REGION IV STREAM FISHERY DATA COLLECTION REPORT

1994

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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 eighth 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 streams included in this report were sampled in response to a request by TWRA's Environmental Services Division. Many surface coal mining permits are currently up for re-licensing that will target areas in two east Tennessee counties (Campbell and Claiborne). Thus, our primary objectives for the surveys were to gather baseline data and to assess the impacts of ongoing or historical surface mining on the biotic structure of streams in this region of east Tennessee.

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. 94-4. A total of 27 streams were sampled and are included in this report. Stream surveys were conducted from June to November, 1994. Thirty-two fish samples and 28 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 reduce the probability of collecting transient species. In larger streams (e.g., Clear Fork, Hickory Creek) where an accurate evaluation of watershed conditions could not be made with one site, multiple sites were surveyed along the length of the stream. Sample lengths ranged from approximately 300 ft to 1,000 ft and included all habitat types characteristic to the survey reach. Sampling locations were delineated in the field on 7.5 min topographical maps and then digitally re-created using a commercially available software package. These maps have been included in each stream account and include the Tennessee Aquatic Database System (TADS) river reach number

and quadrangle map coordinates. Map coordinates were obtained with a Motorola Traxar handheld GPS unit.

WATERSHED ANALYSIS

Watershed size and/or stream order has historically been used to create relationships for determining maximum expected species richness in a given stream when species richness for a number of sites are plotted for against watershed areas (Fausch et al. 1984). We chose to use watershed area (mi^2) to develop our relationships as this variable has been shown to be a more reliable variable for predicting maximum species richness (Charles Saylor, Tennessee Valley Authority, personal communication). Watershed areas (the area upstream of the survey site) were determined by digitizing delineated watershed boundaries from USGS 1:24,000 scale maps. A GTCO Digipad in combination with the Earth Retrieval Data Analysis System (ERDAS) software were used to produce watershed area measurements for the 32 fish sample sites.

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 boat) and seining techniques. Typically, a 10 or 15 x 4 foot seine was used to make hauls in shallow pool and run areas in smaller

streams (< 20 ft mean width). In larger streams, a 20 x 4 ft seine was used. Riffle and deeper run habitats were sampled with a seine in conjunction with a backpack electrofishing unit (100-600 VAC). An area approximating the length of the seine^2 (i.e., 10' x 10') 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 deeper pool areas of some of the larger streams we used a boat mounted electrofishing unit (AC) to collect fish. Timed (10-min duration) runs were performed throughout the pool areas, giving equal effort to midstream and shoreline habitats. In both cases (seining or shocking) an estimate of area (ft^2) covered on each pass was calculated. Fish collections were made in all habitat types within the selected survey reach. Collections were made repeatedly for each habitat type until no new species was collected for three consecutive samples for each habitat type. All fish collected from each sample were enumerated and in the case of game fish, lengths and weights obtained after being anesthetized with MS-222. Anomalies (e.g., parasites, deformities, eroded fins, lesions, or tumors) were noted along with occurrences of hybridization. Young-of-the-year (YOY) fish were not included in the IBI scoring, however, their occurrence was noted. After processing, the captured fish were either held in captivity or released into

the stream where they could not be recaptured. 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 1994 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).

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. Benthic collection efforts were timed samples which averaged 1.6 person hours per sample. Taxa richness and relative abundance are the primary considerations of this type of sampling. Taxa richness reflects the health of the benthic community and biological impairment is reflected in the absence of pollution sensitive taxa such as Ephemeroptera, Plecoptera, and Trichoptera.

Large particles and debris were picked from the samples and discarded in the field. The remaining sample was preserved in 50% isopropanol and later sorted in the laboratory. Organisms were enumerated and attempts were

made to identify specimens to species level when possible. Many were identified to genus, and most were at least identified to family. Dr. David A. Etnier (UTK), examined problematic specimens and either made the determination or confirmed our identifications. Comparisons with identified specimens in our aquatic invertebrate collection were also useful in making determinations. For the most part, nomenclature of aquatic insects used in this report follows Brigham et al. (1982) and Louton (1982). Names of stoneflies (Plecoptera) are after Stewart and Stark (1988), from which many of the determinations were made. Benthic results are presented in tabular form with each stream account. Crayfish collected from IBI samples during 1994 are reported in Appendix D.

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), A Distributional Atlas of Kentucky Fishes (Burr and Warren 1986), various TWRA Annual Reports and unpublished data] to establish historical and more recent accounts of fishes expected to occur in the Clear Fork drainage. Furthermore, we consulted with Charles Saylor of TVA who aided us in establishing criteria and creating maximum expected species list for the Clear Fork drainage. Additional assistance in developing an expected species

list was received from Dr. David A. Etnier at UTK. Scoring criteria for the twelve metrics were modified according to wartershed size. Watesherds draining less than 5 mi^2 were assigned different scoring criteria than those draining greater areas. This was done do accommodate the inherent problems encountered when sampling smaller streams (e.g., lower catch rates and species richness) After calculating a final score, an integrity class was assigned to the stream based on that score. With only slight modifications to the scoring ranges, 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 abundances 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, in damage, and other anomalies regular.
	No fish	Repeated sampling finds no fish.

Benthic data collected for the Clear Fork drainage was also subjected to a similar type of biotic index that rates stream condition based on the EPT taxa present. The North Carolina Division of Environmental Management (NCDEM) has

developed bioclassification criteria for EPT taxa richness values. This method of evaluation is probably the simplest data analysis procedure, however, it does give an indication of water quality degradation as more sensitive EPT taxa are eliminated as stream conditions deteriorate (NCDEM 1995). The criteria for assigning bioclassifications to EPT taxa richness as described by the NCDEM (1995) are as follows:

	Ecoregion		
Bioclassification	**Mountain**	**Piedmont**	**Coastal**
Excellent	> 41	> 31	> 27
Good	32-41	24-31	21-27
Good-Fair	22-31	16-23	14-20
Fair	12-21	8-15	7-13
Poor	0-11	0-7	0-6

Given that the Mountain ecoregion criteria were developed for the Blue Ridge Region of western North Carolina and eastern Tennessee we used the Piedmont criteria to assign our bioclassifications. These criteria were expected to most closely reflect ranges that would be observed in the Clear Fork drainage.

STREAM ACCOUNTS

Capuchin Creek

One IBI fishery survey was conducted on Capuchin Creek in June 1994:

Location and Length - Tributary to the Cumberland River. The sample area was located approximately 0.5 mi downstream of the Trammel Branch-Capuchin Creek confluence and about 0.2 mi south of the state line. The sample length was approximately 500 ft and was sampled on 22 June 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 125 VAC and 10 and 20 ft seines.

Water Quality - (See physicochemical and 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 assess the relative health of the stream and to develop a fish species diversity list for TADS. The Agency did conduct a limited survey of this stream in 1991 (Bivens et al. 1992). The survey focused specifically on collecting the subspecies of johnny darter *(Etheostoma nigrum susanae)* reported from Capuchin Creek (O'Bara 1988).

In all, we collected a total of 313 fish representing 13 species. Four game species were collected from this site which included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, longear sunfish *(L. megalotis)*, and the spotted bass *(Micropterus punctulatus)*. The redbreast sunfish and the longear sunfish were the most abundant of the game fish collected. One nongame and eight forage species were also collected from this site. Three of the forage species collected have been listed in need of management by the state. The rosyface shiner *(Notropis r. rubellus)* was the most abundant of the three followed by the arrow darter *(Etheostoma sagitta)* and the emerald darter *(E. baileyi)*. As with the sample in 1991, we did not encounter the johnny darter during our survey effort. All other species collected were the same with the exception of the logperch which was collected in 1991 but not in 1994.

An additional qualitative fish sample on upper Capuchin Creek in Scott Co. on 24 June 1994 did produce three specimens of the blackside dace *(Phoxinus cumberlandensis)*. This was not a new record for this creek, however, it did

indicate that there is a still is a viable population in this stream.

Our Index of Biotic Integrity analysis revealed that this stream was in "fair" condition based on an IBI score of 44. All of the metrics with the exception of the catch rate metric scored average or better. The catch rate for this stream was substantially lower than what was typically observed for other streams of this size. This may indicate that there is some type of degradation that is depressing the fish populations in this stream. There are several strip mines scattered throughout the watershed that this could be attributed.

Benthic macroinvertebrates collected at this site included Baetidae, Caenidae, Ephemerellidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Perlidae stoneflies, and Hydropsychidae, Leptoceridae, Limnephilidae, Philopotamidae, and Polycentropodidae caddisflies. Coleopterans collected at this site included representatives from the families Dryopidae, Ditiscidae, Elmidae, and Psephenidae. Ephemeropterans accounted for 49.4% of the total sample whereas trichopterans and plecopterans only accounted for 8.0% and 2.0%, respectively. Dipterans made up 12.9% and coleopterans 15.7% of the total number of organisms collected. Overall, a total of 41 taxa was collected with 18 being EPT taxa. Based on the EPT value the bioclassification assigned to this reach was "good-fair".

Management Recommendations:

1. Any action that can be taken to abate non-point source pollution would be beneficial to this stream.

2. Further investigations regarding the subspecies of johnny darter should be conducted. The status of this species is under review and is being considered as a candidate for protection under the Endangered Species Act.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CAPUCHIN CREEK
WATERSHED	CUMBERLAND RIVER
SITE	0.2 MI S. OF STATE LINE
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363522N-841349W
REACH	05130101-10.0
LENGTH	~ 500 FT
AREA	27.8 SQ. MI.
ELEVATION	1015 FT
DATE	6-22-94
TIME	1040

COLLECTOR(S)

RICK D. BIVENS, DWAIN BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 70

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	10	20	40	20	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5		70	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 %	40 %	30 %

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 4.1 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY; HOT & HUMID
AIR TEMP. 81 F @ 1040

10. PAST WEATHER (last 24 hrs)

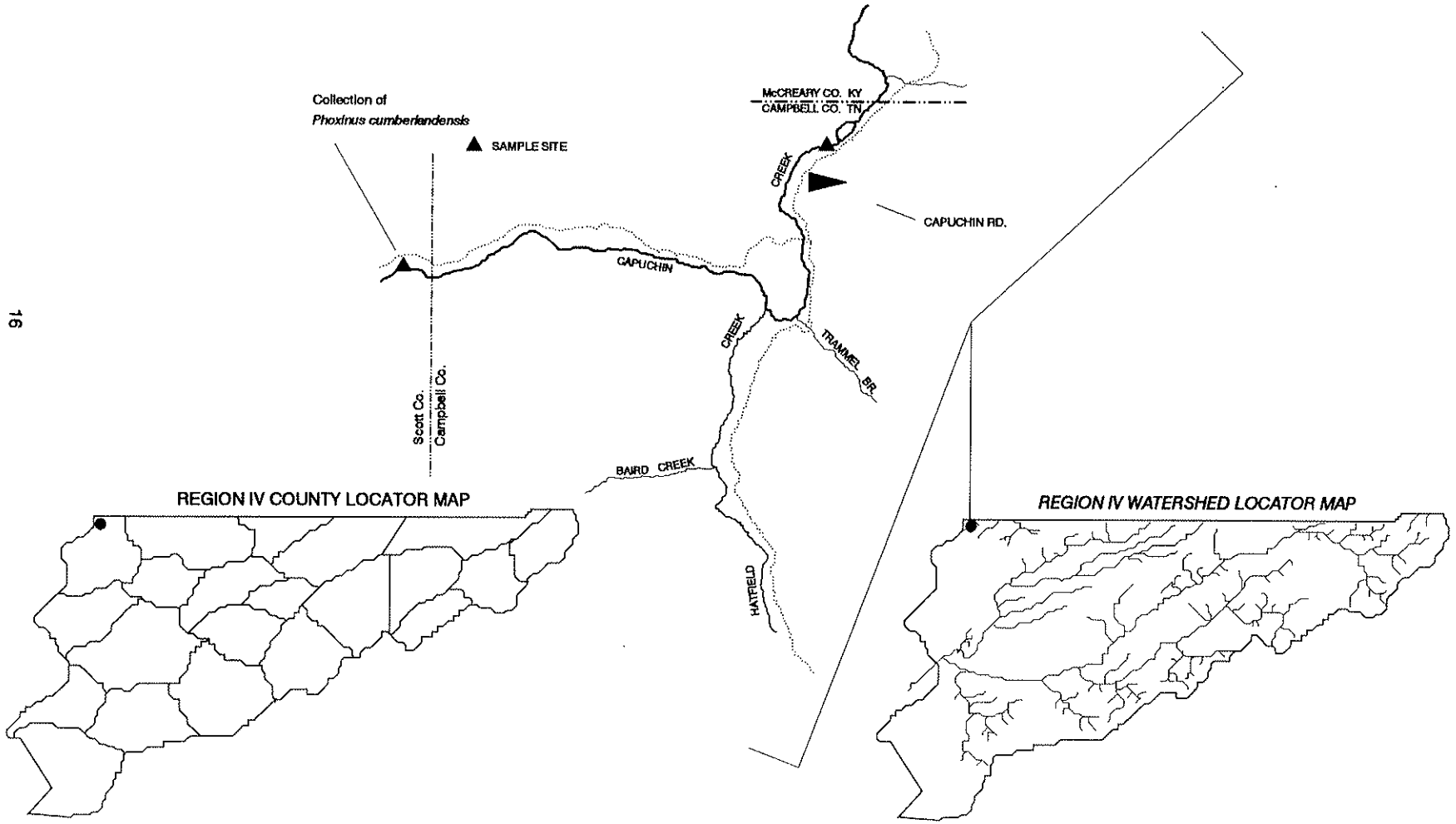
SUNNY; HOT AND HUMID
SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	74 F	325	8.4	95.7

12. COMMENTS:

STATION LOCATED ~ 0.5 MI DOWNSTREAM OF TRAMMEL BRANCH-CAPUCHIN CK CONFLUENCE (0.2 MI S. OF STATE LINE). WATER CLARITY GOOD. HIGH OCCURENCE OF RESIDENTIAL REFUSE ALONG STREAM BANKS.



CAPUCHIN CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' & 20' SEINE AND ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	4		
Campostoma anomalum	45	11		
Etheostoma baileyi	394	3		
Etheostoma kennicotti	418	20		
Etheostoma sagitta	433	21		
Hypentelium nigricans	207	9		
Lepomis auritus	346	19		
Lepomis megalotis	353	11		
Micropterus punctulatus	363	7		
Notropis r. rubellus	131	177		
Percina maculata	470	3		
Pimephales notatus	176	16		
Semotilus atromaculatus	188	12		
	SUM:	313		

11,108

INDEX OF BITOIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<8	8-16	>16	25	12	3
NUMBER OF DARTER SP.	<2	2-4	>4	7	4	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	4	2	3
NUMBER OF SUCKER SP.	<1	1	>1	2	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		3.8	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		5.1	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		71.6	5
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		3.5	3
CATCH RATE	<16	16-32	>32		8.4	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		4.5	3
						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**

CAPUCHIN CREEK BENTHIC DATA
FIELD COLLECTION # 552
EFFORT = 3.0 PERSON HOURS

TAXA RICHNESS = 41
EPT TAXA RICHNESS = 18
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				15.7
	Dryopidae	*Helichus* adults	22	
	DYtiscidae	*Hydroporus* adults	4	
	Elmidae	*Dubiraphia* adults	3	
		Optioservus adults	9	
	Psephenidae	*Psephenus herricki* adult	1	
DIPTERA				12.9
	Athericidae	*Atherix lantha*	18	
	Chironomidae		8	
	Dixidae	*Dixella*	1	
	Simuliidae		2	
	Tipulidae	*Tipula*	3	
EPHEMEROPTERA				49.4
	Baetidae	*Baetis*	5	
	Caenidae	*Caenis*	1	
	Ephemerellidae	*Eurylophella*	3	
	Ephemeridae	*Ephemera*	3	
		Hexagenia	1	
	Heptageniidae	*Heptagenia*	3	
		Stenacron sp.	2	
		Stenonema vicarium	37	
	Oligoneuriidae	*Isonychia*	68	
HEMIPTERA				1.6
	Gerridae	*Gerris conformis*	3	
		Trepobates nymph	1	
MEGALOPTERA				0.8
	Corydalidae	*Corydalus cornutus*	2	
ODONATA				9.6
	Aeshnidae	*Basiaeshna janata*	1	
		Boyeria grafiana	1	
		B. vinosa	1	
	Calopterygidae	*Calopteryx*	1	
	Coenagrionidae	*Argia*	2	
		Enallagma	3	
	Corduliidae	*Helocordulia uhleri*	2	
	Gomphidae	*Gomphus lividus*	5	
		Lanthus early instar	1	
	Macromiidae	*Macromia*	7	
PLECOPTERA				2
	Perlidae	*Acroneuria* early instars	2	
		Perlesta	3	
TRICHOPTERA				8
	Hydropsychidae	*Ceratopsyche sparna*	3	
		Cheumatopsyche	10	
		Hydropsyche dicantha	1	
	Leptoceridae	*Triaenodes*	1	
	Limnephilidae	*Pycnopsyche*	3	
	Philopotamidae	*Chimera*	1	
	Polycentropodidae	*Phylocentropus*	1	
		TOTAL	249	

Trammel Branch

One IBI fishery survey was conducted on Trammel Branch in June 1994:

Location and Length - Tributary to Capuchin Creek (Cumberland River). The sample area was located at the Capuchin Road Crossing. Sampling was conducted upstream and downstream of the road crossing. Stream sample length was approximately 1,200 ft and was sampled on 23 June 1994.

Sampling Methodology - The site was sampled with a 10 ft seine and one backpack electrofishing unit operating at 250 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - As with other surveys in this region, we were interested in assessing stream health and developing a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

We collected a total of 132 fish representing five species. No game fish were collected in our sample. One non-game and four forage species were collected. These included white sucker *(Catostomus commersoni)*, stripetail darter *(Etheostoma kennicotti)*, arrow darter *(E. sagitta)*, blackside dace *(Phoxinus cumberlandensis)*, and creek chub *(Semotilus atromaculatus)*.

Results of our survey were able to validate previous collections of blackside dace from this stream (TVA unpublished data). Sixteen blackside dace were collected below Capuchin Road. Extensive sampling upstream of the road crossing did not locate any dace. Apparently, any existing population upstream of the road has been eliminated (possibly from coal mining) and the presence of a culvert with a vertical drop of approximately 3 ft which has probably prevented any dace from recolonizing the upstream reaches. The blackside dace we collected were most abundant in pool habitat with depths greater than 2 ft.

The Index of Biotic Integrity score for this stream was 36. This corresponds to an integrity classification of "poor to fair". This is not surprising as only half of the native species expected to occur in this stream were found. Other factors that contributed to this low score were the

high percentage of tolerant fish species in the sample, the absence of piscivorous species, and the relatively low catch rate. All of these factors are typically associated with degraded stream conditions. Based on conversations with local residents, the headwaters of Trammel Branch are in close proximity to an abandoned strip mine. Drainage from this mine is probably still impacting this stream and ultimately regulating its recovery.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Heptageniidae, and Leptophlebiidae mayflies, Leuctridae, Peltoperlidae, Perlidae, and Perlodidae stoneflies, Glossosomatidae, Hydropsychidae, Limnephilidae, and Uenoidae caddisflies, and Dryopidae, Elmidae, and Psephenidae beetles. Coleopterans contributed the highest percentage (33.1%) to our sample while plecopterans were the second most dominant group comprising 20.7% of the sample. Ephemeropterans and trichopterans contributed 16.0% and 14.2%, respectively. Based on the EPT taxa richness, this stream reach received a bioclassification of "good-fair".

Management Recommendations:

1. Because this stream does contain a population of the federally threatened blackside dace, watershed protection should be a top priority. Any actions that would mitigate non-point source pollution would be beneficial to this stream.

2. It may be benficial to move some of the blackside dace upstream as this area appeared to have suitable habitat.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	TRAMMEL BRANCH
WATERSHED	CUMBERLAND RIVER
SITE	CAPUCHIN RD. X-ING
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363442N-841355W
REACH	05130101-
LENGTH	~ 1200 FT
AREA	1.53 SQ. MI.
ELEVATION	1040 FT
DATE	6-23-94
TIME	0940

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND DWAIN BIVENS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	5	50	30	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		10	40	40	10	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 90 %

8. FLOW (CFS) 1.1 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY AND HUMID
AIR TEMP. 82 F @ 0950

10. PAST WEATHER (last 24 hrs)

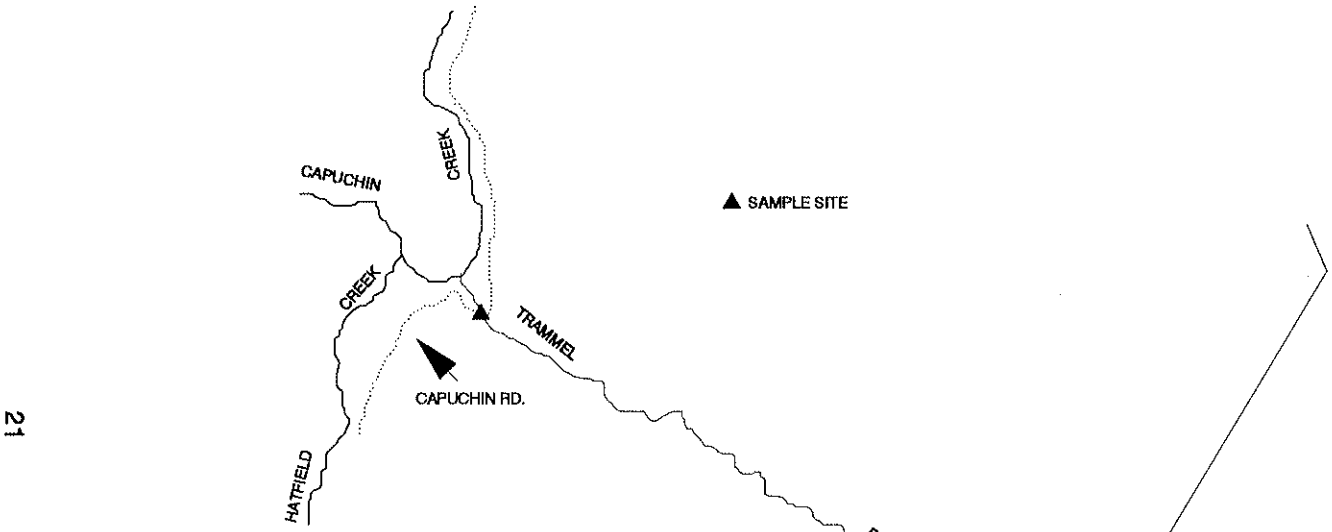
PT. CLOUDY W/ SCATTERED T-STORMS

11. WATER QUALITY

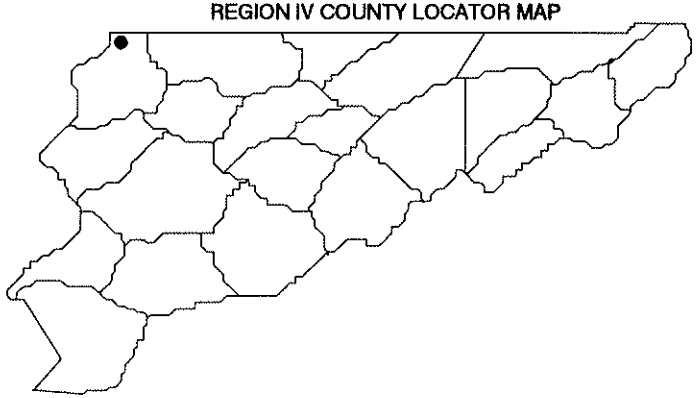
pH	TEMP.	COND.	D.O.	% SAT.
7.0	70 F	55	9.4	100

12. COMMENTS:

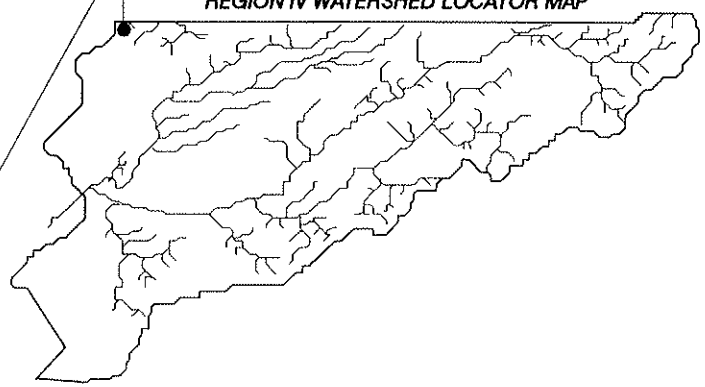
SAMPLE STATION LOCATED @ CAPUCHIN RD. CROSSING. SAMPLED UPSTREAM AND DOWNSTREAM OF ROAD CROSSING. WATER TURBID DUE TO RECENT RAIN.



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



TRAMMEL BRANCH FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT @ 250 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Catostomus commersoni	195	4		
Etheostoma kennicotti	418	8		
Etheostoma sagitta	433	8		
Phoxinus cumberlandensis	166	16		
Semotilus atromaculatus	188	96		
	SUM:	132		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<3	3-6	>6	10	5	3
NUMBER OF DARTER SP.	<2	2	>2	3	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	2	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		75.8	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		3	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		12.1	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		8.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
						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**

TRAMMEL BRANCH BENTHIC DATA
FIELD COLLECTION # 553
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 30
EPT TAXA RICHNESS = 17
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.6
	Oligochaeta		1	
COLEOPTERA				33.1
	Dryopidae	*Helichus* adults	35	
	Elmidae	*Optioservus* larva, adults	6	
	Psephenidae	*Psephenus herricki*	15	
DIPTERA				7.1
	Chironomidae		1	
	Tipulidae	*Hexatoma*	9	
		Tipula	2	
EPHEMEROPTERA				16
	Baetidae	*Baetis*	1	
	Ephemerellidae	*Drunella*	3	
		Eurylophella	1	
	Heptageniidae	*Heptagenia*	17	
		Stenonema	2	
	Leptophlebiidae	*Habrophleboides*	3	
HEMIPTERA				4.1
	Gerridae	*Gerris remigis*	6	
		Trepobates nymph	1	
ISOPODA				2.4
	Asellidae	*Lirceus*	4	
MEGALOPTERA				0.6
	Corydalidae	*Nigronia sp.* early instar	1	
ODONATA				1.2
	Aeshnidae	*Boyeria vinosa*	1	
	Cordulegastridae	*Cordulegaster maculata*	1	
PLECOPTERA				20.7
	Leuctridae	*Leuctra*	1	
	Peltoperlidae	*Peltoperla*	11	
	Perlidae	*Acroneuria carolinensis*	13	
		Perlesta	4	
	Perlodidae	*Isoperla sp.*	1	
		Malirekus/Yugus	5	
TRICHOPTERA				14.2
	Glossosomatidae	*Glossosoma*	1	
	Hydropsychidae	*Ceratopsyche sparna*	8	
		Cheumatopsyche	6	
	Limnephilidae	*Pycnopsyche*	4	
	Uenoidae	*Neophylax*	5	
		TOTAL	**169**	

Hatfield Creek

One IBI fishery survey was conducted on Hatfield Creek in June 1994:

Location and Length - Tributary to the Capuchin Creek (Cumberland River). The sample area was located approximately 0.3 mi by road downstream of the Hatfield-Baird Creek confluence. The sample reach was approximately 300 ft in length and was sampled on 24 June 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 250 VAC and a 10 ft seine.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - As with other streams in this region of east Tennessee, we were interested in assessing stream health based on the fish and benthic community present. Furthermore, we wanted to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

We collected a total of 212 fish representing 13 species. Only two game species were collected from this site. These were the rock bass *(Ambloplites rupestris)* and the redbreast sunfish *(Lepomis auritus)*. Two non-game species and nine forage species were also collected from this site. These included white sucker *(Catostomus commersoni)*, northern hog sucker *(Hypentelium nigricans)* central stoneroller *(Campostoma anomalum)*, emerald darter *(Etheostoma baileyi)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, rosyface shiner *(Notropis r. rubellus)*, blackside darter *(Percina maculata)*, blackside dace *(Phoxinus cumberlandensis)* [previously collected from this stream (TVA unpublished data)], bluntnose minnow *(Pimephales notatus)*, and creek chub *(Semotilus atromacualtus)*. Of special interest was the collection of the federally threatened blackside dace along with three species deemed in need of management by the state (arrow darter, emerald darter, and rosyface shiner).

This stream was assigned a bitoic integrity classification of "fair" based on its Index of Biotic Integrity score of 42. The most notable observation for a stream this size was the relative absence of piscivores.

This is indicative of a stressed condition as top predators become less frequent as stream quality degrades. Based on our observations it did appear this stream was transporting substantial amounts of sediment as many rocks in the pools were covered with a layer of fine silt.

An additional fish collection was made in the headwaters of Hatfield Creek near the confluence of Sawmill Hollow Branch. This additional sample focused on locating populations of blackside dace. Limited sampling in upper Hatfield Creek and Sawmill Branch produced only speciemens of creek chub.

Benthic macroinvertebrates collected in our sample included Baetidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Leuctridae, Peltoperlidae, Perlidae, and Perlodidae stoneflies, and Hydropsychidae, Philopotamidae, and Uenoidae caddisflies. Coleopterns collected included Dryopidae and Psephenidae beetles. Trichopterans made up the highest percentage (31.7) of the sample followed by dipterans (28.2%) and ephemeropterans (20.3%). Plecopterans only accounted for 6.2% of the total. A total of 28 taxa was collected with 16 being EPT taxa. Based on this EPT taxa richness value, this reach of Hatfield Creek received a bioclassification rating of "good-fair".

Management Recommendations:

1. Watershed protection should be a high priority as this stream currently contains a population of blackside dace along with other species of special concern (arrow darter, emerald darter, and rosyface shiner). Any actions to reclaim abandoned strip mines in the watershed would be of benefit.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	HATFIELD CREEK
WATERSHED	CUMBERLAND RIVER
SITE	JUST BELOW BAIRD CK
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363426N-841419W
REACH	05130101-
LENGTH	~ 300 FT
AREA	8.57 SQ. MI.
ELEVATION	1080 FT
DATE	6-24-94
TIME	0930

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER
CARL E. WILLIAMS AND DWAIN BIVENS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS: 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		5	30	40	25	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER: 30 %

8. FLOW (CFS): 6.6 COMPARED TO NORMAL

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

OVERCAST W/ LIGHT DRIZZLE
AIR TEMP. 75 F @ 0940

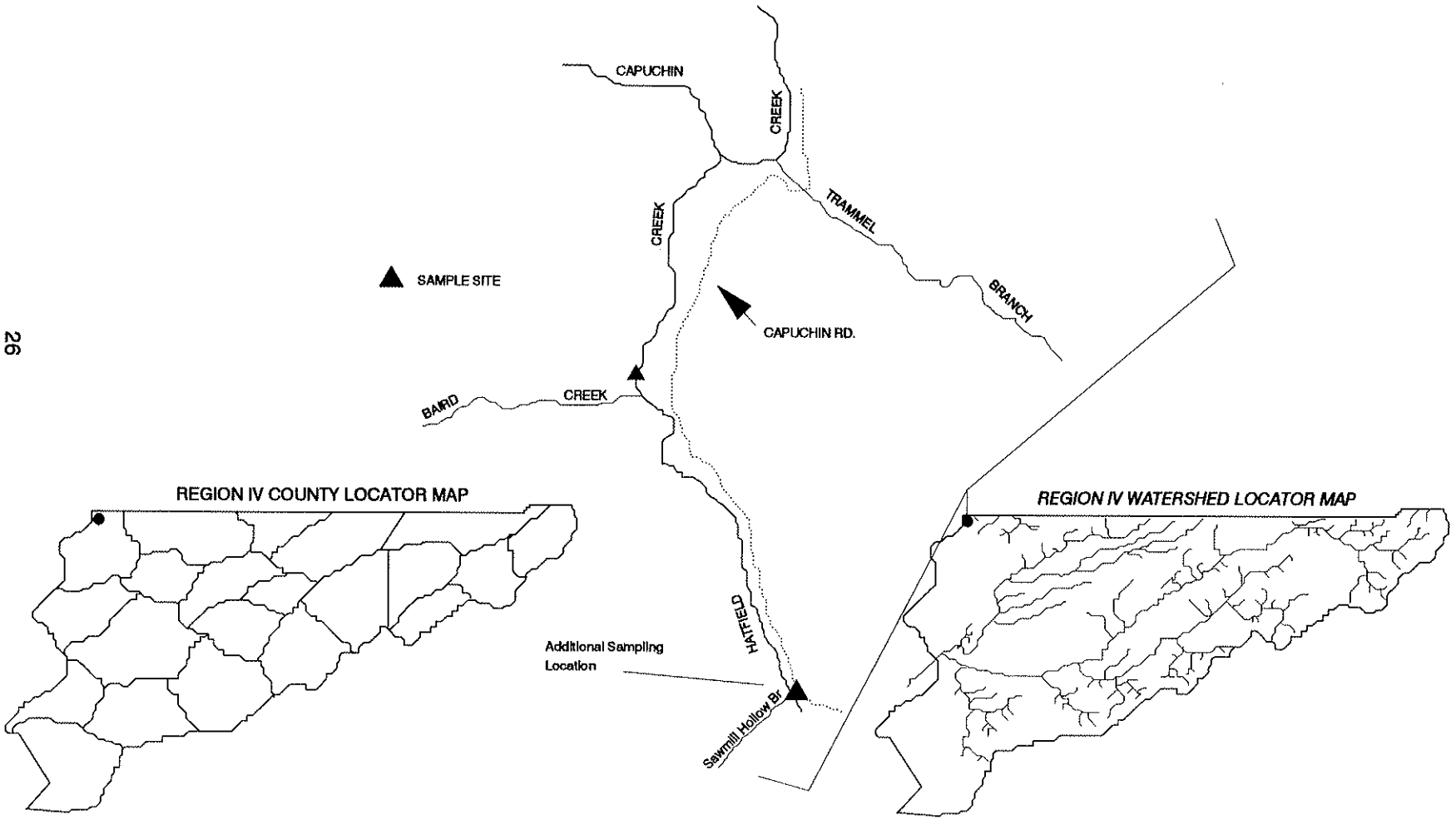
10. PAST WEATHER (last 24 hrs)

PT. CLOUDY; HOT AND HUMID
SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	71 F	255	9.1	99.0

12. COMMENTS:
SAMPLE AREA WAS LOCATED 0.3 MI DOWNSTREAM OF HATFIELD BAIRD CREEK CONFLUENCE.
STREAM APPEARED TO BE TRANSPORTING HEAVY SEDIMENT LOADS.



HATFIELD CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 250 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	1		
Campostoma anomalum	45	47		
Catostomus commersoni	195	8		
Etheostoma baileyi	394	15		
Etheostoma kennicotti	418	39		
Etheostoma sagitta	433	7		
Hypentelium nigricans	207	11		
Lepomis auritus	346	5		
Notropis r. rubellus	131	38		
Percina maculata	470	1		
Phoxinus cumberlandensis	166	7		
Pimephales notatus	176	2		
Semotilus atromaculatus	188	31		
	SUM:	212		

3688

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<6	6-12	>12	19	12	3
NUMBER OF DARTER SP.	<2	2-3	>3	5	4	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	1	1
NUMBER OF SUCKER SP.	<1	1	>1	2	2	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		18.4	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		4.7	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		47.2	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		0.5	1
CATCH RATE	<16	16-32	>32		17.1	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		1.9	5
						42 **FAIR**

IBI RANGE:	**0**	**12-23**	**28-35**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**	**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

HATFIELD CREEK BENTHIC DATA
FIELD COLLECTION # 555
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 28
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.4
	Oligochaeta		1	
COLEOPTERA				7
	Dryopidae	*Helichus* adults	15	
	Psephenidae	*Psephenus herricki* adult	1	
DIPTERA				28.2
	Athericidae	*Atherix lantha*	48	
	Chironomidae larvae, pupa		12	
	Tipulidae	*Tipula*	4	
EPHEMEROPTERA				20.3
	Baetidae	*Baetis*	11	
	Ephemeridae	*Ephemera*	1	
	Heptageniidae	*Heptagenia*	6	
		Stenacron	1	
		Stenonema	9	
		Stenonema vicarium	2	
	Oligoneuriidae	*Isonychia*	16	
HEMIPTERA				2.2
	Gerridae	*Gerris remigis*	5	
MEGALOPTERA				2.6
	Corydalidae	*Corydalis cornutus*	5	
	Sialidae	*Sialis*	1	
ODONATA				1.3
	Cordulegastridae	*Cordulegaster erronea*	1	
		C. maculata	1	
	Gomphidae	*Lanthus* early instar	1	
PLECOPTERA				6.2
	Leuctridae	*Leuctra*	1	
	Peltoperlidae	*Peltoperla*	8	
	Perlidae	*Acroneuria carolinensis*	2	
	Perlodidae	*Malirekus/Yugus*	3	
TRICHOPTERA				31.7
	Hydropsychidae	*Ceratopsyche bronta*	30	
		C. sparna	18	
		C. slossonae	6	
		Cheumatopsyche	11	
	Philopotamidae	*Chimara*	6	
	Uenoidae	*Neophylax*	1	
		TOTAL	**227**	

Baird Creek

One IBI fishery survey was conducted on Baird Creek in June 1994:

Location and Length - Tributary to Hatfield Creek (Capuchin Creek). The sample area was located approximately 400 ft upstream from the confluence of Baird Creek and Hatfield Creek. Sample length was approximately 400 ft. This site was sampled on 23 June 1994.

Sampling Methodology - The site was sampled with a 10 ft seine and one backpack electrofishing unit operating at 250 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - We conducted this survey primarily to assess stream health and to develop a fish species diversity list for TADS. No previous surveys of the stream have been conducted by the Agency.

Our survey included both electrofishing and seining samples which allowed us to capture 49 fish representing seven species. No game fish were collected in our sample, however, we did collect two non-game species and five forage species. These included white sucker *(Catostomus commersoni)*, northern hog sucker *(Hypentelium nigricans)*, central stoneroller *(Campostoma anomalum)*, stripetail darter *(Etheostoma kennicotti)*, arrow darter *(E. sagitta)*, blackside dace *(Phoxinus cumberlandensis)*, and creek chub *(Semotilus atromaculatus)*.

As indicated by our survey, a blackside dace population exists in this stream although it appears to be very weak. This population does represent a previously undocumented population. Based on our observation this stream was suffering from non-point source pollution as there was a thin coating of silt on the substrate.

The Index of Biotic Integrity indicated that this stream was in "poor to fair" condition. The high percentage of tolerant fish in our sampled coupled with the absence of *Lepomis* and *Micropterus* species had a substantial influence on the overall score. Additionally, the catch rate for our sample was lower than those typically observed for other streams of this size.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BAIRD CREEK
WATERSHED	CUMBERLAND RIVER
SITE	NEAR MOUTH
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363414N-841428W
REACH	05130101-
LENGTH	~ 400 FT
AREA	3.87 SQ. MI.
ELEVATION	1100 FT
DATE	6-23-94
TIME	1445

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND DWAIN BIVENS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	15	40	30	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		10	40	30	20	

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 40 %

8. FLOW (CFS) 1.1 COMPARED TO NORMAL

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

SUNNY; HOT AND HUMID
AIR TEMP. 86 F @ 1450

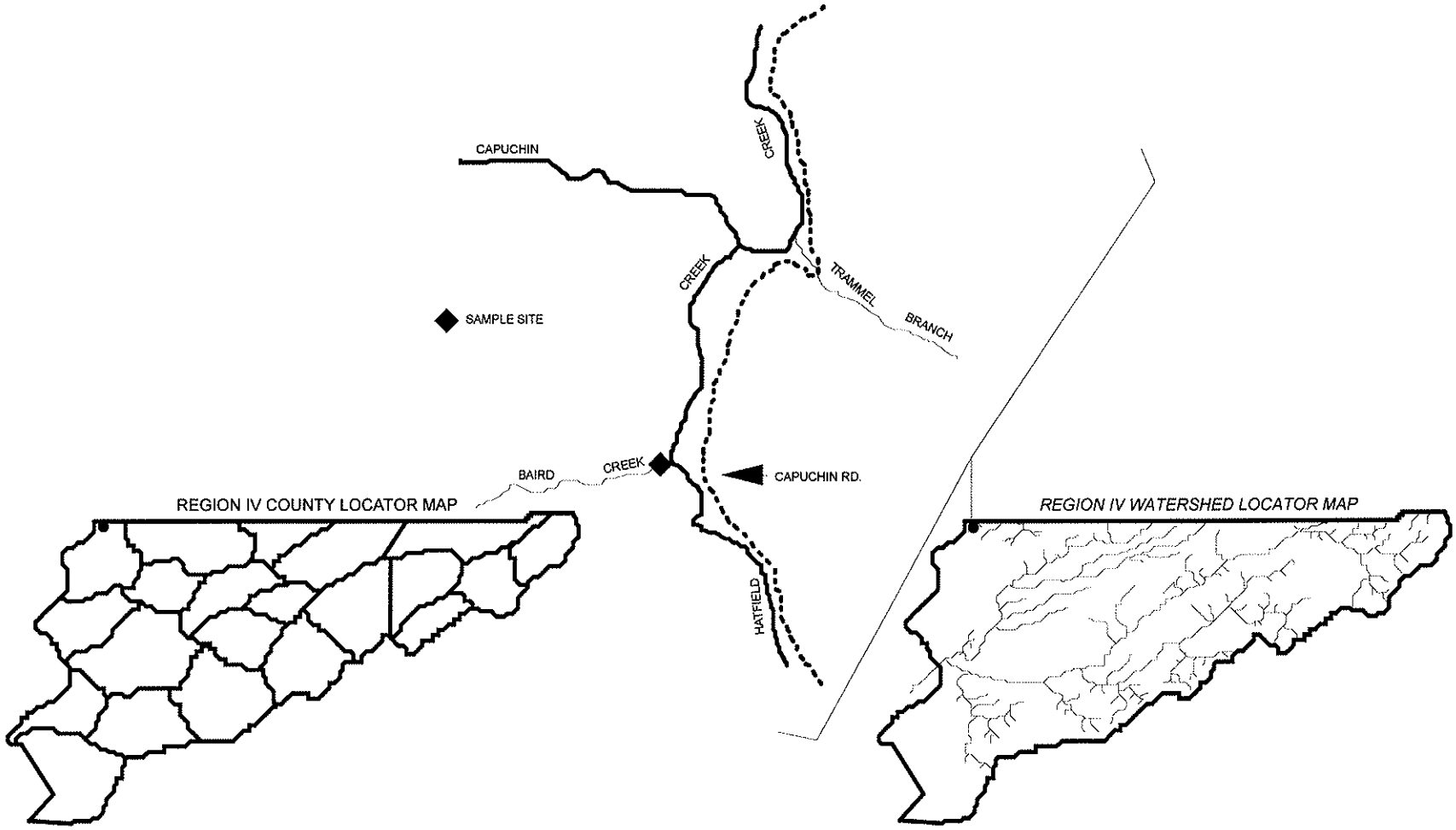
10. PAST WEATHER (last 24 hrs)

PT. CLOUDY; HOT AND HUMID
SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	73 F	220	9.6	108

12. COMMENTS:
SAMPLE STATION LOCATED ~ 400 FT UPSTREAM FROM MOUTH. WATER VERY TURBID DUE TO RECENT RAIN.



Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies, Leuctridae, Peltoperlidae, Perlidae, and Perlodidae stoneflies, and Glossosomatidae, Hydropsychidae, and Rhyacophilidae caddisflies. Beetles included members of the families Dryopidae, Elmidae, and Psephenidae. Trichopterans comprised the largest percentage of our sample contributing 30.6%. Ephemeropterans were the second most abundant group comprising 27.3% of the total sample. Plecopterans contributed 9.2% to the total sample while dipterans and coleopterans accounted for 13.1% and 11.5% of the sample. A total of 33 taxa was collected from this site of which 18 were EPT taxa. Based on the EPT taxa richness of this stream it was assigned a bioclassification rating of "good-fair".

