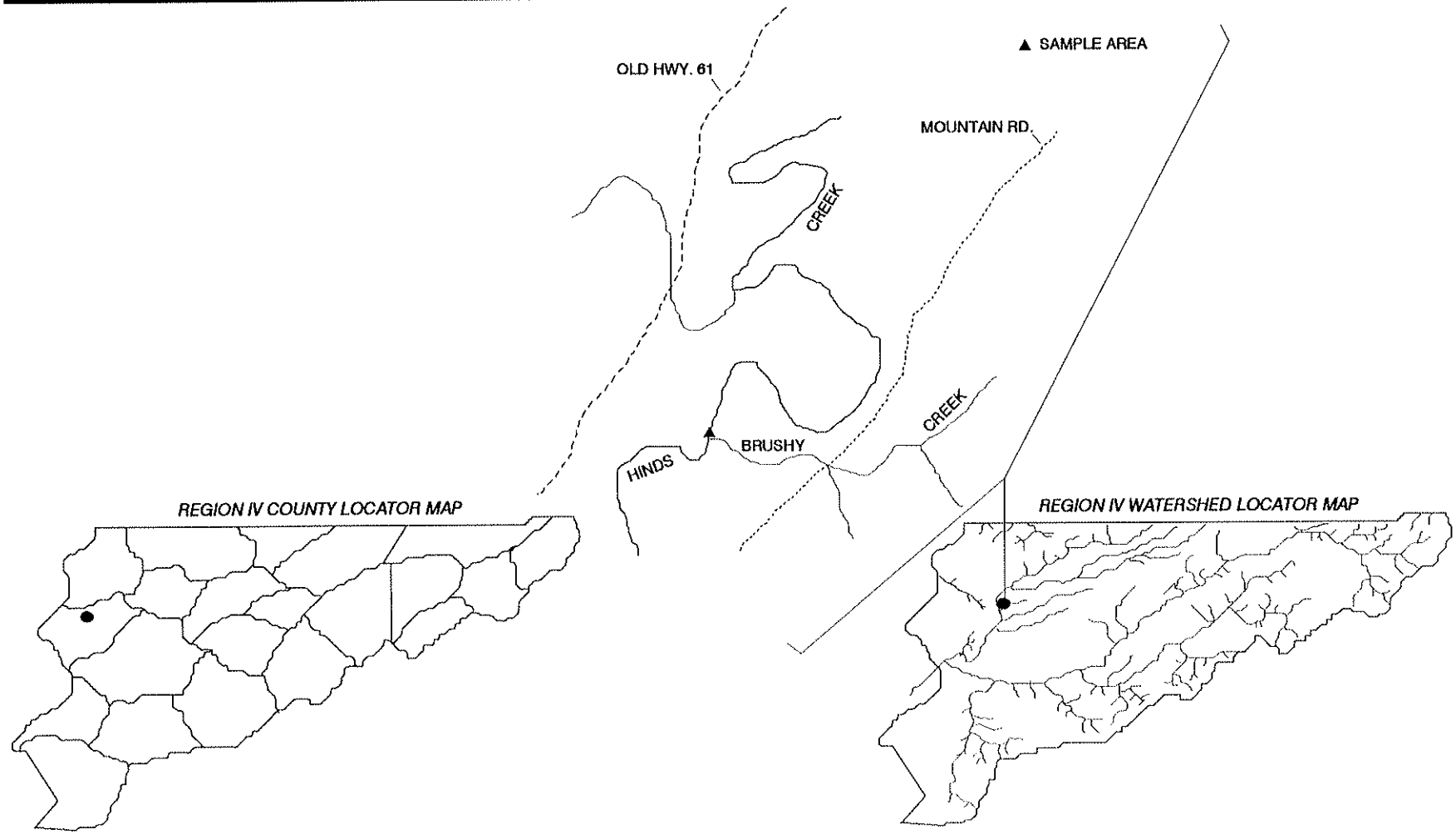
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	17 C	275	9.0	98.0

12. COMMENTS

SAMPLE AREA LOCATED AT THE PROPERTY OF DIANE KLINK. WATER TURBID AT TIME OF SAMPLE. SUBSTRATE SUPRISINGLY CLEAN.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 123



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	20			ONLY 6 INCLUDED IN IBI
Ameiurus natalis	233	1			
Campostoma anomalum	45	112			
Cottus carolinae	322	6			
Cyprinella galactura	54	5			
Cyprinella spiloptera	57	16			
Cyprinus carpio	62	3			
Etheostoma blennioides	398	1			
Etheostoma ruflineatum	431	17			
Etheostoma simoterum	435	17			
Hybopsis amblops	79	5			
Hypentelium nigricans	207	13			
Ictalurus punctatus	240	1	N/A	N/A	NOT INCLUDED IN IBI
Lepomis auritus	346	13	43-171	304	
Lepomis cyanellus	347	3	50-77	18	
Lepomis macrochirus	351	10	68-118	125	
Lepomis megalotis	353	1	82	14	
Luxilus chrysocephalus	89	12			
Micropterus dolomieu	362	1	132	27	
Micropterus punctulatus	363	5	75-245	375	ONLY 3 INCLUDED IN IBI
Micropterus salmoides	364	6	116-197	234	ONLY 1 INCLUDED IN IBI
Morone chrysops	326	3	224-249	282	
Moxostoma duquesnei	224	2			
Moxostoma erythrurum	225	3			
Oncorhynchus mykiss	279	4	131-162	116	
Percina caprodes	464	14			
Pimephales notatus	176	25			
	SUM:	319			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<13	13-25	>25	24	3
NUMBER OF DARTER SP.	<3	3-5	>5	4	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	5
NUMBER OF SUCKER SP.	<2	2	>2	3	5
NUMBER OF INTOLERANT SP.	<2	2-3	>3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>28	28-15	<15	12	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>32	32-17	<17	51	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<23	23-45	>45	18.3	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4	4.7	5
CATCH RATE	<16.4	16.4-32.7	>32.7	14.5	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	17.7	1
					36 **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**

HINDS CREEK BENTHIC DATA
FIELD # 773
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 43
EPT TAXA RICHNESS = 18
BIOCLASSIFICATION = FAIR-GOOD

			NUMBER	PERCENT
ANNELIDA				1.1
	Hirudinea		1	
	Oligochaeta		3	
COLEOPTERA				11.9
	Elmidae	*Dubiraphia* adults	2	
		Stenelmis larvae and adults	20	
	Psephenidae	*Psephenus herricki*	20	
DIPTERA				6.8
	Chironomidae		22	
	Tabanidae	*Tabanus*	1	
	Tipulidae	*Hexatoma*	1	
EPHEMEROPTERA				29.9
	Baetidae	*Baetis*	2	
	Caenidae	*Caenis*	10	
	Ephemerellidae	*Eurylophella*	7	
	Ephemeridae	*Hexagenia*	3	
	Heptageniidae	*Stenacron interpunctatum*	22	
		Stenonema early instars	21	
		Stenonema femoratum	11	
		Stenonema mediopunctatum	1	
		Stenonema terminatum	2	
	Oligoneuriidae	*Isonychia*	27	
GASTROPODA				3.7
	Physidae	*Physa*	1	
	Pleuroceridae	*Leptoxis*	6	
		Pleurocera	6	
HEMIPTERA				1.4
	Gerridae	*Gerris* nymphs	3	
	Veliidae	*Rhagovelia obesa* male and female	2	
ISOPODA				1.1
	Asellidae	*Lirceus*	4	
MEGALOPTERA				1.4
	Corydalidae	*Corydalus cornutus*	2	
	Sialidae	*Sialis*	3	
ODONATA				7.9
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	5	
	Coenagrionidae	*Argia*	13	
		Enallagma	5	
	Gomphidae	*Dromogomphus spinosus*	2	
		Hagenius brevistylus	1	
	Macromiidae	*Macromia*	1	
PELEYCYPODA				6.5
	Corbiculidae	*Corbicula fluminea*	22	
	Sphaeriidae	*Sphaerium*	1	
PLECOPTERA				1.1
	Perlidae	*Neoperla*	1	
		Perlesta placida	3	
TRICHOPTERA				27.1
	Hydropsychidae	*Cheumatopsyche*	48	
		Hydropsyche betteni/depravata	36	
		Hydropsyche frisoni	3	
	Leptoceridae	*Oecetis*	1	
		Triaenodes pupa and larvae	3	
	Limnephilidae	*Pycnopsyche*	3	
	Uenoidae	*Neophylax auris/etnieri*	2	
		TOTAL	354	

Cove Creek

One IBI fishery survey was conducted on Cove Creek in August 1996:

Location and Length - Tributary to the Clinch River (Norris Reservoir). The sample area was located approximately 100 m downstream of Adkins Branch adjacent to Red Ash Baptist Church. The sample area was approximately 152 m in length and was sampled on 22 August 1996.

Sampling Methodology - This site was sampled with a 4.5 m seine and one backpack electrofishing unit operating at 200 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 list for TADS. This sample was conducted in response to a request made by Stan Stooksbury (Royal Blue WMA). The Agency has made no previous collections from this stream.

A total of 168 fish representing 14 species was collected in our survey. Four game fish and one non-game fish species were collected. These included 12 green sunfish (*Lepomis cyanellus*), five bluegill (*L. macrochirus*), one smallmouth bass (*Micropterus dolomieu*), one largemouth bass (*M. salmoides*), and 13 northern hogsuckers (*Hypentelium nigricans*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and rainbow darter (*Etheostoma caeruleum*). Together these two species accounted for 53.5% of all fish collected in our sample.

Our Index of Biotic Integrity analysis indicated that this stream was in "poor" condition based on an IBI score of 28. The strongest negative influences on the overall score were the low number of intolerant, darter, and sucker species in the sample, the relatively high percentage of trophic generalists, the low percentage of piscivorous species in the community, and the high incidence of anomalies on the fish. This region of east Tennessee has been subjected to extensive surface coal mining activities. This has ultimately compromised many streams in this area due to siltation and alteration of water chemistry.

Benthic macroinvertebrates from our sample included Baetidae, Heptageniidae, and Oligoneuriidae mayflies; Peltoperlidae and Perlidae stoneflies; and Glossosomatidae, Hydropsychidae, Leptoceridae, Limnephilidae, and Philopotamidae caddisflies.

Trichopterans were the most abundant organisms in our survey, comprising 24.0% of the total sample. Ephemeropterans were second most abundant with 18.2%. Plecopterans only contributed 2.0% to the total sample. Dipterans and gastropods accounted for 16.5% and 13.3% of the total sample, respectively. A total of 45 taxa was collected from this site of which 16 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Cove Creek was assigned a bioclassification of "fair to good".

Habitat analysis for this portion of Cove Creek resulted in a classification of sub-optimal based on an average index score of 131. Our observations indicated that coal mining activities in the watershed were having the most influence in degrading this stream. Coal fines were quite common in the substrate.

Management Recommendations:

1. Any actions that could address protection of riparian zones and reclamation of strip mines in the watershed would be most beneficial to this stream.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	COVE CREEK
WATERSHED	CLINCH RIVER
SITE	@ RED ASH BAPTIST CH.
COUNTY	CAMPBELL
QUADRANGLE	JACKSBORO 136 SW
LAT-LONG	361839N-841405W
REACH	06010205-128.0
LENGTH	~ 152 m
AREA (SQ. KM.)	34.9
ELEVATION	1075 FT
DATE	8-22-96
TIME	1013

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
7.6 m	0.3 m	1.2 m

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 5.1 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
X		

9. PRESENT WEATHER

PT. CLOUDY AND HOT; AIR TEMP. 23 C @ 1021

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

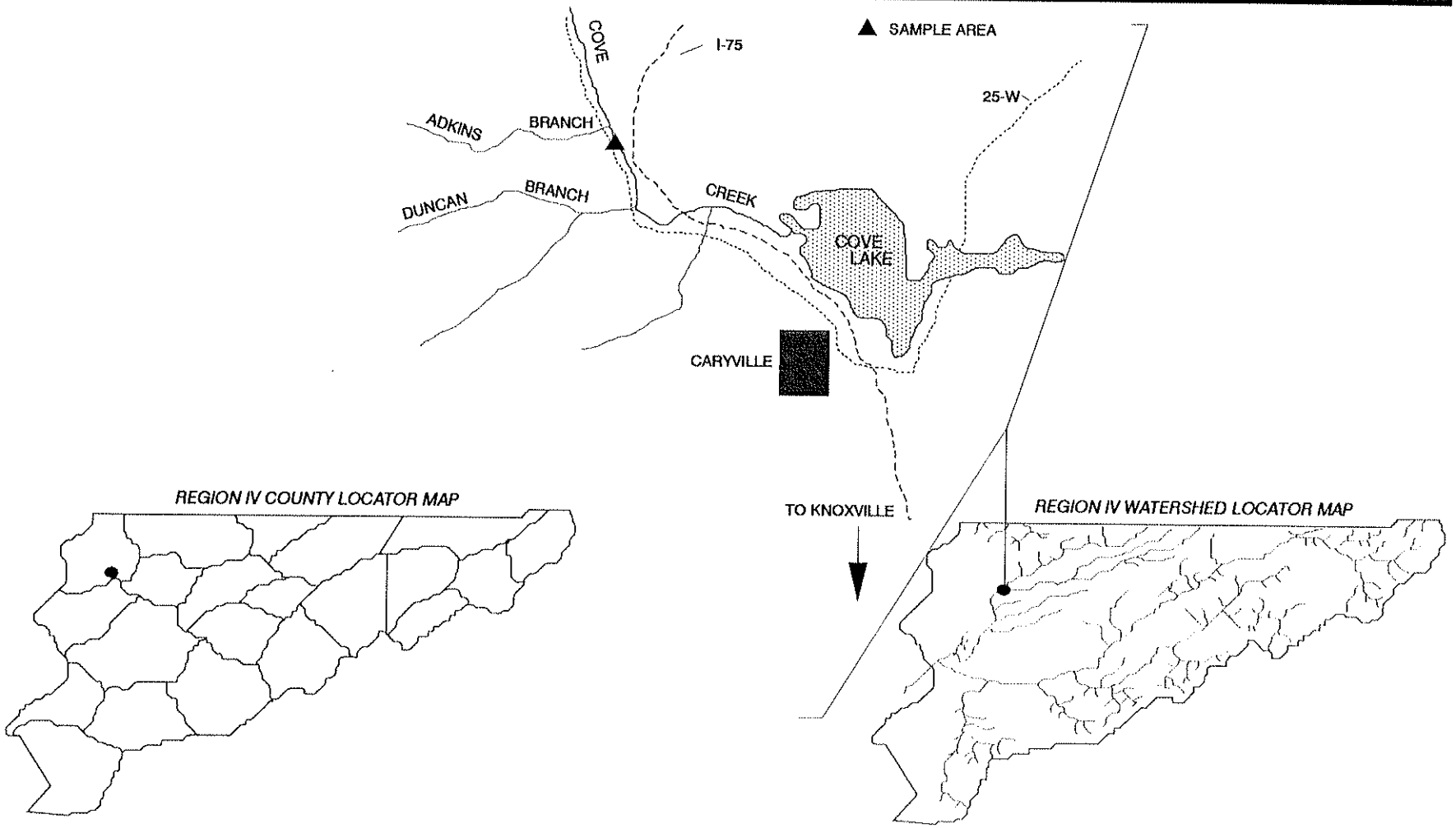
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	20 C	165	8.8	101.2

12. COMMENTS

SAMPLE AREA LOCATED ~ 100 m DOWNSTREAM OF ADKINS BRANCH AND ADJACENT TO RED ASH BAPTIST CHURCH.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 131



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE AND ONE BACKPACK UNIT @ 200 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ameiurus natalis	233	1			
Campostoma anomalum	45	59			
Cottus carolinae	322	1			
Etheostoma caeruleum	401	31			
Hypentelium nigricans	207	13			
Labidesthes sicculus	312	6			
Lepomis cyanellus	347	12	54-132	317	
Lepomis macrochirus	351	5	76-187	202	
Luxilus chrysocephalus	89	4			
Micropterus dolomieu	362	1	122	19	
Micropterus salmoides	364	1	315	250	
Percina caprodes	464	10			
Pimepahles notatus	176	20			
Semotilus atromaculatus	188	4			
		SUM:			
		168			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<10	10-19	>19	14	3
NUMBER OF DARTER SP.	<3	3-4	>4	2	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	2	3
NUMBER OF SUCKER SP.	<2	2	>2	1	1
NUMBER OF INTOLERANT SP.	<2	2-3	>3	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>33	33-17	<17	12.5	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>39	39-20	<20	50	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<19	19-36	>36	24.4	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4	1.2	1
CATCH RATE	<21.8	21.8-43.5	>43.5	24.4	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	12.5	1
					28 POOR

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

COVE CREEK BENTHIC DATA
FIELD # 800
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 45
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION = FAIR -GOOD

			NUMBER	PERCENT
ANNELIDA				0.9
	Oligochaeta		3	
COLEOPTERA				4.9
	Dryopidae	*Helichus* adults	11	
	Elmidae	*Macronychus glabratus*	2	
		Optioservus larva	1	
	Psephenidae	*Psephenus herricki*	3	
DIPTERA				16.5
	Athericidae	*Atherix lantha*	15	
	Chironomidae		6	
	Simuliidae		35	
	Tanyderidae	*Protoplasa fitchii*	1	
EPHEMEROPTERA				18.2
	Baetidae	*Baetis*	7	
	Baetidae sp.	only two caudal filaments	14	
	Heptageniidae	*Stenonema* early instars	12	
		Stenonema sp	2	
		Stenonema vicarium	2	
	Oligoneuriidae	*Isonychia*	26	
GASTROPODA				13.3
	Physidae		1	
	Pleuroceridae	Pleurocera yellow, elongated form	45	
HEMIPTERA				2.0
	Gerridae	*Gerris conformis* female	1	
		Metrobates hesperius	2	
		Trepobates female	1	
	Veliidae	*Microvelia*	2	
		Rhagovelia obesa female	1	
ISOPODA				0.3
	Asellidae	*Lirceus*	1	
MEGALOPTERA				6.4
	Corydalidae	*Corydalus cornutus*	17	
		Nigronia serricornis	1	
	Sialidae	*Sialis*	4	
ODONATA				11.3
	Aeshnidae	*Boyeria grafiana*	1	
		Boyeria vinosa	4	
	Calopterygidae	*Calopteryx*	6	
	Gomphidae	*Dromogomphus spinosus*	1	
		Gomphus lividus	10	
		Hagenius brevistylus	4	
		Stylogomphus albistylus	7	
	Macromiidae	*Macromia*	6	
PELECYPODA				0.3
	Corbiculidae	*Corbicula fluminea*	1	
PLECOPTERA				2.0
	Peltoperlidae	*Peltoperla*	1	
	Perlidae	*Acroneuria abnormis*	6	
TRICHOPTERA				24.0
	Glossosomatidae	*Glossosoma*	2	
	Hydropsychidae	*Ceratopsyche sparna*	8	
		Cheumatopsyche	8	
		Hydropsyche dicantha	8	
	Leptoceridae	*Oecetis* larva & pupa	2	
		Triaenodes	7	
	Limnephilidae	*Pycnopsyche guttifer/scabripennis* group	1	
		Pycnopsyche luculenta group	2	
	Philopotamidae	*Chimara*	45	
		TOTAL	**346**	

Titus Creek

One IBI fishery survey was conducted on Titus Creek in June 1996:

Location and Length - Tributary to the Clinch River (Cove Creek tributary). The sample area was located upstream of the old Hwy. 63 bridge crossing (Royal Blue WMA). The sample area was approximately 152 m in length and was sampled on 25 June 1996.

Sampling Methodology - This site was sampled with a 3 m seine and one backpack electrofishing unit operating at 250 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 list for TADS. This sample was conducted in response to a request made by Stan Stooksbury (Royal Blue WMA). The Agency has made no previous collections from this stream.

A total of 264 fish representing 13 species was collected in our survey. Three game fish and two non-game fish species were collected (see Figure 2 for length frequency distribution of rock bass *Ambloplites rupestris*). These included 18 rock bass (16 sacrificed for otoliths) two bluegill (*Lepomis macrochirus*), 31 green sunfish (*L. cyanellus*), nine northern hogsuckers (*Hypentelium nigricans*) and one white sucker (*Catosotmus commersoni*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocephalus*). Together these two species accounted for 55.3% of all fish collected in our sample. Additionally, four darter species were collected at this site. These included rainbow darter (*Etheostoma caeruleum*), fantail darter (*E. flabellare),* redline darter (*E. ruflineatum*), and logperch (*Percina caprodes*).

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 relatively high percentage of trophic generalists and the high incidence of anomalies on the fish. Being a tributary to Cove Creek, this stream has been subjected to many of the same land use practices that have negatively affected Cove Creek..