Management Recommendations:

1. As with many streams in this region non-point source pollution seems to be impairing this stream. Any mitigation that would decrease sediment input into this stream would be beneficial.

BAIRD CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT @ 250 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	3		
Catostomus commersoni	195	3		
Etheostoma kennicotti	418	9		
Etheostoma sagitta	433	2		
Hypentelium nigricans	207	3		
Phoxinus cumberlandensis	166	2		
Semotilus atromacualtus	188	27		
	SUM:	49		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-8	>8	12	7	3
NUMBER OF DARTER SP.	<2	2	>2	4	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	2	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	2	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		61.2	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		6.1	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		22.4	3
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		9.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	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**

BAIRD CREEK BENTHIC DATA
FIELD COLLECTION # 554
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 33
EPT TAXA RICHNESS = 18
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.5
	Oligochaeta		1	
COLEOPTERA				11.5
	Dryopidae	*Helichus* adults	11	
	Elmidae	*Optioservus* adults	6	
	Psephenidae	*Psephenus herricki* larvae, adults	4	
DIPTERA				13.1
	Athericidae	*Atherix lantha*	15	
	Chironomidae larvae, pupa		4	
	Tabanidae	*Tabanus*	1	
	Tipulidae	*Antocha*	1	
		Hexatoma	1	
		Tipula	2	
EPHEMEROPTERA				27.3
	Baetidae	*Baetis*	9	
		Cetroptilum	1	
	Ephemerellidae	*Drunella*	22	
	Ephemeridae	*Ephemera*	5	
	Heptageniidae	*Hetptagenia*	6	
		Stenonema vicarium	4	
	Leptophlebiidae	*Paraleptophlebia*	2	
	Oligoneuriidae	*Isonychia*	1	
HEMIPTERA				8.2
	Gerridae	*Gerris remigis*	5	
	Veliidae	*Rhagovelia obesa* early instar	10	
MEGALOPTERA				0.5
	Corydalidae	*Corydalus cornutus*	1	
ODONATA				1.6
	Aeshnidae	*Boyeria vinosa*	2	
	Gomphidae	*Lanthus*	1	
PLECOPTERA				9.2
	Leuctridae	*Leuctra* early instar	1	
	Peltoperlidae	*Peltoperla*	2	
	Perlidae	*Acroneuria carolinensis*	12	
		Perlesta	1	
	Perlodidae	*Malirekus/ Yugus*	1	
TRICHOPTERA				30.6
	Glossosomatidae	*Glossosoma*	1	
	Hydropsychidae	*Ceratopsyche bronta*	6	
		C. sparna	29	
		Cheumatopsyche	19	
	Rhyacophilidae	*Rhyacophila sp. cf R. carolina*	1	
		TOTAL	**188**	

Clear Fork (Site 1)

This was one of three fishery surveys conducted on the Clear Fork in 1994:

Location and Length - Tributary to the Cumberland River. The sample area was located near the water pumping station for Jellico Stone Company near Highcliff. Sampling was both upstream and downstream of the pumping station. The sample area was approximately 1,500 ft in length and was sampled on 27 October 1994.

Sampling Methodology - The site was sampled with a 15 ft seine, one backpack electrofishing unit operating at 125 VAC, and one boat shocking unit operating at 240 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - This was one of three sites sampled on the mainstem of the Clear Fork. It was chosen as the most downstream site in order comprehensively evaluate watershed influences on stream health. We also wanted to develop a fish species diversity list for TADS. The only historical collection in close proximity to this site was a collection made by the Agrncy in 1990 (Bivens and Williams 1991). This collection was made upstream of our 1994 site, and was in close proximity to the mouth of Primroy Creek.

We collected a total of 1,191 fish representing 28 species. Ten game fish species were collected from this site. These included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, green sunfish *(L. cyanellus)*, warmouth *(L. gulosus)*, bluegill *(L. macrochirus)*, longear sunfish *(L. megalotis)*, smallmouth bass *(Micropterus dolomieu)*, spotted bass *(M. punctulatus)*, white crappie *(Pomoxis annularis)*, and walleye *(Stizostedion vitreum)*. Additionally, there was an impressive number (34) of channel catfish *(Ictalurus punctatus)* collected from this site. Our collection in 1994 compares quite well with the collection made in 1990. We collected a total of 28 species compared to a total of 25 collected in 1990. We did not collect largemouth bass *(Micropterus salmoides)*, white sucker *(Catostomus commersoni)*, or flathead catfish *(Pylodictus olivaris)* in 1994. Species collected in 1994 that were not collected in 1990 included brook silverside *(Labidesthes sicculus)*, spotfin shiner *(Cyprinella spiloptera)*, least brook lamprey *(Lampetra aepyptera)*, white

crappie *(Pomoxis annularis)*, walleye *(Stizostedion vitreum)*, and warmouth *(Lepomis gulosus)*. The most abundant species collected in our sample were the rainbow darter *(Etheostoma caeruleum)* and the rosyface shiner *(Notropis r. rubellus)*. Furthermore, the collection the the brook silverside represents a new record for this drainage.

Based on our Index of Biotic Integrity analysis this reach of the Clear Fork received a score of 52 which corresponds to a biotic integrity classification of "good". This designation indicated considerable improvement over the upper two sites which rated "fair" at the intermediate site and "very poor to poor" at the upper most site. This trend would indicate that the mainstem of the Clear Fork is exhibiting some recovery as it proceeds downstream through the watershed. The metrics that had the most negative influence on the overall score were the number of intolerant species collected, the relatively low percentage of piscivores in the sample, and the somewhat high occurrence of anomalies on the fish, particularly black grub.

Benthic macroinvertebrates from our sample included Baetidae, Heptageniidae, and Oligoneuriidae mayflies, Perlidae and Taeniopterygidae stoneflies, and Hydropsychidae, Leptoceridae, Philopotamidae, Phyrganeidae, Polycentropodidae, and Psychomyiidae caddisflies. Gastropods included Physidae and Pleuroceridae snails. Ephemeropterans contributed the highest percentage (34.4) to the overall sample. Trichopterans were the next most abundant group contributing 15.6% to the total sample. Plecopterans only contributed 5.8% to the total sample. Overall a total of 41 taxa was collected from this site with 17 being EPT taxa. Based on this EPT taxa richness value site received a bioclassification of "good-fair".

Of special interest was the collection of two speciemns of the rusty crayfish *(Orconectes rusticus)*. This species is not native to Tennessee and has been established by "bait bucket" introductions. The extent of of this species distribution is not well documented, however, it is known to have a detrimental effect on native species when population densities are high.

Management Recommendations:

1. The influence of coal mining and other development in this area has undoubtedly altered the fish community in the Clear Fork to an extent that may never be fully understood. Any action pertaining to watershed protection, particularly mining regulation and mine rehabilitation would be of great benefit to the watershed.

2. Since there is a substantial number of species in the Clear Fork drainage that are listed by the state and the U.S. Fish and Wildlife Service, protection and restoration of these species should be a priority.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CLEAR FORK (SITE 1)
WATERSHED	CUMBERLAND RIVER
SITE	@ JELLICO STONE CO.
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363443N-840429W
REACH	05130101-23.0
LENGTH	~ 0.3 MI
AREA	70.8 SQ. MI.
ELEVATION	1020 FT
DATE	10-27-94
TIME	1657

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND STEVE FRALEY

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 30 %

8. FLOW (CFS) 56.9 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

COOL AND SUNNY

10. PAST WEATHER (last 24 hrs)

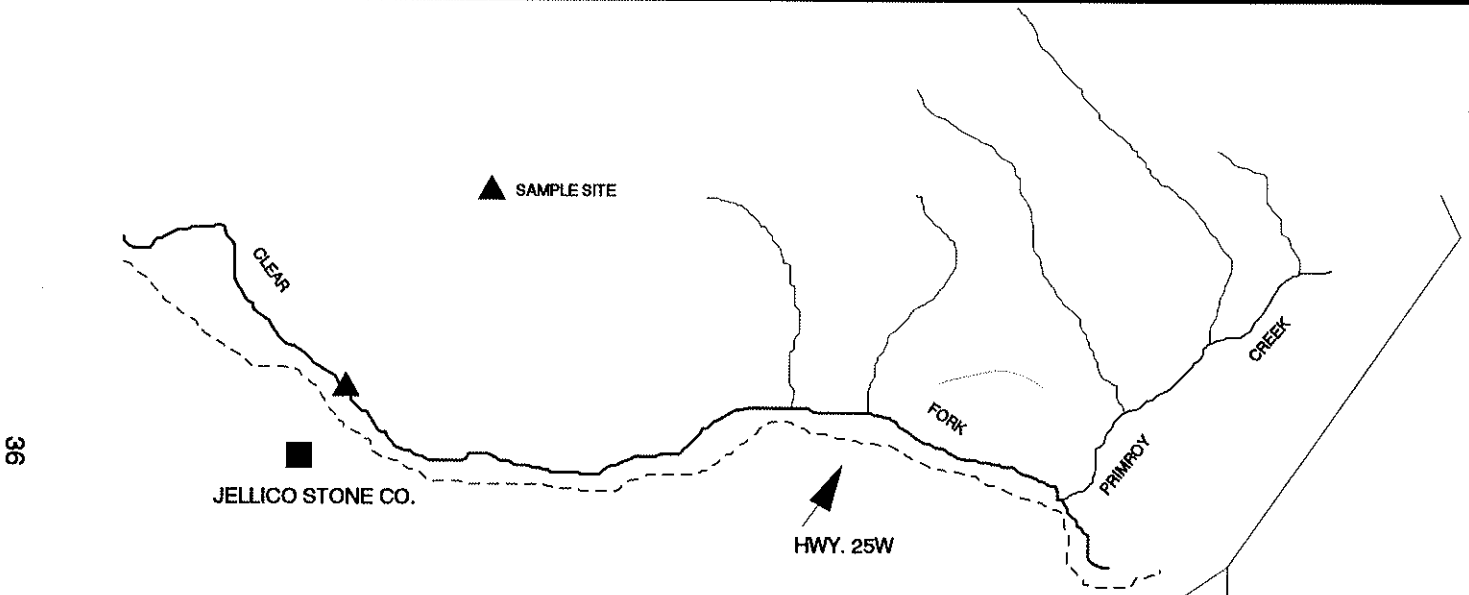
SAME AS ABOVE

11. WATER QUALITY

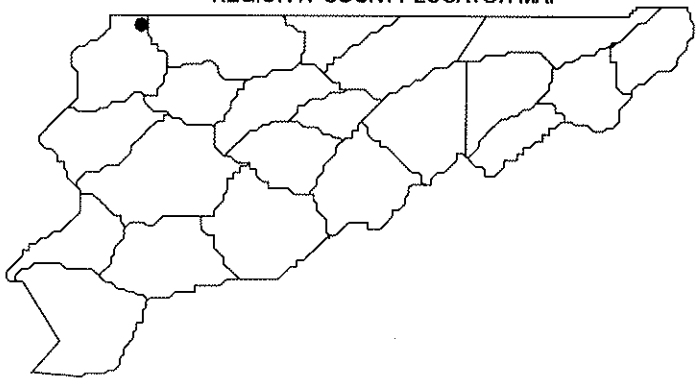
pH	TEMP.	COND.	D.O.	% SAT.
6.7	52 F	382	10.7	98.9

12. COMMENTS:

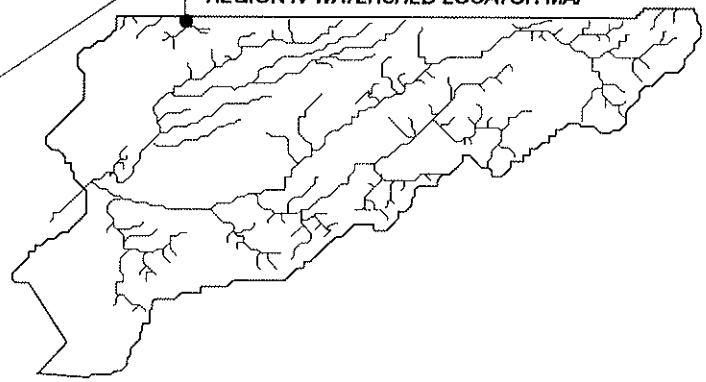
SAMPLING STATION FELL JUST ABOVE AND BELOW THE WATER PUMPING STATION FOR JELLICO STONE CO. COAL FINES PRESENT IN SUBSTRATE.



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



CLEAR FORK FISH DATA (SITE 1)

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15' SEINE, ONE BACKPACK UNIT @ 125
ONE BOAT UNIT OPERATING @ 240 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	12	4-7	1.85
Campostoma anomalum	45	35		
Cyprinella galactura	54	20		
Cyprinella spiloptera	57	24		
Etheostoma baileyi	394	10		
Etheostoma blennioides	398	6		
Ethesotoma caeruleum	401	290		
Etheostoma kennicotti	418	7		
Hypentelium nigricans	207	18		
Ictalurus punctatus	240	34	2-21	33.2
Labidesthes sicculus	312	1		
Lampetra aepyptera	8	1		
Lepomis auritus	346	6	1-5	0.22
Lepomis cyanellus	347	3	3-6	0.28
Lepomis gulosus	349	9	2-6	0.96
Lepomis macrochirus	351	24	2-6	1.15
Lepomis megalotis	353	74	2-5	2.85
Luxilus chrysocephalus	89	29		
Micropterus dolomieu	362	9	2-5	0.47
Micropterus punctulatus	363	21	1-8	2.23
Moxostoma erythrurum	225	19		
Notropis r. rubellus	131	434		
Notropis volucellus	140	3		
Percina caprodes	464	8		
Percina maculata	470	2		
Pimephales notatus	176	90		
Pomoxis annularis	371	1	7	0.18
Stizostedion vitreum	492	1	15	1.1

SUM:
1191

INDEX OF BIOTIC INTEGRITY (CLEAR FORK SITE 1)

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<12	12-24	>24	39	27	5	
NUMBER OF DARTER SP.	<3	3-5	>5	8	6	5	
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	5	5	
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3	
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3	
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		4.7	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		12.8	5	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		63.8	5	
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		3.7	3	
CATCH RATE	<8	8-16	>16		29.7	5	
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		4.9	3	
						52	**GOOD**
IBI RANGE:	**0**		**12-22**	**28-34**	**40-44**	**48-52**	**58-60**
STREAM DESIGNATION:	**NO FISH**		**VERY POOR**	**POOR**	**FAIR**	**GOOD**	**EXCELLENT**

CLEAR FORK (SITE 1) BENTHIC DATA
FIELD COLLECTION # 628
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 41
EPT TAXA RICHNESS = 17
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.4
	Oligochaeta		1	
COLEOPTERA				10.7
	Dryopidae	*Helichus* adults	13	
	Elmidae	*Dubiraphia* adults	2	
		Optioservus larvae	4	
	Gyrinidae	*Dineutus discolor*	1	
	Psephenidae	*Psephenus herricki*	4	
DIPTERA				0.9
	Chironomidae		2	
EPHEMEROPTERA				34.4
	Baetidae	*Baetis*	4	
	Heptageniidae	*Stenonema sp.*	8	
		Stenonema vicarium	11	
	Oligoneuriidae	*Isonychia*	54	
GASTROPODA				6.7
	Physidae	*Physa*	1	
	Pleuroceridae		14	
HEMIPTERA				1.3
	Gerridae	*Metrobates hesperius*	2	
	Veliidae	*Rhagovelia obesa*	1	
LEPIDOPTERA				2.2
	Pyralidae	*Petrophila*	5	
MEGALOPTERA				4.5
	Corydalidae	*Corydalis cornutus*	5	
		Nigronia serricornis	3	
	Sialidae	*Sialis*	2	
ODONATA				12.5
	Aeshnidae	*Basiaeshna janata*	2	
		Boyeria vinosa	12	
	Calopterygidae	*Calopteryx*	2	
	Coenagrionidae	*Enallagma*	5	
	Cordulidae		1	
	Gomphidae	*Gomphus lividus*	1	
		Progomphus obscurus	4	
		Stylurus sp.	1	
PELECYPODA				4.9
	Corbiculidae	*Corbicula fluminea*	11	
PLECOPTERA				5.8
	Perlidae	*Acroneuria abnormis*	11	
		Paragentina immarginata	1	
	Taeniopterygidae	*Taeniopteryx*	1	
TRICHOPTERA				15.6
	Hydropsychidae	*Ceratopsyche cheilonis*	1	
		C. morosa	2	
		C. sparna	1	
		Cheumatopsyche	6	
		Hydropsyche dicantha	16	
	Leptoceridae	*Triaenodes*	1	
	Philopotamidae	*Chimara*	4	
	Phryganeidae	*Ptilostomis*	1	
	Polycentropodidae	*Polycentropus*	1	
	Psychomyiidae	*Psychomyia*	2	
		TOTAL	**224**	

Clear Fork (Site 2)

This was one of three fishery surveys conducted on the Clear Fork in 1994:

Location and Length - Tributary to the Cumberland River. The sample area was located at Tracy Branch and extended below and above the confluence. Sample length was approximately 500 ft in length and was sampled on 17 June 1994.

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

Water Quality - (No water quality data collected)

Benthos Collection - (No benthic collections made)

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

Comments - This portion of the Clear Fork of the Cumberland River was one of three sites sampled during 1994. It was chosen as an intermediate site longitudinally to evaluate stream health and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this portion of the Clear Fork.

A total of 236 fish representing 16 species was collected from our sample. The only game fish collected in our sample were 11 green sunfish *(Lepomis cyanellus)* and two bluegill *(L. macrochirus)*. Eleven forage species and three non-game species were also collected in our sample. These included the central stoneroller *(Campostoma anomalum)*, silverjaw minnow *(Ericymba buccata)*, emerald darter *(Etheostoma baileyi)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, striped shiner *(Luxilus chrysocephalus)*, rosyface shiner *(Notropis r. rubellus)*, blackside darter *(Percina maculata)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinichthys atratulus)*, creek chub *(Semotilus atromaculatus)*, white sucker *(Catostomus commersoni)*, northern hog sucker *(Hypentelium nigricans)*, and golden redhorse *(Moxostoma erythrurum)*. the mos abundant species collected in our sample were the rosyface shiner and the central stoneroller.

Of special interest was the collection of one state threatened species (silverjaw minnow, 2 specimens preserved Cat. # 11.356) and three species deemed in need of management (emerald darter, arrow darter, and rosyface shiner) by TWRA (TWRA 1994). The finding of the silverjaw minnow was of particular significance, as this was the only

sample area in the Clear Fork drainage where this species was collected during 1994. A previous collection of this species in close proximity to our sample site was made by in 1991 (Etnier 1991).

Our Index of Biotic Integrity assessment revealed that this portion of the Clear Fork was in "fair" condition based on a score of 40. The apparent deterioration of the fish community in the portion of the Clear Fork was obvious as more tolerant forms exhibited strong relative abundances. Furthermore, the absence of top predators (i.e., *Micropterus*) was also indicative of degraded stream health.

Benthic macroinvertebrates were not collected from this site, however, it is highly probable that the benthic community would exhibit evidence of impact as several intense coal mining operations were ongoing just upstream of this site in Kentucky.

Management Recommendations:

1. The influence of coal mining and other development in this area has definitely altered the fish community in this reach of the Clear Fork. This warrants special attention as coal mining activities upstream will probably continue. Any actions that would mitigate the impact from these activities would be of benefit.

2. Special emphasis should be placed on protecting the existing silverjaw minnow population as the distribution of this species is limited to only a few localities in the Cumberland River drainage and only one in Tennessee.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CLEAR FORK (SITE 2)
WATERSHED	CUMBERLAND RIVER
SITE	@ TRACY BRANCH
COUNTY	CLAIBORNE
QUADRANGLE	EAGAN 4257 SW
LAT-LONG	363411N-835524W
REACH	05130101-25.0
LENGTH	~ 500 FT
AREA	44.0 SQ. MI.
ELEVATION	1150 FT
DATE	6-17-94
TIME	1620

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND MARK T. FAGG

1. CHANNEL CHARACTERISTICS

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

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

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
N/A	N/A	N/A

6. INSTREAM COVER ABUNDANCE IS

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

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

8. FLOW (CFS) COMPARED TO NORMAL

	LOW	NORMAL	HIGH
N/A	N/A	N/A	N/A

9. PRESENT WEATHER

PT. CLOUDY; HOT AND HUMID

10. PAST WEATHER (last 24 hrs)

PT. CLOUDY W/ SCATTERED T-STORMS

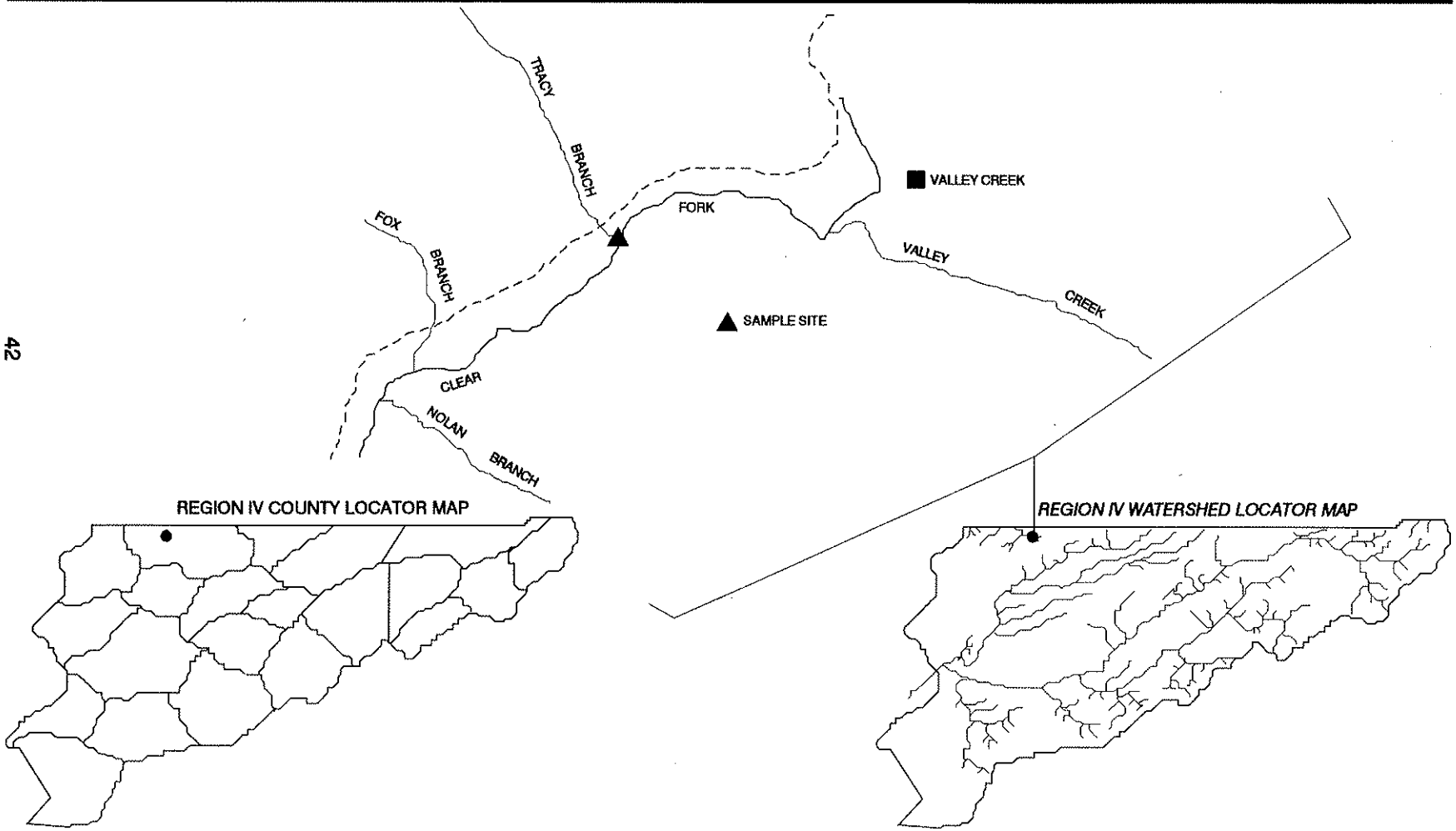
11. WATER QUALITY

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

12. COMMENTS:

STATION LOCATED AT THE MOUTH OF TRACY BRANCH. SAMPLED UPSTREAM AND DOWNSTREAM FROM CONFLUENCE.

NO WATER QUALITY DATA COLLECTED AT THIS SITE.



CLEAR FORK FISH DATA (SITE 2)

SAMLPING TYPE: SEINING AND SHOCKING

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

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	63		
Catostomus commersoni	195	2		
Ericymba buccata	123	10		
Etheostoma baileyi	394	10		
Etheostoma kennicotti	418	5		
Etheostoma sagitta	433	3		
Hypentelium nigricans	207	6		
Lepomis cyanellus	347	11		
Lepomis macrochirus	351	2		
Luxilus chrysocephalus	89	9		
Moxostoma erythrurum	225	1		
Notropis r. rubellus	131	42		
Percina maculata	470	1		
Pimephales notatus	176	21		
Rhinichthys atratulus	184	23		
Semotilus atromaculatus	188	27		
	SUM:	236		

INDEX OF BITOIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<10	10-20	>20	31	16	3
NUMBER OF DARTER SP.	<2	2-4	>4	7	4	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	2	3
NUMBER OF SUCKER SP.	<2	2	>2	3	3	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		20.9	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		13.7	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		26.1	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		0	1
CATCH RATE	<16	16-32	>32		32	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
					40	**FAIR**

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

Clear Fork (Site 3)

One of three IBI fishery surveys was conducted on the Clear Fork in 1994:

Location and Length - Tributary to the Cumberland River. The sample area was located just downstream from the community of Pruden. Sample length was approximately 300 ft in length and was sampled on 17 June 1994.

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

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - This portion of the Clear Fork of the Cumberland River was the uppermost of three sample sites surveyed during 1994. It was located in close proximity the Tennessee-Kentucky state line in an attempt to evaluate stream health in an area of active coal mining. The Agency has made no previous collections from this portion of the Clear Fork.

A total of 62 fish representing three species was collected from our sample. No game fish were collected or observed. One non-game and two forage species were collected. These included white sucker *(Catostomus commersoni)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*.

As indicated by the lack of fish species in our sample, the Index of Biotic Integrity reflected the severity of the degradation in this section of the Clear Fork. The score (24) indicated that this section of stream could be considered to be in "very poor to poor" condition. The major contributors to the derivation of this score were the lack of species richness, the high percentage of tolerant fish species, the absence of piscivores, and the relatively low catch rate. The physical attributes of the stream that were apparently influencing the biotic component and ultimately the IBI score were the obviously high occurrence of fine sediment and the high percentage of coal fines in the substrate. The relatively high conductance of the water (550 micomhos/cm) would also suggest that this portion of the Clear Fork was suffering from some type of enrichment (probably related to coal mining).

Benthic macroinvertebrates from our sample included Perlidae stoneflies, Hydropsychidae and Limnephilidae caddisflies, and Dryopidae beetles. Trichopterans contributed the largest percentage to the sample comprising 38.6%. Dipterans were the next most abundant group comprising 28.1%. Plecopterans and hemipterans were the least abundant comprising 3.5% each. Overall, it appeared that tolerant taxa (15) dominated the sample which was reflected in the EPT taxa richness (5). The bioclassification based on the EPT taxa richness was determined to be "poor" which is not surprising given the condition of this particular stream reach.

Management Recommendations:

1. The extensive coal mining upstream of this site has all but eliminated the fish community in this portion of the Clear Fork. Not surprisingly, only the most tolerant forms of fish and macroinvertebrates have been able to survive. Any actions that could mitigate surface mining runoff from upstream areas would greatly benefit the biological, physical, and chemical condition of this stream reach.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CLEAR FORK (SITE 3)
WATERSHED	CUMBERLAND RIVER
SITE	NEAR TN-KY STATE LINE
COUNTY	CLAIBORNE
QUADRANGLE	EAGAN 4257 SW
LAT-LONG	363459N-835414W
REACH	05130101-25.0
LENGTH	~ 300 FT
AREA	43.0 SQ. MI.
ELEVATION	1250 FT
DATE	6-17-94
TIME	1045

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND MARK T. FAGG

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 30

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	10	40	30	15	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 6.7 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY; HOT AND HUMID

10. PAST WEATHER (last 24 hrs)

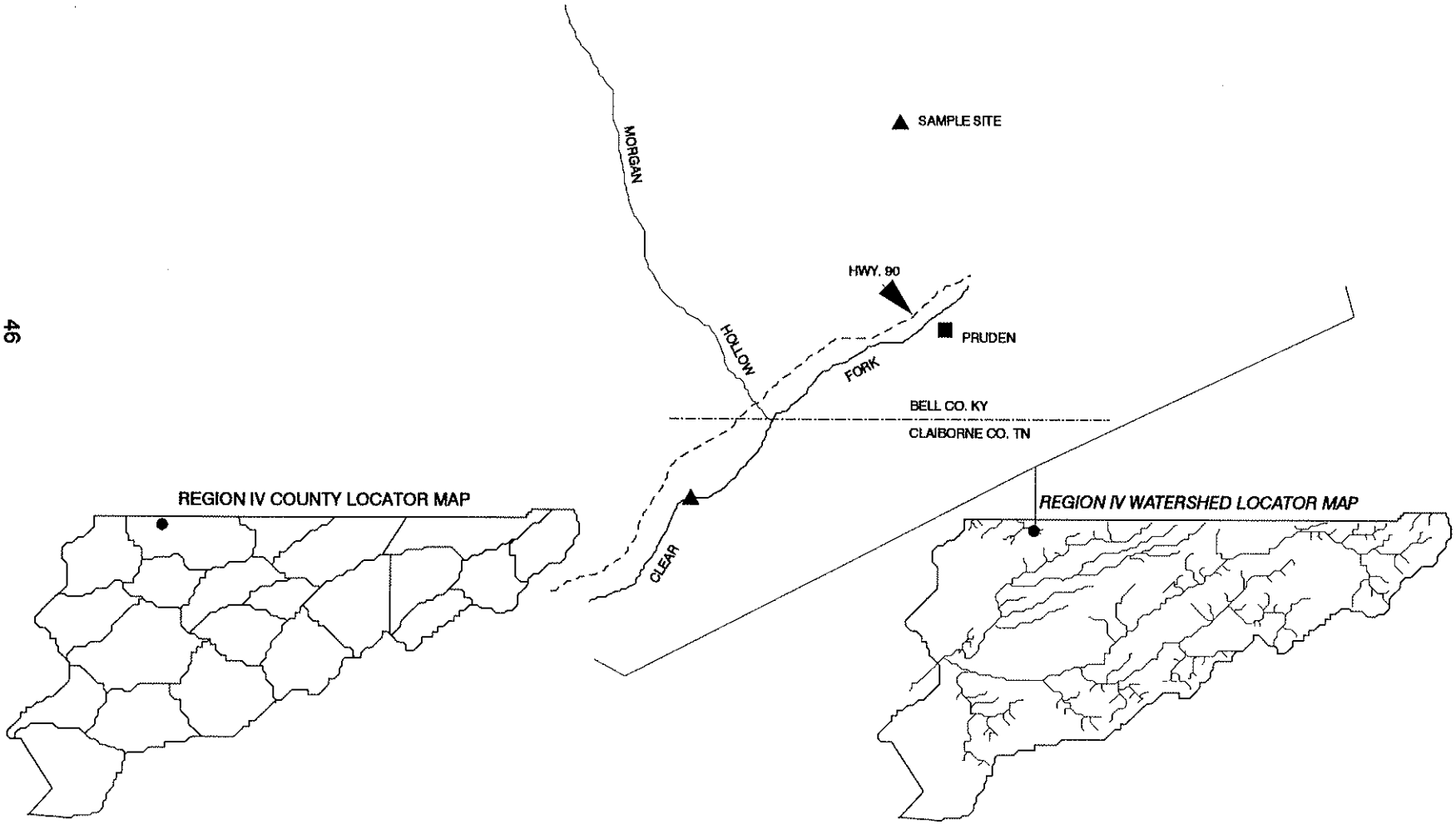
PT. CLOUDY W/ SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.5	68 F	550	9.5	101

12. COMMENTS:

MODERATE SEDIMENT LOADS IN POOLS. MOST OF SUBSTRATE COVERED WITH A FINE LAYER OF SILT. WATER TURBID AT TIME OF SAMPLE.



CLEAR FORK FISH DATA (SITE 3)

SAMLPING TYPE: SEINING AND SHOCKING

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

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Catostomus commersoni	195	1		
Rhinichthys atratulus	184	29		
Semotilus atromaculatus	188	32		
	SUM:	62		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<10	10-20	>20	31	3	1
NUMBER OF DARTER SP.	<2	2-4	>4	7	0	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	0	1
NUMBER OF SUCKER SP.	<2	2	>2	3	1	1
NUMBER OF INTOLERANT SP.	<2	2	>2	3	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		53.2	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		1.6	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		0	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		0	1
CATCH RATE	<16	16-32	>32		7.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
						24

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

CLEAR FORK (SITE 3) BENTHIC DATA
FIELD COLLECTION # 549
EFFORT = 2.0 PERSON HOURS

TAXA RICHNESS = 15
EPT TAXA RICHNESS = 5
BIOCLASSIFICATION (EPT) = 1 (POOR)

	TAXA		NUMBER	PERCENT
COLEOPTERA				5.3
	Dryopidae	*Helichus* adults	3	
DIPTERA				28.1
	Athericidae	*Atherix lantha*	11	
	Chironomidae		3	
	Tipulidae	*Hexatoma*	1	
		Tipula	1	
HEMIPTERA				3.5
	Gerridae	*Gerris remigis*	2	
ODONATA				21
	Aeshnidae	*Aeshna umbrosa*	2	
	Calopterygidae	*Calopteryx*	9	
	Cordulegastridae	*Corduelgaster maculata* early instar	1	
PLECOPTERA				3.5
	Perlidae	*Acroneuria carolinensis*	2	
TRICHOPTERA				38.6
	Hydropsychidae			
		Ceratopsyche slossonae	11	
		Diplectrona modesta	4	
		Hydropsyche betteni/depravata	3	
		Unidentified pupae	2	
	Limnephilidae	*Pycnopsyche*	2	
		TOTAL	**57**	

Elk Fork Creek

One IBI fishery survey was conducted on Elk Fork Creek in July 1994:

Location and Length - Tributary to the Clear Fork (Cumberland River). The sample area was located at the confluence of Little Elk Creek and Elk Fork Creek. The sample area extended upstream and downstream of Little Elk Creek. The sample area was approximately 750 ft in length and was sampled on 13 July 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 250 VAC and a 15 ft seine.

Water Quality - (See physicochemical and 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 assess stream health based on the fish and benthic community present and to develop a fish species diversity list for TADS. The Agency made two qualitative fish and benthic collections from this stream in 1991, one near Indian Mountain State Park in Jellico and one near stream mile 9.4 (Bivens et al. 1991).

We collected a total of 238 fish representing 19 species during our sample. Six game fish species were collected which included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, green sunfish *(L. cyanellus)*, bluegill *(L. macrochirus)*, longear sunfish *(L. megalotis)*, and spotted bass *(Micropterus punctulatus)*. Of these game fish, redbreast sunfish was the most abundant. One non-game fish and 12 forage species were also collected at this site. Of the forage species stoneroller *(Campostoma anomalum)* and rainbow darter *(Etheostoma caeruleum)* were the most abundant. We also collected three species deemed in need of management by the state. These included the emerald darter *(Etheostoma baileyi)*, arrow darter *(E. sagitta)*, and the rosyface shiner *(Notropis r. rubellus)*. Our 1994 sample was located between the samples taken in 1991, however, the species collected compare quite well. A total of 23 species was collected from two sites during the 1991 survey compared to our 19 in 1994. Species collected at the upstream site in 1991 than wer not collected in 1994 were largemeouth bass *Micropterus salmoides)*, smallmouth bass *(M. dolomieu)*, golden redhorse *(Moxostoma erythrurum)*, striped shiner

(Luxilus chrysocephalus), and blackside darter *(Percina maculata)*.

Our Index of Biotic Integrity analysis at this site indicated this stream was in "fair" condition. The stream scored well in regards to species richness and contained a relatively low percentage of tolerant species. However, there was an unusually high occurrence of anomalies among the fish, particularly black grub and lesions. This would indicate some form of degradation to the stream, possibly effects from unregulated waste discharge from residential dwellings along the stream. Additionally, the catch rate for Elk Fork Creek was unusually low when compared to similar size streams.

Benthic macroinvertebrates from our sample included Baetidae, Heptageniidae, and Oligoneuriidae mayflies, Perlidae stoneflies, and Hydropsychidae, Limnephilidae and Philopotamidae caddisflies. Coleopterans included Dryopidae, Elmidae, and Psephenidae beetles. Ephemeropterans comprised the largest component of our sample accounting for 28.8% of the total number of organisms collected. Dipterans accounted for 21.2% while trichopterans and plecopterans only contributed 11.4% and 0.8% to the total sample. Pleurocerid snails were fairly abundant, contributing 18.2% to the overall total. A total of 37 taxa was collected from this site of which 14 were EPT taxa. Based on this EPT value this reach of Elk Fork Creek was assigned a bioclassification of "fair".

Management Recommendations:

1. Given that we collected three species deemed in need of management by the state, watershed protection should be a top priority. This stream does appear to have the potential of being a good fishery if it can be protected.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	ELK FORK CREEK
WATERSHED	CLEAR FORK
SITE	@ LITTLE ELK CREEK
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363242N-841023W
REACH	05130101-14.0
LENGTH	750 FT
AREA	39.10 SQ. MI.
ELEVATION	1000 FT
DATE	7-13-94
TIME	1730

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND PAUL STODOLA

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
28.0 FT	0.8 FT	3.3 FT

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	10	15	20	30	25	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	10	50	30	5	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 40 %

8. FLOW (CFS) 10.6 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY W/ SCATTERED T-STORMS
AIR TEMP. 82 F @ 1740

10. PAST WEATHER (last 24 hrs)

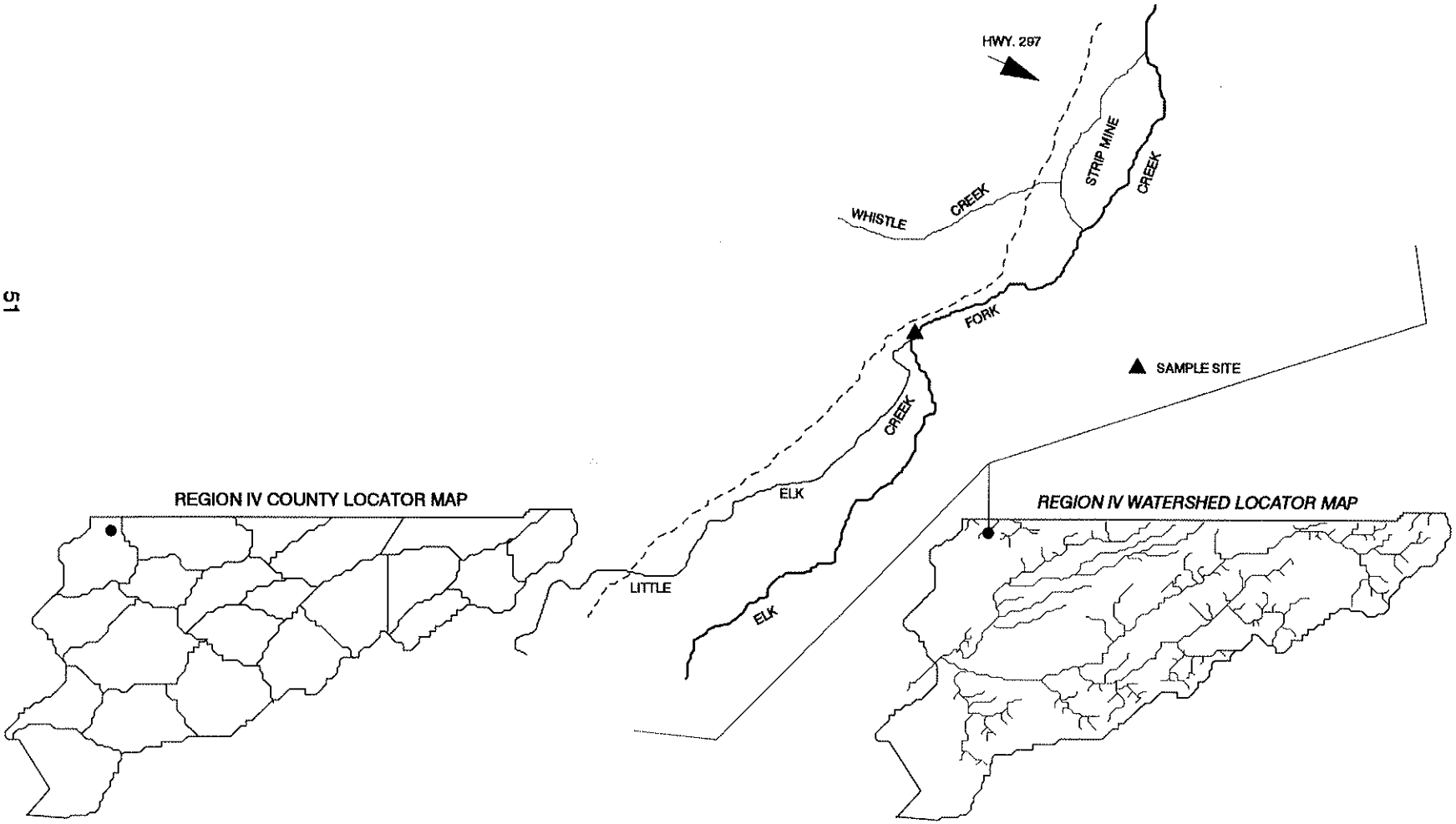
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.5	76 F	205	9.3	112.1

12. COMMENTS:

SAMPLE STATION EXTENDED ~ 250 FT BELOW AND ~ 500 FT ABOVE THE LITTLE ELK CREEK CONFLUENCE. RECENT BRIDGE CONSTRUCTION BELOW LITTLE ELK CREEK HAS CONTRIBUTED MODERATE AMOUNTS OF SEDIMENT TO THE STREAM.