Benthic macroinvertebrates from our sample included Baetidae, Caeindae, Ephemerllidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Leuctridae, Peltoperlidae, Perlidae, and Perlodidae stoneflies; and Hydropsychidae and

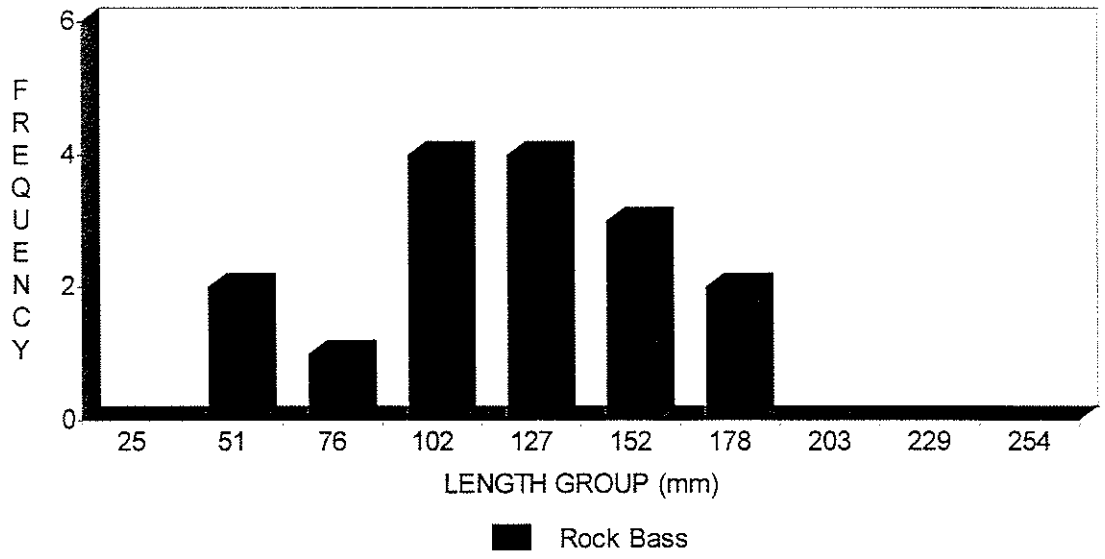
Limnephilidae caddisflies. Dipterans were the most abundant organisms in our survey, comprising 38.0% of the total sample. Coleopterans were second most abundant with 13.1%. Ephemeropterans, Plecopterans, and Trichopterans contributed 7.5%, 7.9%, and 9.5%, respectively, to the total sample. A total of 45 taxa was collected from this site of which 17 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Titus Creek was assigned a bioclassification of "fair to good".

Habitat analysis for this portion of Titus Creek resulted in a classification of sub-optimal based on a average index score of 139. Our observations indicated that coal mining activities and the extensive network of roads in the watershed were having the most influence in regulating this stream. We found coal fines to be quite common in the substrate.

Management Recommendations:

1. Any actions that could address protection of riparian zones and reclamation of strip mines in the watershed would be the most beneficial to this stream.

Figure 2. * Length Frequency Distribution for Rock Bass Collected in Titus Creek during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	TITUS CREEK
WATERSHED	CLINCH RIVER
SITE	@ OLD HWY. 63 BRIDGE
COUNTY	CAMPBELL
QUADRANGLE	PIONEER 128 SW
LAT-LONG	362331N-841645W
REACH	06010205-
LENGTH	~ 152 m
AREA (SQ. KM.)	13.0
ELEVATION	1400 FT
DATE	6-25-96
TIME	1001

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
6.5 m	0.2 m	0.5 m

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	10	15	30	25	10

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 60 %

8. FLOW (CFS) 4.1 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

SUNNY AND MILD; AIR TEMP 24 C @ 1725

10. PAST WEATHER (last 24 hrs)

PT. CLOUDY W/ SCATTERED T-STORMS

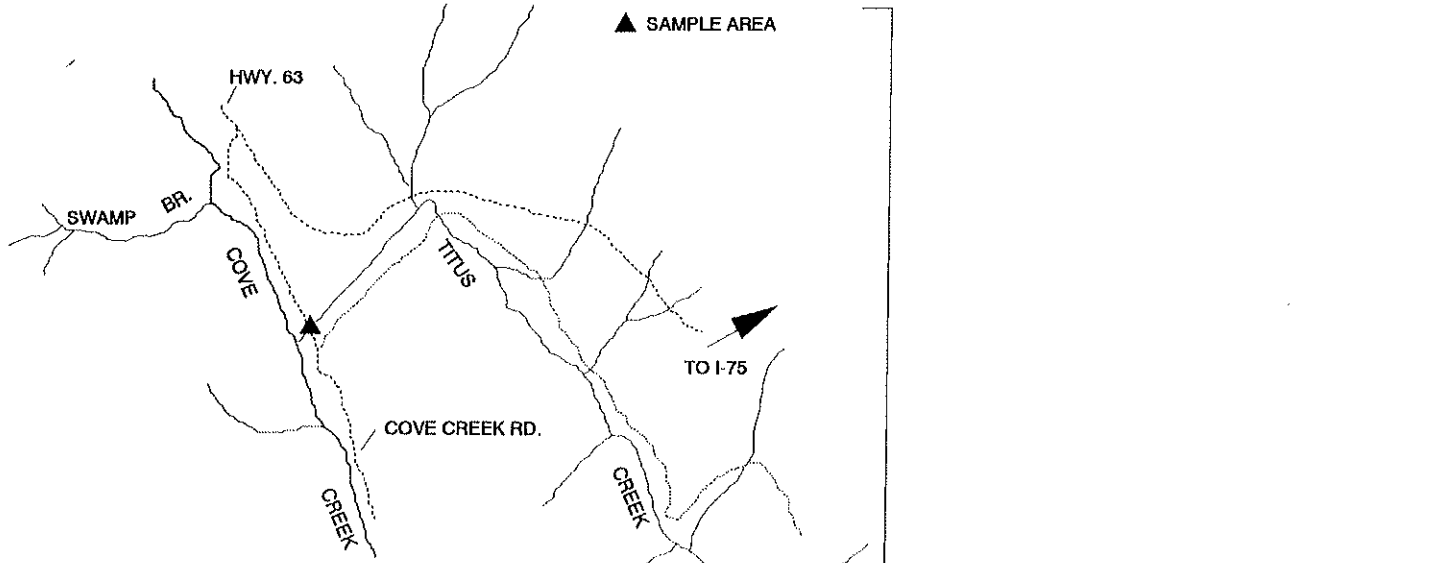
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
6.3	21 C	140	9.4	110.4

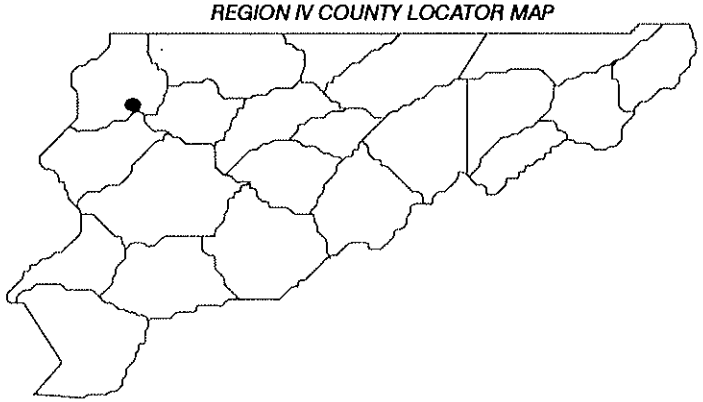
12. COMMENTS

SAMPLED CONDUCTED UPSTREAM AND DOWNSTREAM OF BRIDGE CROSSING. SEDIMENTATION PREVELANT. SOME COAL FINES IN SUBSTRATE.

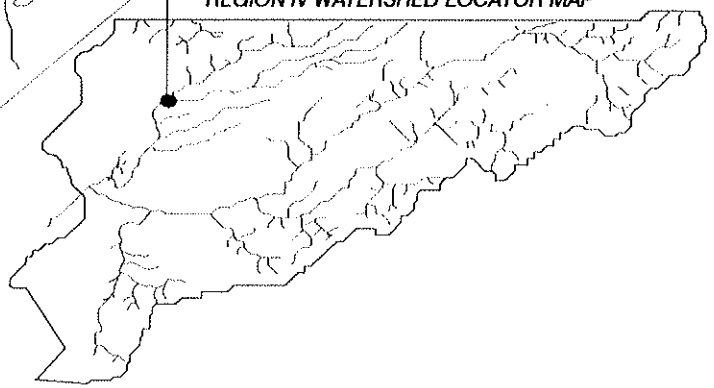
13. $\bar{X}$ HABITAT ASSESSMENT SCORE 139



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 3 m SEINE AND ONE BACKPACK UNIT @ 250 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	18	52-189	774	
Campostoma anomalum	45	121			
Catostomus commersoni	195	1			
Ehteostoma caeruleum	401	9			
Etheostoma flabellare	411	6			
Etheostoma ruflineatum	431	24			
Hypentelium nigricans	207	9			
Lepomis cyanellus	347	31	39-124	232	
Lepomis macrochirus	351	2	107-130	55	
Luxilus chrysocephalus	89	25			
Percina caprodes	464	1			
Pimephales notatus	176	12			
Semotilus atromaculatus	188	5			
		SUM: 264			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<8	8-14	>14	13	3
NUMBER OF DARTER SP.	<2	2-3	>3	4	5
NUMBER OF SUNFISH SP. *less Micropterus*	0	1	>1	3	5
NUMBER OF SUCKER SP.	0	1	>1	2	5
NUMBER OF INTOLERANT SP.	<2	2	>2	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>37	37-19	<19	23.4	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>46	46-24	<24	60	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<15	15-28	>28	15.1	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1.9	1.9-3.7	>3.7	6.8	5
CATCH RATE	<28.5	28.5-56.8	>56.8	31.9	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	13.2	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**

TITUS CREEK BENTHIC DATA
FIELD # 780
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 45
EPT TAXA RICHNESS = 17
BIOCLASSIFICATION = FAIR-GOOD

			NUMBER	PERCENT
ANNELIDA				1.6
	Hirudinea		1	
	Oligochaeta		3	
COLEOPTERA				13.1
	Dryopidae	*Helichus* adults	12	
	Elmidae	*Dubiraphia* adults	19	
	Gyrinidae	*Gyrinus* adult	1	
	Psepheniidae	*Psephenus herricki*	1	
DIPTERA				38.0
	Athericidae	*Atherix lantha*	1	
	Chironomidae		71	
	Simuliidae		18	
	Tipulidae	*Antocha*	4	
		Dicranota	1	
		Tipula	1	
EPHEMEROPTERA				7.5
	Baetidae	*Acentrella*	7	
		Baetis	1	
	Caenidae	*Caenis*	2	
	Ephemerellidae	*Eurylophella*	1	
	Ephemeridae	mutilated specimen	1	
	Heptageniidae	*Stenacron*	1	
		Stenonema	1	
	Oligoneuriidae	*Isonychia*	5	
GASTROPODA				1.2
	Ancylidae	*Ferrissia*	2	
	Planorbidae		1	
HEMIPTERA				1.2
	Gerridae	*Gerris conformis* male & female	2	
	Veliidae	*Rhagovelia obesa*	1	
MEGALOPTERA				2.0
	Corydalidae	*Corydalus cornutus*	2	
		Nigronia serricornis	1	
	Sialidae	*Sialis*	2	
ODONATA				11.9
	Aeshniidae	*Boyeria vinosa*	2	
	Calopterygidae	*Calopteryx*	1	
	Coenagrionidae	*Argia*	1	
		Enallagma	4	
	Gomphidae	*Gomphus lividus*	16	
		Hagenius brevistylus	1	
		Stylogomphus albistylus	3	
	Macromiidae	*Macromia*	2	
PELECYPODA				6.3
	Corbiculidae	*Corbicula fluminea*	16	
PLECOPTERA				7.9
	Leuctridae		3	
	Peltoperlidae	*Peltoperla*	14	
	Perlidae	*Perlesta*	2	
	Perlodidae	*Malirekus/Yugus* early instar	1	
TRICHOPTERA				9.5
	Hydropsychidae	*Ceratopsyche sparna*	12	
		Cheumatopsyche	1	
		Hydropsyche betteni/depravata	3	
	Limnephilidae	*Pycnopsyche guttifer/scabripennis* group	7	
		Pycnopsyche luculenta group	1	
		TOTAL	**253**	

Cloyd Creek

One IBI fishery survey was conducted on Cloyd Creek in May 1996:

Location and Length - Tributary to the Tennessee River. The sample area was located approximately 0.4 km downstream of the Perkle Road crossing. The sample area was approximately 100 m in length and was sampled on 22 May 1996.

Sampling Methodology - This site was sampled with a 3 m 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 in this stream.

A total of 110 fish representing 14 species was collected in our survey. Three game fish and four non-game fish species were collected. These included four redbreast sunfish (*Lepomis auritus*), 42 bluegill (*L. macrochirus*), one green sunfish (*L. cyanellus)* six northern hogsuckers (*Hypentelium nigricans*), four white suckers (*Catostomus commersoni*), two common carp (*Cyprinus carpio*), and two yellow bullhead (*Ameiurus natalis*). The most abundant forage species in our sample were banded sculpin (*Cottus carolinae*) and blacknose dace (*Rhinichthys atratulus*). Together these two species comprised 27.2% of the total number of fish collected. Two darter species, the snubnose darter (*Etheostoma simoterum*) and logperch (*Percina caprodes*) were also collected from this site.

Our Index of Biotic Integrity analysis indicated that this stream was in "poor to fair" condition based on an IBI score of 36. The strongest negative influences on the overall score were the low number of headwater intolerant species in the sample, the relatively low percentage of trophic specialists, the low percentage of piscivorous species in the community, the low CPUE, and the low percentage of simple lithophilic spawners. Much of the riparian zone in our survey area had been removed and cattle did have access to the stream. Furthermore, a significant portion of the stream reach we observed had been channelized. These factors coupled with significant row crop production just upstream of our sample area were the most notable degrading factors.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Leuctridae,

Nemouridae and Perlidae stoneflies; and Hydropsychidae, Hydroptilidae, Leptoceridae, Philopotamidae and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 34.5% of the total sample. Ephemeropterans were second most abundant with 15.2%. Plecopterans accounted for 5.2% of the sample, while isopods and dipterans contributed 14.1% and 9.6%, respectively. Additionally, pleurocerid snails were collected from this site. A total of 44 taxa was collected from this site of which 18 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Cloyd Creek was assigned a bioclassification of "good".

Habitat analysis of this portion of Cloyd Creek resulted in a classification of marginal based on an average index score of 109. Non-point source sedimentation and channelization has degraded this reach of stream to the point that much of the substrate heterogeneity has been lost. Cattle did have access to this portion of the stream.

Management Recommendations:

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

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CLOYD CREEK
WATERSHED	TENNESSEE RIVER
SITE	DSTREAM OF PERKLE RD.
COUNTY	LOUDON
QUADRANGLE	MEADOW 139 NW
LAT-LONG	354334N-841047W
REACH	06010201-22.0
LENGTH	~ 100 m
AREA (SQ. KM.)	10.8
ELEVATION	815 FT
DATE	5-22-96
TIME	1322

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
3.7 m	0.2 m	0.4 m

2. ESTIMATED % OF STREAM IN POOLS IS 80

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
30	15	20	30	5	

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

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 80 %

8. FLOW (CFS) 4.3 **COPMARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. SUNNY AND HOT; AIR TEMP 23 C @ 1330

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

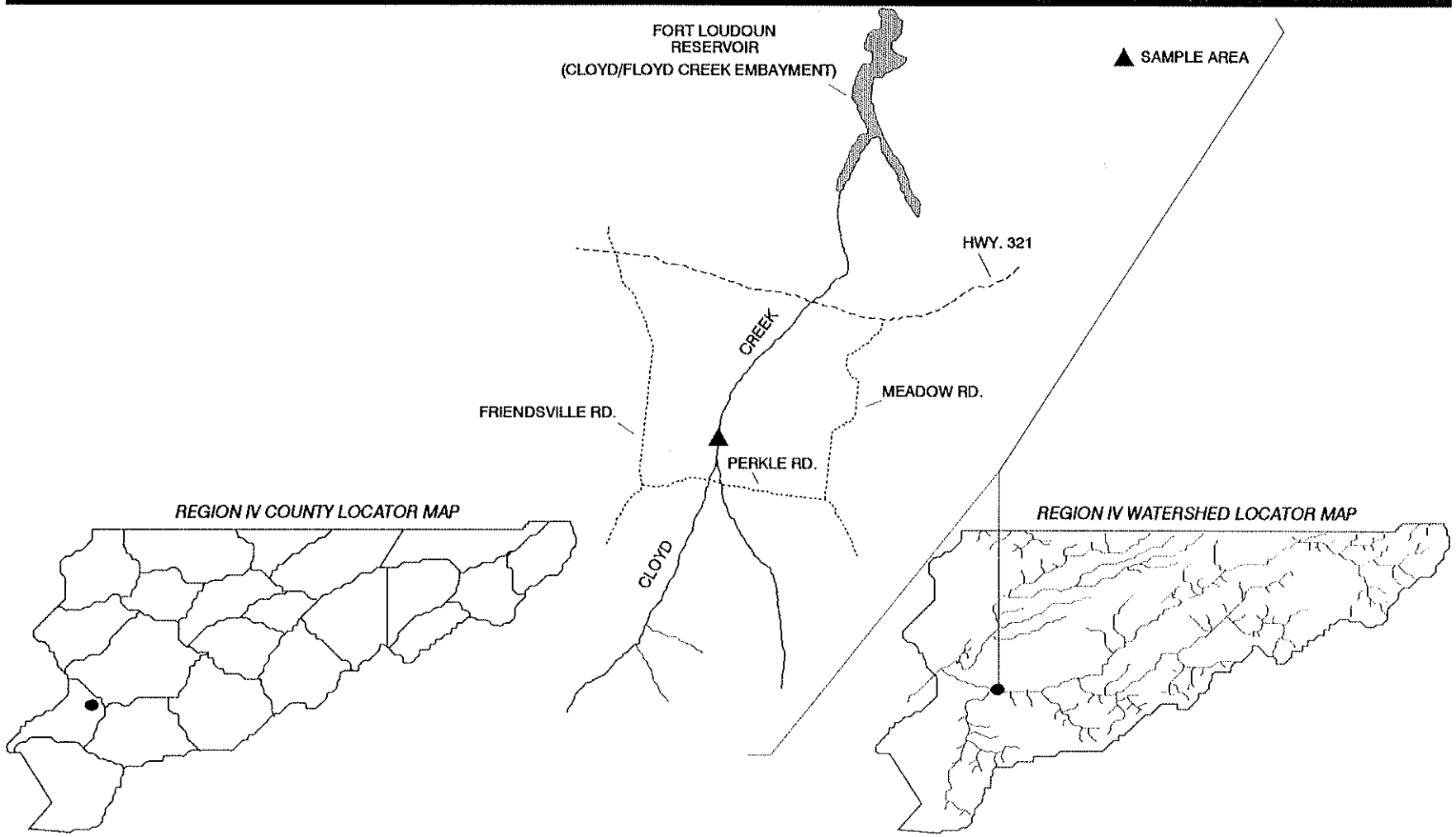
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	17 C	265	8.6	92.8

12. COMMENTS

SAMPLE AREA LOCATED ON PROPERTY OF W. FERGUSON. APPROX. 0.4 KM DOWNSTREAM OF PERKLE ROAD CROSSING. MUCH OF RIPARIAN REMOVED. CATTLE HAVE ACCESS TO STREAM

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 109



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 3 m SEINE AND ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ameiurus natalis	233	2			
Campostoma anomalum	45	7			
Catostomus commersoni	195	4			
Cottus carolinae	322	19			
Cyprinella spiloptera	57	3			
Cyprinus carpio	62	2			
Etheostoma simoterum	435	3			
Hypentelium nigricans	207	6			
Lepomis auritus	346	4	104-135	129	
Lepomis cyanellus	347	1	129	51	
Lepomis macrochirus	351	42	61-145	1167	
Percina caprodes	464	2			
Rhinichthys atratulus	184	11			
Semotilus atromaculatus	188	4			
		SUM: 110			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<6	6-10	>10	12	5
NUMBER OF RIFFLE SP.	<2	2-3	>3	2	3
NUMBER OF POOL SP.	<4	4-6	>6	7	5
% DOMINANCE (COMBINED % OF TWO MOST DOMINANT SP.)	>84	84-69	<69	55	5
NUMBER OF HEADWATER INTOLERANT SP.	<2	2-3	>3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>40	40-20	<20	14.5	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>50	50-25	<25	13.6	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	LOW CPUE			4.5	1
PERCENT OF INDIVIDUALS AS PISCIVORES	LOW CPUE			0	1
CATCH RATE	<34	34-67.8	>67.8	13.8	1
PERCENT OF INDIVIDUALS AS LITHOPHILIC SPAWNERS	<25	25-50	>50	23.6	1
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	4.5	3
					36 **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

CLOYD CREEK BENTHIC DATA
FIELD # 769
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 44
EPT TAXA RICHNESS = 18
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
AMPHIPODA			1	0.2
ANNELIDA				0.4
	Oligochaeta		2	
COLEOPTERA				7.5
	Elmidae	*Dubiraphia* larva and adults	16	
		Microcylloepus pusillus larvae & adults	4	
		Stenelmis larvae and adults	17	
	Haliplidae	*Peltodytes* adults	2	
DIPTERA				9.6
	Chironomidae		44	
	Simuliidae		2	
	Tipulidae	*Antocha*	1	
		Hexatoma	1	
		Pseudolimnephila	1	
		Tipula	1	
EPHEMEROPTERA				15.2
	Baetidae	*Baetis*	11	
	Ephemerellidae	*Ephemerella*	2	
		Eurylophella	1	
	Ephemeridae	*Hexagenia*	1	
	Heptageniidae	*Stenacron interpunctatum*	2	
		Stenonema	44	
	Leptophlebiidae	*Paraleptophlebia*	5	
	Oligoneuriidae	*Isonychia*	13	
GASTROPODA				4.0
	Pleuroceridae	*Elimia*	16	
	Pleuroceridae sp	elongated form with well developed lira	5	
HEMIPTERA				0.6
	Gerridae	*Gerris remigis* male	1	
	Veliidae	*Rhagovelia obesa* nymphs	2	
HYDRACARINA			2	0.4
ISOPODA				14.1
	Asellidae	*Lirceus*	73	
MEGALOPTERA				1.4
	Corydalidae	*Nigronia serricornis*	7	
ODONATA				5.8
	Aeshnidae	*Boyeria vinosa*	2	
	Calopterygidae	*Calopteryx*	4	
	Coenagrionidae	*Argia*	11	
		Enallagma	11	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus lividus*	1	
PELECYPODA				1.2
	Corbiculidae	*Corbicula fluminea*	6	
PLECOPTERA				5.2
	Leuctridae		1	
	Nemouridae	*Amphinemura delosa*	11	
	Perlidae	*Perlesta*	15	
TRICHOPTERA				34.5
	Hydropsychidae	*Cheumatopsyche*	27	
		Hydropsyche betteni/depravata	102	
	Hydroptilidae pupa		1	
	Leptoceridae	*Oecetis* larvae and pupa	4	
		Triaenodes	6	
	Philopotamidae	*Chimara*	2	
	Uenoidae	*Neophylax auris/etnieri*	37	
		TOTAL	519	

Sinking Creek

One IBI fishery survey was conducted on Sinking Creek in May 1996:

Location and Length - Tributary to Little Tennessee River. The sample area was located downstream of the bridge crossing on Jackson Ferry Road. The sample area was approximately 152 m in length and was sampled on 22 May 1996.