ELK FORK CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15' SEINE AND ONE BACKPACK UNIT AT 250 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	2	3-4	
Campostoma anomalum	45	63		
Cyprinella spiloptera	57	1		
Etheostoma baileyi	394	4		
Etheostoma blennioides	398	8		
Etheostoma caeruleum	401	43		
Etheostoma kennicotti	418	15		
Etheostoma sagitta	433	1		
Hypentelium nigricans	207	13		
Lepomis auritus	346	11	2-6	
Lepomis cyanellus	347	1	3	
Lepomis macrochirus	351	1	3	
Lepomis megalotis	353	3	3-5	
Lepomis sp. (hybrid)		1	6	
Lythrurus ardens	93	2		
Micropterus punctulatus	363	1	9	
Notropis r. rubellus	131	40		
Percina caprodes	464	4		
Pimephales notatus	176	22		
Semotilus atromaculatus	188	2		

7359

SUM: 238

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<8	8-16	>16	25	18	5
NUMBER OF DARTER SP.	<2	2-4	>4	7	6	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	5	5
NUMBER OF SUCKER SP.	<2	2	>2	3	1	1
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		1.7	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		9.2	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		49.2	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		1.3	3
CATCH RATE	<16	16-32	>32		9.9	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0.4	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		15.5	1
						40 **FAIR**

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

ELK FORK CREEK
FIELD COLLECTION # 566
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 37
EPT TAXA RICHNESS = 14
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				8
	Dryopidae	*Helichus adults*	3	
	Elmidae	*Optioservus* larva, adults	4	
	Psephenidae	*Psephenus herricki* larvae, adults	14	
DIPTERA				21.2
	Athericidae	*Atherix lantha*	50	
	Chironomidae		3	
	Simuliidae		2	
	Tipulidae	*Tipula*	1	
EPHEMEROPTERA				28.8
	Baetidae	*Baetis*	5	
	Heptageniidae	*Epeorus rubidus/ subpallidus*	8	
		Heptagenia	1	
		Stenacron interpunctatus	1	
		Stenonema early instars	10	
		Stenonema sp.	22	
		Stenonema vicarium	8	
	Oligoneuriidae	*Isonychia*	21	
GASTROPODA				18.2
	Pleuroceridae		48	
HEMIPTERA				3
	Gerridae	*Gerris conformis*	2	
		Rheumatobates rileyi	1	
	Nepidae	*Ranatra nigra*	1	
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa nymphs	3	
MEGALOPTERA				0.8
	Corydalidae	*Corydalis cornutus*	1	
		Nigronia serricornis	1	
ODONATA				6.4
	Aeshnidae	*Basiaeschna janata*	1	
		Boyeria vinosa	9	
	Coenagroinidae	*Argia*	1	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Hagenius brevistylus*	1	
		Lanthus	1	
	Macromiidae	*Macromia*	3	
PELECYPODA				1.1
	Sphaeriidae	*Sphaerium*	3	
PLECOPTERA				0.8
	Perlidae	*Acroneuria evoluta*	2	
TRICHOPTERA				11.4
	Hydropsychidae	*Ceratopsyche sparna*	1	
		Cheumatopsyche	3	
		Hydropsyche betteni/depravata	2	
		H. dicantha	23	
	Limnephilidae	*Pycnopsyche*	1	
	Philopotamidae	*Chimara*	1	
		TOTAL	**264**	

Fall Branch

One IBI fishery survey was conducted on Fall Branch in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork of the Cumberland River). The sample area was located approximately 50 ft upstream of the Wooldridge Rd. crossing. The sample area was approximately 450 ft in length and was sampled on 14 July 1994.

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

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

Benthos Collection - (See benthic data form)

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

Comments - This stream was sampled to evaluate stream health and to develop a fish species diversity list for TADS. The Agency has made no prior collections from this stream.

A total of 154 fish representing two species was collected from this stream. These included creek chub *(Semotilus atromaculatus)*, and the federally threatened blackside dace *(Phoxinus cumberlandensis)*. The population of blackside dace appeared to be stronger in this stream than in most others sampled in this watershed. We collected a total of 28 individuals representing different age classes. This population represents a previously undocumented population of blackside dace.

Based on the Index of Biotic Integrity (IBI) score (28) this stream reach rated "poor". This was primarily due to the lack of species richness in our sample area and the high percentage of tolerant individuals (creek chub). The most evident impact to this stream section was the presence of cattle. We observed several cattle in and around the stream with very little fencing to restrict their access to the stream. Heavy sedimentation and bank erosion were prevalent as well as enrichment from the cattle waste.

Benthic macroinvertebrates from our sample included Baetidae mayflies and Hydropsychidae caddisflies. Dipterans comprised 41% of the total number collected, while ephemeropterans, odonates, and trichopterans represented 13.9%, 15.6%, and 22.9%, respectively. A total of 15 taxa

was collected at this site of which three were EPT taxa. Based on the extremely low number of EPT taxa, this site was assigned a bioclassification of "poor".

Management Recommendations:

1. This portion of Fall Branch has become severely degraded due to cattle use in and around the stream. Any corrective measures that would limit or exclude cattle from this stream would drastically improve the area we surveyed and would improve water quality downstream.

2. Special emphasis should be placed on protecting the existing blackside dace population as these fish were only found in number where cattle access was limited or excluded. Watershed protection should be of upmost importance.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	FALL BRANCH
WATERSHED	CLEAR FORK
SITE	WOOLDRIDGE RD. X-ING
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363427N-840907W
REACH	05130101-
LENGTH	~ 450 FT
AREA	0.77 SQ. MI.
ELEVATION	1023 FT
DATE	7-14-94
TIME	0830

COLLECTOR(S)

RICK D. BIVENS AND BART D. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
5.6 FT	0.2 FT	0.5 FT

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	15	20	30	20	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 50 %

8. FLOW (CFS) 0.3 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY; MILD AND HUMID
AIR TEMP. 78 F @ 0850

10. PAST WEATHER (last 24 hrs)

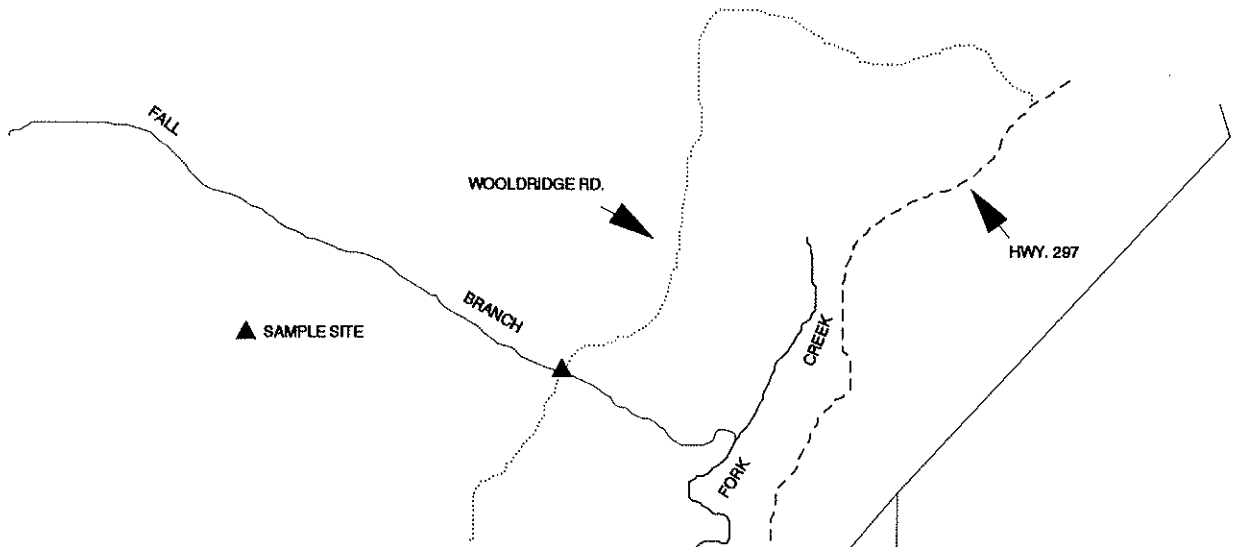
SAME AS ABOVE

11. WATER QUALITY

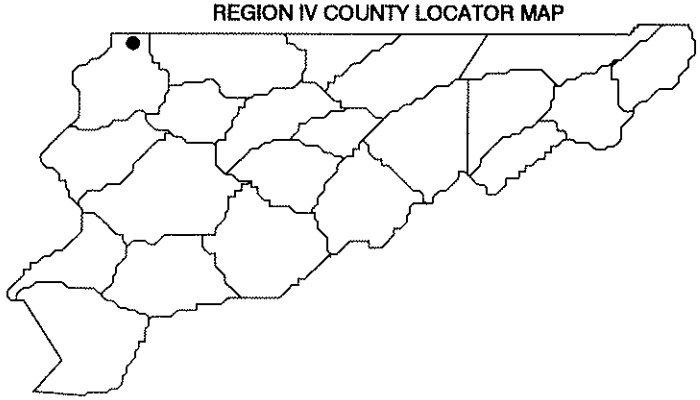
pH	TEMP.	COND.	D.O.	% SAT.
7.5	72 F	412	6.5	75.0

12. COMMENTS:

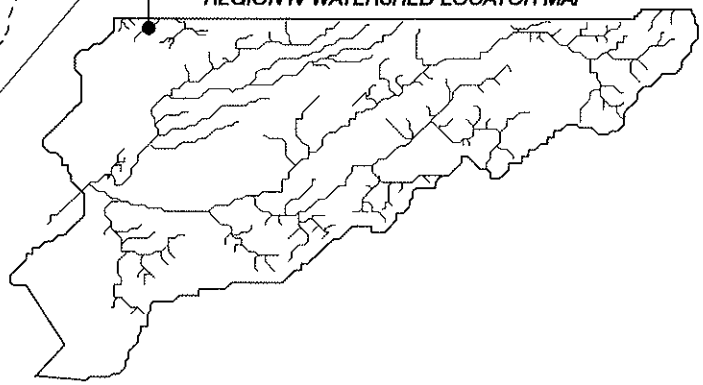
SAMPLE STATION BEGAN AT WOOLDRIDGE RD. CROSSING AND PROCEEDED UPSTREAM. FIRST 100 FT OF STREAM HEAVILY IMPACTED BY CATTLE. SEVERE BANK EROSION AND STREAM SEDIMENTATION.



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



FALL BRANCH FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPCK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Phoxinus cumberlandensis	166	28		
Semotilus atromaculatus	188	126		
	SUM:	154		

806

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<3	3-6	>6	10	2	1
NUMBER OF DARTER SP.	<2	2	>2	3	0	1
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<1	1	>1	2	1	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		81.8	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		0	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		31.6	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		1.3	5
						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**

FALL BRANCH BENTHIC DATA
FIELD COLLECTION # 567
EFFORT = 0.5 PERSON HOURS

TAXA RICHNESS = 15
EPT TAXA RICHNESS = 3
BIOCLASSIFICATION (EPT) = 1 (POOR)

TAXA			NUMBER	PERCENT
DIPTERA				41
	Chironomidae		49	
	Tabanidae	*Chrysops*	1	
EPHEMEROPTERA				13.9
	Baetidae	*Baetis*	17	
HEMIPTERA				4.9
	Gerridae	*Gerris conformis*	1	
		Trepobates pictus	3	
	Veliidae	*Rhagovelia obesa*	2	
MEGALOPTERA				1.6
	Corydalidae	*Nigronia serricornis*	2	
ODONATA				15.6
	Aeshnidae	*Boyeria vinosa*	2	
	Calopterygidae	*Calopteryx*	2	
	Coenagrionidae	*Argia*	1	
	Cordulegastridae	*Cordulegaster maculata*	4	
	Gomphidae	*Gomphus lividus*	9	
		Stylogomphus albistylus	1	
TRICHOPTERA				22.9
	Hydropsychidae	*Cheumatopsyche*	7	
		Hydropsyche betteni/depravata	21	
		TOTAL	**122**	

Crooked Creek

One IBI fishery survey was conducted on Crooked Creek in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork of the Cumberland River). The sample station began approximately 500 ft below the first Wooldridge Rd. crossing and extended to the road crossing. The survey section was approximately 500 ft and was sampled on 14 July 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 125 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Our primary objectives in surveying this stream were to evaluate stream health based on the fish community present and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream.

We collected a total of 184 fish representing six species. The only game fish collected during our sample was one bluegill *(Lepomis macrochirus)*. The only non-game species was the northern hog sucker *(Hypentelium nigricans)*. The remaining four species were forage fish which included central stoneroller *(Campostoma anomalum)*, rainbow darter *(Etheostoma caeruleum)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. The most abundant species collected in our sample was the rainbow darter. Additionally, we were interested in determining if blackside dace *(Phoxinus cumberlandensis)* were present in this watershed. We surveyed the Left Fork of Crooked Creek and collected several blackside dace (coordinates of collection 363447N-841127W). This collection represents a previously undocumented occurrence of blackside dace in this watershed.

Our Index of Biotic Integrity analysis indicated this stream was in "poor to fair" condition based on the IBI score of 38. The factors that had the greatest negative influence on the overall score were the lack of darter species, the absence of intolerant fish species, and the absence of piscivores. Overall, this stream appeared to be suffering primarily from stream bank erosion and residential

dumping into the stream along with non-point source pollution upstream of our survey site.

Benthic macroinvertebrates collected from this site included Baetidae and Heptageniidae mayflies, Perlidae stoneflies, and Hydropsychidae and Limnephilidae caddisflies. Coleopterans collected included representative from the families Dryopidae and Elmidae. Trichopterans were the most abundant organisms in our sample, comprising 44.9% of the total sample. Dipterans were the second most abundant group accounting for 20.5%. Plecopterans and ephemeropterans were the least abundant groups contributing only 1.0% and 0.5% to the overall sample. A total of 26 taxa was collected from this site of which nine were EPT. Based on this EPT taxa richness value this reach of Crooked Creek was assigned a bioclassification of "fair".

Management Recommendations:

1. Any action that can be taken to mitigate non-point source pollution would be beneficial to this stream.

2. Special emphasis should be place on watershed protection as the headwaters of this stream contains a viable population of blackside dace.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CROOKED CREEK
WATERSHED	CLEAR FORK
SITE	@ WOOLRIDGE RD.
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363418N-841044W
REACH	05130101-
LENGTH	~ 500 FT
AREA	3.1 SQ. Mi.
ELEVATION	1000 FT
DATE	7-14-94
TIME	1300

COLLECTOR(S)

RICK D. BIVENS AND BART D. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
6.3 FT	0.6 FT	2.7 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	15	30	40	15		

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	15	40	35	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 60 %

8. FLOW (CFS) 1.3 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY; HOT AND HUMID
AIR TEMP. 80 F @ 1320

10. PAST WEATHER (last 24 hrs)

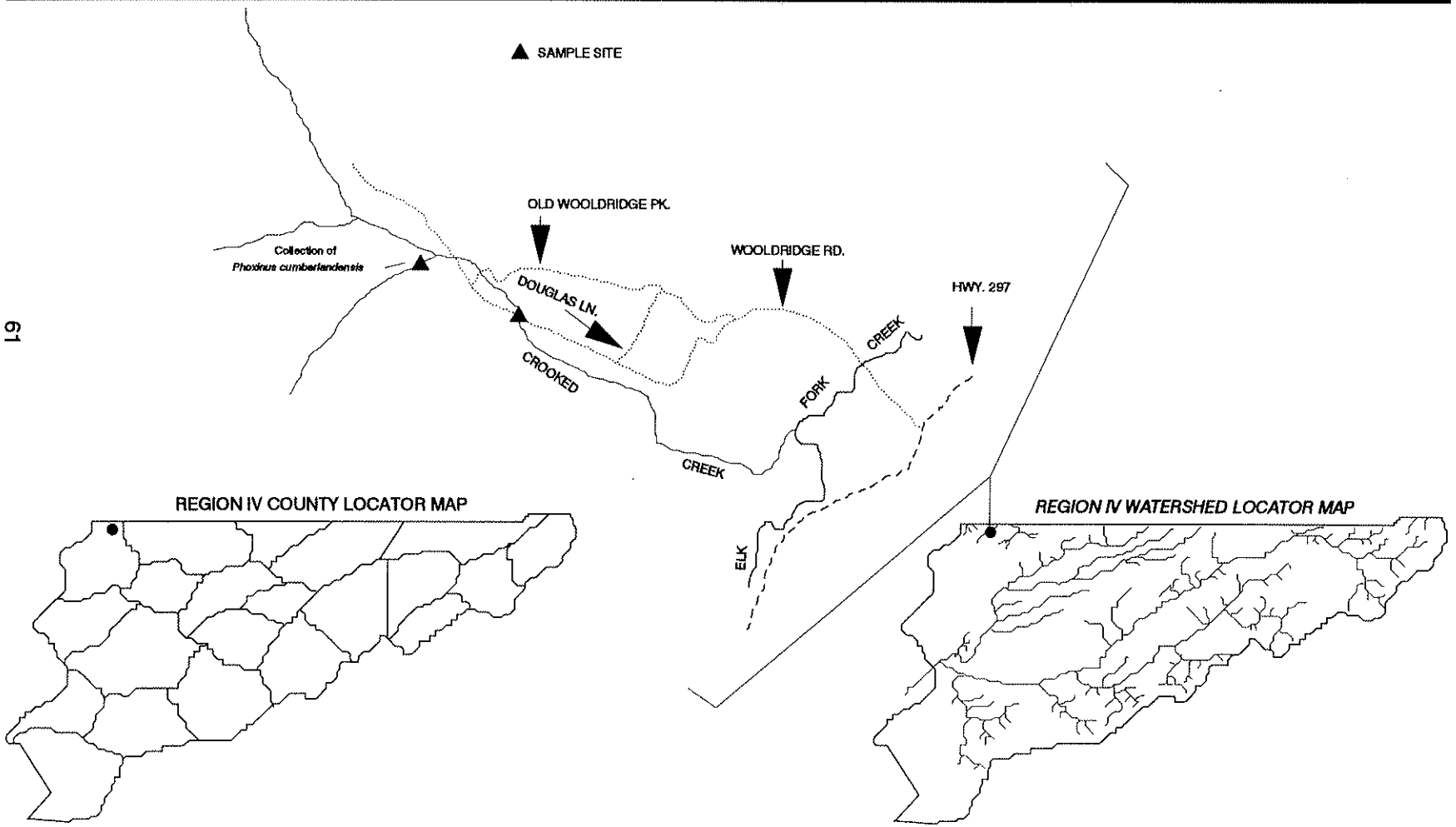
PT. CLOUDY W/ SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
8.0	74 F	500	8.5	99.7

12. COMMENTS:

STATION WAS LOCATED AT FIRST WOOLDRIDGE RD. CROSSING AND PROCEEDED DOWNSTREAM. SOME PORTIONS OF STREAM BANK SEVERELY ERODED. MODERATE OCCURENCE OF REFUSE IN AND ALONG STREAM.



CROOKED CREEK FISH DATA

SAMPLING TYPE: SHOCKING

GEAR TYPE: ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	49		
Etheostoma caeruleum	401	87		
Hypentelium nigricans	207	3		
Lepomis macrochirus	351	1	3	
Rhinichthys atratulus	184	22		
Semotilus atromacualtus	188	22		
		SUM:		
		184		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-9	>9	14	6	3
NUMBER OF DARTER SP.	<2	2	>2	4	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		12	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		47.3	5
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		27.7	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		2.2	3
						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**

CROOKED CREEK BENTHIC DATA
FIELD COLLECTION # 568
EFFORT = 1.0 PERSON HOUR

TAXA RICHNESS = 26
EPT TAXA RICHNESS = 9
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				2
	Dryopidae	*Helichus* adults	3	
	Elmidae	*Macronychus glabratus* adult	1	
DIPTERA				20.5
	Athericidae	*Atherix lantha*	12	
	Chironomidae		23	
	Empididae		1	
	Simuliidae		3	
	Tipulidae	*Hexatoma*	2	
		Tipula	1	
EPHEMEROPTERA				4.9
	Baetidae	*Baetis*	7	
	Heptageniidae	*Stenonema vicarium*	3	
HEMIPTERA				0.5
	Veliidae	*Rhagovelia obesa*	1	
MEGALOPTERA				11.7
	Corydalidae	*Corydalis cornutus*	2	
		Nigronia fasciatus	2	
		N. serricornis	20	
ODONATA				14.6
	Aeshnidae	*Boyeria vinosa*	18	
	Coenagrionidae	*Argia*	3	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus lividus*	5	
		Stylogomphus albistylus	3	
PLECOPTERA				1
	Perlidae	*Acroneuria carolinensis*	2	
TRICHOPTERA				44.9
	Hydropsychidae	*Ceratopsyche bronta*	13	
		C. prob. slossonae	2	
		C. sparna	2	
		Cheumatopsyche	49	
		Hydropsyche betteni/depravata	25	
	Limnephilidae	*Pycnopsyche*	1	
		TOTAL	**205**	

Burnt Pone Creek

One IBI fishery survey was conducted on Burnt Pone Creek in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork of the Cumberland River). The sample station began at the third road crossing and proceeded upstream. The sample reach was approximately 500 ft in length and was sampled on 27 July 1994.

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

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Our primary objectives in surveying this stream were to evaluate stream health based on the fish community present and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream.

We collected a total of 137 fish representing seven species. Three game species were collected from this site. These included redbreast sunfish *(Lepomis auritus)*, bluegill *(L. macrochirus)*, and spotted bass *(Micropterus punctulatus)*. The only non-game fish collected was the white sucker *(Catostomus commersoni)*. The remaining three species were forage fish which included rainbow darter *(Etheostoma caeruleum)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. The most abundant species collected in our sample was the creek chub.

Based on our Index of Biotic Integrity evaluation, this portion of Burnt Pone Creek received a rating of "poor to fair". This is not surprising as the streams courses through old stripe mine slurry ponds. Additionally, we observed several iron oxide upwellings along the stream margin. Residential refuse was also common in and along the stream. The most notable negative influences on the overall score were the lack of darter, sunfish and intolerant species, the high percentage of tolerant species, and the low catch rate.

Benthic macroinvertebrates collected from this site included Heptageniidae and Oligoneuriidae mayflies,

Chloroperlidae, Peltoperlidae, and Perlidae stoneflies, and Hyrdopsychidae and Limnephilidae caddisflies. Gastropods collected included representatives from the families Lymnaeidae and Planorbidae. Megalopterans were the most abundant organisms constituting 29.8% of the overall sample. Odonates and dipterans were the next most abundant, accounting for 23.4% and 20.6%, respectively. A total of 32 taxa was collected from this site with nine being EPT taxa. Based on this EPT value this section of Burnt Pone Creek was given a bioclassification of "fair".

Management Recommendations:

1. Any action that can be taken to mitigate non-point source pollution would be beneficial to this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	BURNT PONE CREEK
WATERSHED	CLEAR FORK
SITE	STANDARD HOLLOW RD.
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363331N-841038W
REACH	05130101-
LENGTH	~ 500 FT
AREA	1.6 SQ. MI.
ELEVATION	1000 FT
DATE	7-27-94
TIME	0844

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND MARK T. FAGG

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
6.0 FT	0.5 FT	1.7 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	20	10	40	20	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 0.6 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY W/ SCATTERED T-STORMS
AIR TEMP. 68 F @ 0900

10. PAST WEATHER (last 24 hrs)

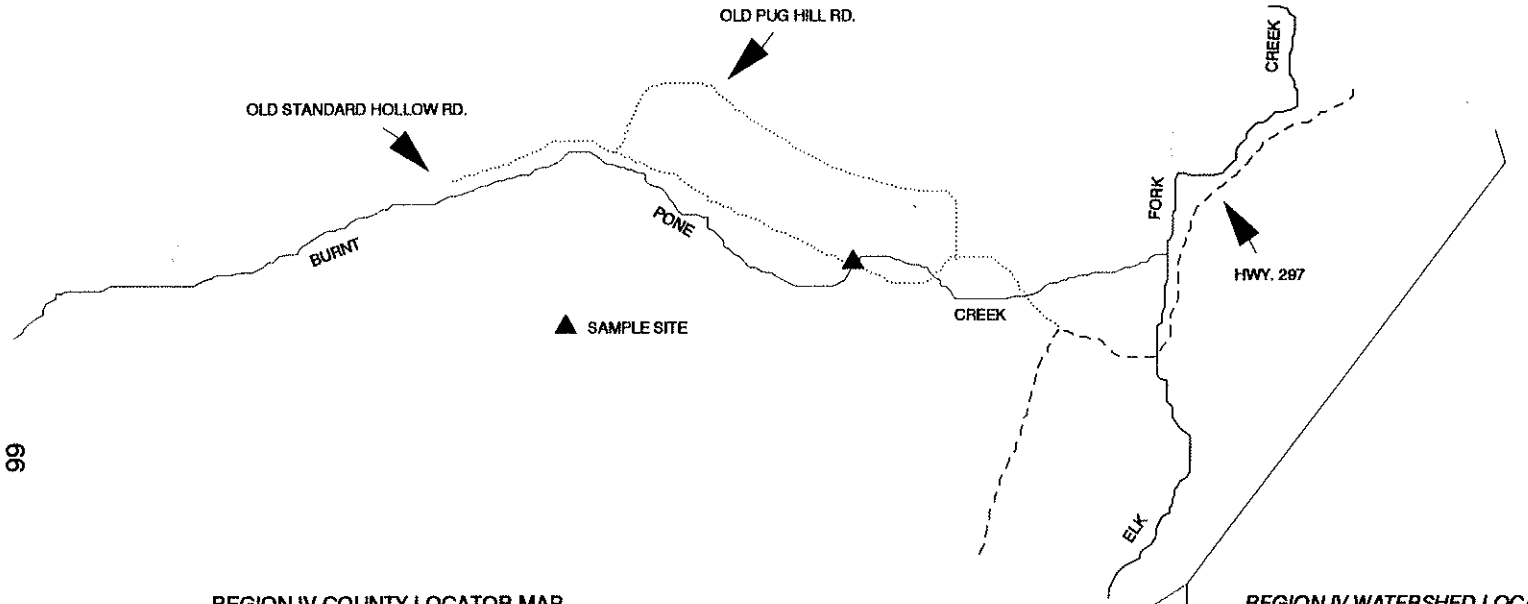
SAME AS ABOVE

11. WATER QUALITY

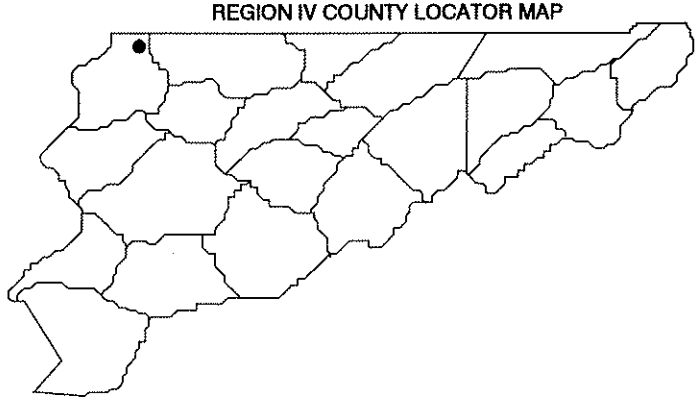
pH	TEMP.	COND.	D.O.	% SAT.
7.5	69 F	310	7.4	82.5

12. COMMENTS:

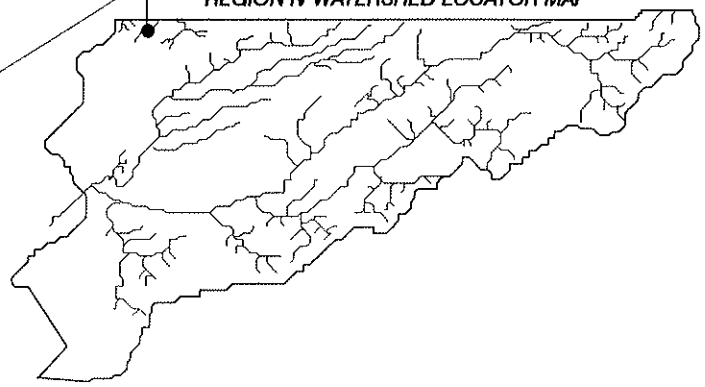
STATION BEGAN AT THIRD BRIDGE CROSSING ON STANDARD HOLLOW RD. STREAM COARSES THROUGH OLD STRIP MINE SLURRY PONDS. SEVERAL IRON-OXIDE UPWELLINGS. REFUSE COMMON IN AND AROUND STREAM.



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



BURNT PONE CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

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

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Catostomus commersoni	195	19		
Etheostoma caeruleum	401	18		
Lepomis auritus	346	4	2-5	
Lepomis macrochirus	351	10	1-5	
Micropterus punctulatus	363	1	3	
Rhinichthys atratulus	184	7		
Semotilus atromacualtus	188	78		
	SUM:	137		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<3	3-6	>6	10	6	3
NUMBER OF DARTER SP.	<2	2	>2	3	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		70.8	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		13.9	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		13.1	3
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0.7	5
CATCH RATE	<16	16-32	>32		13.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	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**

BURNT PONE CREEK BENTHIC DATA
FIELD COLLECTION # 582
EFFORT = 1.0 PERSON HOUR

TAXA RICHNESS = 32
EPT TAXA RICHNESS = 9
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.7
	Oligochaeta		1	
COLEOPTERA				5.7
	Dryopidae	*Helichus* adults	2	
	Elmidae	*Stenelmis* adult	1	
	Psephenidae	*Psephenus herricki* larvae, adults	5	
DIPTERA				20.6
	Chironomidae		20	
	Simuliidae		5	
	Tipulidae	*Dicranota*	1	
		Hexatoma	2	
		Tipula	1	
EPHEMEROPTERA				2.1
	Heptageniidae	*Stenonema femoratum*	2	
	Oligoneuriidae	*Isonychia*	1	
GASTROPODA				1.4
	Lymnaeidae		1	
	Planorbidae		1	
HEMIPTERA				2.1
	Gerridae	*Gerris conformis*	1	
		G. remigis	2	
MEGALOPTERA				29.8
	Corydalidae	*Corydalis cornutus*	2	
		Nigronia fasciatus	2	
		N. serricornis early instars	37	
	Sialidae	*Sialis*	1	
NEMATOMORPHA				0.7
	Gordioidae		1	
ODONATA				23.4
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	3	
	Coenagrionidae	*Argia*	3	
	Gomphidae	*Lanthus* early instars	14	
		Stylogomphus albistylus	12	
PLECOPTERA				3.5
	Chloroperlidae		1	
	Peltoperlidae	*Peltoperla*	1	
	Perlidae	*Acroneuria*	2	
		Perlesta	1	
TRICHOPTERA				9.9
	Hydropsychidae	*Cheumatopsyche*	5	
		Hydropsyche betteni/depravata	7	
	Limnephilidae	*Pycnopsyche*	2	
		TOTAL	**141**	

Whistle Creek

One IBI fishery survey was conducted on Whistle Creek in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork of the Cumberland River). The sample area began approximately 125 ft downstream of the Capuchin Rd. crossing. The sample areas was approximately 500 ft in length and was sampled on 12 July 1994.

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

Water Quality - (See physicochemical and 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 assess the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

We collected a total of 186 fish representing ten species of which four were game fish. These included redbreast sunfish *(Lepomis auritus)*, green sunfish *(L. cyanellus)*, bluegill *(L. macrochirus)*, and largemouth bass *(Micropterus salmoides)*. One non-game species, the white sucker *(Catostomus commersoni)* and four forage species were also collected from this site. No state or federally listed species were collected from this site. Creek chub *(Semotilus atromaculatus)* was the most abundant species collected during our survey. Additonally, the collection of the fathead minnow *(Pimephales promelas)* represented a new record for the Clear Fork drainage.

Our Index of Biotic Integrity evaluation (38) indicated that this stream was in "poor to fair" condition based on the fish community present. However, there was a high percentage of tolerant fish in the overall sample. Conversely, the percentage of specialized insectivores (i.e. darters) was below average. Both of these trends would indicate that this stream is being stressed. We did observe a considerable amount of coal fines in the stream along with a strong sulfur smell around the stream.

Our benthic collections from this site included Baetidae and Heptageniidae mayflies, Peltoperlidae, Perlidae, and Perlodidae stoneflies, and Hydropsychidae

caddisflies. Coleopterans collected included individuals from the families Dryopidae, Elmidae, and Psephenidae. Trichopterans accounted for 27.3% of the total number of organisms. Plecopterans represented 17.3% of the total while ephemeropterans only accounted for 1.8% of the total number of organisms collected. A total of 24 taxa were collected of which eight were EPT taxa. Based on this EPT value this reach of Whistle Creek was given a bioclassification of "fair".

Management Recommendations:

1. Whistle Creek received a rating of "poor-fair" and was apparent that it has suffered from strip mining activities, past and present. Any action that could mitigate non-point source pollution would be beneficial to this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	WHISTLE CREEK
WATERSHED	CLEAR FORK
SITE	CAPUCHIN RD. X-ING
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363237N-841038W
REACH	05130101-
LENGTH	~ 500 FT
AREA	2.1 SQ. MI.
ELEVATION	1000 FT
DATE	7-12-94
TIME	0920

COLLECTOR(S)

RICK D. BIVENS AND BART D. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
10 FT	1.3 FT	4.0 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	20	50	25		

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) 0.33 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY W/ SCATTERED T-STORMS
AIR TEMP. 76 F @ 0945

10. PAST WEATHER (last 24 hrs)

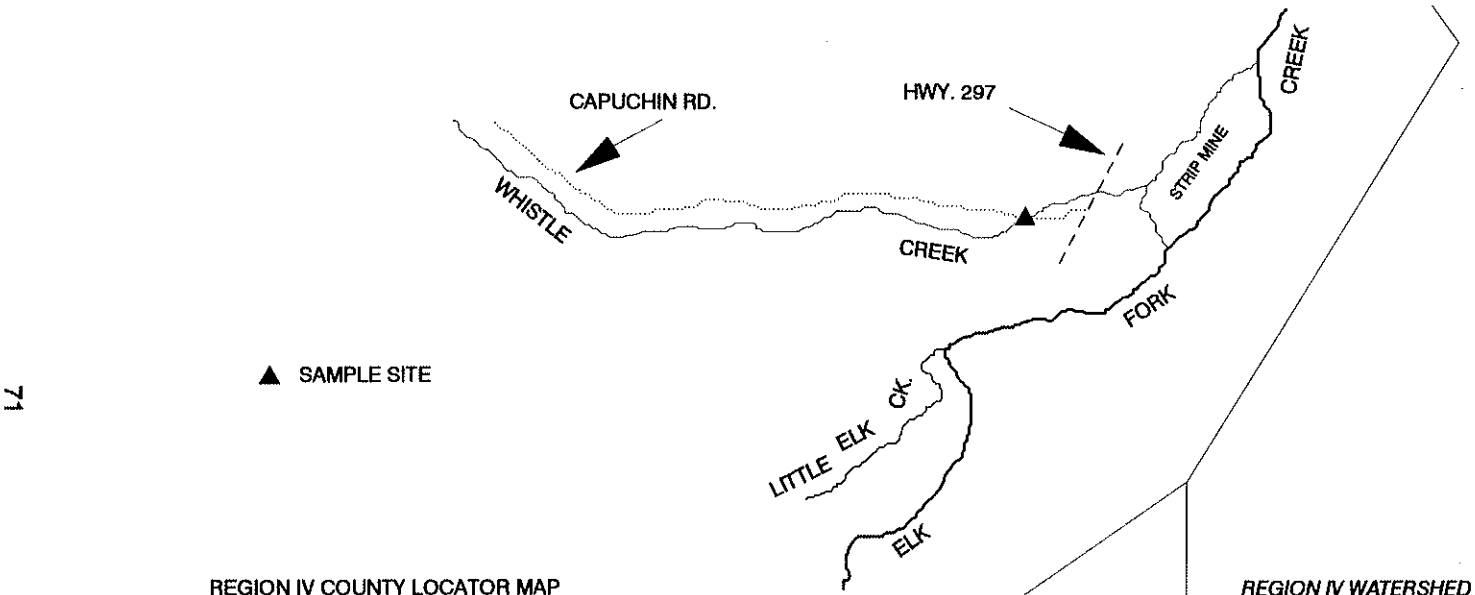
SAME AS ABOVE

11. WATER QUALITY

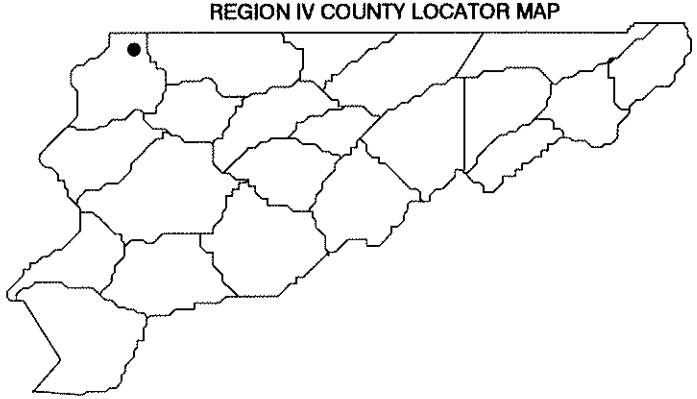
pH	TEMP.	COND.	D.O.	% SAT.
7.5	65 F	225	7.6	85.6

12. COMMENTS:

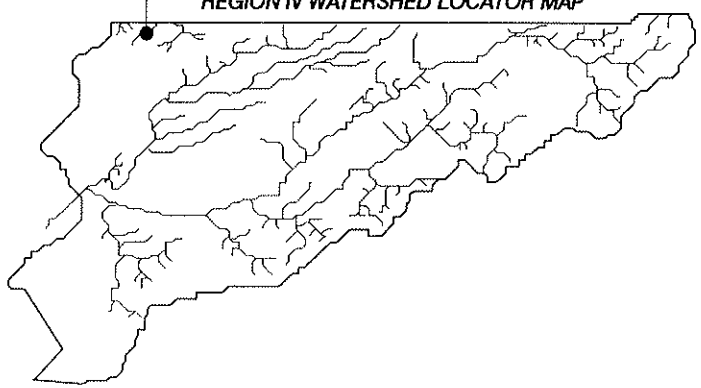
STATION BEGAN ~ 125 FT. DOWNSTREAM OF CAPUCHIN RD. CROSSING. STRONG SULFUR SMELL DOWNSTREAM OF RD. X-ING. SUBSTRATE COVERED WITH RUST COLORED SILT. SOME COAL FINES IN SEDIMENT.



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



WHISTLE CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Catostomus commersoni	195	9		
Etheostoma caeruleum	401	10		
Lepomis auritus	346	24		
Lepomis cyanellus	347	33		
Lepomis gulosus	349	1		
Lepomis macrochirus	351	5		
Micropterus salmoides	364	3		
Pimephales promelas	177	1		
Rhinichthys atratulus	184	1		
Semotilus atromaculatus	188	99		
	SUM:	186		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-8	>8	12	8	3
NUMBER OF DARTER SP.	<2	2	>2	3	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	3	5
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		76.3	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		5.4	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		5.4	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		1.6	5
CATCH RATE	<16	16-32	>32		16.6	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		3.2	3
						38

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

POOR-FAIR

WHISTLE CREEK BENTHIC DATA
FIELD COLLECTION # 564
EFFORT = 2.0 PERSON HOURS

TAXA RICHNESS = 24
EPT TAXA RICHNESS = 8
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				18.2
	Dryopidae	*Helichus* adults	3	
	Elmidae	*Stenelmis* larvae	2	
	Psephenidae	*Psephenus herricki*	15	
DIPTERA				11.8
	Athericidae	*Atherix lantha*	1	
	Chironomidae		5	
	Tipulidae	*Hexatoma*	1	
		Tipula	6	
EPHEMEROPTERA				1.8
	Baetidae	*Baetis*	1	
	Heptageniidae	*Stenonema vicarium*	1	
HEMIPTERA				6.4
	Gerridae	*Gerris conformis*	2	
		G. remigis	4	
		Trepobates pictus	1	
MEGALOPTERA				9.1
	Corydalidae	*Nigronia fasciatus*	1	
		N. serricornis	7	
	Sialidae	*Sialis*	2	
ODONATA				8.2
	Aeshnidae	*Boyeria vinosa*	5	
	Cordulegastridae	*Corduelgaster maculata*	3	
	Gomphidae	*Gomphus lividus*	1	
PLECOPTERA				17.3
	Peltoperlidae	*Peltoperla*	3	
	Perlidae	*Acroneuria carolinensis*	5	
		Perlesta	8	
	Perlodidae	*Malirekus/Yugus early instars*	3	
TRICHOPTERA				27.3
	Hydropsychidae	*Cheumatopsyche*	20	
		Hydropsyche betteni/depravata	10	
		TOTAL	**110**	

Little Elk Creek

One IBI fishery survey was conducted on Little Elk Creek in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork of the Cumberland River). The sample area was located approximately 200 ft upstream from the confluence of Elk Fork Creek and Little Elk Creek. Sample length was approximately 500 ft and was sampled on 13 July 1994.