Sampling Methodology - This site was sampled with a 3 m 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 collections in this stream.

A total of 221 fish representing eight species was collected in our survey. One game fish and one non-game fish species were collected. These included 80 bluegill (*Lepomis macrochirus*) and one northern hogsucker (*Hypentelium nigricans*). The most abundant forage species in our sample were banded sculpin (*Cottus carolinae*) and blacknose dace (*Rhinichthys atratulus*). Together these two species accounted for 43.4% of all fish collected in our sample.

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 low number of intolerant species in the sample, the relatively low percentage of trophic specialists, the low percentage of piscivorous species in the community, and the low CPUE. The relatively small size of this stream and the high occurrence of fine sediment in the stream were the two most notable factors possibly influencing the scoring metrics.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Perlidae stoneflies; and Brachycentridae, Glossosomatidae, Hydropsychidae, Leptoceridae, Limnephilidae, Philopotamidae, Polycentropodidae, and Uenoidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 42.1% of the total sample. Ephemeropterans were second most abundant with 16.9%. Plecopterans only contributed 0.7% to the total sample. Pleurocerid snails and odonates accounted for 10.6% and 9.2% of the total sample, respectively. A total of 38 taxa was collected from this site of which

17 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Sinking Creek was assigned a bioclassification of "good". Two new invertebrate locality records were recorded from this site in the 1996 survey. These included the caddisfly *Brachycentrus nigrosoma* and the burrowing crayfish *Cambarus dubius*.

Habitat analysis for this portion of Sinking Creek resulted in a classification of sub-optimal based on an average index score of 126. Our observations indicated that habitat diversity in the stream was somewhat less than other streams of this size in the Ridge and Valley ecoregion. This may be a strong regulatory factor in this stream.

Management Recommendations:

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

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	SINKING CREEK
WATERSHED	LITTLE TN. RIVER
SITE	JACKSON FERRY RD. X-ING
COUNTY	LOUDON
QUADRANGLE	MEADOW 139 NW
LAT-LONG	354046N-841242W
REACH	06010204-78.0
LENGTH	~ 152 m
AREA (SQ. KM.)	20.4
ELEVATION	840 ft
DATE	5-21-96
TIME	1648

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
3.2 m	0.3 m	0.4 m

2. ESTIMATED % OF STREAM IN POOLS IS 60

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	15	35	20	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	20	40	20	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 90 %

8. FLOW (CFS) 6.3 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

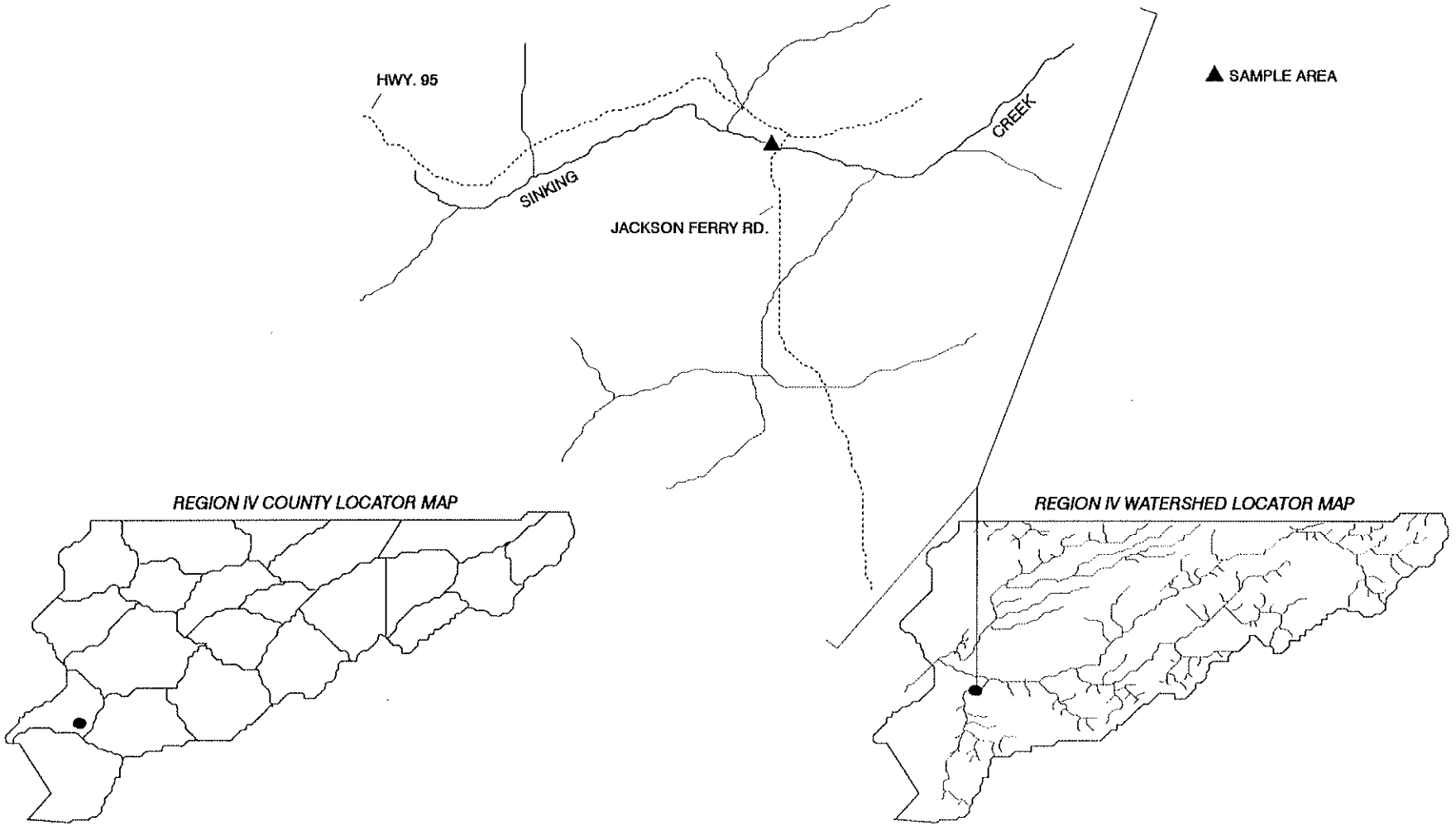
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	20 C	260	7.5	86.5

12. COMMENTS

SAMPLE AREA LOCATED DOWNSTREAM OF BRIDGE CROSSING ON JACKSON FERRY RD. WATER SLIGHTLY TURBID AT TIME OF SAMPLE.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 126



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 3 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Campostoma anomalum	45	15			
Cottus carolinae	322	69			ONLY 62 INCLUDED IN IB
Etheostoma simoterum	435	14			
Hypentelium nigricans	207	8			
Lepomis macrochirus	351	80	30-65	13 (partial)	ONLY 8 INCLUDED IN IBI
Percina caprodes	464	2			
Rhinichtys atratulus	184	27			
Semotilus atromaculatus	188	6			ONLY 5 INCLUDED IN IBI
		SUM: 221			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<7	7-13	>13	8	3
NUMBER OF DARTER SP.	<2	2-3	>3	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	0	1	>1	1	3
NUMBER OF SUCKER SP.	0	1	>1	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>37	37-19	<19	3.5	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>46	46-24	<24	10.6	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<14	14-27	>27	11.3	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1.9	1.9-3.7	>3.7	0	1
CATCH RATE	<28.6	28.6-57.1	>57.1	19.4	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	2.1	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**

SINKING CREEK BENTHIC DATA
FIELD # 768
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 38
EPT TAXA RICHNESS = 17
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
AMPHIPODA			1	0.4
ANNELIDA				0.7
	Oligochaeta		2	
COLEOPTERA				2.6
	Elmidae	*Dubiraphia* larva and adults	3	
		Macronychus glabratus	1	
		Stenelmis adults	3	
DIPTERA				8.8
	Chironomidae		11	
	Simuliidae		9	
	Tipulidae	*Antocha*	4	
EPHEMEROPTERA				16.9
	Baetidae	*Baetis*	3	
	Ephemerellidae	*Ephemerella*	5	
	Heptageniidae	*Stenacron interpunctatum*	24	
		Stenonema	4	
	Leptophlebiidae	*Paraleptophlebia*	6	
	Oligoneuriidae	*Isonychia*	4	
GASTROPODA				10.6
	Pleuroceridae	*Elimia*	19	
	Pleuroceridae sp.	elongated form with well developed lira	10	
HEMIPTERA				2.2
	Corixidae		1	
	Gerridae	*Gerris* nymphs	2	
	Veliidae	*Rhagovelia obesa* males and female	3	
HYDRACARINA			1	0.4
MEGALOPTERA				4.0
	Corydalidae	*Nigronia serricornis*	11	
ODONATA				9.2
	Aeshnidae	*Basiaeshna janata*	1	
		Boyeria vinosa	4	
	Calopterygidae	*Calopteryx*	6	
	Coenagrionidae	*Argia*	1	
	Gomphidae	*Gomphus lividus*	7	
		Hagenius brevistylus	6	
PELECYPODA				1.5
	Corbiculidae	*Corbicula fluminea*	4	
PLECOPTERA				0.7
	Perlidae	*Perlesta*	2	
TRICHOPTERA				42.1
	Brachycentridae	*Brachycentrus nigrosoma*	14	
	Glossosomatidae	*Glossosoma*	6	
	Hydropsychidae	*Cheumatopsyche*	45	
		Hydropsyche betteni/depravata	13	
	Leptoceridae	*Oecetis*	3	
		Triaenodes pupa and larvae	4	
	Limnephilidae	*Pycnopsyche* scabripennis/guttifer group	3	
	Philopotamidae	*Chimara*	7	
	Polycentropodidae	*Polycentropus*	1	
	Uenoidae	*Neophylax*	19	
		TOTAL	**273**	

Baker Creek

One IBI fishery survey was conducted on Baker Creek in May 1996:

Location and Length - Tributary to Little Tennessee River. The sample area was located downstream of Hwy. 95 adjacent to Pine Grove Circle Road on the property of Jay Hagey. The sample area was approximately 304 m in length and was sampled on 21 May 1996.

Sampling Methodology - This site was sampled with a 4.5 m 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 collections in this stream.

A total of 23 fish representing 12 species was collected in our survey. Three game fish and four non-game fish species were collected. These included one green sunfish (*Lepomis cyanellus*), five bluegill (*L. macrochirus*), one largemouth bass (*Micropterus salmoides*), one northern hogsucker (*Hypentelium nigricans*), two common carp (*Cyprinus carpio*), one black redhorse (*Moxostoma duquesnei*), and two golden redhorse (*M. erythrurum*). The most abundant forage species in our sample was spotfin shiner (*Cyprinella spiloptera*). This species comprised 26.0% of the total number of fish collected.

Our Index of Biotic Integrity analysis indicated that this stream was in "very poor to poor" condition based on an IBI score of 26. The strongest negative influences on the overall score were the low species diversity, the low number of intolerant and darter species in the sample, the high percentage of tolerant species, the relatively low percentage of trophic specialists, the low percentage of piscivorous species in the community, the low CPUE, and the high percentage of fish with anomalies. Agricultural practices combined with residential and industrial expansion within the watershed have severely degraded this stream. This was exemplified in the depressed state of the fish community which should have contained at least 5 to 7 additional species.

Benthic macroinvertebrates from our sample included Baetidae, Ephemeridae, and Heptageniidae mayflies; Perlidae stoneflies; and Brachycentridae, Hydropsychidae, Leptoceridae, and Polycentropodidae caddisflies. Ephemeropterans were the most

abundant organisms in our survey, comprising 37.1% of the total sample. Trichopterans were second most abundant with 20.6%. Plecopterans only contributed 2.9% to the total sample. Coleopterans and isopods accounted for 13.7% and 6.9% of the total sample, respectively. Additionally, pleurocerid snails were collected from this site. A total of 32 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 Baker Creek was assigned a bioclassification of "fair to good". Similar to the fish community the benthic community did exhibit characteristics common to a depressed system. Most of the taxa collected here were more tolerant forms. Of special interest, was the collection of the caddisflies *Hydropsyche mississippiensis* and *Brachycentrus nigrosoma*. The occurrence of these species had previously been undocumented from this county.

Habitat analysis of this portion of Baker Creek resulted in a classification of sub-optimal based on a average index score of 121. Non-point source sedimentation was the most obvious factor regulating this stream.

Management Recommendations:

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

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BAKER CREEK
WATERSHED	LITTLE TN. RIVER
SITE	@ JAY HAGEY PROPERTY
COUNTY	LOUDON
QUADRANGLE	MEADOW 139 NW
LAT-LONG	353902N-840923W
REACH	06010204-43.1
LENGTH	~ 304 m
AREA (SQ. KM.)	140.8
ELEVATION	820 FT
DATE	5-21-96
TIME	1017

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
7.8 m	0.5 m	0.8 m

2. ESTIMATED % OF STREAM IN POOLS IS 70

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
70	25	5			

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
55	30	15			

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SPARSE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 90 %

8. FLOW (CFS) 47.3 **COPMARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 26 C @ 1029

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

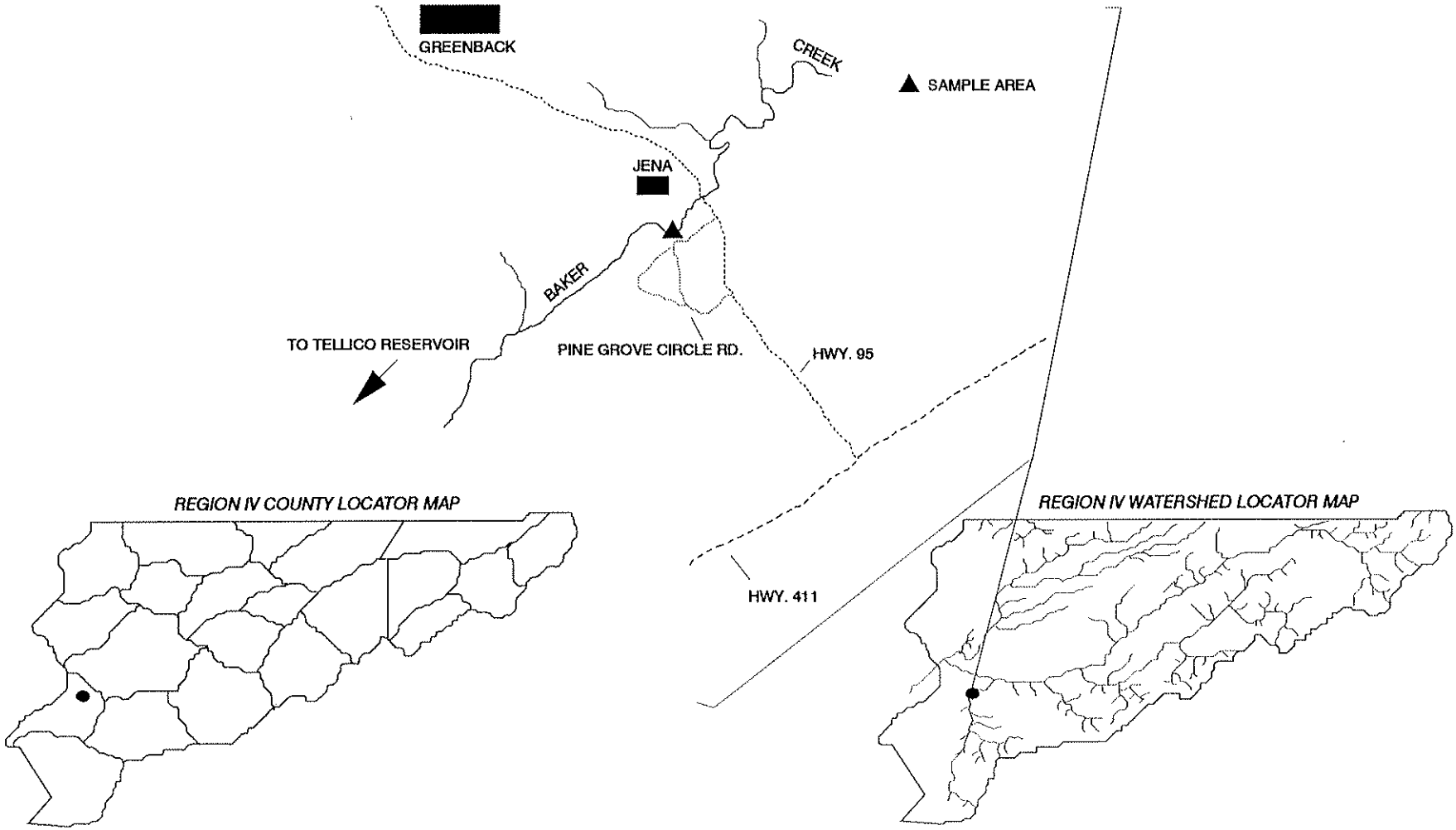
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	17.5 C	285	9.2	99

12. COMMENTS

SAMPLED ON THE PROPERTY OF JAY HAGEY ON PINE GROVE CIRCLE RD. WATER VERY TURBID AT TIME OF SAMPLE. HEAVY SILTATION.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 121



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Cottus carolinae	322	1			
Cyprinella spiloptera	57	6			
Cyprinus carpio	62	2			
Gambusia affinis	309	1			
Hypentelium nigricans	207	1			
Lepomis cyanellus	347	1	79	10	
Lepomis macrochirus	351	5	33-112	95	
Micropterus salmoides	364	1	94	10	
Moxostoma duquesnei	224	1			
Moxostoma erythrurum	225	2			
Percina caprodes	464	1			
Pimephales vigilax	178	1			
	SUM:	23			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<13	13-25	>25	10	1
NUMBER OF DARTER SP.	<3	3-5	>5	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	5
NUMBER OF INTOLERANT SP.	<2	2-3	>3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>29	29-15	<15	43.5	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>33	33-17	<17	8.7	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	LOW CPUE			8.7	1
PERCENT OF INDIVIDUALS AS PISCIVORES	LOW CPUE			4.3	1
CATCH RATE	<17	17-33.9	>33.9	2.1	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	34.8	1
					26 **VERY POOR-POOR**

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

BAKER CREEK BENTHIC DATA
FIELD # 767
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 32
EPT TAXA RICHNESS = 14
BIOCLASSIFICATION = FAIR-GOOD

			NUMBER	PERCENT
ANNELIDA				1.1
	Oligochaeta		2	
COLEOPTERA				13.7
	Elmidae	*Ancyronyx variegatus* larva and adults	5	
		Dubiraphia adults	2	
		Macronychus glabratus larva and adults	17	
DIPTERA				3.4
	Chironomidae		6	
EPHEMEROPTERA				37.1
	Baetidae	*Baetis*	7	
	Ephemeridae	*Hexagenia*	20	
	Heptageniidae	*Stenacron interpunctatum*	19	
		Stenonema mediopunctatum	15	
		Stenonema modestum	4	
GASTROPODA				1.7
	Pleuroceridae	elongated form with well developed lira	3	
HEMIPTERA				3.4
	Corixidae		2	
	Gelastocoridae	*Gelastocoris oculatus oculatus*	1	
	Veliidae	*Rhagovelia obesa* females	3	
ISOPODA				6.9
	Asellidae	*Asellus*	10	
		Lirceus	2	
MEGALOPTERA				1.1
	Corydalidae	*Nigronia serricornis*	1	
	Sialidae	*Sialis*	1	
ODONATA				5.1
	Calopterygidae	*Calopteryx*	4	
	Coenagrionidae	*Argia*	3	
	Gomphidae	*Dromogomphus spinosus*	1	
	Gomphidae sp	mutilated specimen	1	
PELECYPODA				2.9
	Corbiculidae	*Corbicula fluminea*	5	
PLECOPTERA				2.9
	Perlidae	*Perlesta placida*	5	
TRICHOPTERA				20.6
	Brachycentridae	*Brachycentrus nigrosoma*	1	
	Hydropsychidae	*Cheumatopsyche*	19	
		Hydropsyche betteni/depravata	6	
		Hydropsyche mississippiensis	1	
	Leptoceridae	*Oecetis* pupae	2	
		Triaenodes larvae and pupa	4	
	Polycentropodidae	*Nyctiophylax*	1	
		Polycentropus	2	
		TOTAL	175	

Little Baker Creek

One IBI fishery survey was conducted on Little Baker Creek in May 1996:

Location and Length - Tributary to Little Tennessee River (Baker Creek tributary). The sample area was located at the bridge crossing on Old Niles Ferry Road. The sample area began upstream of the bridge crossing and was approximately 213 m in length. The site was sampled on 14 May 1996.