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

Water Quality - (See physicochemical data sheet)

Benthos Collection - (See benthic data form)

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

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

A total of 124 fish representing 14 species was collected during our survey. Six game species including largemouth bass (*Micropterus salmoides*), redbreast sunfish (*Lepomis auritus*), green sunfish (*L. cyanellus*), warmouth (*L. gulosus*), bluegill (*L. macrochirus*), and longear sunfish (*L. megalotis*) were collected. Two non-game species and six forage species were also collected. These included white sucker (*Catostomus commersoni*), northern hogsucker (*Hypentelium nigricans*), central stoneroller (*Campostoma anomalum*), rainbow darter (*Etheostoma caeruleum*), stripetail darter (*E. kennicotti*), rosyface shiner (*Notropis r. rubellus*), bluntnose minnow (*Pimephales notatus*), and creek chub (*Semotilus atromaculatus*). The most abundant species collected in our sample was the rainbow darter. Additional sampling upstream in Little Elk Creek and Barley Branch produced one species not collected in the IBI sample, the arrow darter (*Etheostoma sagitta*).

Based on the Index of Biotic Integrity (IBI) score (40) this stream rated as "fair". This score is indicative of deterioration of stream health as intolerant forms are eliminated and trophic structure becomes skewed. The only top predators collected were three largemouth bass, which were all 4 inches or less in length. This was also indicative of deteriorating stream health as older age

classes of these types of fish become rare in degraded habitats.

Benthic macroinvertebrates from our sample included Ephemeridae and Heptageniidae mayflies, Glossosomatidae, Hydropsychidae, Leptoceridae, Limnephilidae, and Polycentropodidae caddisflies, and Dryopidae and Elmidae beetles. Gastropods included pleurocerid snails. Both trichopterans and dipterans represented 18.4%, while ephemeropterns, coleopterans, and odonates accounted for 17.7%, 7.0%, and 12.0%, respectively. A total of 34 taxa was collected at this site with 10 being EPT taxa. This EPT taxa richness value resulted in this site receiving a bioclassification of "fair".

Management Recommendations:

1. Anything to alleviate non-point source pollution as well as "straight-piping" from residential property would be beneficial to this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE ELK CREEK
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CAMPBELL
QUADRANGLE	JELLICO WEST 4157 SW
LAT-LONG	363242N-841023W
REACH	05130101-104.0
LENGTH	~ 500 FT
AREA	7.02 SQ. MI.
ELEVATION	1000 FT
DATE	7-13-94
TIME	0930

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND PAUL STODOLA

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
13.3 FT	0.6 FT	1.1 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		15	50	20	15	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) 2.6 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY W/ SCATTERED T-STORMS
AIR TEMP. 76 F @ 0950

10. PAST WEATHER (last 24 hrs)

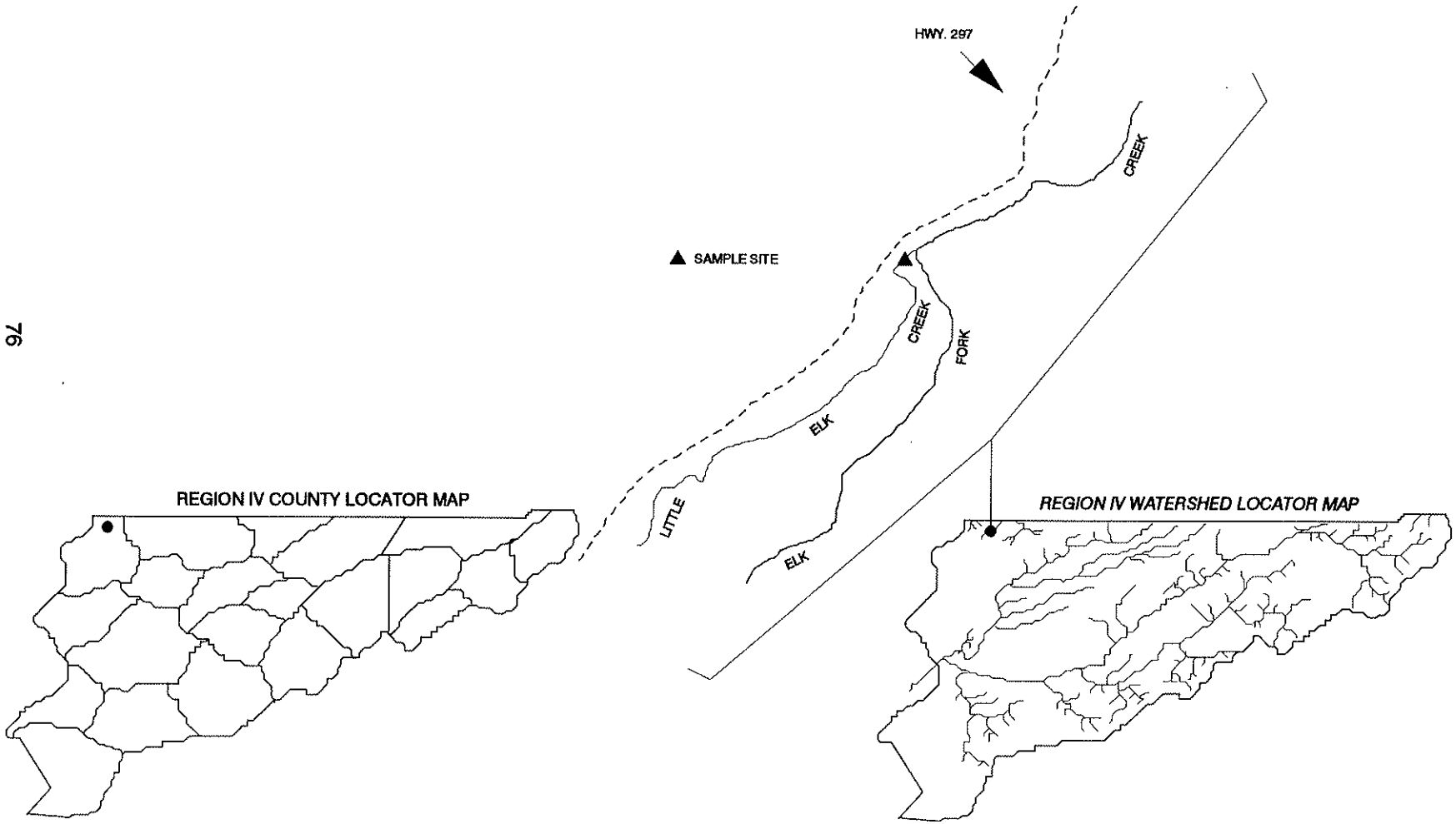
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	72 F	205	7.6	86.7

12. COMMENTS:

SAMPLE STATION BEGAN JUST UPSTREAM OF MOUTH. CREEK HAS A FAIRLY UNIFORM WIDTH. SOME REFUSE IN CREEK AND ALONG MARGINS. HIGH ABUNDANCE OF SNAILS IN ELK FORK CREEK BUT QUICKLY DISAPPEAR IN LITTLE ELK CREEK.



LITTLE ELK CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	11		
Catostomus commersoni	195	2		
Etheostoma caeruleum	401	41		
Etheostoma kennicotti	418	14		
Hypentelium nigricans	207	6		
Lepomis auritus	346	21	2-5	
Lepomis cyanellus	347	1	4	
Lepomis gulosus	349	1	4	
Lepomis macrochirus	351	1	3	
Lepomis megalotis	353	14	2-4	
Lepomis sp. (hybrid)		1	4	
Micropterus salmoides	364	3	3-4	
Notropis r. rubellus	131	2		
Pimephales notatus	176	2		
Semotilus atromaculatus	188	4		
	SUM:	124		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-11	>11	17	13	5
NUMBER OF DARTER SP.	<2	2	>2	4	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	4	5
NUMBER OF SUCKER SP.	<1	1	>1	2	2	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		5.6	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		3.2	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		46	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		2.4	3
CATCH RATE	<16	16-32	>32		12.7	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0.8	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		5.6	1
						40 **FAIR**

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

LITTLE ELK CREEK BENTHIC DATA
FIELD COLLECTION # 565
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 34
EPT TAXA RICHNESS = 10
BIOCLASSIFICATION = 2 (FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				1.3
	Hirudinea		1	
	Oligochaeta		1	
COLEOPTERA				7
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Dubiraphia* larva, adults	6	
		Optioservus larva, adult	2	
	Psephenidae	*Psephenus herricki*	2	
DIPTERA				18.4
	Athericidae	*Atherix lantha*	24	
	Ceratopogonidae	*Palpomyia complex*	1	
	Chironomidae		2	
	Simuliidae		2	
EPHEMEROPTERA				17.7
	Ephemeridae	*Ephemera*	2	
	Heptageniidae	*Stenacron interpunctatum*	4	
		Stenonema femoratum	5	
		S. vicarium	17	
GASTROPODA				2.5
	Pleuroceridae		4	
HEMIPTERA				7
	Gerridae	*Gerris conformis*	8	
		Trepobates pictus	1	
	Nepidae	*Ranatra nigra*	1	
	Veliidae	*Rhagovelia obesa* nymph	1	
HYDRACARINA			3	1.9
MEGALOPTERA				8.9
	Corydalidae	*Corydalis cornutus*	2	
		Nigronia serricornis	10	
	Sialidae	*Sialis*	2	
ODONATA				12
	Aeshnidae	*Boyeria vinosa*	11	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus lividus*	6	
		Lanthus early instar	1	
PELECYPODA				5.1
	Sphaeriidae	*Sphaerium*	8	
TRICHOPTERA				18.4
	Glossosomatidae	*Glossosoma*	1	
	Hydropsychidae	*Cheumatopsyche*	19	
		Hydropsyche betteni/depravata	3	
	Leptoceridae	*Triaenodes*	1	
	Limnephilidae	*Pycnopsyche*	4	
	Polycentropodidae	*Polycentropus*	1	
		TOTAL	**158**	

Lick Fork

One IBI fishery survey was conducted on Lick Fork in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork). The sample area was located at the bridge crossing on John Baird Road. Sampling was conducted upstream and downstream of the bridge with a total sample length of approximately 400 ft. The site was sampled on 20 July 1994.

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

Water Quality - (See physicochemical and 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 stream health and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream.

A total of 302 fish representing 12 species was collected from our sample. Two game species, two non-game species, and eight forage species were collected in our sample. These included: redbreast sunfish *(Lepomis auritus)*, bluegill *(L. macrochirus)*, white sucker *(Catostomus commersoni)*, northern hog sucker *(Hypentelium nigricans)*, central stoneroller *(Campostoma anomalum)*, rainbow darter *(Etheostoma caeruleum)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, rosefin shiner *(Lythrurus ardens)*, blackside dace *(Phoxinus cumberlandensis)*, bluntnose minnow *(Pimephales notatus)*, and creek chub *(Semotilus atromaculatus)*.

Probably the most significant finding of our survey was the extremely high density of blackside dace in this stream section. Of all the populations surveyed in the Clear Fork drainage this population was the strongest. We collected a total of 135 blackside dace with good representation of all age and size classes. This finding is of substantial importance as this was a previously undocumented population. Given that this was the most dense population surveyed in the Clear Fork drainage, it could serve as a source of fish for reintroduction efforts.

Our Index of Biotic Integrity (38) indicated that this stream was in "poor to fair" condition. The metrics that had the greatest negative influence on the overall score were the low overall percentage of fish categorized as specialized insectivores (i.e. darters), The absence of fish designated as intolerant, and the absence of piscivorous species (i.e. bass). There was evidence of non-point source as fine sediments were relatively abundant in pool areas. Additionally, there were some coal fines in the stream substrate.

Benthic macroinvertebrates from our sample represented 30 taxa and included Baetidae, Ephemeridae, Heptageniidae, and Oligoneuriidae mayflies, Perlidae and Perlodidae stoneflies, Hydropsychidae and Limnephilidae caddisflies, and Dryopidae and Elmidae beetles. Both trichopterans and dipterans contributed 28.9% to the total number of organisms collected. While ephemeropterans and plecopterans comprised 15.4% and 3.4%, respectively. Based on the EPT taxa richness, the stream section we surveyed received a bioclassification of "fair".

Management Recommendations:

1. Watershed protection should be of the highest priority as this stream contains an excellent population of blackside dace. Any actions to mitigate non-point source pollution and the discharge of residential waste into this stream would be of benefit.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LICK FORK
WATERSHED	CLEAR FORK
SITE	JOHN BAIRD RD. X-ING
COUNTY	CAMPBELL
QUADRANGLE	PIONEER 128 NE
LAT-LONG	362817N-841712W
REACH	05130101-
LENGTH	~ 400 FT
AREA	6.23 SQ. MI.
ELEVATION	1180 FT
DATE	7-20-94
TIME	0924

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
18.4 FT	0.75 FT	1.8 FT

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SPARSE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) COMPARED TO NORMAL

FLOW (CFS)	LOW	NORMAL	HIGH
3.0		X	

9. PRESENT WEATHER

PT. CLOUDY; HOT AND HUMID
AIR TEMP. 82 F @ 0935

10. PAST WEATHER (last 24 hrs)

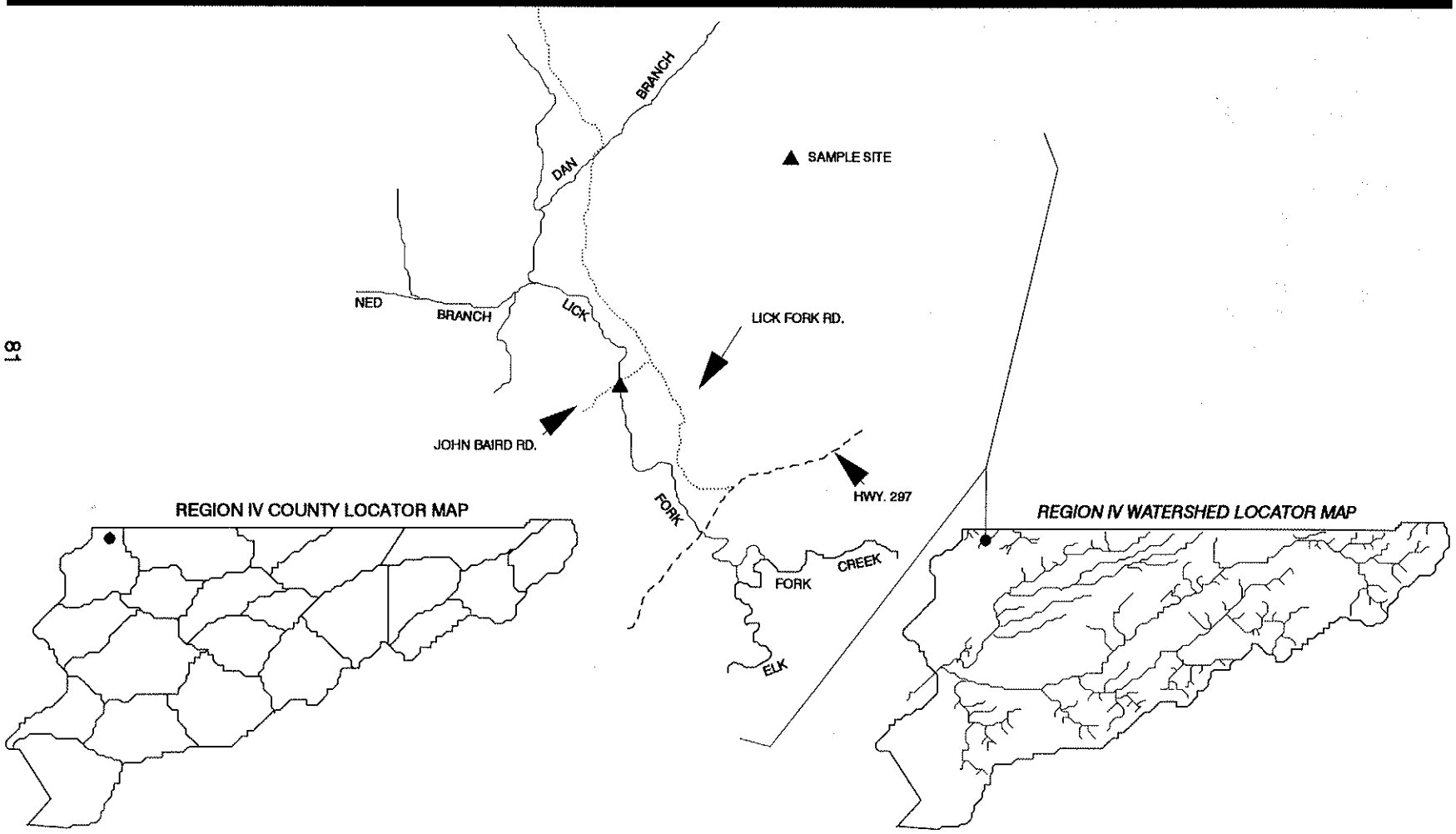
HOT AND HUMID
SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	70 F	290	8.4	95.0

12. COMMENTS:

SAMPLED UPSTREAM AND DOWNSTREAM OF JOHN BAIRD RD. CROSSING. SOME COAL FINES IN STREAM SUBSTRATE.



LICK FORK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	43		
Catostomus commersoni	195	2		
Etheostoma caeruleum	401	11		
Etheostoma kennicotti	418	24		
Etheostoma sagitta	433	2		
Hypentelium nigricans	207	1		
Lepomis auritus	346	20	1-4	2960
Lepomis macrochirus	351	1	3	
Lythrurus ardens	93	8		
Phoxinus cumberlandensis	166	135		
Pimephales notatus	176	11		
Semotilus atromaculatus	188	44		
	SUM:	302		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-11	>11	17	11	3
NUMBER OF DARTER SP.	<2	2	>2	4	3	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	1	1
NUMBER OF SUCKER SP.	<1	1	>1	2	2	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		15.2	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		4.3	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		14.9	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		0	1
CATCH RATE	<16	16-32	>32		36.8	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		3.6	3
					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**

LICK FORK BENTHIC DATA
FIELD COLLECTION # 575
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 30
EPT TAXA RICHNESS = 10
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.7
	Oligochaeta		1	
COLEOPTERA				3.4
	Dryopidae	*Helichus* adults	4	
	Elmidae	*Dubiraphia* adult	1	
DIPTERA				28.9
	Athericidae	*Atherix lantha*	22	
	Chironomidae		11	
	Simuliidae		4	
	Tipulidae	*Antocha*	1	
		Hexatoma	3	
		Tipula	2	
EPHEMEROPTERA				15.4
	Baetidae	*Baetis*	2	
	Ephemeridae	*Ephemera*	3	
	Heptageniidae	*Stenonema vicarium*	15	
	Oligoneuriidae	*Isonychia*	3	
HEMIPTERA				7.4
	Gerridae	*Gerris remigis*	5	
		Trepobates pictus	2	
	Veliidae	*Rhagovelia obesa*	4	
MEGALOPTERA				4.7
	Corydalidae	*Nigronia serricornis*	5	
	Sialidae	*Sialis*	2	
ODONATA				7.4
	Aeshnidae	*Boyeria vinosa*	2	
	Cordulegastridae	*Cordulegaster maculata*	1	
		Cordulegaster o. obliquua	1	
	Cordulidae		3	
	Gomphidae	*Gomphus lividus*	3	
		Stylogomphus albistylus	1	
PLECOPTERA				3.4
	Perlidae	*Acroneuria carolinensis*	4	
	Perlodidae	*Malirekus/Yugus*	1	
TRICHOPTERA				28.9
	Hydropsychidae	*Cheumatopsyche*	18	
		Diplectrona modesta	1	
		Hydropsyche betteni/depravata	22	
	Limnephilidae	*Pycnopsyche*	2	
		TOTAL	**149**	

Terry Creek

One IBI fishery survey was conducted on Terry Creek in July 1994:

Location and Length - Tributary to Elk Fork Creek (Clear Fork of the Cumberland River). The sample station began just downstream of the Hwy. 297 crossing and extended upstream to the bridge crossing on Terry Creek Road. Sample site length was approximately 400 ft and was sampled on 1 July 1994.

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

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Terry Creek was sampled primarily to assess the relative health of the stream and to develop afish species diversity list for TADS. We were also interested in determining the status of the blackside dace *(Phoxinus cumberlandenesis)* population in this stream.

We collected a total of 288 fish representing 12 species in our survey. The only game species collected was the longear sunfish *(Lepomis megalotis)*. Two non-game and nine forage species: white sucker *(Catostomus commersoni)*, northern hogsucker *(Hypentelium nigricans)*, emerald darter *(Etheostoma baileyi)*, rainbow darter *(E. caeruleum)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, rosefin shiner *(Lythrurus ardens)*, blackside dace *(Phoxinus cumberlandensis)*, bluntnose minnow *(Pimephales notatus)*, and creek chub *(Semotilus atromaculatus)* were collected from this site. Creek chub and stripetail darter were the two dominant species collected in our sample. Additionally, we were able to collect 15 blackside dace during our survey. Apparently, our survey area was near the most downstream end of the population as hundreds of blackside dace had been observed further upstream during a previous survey by U.S. Fish and Wildlife (USFWS) biologists (Dave Pelren, USFWS personal communication). An additonal survey of an Elk Fork Creek tributary, Coontail Branch, was made after the Terry Creek sample. We were interested in locating a blackside dace population in this stream as it was speculated that it might contain a population (O'Bara 1988). We were able to collect this species from the Hwy 297 bridge upstream for approximately 300 yds. This

collection of blackside dace represents a previously undocumented population.

Our Index of Biotic Integrity evaluation indicated this stream was in "good" condition based on a score of 48. Total species richness was somewhat below what was expected, however, individual groups such as darters and suckers were within expected values. The relatively high percentage of tolerant species as well as the absence of piscivores had the strongest negative influence on the overall score.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, and Heptageniidae mayflies, Leuctridae and Perlidae stoneflies, and Hydropsychidae caddisflies. Dipterans contributed 45.1% to the total number of organisms collected followed by ephemeropterans with 23.2%. Plecopterans and trichopterans were the next most abundant groups contributing 7.3% and 11%, respectively. Overall, a total of 20 taxa was collected from this site. EPT taxa richness was relatively low (8), resulting in this stream receiving a bioclassification of "fair".

Upon completing our sample at this location we proceeded upstream to an area that was being extensively logged. We observed several areas where skidder roads were crossing the stream or were paralleling in close proximity to the stream. The riparian zone in several area had been cut and slash deposited in the stream. Siltation was heavy in this portion of the stream and was probably impacting downstream areas. Tennessee Department of Environment and Conservation (TDEC) was informed of our findings on Terry Creek. A biologist from TDEC and a forester from Tennessee Division of Forestry investigated the operation and met with the person conducting the logging. A formal letter of their findings which included mitigation recommendations was sent to the person in charge of the logging operation.

Management Recommendations:

1. Watershed protection should be a high priority as this stream currently contains a good population of blackside dace. As with other streams in this region, dumping of residential waste is a concern. Anything to alleviate this practice would be of benefit to the stream.

2. A follow-up check of the logging activities in this watershed should be done.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	TERRY CREEK
WATERSHED	CLEAR FORK
SITE	@ HWY. 297 X-ING
COUNTY	CAMPBELL
QUADRANGLE	PIONEER 128 NE
LAT-LONG	362634N-841334W
REACH	05130101-
LENGTH	~ 400 FT
AREA	4.60 SQ. MI.
ELEVATION	1170 FT
DATE	7-1-94
TIME	0940

COLLECTOR(S)

CARL E. WILLIAMS AND BART D. CARTER

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
5	15	10	40	25	5	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	15	45	30	5	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SPARSE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 1.6 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY; HOT AND HUMID
AIR TEMP. 79 F @ 0945

10. PAST WEATHER (last 24 hrs)

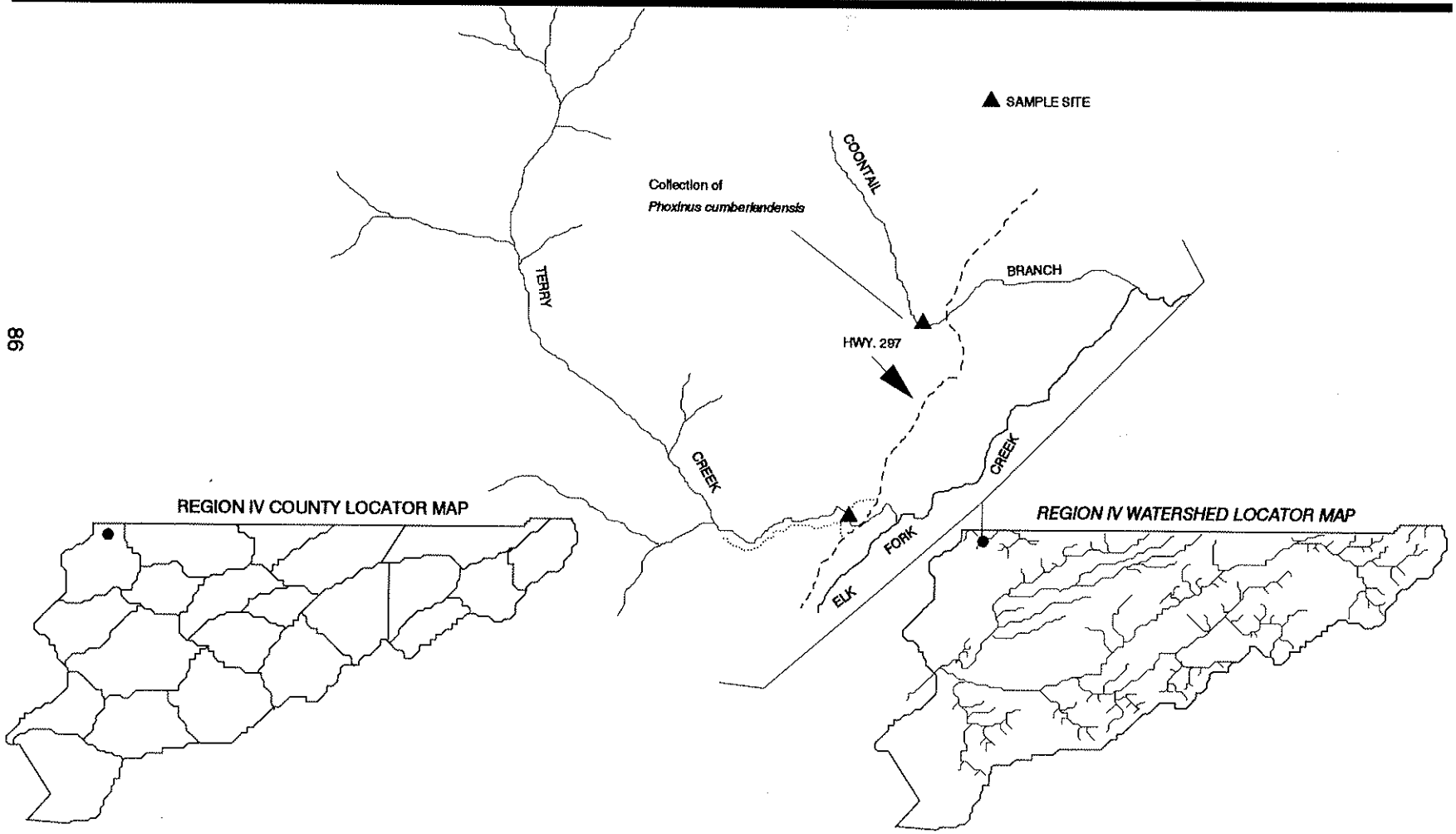
HOT AND HUMID; SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	68 F	120	9.1	96.5

12. COMMENTS:

SAMPLE STATION BEGAN JUST BELOW HWY. 297 CROSSING AND EXTENDED UPSTREAM TO THE BRIDGE ON TERRY CREEK RD. WATER TURBID; HIGH OCCURENCE OF REFUSE IN AND ALONG STREAM.



TERRY CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	31		
Catostomus commersoni	195	5		
Etheostoma baileyi	394	4		
Etheostoma caeruleum	401	32		
Etheostoma kennicotti	418	67		
Etheostoma sagitta	433	6		
Hypentelium nigricans	207	7		
Lepomis megalotis	353	1		
Lythrurus ardens	93	25		
Phoxinus cumberlandensis	166	15		
Pimephales notatus	176	5		
Semotilus atromaculatus	188	90		
	SUM:	288		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-10	>10	16	12	5
NUMBER OF DARTER SP.	<2	2	>2	4	4	5
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3
NUMBER OF SUCKER SP.	0		>0	1	2	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		33	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		3.5	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		46.5	5
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		45.5	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
						48

GOOD

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

TERRY CREEK BENTHIC DATA
FIELD COLLECTION # 559
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 20
EPT TAXA RICHNESS = 8
BIOCLASSIFICATION (EPT) = 2 (FAIR)

	TAXA		NUMBER	PERCENT
COLEOPTERA				2.4
	Gyrinidae	*Dineutus assimilis*	1	
	Psephenidae	*Psephenus herricki*	1	
DIPTERA				45.1
	Athericidae	*Atherix lantha*	27	
	Chironomidae		2	
	Simuliidae		1	
	Tipulidae	*Hexatoma*	7	
EPHEMEROPTERA				23.2
	Baetidae	*Baetis*	2	
	Ephemerellidae	*Drunella*	4	
	Heptageniidae	*Stenonema sp.*	1	
		Stenonema vicarium	12	
HEMIPTERA				4.9
	Gerridae	*Gerris conformis*	1	
		G. remigis	3	
ODONATA				6.1
	Aeshnidae	*Boyeria grafiana*	1	
	Calopterygidae	*Calopteryx*	1	
	Gomphidae	*Gomphus lividus*	2	
		Lanthus early instar	1	
PLECOPTERA				7.3
	Leuctridae	*Leuctra*	1	
	Perlidae	*Acroneuria carolinensis*	5	
TRICHOPTERA				11
	Hydropsychidae	*Cheumatopsyche*	7	
		Hydropsyche betteni/depravata	2	
		TOTAL	**82**	

Crouches Creek

One IBI fishery survey was conducted on Crouches Creek in July 1994:

Location and Length - Tributary to the Clear Fork (Cumberland River). The sample area was located approximately 0.75 mi upstream from the mouth. The survey length was approximately 1,000 ft and was sampled on 28 July 1994.

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

Water Quality - (See physicochemical and 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 surveyed to evaluate the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

We collected a total of 126 fish representing six species. The only game fish collected in our survey was one hybrid sunfish *(Lepomis sp.)*. The remaining six species collected were all forage species. These included the central stoneroller *(Campostoma anomalum)*, rainbow darter *(Etheostoma caeruleum)*, stripetail darter *(E. kennicotti)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. Blacknose dace and creek chubs were the most abundant species present.

Based on our Index of Biotic Integrity analysis evaluation this reach of Crouches Creek received a classification of "poor" based on an IBI score of 28. Half of the IBI metrics scored below average with only two scoring above average. Probably the most notable negative influences on the overall score were the high percentage of tolerant fish species, the low percentage of trophic specialists (i.e., darters), and the absence of piscivores. These are classic indicators of a stream system that has undergone severe degradation. In support of this, we observed a thin oil sheen in the creek associated with a strong petroleum smell. It is believed that the petroleum product(s) was originating from run off associated with fueling centers located adjacent to Interstate 75 at

Jellico. Additionally, there was an unusually high occurrence of residential refuse in and along the stream.

Benthic macroinvertebrates collected from this reach of Crouches Creek included only one EPT taxa, with more tolerant forms dominating the overall sample. Dipterans accounted for 50% of the total sample while odonates comprised 39.5%. Plecopterans were represented by a single family which only comprised 1.3% of the total sample. A total of 13 taxa was collected from this site. Based on this EPT taxa richness value, this reach of stream received an unsurprising bioclassification rating of "poor".

Management Recommendations:

1. This stream is suffering severely from non-point source pollution. Any action that could address the non-point pollution issue would be beneficial.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	CROUCHES CREEK
WATERSHED	CLEAR FORK
SITE	~ 0.25 MI EAST OF I-75
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363507N-840608W
REACH	05130101-
LENGTH	~ 1000 FT
AREA	1.53 SQ. MI.
ELEVATION	980 FT
DATE	7-28-94
TIME	0800

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
5.1 FT	0.7 FT	1.8 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	20	60	15		

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 1.7 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

CLOUDY AND MILD

AIR TEMP. 67 F @ 0835

10. PAST WEATHER (last 24 hrs)

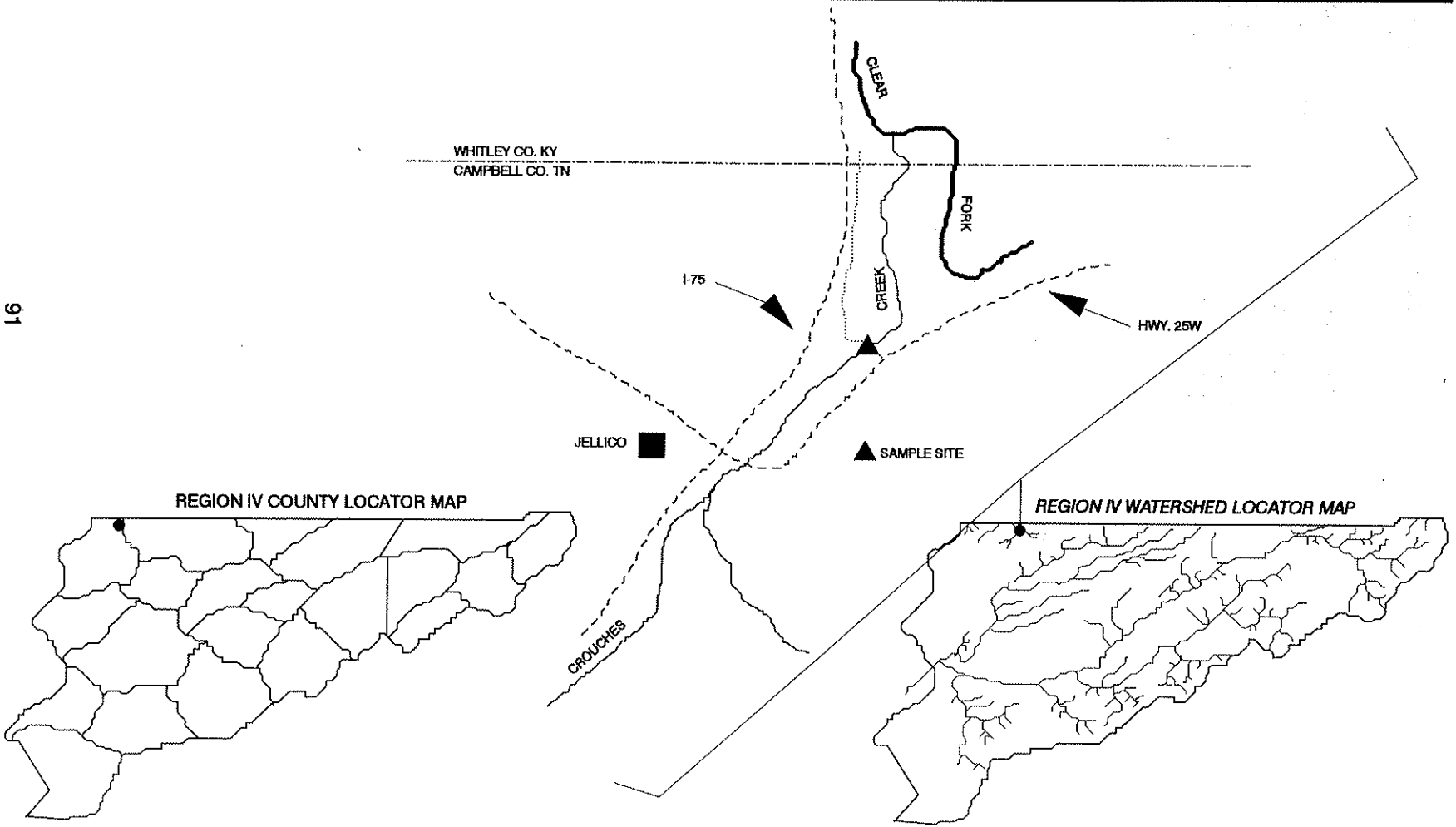
PT. CLOUDY MILD

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.5	68 F	330	7.7	85.3

12. COMMENTS:

STREAM EXTREMELY TURBID. HIGH OCCURENCE OF RESIDENTIAL REFUSE. OIL SHEEN AND HEAVY PETROLEUM ODOR PRESENT AT TIME OF SAMPLE. PETROLEUM PRODUCTS PROBABLY CONTAINED IN RUN-OFF FROM SURROUNDING PAVED AREAS.



CROUCHES CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	5		
Etheostoma caeruleum	401	3		
Etheostoma kennicotti	418	1		
Lepomis sp. (hybrid)		1	4	
Pimepahles notatus	176	1		
Rhinichthys atratulus	184	46		
Semotilus atromacualtus	188	69		
	SUM:	126		

INDEX OF BITOIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<3	3-6	>6	10	6	3
NUMBER OF DARTER SP.	<2	2	>2	3	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<1	1	>1	2	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		54.8	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0.8	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		3.2	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		18.9	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0.8	3
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		1.6	5
						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**

CROUCHES CREEK BENTHIC DATA
FIELD COLLECTION # 585
EFFORT = 0.75 PERSON HOURS

TAXA RICHNESS = 13
EPT TAXA RICHNESS = 1
BIOCLASSIFICATION (EPT) = 1 (POOR)

TAXA			NUMBER	PERCENT
ANNELIDA				2.6
	Hirudinea		1	
	Oligochaeta		1	
COLEOPTERA				1.3
	Dryopidae	*Helichus* adult	1	
DIPTERA				50
	Chironomidae		37	
	Stratiomyidae	*Stratiomys*	1	
HEMIPTERA				3.9
	Gerridae	*Gerris conformis*	3	
MEGALOPTERA				1.3
	Sialidae	*Sialis*	1	
ODONATA				39.5
	Aeshnidae	*Boyeria vinosa*	7	
	Coenagrionidae	*Argia*	3	
	Cordulegastridae	*Cordulegaster maculata*	4	
	Gomphidae	*Gomphus lividus*	10	
		Stylogomphus albistylus	6	
PLECOPTERA				1.3
	Chloroperlidae		1	
		TOTAL	**76**	

Hickory Creek (Site 1)

This was one of two IBI fishery surveys conducted on Hickory Creek in October 1994:

Location and Length - Tributary to the Clear Fork (Cumberland River). The sample area was located approximately 0.4 mi by road upstream of the of the Chaska Rd. Bridge and extended downstream to the bridge. The sample reach was approximately 800 ft in length and was sampled on 25 October 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 250 VAC, a 15 ft seine, and a boat electrofishing unit operating at 240 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - This portion of Hickory Creek was sampled primarily to evaluate stream health based on the fish and benthic communities and to develop a fish species diversity list for TADS. The Agency has made no previous collections or studies of this stream.

We collected a total 745 fish representing 22 species. Eight game species were collected from this site. These included rock bass *(Abmloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, bluegill *(L. macrochirus)*, longear sunfish *(L. megalotis)*, smallmouth bass *(Micropterus dolomieu)*, spotted bass *(M. punctulatus)*, and largemouth bass *(M. salmoides)*. Based on our sample it appears that there is a fairly good spotted bass fishery here as we collected a total of 32 which ranged up to the 14-in class. Additionally, we collected 67 longear sunfish ranging up to the 6-in class. Two non-game and 12 forage species were also collected from this site. Of special interest was the collection of three state listed species, the emerald darter *(Etheostoma baileyi)*, arrow darter *(E. sagitta)*, and rosyface shiner *(Notropis r. rubellus)*. Central stonerollers *(Campostoma anomalum)* and rosyface shiners were the most abundant species collected in our sample.

Our Index of Biotic Integrity evaluation (46) indicated that this stream was in "fair to good" condition based on the fish community present. Probably the most notable negative influence on the overall IBI score was the relatively high occurrence of anomalies on the fish. The

most frequent anomalies noticed on the fish were black grub, leeches, and various types of lesions.

Benthic macroinvertebrates collected at this site included Baetidae, Caenidae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies, Capniidae, Perlidae, and Taeniopterygidae stoneflies, and Hydropsychidae, Philopotamidae, and Phryganeidae caddisflies. We also collected several gastropods including representatives from the families Ancylidae, Lymnaeidae, Physidae, Planorbidae, and Pleuroceridae. Overall, ephemeropterans comprised 34.0% of the sample followed by trichopterans and odonates at 23.6% and 15.6%, respectively. Plecopterans only comprised 2.8% of the total number of organisms collected. A total of 44 taxa was collected of which 17 were EPT taxa. Based the EPT value, this portion of Hickory Creek received a bioclassification of "good-fair".

Management Recommendations:

1. Based on the number of *Lepomis sp.* and *Micropterus sp.* collected in our sample, this portion of Hickory Creek does support a fair fishery. Furthermore, the collection of the three state listed species does warrant extra protection for this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	HICKORY CREEK (SITE 1)
WATERSHED	CLEAR FORK
SITE	CHASKA
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363131N-840442W
REACH	05130101-18.0
LENGTH	~ 800 FT
AREA	48.0 SQ. MI.
ELEVATION	1129 FT
DATE	10-25-94
TIME	1000

COLLECTOR(S)

BART D. CARTER, CARL E. WILLIAMS AND JOHN BAXTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
37.7 FT	0.9 FT	4.0 + FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 30 %

8. FLOW (CFS) 18.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND COOL
AIR TEMP. 49 F @ 1009

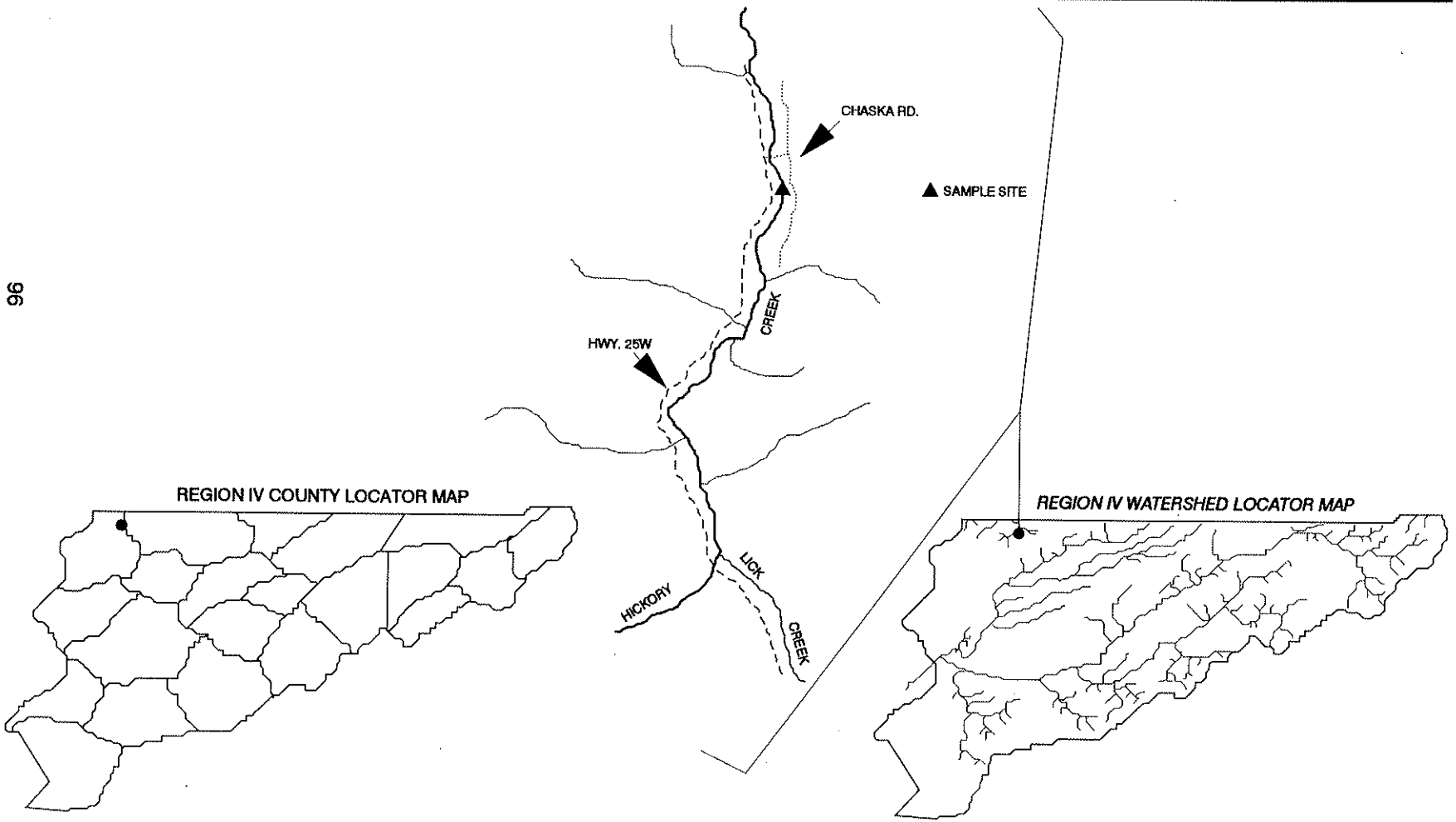
10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
6.5	55 F	380	9.3	88.2

12. COMMENTS:
SAMPLE STATION LOCATED ~ 0.4 MI UPSTREAM OF CHASKA RD. BRIDGE. STREAM MARGINS ALTERED BY LIVESTOCK.



HICKORY CREEK FISH DATA (SITE 1)

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15' SEINE, ONE BACKPACK UNIT @ 125 VAC AND ONE BOAT UNIT @ 240 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	24	2-10	4.66
Campostoma anomalum	45	165		
Cyprinella galactura	54	37		
Cyprinella spiloptera	57	5		
Etheostoma baileyi	394	18		
Etheostoma blennioides	398	2		
Ethesotoma caeruleum	401	1		
Etheostoma kennicotti	418	17		
Etheostoma sagitta	433	6		
Hypentelium nigricans	207	29		
Ictalurus punctatus	240	8	10-18	10.24
Lepomis auritus	346	15	1-6	0.86
Lepomis sp. (hybrid)		1	5	0.13
Lepomis macrochirus	351	11	2-6	1.56
Lepomis megalotis	353	67	1-6	6.24
Luxilus chrysocephalus	89	12		
Micropterus dolomieu	362	9	4-6	0.41
Micropterus punctulatus	363	32	1-14	10.38
Micropterus salmoides	364	1	8	0.3
Moxostoma erythrurum	225	59		
Notropis r. rubellus	131	213		
Percina caprodes	464	3		
Pimephales notatus	176	10		
	SUM:	745		

INDEX OF BIOTIC INTEGRITY (HICKORY CREEK SITE 1)

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<10	10-20	>20	31	21	5	
NUMBER OF DARTER SP.	<2	2-4	>4	7	6	5	
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	3	3	
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3	
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5	
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		2.3	5	
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		4.1	5	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		35.1	3	
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		8.9	5	
CATCH RATE	<16	16-32	>32		23.2	3	
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0.1	3	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		10.9	1	
						46	**FAIR-GOOD**

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

HICKORY CREEK (SITE 1) BENTHIC DATA
FIELD COLLECTION # 626
EFFORT = 3.0 PERSON HOURS

TAXA RICHNESS = 44
EPT TAXA RICHNESS = 17
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				1.4
	Oligochaeta		3	
COLEOPTERA				3.5
	Elmidae	*Dubiraphia* adult	1	
	Gyrinidae	*Dineutus discolor*	1	
		Gyrinus	2	
DIPTERA				9.4
	Athericidae	*Atherix lantha*	11	
	Chironomidae		3	
	Tabanidae	*Tabanus*	1	
	Tipulidae	*Tipula*	5	
EPHEMEROPTERA				34
	Baetidae	*Baetis*	1	
	Caenidae	*Caenis*	1	
	Hetpageniidae	*Stenacron*	1	
		Stenonema vicarium	33	
	Leptophlebiidae	*Leptophlebia*	1	
		Paraleptophlebia	1	
	Oligonuriidae	*Isonychia*	34	
GASTROPODA				2.4
	Ancylidae	*Ferrissia*	1	
	Lymnaeidae		1	
	Physidae	*Physa*	1	
	Planorbidae		1	
	Pleuroceridae		1	
HEMIPTERA				3.3
	Nepidae	*Ranatra nigra*	1	
	Veliidae	*Rhagovelia obesa*	6	
MEGALOPTERA				5.7
	Corydalidae	*Corydalus cornutus*	6	
		Nigronia serricornis	2	
	Sialidae	*Sialis*	4	
ODONATA				15.6
	Aeshnidae	*Boyeria vinosa*	8	
	Calopterygidae	*Calopteryx*	5	
	Coenagrionidae	*Argia*	2	
		Enallagma	2	
	Cordulegastridae	*Corduelgaster maculata*	1	
	Gomphidae	*Gomphus lividus*	6	
		Progomphus obscurus	2	
		Stylogomphus albistylus	1	
	Macromiidae	*Macromia*	6	
PLECOPTERA				2.8
	Capniidae		1	
	Perlidae	*Acroneuria abnormis*	3	
		A. lycorias	1	
	Taeniopterygidae	*Taeniopteryx*	1	
TRICHOPTERA				23.6
	Hydropsychidae	*Ceratopsyche bronta*	4	
		C. sparna	2	
		Cheumatopsyche	10	
		Hydropsyche dicantha	27	
	Philopotamidae	*Chimara*	4	
	Phryganeidae	*Ptilostomis*	3	
		TOTAL	**212**	

Hickory Creek (Site 2)

This was one of two IBI fishery surveys conducted on Hickory Creek in October 1994:

Location and Length - Tributary to the Clear Fork (Cumberland River). The sample area began at the Rock Creek Rd. bridge and extended upstream to the confluence of Hickory Creek and Stinking Creek. The sample site was approximately 500 ft in length and was sampled on 18 October 1994.

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

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - This was the most upstream Hickory Creek sample and as with other samples in the Clear Fork drainage we wanted to assess stream health and develop a fish species diversity list for TADS. The agency has made no previous collections from this stream.

We collected a total of 266 fish representing 18 species. Seven game species were collected from this site which included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, bluegill *(L. macrochirus)*, longear sunfish *(L. megalotis)*, smallmouth bass *(Micropterus dolomieu)*, spotted bass *(M. punctulatus)*, and largemouth bass *(M. salmoides)*. We collected ten smallmouth bass which was the most abundant game fish followed by spotted bass. In both cases we collected individuals ranging up to the 7-in class. Other fish collected included two non-game species and nine forage species. Of the forage species collected three were fishes listed in need of management by the state. These were the emerald darter *(Etheostoma baileyi)*, arrow darter *(E. sagitta)*, and the rosyface shiner *(Notropis r. rubellus)*. Central stonerollers *(Campostoma anomalum)*, and rosyface shiners were the most abundant species collected in our sample.

The Index of Biotic Integrity indicated this stream was in "good" condition based on an IBI score of 48. All of the metrics scored average or above with the exception of the catch rate metric. This was the lowest scoring metric which may indicate some form of stream degradation which is being manifested in lower fish population densities. Overall,

this portion of Hickory Creek appeared to be in better condition than most streams in the Clear Fork drainage.

Our benthic collection from this site yielded a total of 38 taxa. These included Baetidae, Heptageniidae, and Oligoneuriidae mayflies, Perlidae stoneflies, and Hydropsychidae, Limnephilidae, Philopotamidae, and Phyriganeidae caddisflies. Gastropods collected included Pleurocerid snails. Trichopterans accounted for the highest percentage (30.3) of the total sample followed by ephemeropterans at 29.7%. Dipterans accounted for 12.6% while plecopterans comprised only 0.6% of the total number of organisms collected. The bioclassification for this portion of Hickory Creek was "fair" based on an EPT taxa richness of 12.

Management Recommendations:

1. This portion of Hickory Creek does support a fair to good fishery based on our collection. The collection of three state listed species warrants extra protection for this watershed.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	HICKORY CREEK (SITE 2)
WATERSHED	CLEAR FORK
SITE	@ STINKING CREEK
COUNTY	CAMPBELL
QUADRANGLE	LAFOLLETTE 136 NE
LAT-LONG	362949N-840631W
REACH	05130101-18.0
LENGTH	~ 500 FT
AREA	41.6 SQ. MI.
ELEVATION	1140 FT
DATE	10-18-94
TIME	1355

COLLECTOR(S)

RICK D. BIVENS, CARL E. WILLIAMS AND BART D. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
33.4 FT	0.8 FT	3.3 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	10	5	15	45	25	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 20 %

8. FLOW (CFS) 12.0 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND MILD

AIR TEMP. 66 F @ 1354

10. PAST WEATHER (last 24 hrs)

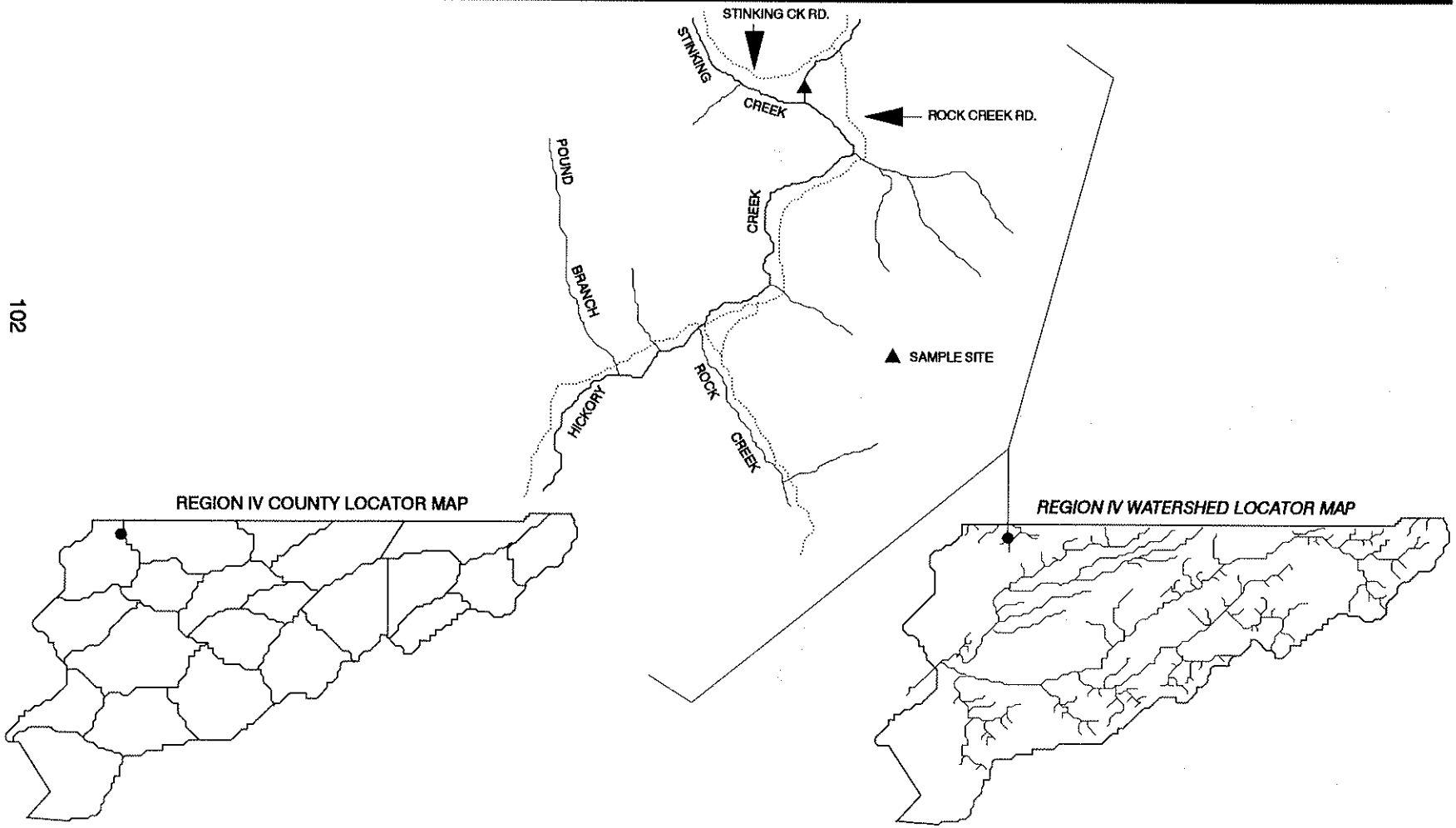
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
6.5	59 F	365	10.2	99.3

12. COMMENTS:

STATION EXTENDED FROM HICKORY-STINKING CREEK CONFLUENCE DOWNSTREAM TO ROCK CREEK RD. BRIDGE.



HICKORY CREEK FISH DATA (SITE 2)

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15' SEINE AND ONE BACKPACK @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	6	1-8	1.04	
Campostoma anomalum	45	31			
Cyprinella galactura	54	28			
Etheostoma baileyi	394	3			
Etheostoma kennicotti	418	20			
Etheostoma sagitta	433	6			
Hypentelium nigricans	207	15			
Lepomis auritus	346	5	4-6	0.6	
Lepomis macrochirus	351	1	4	0.04	
Lepomis megalotis	353	2	2-4	0.08	
Luxilus chrysocephalus	89	3			
Micropterus dolomieu	362	10	2-7	2.1	ONLY 7 INCLUDED IN IBI
Micropterus punctulatus	363	7	1-7	0.32	ONLY 4 INCLUDED IN IBI
Micropterus salmoides	364	1	9	0.4	
Moxostoma erythrurum	225	8			
Notropis r. rubellus	131	112			
Pimephales notatus	176	7			
Semotilus atromaculatus	188	1			

SUM: 266

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<8	8-16	>16	25	17	5
NUMBER OF DARTER SP.	<2	2-4	>4	7	3	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2-3	>3	5	3	3
NUMBER OF SUCKER SP.	<2	2	>2	3	2	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		1.5	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		3.9	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		54.4	5
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		6.9	5
CATCH RATE	<16	16-32	>32		11.3	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		2.7	3
						48 **GOOD**

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

HICKORY CREEK (SITE 2) BENTHIC DATA
FIELD COLLECTION # 625
EFFORT = 2.25 PERSON HOURS

TAXA RICHNESS = 38
EPT TAXA RICHNESS = 12
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				3.5
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Optioservus* larvae, adult	8	
	Gyrinidae	*Dineutus discolor*	2	
	Psephenidae	*Psephenus herricki*	1	
DIPTERA				12.6
	Athericidae	*Atherix lantha*	25	
	Ceratopogonidae	*Palpomyia complex*	1	
	Chironomidae		5	
	Simuliidae		5	
	Tipulidae	*Hexatoma*	2	
		Tipula	5	
EPHEMEROPTERA				29.7
	Baetidae	*Baetis*	21	
	Heptageniidae	*Stenacron sp.*	2	
		Stenonema vicarium	46	
	Oligonuriidae	*Isonychia*	32	
GASTROPODA				1.2
	Pleuroceridae		4	
HEMIPTERA				7.4
	Gerridae	*Metrobates hesperius*	16	
	Nepidae	*Ranatra sp.*	2	
	Veliidae	*Rhagovelia obesa*	7	
MEGALOPTERA				5.6
	Corydalidae	*Corydalus cornutus*	13	
		Nigronia serricornis	1	
	Sialidae	*Sialis*	5	
ODONATA				9.1
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	5	
	Coenagrionidae	*Argia*	6	
		Enallagma	4	
	Cordulegastridae	*Corduelgaster macualta*	2	
	Gomphidae	*Gomphus lividus*	3	
		Hagenius brevistylus	1	
		Stylogomphus albistylus	1	
	Macromiidae	*Macromia*	8	
PLECOPTERA				0.6
	Perlidae	*Acroneuria abnormis*	1	
		A. carolinensis	1	
TRICHOPTERA				30.3
	Hydropsychidae	*Ceratopsyche sparna*	4	
		Cheumatopsyche	17	
		Hydropsyche dicantha	26	
	Lymnephilidae	*Pycnopsyche*	2	
	Philopotamidae	*Chimara*	53	
	Phryganeidae	*Ptilostomus*	1	
		TOTAL	**340**	

White Oak Creek

One IBI fishery survey was conducted on White Oak Creek in July 1994:

Location and Length - Tributary to Hickory Creek (Clear Fork of the Cumberland River). The sample station began at the bridge crossing on Little White Oak Rd. Sampling was conducted below and above the bridge. The sample reach was approximately 600 ft in length and was sampled on 26 July 1994.

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

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Our primary objectives in surveying this stream were to evaluate stream health based on the fish community present and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream.

We collected a total of 138 fish representing seven species from our sample. Two game species, spotted bass *(Micropterus punctulatus)* and bluegill *(Lepomis macrochirus)* were collected from this site. The only non-game species collected was the white sucker *(Catostomus commersoni)*. The remaining four species were forage fish which included central stoneroller *(Campostoma anomalum)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinicthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. Creek chub was the most abundant species collected in our sample. An additional collection on an upstream tributary to White Oak Creek revealed the same species with the exception of the fathead minnow *(Pimephales promelas)*. The collection of this species represents a new record for the Clear Fork drainage.

Our Index of Biotic Integrity analysis indicated that this portion of White Oak Creek was in "poor" condition based on the IBI score of 30. The most notable negative influences on the overall score were the absence of darter species in our sample, the absence of any intolerant species, the high percentage of tolerant species in the sample, the relatively low percentage of species considered to be trophic specialists (i.e., darters), and the low catch

rate for a stream of this size. Strip mining has long plagued this watershed and is evidenced by the apparent degradation of the fish community. Additionally, we noted some discharges of unregulated residential waste and a relatively high occurrence of filamentous algae in the stream.

Benthic macroinvertebrates collected in our sample included Baetidae and Heptageniidae mayflies, Hydropsychidae, Limnephilidae, and Psychomyiidae caddisflies. Dryopidae and Elmidae beetles were also collected in the sample. Trichopterans accounted for 49.3% of the total sample while ephemeropterans comprised 19.0%. Dipterans were the third most abundant group followed by odonates and megalopterans. A total of 34 taxa was collected from this site of which nine were EPT taxa. Based on this EPT taxa richness value this portion of White Oak Creek was assigned a bioclassification of "fair".

Management Recommendations:

1. Any actions that would address reclamation of abandoned strip mines and discharge of unregulated residential waste in this watershed would be beneficial.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	WHITE OAK CREEK
WATERSHED	CLEAR FORK
SITE	L. WHITE OAK RD. X-ING
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363157N-840203W
REACH	05130101-
LENGTH	~ 600 FT
AREA	5.3 SQ. MI.
ELEVATION	1460 FT
DATE	7-26-94
TIME	1039

COLLECTOR(S)

RICK D. BIVENS, MARK T. FAGG, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
21.1 FT	0.5 FT	2.0 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	5	20	40	25	5

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 3.4 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY W\ SCATTERED T-STORMS
AIR TEMP. 74 F @ 1043

10. PAST WEATHER (last 24 hrs)

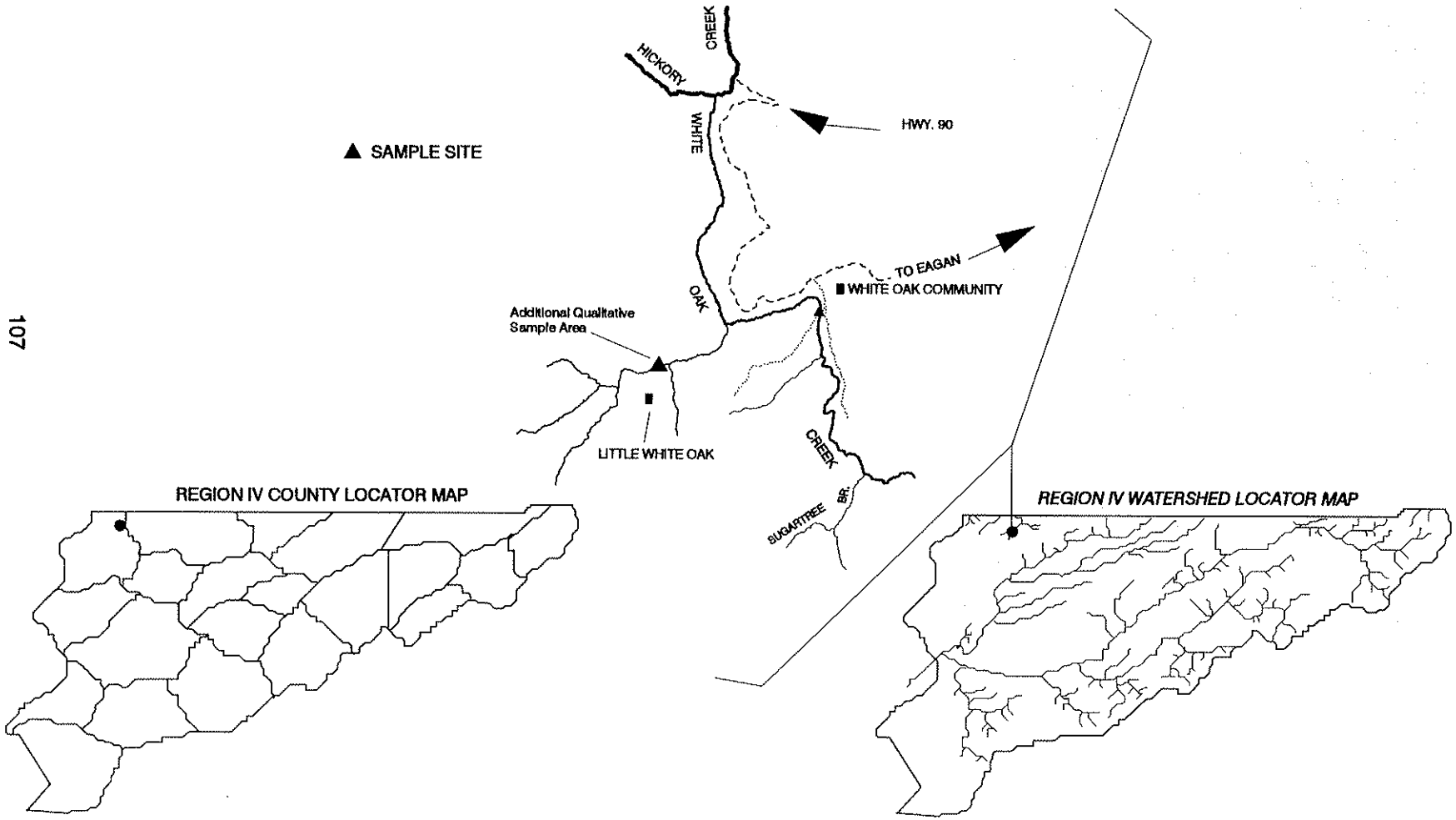
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
8.0	70 F	480	7.8	87.5

12. COMMENTS:

STATION BEGAN @ LITTLE WHITE OAK RD. CROSSING. MODERATE OCCURENCE OF FILAMENTOUS ALGAE. SOME RESIDENTIAL STRAIGHT PIPING. FISH DIVERSITY IMPACTED BY STRIP MINING ACTIVITIES.



WHITE OAK CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

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

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	1		
Catostomus commersoni	195	6		
Lepomis macrochirus	351	30	2-5	
Micropterus punctulatus	363	7	1-2	
Pimephales notatus	176	1		
Rhinichthys atratulus	184	1		
Semotilus atromaculatus	188	92		
		SUM: 138		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-11	>11	17	7	3
NUMBER OF DARTER SP.	<2	2	>2	4	0	1
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	1	1
NUMBER OF SUCKER SP.	<1	1	>1	2	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		71	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		5.1	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		0	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		5.1	5
CATCH RATE	<16	16-32	>32		10.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		2.2	3
						30 **POOR**

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

WHITE OAK CREEK BENTHIC DATA
FIELD COLLECTION # 580
EFFORT = 2.0 PERSON HOURS

TAXA RICHNESS = 34
EPT TAXA RICHNESS = 9
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.7
	Oligochaeta		4	
COLEOPTERA				3.1
	Dryopidae	*Helichus*	4	
	Elmidae	*Dubiraphia* larva	1	
		Dubiraphia vittata	4	
		Macronychus glabratus	3	
		Optioservus larvae	2	
		Optioservus trivittatus	3	
		Stenelmis adult	1	
DIPTERA				12.9
	Athericidae	*Atherix lantha*	37	
	Chironomidae		31	
	Empididae		1	
	Simuliidae		6	
EPHEMEROPTERA				19
	Baetidae	*Baetis*	88	
	Heptageniidae	*Stenoenma femoratum*	11	
		S. vicarium	8	
	Oligoneuriidae	*Isonychia*	3	
GASTROPODA				0.2
	Planorbidae		1	
HEMIPTERA				0.5
	Gerridae	*Gerris* nymph	1	
		Rheumatobates rileyi adult	1	
		Trepobates pictus adult	1	
ISOPODA				0.9
	Asellidae	*Lirceus*	5	
MEGALOPTERA				4.1
	Corydalidae	*Corydalus cornutus*	2	
		Nigronia serricornis	11	
	Sialidae	*Sialis*	11	
ODONATA				8.3
	Aeshnidae	*Aeshna umbrosa*	1	
		Boyeria grafiana	1	
		B. vinosa	36	
	Coenagriunidae	*Argia*	3	
	Gomphidae	*Gomphus lividus*	6	
	Macromiidae	*Macromia*	1	
PELECYPODA				1
	Corbiculidae	*Corbicula fluminea*	6	
TRICHOPTERA				49.3
	Hydropsychidae	*Ceratopsyche sparna*	1	
		Cheumatopsyche	4	
		Hydropsyche early instars	14	
		Hydropsyche betteni/depravata	263	
	Limnephilidae	*Pycnopsyche*	3	
	Psychomyiidae	*Psychomyia flavida*	1	
		TOTAL	**580**	

No Business Branch

One IBI fishery survey was conducted on No Business Branch in July 1994:

Location and Length - Tributary to the Hickory Creek (Clear Fork). The sample station was located approximately 400 yds upstream from the mouth. The sample length was approximately 400 ft and was sampled on 27 July 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 500 VAC and a 10 ft seine.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Our primary objectives in surveying this stream were to evaluate stream health based on the fish community present and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream. Previous collections were made in this stream by Dr. David Etnier and others in 1981 and 1982.

We collected a total of 130 fish comprising four species during our survey of this stream. All species collected were forage species which included the stripetail darter *(Etheostoma kennicotti)*, arrow darter *(E. sagitta)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. The species we collected were similar to those listed by Etnier et al. (1983). However, they did collect two species which we did not encounter, the white sucker *(Catostomus commersoni)* and northern hog sucker *(Hypentelium nigricans)*. According to records from the TVA natural heritage program, blackside dace *(Phoxinus cumberlandenesis)* had been previously introduced into this stream. However, our limited survey was unable to locate any. We did, however, collect three specimens of the arrow darter which has been deemed in need of management by the state. Creek chub was the most abundant species collected in our sample.

Based on our Index of Biotic Integrity analysis this reach of No Business Branch was classified as "poor". Although this score in all probability accurately reflects the condition of the fish community, it should not be considered an indicator of water quality conditions in this stream. This stream was one of the "cleanest" we observed

during our survey of the Clear Fork drainage and exhibited water quality characteristics similar to those found in Blue Ridge streams. Perhaps the most notable influences affecting the fish community in this stream were the lack of instream habitat and the potential for this stream to become dewatered during dry years. These factors in all likelihood play a significant role in regulating the fish community in this stream. Additionally, a man-made barrier (culvert) at the road crossing would prevent any significant recolinization of this stream in the event of a natural pertubation (e.g., floods and droughts).

Benthic macroinvertebrates collected at this site included Heptageniidae and Leptophlebiidae mayflies, Leuctridae, Peltoperlidae, and Perlidae stoneflies, and Glossosomatidae, Hydropsychidae, Lepidostomatidae, Philopotamidae, and Rhyacophilidae caddisflies. Trichopterans dominated the sample contributing 45.0% to the total number of organisms collected. Plecopterans accounted for 36.0% while ephemeropterans contributed 8.0% to the overall sample. Our collection yielded a total of 26 taxa of which 17 were EPT. This high EPT value is not surprising as the water quality in this stream appeared to be good. Therefore, the bioclassification for this reach of No Business Branch based on the EPT richness value was "good-fair". This classification in all probability is more indicative of the water quality of the stream than the IBI value and should be emphasized more than the IBI value. Of special interest was the collection of the Tipulid, *Longurio* from this site. This was the first time we have encountered this genus during our stream surveys.

Management Recommendations:

1. Since this stream appeared to have high water quality, watershed protection should be top priority. Further investigations into the success of the blackside dace introductions should be made.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	NO BUSINESS BRANCH
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363306N-840404W
REACH	05130101-
LENGTH	~ 400 FT
AREA	2.6 SQ. MI.
ELEVATION	1060 FT
DATE	7-27-94
TIME	1537

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
17.3 FT	0.7 FT	2.1 FT

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		10	40	40	10	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 70 %

8. FLOW (CFS) 1.2 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY; MILD
AIR TEMP. 70 F @ 1616

10. PAST WEATHER (last 24 hrs)

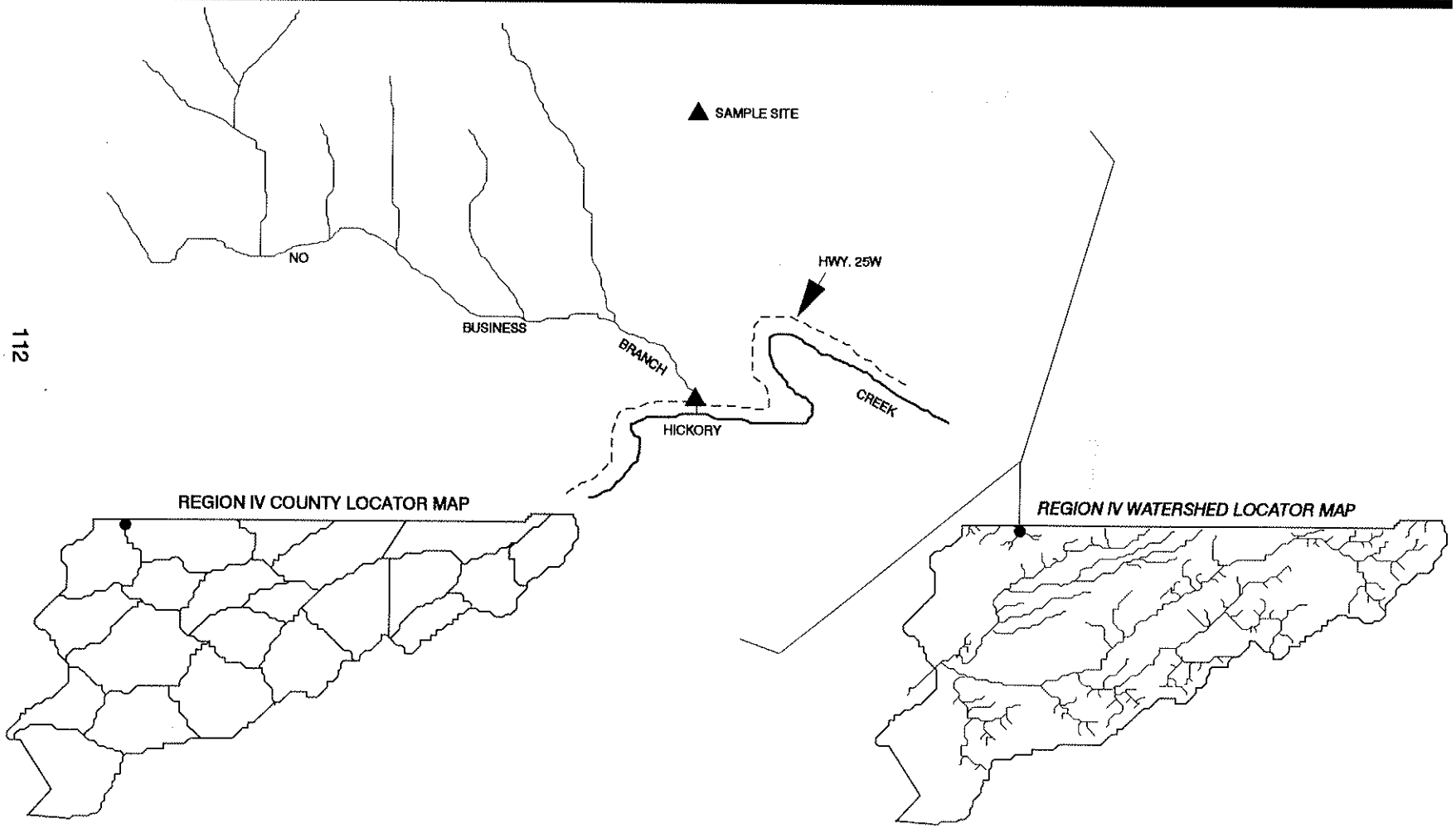
PT. CLOUDY W/ SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	67 F	20	8.7	94.8

12. COMMENTS:

PERHAPS ONE OF THE BEST STREAMS REMAINING IN IN THE CLEAR FORK DRAINAGE IN TERMS OF WATER QUALITY. LOW OCCURENCE OF REFUSE IN OR AROUND STREAM.



NO BUSINESS BRANCH FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 500 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Etheostoma kennicotti	418	16		
Etheostoma sagitta	433	3		
Rhinichthys atratulus	184	9		
Semotilus atromaculatus	188	102		
	SUM:	130		

3704

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-8	>8	12	4	3
NUMBER OF DARTER SP.	<2	2	>2	3	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<1	1	>1	2	1	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		78.5	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		14.6	3
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		10.5	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		3.1	3
						30 **POOR**

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

NO BUSINESS BRANCH BENTHIC DATA
FIELD COLLECTION # 584
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 26
EPT TAXA RICHNESS = 17
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				1
	Dryopidae	*Helichus*	1	
	Psephenidae	*Psephenus herricki*	1	
DIPTERA				6.5
	Chironomidae		3	
	Empididae		1	
	Tipulidae	*Antocha*	1	
		Hexatoma	7	
		Longurio	1	
EPHEMEROPTERA				8
	Heptageniidae	*Epeorus rubidus/subpallidus*	8	
		Heptagenia	5	
		Stenonema sp.	1	
	Leptophlebiidae	*Habrophleboides*	2	
HEMIPTERA				3
	Gerridae	*Gerris remigis*	6	
ODONATA				0.5
	Aeshnidae	*Boyeria vinosa*	1	
PLECOPTERA				36
	Leuctridae	*Leuctra*	22	
	Peltoperlidae	*Peltoperla*	28	
	Perlidae	*Acroneuria abnormis*	2	
		A. carolinensis	20	
TRICHOPTERA				45
	Glossosomatidae	*Glossosoma*	2	
	Hydropsychidae	*Ceratopsyche sparna*	19	
		Cheumatopsyche	3	
		Diplectrona modesta	2	
		Hydropsyche betteni/depravata	2	
	Lepidostomatidae	*Lepidostoma*	1	
	Philopotamidae	*Dolophilodes distinctus*	49	
	Rhyacophilidae	*Rhyacophila sp. cf. R. carolina*	5	
		R. nigrita	6	
		TOTAL	199	

Laurel Fork

One IBI fishery survey was conducted on Laurel Fork in July 1994:

Location and Length - Tributary to Hickory Creek (Clear Fork). The sample area began approximately 400 ft upstream from the mouth and proceeded upstream for approximately 600 ft. The site was sampled on 28 July 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 250 VAC and a 15 ft seine.

Water Quality - (See physicochemical and 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 assess the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

We collected a total of 260 fish representing 19 species. Six game species were collected from this site. These included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, bluegill *(L. macrochirus)*, longear sunfish *(L. megalotis)*, smallmouth bass *(Micropterus dolomieu)*, and spotted bass *(M. punctulatus)*. One nongame and 12 forage species were also collected at this site. Three species deemed in need of management by the state were collected. These included the emerald darter *(Etheostoma baileyi)*, arrow darter *(E. sagitta)*, and the rosyface shiner *(Notropis r. rubellus)*. These fishes were quite abundant in this stream with the rosyface shiner being the most abundant of the three. An additional sample of this stream was conducted in November 1994. We were primarily interested in the possible occurence of blackside dace *(Phoxinus cumberlandenesis)* in the headwater areas of this stream. Repeated sampling in likely habitats did not turn up any dace. Species collected at this upstream site included blacknose dace *(Rhinichthys atratulus)*, creek chub *(Semotilus atromaculatus)*, central stoneroller *(Campostoma anomalum)*, white sucker *(Catostomus commersoni)*, and fathead minnow *(Pimephales promelas)*. The occurence of the fathead minnow in this watershed had been previously undocumented.

Our Index of Biotic Integrity evaluation indicated this stream was in "good" condition based on the IBI score of 52.

With the exception of the catch rate metric all other metrics scored average or better. This is not surprising, as this stream was considered to be one of the better Clear Fork System streams we surveyed in 1994. Given the relatively good condition of this stream, it could potentially serve as reference stream for future investigations in the Clear Fork drainage.

Benthic macroinvertebrates collected at this site included Baetidae, Ephemerellidae, Heptageniidae, Leptophlebiidae, and Oligoneuriidae mayflies, Peltoperlidae and Perlidae stoneflies, and Hydropsychidae, Limnephilidae, and Philopotamidae caddisflies. Gastropods collected included Physa and Pleurocerid snails. Ephemeropterans comprised nearly half of the sample, contributing 42.2% to the total number of organisms collected. Trichopterans and plecopterans comprised 18.0% and 6.1% while dipterans made up 7.6% of the total sample. A total of 37 taxa was collected from this site with 16 being EPT taxa. Based on this EPT value, this reach of Laurel Fork was assigned a bioclassification of "good-fair".

Management Recommendations:

1. Laurel Fork probably represents the pre-mining condition of many streams in the Clear Fork drainage. Any action that would protect this watershed from future mining activities would be of benefit. The collection of three state listed species does merit extra protection for this stream.