Sampling Methodology - This site was sampled with a 3 m 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 in this stream.

A total of 239 fish representing nine species was collected in our survey. Three game fish and two non-game fish species were collected. These included 11 bluegill (*Lepomis macrochirus*), six green sunfish (*L. cyanellus)*, one largemouth bass (*Micropterus salmoides*), ten northern hogsuckers (*Hypentelium nigricans*), and two white suckers (*Catostomus commersoni*). The most abundant forage species in our sample were banded sculpin (*Cottus carolinae*) and blacknose dace (*Rhinichthys atratulus*). Together these two species comprised 69.0% of the total number of fish collected. 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 to fair" condition based on an IBI score of 38. The strongest negative influences on the overall score were the low number of headwater intolerant species in the sample, the relatively low percentage of trophic specialists, and the low percentage of piscivorous species in the community. It was apparent from our observations, this stream was being enriched (probably stemming from residential "straight piping") as filamentous algae was quite common in our survey reach.

Benthic macroinvertebrates from our sample included Baetidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Nemouridae and Perlidae stoneflies; and Glossosomatidae, Hydropsychidae, Hydroptilidae, Limnephilidae, Philopotamidae, Psychomyiidae, and Uenoidae caddisflies. Trichopterans were the most

abundant organisms in our survey, comprising 29.0% of the total sample. Ephemeropterans were second most abundant with 24.7%. Plecopterans accounted for 4.5% of the sample, while gastropods and dipterans contributed 16.5% and 13.9%, respectively. A total of 38 taxa was collected from this site of which 16 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Little Baker Creek was assigned a bioclassification of "good".

Habitat analysis of this portion of Little Baker Creek resulted in a classification of sub-optimal based on an average index score of 122. Non-point source sedimentation was the most notable factor negatively influencing the stream substrate.

Management Recommendations:

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

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE BAKER CREEK
WATERSHED	LITTLE TN. RIVER
SITE	OLD NILES FERRY BRIDGE
COUNTY	BLOUNT
QUADRANGLE	BINFIELD 139 NE
LAT-LONG	353933N-840621W
REACH	06010204-
LENGTH	~ 213 m
AREA (SQ. KM.)	9.5
ELEVATION	870 FT
DATE	5-14-96
TIME	1008

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
5.0 m	0.2 m	0.3 m

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
30	25	15	15	10	5

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
20 %	20 %	60 %

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 5.8 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

SUNNY AND COOL; AIR TEMP 13 C @ 1018

10. PAST WEATHER (last 24 hrs)

OVERCAST AND COOL; SCATTERED SHOWERS

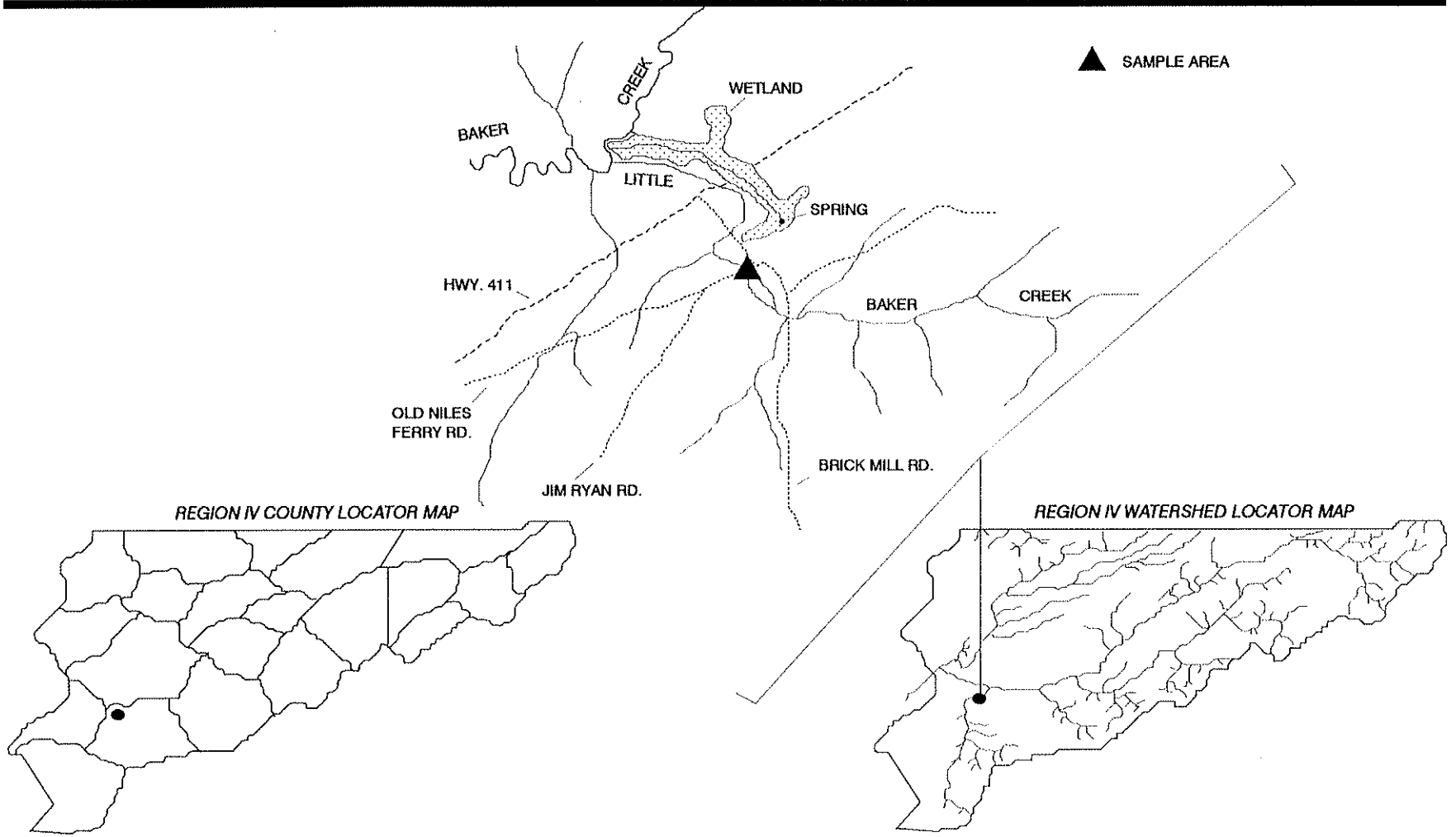
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	13 C	255	10.4	102.5

12. COMMENTS

SAMPLED AT BRIDGE X-ING ON OLD NILES FERRY RD. SAMPLE CONDUCTED UPSTREAM OF BRIDGE. SUBSTRATE COVERED WITH SILT. FILAMENTOUS ALGAE COMMON.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 122



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 3 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Campostoma anomalum	45	34			
Catostomus commersoni	195	2			
Cottus carolinae	322	72			
Etheostoma simoterum	435	9			
Hypentelium nigricans	207	10			
Lepomis cyanellus	347	6	63-109	84	
Lepomis sp. (hybrid)	345	1	119	29	
Lepomis macrochirus	351	11	62-183	485	
Micropterus salmoides	364	1	136	33	
Rhinichthys atratulus	184	93			
		SUM: 239			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-9	>9	9	3
NUMBER OF RIFFLE SP.	<2	2	>2	2	3
NUMBER OF POOL SP.	<3	3-5	>5	4	3
% DOMINANCE (COMBINED % OF TWO MOST DOMINANT SP.)	>84	84-70	<70	69	5
NUMBER OF HEADWATER INTOLERANT SP.	<2	2-3	>3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>40	40-20	<20	3.3	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>50	50-25	<25	15.1	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<11	11-21	>21	3.8	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1.5	1.5-2.8	>2.8	0.4	1
CATCH RATE	<35.2	35.2-70.2	>70.2	37.2	3
PERCENT OF INDIVIDUALS AS LITHOPHILIC SPAWNERS	<25	25-50	>50	47.7	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	0.8	5
					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**

LITTLE BAKER CREEK BENTHIC DATA
FIELD # 765
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 38
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
AMPHIPODA				0.5
	Crangonyctidae		3	
ANNELIDA				1.0
	Oligochaeta		6	
COLEOPTERA				1.4
	Elmidae	*Dubiraphia* larvae	4	
		Stenelmis larvae and adult	3	
	Hydrophilidae	*Spercopsis tessellatus*	1	
DIPTERA				13.9
	Chironomidae		64	
	Simuliidae		13	
	Tipulidae	*Hexatoma*	1	
		Pseudolimnophila	1	
		Tipula	1	
EPHEMEROPTERA				24.7
	Baetidae	*Baetis*	29	
	Ephemeridae	*Hexagenia*	2	
	Heptageniidae	*Stenacron interpunctatum*	4	
		Stenonema	18	
	Leptophlebiidae	*Habrophlebiodes*	22	
	Oligoneuriidae	*Isonychia*	67	
GASTROPODA				16.5
	Pleuroceridae	*Elimia*	91	
	Pleuroceridae sp	well developed lira, mantle edge irregular	4	
HEMIPTERA				1.1
	Corixidae nymph		1	
	Gerridae	*Gerris remigis* male and female	2	
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa male and female	2	
HYDRACARINA			1	0.2
ISOPODA				4.0
	Asellidae	*Lirceus*	23	
MEGALOPTERA				0.5
	Corydalidae	*Nigronia serricornis*	3	
ODONATA				2.6
	Aeshnidae	*Boyeria vinosa*	3	
	Calopterygidae	*Calopteryx*	4	
	Gomphidae	*(Genus A) rogersi*	8	
PELECYPODA				0.0
	Unionidae	relic 1 valve	0	
PLECOPTERA				4.5
	Nemouridae	*Amphinemura delosa*	2	
	Perlidae	*Perlesta*	24	
TRICHOPTERA				29.0
	Glossosomatidae	*Glossosoma* larvae and pupae	5	
	Hydropsychidae	*Cheumatopsyche*	70	
		Hydropsyche betteni/depravata	36	
	Hydroptilidae	*Ochrotrichia* larvae and pupae	13	
	Limnephilidae	*Pycnopsyche* (luculenta group)	1	
	Philopotamidae	*Chimara*	21	
	Psychomyiidae	*Psychomyia* pupa	1	
	Uenoidae	*Neophylax auris/etnieri*	20	
		TOTAL	**575**	

Ninemile Creek

One IBI fishery survey was conducted on Ninemile Creek in May 1996:

Location and Length - Tributary to Little Tennessee River. The sample area was located approximately 0.8 km downstream of the bridge on Kyker Road (Kyker Bottoms WMA). The sample area was approximately 150 m in length and was sampled on 23 May 1996.

Sampling Methodology - This site was sampled with a 4.5 m 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 did make a collection in this stream in 1987 (Bivens 1988).

A total of 44 fish representing 12 species was collected in our survey. Five game fish and one non-game fish species were collected. These included two rock bass (*Ambloplites rupestris*) (see Figure 3 for length frequency distribution), four redbreast sunfish (*Lepomis auritus*), six bluegill (*L. macrochirus*), one warmouth (*L. gulosus*), two green sunfish (*L. cyanellus)* and two northern hogsuckers (*Hypentelium nigricans*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and banded sculpin (*Cottus carolinae*). Together these two species comprised 36.4% of the total number of fish collected. Three darter species, the snubnose darter (*Etheostoma simoterum*), greenside darter (*E. blennioides*), and blueside darter (*E. jessiae*) were collected from this site. The survey conducted in 1987 in a reach just upstream from our sample area accounted for 17 species. Species encountered in 1987 survey that were not collected in 1996 included largemouth bass (*Micropterus salmoides*), black redhorse (*Moxostoma duquesnei*), golden redhorse (*M. erythrurum*), common carp (*Cyprinus carpio*), warpaint shiner (*Luxilus coccogenis*), western mosquito fish (*Gambusia affinis*) and lamprey (*Ichthyomyzon sp.*). Warmouth and blueside darter were the only species present in 1996 that were not collected in 1987.

Our Index of Biotic Integrity analysis indicated that this stream was in "very poor to poor" condition based on an IBI score of 24. The strongest negative influences on the overall score were the low species diversity, the low number of intolerant and sucker species in the sample, the relatively low percentage of trophic specialists, the low percentage of piscivorous species in the community, the low CPUE, and the high

percentage of hybrids in the sample. Overall, it appeared that this stream has continued to degrade over the past 10 years primarily due to heavy sedimentation input within the watershed. Most of the substrate was covered with a heavy layer of silt and the stream was transporting a heavy suspended sediment load during our survey.

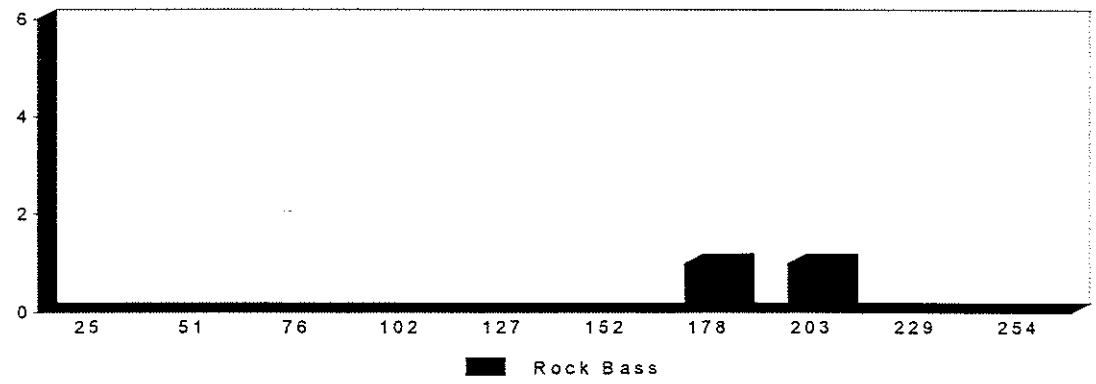
Benthic macroinvertebrates from our sample included Baetidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies; Nemouridae and Perlidae stoneflies; and Brachycentridae, Hydropsychidae, Leptoceridae, Limnephilidae, and Polycentropodidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 32.3% of the total sample. Trichopterans were second most abundant with 22.8%. Plecopterans and coleopterans contributed 9.8% and 9.2%, respectively. Additionally, pleurocerid snails were collected from this site. A total of 39 taxa was collected from this site of which 16 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Ninemile Creek was assigned a bioclassification of "good".

Habitat analysis of this portion of Ninemile Creek resulted in a classification of sub-optimal based on a average index score of 129. Non-point source sedimentation has degraded this stream to the point that much of the substrate heterogeneity has been lost and has resulted in a steady decline in the diversity of the fish community.

Management Recommendations:

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

Figure 3. *Length Frequency Distribution for Rock Bass Collected in Ninemile Creek during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	NINEMILE CREEK
WATERSHED	LITTLE TN. RIVER
SITE	KYKER RD. BRIDGE X-ING
COUNTY	BLOUNT
QUADRANGLE	TALLASSEE 139 SE
LAT-LONG	353620N-840635W
REACH	06010204-42.0
LENGTH	~ 150 m
AREA (SQ. KM.)	124.0
ELEVATION	848 FT
DATE	5-23-96
TIME	1053

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
9.3 m	0.4 m	0.7 m

2. ESTIMATED % OF STREAM IN POOLS IS 60

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
15	5	10	30		40

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) 46.0 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT; AIR TEMP. 21 C

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

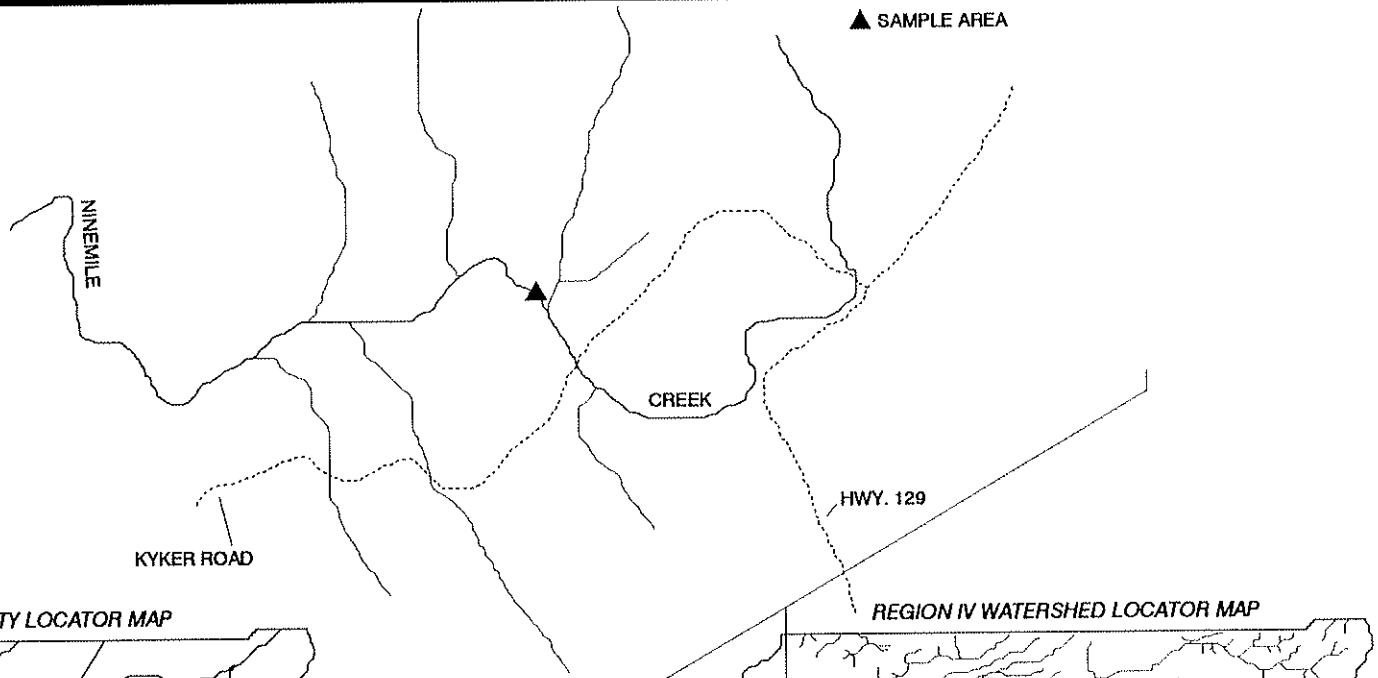
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	18 C	220	7.5	81.4

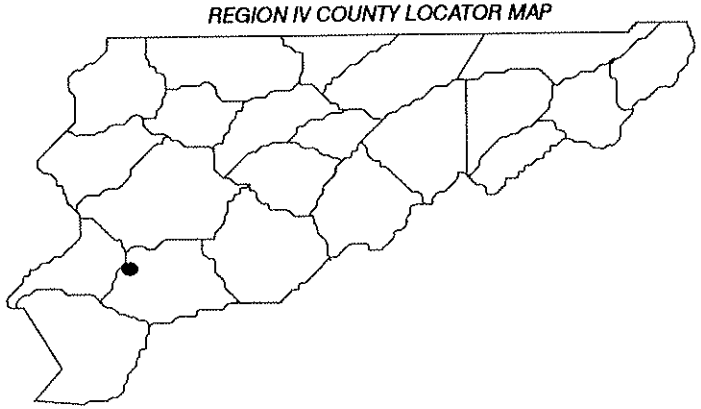
12. COMMENTS

SAMPLE AREA LOCATED DOWNSTREAM OF KYKER ROAD CROSSING.