2. Further investigations to locate blackside dace in this watershed should be made.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LAUREL FORK
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363239N-840452W
REACH	05130101-
LENGTH	~ 600 FT
AREA	7.7 SQ. MI.
ELEVATION	1080 FT
DATE	7-28-94
TIME	1252

COLLECTOR(S)

RICK D. BIVENS, CARL E. WILLIAMS AND BART D. CARTER

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
19 FT	0.8 FT	4.0 + FT

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		10	40	40	10	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) 8.0 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND MILD
AIR TEMP. 70 F @ 1304

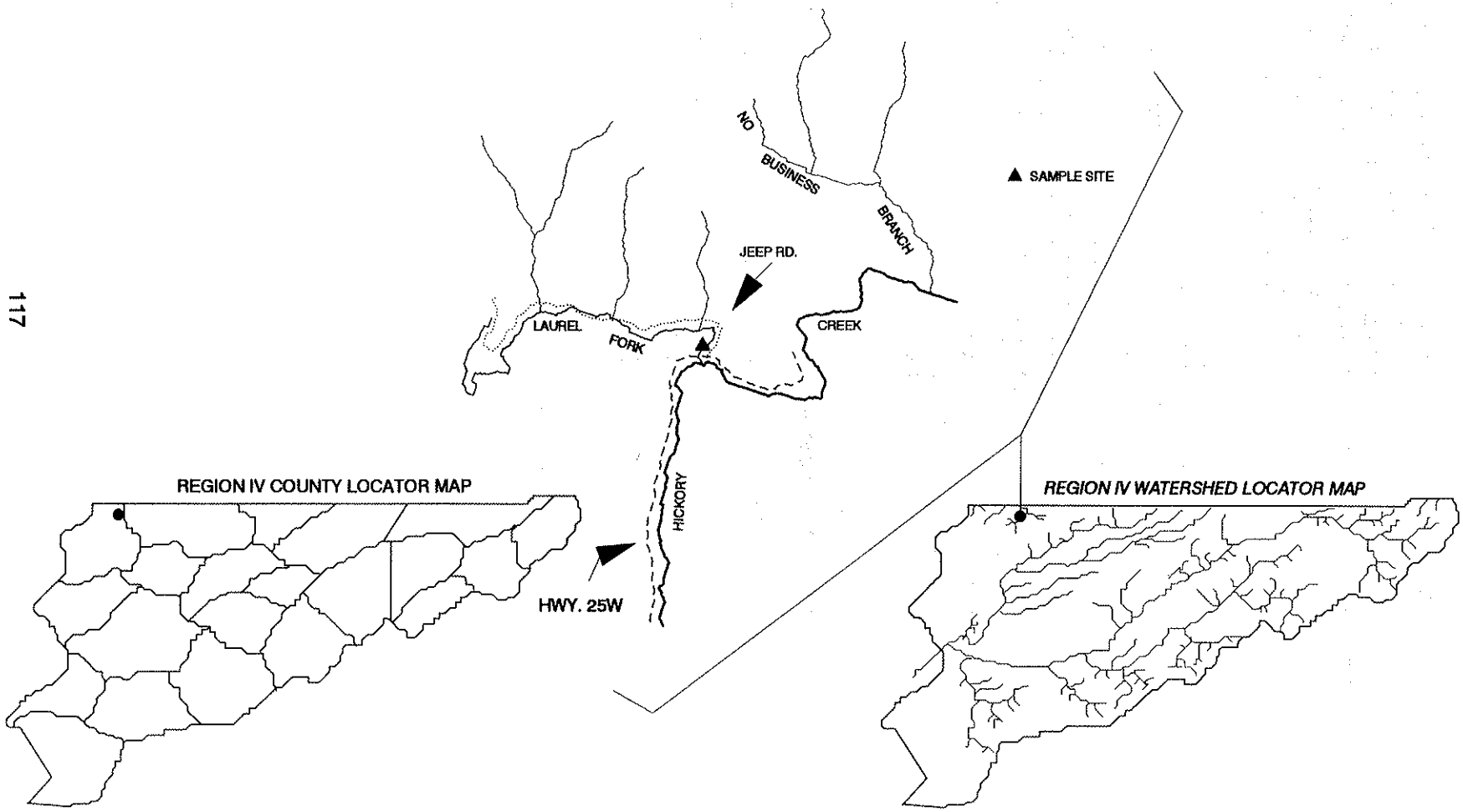
10. PAST WEATHER (last 24 hrs)

PT. CLOUDY W/
SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	68 F	145	8.8	97.9

12. COMMENTS:
WATER TURBID, SEVERAL POINTS OF SEDIMENT INPUT FROM JEEP ROAD.



LAUREL FORK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15' SEINE AND ONE BACKPACK UNIT AT 250 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	1	5	
Campostoma anomalum	45	17		
Cyprinella galactura	54	2		
Etheostoma baileyi	394	20		
Etheostoma blennioides	398	1		
Etheostoma caeruleum	401	10		6927
Etheostoma kennicotti	418	35		
Etheostoma sagitta	433	7		
Hypentelium nigricans	207	7		
Lepomis auritus	346	4	2-5	
Lepomis macrochirus	351	1	2	
Lepomis megalotis	353	1	3	
Luxilus chrysocephalus	89	9		
Micropterus dolomieu	362	2	4-7	
Micropterus punctulatus	363	3	7-9	
Notropis r. rubellus	131	114		
Pimephales notatus	176	5		
Rhinichthys atratulus	184	5		
Semotilus atromaculatus	188	16		
	SUM:	260		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<6	6-12	>12	19	18	5
NUMBER OF DARTER SP.	<2	2-3	>3	5	5	5
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	3	5
NUMBER OF SUCKER SP.	<1	1	>1	2	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		9.6	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		5.4	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		71.9	5
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		2.3	3
CATCH RATE	<16	16-32	>32		11.3	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0.8	5
					52	**GOOD**

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

LAUREL FORK BENTHIC DATA
FIELD COLLECTION # 586
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 37
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.6
	Oligochaeta		2	
COLEOPTERA				6.7
	Dryopidae	*Helichus* adults	11	
	Elmidae	*Dubiraphia* adults	2	
		Optioservus larvae, adults	9	
DIPTERA				7.6
	Athericidae	*Atherix lantha*	6	
	Chironomidae		9	
	Simuliidae		6	
	Tipulidae	*Hexatoma*	1	
		Tipula	3	
EPHEMEROPTERA				42.2
	Baetidae	*Baetis*	20	
	Ephemerellidae	*Eurylophella*	1	
	Heptageniidae	*Epeorus rubidus/subpallidus*	3	
		Stenonema early instars	29	
		Stenonema (prob. ithaca)	5	
		S. vicarium	24	
	Leptophlebiidae	*Habrophlebiodes*	1	
	Oligoneuriidae	*Isonychia*	55	
GASTROPODA				4.3
	Physidae	*Physa*	6	
	Pleuroceridae		8	
HEMIPTERA				5.8
	Gerridae	*Gerris conformis*	5	
		Metrobates hesperius	6	
	Veliidae	*Rhagovelia obesa*	8	
MEGALOPTERA				6.4
	Corydalidae	*Corydalis cornutus*	14	
		Nigronia serricornis	7	
ODONATA				2.1
	Aeshnidae	*Boyeria grafiana*	1	
		Boyeria vinosa	1	
	Cordulegastridae	*Corduelgaster* early instar	1	
	Gomphidae	*Hagenius brevistylus*	1	
		Stylogomphus albistylus	3	
PLECOPTERA				6.1
	Peltoperlidae	*Peltoperla*	1	
	Perlidae	*Acroneuria abnormis*	19	
TRICHOPTERA				18
	Hydropsychidae	*Ceratopsyche bronta*	2	
		C. sparna	10	
		Cheumatopsyche	9	
		Hydropsyche betteni/depravata	2	
		H. dicantha	1	
	Limnephilidae	*Pycnopsyche*	2	
	Philopotomidae	*Chimara*	33	
		TOTAL	**327**	

Lick Creek

One IBI fishery survey was conducted on Lick Creek in August 1994:

Location and Length - Tributary to Hickory Creek (Clear Fork). The sample area began approximately 400 ft upstream of the mouth and proceeded upstream for approximately 700 ft. The site was sampled on 19 August 1994.

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

Water Quality - (See physicochemical and 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 assess the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

We collected a total of 291 fish representing 15 species from this site. Five game species were collected which included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, longear sunfish *(L. megalotis)*, smallmouth bass *(Micropterus dolomieu)*, and spotted bass *(M. punctulatus)*. The most abundant game fish collected was the smallmouth bass. A total of 24 were collected which ranged from 3-in up to the 10-in class. One non-game species and eight forage species were also collected from this site. Of special interest was the collection of two state listed species, the emerald darter *(Etheostoma baileyi)* and the rosyface shiner *(Notropis r. rubellus)*. Rosyface shiners, northern hog suckers *(Hypentelium nigricans)*, and central stonerollers *(Campostoma anomalum)* were the most abundant species in our sample. An additional qualitative survey was conducted in the headwaters of Lick Creek 0.3 mi upstream of bridge crossing on Hwy. 25W. We were primarily interested in the occurrence of blackside dace in the headwaters of this stream. No dace were collected during our effort, however, we did collect bluegill *(Lepomis macrochirus)* and white sucker *(Catostomus commersoni)* which were not collected in our downstream IBI sample.

Our Index of Biotic Integrity evaluation (44) indicated this stream was in "fair" condition based on the fish community present. All of the IBI metrics scored average or

above with the exception of the catch rate which was the lowest scoring metric. There was some indication of above normal sediment transport in this stream as many of the pool areas had substantial sediment deposition.

Our benthic collections at this site revealed a total of 39 taxa including Baetidae, Caenidae, Heptageniidae and Oligoneuriidae mayflies, Perlidae stoneflies, and Glossosomatidae, Hydropsychidae, Hydroptilidae, and Philopotamidae caddisflies. Pleurocerid snails along with Dryopid, Dyticid,and Elmid beetles were present. Trichopterans and ephemeropterans were the most abundant groups, representing 27.7% and 26.3% of the total number of organisms collected. Dipterans accounted for 24.9% whereas plecopterans only comprised 0.8%. Based on the EPT taxa richness of 16 this reach of Lick Creek was assigned a bioclassification of "good-fair".

Management Recommendations:

1. Based on our observations, Lick Creek does appear to support a fair to good smallmouth bass population in the lower reaches. Also, the occurrence of the two state listed species merits extra protection for this stream.

2. Any action that would decrease non-point source pollution, particularly sediment input, would be beneficial to this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LICK CREEK
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CAMPBELL
QUADRANGLE	JELLICO EAST 4157 SE
LAT-LONG	363016N-840443W
REACH	05130101-
LENGTH	~ 700 FT
AREA	5.4 SQ. MI.
ELEVATION	1100 FT
DATE	8-19-94
TIME	0945

COLLECTOR(S)

RICK D. BIVENS AND BART D. CARTER
CARL E. WILLIAMS AND DWAIN BIVENS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
21.2 FT	0.7 FT	2.4 FT

2. ESTIMATED % OF STREAM IN POOLS IS 30

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SOURCE
		X

6. INSTREAM COVER ABUNDANCE IS

GOOD IN	AVERAGE IN	POOR IN
25 %	50 %	25 %

7. SHADE OR CANOPY COVER GOOD OVER 75 %

8. FLOW (CFS) 6.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

CLEAR AND MILD
AIR TEMP. 70 F @ 1000

10. PAST WEATHER (last 24 hrs)

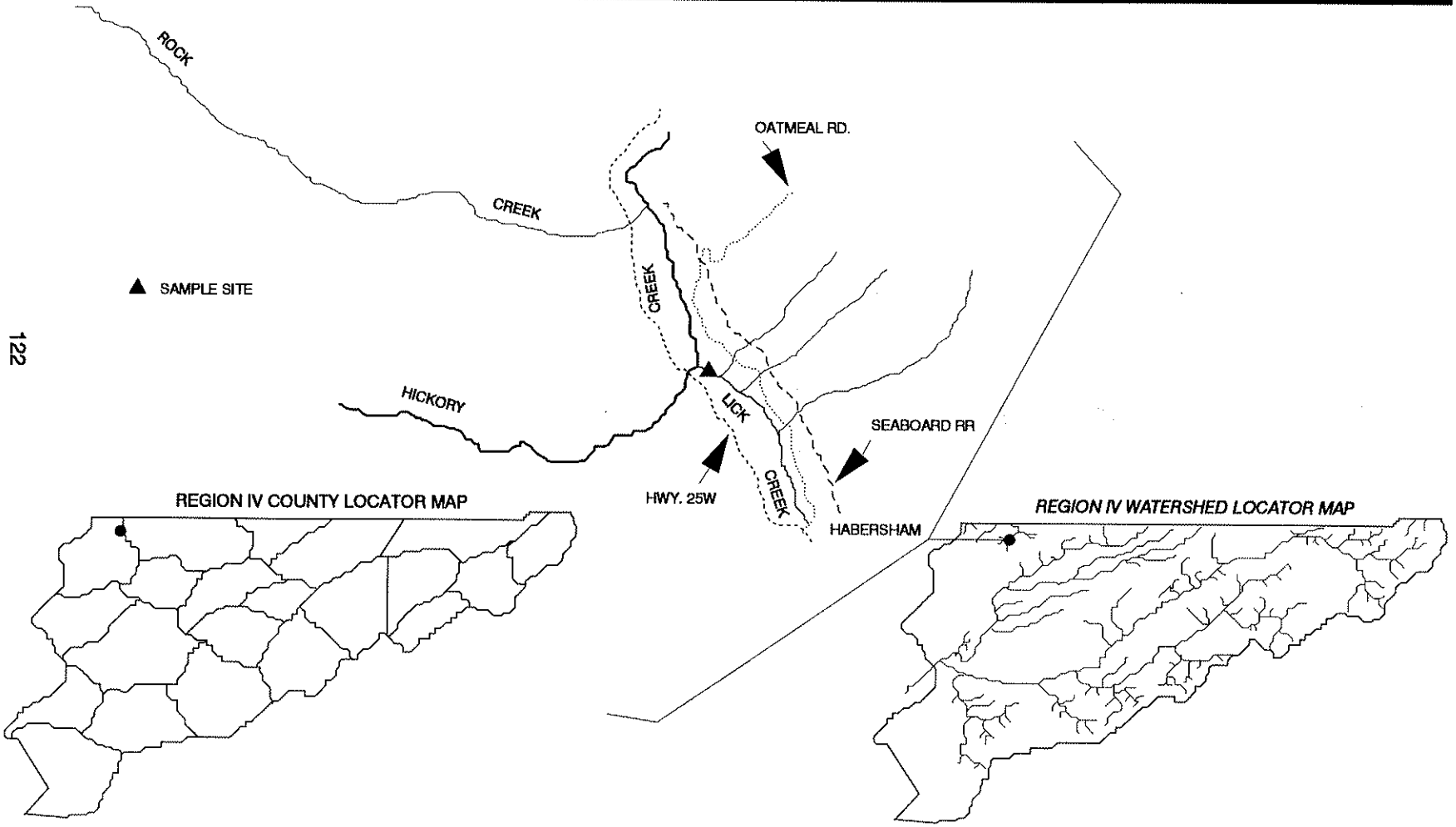
PT. CLOUDY; HOT AND HUMID

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.5	70 F	525	8.0	91.0

12. COMMENTS:

SAMPLE LOCATION NEAR MOUTH AT HABERSHAM. STREAM VERY SILTY, ESPECIALLY IN POOL AREAS. BANK EROSION EVIDENT IN PLACES. RESIDENTIAL REFUSE PRESENT ALONG STREAM COURSE.



LICK CREEK FISH DATA

SAMPLING TYPE: SEINING AND SHOCKING

GEAR TYPE: 15' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Ambloplites rupestris	342	13	2-9	2.2
Campostoma anomalum	45	29		
Cyprinella galactura	54	1		
Etheostoma baileyi	394	7		
Etheostoma kennicotti	418	6		
Hypentelium nigricans	207	51		
Lepomis auritus	346	7	2-5	0.22
Lepomis megalotis	353	1	2	0.01
Luxilus chrysocephalus	89	18		
Micropterus dolomieu	362	24	3-10	2.53
Micropterus punctulatus	363	3	6-7	0.5
Notropis r. rubellus	131	91		
Pimephales notatus	176	37		
Rhinichthys atratulus	184	1		
Semotilus atromaculatus	188	2		
	SUM:	291		

661

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-11	>11	17	14	5
NUMBER OF DARTER SP.	<2	2	>2	4	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	2	3
NUMBER OF SUCKER SP.	<1	1	>1	2	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		6.9	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		18.9	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		35.7	3
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		13.7	5
CATCH RATE	<16	16-32	>32		13.1	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		4.8	3
						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**

LICK CREEK BENTHIC DATA
FIELD COLLECTION # 593
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 39
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				1.9
	Oligochaeta		7	
COLEOPTERA				3.6
	Dryopidae	*Helichus* adults	2	
	Dytiscidae	*Hydroporus* adult	1	
	Elmidae	*Dubiraphia* adult	1	
		Macronychus glabratus adult	1	
		Optioservus larva, adult	2	
	Gyrinidae	*Gyrinus* larvae	2	
	Psephenidae	*Psephenus herricki*	4	
DIPTERA				24.9
	Athericidae	*Atherix lantha*	59	
	Ceratopogonidae	*Atrichopogon*	1	
	Chironomidae		5	
	Culicidae		1	
	Simuliidae larvae, pupae		22	
	Tipulidae	*Antocha*	2	
EPHEMEROPTERA				26.3
	Baetidae	*Baetis*	50	
	Caenidae	*Caenis*	1	
	Heptageniidae	*Heptagenia*	1	
		Stenacron interpunctatum	1	
		Stenonema femoratum	4	
		S. vicarium	10	
	Oligoneuriidae	*Isonychia*	28	
GASTROPODA				0.3
	Pleuroceridae		1	
HEMIPTERA				2.5
	Gerridae	*Gerris conformis*	3	
	Veliidae	*Rhagovelia obesa*	6	
MEGALOPTERA				9.7
	Corydalidae	*Corydalis cornutus*	33	
		Nigronia serricornis	2	
ODONATA				2.2
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	3	
	Gomphidae	*Gomphus lividus*	3	
	Macromiidae	*Macromia*	1	
PLECOPTERA				0.8
	Perlidae	*Acroneuria abnormis*	3	
TRICHOPTERA				27.7
	Glossosomatidae	*Glossosoma pupa*	1	
	Hydropsychidae	*Ceratopsyche bronta*	1	
		C. sparna	14	
		Cheumatopsyche	13	
		Hydropsyche betteni/depravata	1	
		H. dicantha	36	
	Hydroptilidae	*Leucotrichia pietipes*	5	
	Philopotamidae	*Chimara*	29	
		TOTAL	**361**	

Davis Creek

One IBI fishery survey was conducted on Davis Creek in October 1994:

Location and Length - Tributary to Lick Creek (Hickory Creek). The sample area was located approximately 0.6 mi by road downstream of the Hog Camp Branch-Davis Creek confluence. The sample reach was 1,000 ft in length and was sampled on 26 October 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 100 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - As with other streams in this region of east Tennessee, we were interested in assessing stream health based on the fish and benthic community structure. Furthermore, we wanted to develop a fish species diversity list for TADS. The Agency has made no previous collection from this stream.

We collected a total of 252 fish representing 13 species. Three game fish were collected which included rock bass *(Ambloplites rupestris)*, redbreast sunfish *(Lepomis auritus)*, and smallmouth bass *(Micropterus dolomieu)*. The only non-game species collected at this site was the northern hog sucker *(Hypentelium nigricans)*. The remaining nine taxa were forage species which included central stoneroller *(Campostoma anomalum)*, emerald darter *(Etheostoma baileyi)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, striped shiner *(Luxilus chrysocephalus)*, rosyface shiner *(Notropis r. rubellus)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. Central stonerollers and northern hog suckers were the most abundant species collected.

The Index of Biotic Integrity score (38) for this sample site indicated that this particular segment of stream was in "poor-fair" condition. This was not surprising as we observed obvious degradation in water quality at this site. In particular, the conductivity of the water at this site was 500 micomhos/cm which was the second highest value recorded from our 1994 surveys. Filamentous algae was quite common in this reach indicating this stream was receiving

some form of nutrient loading. The majority of the IBI metrics scored average or below. The most notable negative influences on the overall score were the relatively low percentage of specialized insectivores (i.e., darter) in the sample and high occurrence of anomalies (i.e., lesions and leeches).

The blackside dace had been collected historically in the headwater reaches of Davis Creek (USFWS 1988). We were interested in determining if this population still existed in light of the activities ongoing in the watershed. We sampled a stream reach approximately 200 ft long upstream of Sandlick Branch and collected seven specimens. Blackside dace were also present in Sandlick Branch.

Benthic macroinvertebrates from our sample included Baetidae, Heptageniidae, and Oligoneuriidae mayflies, Capniidae, Perlidae, and Taeniopterygidae stoneflies, and Hydropsychidae and Philopotamidae caddisflies. Ephemeropterans represented 51.6% of the sample while trichopterans accounted for 20.4%. Dipterans comprised 12.7% while plecopterans only accounted for 5.2% of the total number of organisms collected. A total of 29 taxa was collected from this site with 14 being EPT taxa. Based on this EPT taxa richness value this stream received a bioclassification of "fair".

Management Recommendations:

1. Watershed protection should be a high priority as this stream currently contains a population of blackside dace in the headwaters along with other species of special concern (arrow darter, emerald darter, and rosyface shiner). Unregulated discharge of residential waste was observed in our sample reach and is probably common throughout the watershed. Efforts to curtail these practices should be a high priority.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	DAVIS CREEK
WATERSHED	CLEAR FORK
SITE	0.6 MI BELOW HOGCAMP
COUNTY	CAMPBELL
QUADRANGLE	LAFOLLETTE 136 NE
LAT-LONG	362941N-840337W
REACH	05130101-21.0
LENGTH	~ 1000 FT
AREA	14.0 SQ. MI.
ELEVATION	1120 FT
DATE	10-26-94
TIME	1240

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
25.0 FT	0.6 FT	1.6 FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	25	10	20	30	15	

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 60 %

8. FLOW (CFS) 2.7 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND COOL
AIR TEMP. 58 F @ 1247

10. PAST WEATHER (last 24 hrs)

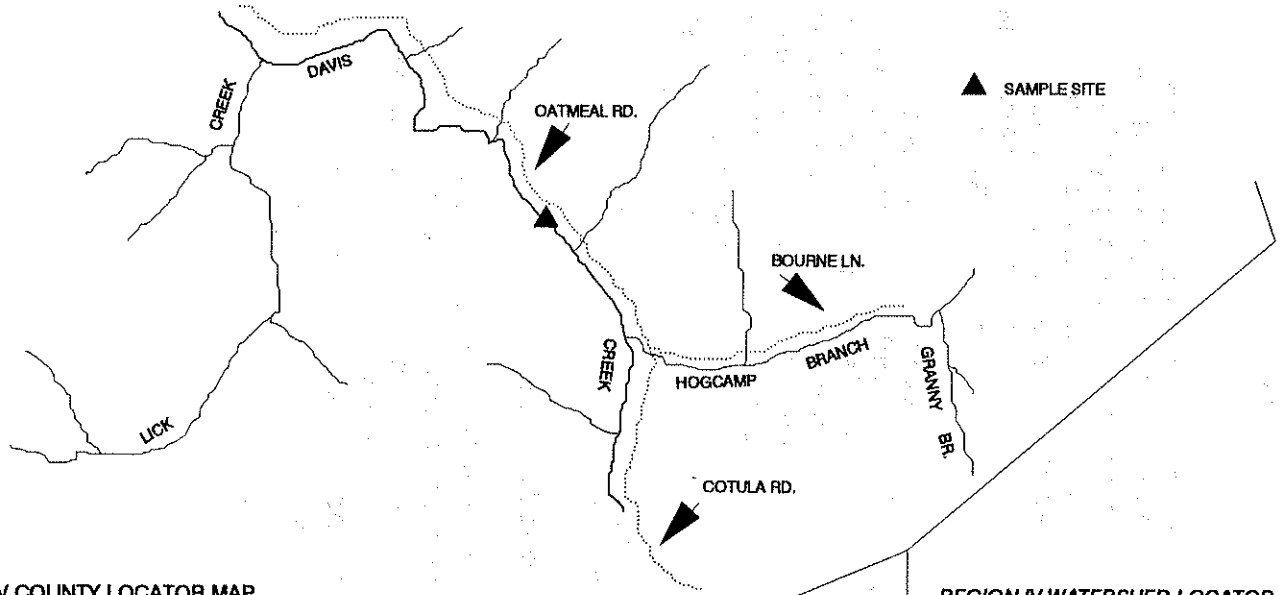
SAME AS ABOVE

11. WATER QUALITY

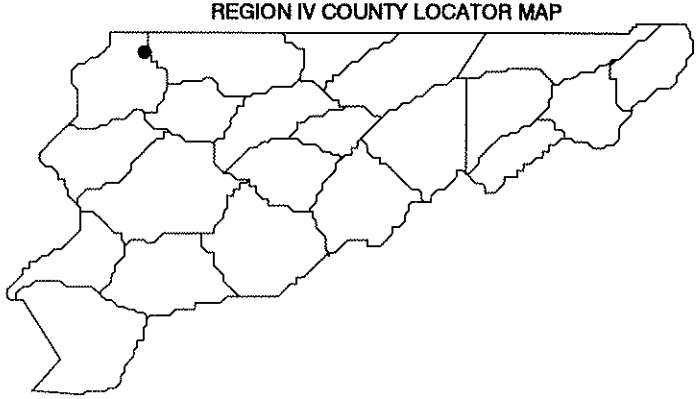
pH	TEMP.	COND.	D.O.	% SAT.
7.5	55 F	500	12.8	120.8

12. COMMENTS:

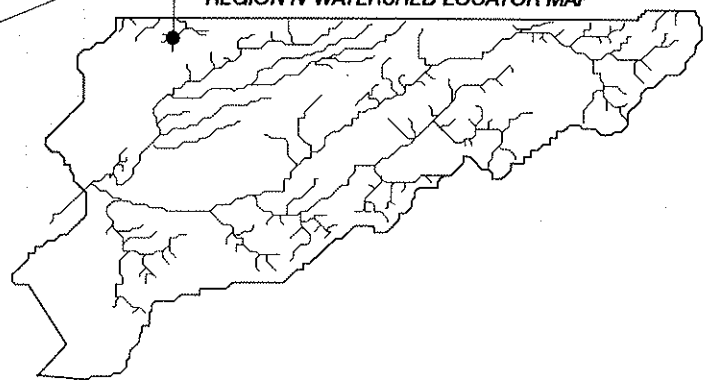
SAMPLE STATION WAS ~ 0.6 MI DOWNSTREAM OF HOGCAMP BRANCH. NUTRIENT INPUT INTO THIS STREAM APPARENTLY HIGH AS FILAMENTOUS ALGAE WAS QUITE COMMON.



REGION IV COUNTY LOCATOR MAP



REGION IV WATERSHED LOCATOR MAP



DAVIS CREEK FISH DATA

SAMPLING TYPE: SHOCKING

GEAR TYPE: ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Ambloplites rupestris	342	2	6	0.4	
Campostoma anomalum	45	157			
Etheostoma baileyi	394	5			
Etheostoma kennicotti	418	6			
Etheostoma sagitta	433	3			
Hypentelium nigricans	207	38			
Lepomis auritus	346	4	1-6	0.6	
Luxilus chrysocephalus	89	11			
Micropterus dolomieu	362	9	1-8	0.4	ONLY 6 INCLUDED IN IBI
Notropis r. rubellus	131	4			
Pimephales notatus	176	2			
Rhinichthys atratulus	184	5			
Semotilus atromaculatus	188	6			
	SUM:	252			

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INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<6	6-12	>12	19	12	3
NUMBER OF DARTER SP.	<2	2-3	>3	5	3	3
NUMBER OF SUNFISH SP. *less Micropterus*	<2	2	>2	3	1	1
NUMBER OF SUCKER SP.	<1	1	>1	2	1	3
NUMBER OF INTOLERANT SP.	<2	2	>2	3	3	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		6.8	5
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		5.2	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<25	25-50	>50		7.1	1
PERCENT OF INDIVIDUALS AS PISCIVORES	<1	1-5	>5		4.3	3
CATCH RATE	<16	16-32	>32		18.5	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		5.9	1
					38	**POOR-FAIR**

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

DAVIS CREEK BENTHIC DATA
FIELD COLLECTION # 627
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 29
EPT TAXA RICHNESS = 14
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.6
	Oligochaeta		2	
COLEOPTERA				0.6
	Elmidae	*Dubiraphia* adult	1	
		Optioservus adult	1	
DIPTERA				12.7
	Athericidae	*Atherix lantha*	23	
	Chironomidae larvae, pupa		6	
	Simuliidae		5	
	Tipulidae	*Tipula*	5	
EPHEMEROPTERA				51.6
	Baetidae	*Baetis*	6	
	Heptageniidae	*Stenonema femoratum*	1	
		S. vicarium	18	
	Oligoneuriidae	*Isonychia*	134	
GASTROPODA				1
	Pleuroceridae		3	
HEMIPTERA				1.6
	Veliidae	*Rhagovelia obesa*	5	
MEGALOPTERA				2.6
	Corydalidae	*Corydalus cornutus*	1	
		Nigronia serricornis	6	
	Sialidae	*Sialis*	1	
ODONATA				3.6
	Aeshnidae	*Boyeria vinosa*	3	
	Calopterygidae	*Calopteryx*	7	
	Coenagrionidae	*Argia*	1	
PLECOPTERA				5.2
	Capniidae		13	
	Perlidae	*Acroneuria abnormis*	2	
	Taeniopterygidae	*Taeniopteryx*	1	
TRICHOPTERA				20.4
	Hydropsychidae	*Ceratopsyche bronta*	17	
		C. slossonae	10	
		C. sparna	15	
		Cheumatopsyche	5	
		Hydropsyche betteni/depravata	3	
		H. dicantha	5	
	Philopotamidae	*Chimara*	8	
		TOTAL	**308**	

Rock Creek

One IBI fishery survey was conducted on Rock Creek in October 1994:

Location and Length - Tributary to Hickory Creek (Clear Fork). The sample area was located approximately 100 ft upstream from the confluence of Hickory Creek and Rock Creek. Sample length was approximately 750 ft and was sampled on 17 October 1994.

Sampling Methodology - The site was sampled with one backpack electrofishing unit operating at 125 VAC.

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

Benthos Collection - (See benthic data form)

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

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

A total of 319 fish representing 16 species was collected during our survey. Five game species including largemouth bass *(Micropterus salmoides)*, spotted bass *(M. punctulatus)*, bluegill *(Lepomis macrochirus)*, green sunfish *(L. cyanellus)*, and redbreast sunfish *(L. auritus)* were collected from this site. One non-game and 10 forage species were also collected. These included northern hog sucker *(Hypentelium nigricans)*, central stoneroller *(Campostoma anomalum)*, whitetail shiner *(Cyprinella galactura)*, emerald darter *(Etheostoma baileyi)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, striped shiner *(Luxilus chrysocephalus)*, rosyface shiner *(Notropis r. rubellus)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. Central stoneroller, creek chub, stripetail darter, and arrow darter were the most abundant species present. Of all the arrow darter populations surveyed in the Clear Fork drainage, this population had the highest density.

The Index of Biotic Integrity (IBI) score (54) calculated for this stream indicated that this reach of stream was in "good to excellent" condition. This was primarily due to the relatively high fish diversity for a stream of this size. Species richness was only slightly below what was expected. There was a relatively high

abundance of top carnivores (spotted and largemouth bass) representing a variety of size classes. This is often associated with streams that are in above average condition. The stream did exhibit some signs of stress as the percentage of tolerant fish species was somewhat high as well as the incidence of anomalies.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, and Heptageniidae mayflies, Leuctridae and Perlidae stoneflies, and Hydropsychidae, Leptoceridae, Philopotamidae, and Uenoidae caddisflies. Trichopterans comprised the majority of the sample contributing 46.3%, while ephemeropterans, dipterans, and plecopterans accounted for 35.2%, 10.5%, and 0.6%, respectively. A total of 33 taxa was collected at this site with 16 being EPT taxa. Based on the EPT taxa richness this stream received a bioclassificaton of "good-fair".

Management Recommendations:

1. Based on our observations this stream appears to be relatively unimpacted when compared to other Clear Fork streams of this size. It also is evident that stream does support a fair fishery based on the number and size of game fish collected. Watershed protection should be of first importance as there are few streams of this size in the Clear Fork drainage that support this type of fish diversity.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	ROCK CREEK
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CAMPBELL
QUADRANGLE	LAFOLLETTE 136 NE
LAT-LONG	362906N-840650W
REACH	05130101-
LENGTH	~ 750 FT
AREA	4.49 SQ. MI.
ELEVATION	1180 FT
DATE	10-17-94
TIME	0955

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
9.7 FT	0.3 FT	2.3 FT

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	10	5	20	25	40	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 50 %

8. FLOW (CFS) 0.8 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

COOL AND SUNNY
AIR TEMP. 53 F @ 1008

10. PAST WEATHER (last 24 hrs)

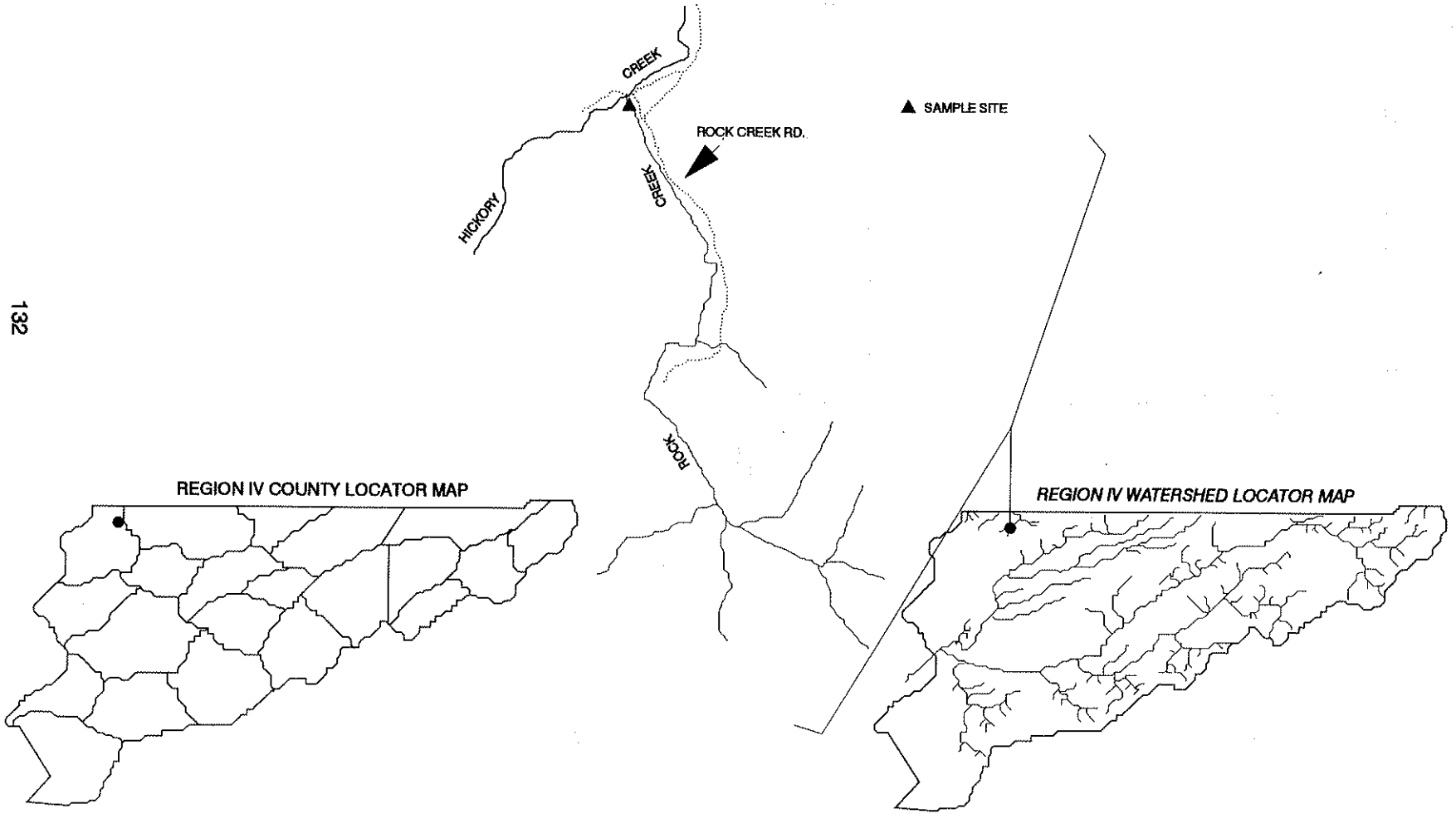
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
6.7	52 F	425	10.8	97.4

12. COMMENTS:

SAMPLE STATION BEGAN JUST ABOVE ROCK AND HICKORY CREEK CONFLUENCE. GOOD SPOTTED BASS FISHERY GIVEN THE SIZE OF OF THE STREAM.



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ROCK CREEK FISH DATA

SAMPLING TYPE: SHOCKING

GEAR TYPE: ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT	NOTE
Campostoma anomalum	45	97			
Cyprinella galactura	54	5			
Etheostoma baileyi	394	7			
Etheostoma kennicotti	418	40			
Etheostoma sagitta	433	40			
Hypentelium nigricans	207	6			
Lepomis auritus	346	7	2-4		
Lepomis cyanellus	347	11	2-5		
Lepomis macrochirus	351	5	3-7	0.6	ONLY 3 WEIGHED
Luxilus chrysocephalus	89	1			
Micropterus punctulatus	363	21	1-13	6.2	ONLY 7 WEIGHED
Micropterus salmoides	364	1	11	0.7	
Notropis r. rubellus	131	7			
Pimephales notatus	176	3			
Rhinichthys atratulus	184	27			
Semotilus atromaculatus	188	41			
	SUM:	319			

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-10	>10	16	15	5
NUMBER OF DARTER SP.	<2	2	>2	4	3	5
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	2	5
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<2	2	>2	3	2	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		16.6	3
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		1.3	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		29.5	5
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		6.9	5
CATCH RATE	<16	16-32	>32		32.1	5
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		2.5	3
					54	**GOOD-EXCELLENT**

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

ROCK CREEK BENTHIC DATA
FIELD COLLECTION # 624
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 33
EPT TAXA RICHNESS = 16
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				0.4
	Oligochaeta		2	
COLEOPTERA				1.7
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Dubiraphia* adult	1	
		Optioservus larva	1	
	Psephenidae	*Psephenus herricki*	6	
DIPTERA				10.5
	Athericidae	*Atherix lantha*	14	
	Chironomidae larvae, pupa		6	
	Simuliidae larvae, pupa		27	
	Tipulidae	*Tipula*	8	
EPHEMEROPTERA				35.2
	Baetidae	*Baetis*	98	
	Ephemerellidae	*Eurylophella*	1	
	Ephemeridae	*Ephemera*	1	
	Heptageniidae	*Stenonema* early instars	27	
		Stenoenma femoratum	2	
		S. vicarium	46	
	Oligoneuriidae	*Isonychia*	9	
HEMIPTERA				1.3
	Veliidae	*Microvelia*	1	
		Rhagovelia obesa	6	
ISOPODA				1
	Asellidae	*Lirceus*	5	
MEGALOPTERA				1
	Corydalidae	*Corydalus cornutus*	5	
ODONATA				2.1
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	4	
	Coenagrionidae	*Argia*	4	
	Macromiidae	*Macromia*	2	
PLECOPTERA				0.6
	Leuctridae	*Leuctra*	1	
	Perlidae	*Acroneuria carolinensis*	1	
		A. evoluta	1	
TRICHOPTERA				46.3
	Hydropsychidae	*Ceratopsyche bronta*	12	
		C. sparna	23	
		Cheumatopsyche	13	
		Hydropsyche betteni/depravata	9	
		H. dicantha	14	
	Leptoceridae	*Triaenodes*	2	
	Philopotamidae	*Chimara*	169	
	Uenoidae	*Apatania* case only		
		TOTAL	**523**	

Little Tackett Creek

One IBI fishery survey was conducted on Little Tackett Creek in June 1994:

Location and Length - Tributary to Tackett Creek (Clear Fork of the Cumberland River). The sample station began just above the railroad crossing approximately 500 yds upstream from the mouth. The sample reach was approximately 500 ft in length and was sampled on 30 June 1994.

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

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Our primary objectives in surveying this stream were to evaluate stream health based on the fish community present and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream.

We collected a total of 79 fish representing three species from this section of stream. No game or non game species were collected. Three forage species were encountered during our survey which included the stripetail darter *(Etheostoma kennicotti)*, blackside dace *(Phoxinus cumberlandensis)*, and creek chub *(Semotilus atromaculatus)*. Of the species collected, the creek chub was the most abundant. Of special interest, was the collection of the federally threatened blackside dace. This collection represents the first documentation of this species from this stream. Unfortunately, only one specimen of this species was collected. Based on our surveys of other blackside dace populations in this region, this one appears to be the most susceptible to extirpation. Given the relative susceptibility of this population to extinction, upmost protection should be given to this stream.

Our Index of biotic Integrity analysis indicated this reach of Little Tackett Creek was in "poor" condition based the on the IBI score of 28. Although the fish community would indicate stressed conditions, it is our hypothesis that the fish community in this stream was altered by a natural event (i.e., flood) as water quality and watershed conditions appeared to be excellent for this region.

Further observations of this stream revealed a man made barrier (culvert) just downstream from our sample site. It is apparent that this structure would prevent recolinization of fishes from downstream reaches thus preventing any substantial recovery in upstream areas. Therefore, our IBI analysis may not accurately reflect the true condition of this stream.

Benthic macroinvertebrates collected from this site included Baetidae, Ephemeridae, Heptageniidae, and Leptophlebiidae mayflies, Leuctridae, Peltoperlidae, and Perlidae stoneflies, Glossosomatidae, Hydropsychidae, Philopotamidae, Polycentropodidae, and Rhyacophilidae caddisflies. Coleopterans collected included representatives of the families Dryopidae, Elmidae, Psephenidae, and Ptilodactylidae. Of special interest is the collection of a specimen of *Anchytarsus bicolor* at this site. Aquatic ptilodactylids are considered quite rare and their distribution is sporadic, even in stream where they are known to occur (Brigham et al. 1982). *Anchytarsus bicolor* is the only species known from eastern North America and the larvae are generally found in small, cool streams and spring brooks where they may be locally common. Overall, trichopterans represented 40.0% while plecopterans accounted for 29.3%. Ephemeropterans comprised 8.3% while coleopterans contributed 7.2% to the total number of organisms collected. Overall, a total of 42 taxa was collected from this reach. Of this total 23 were EPT taxa. Thus, the bioclassification assigned to this reach of stream based on the EPT value was "good-fair".

Given the findings regarding the fish community in the this stream, we feel that the benthic macroinvertebrate data should be considered as the measure of health for this particular stream. Given the nature of the downstream barrier on this stream, it may be beneficial to transplant native fish species into upstream areas.

Management Recommendations:

1. Consideration of fish transplanting to upstream areas of this stream should be considered. Watershed protection should be of primary importance given the occurrence of the blackside dace in this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE TACKETT CREEK
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CLAIBORNE
QUADRANGLE	EAGAN 4257 SW
LAT-LONG	363009N-835715W
REACH	05130101-
LENGTH	~ 500 FT
AREA	4.0 SQ. MI.
ELEVATION	1450 FT
DATE	6-30-94
TIME	1030

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 30

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
	X	

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 75 %

8. FLOW (CFS) 9.2 COMPARED TO NORMAL

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

PT. CLOUDY; HOT AND HUMID
AIR TEMP. 82 F @ 1125

10. PAST WEATHER (last 24 hrs)

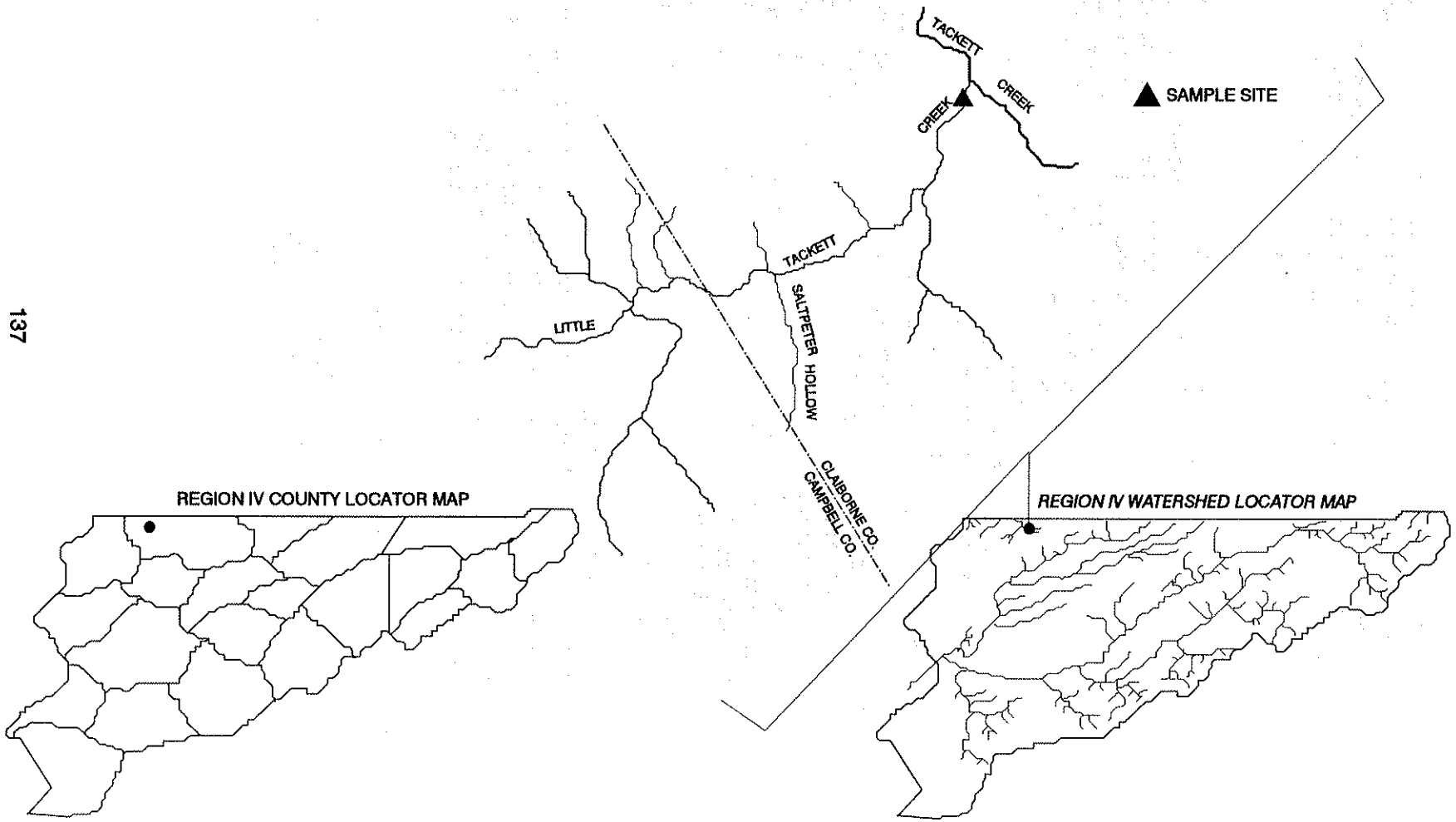
SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	69 F	80	9.0	95.2

12. COMMENTS:

STATION BEGAN JUST ABOVE RR CROSSING. HIGHER WATER QUALITY IN THIS STREAM COMPARED TO OTHER CLEAR FORK TRIBS.



LITTLE TACKETT CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT AT 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Etheostoma kennicotti	418	22		
Phoxinus cumberlandensis	166	1		
Semotilus atromaculatus	188	56		
		SUM: 79		3832

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<5	5-10	>10	16	3	1
NUMBER OF DARTER SP.	<2	2	>2	4	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<2	2	>2	3	1	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		70.9	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		27.8	5
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		5.7	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
						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

LITTLE TACKETT CREEK BENTHIC DATA
FIELD COLLECTION # 558
EFFORT = 2.25 PERSON HOURS

TAXA RICHNESS = 42
EPT TAXA RICHNESS = 23
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				7.2
	Dryopidae	*Helichus* adult	1	
	Elmidae	*Optioservus* adults	2	
		Stenelmis adults	6	
	Psephenidae	*Psephenus herricki* larvae, adults	3	
	Ptilodactylidae	*Anchytarsus bicolor* larva	1	
DIPTERA				5.5
	Chironomidae		4	
	Simuliidae		2	
	Tipulidae	*Hexatoma*	3	
		Pseudolimnophila	1	
EPHEMEROPTERA				8.3
	Baetidae	*Baetis*	5	
	Ephemeridae	*Ephemera*	1	
	Heptageniidae	*Epeorus rubidus/subpallidus*	4	
		Stenonema sp.	2	
		Stenonema vicarium	2	
	Leptophlebiidae	*Paraleptophlebia*	1	
HEMIPTERA				2.8
	Gerridae	*Gerris remigis*	2	
	Veliidae	*Rhagovelia obesa*	3	
MEGALOPTERA				0.5
	Corydalidae	*Nigronia serricornis*	1	
	Sialidae	*Sialis*	1	
ODONATA				6.1
	Calopterygidae	*Calopteryx*	4	
	Coenagrionidae	*Argia*	1	
	Cordulegastridae	*Cordulegaster maculata*	2	
	Gomphidae	*Gomphus lividus*	1	
		Lanthus vernalis	2	
		Stylogomphus albistylus	1	
PLECOPTERA				29.3
	Leuctridae	*Leuctra*	24	
	Peltoperlidae	*Peltoperla*	8	
	Perlidae	*Acroneuria abnormis*	3	
		A. carolinensis	5	
		Eccoptera xanthenes	1	
		Paragnetina immarginata	11	
		Perlesta	1	
TRICHOPTERA				40
	Glossosomatidae	*Glossosoma*	3	
	Hydropsychidae	*Ceratopsyche sparna*	27	
		Cheumatopsyche	20	
		Diplectrona modesta	3	
		Hydropsyche betteni/depravata	1	
	Philopotamidae	*Chimara*	13	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhyacophila sp. cf. R. carolina*	1	
		Rhyacophila fuscula	2	
		R. mycta	1	
		TOTAL	181	

Unnamed Tributary to Little Tackett Creek

One IBI fishery survey was conducted on this stream in November 1994:

Location and Length - Tributary to Little Tackett Creek (Clear Fork). The sample area began approximately 300 ft downstream of the Jeep Rd. crossing and proceeded upstream for approximately 650 ft. This site was sampled on 4 November 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 500 VAC.

Water Quality - (See physicochemical and 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 assess the relative health of the stream and to develop a fish species diversity list for TADS. The Agency has made no previous surveys of this stream.

No fish could be captured from this stream after repeated sampling with a backpack electroshocker. Apparently, this stream has been devoid of fish naturally or has been subjected to some form of abiotic perturbation that has eliminated the fish community. Although the stream appeared to be habitat limited in the upstream reaches, there were enough areas in our survey reach that could have harbored fish. The possibility that this stream was subjected to perturbation (i.e., extreme flooding) that eliminated fish is conceivable if densities were low initially. Upon further investigation we did observe a downstream barrier at the mouth that would have prevented any recolinization from downstream in the case of such an event. Apparently, there has been no mining activity upstream of our sample site in the unnamed tributary that would have contributed to the degradation of this stream.

Benthic macroinvertebrate collections at this site revealed a fairly diverse community of organisms. We collected a total of 32 taxa including Baetidae, Ephemerellidae, Heptageniidae, and Siphlonuriidae mayflies, Capniidae, Peltoperlidae, Perlidae, and Perlodidae stoneflies, and Glossomatidae, Hydropshychidae, Philopotamidae, Polycentropodidae, and Rhyacophilidae caddisflies. Coleopterans collected included representative from the families Elmidae, Gyrinidae, Psephenidae, and Ptilodactylidae. Of special interest is the collection of

five specimens of *Anchytarsus bicolor* at this site. Aquatic ptilodactylids are considered quite rare and their distribution is sporadic, even in streams where they are known to occur (Brigham et al. 1982). *Anchytarsus bicolor* is the only species known from eastern North America and the larvae are generally found in small, cool streams and spring brooks where thay may be locally common. Overall, trichopterans contributed 41.8% to the total number of organisms collected. Plecopterans and ephemeropterans were the next most abundant groups accounting for 29.6% and 10.6%, respectively. Based on our collection, there appears to be a healthy benthic community and there were no indications of water quality problems based on the point data we collected. In fact, the water quality data we collected was very similar to values typically observed in Blue Ridge streams. Based on the benthic collection and the EPT taxa richness value of 19, this stream reach was classified as "good-fair".

Management Recommendations:

1. This stream has apparently been naturally devoid of fish or has suffered some natural event that has eliminated the fish community. This stream could be considered for some experimental reintroductions of fish such as the blackside dace *(Phoxinus cumberlandenesis)* in the lower reaches.

2. This watershed has been spared from mining activities according to the county wildlife officer and therefore should be afforded special protection if possible.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	TRIB. TO L. TACKETT CK
WATERSHED	CLEAR FORK
SITE	@ ROAD CROSSING
COUNTY	CLAIBORNE
QUADRANGLE	WELL SPRING 145 NE
LAT-LONG	362953N-835717W
REACH	05130101-
LENGTH	~ 650 FT
AREA	1.8 SQ. MI.
ELEVATION	1500 FT
DATE	11-4-94
TIME	1043

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

AVG. WIDTH	AVG. DEPTH	MAX. DEPTH
16 FT	0.6 FT	4.0 + FT

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
		10	20	30	40	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 0.3 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY AND COOL
AIR TEMP. 62 F @ 1041

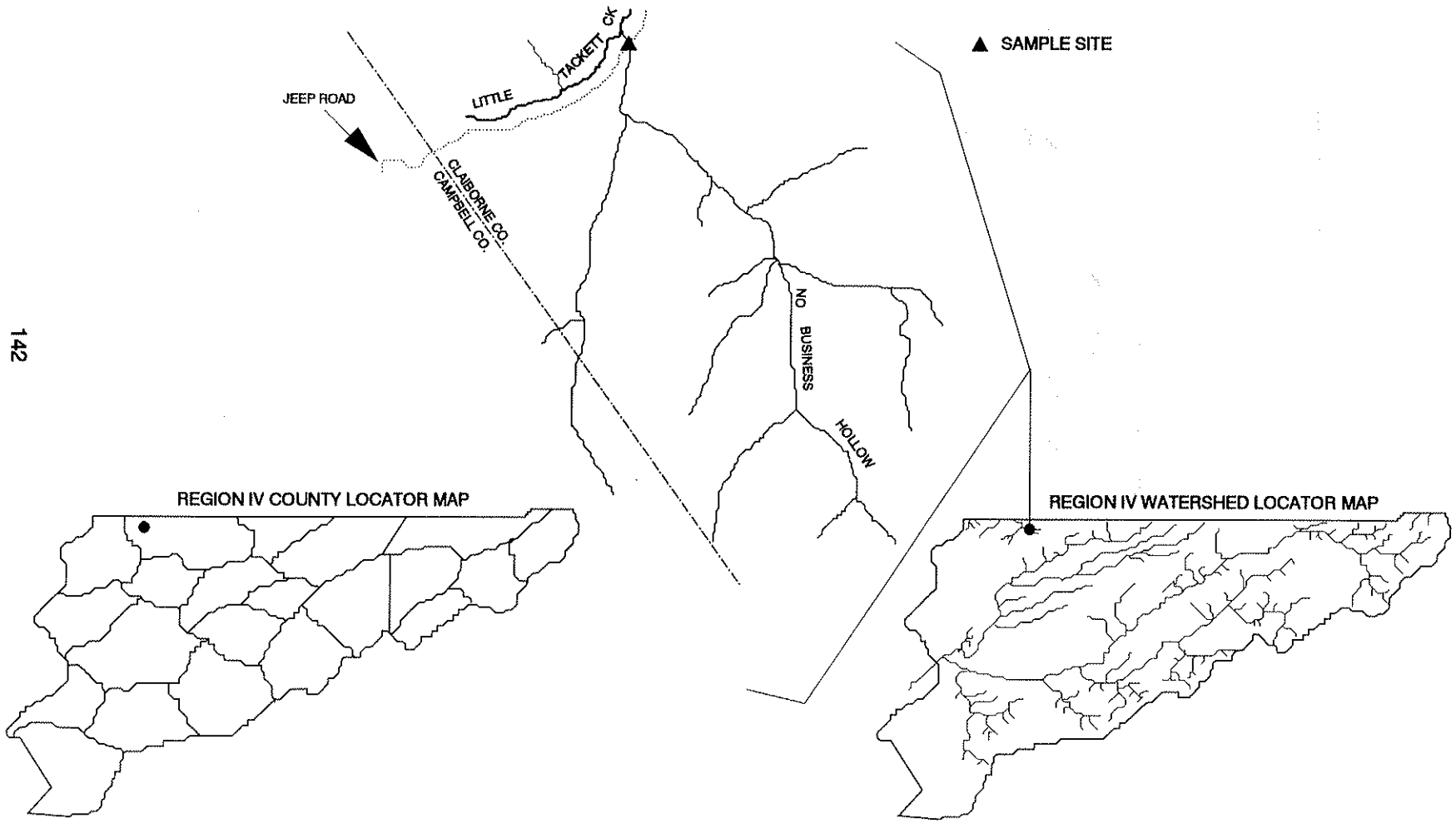
10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
6.5	50 F	12	11.0	97.0

12. COMMENTS:
STATION WAS LOCATED ~ 1 MI FROM DAVIS CREEK RD. AT JEEP RD. CROSSING.



UNNAMED TRIBUTARY TO LITTLE TACKETT CREEK FISH DATA

SAMPLING TYPE: SHOCKING

GEAR TYPE: ONE BACKPACK UNIT @ 500 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
NONE COLLECTED ON SEVERAL EFFORTS	498			

SUM: 0

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<3	3-6	>6	10	0	0
NUMBER OF DARTER SP.	<2	2	>2	3	0	0
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	0
NUMBER OF SUCKER SP.	0		>0	1	0	0
NUMBER OF INTOLERANT SP.	<1	1	>1	2	0	0
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		0	0
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0	0
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		0	0
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	0
CATCH RATE	<16	16-32	>32		0	0
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	0
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	0
						0

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

NO FISH

BENTHIC DATA

UNNAMED TRIB. TO LITTLE TACKETT CREEK
FIELD COLLECTION # 632
EFFORT = 2.25 PERSON HOURS

TAXA RICHNESS = 32
EPT TAXA RICHNESS = 19
BIOCLASSIFICATION (EPT) = 3 (GOOD-FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				5.3
	Elmidae	*Promoresia* larvae	2	
	Gyrinidae	*Dineutus* larva	1	
	Psephenidae	*Psephenus herricki*	6	
	Ptilodactylidae	*Anchytarsus bicolor*	5	
DIPTERA				6.1
	Chironomidae larvae, pupa		13	
	Tipulidae	*Hexatoma*	1	
		Tipula	2	
EPHEMEROPTERA				10.6
	Baetidae	*Baetis*	1	
	Ephemerellidae	*Eurylophella*	9	
	Heptageniidae	*Stenacron interpunctatum*	1	
		Stenonema sp.	15	
	Siphlonuriidae	*Ameletus cryptostimulus*	2	
HEMIPTERA				4.2
	Gerridae	*Gerris remigis*	4	
	Notonectidae	*Notonecta*	1	
	Veliidae	*Rhagovelia obesa*	6	
MEGALOPTERA				1.1
	Corydalidae	*Nigronia fasciatus*	3	
ODONATA				1.1
	Aeshnidae	*Boyeria grafiana*	1	
	Gomphidae	*Lanthus vernalis*	2	
PLECOPTERA				29.6
	Capniidae		16	
	Peltoperlidae	*Peltoperla*	34	
	Perlidae	*Acroneuria carolinensis*	19	
	Perlodidae	*Isoperla*	8	
		Malirekus hastatus	1	
TRICHOPTERA				41.8
	Glossosomatidae	*Glossosoma* pupa	1	
	Hydropsychidae	*Ceratopsyche ventura*	52	
		Diplectrona modesta	7	
		Hydropsyche bettenii/depravata	1	
	Philopotamidae	*Dolophilodes distinctus*	34	
	Polycentropodidae	*Polycentropus*	1	
	Rhyacophilidae	*Rhyacophila sp.*	8	
		Ryhacophila fuscula	3	
		Rhyacophila torva	3	
		TOTAL	**263**	

Rose Creek

One IBI fishery survey was conducted on Rose Creek in June 1994:

Location and Length - Tributary to the Clear Fork (Cumberland River). The sample station began at the Hwy. 90 crossing and proceeded upstream. The sample reach was approximately 400 ft in length and was sampled on 15 June 1994.

Sampling Methodology - The site was sampled with one back-pack electrofishing unit operating at 100 VAC and a 10 ft seine.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (See benthic collection form)

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

Comments - Our primary objectives in surveying this stream were to evaluate stream health based on the fish community present and to develop a fish species diversity list for TADS. The Agency has made no previous collections from this stream.

We collected a total of 143 fish representing eight species. The only game fish collected in our sample was two green sunfish *(Lepomis cyanellus)*. The remaining seven species were forage species which included central stoneroller *(Campostoma anomalum)*, rainbow darter *(Etheostoma caeruleum)*, stripetail darter *(E. kennicotti)*, arrow darter *(E. sagitta)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromacualtus)*. Creek chub and blacknose dace were the most abundant species collected in our sample. Of special interest was the collection of the state listed arrow darter. This species has been deemed in need of management by the state and is restricted to the Clear Fork and Big South Fork drainages of the Cumberland River system.

Our Index of Biotic Integrity evaluation indicated this stream was in "poor to fair" condition based on the IBI score of 36. The most notable negative influences on the overall rating were the lack of sucker species in the fish community, the relatively high percentage of tolerant species, the relatively low percentage of trophic specialists (i.e., darters) in the community and the absence of piscivores in the fish community. It appeared that this stream is suffering from non-point source pollution,

particularly run-off from the adjacent gravel road and unregulated residential waste discharge into the stream.

Benthic macroinvertebrates collected from this site included Baetidae, Ephemerellidae, Ephemeridae, and Heptageniidae mayflies, Leuctridae, Perlodidae, and Perlidae stoneflies, and Hydropsychidae caddisflies. Coleopterans collected included representatives from the families Dryopidae, Elmidae, and Psephenidae. Overall, ephemeropterans accounted for 26.3% of the total sample followed by dipterans at 23.8%. Trichopterans and plecopterans contributed 18.8% and 10.0%, respectively. A total of 24 taxa was collected of which 11 were EPT taxa. Based on this EPT value this stream reach was given a bioclassification of "fair".

Management Recommendations:

1. Any action that can be taken to mitigate non-point source pollution would be beneficial to this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	ROSE CREEK
WATERSHED	CLEAR FORK
SITE	@ HWY. 90 X-ING
COUNTY	CAMPBELL
QUADRANGLE	EAGAN 4257 SW
LAT-LONG	363305N-835905W
REACH	05130101-
LENGTH	~ 400 FT
AREA	2.1 SQ. MI.
ELEVATION	1080 FT
DATE	6-15-94
TIME	1100

COLLECTOR(S)

RICK D. BIVENS, MARK T. FAGG, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	15	20	30	25	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	10	30	40	15	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SOURCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 40 %

8. FLOW (CFS) 0.5 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

PT. CLOUDY W/ SCATTERED T-STORMS
AIR TEMP. 79 F @ 1118

10. PAST WEATHER (last 24 hrs)

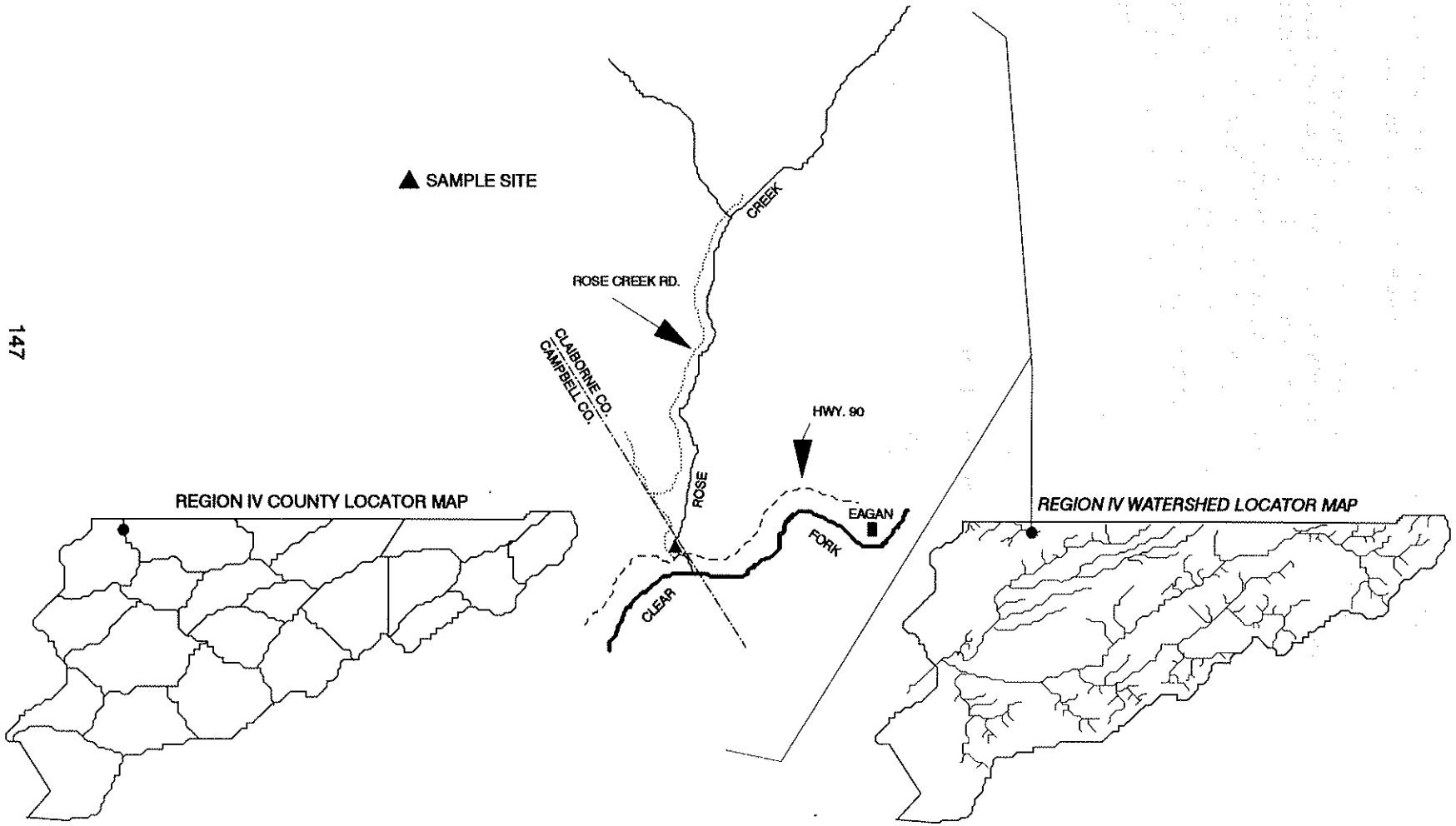
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	71 F	180	9.0	99.0

12. COMMENTS:

SAMPLE STATION BEGAN @ HWY. 90 CROSSING AND PROCEEDED UPSTREAM FOR ~ 400 FT. HIGH AMOUNTS OF SEDIMENT BEING INPUT INTO STREAM AS EVIDENCED BY RUN-OFF DURING A T-STORM.



ROSE CREEK FISH DATA

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	10		
Etheostoma caeruleum	401	3		
Etheostoma kennicotti	418	11		
Etheostoma sagitta	433	3		
Lepomis cyanellus	347	2	3	
Pimephales notatus	176	1		
Rhinichthys atratulus	184	57		
Semotilus atromaculatus	188	56		
	SUM:	143		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-8	>8	12	8	3
NUMBER OF DARTER SP.	<2	2	>2	3	3	5
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<1	1	>1	2	1	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		40.6	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0.7	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		11.9	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		26.8	3
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
					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**

ROSE CREEK BENTHIC DATA
FIELD COLLECTION # 547
EFFORT = 2.0 PERSON HOURS

TAXA RICHNESS = 24
EPT TAXA RICHNESS = 11
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
COLEOPTERA				6.3
	Dryopidae	*Helichus* adults	2	
	Elmidae	*Optioservus* adults	2	
	Psephenidae	*Psephenus herricki* adult	1	
DIPTERA				23.8
	Athericidae	*Atherix lantha*	2	
	Chironomidae larvae, pupa		13	
	Tipulidae	*Hexatoma*	4	
EPHEMEROPTERA				26.3
	Baetidae	*Baetis*	5	
	Ephemerellidae	*Eurylophella*	1	
	Ephemeridae	*Ephemera*	13	
	Heptageniidae	*Stenonema* early instar	1	
		Stenonema vicarium	1	
HEMIPTERA				5
	Gerridae	*Gerris conformis*	4	
ISOPODA				1.3
	Asellidae	*Lirceus*	1	
MEGALOPTERA				2.5
	Corydalidae	*Nigronia serricornis*	1	
	Sialidae	*Sialis*	1	
ODONATA				6.3
	Coenagrionidae	*Argia*	1	
	Gomphidae	*Lanthus vernalis*	3	
		Stylogomphus albistylus	1	
PLECOPTERA				10
	Leuctridae	*Leuctra*	1	
	Perlodidae	*Malirekus/Yugus* early instars	2	
	Perlidae	*Eccoptura xanthenes*	3	
		Perlesta	2	
TRICHOPTERA				18.8
	Hydropsychidae	*Ceratopsyche sparna*	1	
		Cheumatopsyche	13	
		Dipectrona modesta	1	
		TOTAL	**80**	

Rock Creek

One IBI fishery survey was conducted on Rock Creek in June 1994:

Location and Length - Tributary to Straight Creek (Clear Fork). The sample area was located approximately 100 ft upstream from the confluence of Straight Creek and Rock Creek. Sample length was approximately 400 ft in length and was sampled on 15 June 1994.

Sampling Methodology - The site was sampled with one backpack electrofishing unit operating at 125 VAC.

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

Benthos Collection - (See benthic data form)

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

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

A total of 28 fish representing five species was collected from our sample. The only game fish collected was one green sunfish *(Lepomis cyanellus)*. Four forage species: central stoneroller *(Campostoma anomalum)*, stripetail darter *(Etheostoma kennicotti)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)* were collected from this stream. The most abundant species collected in our sample was the creek chub.

The condition of this stream was classified as "poor" based on the IBI score of 28. The derivation of this score was primarily due to the lack of species richness and the high percentage of tolerant fish species and habitat generalists. Additionally, no top predators were collected from this stream which is indicative of degradation.

Benthic macroinvertebrates from our sample included Baetidae, Ephemerellidae, Ephemeridae, and Heptageniidae mayflies, Peltoperlidae and Perlidae stoneflies, Glossosomatidae, Hydropsychidae, Uenoidae caddisflies and Psephenidae beetles. Trichopterans contributed the largest percentage to the sample comprising 31.6%. Ephemeropterans were second most abundant, comprising 27.8% of the total number of organisms collected. Plecopterans comprised 10.1% while dipterans and coleopterans accounted for 5.1% and 3.8%, respectively. A total of 25 taxa was collected from

this site of which 13 were EPT taxa. Based on the EPT taxa richness, this stream received a bioclassification of "fair".

Our observations revealed that this stream had been severely impacted by the strip mining activities in the area as coal fines were abundant in the stream substrate. We also observed exposed pyritic rock formations near and old strip mine site. The cumulative influence of strip mining, residential straight-piping, and development within this watershed has ultimately led to the degradation of this stream. This fish community present does indicate a depressed state although the benthic community appears to be in slightly better condition.

Management Recommendations:

1. It is apparent that human activities in this watershed have degraded the stream considerably. Any action that can be taken to limit or eliminate strip mining and unregulated discharge of residential waste would be of significant benefit to this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	ROCK CREEK
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CLAIBORNE
QUADRANGLE	EAGAN 4257 SW
LAT-LONG	363223N-835536W
REACH	05130101-
LENGTH	~ 400 FT
AREA	3.50 SQ. MI.
ELEVATION	1180 FT
DATE	6-15-94
TIME	1610

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER AND CARL E. WILLIAMS

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 40

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 7.2 **COMPARED TO NORMAL**

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

PT. CLOUDY W/ SCATTERED T-STORMS
AIR TEMP. 76 F @ 1626

10. PAST WEATHER (last 24 hrs)

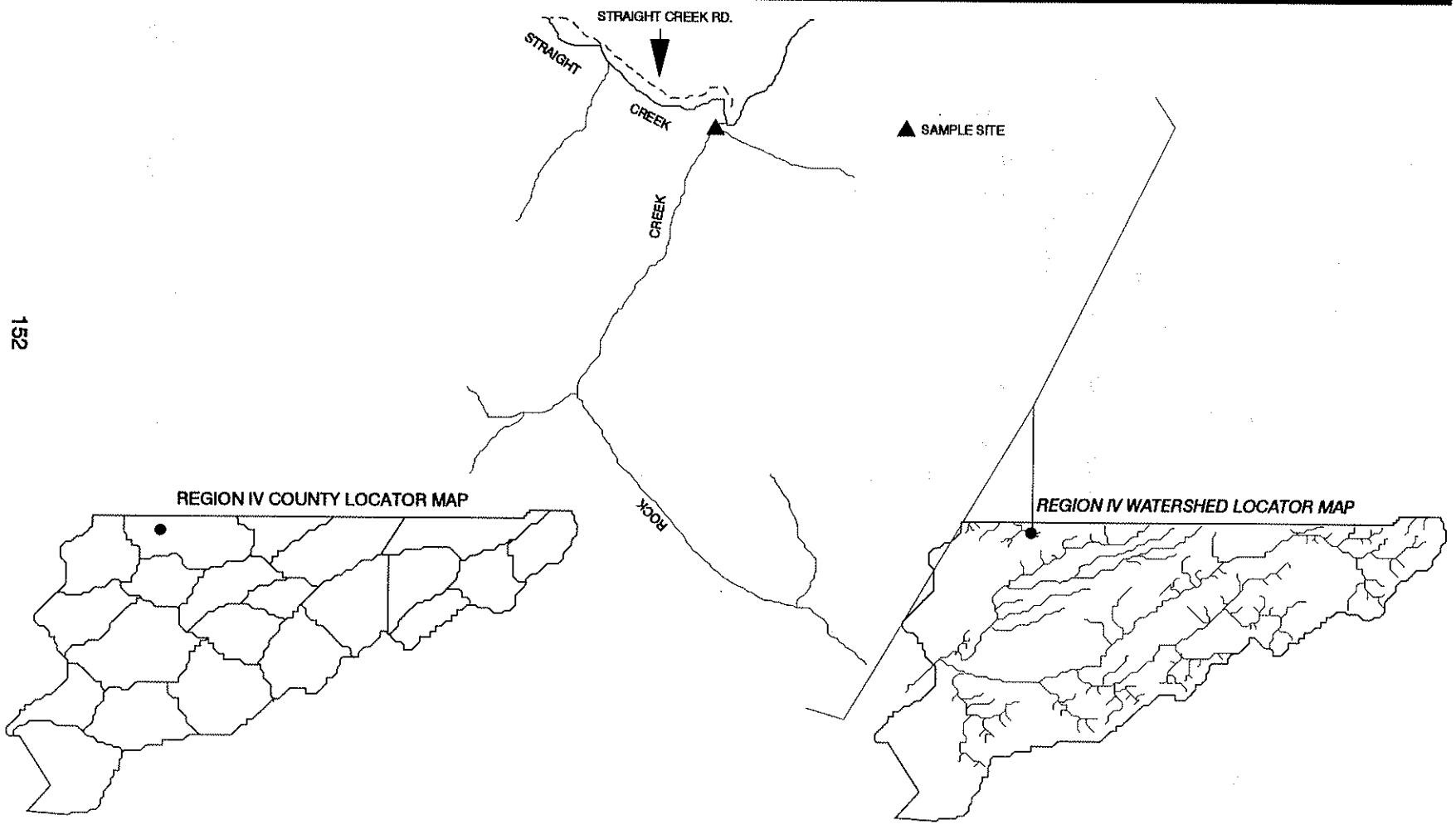
SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	71 F	172	9.2	100

12. COMMENTS:

SAMPLE SITE BEGAN JUST ABOVE MOUTH. HIGH OCCURENCE OF BEDROCK IN THIS SECTION. OBSERVED TWO OUTCROPPINGS OF PYRITIC ROCK. COAL FINES ABUNDANT IN STREAM.



ROCK CREEK FISH DATA

SAMPLING TYPE: SHOCKING

GEAR TYPE: ONE BACKPACK UNIT @ 125 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	2		
Etheostoma kennicotti	418	3		
Lepomis cyanellus	347	1	3	
Rhinichthys atratulus	184	1		
Semotilus atromaculatus	188	21		
		SUM: 28		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-9	>9	14	5	3
NUMBER OF DARTER SP.	<2	2	>2	4	1	1
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<1	1	>1	2	0	1
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		78.6	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		0	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		10.7	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		5.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
						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**

ROCK CREEK BENTHIC DATA
FIELD COLLECTION # 548
EFFORT = 1.5 PERSON HOURS

TAXA RICHNESS = 25
EPT TAXA RICHNESS = 13
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
ANNELIDA				7.6
	Oligochaeta		6	
COLEOPTERA				3.8
	Psephenidae	*Psephenus herricki* adults, larva	3	
DIPTERA				5.1
	Athericidae	*Atherix lantha*	2	
	Chironomidae		1	
	Unidentified		1	
EPHEMEROPTERA				27.8
	Baetidae	*Baetis*	14	
		Centroptilum	1	
	Ephemerellidae	*Eurylophella*	1	
	Ephemeridae	*Ephemera*	3	
	Heptageniidae	*Heptagenia*	3	
HEMIPTERA				6.3
	Gerridae	*Gerris conformis*	2	
	Veliidae	*Rhagovelia obesa* nymphs	3	
ISOPODA				1.3
	Asellidae	*Lirceus*	1	
ODONATA				6.3
	Aeshnidae	*Boyeria vinosa*	1	
	Calopterygidae	*Calopteryx*	1	
	Coenagrionidae	*Argia*	1	
	Cordulegastridae	*Cordulegaster maculata*	1	
	Gomphidae	*Gomphus lividus*	1	
PLECOPTERA				10.1
	Peltoperlidae	*Peltoperla*	2	
	Perlidae	*Acroneuria carolinensis*	1	
		Perlesta	5	
TRICHOPTERA				31.6
	Glossosomatidae	*Glossosoma*	2	
	Hydropsychidae	*Ceratopsyche cheilonis*	1	
		Diplectrona modesta	1	
		Hydropsyche betteni/depravata	16	
	Uenoidae	*Neophylax*	5	
		TOTAL	**79**	

Tracy Branch

One IBI fishery survey was conducted on Tracy Branch in June 1994:

Location and Length - Tributary to the Clear Fork (Cumberland River). The sample area began near the confluence of Tracy Branch and Clear Fork and proceeded upstream to Hwy. 90 bridge. The sample area was approximately 500 ft in length and was sampled on 17 June 1994.

Sampling Methodology - The site was sampled with one backpack electrofishing unit operating at 100 VAC.

Water Quality - (See physicochemical and 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 primarily to evaluate stream health and to develop a fish species diversity list for TADS. Only a limited survey was conducted and emphasis was placed on the fish species present. The Agency has made no previous collections from this stream.

A total of 101 fish representing seven species was collected. The only game fish present in our sample was the green sunfish *(Lepomis cyanellus)*. Other species collected included central stoneroller *(Campostoma anomalum)*, stripetail darter *(Etheostoma kennicotti)*, arrow darter *(E. sagitta)*, bluntnose minnow *(Pimephales notatus)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. The blacknose dace and creek chub were the most abundant species in our sample.

The Index of Biotic Integrity score (34) for this stream corresponded to a integrity classification of "poor". This was primarily due to the high percentage of tolerant species (i.e., creek chub), the relatively low percentage of specialized insectivores (i.e., darters), the abscence of piscivores, and the relatively low catch rate. This stream had moderate amounts of fine sediment in the substrate with mixed gravel and rubble. Perhaps the most alarming finding was the high conductance of the water. We recorded a conductivity of 700 micromhos/cm, the highest of any stream sampled in the Clear Fork drainage during 1994. We did not investigate potential sources contributing to this high value, however, it is believed that residential "straight piping" may be the cause.

Benthic macroinvertebrates from our sample included Baetidae, Caenidae and Heptageniidae mayflies, Leuctridae stoneflies, and Hydropsychidae caddisflies, Elmidae and Psephenidae beetles. Overall, a total of 20 taxa was collected with eight being EPT taxa. Trichopterans contributed the highest percentage (29.9) to the total sample. Dipterans, ephemeropterans, and isopods contributed 14.9% each, while plecopterans only contributed 3%. The bioclassification for this stream based on the EPT taxa richness was "fair".

Management Recommendations:

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

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	TRACY BRANCH
WATERSHED	CLEAR FORK
SITE	NEAR MOUTH
COUNTY	CLAIBORNE
QUADRANGLE	EAGAN 4257 SW
LAT-LONG	363410N-835526W
REACH	05130101-
LENGTH	~ 500 FT
AREA	1.90 SQ. MI.
ELEVATION	1160 FT
DATE	6-17-94
TIME	1430

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND MARK T. FAGG

1. CHANNEL CHARACTERISTICS

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

2. ESTIMATED % OF STREAM IN POOLS IS 50

3. ESTIMATED POOL SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	15	40	30	10	

4. ESTIMATED RIFFLE SUBSTRATE (%)

MUD	SILT	SAND	GRAVEL	RUBBLE	BOULDER	BEDROCK
	5	5	30	50	10	

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
		X

6. INSTREAM COVER ABUNDANCE IS

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

7. SHADE OR CANOPY COVER GOOD OVER 80 %

8. FLOW (CFS) 0.73 COMPARED TO NORMAL

LOW	NORMAL	HIGH
	X	

9. PRESENT WEATHER

SUNNY; HOT AND HUMID
AIR TEMP. 80 F @ 1440

10. PAST WEATHER (last 24 hrs)

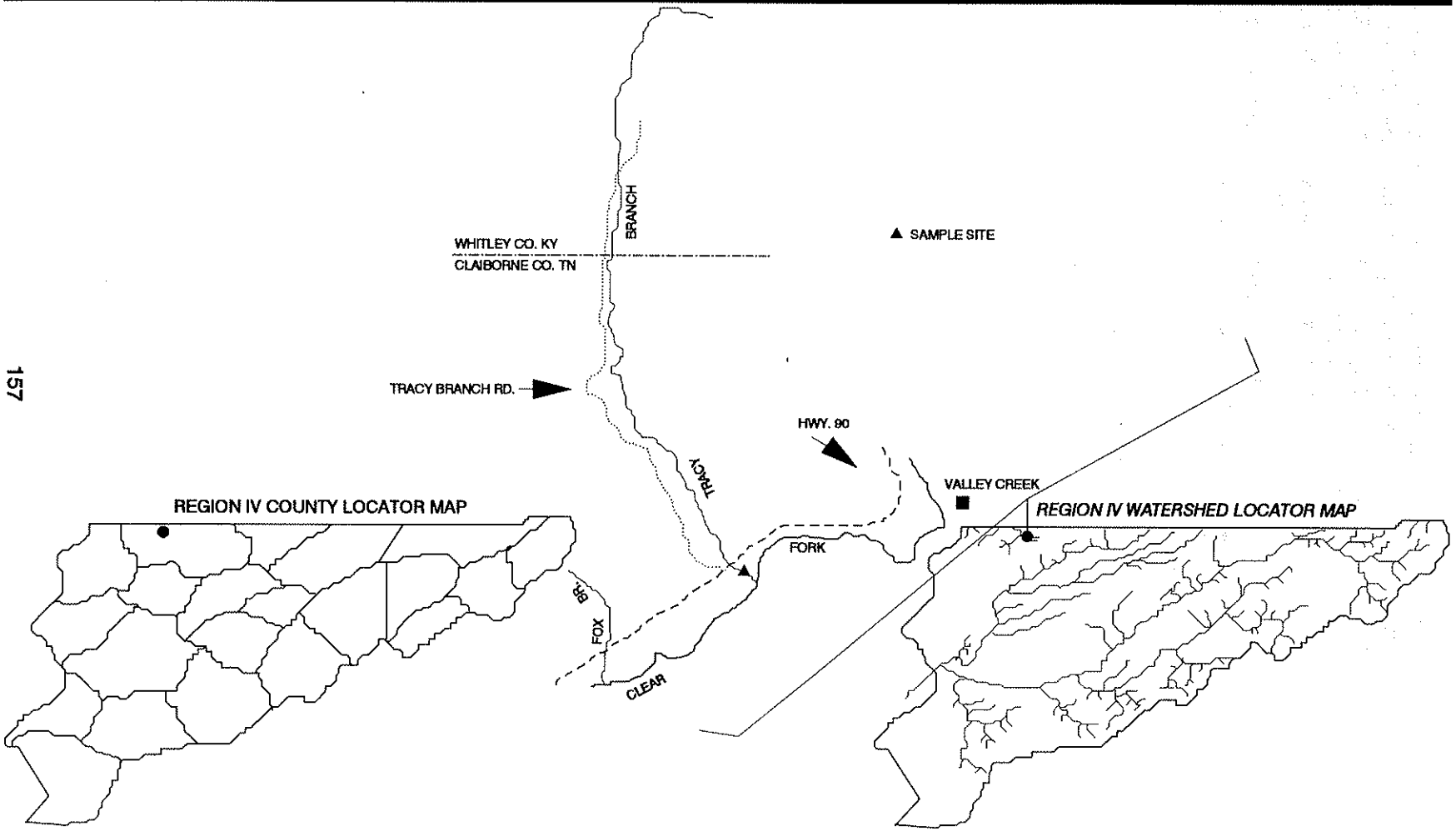
PT. CLOUDY W/ SCATTERED T-STORMS

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	76 F	700	8.8	101.5

12. COMMENTS:

SAMPLE STATION BEGAN AT THE CONFLUENCE OF TRACY BRANCH AND CLEAR FORK AND EXTENDED TO THE HWY. 90 CROSSING. WATER ONLY SLIGHTLY TURBID AT TIME OF SAMPLE.