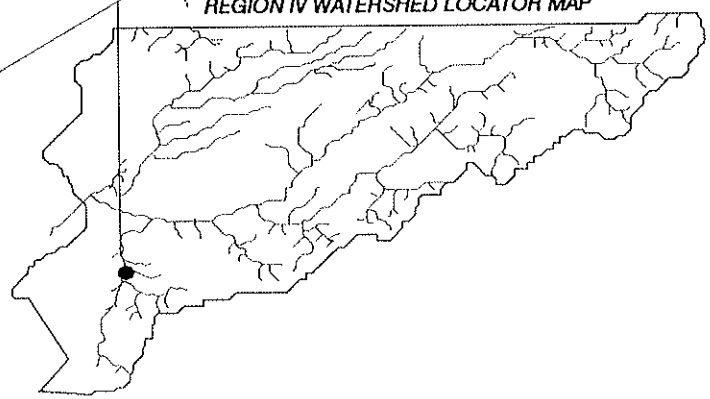
13. X HABITAT ASSESSMENT SCORE 129



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	2	181-209	346	
Campostoma anomalum	45	7			
Cottus carolinae	322	9			
Etheostoma blennioides	398	1			
Etheostoma jessiae	416	1			
Etheostoma simoterum	435	1			
Hypentelium nigricans	207	2			
Lepomis auritus	346	4	106-134	155	
Lepomis cyanellus	347	2	49-115	41	
Lepomis sp. (hybrid)	345	3	68-130	56	
Lepomis gulosus	349	1	116	26	
Lepomis macrochirus	351	6	36-116	109	
Luxilus chrysocephalus	89	5			
		SUM: 44			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<13	13-24	>24	11	1
NUMBER OF DARTER SP.	<3	3-4	>4	3	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	5
NUMBER OF SUCKER SP.	<2	2	>2	1	1
NUMBER OF INTOLERANT SP.	<2	2-3	>3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>29	29-15	<15	15.9	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>34	34-18	<18	27.3	3
PERCENT OF INDIVIDUALS AS SPECIALISTS	LOW CPUE			6.8	1
PERCENT OF INDIVIDUALS AS PISCIVORES	LOW CPUE			4.5	1
CATCH RATE	<17.6	17.6-35.1	>35.1	3.4	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	6.8	1
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	2.3	3
				24	**VERY POOR-POOR**

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

NINEMILE CREEK BENTHIC DATA
FIELD # 770
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 39
EPT TAXA RICHNESS = 16
BIOCLASSIFCATION = GOOD

			NUMBER	PERCENT
ANNELIDA				0.6
	Oligochaeta		2	
COLEOPTERA				9.2
	Dryopidae	*Helichus* adults	8	
	Elmidae	*Dubiraphia* adults	13	
		Macronychus glabratus adult	1	
		Microcylloepus pusillus adults	3	
		Stenelmis adults and larva	4	
	Haliplidae	*Peltodytes*	1	
	Hydrophilidae		1	
DIPTERA				1.2
	Chironomidae		2	
	Tabanidae	*Chrysops*	1	
	Tipulidae	*Hexatoma*	1	
EPHEMEROPTERA				32.3
	Baetidae	*Baetis*	3	
	Ephemeridae	*Hexagenia*	9	
	Heptageniidae	*Stenacron*	9	
		Stenonema early instars	61	
		Stenonema mediopunctatum	4	
		Stenonema modestum	2	
	Leptophlebiidae	*Paraleptophlebia*	3	
	Oligoneuriidae	*Isonychia*	18	
GASTROPODA				0.9
	Pleuroceridae	*Pleurocera*	3	
HEMIPTERA				0.9
	Corixidae		1	
	Veliidae	*Rhagovelia obesa* nymphs	2	
ISOPODA				11.0
	Asellidae	*Lirceus*	37	
MEGALOPTERA				1.5
	Corydalidae	*Corydalus cornutus*	1	
		Nigronia serricornis	4	
ODONATA				5.9
	Aeshnidae	*Boyeria vinosa*	4	
	Calopterygidae	*Calopteryx*	5	
	Gomphidae	*Stylurus scudderi*	8	
	Macromiidae	*Macromia*	3	
PELECYPODA				4.1
	Corbiculidae	*Corbicula fluminea*	9	
	Sphaeriidae	*Sphaerium*	5	
PLECOPTERA				9.8
	Nemouridae	*Amphinemura delosa*	1	
	Perlidae	*Paragnetina* sp., early instars	4	
		Perlesta placida	28	
TRICHOPTERA				22.8
	Brachycentridae	*Brachycentrus* early instars	10	
	Hydropsychidae	*Cheumatopsyche*	25	
		Hydropsyche betteni/depravata	25	
	Leptoceridae	*Triaenodes* larvae and pupa	12	
	Limnephilidae	*Pycnopsyche* guttifer/scabripennis group	4	
	Polycentropodidae	*Polycentropus*	1	
		TOTAL	**338**	

East Fork

One IBI fishery survey was conducted on East Fork in July 1996:

Location and Length - Tributary to the Little Pigeon River (French Broad River tributary). The sample area was located near the intersection of Highways 441 and 339 approximately 0.2 km south of Harrisburg. The sample area was approximately 150 m in length and was sampled on 25 July 1996.

Sampling Methodology - This site was sampled with a 4.5 m 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 list for TADS. The Agency has made no previous collections from this river.

A total of 299 fish representing 25 species was collected in our survey. Five game fish and four non-game fish species were collected. These included one rock bass (*Ambloplites rupestris*), 35 bluegill (*Lepomis macrochirus*), five redbreast sunfish (*L. auritus*), one smallmouth bass (*Micropterus dolomieu*), 12 northern hogsuckers (*Hypentelium nigricans*), one gizzard shad (*Dorosoma cepedianum*), one black redhorse (*M. duquesnei*), and two 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 accounted for 41.8% of all fish collected in our sample. Five darter species were collected at this site. These included greenside darter (*Etheostoma blennioides*), redline darter (*E. ruflineatum*), banded darter (*E. zonale*), snubnose darter (*Etheostoma simoterum*), and logperch (*Percina caprodes*).

Our Index of Biotic Integrity analysis indicated that this stream was in "poor to fair" condition based on an IBI score of 36. The strongest negative influences on the overall score were the relatively high percentage of trophic generalists, the low percentage of piscivores, and the high incidence of anomalies on the fish.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerllidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Peltoperlidae stoneflies; and Hydropsychidae, Leptoceridae, and Limnephilidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 37.8% of the total sample.

Ephemeropterans were second most abundant with 28.1% while plecopterans only accounted for 0.3%. Odonates and dipterans were fairly abundant, contributing 7.2% and 6.0%, respectively. A total of 40 taxa was collected from this site of which 16 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of East Fork was assigned a bioclassification of "fair to good".

Habitat analysis for this portion of East Fork resulted in a classification of sub-optimal based on an average index score of 124. Non-point source sedimentation appeared to be the most noticeable factor influencing this stream. We did make note of an apparent illegal discharge of a petroleum based substance over a steep embankment. The substance had killed all vegetation on the embankment and had reached the river. We did notify the Tennessee Department of Environment and Conservation of our finding upon which they investigated.

Management Recommendations:

1. This river has been subject to years of agricultural run-off that has degraded the river to its present state. Any action that would address non-point source pollution and riparian zone protection would be of benefit.

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	EAST FORK
WATERSHED	FRENCH BROAD RIVER
SITE	OLD ST HWY BRIDGE
COUNTY	SEVIER
QUADRANGLE	RICHARDSON CV 164 SW
LAT-LONG	355206N-832939W
REACH	06010107-25.0
LENGTH	~ 152 m
AREA (SQ. KM.)	166.0
ELEVATION	935 FT
DATE	7-25-96
TIME	0900

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
8.7 m	0.3 m	1.2+ m

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
25	15	20	30	5	5

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X WATER WILLOW	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 75 %

8. FLOW (CFS) 29.5 **COPMARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND HOT

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

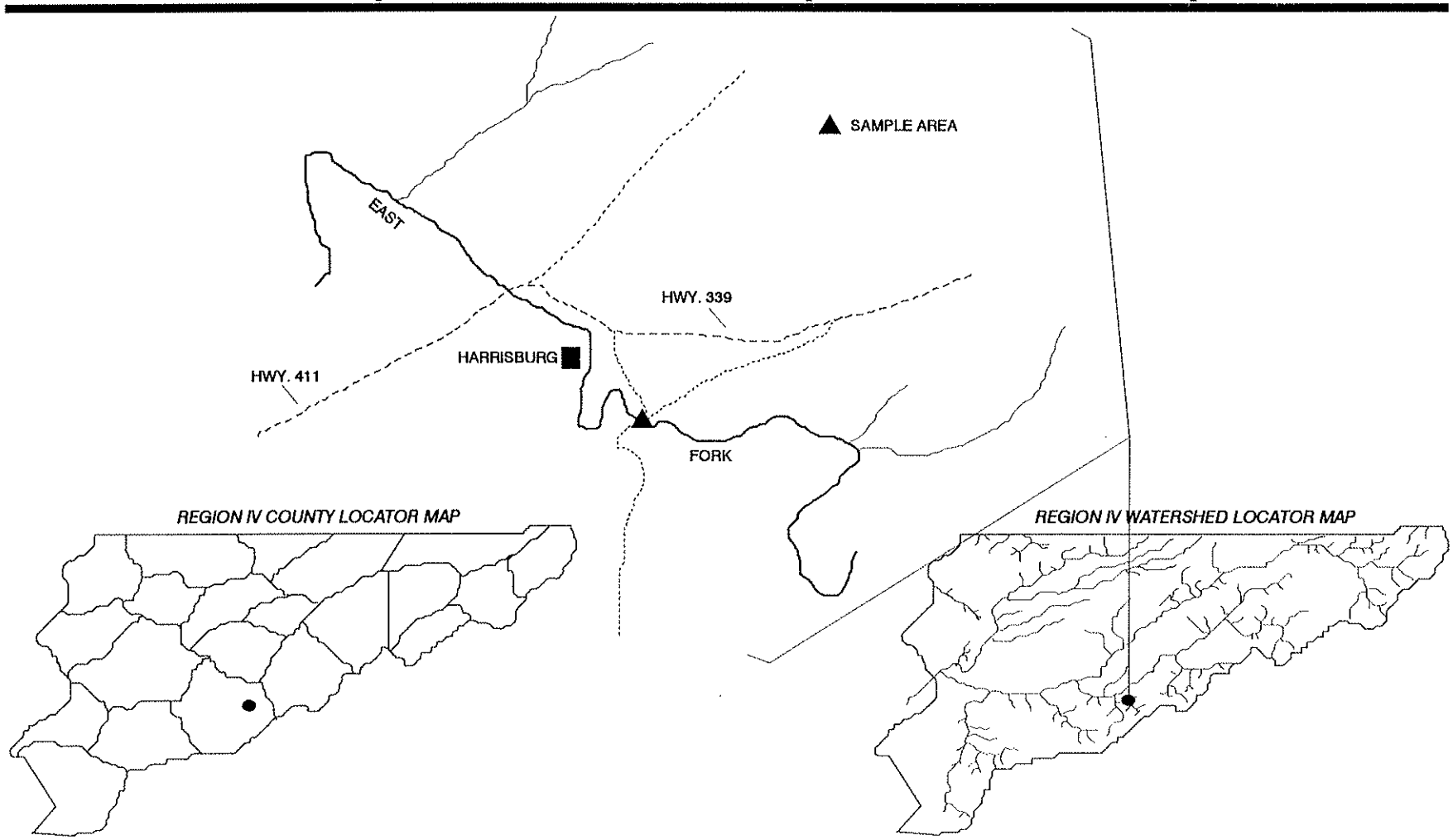
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
7.0	22 C	210	7.9	90.7

12. COMMENTS

SAMPLE AREA LOCATED DOWNSTREAM OF OLD STATE HWY. BRIDGE CROSSING ALONG HWY. 339. HEAVY SEDIMENTATION PREVALENT IN STREAM.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 124



EAST FORK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	1	184	134	
Campostoma anomalum	45	92			
Cottus carolinae	322	26			
Cyprinella galactura	54	11			
Cyprinella spiloptera	57	4			
Dorosoma cepedianum	41	1			
Etheostoma blennioides	398	10			
Etheostoma ruflineatum	431	13			
Etheostoma simoterum	435	16			
Etheostoma zonale	449	1			
Hybopisis amblops	79	6			
Hypentelium nigricans	207	12			
Lepomis auritus	346	5	59-172	134	
Lepomis cyanellus	347	3	53-148	76	
Lepomis macrochirus	351	35	25-184	695	
Lepomis sp. (hybrid)	345	1	145	28	
Luxilus chrysocephalus	89	33			
Luxilus coccogenis	90	7			
Micropterus dolomieu	362	1	41	1	NOT INCLUDED IN IBI
Moxostoma duquesnei	224	1			
Moxostoma erythrurum	225	2			
Notropis photogenis	130	8			
Notropis rubellus	131	4			
Notropis stramineus	137	3			
Notropis telescopus	138	1			
Percina caprodes	464	2			
	SUM:	299			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<14	14-26	>26	23	3
NUMBER OF DARTER SP.	<3	3-5	>5	5	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	5
NUMBER OF SUCKER SP.	<2	2	>2	3	5
NUMBER OF INTOLERANT SP.	<2	2-3	>3	3	3
PERCENT OF INDIVIDUALS AS TOLERANT	>28	28-15	<15	13.9	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>32	32-17	<17	42.7	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<24	24-46	>46	24.1	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4	0.3	1
CATCH RATE	<16.3	16.3-32.4	>32.4	23.9	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0.3	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	17.3	1
					36 **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**

EAST FORK BENTHIC DATA
FIELD # 792
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 40
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION = FAIR-GOOD

			NUMBER	PERCENT
ANNELIDA				0.8
	Oligochaeta		3	
COLEOPTERA				5.2
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Dubiraphia* adult	1	
		Macronychus glabratus adults & larva	14	
	Gyrinidae	*Dineutus discolor* males & females	4	
		Dineutus larva	1	
DIPTERA				6.0
	Athericidae	*Atherix lantha*	14	
	Chironomidae		5	
	Simuliidae		3	
	Tipulidae	*Tipula*	2	
EPHEMEROPTERA				28.1
	Baetidae	*Baetis*	5	
	Ephemerellidae	*Serratella*	1	
	Ephemeridae	*Hexagenia*	8	
	Heptageniidae	*Epeorus rubidus/subpallidus*	1	
		Stenacron	3	
		Stenonema (probably *ithaca)*	3	
		Stenonema exiguum	1	
		Stenonema early instars	42	
	Oligoneuriidae	*Isonychia*	49	
GASTROPODA				4.0
	Ancylidae	*Ferrissia*	14	
	Pleuroceridae	pretty; yellow with purple spirals	2	
HEMIPTERA				3.2
	Gerridae	*Metrobates hesperius* male & females	3	
		Rheumatobates rileyi males & females	7	
		Trepobates inermis male	1	
	Veliidae	*Rhagovelia obesa* males	2	
MEGALOPTERA				7.2
	Corydalidae	*Corydalus cornutus*	14	
		Nigronia serricornis	15	
ODONATA				5.5
	Aeshnidae	*Boyeria vinosa*	10	
	Calopterygidae	*Hetaerina americana*	1	
	Coenagrionidae	*Argia*	6	
	Gomphidae	*Gomphus lividus*	1	
		Hylogomphus brevis	1	
	Macromiidae	*Macromia*	3	
PELECYPODA				2.0
	Corbiculidae	*Corbicula fluminea*	8	
PLECOPTERA				0.3
	Peltoperlidae	*Peltoperla*	1	
TRICHOPTERA				37.8
	Hydropsychidae	*Ceratopsyche morosa*	1	
		Cheumatopsyche	78	
		Hydropsyche betteni/depravata	39	
		Hydropsyche frisoni	13	
		Hydropsyche venularis, questionable det.	1	
		Hydropsyche, early instars	12	
	Leptoceridae	*Triaenodes*	7	
	Limnephilidae	*Pycnopsyche* with case of rock & wood	1	
		TOTAL	402	

Dunn Creek

One IBI fishery survey was conducted on Dunn Creek in June 1996:

Location and Length - Tributary to the East Fork (French Broad River tributary). The sample area was located at bridge crossing on Pearl Valley Road. The sample area was approximately 213 m in length and was sampled on 19 June 1996.

Sampling Methodology - This site was sampled with a 4.5 m seine and one backpack electrofishing unit operating at 200 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 list for TADS. The Agency did conduct two samples on this stream in 1993 (Bivens and Williams 1994).

A total of 519 fish representing 24 species was collected in our survey. Five game fish and two non-game fish species were collected. These included six rock bass (*Ambloplites rupestris*) (all sacrificed for otoliths, see Figure 4 for length frequency distribution), one bluegill (*Lepomis macrochirus*), 12 redbreast sunfish (*L. auritus*), two smallmouth bass (*Micropterus dolomieu*) (all sacrificed for otoliths, see Figure 4 for length frequency distribution), two rainbow trout (*Oncorhynchus mykiss*), 11 northern hogsuckers (*Hypentelium nigricans*) and eight black redhorse (*Moxostoma duquesnei*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocephalus*). Together these two species accounted for 53.6% of all fish collected in our sample. Four darter species were collected at this site. These included greenside darter (*Etheostoma blennioides*), redline darter (*E. rufilineatum*), stripetail darter (*E. kennicotti*), and snubnose darter (*E. simoterum*). Of special interest, was the collection of five specimens of the Tennessee dace (*Phoxinus tennesseensis*). This collection represents the first record of this species from this stream (three specimens to UT collection and two to TWRA collection). Species encountered during the 1993 survey (site 1, 1993 sample in closest proximity to our 1996 survey) that were not collected in 1996 included saffron shiner (*Notropis rubricroceus*) and sand shiner (*Notropis stramineus*). Species encountered in 1996 that were not collected in 1993 included northern studfish (*Fundulus catenatus*), telescope shiner (*Notropis telescopus*), and Tennessee dace.

Our Index of Biotic Integrity analysis indicated that this stream was in "poor" condition based on an IBI score of 32. The strongest negative influences on the overall score were the relatively high percentage of trophic generalists, the low percentage of piscivores, and the high incidence of anomalies on the fish.

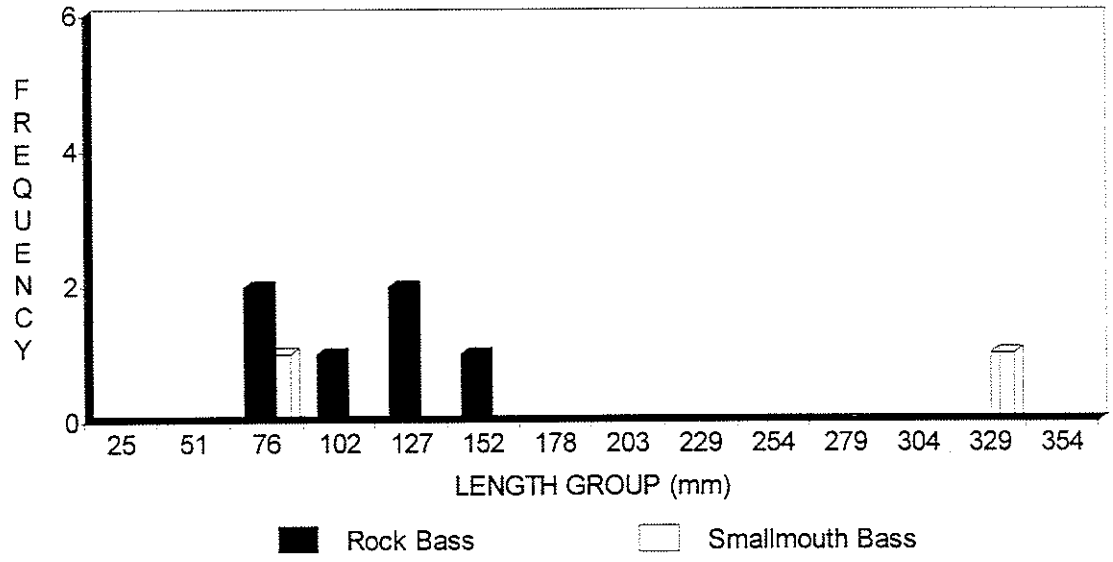
Benthic macroinvertebrates from our sample included Baetidae, Caenidae Ephemerllidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Chloroperlidae, Leuctridae, Peltoperlidae, Perlidae, and Pteronarcyidae stoneflies; and Glossosomatidae, Goeridae, Hydropsychidae, Philopotamidae, Polycentropodidae, and Uenoidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 38.6% of the total sample. Trichopterans were second most abundant with 34.6% while plecopterans only accounted for 7.9%. Odonates and dipterans were fairly abundant, contributing 4.2% and 3.9%, respectively. A total of 50 taxa was collected from this site of which 28 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Dunn Creek was assigned a bioclassification of "good".

Habitat analysis for this portion of Dunn Creek resulted in a classification of sub-optimal based on an average index score of 136. Non-point source sedimentation appeared to be the most noticeable factor influencing this stream.

Management Recommendations:

1. Given the occurrence of the Tennessee dace, water quality and habitat protection should be a high priority. Any action that would address non-point source pollution and riparian zone protection would be of benefit.

Figure 4. * Length Frequency Distributions for Rock Bass and Smallmouth Bass Collected in Dunn Creek during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	DUNN CREEK
WATERSHED	FRENCH BROAD
SITE	@ BRIDGE X-ING
COUNTY	SEVIER
QUADRANGLE	RICHARDSON COVE 164 SW
LAT-LONG	354937N-832322W
REACH	06010107-26.0
LENGTH	~ 213 m
AREA (SQ. KM.)	91.9
ELEVATION	1060 FT
DATE	6-19-96
TIME	1029

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
11.5 m	0.3 m	0.8 m

2. ESTIMATED % OF STREAM IN POOLS IS 30

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	15	15	45	10	5

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SOURCE
	X (WATER WILLOW)	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) 61.6 COMPARED TO NORMAL

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER
SUNNY AND HOT; AIR TEMP. 24 C @ 1046

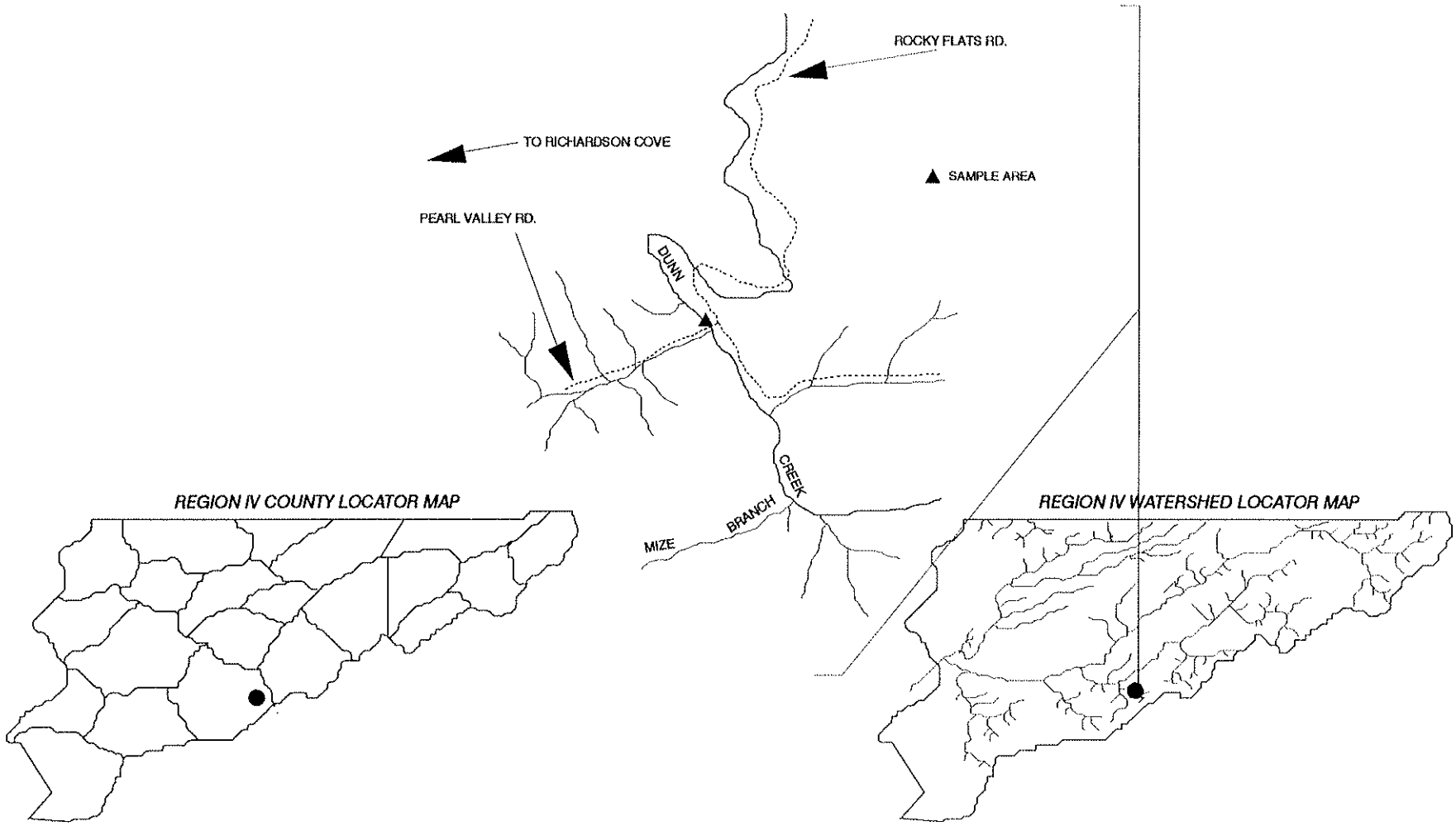
10. PAST WEATHER (last 24 hrs)
SAME W/ SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
6.3	18 C	70	9.0	97.4

12. COMMENTS
SAMPLE AREA LOCATED AT BRIDGE X-ING ON PEARL VALLEY RD. STREAM TURBIB AT TIME OF SAMPLE. RESIDENTIAL CONSTRUCTION PROBABLE SOURCE OF SEDIMENT INPUT.

13. X̄ HABITAT ASSESSMENT SCORE 136



DUNN CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE AND ONE BACKPACK UNIT @ 200 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	6	76-155	231	
Campostoma anomalum	45	230			
Cottus carolinae	322	1			
Cyrpinella galactura	54	27			
Etheostoma blennioides	398	12			
Etheostoma kennicotti	418	3			
Etheostoma rufilineatum	431	46			
Etheostoma simoterum	435	20			
Fundulus catenatus	301	5			
Hybopsis amblops	79	3			
Hypentelium nigricans	207	11			
Lepomis auritus	346	12	31-155	201	
Lepomis macrochirus	351	1	60	4	
Luxilus chrysocephalus	89	47			
Luxilus coccogenis	90	23			
Micropterus dolomieu	362	2	90-332	425	
Moxostoma duquesnei	224	8			
Nocomis micropogon	110	7			
Notropis leuciodus	128	28			
Notropis rubellus	131	1			
Notropis sp. (hybrid)	115	1			
Notropis telescopus	138	3			
Oncorhynchus mykiss	279	2	76	5	
Phoxinus tennesseensis	169	5			
Semotilus atromaculatus	188	15			
	SUM:	519			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<12	12-22	>22	22	3
NUMBER OF DARTER SP.	<3	3-4	>4	4	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	2	3
NUMBER OF SUCKER SP.	<2	2	>2	2	3
NUMBER OF INTOLERANT SP.	<2	2-3	>3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>31	31-16	<16	12	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>36	36-19	<19	55	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<21	21-41	>41	27.9	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<2	2-4	>4	1.4	1
CATCH RATE	<19.1	19.1-38	>38	22.5	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0.2	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	42.1	1
					32 **POOR**

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

DUNN CREEK BENTHIC DATA
FIELD # 776
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 50
EPT TAXA RICHNESS = 28
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
ANNELIDA				0.7
	Oligochaeta		3	
COLEOPTERA				2.2
	Elmidae	*Macronychus glabratus* adult	1	
		Promoresia adult	1	
	Psephenidae	*Psephenus herricki* larvae & adults	7	
DIPTERA				3.9
	Athericidae	*Atherix lantha*	4	
	Chironomidae		7	
	Simuliidae		2	
	Tipulidae	*Antocha pupa*	1	
		Hexatoma	1	
		Tipula	1	
EPHEMEROPTERA				38.6
	Baetidae	*Baetis* early instars	17	
		Baetis pluto/intercalaris	1	
		Acentrella	8	
	Baetidae sp.		3	
	Caenidae	*Caenis*	7	
	Ephemerellidae	*Ephemerella*	2	
		Eurylophella	3	
		Serratella deficiens	1	
	Ephemeridae	*Hexagenia*	14	
	Heptageniidae	*Epeorus rubidus/subpallidus*	5	
		Stenonema	37	
		Stenonema femoratum	2	
	Oligoneuriidae	*Isonychia*	57	
GASTROPODA				1.2
	Pleuroceridae		5	
HEMIPTERA				0.7
	Veliidae	*Rhagovelia obesa* male & females	3	
MEGALOPTERA				2.9
	Corydalidae	*Corydalus cornutus*	6	
		Nigronia serricornis	6	
ODONATA				4.2
	Aeshnidae	*Boyeria vinosa*	4	
	Calopterygidae	*Calopteryx dimidiata/maculata*	3	
	Gomphidae	*Genus A rogersi*	1	
		Gomphus lividus	2	
		Progomphus obscurus	2	
		Stylogomphus albistylus	3	
	Macromiidae	*Macromia*	2	
PELECYPODA				2.7
	Corbiculidae	*Corbicula fluminea*	11	
PLECOPTERA				7.9
	Chloroperlidae		1	
	Leuctridae		2	
	Peltoperlidae	*Peltoperla*	13	
	Perlidae	*Acroneuria abnormis*	4	
		Eccoptera xanthanes	1	
		Perlesta early instar	2	
		Perlesta placida	7	
	Pteronarcyidae	*Pteronarcys*	2	
TRICHOPTERA				34.6
	Glossosomatidae	*Glossosoma*	1	
	Goeridae	*Goera*	1	
	Hydropsychidae	*Ceratopsyche bronta*	5	
		Ceratopsyche morosa	10	
		Ceratopsyche sparna	8	
		Cheumatopsyche	67	
		Hydropsyche betteni/depravata	26	
	Philopotamidae	*Chimara*	22	
	Polycentropodidae	*Polycentropus*	1	
	Uenoidae	*Neophylax*	1	
		TOTAL	**407**	

Wilhite Creek

One IBI fishery survey was conducted on Wilhite Creek in June 1996:

Location and Length - Tributary to the French Broad River. The sample area was located at the road crossing on William Hollow Road. The sample area extended upstream from the bridge and was approximately 150 m in length. The site was sampled on 12 June 1996.

Sampling Methodology - This site was sampled with a 3 m seine and one backpack electrofishing unit operating at 200 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 collections from this stream.

A total of 437 fish representing 21 species was collected in our survey. Four game fish and four non-game fish species were collected (see Figure 5 for length frequency distributions of rock bass and smallmouth bass). These included 14 rock bass (*Ambloplites rupestris*) (all sacrificed for otoliths), 11 redbreast sunfish (*Lepomis auritus*), two bluegill (*L. macrochirus*), and one smallmouth bass (*Micropterus dolomieu*) (sacrificed for otoliths). Non-game species included one yellow bullhead (*Ameiurus natalis*), one white sucker (*Catostomus commersoni*), nine northern hogsucker (*Hypentelium nigricans*), and 11 black redhorse (*Moxostoma duquesnei*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocepahlus*). Together these two species accounted for 59.7% of all fish collected in our sample. Three darter species were also collected from this site. These included stripetail darter (*Etheostoma kennicotti*), redline darter (*E. rufilineatum*), 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 44. The strongest negative influences on the overall score were the high percentage of trophic generalists, the low percentage of piscivores in the community, and the high incidence of anomalies on the fish.

Benthic macroinvertebrates from our sample included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies; Peltoperlidae and Perlidae stoneflies; and Glossosomatidae, Hydropsychidae, Limnephilidae,

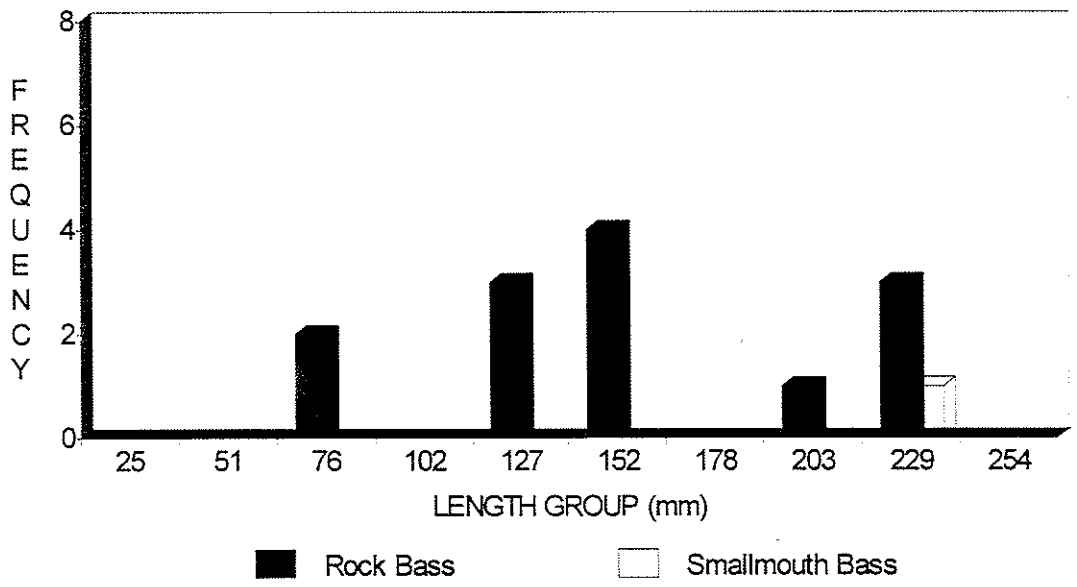
Philopotamidae, and Rhyacophilidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 44.2% of the total sample. Ephemeropterans were second most abundant with 25.3%. Plecopterans only contributed 1.9% to the total sample. Dipterans and odonates accounted for 17.9% and 4.2% of the total sample, respectively. A total of 46 taxa was collected from this site of which 19 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Wilhite Creek was assigned a bioclassification of "good".

Habitat analysis for this portion of Wilhite Creek resulted in a classification of sub-optimal based on an average index score of 129. There was some evidence of non-point sedimentation as evidenced by a layer of silt on the substrate.

Management Recommendations:

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

Figure 5. *Length Frequency Distributions for Rock Bass and Smallmouth Bass Collected in Wilhite Creek during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	WILHITE CREEK
WATERSHED	FRENCH BROAD RIVER
SITE	WILLIAM HLW. RD. X-ING
COUNTY	SEVIER
QUADRANGLE	RICHARDSON CV 164 SW
LAT-LONG	355102N-832257W
REACH	06010107-27.0
LENGTH	~ 150 m
AREA (SQ. KM.)	17.6
ELEVATION	1020 FT
DATE	6-12-96
TIME	0956

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
4.6 m	0.1 m	1.2+ m

2. ESTIMATED % OF STREAM IN POOLS IS 30

3. ESTIMATED POOL SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
20	30	20	20	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	20	20	40	10	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SPARSE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) 4.6 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

CLOUDY W/ SCATTERED T-STORMS; AIR TEMP. 19 C @ 1000

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

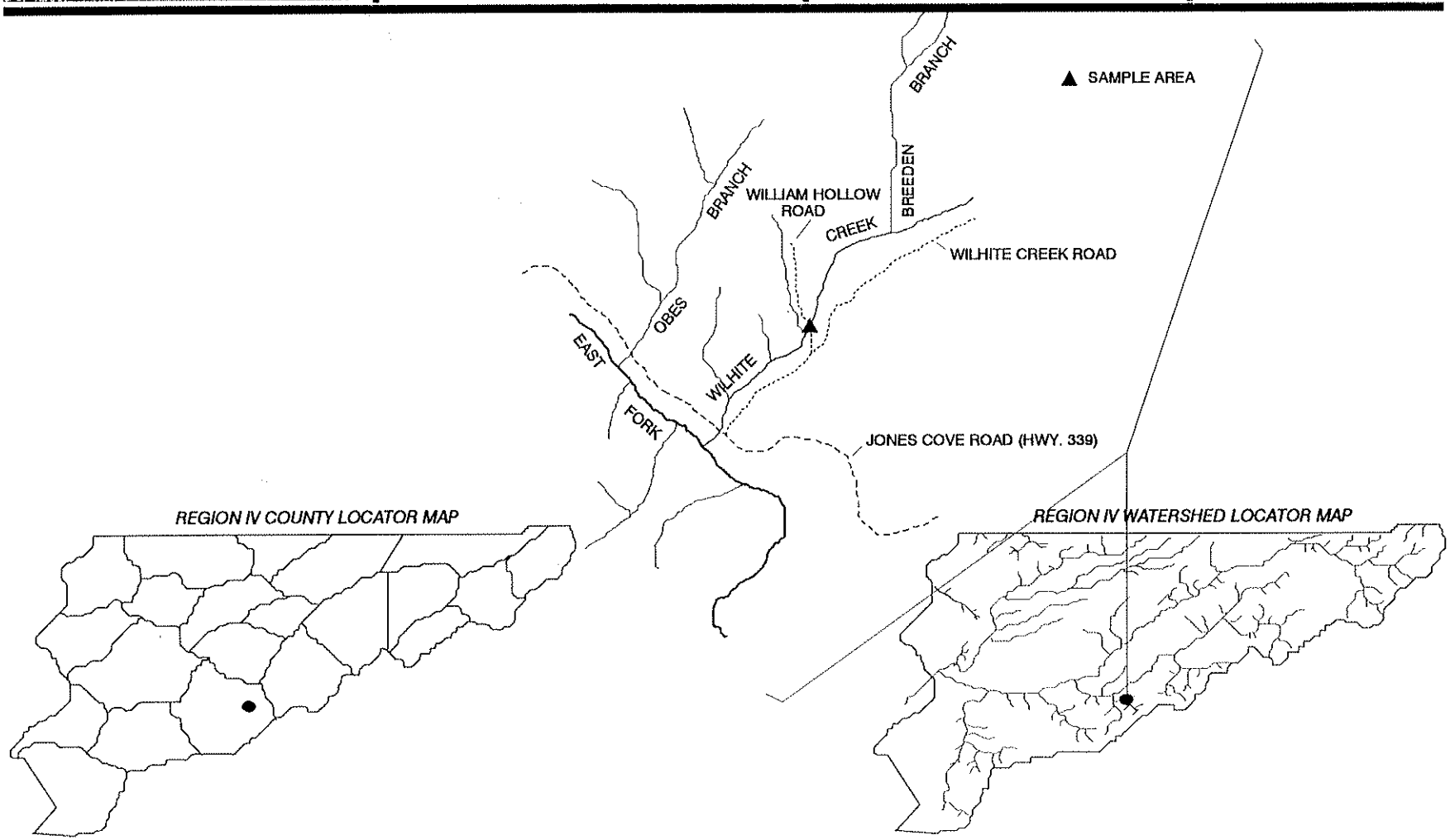
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
6.5	15 C	150	9.0	95.2

12. COMMENTS

SAMPLED AT WILLIAM HOLLOW RD. X-ING. APPROX. 0.8 KM UPSTREAM OF CONFLUENCE WITH EAST FORK PIGEON RIVER.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 129



WILHITE CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 3 m SEINE AND ONE BACKPACK UNIT @ 200 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	14	94-238	1445	
Ameiurus natalis	233	1			
Campostoma anomalum	45	189			
Catostomus commersoni	195	1			
Cottus carolinae	322	8			
Cyprinella galactura	54	10			
Cyprinella spiloptera	57	6			
Etheostoma kennicotti	418	35			
Etheostoma rufilineatum	431	5			
Etheostoma simoterum	435	29			
Fundulus catenatus	301	5			
Hybopsis amblops	79	1			
Hypentelium nigricans	207	9			
Lepomis auritus	346	11	52-203	484	
Lepomis macrochirus	351	2	64-121	34	
Luxilus chrysocephalus	89	72			
Micropterus dolomieu	362	1	245	176	
Moxostoma duquesnei	224	11			
Notropis stramineus	137	13			
Notropis telescopus	138	2			
Semotilus atromaculatus	188	12			
	SUM:	437			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<7	7-13	>13	20	5
NUMBER OF DARTER SP.	<2	2	>2	3	5
NUMBER OF SUNFISH SP. *less Micropterus*	0	1	>1	2	5
NUMBER OF SUCKER SP.	0	1	>1	3	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>38	38-20	<20	22	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>47	47-24	<24	61.7	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<14	14-26	>26	19.7	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1.8	1.8-3.5	>3.5	3.5	3
CATCH RATE	<29.8	29.8-59.5	>59.5	57.1	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	47.1	1
					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**

WILHITE CREEK BENTHIC DATA
FIELD # 775
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 46
EPT TAXA RICHNESS = 19
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
ANNELIDA				1.3
	Oligochaeta		7	
COLEOPTERA				1.0
	Dryopidae	*Helichus* adults	2	
	Elmidae	*Stenelmis* adults	3	
DIPTERA				17.9
	Athericidae	*Atherix lantha*	20	
	Chironomidae		63	
	Simuliidae		6	
	Tabanidae	*Tabanus*	1	
	Tipulidae	*Antocha*	3	
		Hexatoma	1	
		Tipula	1	
EPHEMEROPTERA				25.3
	Baetidae	*Baetis*	29	
	Caenidae	*Caenis*	6	
	Ephemerellidae	*Ephemerella*	24	
		Eurylophella	1	
	Ephemeridae	*Hexagenia*	1	
	Heptageniidae	*Heptagenia*	5	
		Stenonema	12	
	Oligoneuriidae	*Isonychia*	56	
GASTROPODA				1.5
	Ancylidae	*Ferrissia*	7	
	Pleuroceridae	elongated, yellow with brown spiral	1	
HEMIPTERA				0.2
	Gerridae	*Trepobates* nymph	1	
MEGALOPTERA				2.6
	Corydalidae	*Nigronia fasciatus*	1	
		Nigronia serricornis	4	
	Sialidae	*Sialis*	5	
	Corydalidae	*Corydalus cornutus*	4	
ODONATA				4.2
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	2	
	Coenagrionidae	*Argia*	2	
		Enallagma	3	
	Cordulidae		2	
	Gomphidae	*Gomphus* (Genus A) *rogersi*	1	
		Gomphus lividus	8	
		Hagenius brevistylus	1	
		Stylogomphus albistylus	1	
	Macromiidae	*Didymops transversa*	1	
PLECOPTERA				1.9
	Peltoperlidae	*Peltoperla*	4	
	Perlidae	*Perlesta*	6	
TRICHOPTERA				44.2
	Glossosomatidae	*Glossosoma* pupae	4	
	Hydropsychidae	*Ceratopsyche bronta*	1	
		Ceratopsyche morosa	2	
		Ceratopsyche sparna	33	
		Cheumatopsyche	171	
		Hydropsyche betteni/depravata	16	
	Limnephilidae	*Pycnopsyche luculenta* group	1	
	Philopotamidae	*Chimara*	5	
	Rhyacophilidae	*Rhyacophila fuscula*	1	
		TOTAL	530	

Watauga River

One IBI fishery survey was conducted on Watauga River in June 1996:

Location and Length - Tributary to the Holston River. The sample area was located at Watson Island (Watauga River mile 53.6). Sampling was conducted adjacent to the island and upstream of the island. The sample area was approximately 300 m in length and was sampled on 27 June 1996 (benthics and water quality sampled on 15 August 1996).

Sampling Methodology - This site was sampled with a 4.5 m seine, one backpack electrofishing unit operating at 200 VAC, and approximately 228 m of primacord.

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 survey was conducted to evaluate the relative health of the river and to develop a fish species list for TADS. The Agency has made no previous collections from this river.