TRACY BRANCH FISH DATA

SAMPLING TYPE: SHOCKING

GEAR TYPE: ONE BACKAPCK UNIT @ 100 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	195	3		
Etheostoma kennicotti	418	7		
Etheostoma sagitta	433	1		
Lepomis cyanellus	347	7	2-4	
Pimephales notatus	176	1		
Rhinichthys atratulus	184	42		
Semotilus atromacualtus	188	40		
	SUM:	101		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<3	3-6	>6	10	7	5
NUMBER OF DARTER SP.	<2	2	>2	3	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3
NUMBER OF SUCKER SP.	0		>0	1	0	1
NUMBER OF INTOLERANT SP.	<1	1	>1	2	1	3
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		46.5	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		1	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		7.9	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		15.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
					34	**POOR**

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

TRACY BRANCH BENTHIC DATA
FIELD COLLECTION # 550
EFFORT = 1.0 PERSON HOUR

TAXA RICHNESS = 20
EPT TAXA RICHNESS = 8
BIOCLASSIFICATION (EPT) = 2 (FAIR)

TAXA			NUMBER	PERCENT
AMPHIPODA			1	1.5
COLEOPTERA				4.5
	Elmidae	*Optioservus trivittatus* adults	2	
	Psephenidae	*Psephenus herricki* larva	1	
DIPTERA				14.9
	Athericidae	*Atherix lantha*	3	
	Ceratopogonidae	*Atrichopogon*	1	
	Chironomidae		5	
	Tipulidae	*Tipula*	1	
EPHEMEROPTERA				14.9
	Baetidae	*Baetis*	7	
	Caenidae	*Caenis*	1	
	Heptageniidae	*Stenonema femoratum*	1	
		Stenonema vicarium	1	
HEMIPTERA				10.5
	Gerridae	*Gerris conformis*	1	
	Veliidae	*Rhagovelia obesa*	6	
ISOPODA				14.9
	Asellidae	*Lirceus*	10	
MEGALOPTERA				1.5
	Corydalidae	*Nigronia fasciatus*	1	
ODONATA				4.5
	Calopterygidae	*Calopteryx*	3	
PLECOPTERA				3
	Leuctridae	*Leuctra*	2	
TRICHOPTERA				29.9
	Hydropsychidae	*Ceratopsyche sparna*	4	
		Cheumatopsyche	10	
		Hydropsyche betteni/depravata	6	
		TOTAL	**67**	

Little Yellow Creek

Three fishery IBI surveys were conducted on Little Yellow Creek in 1994:

Location and Length - Tributary to the Cumberland River. Sample Site 1 was located approximately 400 ft downstream of first road crossing upstream of Fern Lake. The sample site was approximately 400 ft in length. Sample Site 2 was located approximately 150 ft upstream of the eighth road crossing upstream of Fern Lake. The sample site was approximately 800 ft in length. Sample Site 3 was located approximately 0.25 mi upstream of Site 2. Sample length was approximately 850 ft. All three sites were sampled on 8 December 1994.

Sampling Methodology - The sites were sampled with a 10 ft seine and one backpack electrofishing unit operating at 400 VAC.

Water Quality - (See physicochemical and site location form)

Benthos Collection - (No benthic collections made)

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

Comments - This portion of Little Yellow Creek was sampled cooperatively with the Tennessee Department of Environment and Conservation (TDEC), Tennessee Valley Authority (TVA), and the Office of Surface Mining (OSM). The primary objectives of these surveys were to determine the relative health of the stream based on the fish community present and to develop a species diversity list for TADS. Areas within this watershed were being reviewed for permitting regarding coal extraction. This was a major concern and focus of our efforts in this watershed. In all a total of four surveys were conducted on Little Yellow Creek. However, because of the close proximity of sample Sites 2 and 3 the data for these sites was combined and is reported as Site 2 in this account. Sample Site 3 in this account represents the most upstream sample conducted. Further information regarding this stream and data collected during these samples can be found in Turner (1995).

A total of 260 fish representing eight species was collected from Site 1. The only game fish collected in our sample was four bluegill *(Lepomis macrochirus)*. One non-game species the white sucker *(Catostomus commersoni)* was also collected during our survey effort. The remaining six species were forage fish which included central stoneroller *(Campostoma anomalum)*, stripetail darter *(Etheostoma*

kennicotti), arrow darter *(E. sagitta)*, blackside dace *(Phoxinus cumberlandensis)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*.

Of special interest was the collection of one federally threatened species (blackside dace) and one species deemed in need of management by the state (arrow darter). There appeared to be a relatively healthy population of blackside dace at this site, as a total of 30, representing all age classes were collected.

Our Index of Biotic Integrity analysis indicated this reach of stream was in "poor to fair" condition based on the IBI score of 38. The most notable negative influences on the overall score were the relatively high percentage of tolerant fish species, the low percentage of trophic specialists in the sample, and the absence of piscivores. At the time of our sample there was no active mining in the watershed which would have degraded the stream. However, there did appear to be heavy sediment loads in the stream and an apparent lack of habitat heterogeneity.

A total of 153 fish representing six species was collected from our sample at Site 2. One non-game species the white sucker *(Catostomus commersoni)* was collected during our survey effort. The remaining five species were forage fish which included stripetail darter *(Etheostoma kennicotti)*, arrow darter *(E. sagitta)*, blackside dace *(Phoxinus cumberlandensis)*, blacknose dace *(Rhinichthys atratulus)*, and creek chub *(Semotilus atromaculatus)*. Creek chub was the most abundant species collectd at this site.

Of special interest was the collection of one federally threatened species (blackside dace) and one species deemed in need of management by the state (arrow darter). There appeared to be a relatively healthy population of blackside dace at this site, as a total of 17, representing all age classes were collected.

Our Index of Biotic Integrity analysis indicated this reach of stream was in "poor to fair" condition based on the IBI score of 38. The most notable negative influences on the overall score were the relatively high percentage of tolerant fish species, the absence of sunfish species in the sample, the absence of piscivores, and the relatively low catch rate for a stream of this size. At the time of our sample there was no active mining in the watershed which would have degraded the stream. However, there did appear to be heavy sediment loads in the stream and an apparent lack of habitat heterogeneity.

A total of 102 fish representing four species was collected from our sample at Site 3. One non-game species the white sucker *(Catostomus commersoni)* was collected

during our survey effort. The remaining three species were forage fish which included stripetail darter *(Etheostoma kennicotti)*, blackside dace *(Phoxinus cumberlandensis)*, and creek chub *(Semotilus atromaculatus)*. The creek chub was the most abundant species collected at this site.

Of special interest was the collection of one federally threatened species (blackside dace). There appeared to be a relatively healthy population of blackside dace at this site, as a total of 16, representing all age classes were collected from this site.

Our Index of Biotic Integrity analysis indicated this reach of stream was in "poor to fair" condition based on the IBI score of 36. The most notable negative influences on the overall score were the relatively high percentage of tolerant fish species, the absence of sunfish species in the sample, the absence of piscivores, and the relatively low catch rate. At the time of our sample there was no active mining in the watershed which would have degraded the stream. However, there did appear to be heavy sediment loads in the stream and an apparent lack of habitat heterogeneity.

Management Recommendations:

1. Special emphasis should be placed on protecting the existing blackside dace population in this stream.

PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE YELLOW (SITE 1)
WATERSHED	CUMBERLAND RIVER
SITE	NEAR MOUTH
COUNTY	CLAIBORNE
QUADRANGLE	MIDDLESBORO S 153 SW
LAT-LONG	363429N-834407W
REACH	05130101-
LENGTH	~ 400 FT
AREA	3.45 SQ. MI.
ELEVATION	1160 FT
DATE	12-8-94
TIME	N/A

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND MARK T. FAGG

1. CHANNEL CHARACTERISTICS

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

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

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
N/A	N/A	N/A

6. INSTREAM COVER ABUNDANCE IS

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

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

8. FLOW (CFS) 8.15 COMPARED TO NORMAL

LOW	NORMAL	HIGH
		X

9. PRESENT WEATHER

PT. CLOUDY; COOL

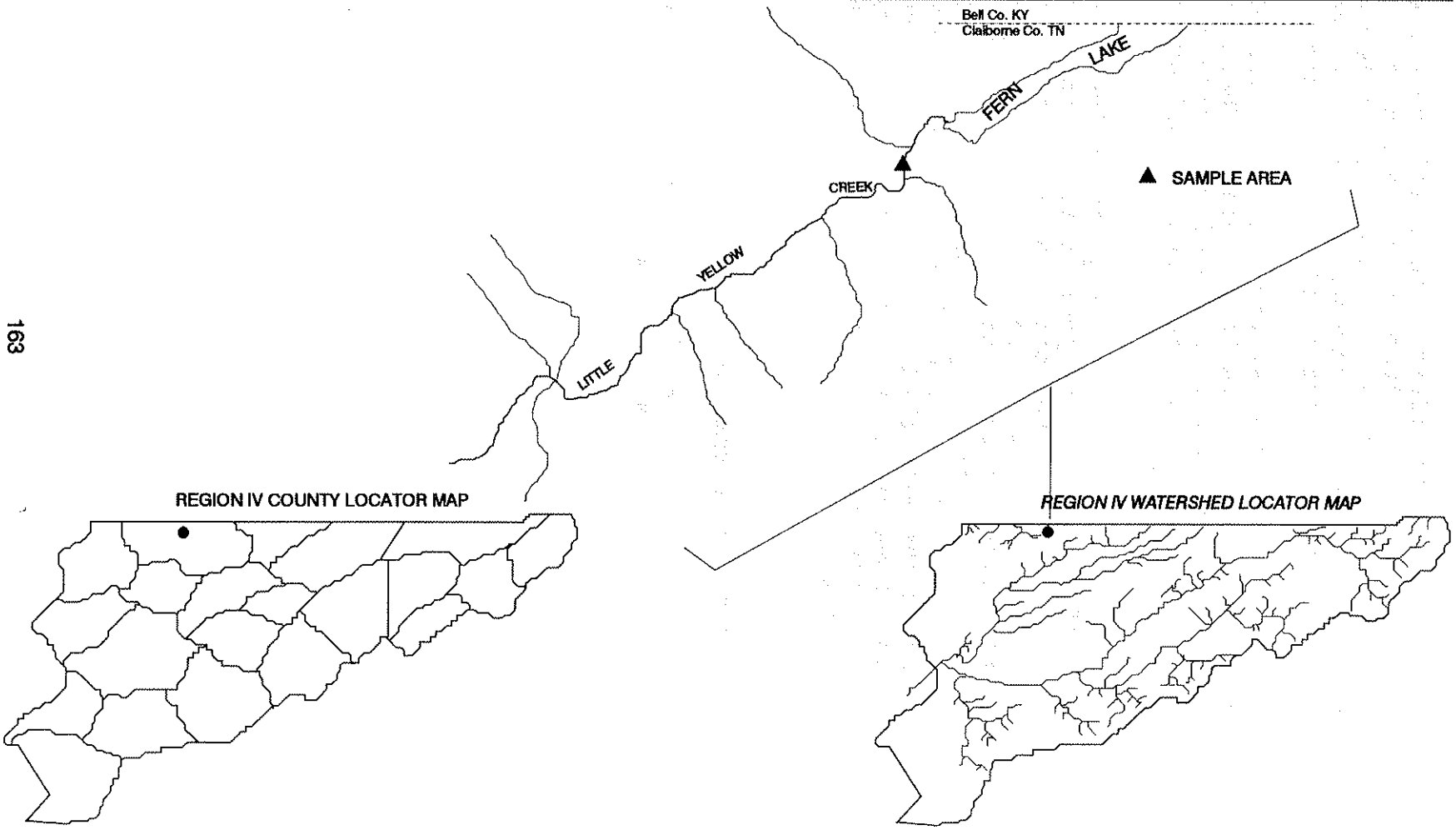
10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	47.8	22	N/A	N/A

12. COMMENTS:



PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE YELLOW (SITE 2)
WATERSHED	CUMBERLAND RIVER
SITE	@ 8TH STREAM X-ING
COUNTY	CLAIBORNE
QUADRANGLE	FORK RIDGE 144 SE
LAT-LONG	363356N-834507W
REACH	05130101-
LENGTH	~ 500 FT
AREA	3.35 SQ. MI.
ELEVATION	1200 FT
DATE	12-8-94
TIME	N/A

COLLECTOR(S)

RICK D. BIVENS, BART D. CARTER, CARL E. WILLIAMS AND MARK T. FAGG

1. CHANNEL CHARACTERISTICS

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

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

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
N/A	N/A	N/A

6. INSTREAM COVER ABUNDANCE IS

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

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

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

LOW	NORMAL	HIGH
N/A	N/A	N/A

9. PRESENT WEATHER

PT. CLOUDY; COOL

10. PAST WEATHER (last 24 hrs)

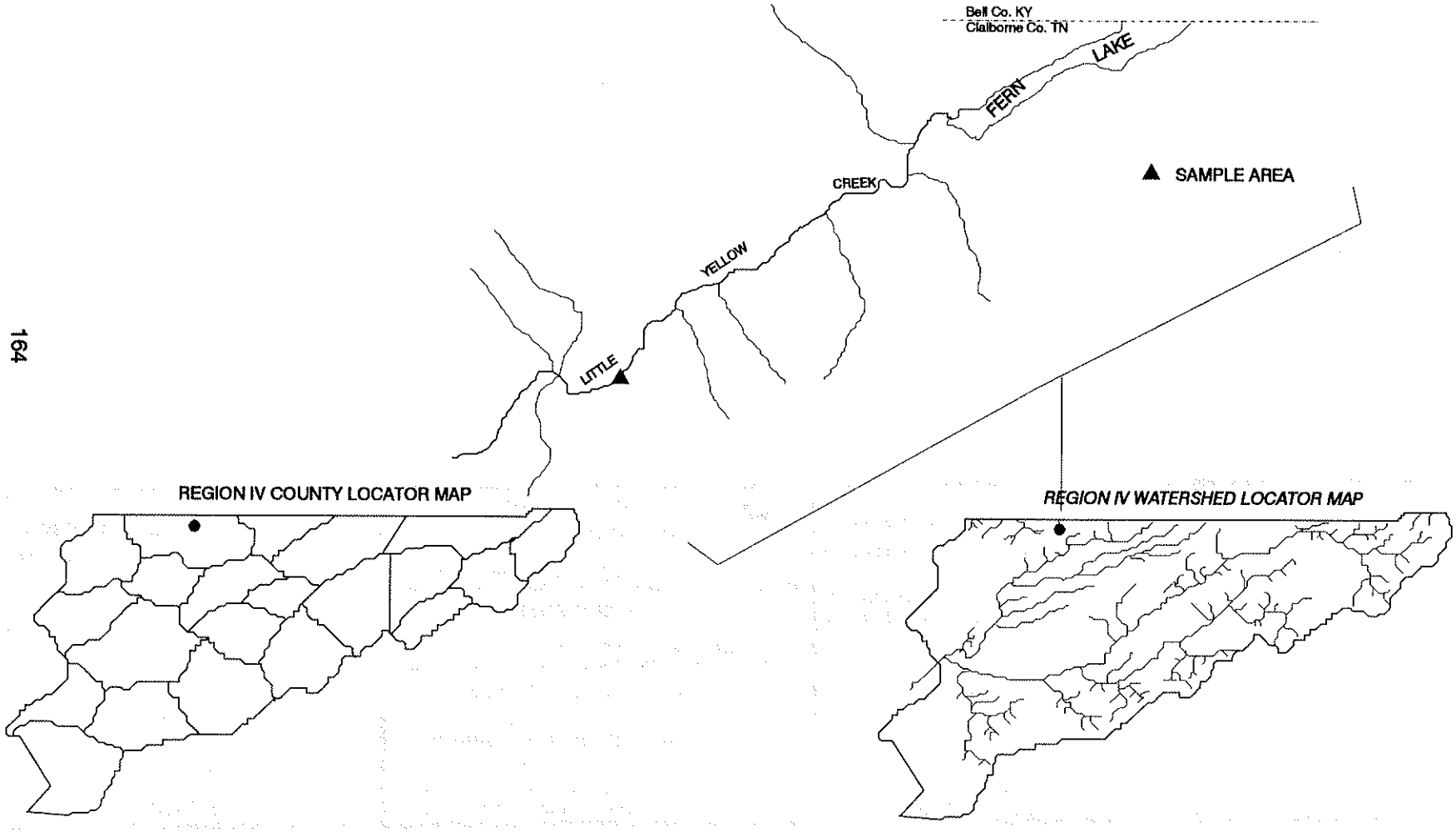
SAME AS ABOVE

11. WATER QUALITY

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

12. COMMENTS:

NO WATER QUALITY DATA OR BENTHIC COLLECTIONS TAKEN.



PHYSICOCHEMICAL AND SAMPLE SITE LOCATION DATA

STREAM	LITTLE YELLOW (SITE 3)
WATERSHED	CUMBERLAND RIVER
SITE	BELOW H-3
COUNTY	CLAIBORNE
QUADRANGLE	FORK RIDGE 144 SE
LAT-LONG	363350N-834525W
REACH	05130101-
LENGTH	~ 1100 FT
AREA	3.10 SQ. MI.
ELEVATION	1480 FT
DATE	12-8-94
TIME	N/A

COLLECTOR(S)

CHARLIE SAYLOR et al.

1. CHANNEL CHARACTERISTICS

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

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

3. ESTIMATED POOL SUBSTRATE (%)

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

4. ESTIMATED RIFFLE SUBSTRATE (%)

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

5. ABUNDANCE OF LITTORAL AQUATIC PLANTS IS

NUMEROUS	AVERAGE	SCARCE
N/A	N/A	N/A

6. INSTREAM COVER ABUNDANCE IS

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

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

8. FLOW (CFS) COMPARED TO NORMAL

FLOW (CFS)	LOW	NORMAL	HIGH
1.86	N/A	N/A	N/A

9. PRESENT WEATHER

PT. CLOUDY; COOL

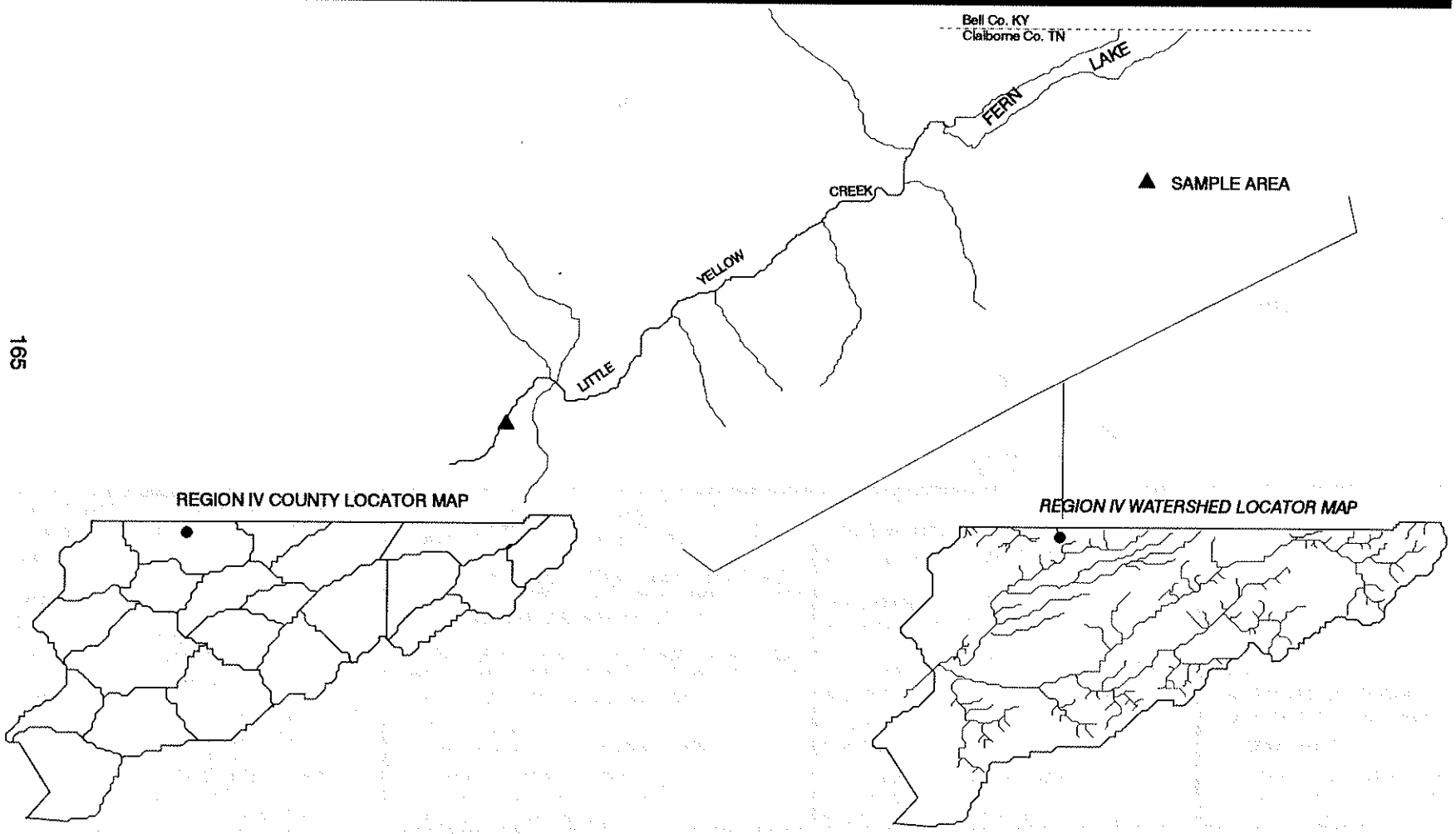
10. PAST WEATHER (last 24 hrs)

SAME AS ABOVE

11. WATER QUALITY

pH	TEMP.	COND.	D.O.	% SAT.
7.0	47.8	22	N/A	N/A

12. COMMENTS:



LITTLE YELLOW CREEK FISH DATA (SITE 1)

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT @ 400 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Campostoma anomalum	45	3		
Catostomus commersoni	195	11		
Etheostoma kennicotti	418	16		
Etheostoma sagitta	433	2		
Lepomis macrochirus	351	4	2	
Phoxinus cumberlandensis	166	30		
Rhinichthys atratulus	184	43		
Semotilus atromaculatus	188	151		
		SUM: 260		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE	
NUMBER OF NATIVE SP.	<4	4-9	>9	14	8	3	
NUMBER OF DARTER SP.	<2	2	>2	4	2	3	
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	1	3	
NUMBER OF SUCKER SP.	0		>0	1	1	5	
NUMBER OF INTOLERANT SP.	<1	1	>1	2	2	5	
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		62.3	1	
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		4.2	5	
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		6.9	1	
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1	
CATCH RATE	<16	16-32	>32		21.4	3	
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5	
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		3.8	3	
						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 YELLOW CREEK FISH DATA (SITE 2)

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: 10' SEINE AND ONE BACKPACK UNIT @ 400 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Catostomus commersoni	195	8		
Etheostoma kennicotti	418	22		
Etheostoma sagitta	433	7		
Phoxinus cumberlandensis	166	17		
Rhinichthys atratulus	184	4		
Semotilus atromaculatus	188	95		
	SUM:	153		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-9	>9	14	6	3
NUMBER OF DARTER SP.	<2	2	>2	4	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	2	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		67.3	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		5.2	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		18.9	3
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		11.2	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	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 YELLOW CREEK FISH DATA (SITE 3)

SAMLPING TYPE: SEINING AND SHOCKING

GEAR TYPE: ONE BACKPACK UNIT @ 400 VAC

SPECIES	TADS CODE	NO. COLL.	IN. CLASS	TOT. WEIGHT
Catostomus commersoni	195	2		
Etheostoma kennicotti	418	5		
Phoxinus cumberlandensis	166	16		
Semotilus atromaculatus	188	79		
	SUM:	102		

INDEX OF BIOTIC INTEGRITY

METRIC DESCRIPTION	SCORING CRITERIA 1	3	5	MAXIMUM EXPECTED	OBSERVED	SCORE
NUMBER OF NATIVE SP.	<4	4-9	>9	14	4	3
NUMBER OF DARTER SP.	<2	2	>2	4	2	3
NUMBER OF SUNFISH SP. *less Micropterus*	<1	1	>1	2	0	1
NUMBER OF SUCKER SP.	0		>0	1	1	5
NUMBER OF INTOLERANT SP.	<1	1	>1	2	2	5
PERCENT OF INDIVIDUALS AS TOLERANT	>20	20-10	<10		79.4	1
PERCENT OF INDIVIDUALS AS OMNIVORES	>45	45-22	<22		1.9	5
PERCENT OF INDIVIDUALS AS SPECIALISTS	<13	13-26	>26		4.9	1
PERCENT OF INDIVIDUALS AS PISCIVORES	0		>0		0	1
CATCH RATE	<16	16-32	>32		9	1
PERCENT OF INDIVIDUALS AS HYBRIDS	>1	1-TR	0		0	5
PERCENT OF INDIVIDUALS WITH ANOMALIES	>5	5-2	<2		0	5
						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**

SUMMARY

Coal mining in Campbell and Claiborne counties of east Tennessee began in he early 1900's and peaked in the middle 1940's. Mining activities have continues to the present day although the extensiveness of these activities has declined in recent years. As a result of these activities, the Clear Fork of the Cumberland River and most of its tributaries in Campbell and Claiborne counties have suffered degradation from sedimentation and acid mine drainage. Sources of these pollutants have arisen from surface and deep coal mined areas in the watershed.

In Tennessee, stream siltation is the major pollutant associated with surface mining. Acid mine drainage has the most pronounced effect on aquatic ecosystems but is generally linked to deep mining activities. The contour or strip mining has been the most popular method of coal extraction in the Cumberland Plateau region of Tennessee (Talak 1977). Campbell county has been one of the most severely affected counties with approximately 478 mi of streams polluted by sedimentation and 160 mi polluted by acid mine drainage (Tennessee Department of Public Health 1978). The Clear Fork drainage basin in Campbell and Claiborne counties, has been reported as severely polluted and significantly degraded by mine drainage (Appalachian Regional Commission 1969).

Our survey of the Clear Fork drainage basin included 32 fish samples and 28 benthic macroinvertebrate samples. Scores for the fish samples ranged from 24 to 54 (very poor to good-excellent) whereas the benthic macroinvertebrate ratings varied from 1 to 3 (poor to good-fair) (see Appendix A). Of the 32 fish samples 28.1% (9) scored "poor" or below, 34.3% (11) scored "poor to fair", 18.7% (6) scored "fair", 3.1% (1) scored "fair to good", 12.5% (4) scored "good", and only one stream (3.1%) scored "good to excellent". Ratings based on the benthic EPT taxa richness at the 28 collection sites included three (10.7%) receiving a classification of "poor", thirteen (46.4%) receiving a classification of "fair", and twelve (42.8%) receiving a classification of "good to fair". As depicted in the graph (Appendix A) it does appear that the IBI fish scores and the ratings based on EPT taxa richness values generally followed the same trends. However, there were a few streams where it is believed the fish community had been altered by factors other than pollution (Little Tackett Creek, No Business Branch, and Unnamed trib. to Little Tackett Creek).

In regards to game fish populations that would provide adequate angling opportunities, we concluded that of the 27 streams surveyed (32 total sample sites) about eight of these could be considered to contain a fishery for one or more species of game fish. These included Capuchin Creek, Hatfield Creek, the lower reaches of the Clear Fork, Elk

Fork Creek, Hickory Creek, Laurel Fork, Lick Creek, and Rock Creek in Campbell county.

Several streams surveyed in this drainage contained species of special concern. Of the 32 surveys made, 22 (68.7%) contained species deemed in need of management by the state. Furthermore, eleven (34.3%) of these samples contained the federally threatened blackside dace. Of the populations sampled, five (Baird Creek, Crooked Creek, Fall Branch, Lick Fork, and Little Tackett Creek) represent previously undocumented populations.

Overall, a good portion of the streams we surveyed are still suffering from past and/or present mining activities and various other unregulated land uses. However, there was an indication that some of these streams are starting to respond and are recovering to some extent. This was particularly evident on the mainstem of the Clear Fork. Additionally, there is a great deal that could be done to mitigate past and present impacts on these aquatic systems, particularly the reclaiming of abandoned strip mines and the reduction of unregulated waste discharge from residential property.

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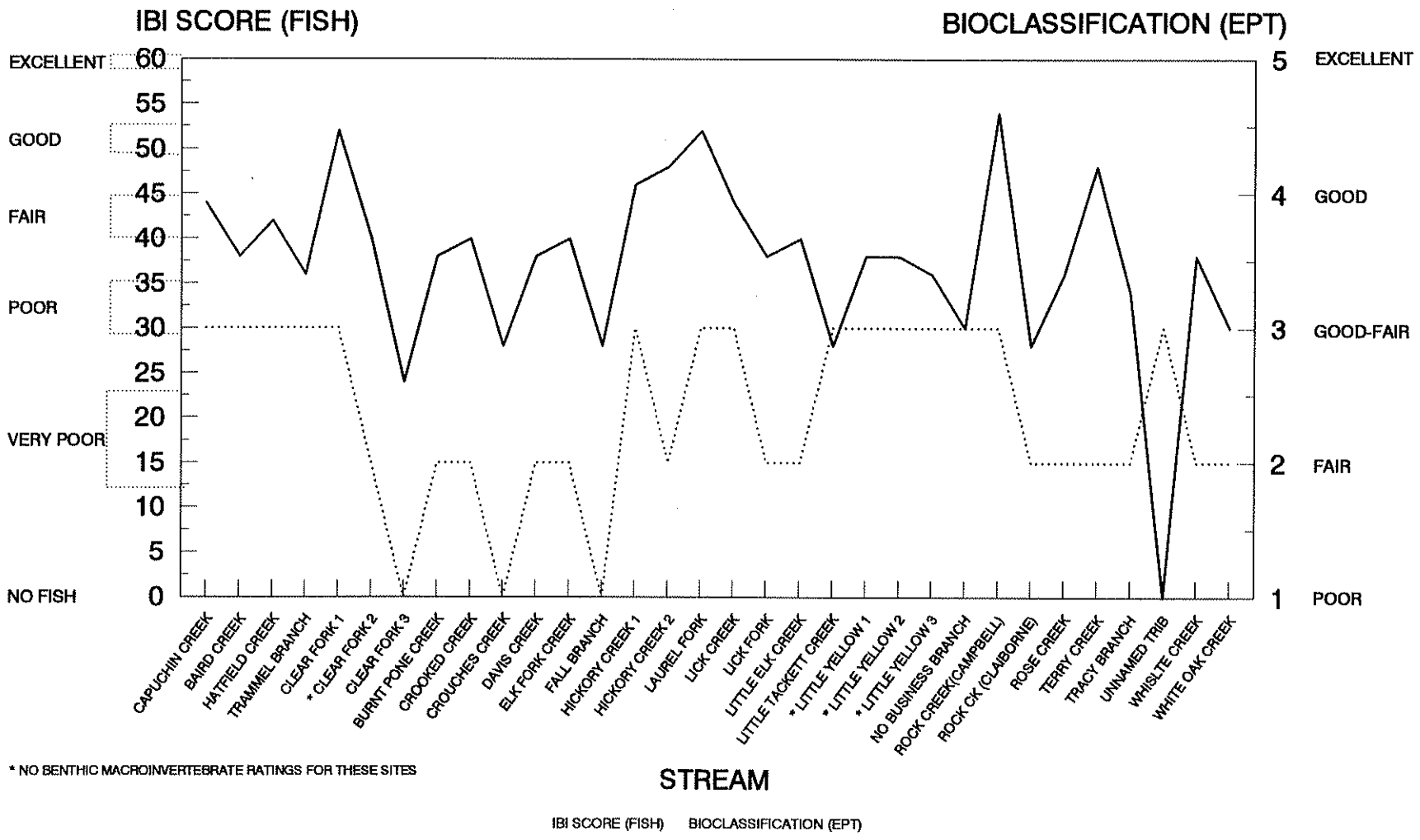
APPENDIX A

Trends in IBI Fish Scores and EPT Bioclassification Scores

Trends in IBI Fish Scores and Bioclassification Scores Based on EPT Taxa Richness for Samples Conducted in the Cumberland River System during 1994



* NO BENTHIC MACROINVERTEBRATE RATINGS FOR THESE SITES

APPENDIX B

Designations for Fish Species Collected in the Cumberland River System

Fish Species Collected in the Cumberland River System during 1994 with Desigantions for Trophic Guild, Family Group, and Tolerance.

COMMON NAME	SCIENTIFIC NAME	TROPHIC GUILD	GROUP	TOLERANCE
Rock bass	*Ambloplites rupestris*	PI	SUNFISH	INTOL **
Central stoneroller	*Campostoma anomalum*	HB	MISC	
White sucker	*Catostomus commersoni*	OM	SUCKER	TOL
Whitetail shiner	*Cyprinella galactura*	IN	MISC	
Spotfin shiner	*Cyprinella spiloptera*	IN	MISC	TOL
Silverjaw minnow	*Ericymba buccata*	IN	MISC	
Emerald darter	*Etheostoma baileyi*	SP	DARTER	
Greenside darter	*Etheostoma blennioides*	SP	DARTER	
Rainbow darter	*Etheostoma caeruleum*	SP	DARTER	
Stripetail darter	*Etheostoma kennicotti*	SP	DARTER	
Arrow darter	*Etheostoma sagitta*	SP	DARTER	INTOL
Northern hog sucker	*Hypentelium nigricans*	IN	SUCKER	
Channel catfish	*Ictalurus punctatus*	OM	MISC	
Brook silverside	*Labidesthes sicculus*	IN	MISC	
Least brook lamprey	*Lampetra aepyptera*	HB	MISC	
Redbreast sunfish	*Lepomis auritus*	IN	SUNFISH	
Green sunfish	*Lepomis cyanellus*	IN	SUNFISH	TOL
Warmouth	*Lepomis gulosus*	IN	SUNFISH	
Bluegill	*Lepomis macrochirus*	IN	SUNFISH	
Longear sunfish	*Lepomis megalotis*	IN	SUNFISH	
Striped shiner	*Luxilus chrysocephalus*	OM	MISC	TOL
Rosefin shiner	*Lythrurus ardens*	SP	MISC	
Smallmouth bass	*Micropterus dolomieu*	PI	MISC	
Spotted sass	*Micropterus punctulatus*	PI	MISC	
Largemouth bass	*Micropterus salmoides*	PI	MISC	
Golden redhorse	*Moxostoma erythrurum*	OM	SUCKER	
Rosyface shiner	*Notropis r. rubellus*	SP	MISC	INTOL
Mimic shiner	*Notropis volucellus*	SP	MISC	
Logperch	*Percina caprodes*	SP	DARTER	
Blackside darter	*Percina maculata*	SP	DARTER	
Blackside dace	*Phoxinus cumberlandensis*	HB	MISC	INTOL *
Bluntnose minnow	*Pimephales notatus*	OM	MISC	
Fathead minnow	*Pimephales promelas*	OM	MISC	
White crappie	*Pomoxis annularis*	PI	SUNFISH	
Blacknose dace	*Rhinichthys atratulus*	IN	MISC	
Creek chub	*Semotilus atromaculatus*	IN	MISC	TOL
Walleye	*Stizostedion vitreum*	PI	MISC	

* FOR STREAMS DRAINING LESS THAN 5 SQUARE MILES
** OVER 5 INCHES TOTAL LENGTH

SP = SPECIALIST
HB = HERBIVORE
OM = OMNIVORE
IN = INSECTIVORE
PI = PISCIVORE

APPENDIX C

Distribution of Fishes Collected during 1994 Stream Surveys

Distribution of Fishes Collected during 1994 Stream Surveys

FAMILY	SCIENTIFIC NAME	STATUS	CAPUCHIN CREEK	BAIRD CREEK	HATFIELD CREEK	TRAMMEL BRANCH	LITTLE YELLOW	CLEAR FORK 1	CLEAR FORK 2	CLEAR FORK 3	BURNT POND CREEK	CROOKED CREEK	CROUCHES CREEK	DAVIS CREEK	ELK FORK CREEK	FALL BRANCH	HICKORY CRK 1	HICKORY CRK 2	LAUREL FORK	LICK CREEK	LICK FORK	LITTLE ELK CRK	LITTLE TACKETT	LITTLE YELL 1	LITTLE YELL 2	LITTLE YELL 3	NO BUSINESS BR	ROCK CREEK CA	ROCK CREEK CL	ROSE CREEK	TERRY CREEK	TRACY BRANCH	UNNAMED TRIB	WHISTLE CREEK
			CUMBERLAND RIVER SYSTEM					CLEAR FORK DRAINAGE																										
ATHERINIDAE	*Labidesthes sicculus*							X																										
CATOSTOMIDAE	*Catostomus commersoni*			X	X	X	X		X	X	X								X	X	X	X		X	X	X					X			X
	Hypentelium nigricans		X	X	X			X	X			X		X	X		X	X	X	X	X	X						X			X			
	Moxostoma erythrurum							X	X								X	X																
CENTRARCHIDAE	*Ambloplites rupestris*		X		X			X						X	X		X	X	X	X														
	Lepomis auritus		X		X			X			X			X	X		X	X	X	X	X	X						X						X
	Lepomis cyanellus							X	X						X							X						X	X	X		X		X
	Lepomis gulosus							X														X												X
	Lepomis macrochirus						X	X	X		X	X			X		X	X	X	X	X	X		X				X						X
	Lepomis megalotis		X					X							X		X	X	X	X		X									X			
	Lepomis sp. (hybrid)												X		X		X					X												
	Micropterus dolomieu							X						X			X	X	X	X														
	Micropterus punctulatus		X					X			X				X		X	X	X	X								X						
	Micropterus salmoides																X	X				X						X						X
	Pomoxis annularis							X																										
CYPRINIDAE	*Campostoma anomalum*		X	X	X		X	X	X			X	X	X	X		X	X	X	X	X	X		X				X	X	X	X	X		
	Cyprinella galactura							X									X	X	X	X								X						
	Cyprinella spiloptera							X							X		X																	
	Ericymba buccata	ST							X																									
	Luxilus chrysocephalus							X	X					X			X	X	X	X								X						
	Lythrurus ardens														X						X										X			
	Notropis r. rubellus	INM	X		X			X	X					X	X		X	X	X	X		X						X						
	Notropis volucellus							X																										
	Phoxinus cumberlandensis	FT	X	X	X	X	X					X		X		X					X		X	X	X	X					X			
	Pimephales notatus		X		X			X	X				X	X	X		X	X	X	X	X	X						X		X	X	X		
	Pimephales promelas																		X															X
	Rhinichthys atratulus						X		X	X	X	X	X	X					X	X				X	X		X	X	X	X		X		X
	Semotilus atromaculatus		X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
ICTALURIDAE	*Ictalurus punctatus*							X									X																	
PERCIDAE	*Etheostoma baileyi*	INM	X		X			X	X					X	X		X	X	X	X								X			X			
	Etheostoma blennioides							X							X		X		X															
	Etheostoma caeruleum							X			X	X	X		X		X		X		X	X								X	X			X
	Etheostoma kennicotti		X	X	X	X	X	X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
	Etheostoma sagitta	INM	X	X	X	X	X		X					X	X		X	X	X		X			X	X	X	X	X		X	X	X		
	Percina caprodes							X							X		X																	
	Percina maculata		X		X			X	X																									
	Stizostedion vitreum							X																										
PETROMYZONTIDAE	*Lampetra aepyptera*							X																										

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

APPENDIX D

Distribution of Crayfishes Collected during 1994 Stream Surveys

Distribution of Crayfishes Collected during 1994 Stream Surveys

		CUMBERLAND RIVER SYSTEM					CLEAR FORK DRAINAGE																					
		CAPUCHIN CREEK	BAIRD CREEK	HATFIELD CREEK	TRAMMEL BRANCH	LITTLE YELLOW	CLEAR FORK	BURNT PONE CRK	CROUCHES CREEK	DAVIS CREEK	FALL BRANCH	HICKORY CREEK	LAUREL FORK	LICK CREEK	LITTLE ELK CRK	NO BUSINESS BR	LITTLE TACKETT	ROCK CREEK CA	ROCK CREEK CL	ROSE CREEK	TERRY CREEK	TRACY BRANCH	WHISTLE CREEK	WHITE OAK CRK
FAMILY	SCIENTIFIC NAME																											
CAMBARIDAE	*Cambarus buntingi*	X	X		X	X	X	X					X	X	X	X	X	X	X	X	X	X			X
	Cambarus distans		X		X		X				X	X			X			X							
	Cambarus dubius					X			X	X						X	X	X							
	Cambarus sphenoides							X	X		X													X	
	Cambarus thomai								X																
	Orconectes putnami	X		X				X				X		X	X				X	X	X				X
	Orconectes rusticus						X																		

APPENDIX E

1994 Summary of Stream Strategic Plan Activities

1994 SUMMARY OF STREAM STRATEGIC PLAN ACTIVITIES

ACTIVITY	COMPLETED	NUMBER
Coordinate enforcement of pollution laws	yes	1
Estimate monitoring system for compliance monitoring	no	
Provide environmental in-service	no	
Draft legislation to change TCA 70-4-206	no	
Draft legislation for tax incentives	no	
Draft legislation for silviculture and agriculture	no	
Determine criteria and list streams for scenic rivers	no	
Write magazine article	no	
Assimilate slide show	yes	1
Wrote programs to enhance landowner-user relations	contacts	3
Conducted compliance inspections	no	
I & E stream demonstrations	yes	1
Participated in Tennessee restoration project	yes	
Completed stream surveys	yes	27
Developed method to quantify siltation	no	
Obtained access sites	no	
Improved access sites	no	
Developed DOT agreement to build access sites	no	
Developed stream information for brochure	no	
Wrote news release	no	
Coordinated C.E.N.T.S. program in schools	no	
Developed aquatic education curriculum	no	