A total of 261 fish representing 26 species was collected in our survey. Five game fish and eight non-game fish species were collected (see Figure 6 for length frequency distributions of rock bass and smallmouth bass). These included 14 rock bass (*Ambloplites rupestris*) (all sacrificed for otoliths), one YOY rainbow trout (*Oncorhynchus mykiss*), 13 bluegill (*Lepomis macrochirus*), nine redbreast sunfish (*L. auritus*), 17 smallmouth bass (*Micropterus dolomieu*) (all sacrificed for otoliths), 27 northern hogsuckers (*Hypentelium nigricans*), two white suckers (*Catostomus commersoni*), three gizzard shad (*Dorosoma cepedianum*), two river redhorse (*Moxostoma carinatum*), 20 black redhorse (*M. duquesnei*), four golden redhorse (*M. erythrurum*), three channel catfish (*Ictalurus punctatus*), and one yellow bullhead (*Ameiurus natalis*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and warpaint shiner (*Luxilus coccogenis*). Together these two species accounted for 26.9% of all fish collected in our sample. Additionally, five darter species were collected at this site. These included greenside darter (*Etheostoma blennioides*), greenfin darter (*E. chlorobranchium),* redline darter (*E. rufilineatum*), banded darter (*E. zonale*), and tangerine darter (*Percina aurantiaca*). Of special interest was the collection of the margined madtom (*Noturus insignis*) from this site. This was our first collection of this species, which proved to be quite common at this site. This species is native to Atlantic Coastal drainages and is unlikely that it occurred in Tennessee historically (Etnier and Starnes 1993). It is known from two localities in the upper Holston River system, Watauga River above the reservoir and in the North Fork Holston River in Virginia (Etnier and Starnes 1993). It is speculated that these populations were established by "bait bucket" introductions.

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 relatively high percentage of trophic generalists, the low percentage of specialized feeders, the low percentage of piscivores, and the low CPUE.

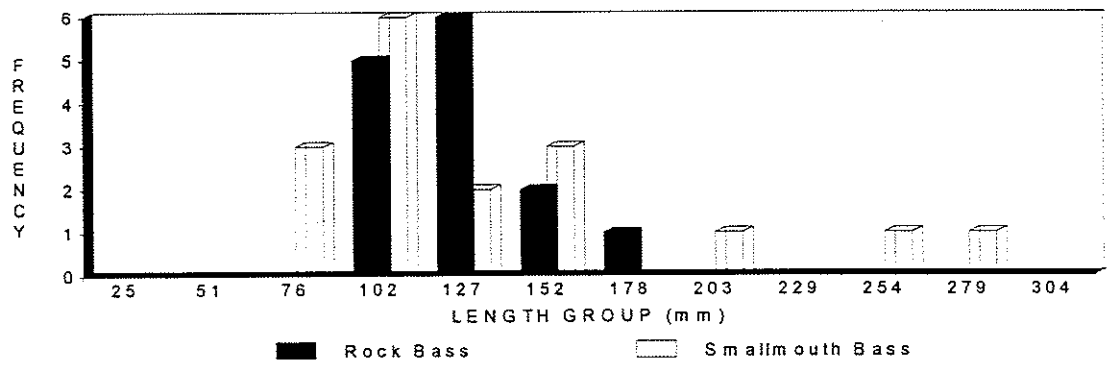
Benthic macroinvertebrates from our sample included Baetidae, Ephemerllidae, Ephemeridae, Heptageniidae, Oligoneuriidae, and Polymitarcyidae mayflies; Chloroperlidae and Perlidae stoneflies; and Brachycentridae, Hydropsychidae, Lepidostomatidae, Leptoceridae, Philopotamidae, and Polycentropodidae caddisflies. Trichopterans were the most abundant organisms in our survey, comprising 35.2% of the total sample. Ephemeropterans were second most abundant with 31.7% while plecopterans only accounted for 8.1%. Coleopterans and dipterans were fairly abundant, contributing 12.7% and 6.0%, respectively. A notable collection was made at this site during our benthic survey. We collected eight specimens of *Ephoron leukon*, a burrowing mayfly in the family Polymitarcyidae. This represents the first collection of this species and family within the state. It is one of two species in this genus known to occur in the United States (Brigham et al. 1982). A total of 48 taxa was collected from this site of which 28 were EPT taxa. Based on the tolerance values for the taxa collected and the overall EPT taxa richness value, this reach of Watauga River was assigned a bioclassification of "good".

Habitat analysis for this portion of Watauga River resulted in a classification of sub-optimal based on an average index score of 156. There did appear to be some indications of non-point source sedimentation as the substrate was covered with a fine layer of silt.

Management Recommendations:

1. This river represents an outstanding resource that deserves the upmost protection. Practically the entire riverine reach between the reservoir and the North Carolina state line courses through a fairly inaccessible gorge. This has allowed this portion of the river to remain relatively undeveloped. Watershed protection should be a high priority.

Figure 6. * Length Frequency Distributions for Rock Bass and Smallmouth Bass Collected in Watauga River during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	WATAUGA RIVER
WATERSHED	HOLSTON RIVER
SITE	@ WATSON ISLAND
COUNTY	JOHNSON
QUADRANGLE	ELK MILLS 214 SW
LAT-LONG	361723N-815604W
REACH	06010103-29.0
LENGTH	~ 0.3 KM
AREA (SQ. KM.)	393.6
ELEVATION	1980 FT
DATE	8-15-96
TIME	1219

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
41.5 m	N/A	1.8+ m

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
10	15	10	35	30	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X SEDGES	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 10 %

8. FLOW (CFS) N/A COPMARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND MILD

10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

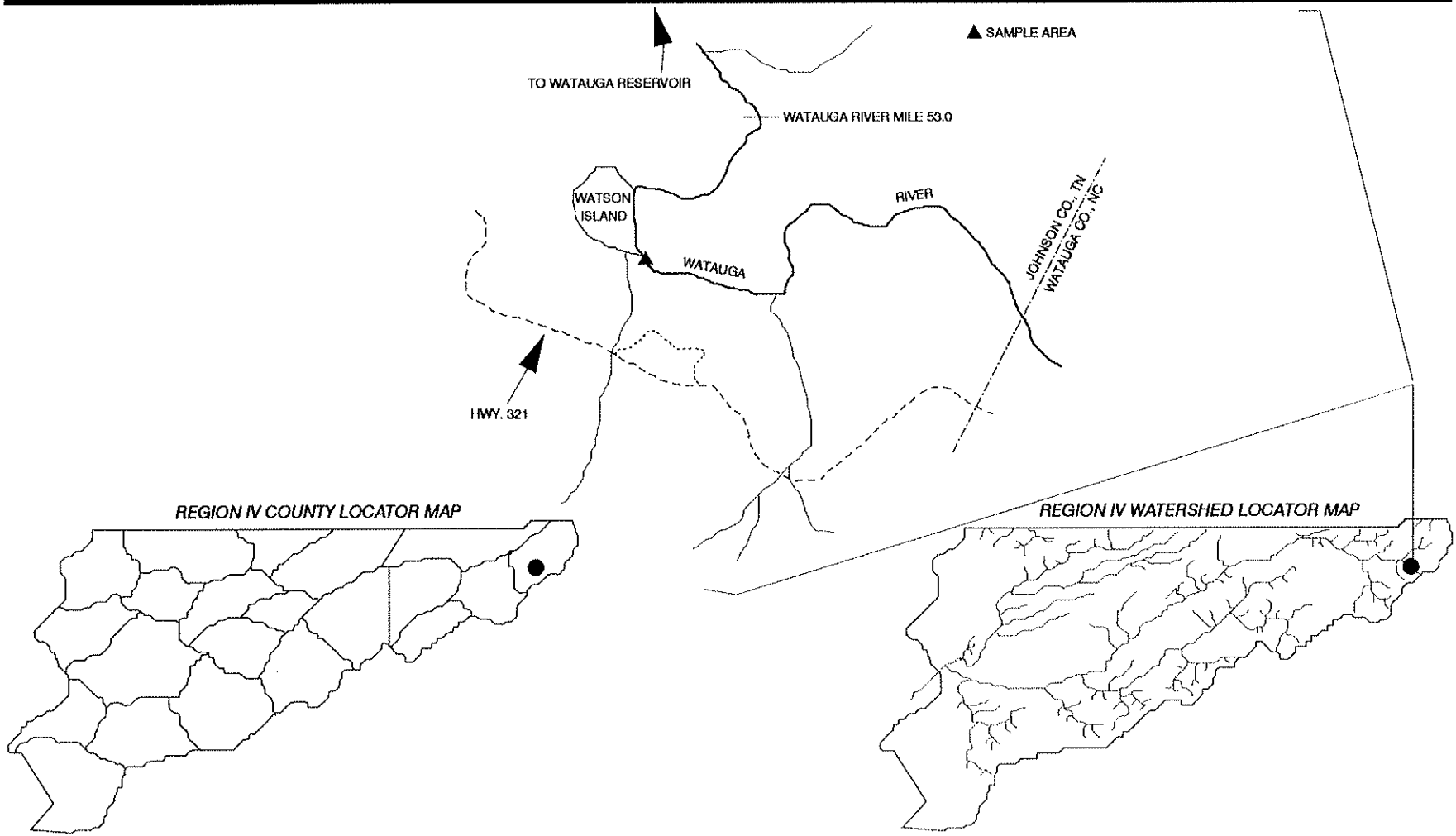
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
6.5	16.6 C	60	9.5	102

12. COMMENTS

SAMPLE STATION LOCATED JUST UPSTREAM OF WATSON ISLAND. PRIMA CORD USED IN ONE POOL TO COLLECT FISH.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 156



WATAUGA RIVER FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 4.5 m SEINE, ONE BACKPACK UNIT @ 200 VAC, AND D-CORD

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	14	115-195	765	ONLY 8 INCLUDED IN IBI
Ameiurus natalis	233	1			
Campostoma anomalum	45	39			
Catostomus commersoni	195	2			
Cyprinella galactura	54	26			
Dorosoma cepedianum	41	3			
Etheostoma blennioides	398	6			
Etheostoma chlorobranchium	403	2			
Etheostoma rufilineatum	431	4			
Etheostoma zonale	449	1			
Hypentelium nigricans	207	27			
Ictalurus punctatus	240	3			
Lepomis auritus	346	9	110-160	330	
Lepomis macrochirus	351	13	84-157	444	
Luxilus coccogenis	90	31			
Micropterus dolomieu	362	17	90-287	878	ONLY 10 INCLUDED IN IBI
Moxostoma carinatum	223	2			
Moxostoma duquesnei	224	20			
Moxostoma erythrurum	225	4			
Nocomis micropogon	110	14			
Notropis photogenis	130	1			
Notropis telescopus	138	3			
Noturus insignis	254	14			
Oncorhynchus mykiss	279	1			YOY
Percina aurantiaca	462	2			
Pimephales notatus	176	2			
	SUM:	261			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<10	10-18	>18	23	5
NUMBER OF DARTER SP.	<2	2-3	>3	5	5
NUMBER OF SUNFISH SP. *less Micropterus*	0	1	>1	2	5
NUMBER OF SUCKER SP.	<2	2	>2	5	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>24	24-13	<13	2.4	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>20	20-11	<11	25.8	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	LOW CPUE			25.8	1
PERCENT OF INDIVIDUALS AS PISCIVORES	LOW CPUE			7.3	1
CATCH RATE	<10.5	10.5-20.8	>20.8	3.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	TR-1	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	3.2	3
				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**

WATAUGA RIVER BENTHIC DATA
FIELD # 799
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 48
EPT TAXA RICHNESS = 28
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
ANNELIDA				0.4
	Oligochaeta		1	
COLEOPTERA				12.7
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Dubiraphia* adult	1	
		Macronychus glabratus adults	7	
		Promoresia adults & larvae	13	
		Stenelmis larva	1	
	Gyrinidae	*Dineutus discolor* males & females	11	
		Dineutus larva	1	
	Hydrophilidae	*Paracymus* adult	1	
DIPTERA				6.0
	Chironomidae		6	
	Simuliidae	larvae & pupa	9	
	Tipulidae	*Antocha*	1	
		Tipula	1	
EPHEMEROPTERA				31.7
	Baetidae	*Baetis*	36	
	Baetidae sp.	only two caudal filiments	5	
	Ephemerellidae	*Drunella allegheniensis*	3	
		Serratella deficiens	4	
		Serratella sp.	3	
	Ephemeridae	*Hexagenia*	1	
	Heptageniidae	*Epeorus dispar*	1	
		Heptagenia	1	
		Stenonema early instars	9	
		Stenonema ithaca	2	
		Stenonema modestum	4	
	Oligoneuriidae	*Isonychia*	13	
	Polymitarcyidae	*Ephoron leukon*	8	
GASTROPODA				0.7
	Pleuroceridae	light brown shell, elongated spiral	2	
HEMIPTERA				2.1
	Corixidae		1	
	Gerridae	*Gerris conformis* females	2	
		Metrobates hesperius	1	
	Veliidae	*Rhagovelia obesa* male & female	2	
MEGALOPTERA				1.4
	Corydalidae	*Corydalus cornutus*	4	
ODONATA				1.8
	Aeshnidae	*Boyeria vinosa*	4	
	Gomphidae	*Hagenius brevistylus*	1	
PLECOPTERA				8.1
	Chloroperlidae		1	
	Perlidae	*Acroneuria abnormis*	21	
		Paragnetina immarginata	1	
TRICHOPTERA				35.2
	Brachycentridae	*Brachycentrus appalachia*	1	
		Brachycentrus pupa	1	
		Micrasema	1	
	Hydropsychidae	*Ceratopsyche morosa*	11	
		Ceratopsyche sparna	47	
		Cheumatopsyche	5	
		Hydropsyche sp.	2	
		Macrostemum zebratum	1	
	Lepidostomatidae	*Lepidostoma*	7	
	Leptoceridae	*Oecetis* larva and pupa	2	
		Triaenodes	2	
	Philopotamidae	*Chimara*	12	
	Polycentropodidae	*Nyctiophylax*	7	
		Polycentropus	1	
		TOTAL	**284**	

Stony Fork

One IBI fishery survey was conducted on Stony Fork in June 1996:

Location and Length - Tributary to the New River (Big South Fork tributary). The sample area was located adjacent to the Clinchmore Church on Stony Fork School Road. The sample area extended upstream from the church and was approximately 304 m in length. The site was sampled on 5 June 1996.

Sampling Methodology - This site was sampled with a 3 m 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 collections from this stream.

A total of 309 fish representing 14 species was collected in our survey. Two game fish and three non-game fish species were collected (see Figure 7 for length frequency distributions of rock bass and smallmouth bass). These included one rock bass (*Ambloplites rupestris*) (sacrificed for otoliths) and 12 smallmouth bass (*Micropterus dolomieu*) (all sacrificed for otoliths). Non-game species included three white suckers (*Catostomus commersoni*), 37 northern hogsuckers (*Hypentelium nigricans*), and one golden redhorse (*Moxostoma erythrurum*). The most abundant forage species in our sample were central stoneroller (*Campostoma anomalum*) and striped shiner (*Luxilus chrysocepahlus*). Together these two species accounted for 62.1% of all fish collected in our sample. Three darter species were also collected from this site. These included greenside darter (*Etheostoma blennioides*), rainbow darter (*E. caeruleum*), and bluebreast darter (*E. camurum*).

Our Index of Biotic Integrity analysis indicated that this stream was in "poor to fair" condition based on an IBI score of 38. The strongest negative influences on the overall score were the low number of intolerant species in the sample, the high percentage of trophic generalists and tolerant species, and the low percentage of specialized insectivores in the community. Coal mining within the watershed has been extensive and has ultimately led to the degradation of this stream. During our survey we observed a high occurrence of coal fines in the substrate. Furthermore, we noticed "gray water" in a small tributary (Mart Branch) upstream of our survey site. The stream gradient is fairly steep with riffle-pool characteristics similar to those observed in Blue Ridge streams.

The stream did support a fairly abundant smallmouth bass population, however, individuals did not appear to attain lengths in excess of 225 mm.

Benthic macroinvertebrates from our sample included Baetidae, Caenidae, Ephemerellidae, Heptageniidae, and Oligoneuriidae mayflies; Leuctridae, Peltoperlidae and Perlidae stoneflies; and Glossosomatidae, Hydropsychidae, Limnephilidae, Polycentropodidae, and Rhyacophilidae caddisflies. Ephemeropterans were the most abundant organisms in our survey, comprising 39.9% of the total sample. Dipterans were second most abundant with 27.7%. Trichopterans accounted for 14.1%, while plecopterans only contributed 3.8% to the total sample. Coleopterans and odonates comprised 6.6% and 4.2% of the total sample, respectively. A total of 35 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 Stony Fork was assigned a bioclassification of "good".

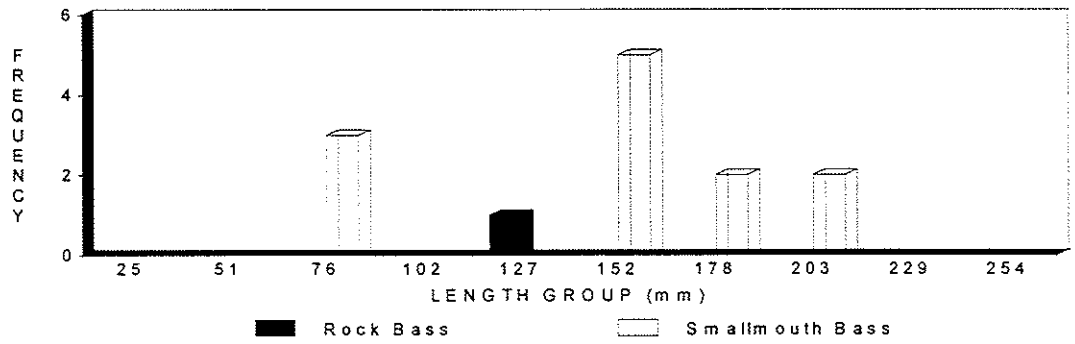
Habitat analysis for this portion of Stony Fork resulted in a classification of sub-optimal based on a average index score of 133. There was some evidence of non-point sedimentation as evidenced by fine silt layers and coal fines in the substrate. There was some bank erosion in the area we surveyed.

Management Recommendations:

1. Any actions that could address protection of riparian zones and limit non-point source pollution within the watershed would be of benefit to this stream. Reclamation of abandoned strip mines would be beneficial to this stream.

2. Consider conducting quantitative surveys of the smallmouth bass population with special emphasis placed on age and growth characterization.

Figure. *Length Frequency Distributions for Rock Bass and Smallmouth Bass Collected in Stony Fork during 1996



* Length groups approximate 1-inch

PHYSIOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	STONY FORK
WATERSHED	BIG SOUTH FORK
SITE	@ CLINCHMORE CHURCH
COUNTY	CAMPBELL
QUADRANGLE	DUNCAN FLATS 129 NE
LAT-LONG	361324N-841708W
REACH	05130104-62.0
LENGTH	~ 304 m
AREA (SQ. KM.)	20.2
ELEVATION	1420 FT
DATE	6-5-96
TIME	1008

COLLECTOR(S)

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

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
5.9 m	0.3 m	1.0 m

2. ESTIMATED % OF STREAM IN POOLS IS 35

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

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) 7.2 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND MILD; AIR TEMP. 16 C @ 1026

10. PAST WEATHER (last 24 hrs)

SUNNY AND MILD

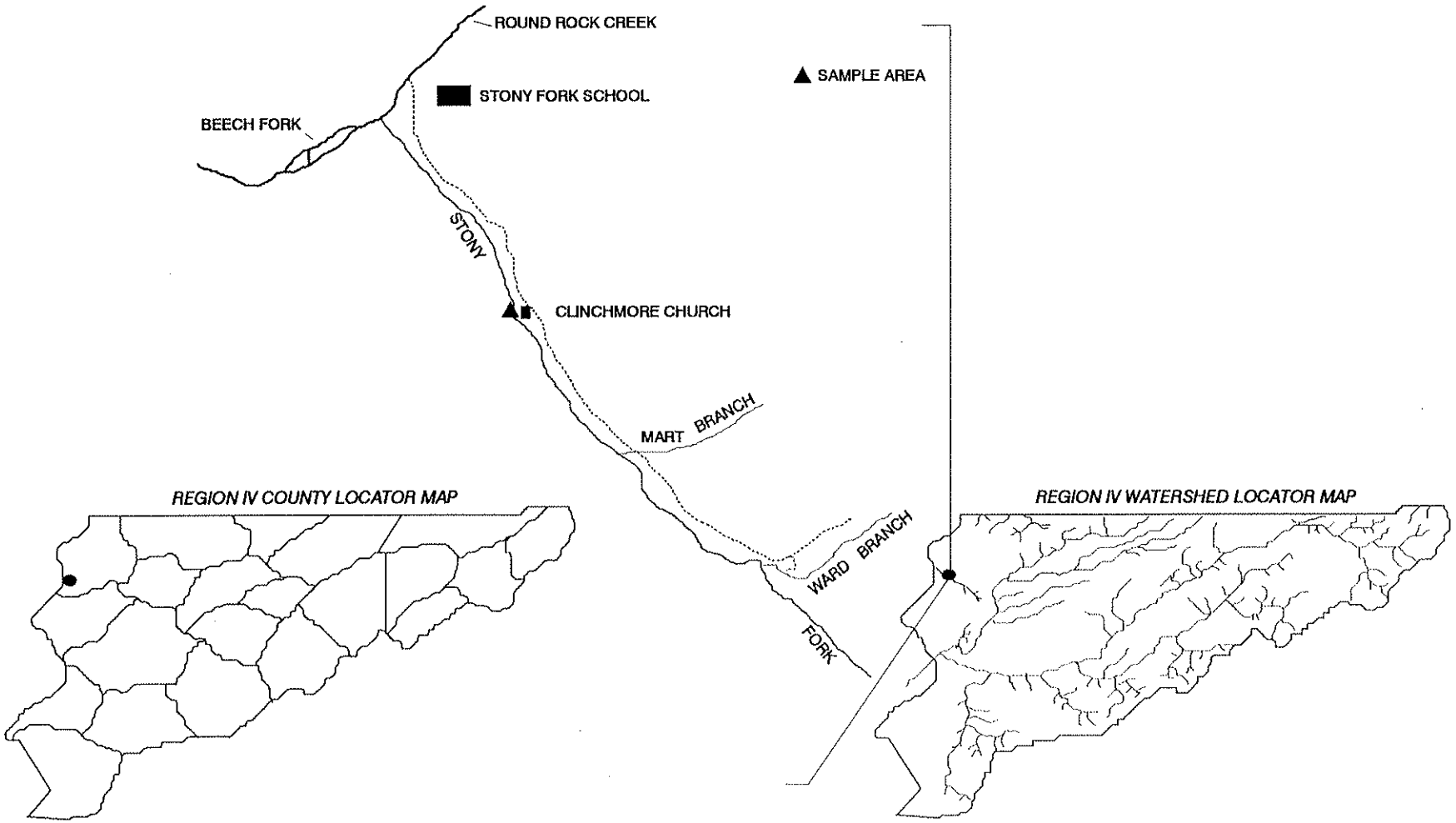
11. WATER QUALITY

pH	TEMP	COND.	D.O.	% SAT.
6.5	13 C	290	9.7	95.8

12. COMMENTS

SAMPLE AREA LOCATED CLINCMORE CHURCH ON STONY FORK SCHOOL ROAD. COAL FINES QUITE COMMON IN SUBSTRATE. SEVERAL STRIP MINES IN WATERSHED.

13. $\bar{X}$ HABITAT ASSESSMENT SCORE 133



SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 3 m SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	RANGE(mm)	TOT. WEIGHT(g)	NOTE
Ambloplites rupestris	342	1	144	65	
Campostoma anomalum	45	118			
Catostomus commersoni	195	3			
Cyprinella galactura	54	6			
Etheostoma blennioides	398	14			
Etheostoma caeruleum	401	27			
Etheostoma camurum	402	1			
Hypentelium nigricans	207	37			
Luxilus chrysocephalus	89	74			
Micropterus dolomieu	362	12	76-217	748	ONLY 7 INCLUDED IN IBI
Moxostoma erythrurum	225	1			
Notropis vollucelus	140	6			
Rhinichthys atratulus	184	1			
Semotilus atromaculatus	188	8			
		SUM: 309			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-11	>11	14	5
NUMBER OF DARTER SP.	<2	2	>2	3	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	1	1
NUMBER OF SUCKER SP.	0	1	>1	3	5
NUMBER OF INTOLERANT SP.	<2	2	>2	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10	27.9	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22	64.1	1
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50	15.7	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5	2.6	3
CATCH RATE	<16	16-32	>32	38.4	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-Tr	0	0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2	0.3	5
					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**

STONY FORK BENTHIC DATA
FIELD # 774
EFFORT = 3 PERSON HOURS

TAXA RICHNESS = 35
EPT TAXA RICHNESS = 22
BIOCLASSIFICATION = GOOD

			NUMBER	PERCENT
ANNELIDA				0.9
	Oligochaeta		2	
COLEOPTERA				6.6
	Psephenidae	*Psephenus herricki*	14	
DIPTERA				27.7
	Athericidae	*Atherix lantha*	4	
	Chironomidae		40	
	Simuliidae		11	
	Tipulidae	*Tipula*	4	
EPHEMEROPTERA				39.9
	Baetidae	*Baetis*	42	
		Centroptilium	1	
	Caenidae	*Caenis*	1	
	Ephemerellidae	*Drunella*	14	
		Ephemerella	1	
		Eurylophella	3	
	Heptageniidae	*Epeorus dispar*	7	
		Stenonema early instars	2	
		Stenonema mediopunctatum	3	
		Stenonema vicarium	5	
	Oligoneuriidae	*Isonychia*	6	
HEMIPTERA				0.5
	Veliidae	*Rhagovelia obesa* nymph	1	
MEGALOPTERA				1.9
	Corydalidae	*Corydalus cornutus*	4	
NEMATOMORPHA				0.5
	Gordiodea		1	
ODONATA				4.2
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus lividus*	1	
		Lanthus sp.	1	
		Stylogomphus albistylus	6	
PLECOPTERA				3.8
	Leuctridae	*Leuctra*	6	
	Peltoperlidae	*Peltoperla*	1	
	Perlodidae	*Isoperla cotta/orata*	1	
TRICHOPTERA				14.1
	Glossosomatidae	*Glossosoma*	1	
	Hydropsychidae	*Ceratopsyche ventura*	7	
		Cheumatopsyche	7	
		Diplectrona modesta	1	
		Hydropsyche dicantha	3	
		Hydropsyche early instar	1	
	Limnephilidae	*Pycnopsyche guttifer/scabripennis* group	2	
		Pycnopsyche luculenta group	3	
	Polycentropodidae	*Polycentropus*	4	
	Rhyacophilidae	*Rhyacophila* pupa	1	
		TOTAL	213	

SUMMARY

Our 1996 stream surveys comprised 13 fish samples and 13 benthic samples. Index of Biotic Integrity scores for the fish samples ranged from 24 to 42 (very poor-poor to fair) with an average score of 35. Ratings for the benthic macroinvertebrate samples ranged from 3 to 4.5 (fair-good to good) with an average rating of 3.6 (see appendix A). Of the 13 IBI fish surveys conducted 38.5% (5) scored "poor" or below, 38.5% (5) scored "poor to fair", and 23.0% (3) scored "fair". Based on the analysis of the benthic macroinvertebrate ratings collected during 1996, 38.5% (5) of the samples were categorized as "fair to good", while 61.5% (8) received a classification of "good".

Two noteworthy collections were made during the 1996 field season. These included the collection of Tennessee dace **(in need of management)** from Dunn Creek in Sevier county. The occurrence of this species in this stream was previously undocumented. Additionally, we collected a species of burrowing mayfly (*Ephoron leukon*) from the Watauga River in Johnson county, which represented the first documentation of this species in Tennessee.

In regards to streams supporting game fish populations that would provide adequate angling opportunities, we concluded that six of the 13 streams surveyed contained adequate angling opportunities for one or more species of game fish. These included Hinds Creek, Titus Creek, Dunn Creek, Wilhite Creek, Watauga River, and Stony Fork. 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 the full potential of 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 1996.

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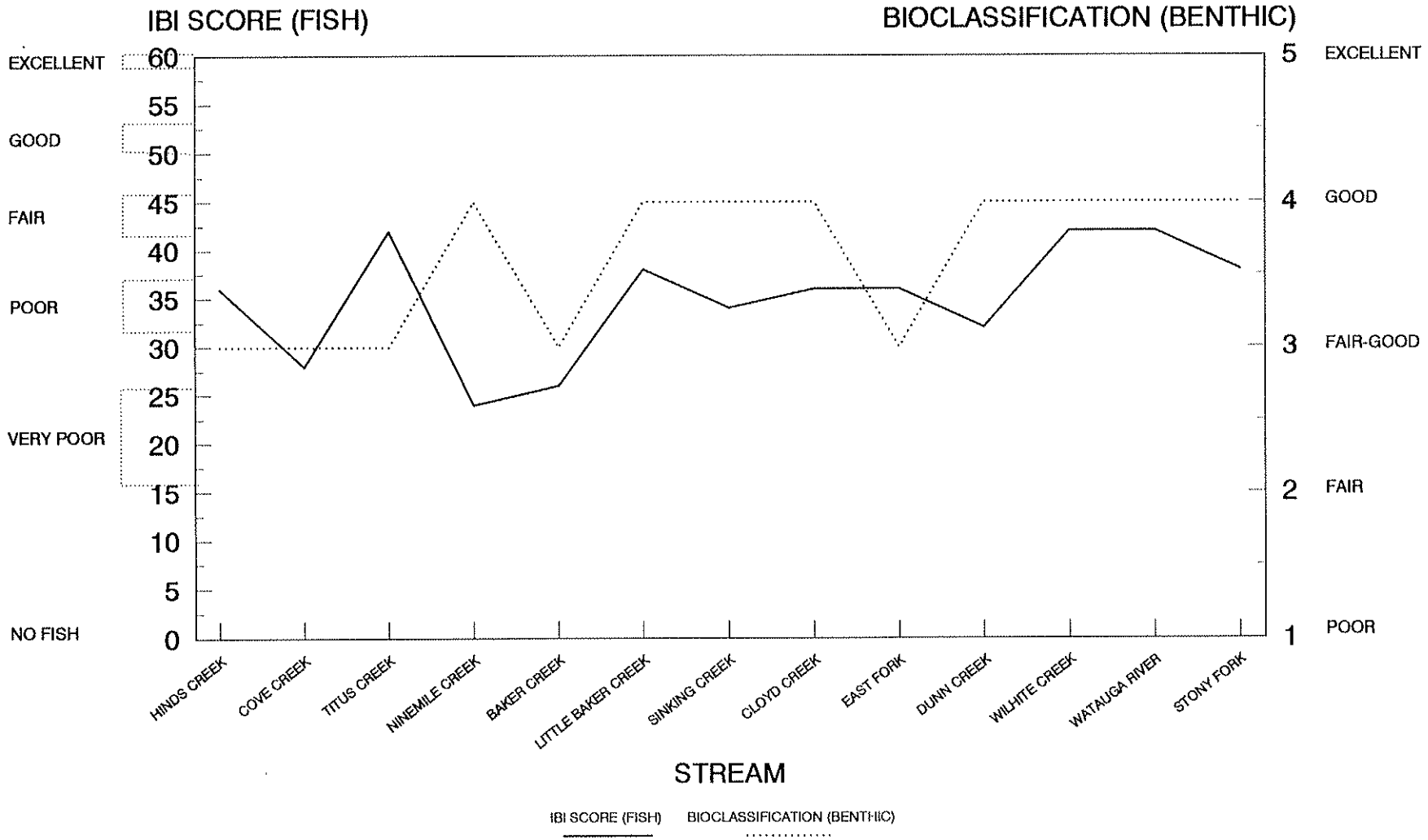
APPENDIX A

Trends in IBI Fish Scores and Biotic Index Values Calculated for Benthic Macroinvertebrate Samples Collected during 1996

Trends in IBI Fish Scores and Biotic Index Values Calculated for Benthic Macroinvertebrate Samples Collected during 1996



APPENDIX B

Fish Species Collected during 1996 with Desigantions for Trophic Guild, Reproductive Guild, Tolerance, and Headwater Habitat

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

Family	Species	Tolerance	Trophic Guild	Reproductive Guild	Headwater Habitat
ATHERINIDAE	*Labidesthes sicculus*				
CATOSTOMIDAE	*Catostomus commersoni*	TOL	OM	L	P
	Hypentelium nigricans			L	
	Moxosotma carinatum			L	
	Moxostoma duquesnei	INT		L	P
	Moxostoma erythrurum			L	P
CENTRARCHIDAE	*Ambloplites rupestris*	INT	TC		P
	Lepomis auritus				
	Lepomis cyanellus	TOL			P
	Lepomis macrochirus				
	Lepomis megalotis	HI			P
	Lepomis gulosus				P
	Lepomis sp. (hybrid)				
	Micropterus dolomieu	TC			P
	Micropterus punctulatus	TC			P
	Micropterus salmoides	TC			P
CLUPEIDAE	*Dorosoma cepedianum*	TOL	OM		
COTTIDAE	*Cottus carolinae*				R
CYPRINIDAE	*Campostoma anomalum*	OM			
	Cyprinella galactura				P
	Cyprinella spiloptera	TOL			P
	Cyprinus carpio	TOL	OM		
	Hybopsis amblops	HI	SP	L	P
	Luxilus chrysocephalus	TOL	OM	L	P
	Luxilus coccogenis	HI	SP	L	P
	Nocomis micropogon		OM		P
	Notropis leuciodus	HI	SP	L	P
	Notropis photogenis		SP	L	P
	Notropis rubellus		SP	L	
	Notropis stramineus		SP	L	P
	Notropis telescopus	INT	SP	L	P
	Notropis volucellus		SP	L	
	Pimephales notatus		OM		P
	Pimephales vigilax		SP		
	Phoxinus tennesseensis	HI		L	P
	Rhinichthys atratulus			L	
	Semotilus atromaculatus	TOL			P
FUNDULIDAE	*Fundulus catenatus*	HI	SP	L	R
ICTALURIDAE	*Ameiurus natalis*	TOL	OM		P
	Ictalurus punctatus		OM		
	Noturus insignis		SP		
MORONIDAE	*Morone chrysops*	TC		L	
PERCIDAE	*Etheostoma blennioides*		SP	L	R
	Etheostoma caeruleum		SP	L	R
	Etheostoma camurum	INT	SP	L	
	Etheostoma chlorobranchium		SP	L	
	Etheostoma flabellare	INT	SP		R
	Etheostoma jessiae	INT	SP	L	P
	Etheostoma kennicotti		SP	L	P
	Etheostoma rufilineatum		SP	L	R
	Etheostoma simoterum		SP	L	R
	Etheostoma zonale		SP	L	R
	Percina aurantiaca		SP	L	
	Percina caprodes		SP	L	P
POECILIIDAE	*Gambusia affinis*	TOL			P
SALMONIDAE	*Oncorhynchus mykiss*				

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

APPENDIX C

Distribution of Fishes Collected during 1996 Stream Surveys

Distribution of Fishes Collected during 1996 Stream Surveys

	Watershed →	A	A	A	B	B	B	B	C	D	D	D	E	F
		HINDS CREEK	COVE CREEK	TITUS CREEK	NINEMILE CREEK	BAKER CREEK	LITTLE BAKER CREEK	SINKING CREEK	CLOYD CREEK	EAST FORK	DUNN CREEK	WILHITE CREEK	WATAUGA RIVER	STONY FORK
FAMILY	SCIENTIFIC NAME STATUS													
ATHERINIDAE	*Labidesthes sicculus*		X											
CATOSTOMIDAE	*Catostomus commersoni*			X			X		X			X	X	X
	Hypentelium nigricans	X	X	X	X	X	X	X	X	X	X	X	X	X
	Moxostoma cannatum												X	
	Moxostoma duquesnei	X				X				X	X	X	X	
	Moxostoma erythrurum	X				X				X			X	X
CENTRARCHIDAE	*Ambloplites rupestris*	X		X	X					X	X	X	X	X
	Lepomis auritus	X			X				X	X	X	X	X	
	Lepomis cyanellus	X	X	X	X		X		X	X				
	Lepomis macrochirus	X	X	X	X	X	X	X	X	X	X	X	X	
	Lepomis megalotis	X												
	Lepomis gulosus				X									
	Lepomis sp. (hybrid)				X		X			X	X			
	Micropterus dolomieu	X	X							X	X	X	X	X
	Micropterus punctulatus	X												
	Micropterus salmoides	X	X			X	X							
CLUPEIDAE	*Dorosoma cepedianum*									X			X	
COTTIDAE	*Cottus carolinae*	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
	Cyprinella galactura	X								X	X	X	X	X
	Cyprinella spiloptera	X				X			X	X		X		
	Cyprinus carpio	X				X			X					
	Hybopsis amblops	X								X	X	X		
	Luxilus chrysocephalus	X	X	X	X					X	X	X		X
	Luxilus coccogenis									X	X		X	
	Nocomis micropogon										X		X	
	Notropis leuciodus										X			
	Notropis photogenis									X			X	
	Notropis rubellus									X	X			
	Notropis stramineus									X		X		
	Notropis telescopus									X	X	X	X	
	Notropis volucellus													X
	Pimephales notatus	X	X	X									X	
	Pimephales vigilax					X								
	Phoxinus tennesseensis INM										X			
	Rhinichthys atratulus						X	X	X					X
	Semotilus atromaculatus		X	X				X	X		X	X		X
FUNDULIDAE	*Fundulus catenatus*										X	X		
ICTALURIDAE	*Ameiurus natalis*	X	X						X			X	X	
	Ictalurus punctatus	X											X	
	Noturus insignis												X	
MORONIDAE	*Morone chrysops*	X												
PERCIDAE	*Etheostoma blennioides*	X			X					X	X		X	X
	Etheostoma caeruleum		X	X										X
	Etheostoma camurum													X
	Etheostoma chlorobranchium												X	
	Etheostoma flabellare			X										
	Etheostoma jessiae				X									
	Etheostoma kennicotti										X	X		
	Etheostoma rufilineatum	X		X						X	X	X	X	
	Etheostoma simoterum	X			X		X	X	X	X	X	X		
	Etheostoma zonale									X			X	
	Percina aurantiaca INM												X	
	Percina caprodes	X	X	X		X		X	X	X				
POECILIIDAE	*Gambusia affinis*					X								
SALMONIDAE	*Oncorhynchus mykiss*	X									X		X	

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

A = CLINCH RIVER WATERSHED
B = LITTLE TENNESSEE RIVER WATERSHED
C = TENNESSEE RIVER WATERSHED
D = FRENCH BROAD RIVER WATERSHED
E = HOLSTON RIVER WATERSHED
F = BIG SOUTH FORK WATERSHED

APPENDIX D

Distribution of Crayfishes Collected during 1996 Stream Surveys

	Distribution of Crayfish Collected during 1996 Stream Surveys														
	Watershed →	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**C**	**D**	**D**	**D**	**E**	**F**
		HINDS CREEK	COVE CREEK	TITUS CREEK	NINEMILE CREEK	BAKER CREEK	LITTLE BAKER CREEK	SINKING CREEK	CLOYD CREEK	EAST FORK	DUNN CREEK	WILHITE CREEK	WATAUGA RIVER	STONY FORK
FAMILY	SCIENTIFIC NAME STATUS													
Cambaridae	*Cambarus buntingi*		X	X										
	Cambarus cumberlandensis													X
	Cambarus distans			X										X
	Cambarus dubius							X						
	Cambarus girardianus						X		X					
	Cambarus sp. cf. C. robustus												X	
	Cambarus thomai	X						X			X			
	Orconectes erichsonianus				X				X	X				
	Orconectes forceps									X		X		
	Orconectes forceps/placidus		X											
	Orconectes spinosus												X	

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

A = CLINCH RIVER WATERSHED
B = LITTLE TENNESSEE RIVER WATERSHED
C = TENNESSEE RIVER WATERSHED
D = FRENCH BROAD RIVER WATERSHED
E = HOLSTON RIVER WATERSHED
F = BIG SOUTH FORK WATERSHED

APPENDIX E

Mean Habitat Assessment Scores for Streams Surveyed during 1996

Mean Habitat Assessment Scores for Streams Surveyed during 1996

	PREVALENT HABITAT TYPE	HABITAT PARAMETER 1	HABITAT PARAMETER 2	HABITAT PARAMETER 3	HABITAT PARAMETER 4	HABITAT PARAMETER 5	HABITAT PARAMETER 6	HABITAT PARAMETER 7	HABITAT PARAMETER 8	HABITAT PARAMETER 9	HABITAT PARAMETER 10	
	RIFFLE/RUN	Instream Cover	Epifaunal Substrate	Embeddedness	Channel Alteration	Sediment Deposition	Freq. of Riffles	Channel Flow Status	Bank Vegetative Cover	Bank Stability	Riparian Vegetative Zone Width	
	GLIDE/POOL	Bottom Substrate	Pool Substrate	Pool Variability	Channel Alteration	Sediment Deposition	Channel Sinuosity	Channel Flow Status	Bank Vegetative Cover	Bank Stability	Riparian Vegetative Zone Width	
STREAM	* DESIGNATION	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	SCORE	MEAN TOTAL SCORE
HINDS CREEK	RIFFLE/RUN	15	13	10	18	9	10	16	11	10	11	123
COVE CREEK	RIFFLE/RUN	9	13	13	18	11	12	11	17	13	14	131
TITUS CREEK	RIFFLE/RUN	18	15	8	14	9	16	15	17	15	12	139
SINKING CREEK	RIFFLE/RUN	11	13	8	16	9	13	17	15	15	9	126
BAKER CREEK	GLIDE/POOL	10	8	13	18	8	15	16	14	9	12	121
LIT. BAKER CREEK	RIFFLE/RUN	10	14	7	14	8	15	17	14	14	9	122
NINEMILE CREEK	GLIDE/POOL	11	13	12	17	11	18	16	14	9	8	129
CLOYD CREEK	RIFFLE/RUN	14	10	9	15	7	11	16	12	11	4	109
EAST FORK	RIFFLE/RUN	13	11	9	13	8	12	15	17	13	13	124
DUNN CREEK	RIFFLE/RUN	14	16	13	14	12	13	15	14	15	10	136
WILHITE CREEK	RIFFLE/RUN	14	17	14	13	9	16	15	11	13	7	129
WATAUGA RIVER	RIFFLE/RUN	17	15	13	20	10	15	14	19	15	18	156
STONY FORK	RIFFLE/RUN	14	16	11	16	8	17	12	13	13	13	133

* Streams designated as riffle/run or glide/pool were evaluated based on the specific criteria for that habitat type.

APPENDIX F

Visual-Based Habitat Assessment Forms Used to Evaluate Stream Habitat during 1996

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 ____

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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

Barbour and Stribling, Visual-Based Habitat Assessment

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 ____

Barbour and Stribling, Visual-Based Habitat Assessment

APPENDIX G

1996 Summary of Strategic Plan Activities

1996 SUMMARY OF 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	13
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	25
Locations for potential land purchases or leases:	NO	