FISHERIES REPORT
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WARMWATER STREAM FISHERIES REPORT
REGION IV
2001

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April, 2002

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Cover: The region 4 stream survey unit utilizes a custom built cataraft (ww-16 muskrat) to conduct fish surveys on the North Fork Holston River during 2001.

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INTRODUCTION

The fish fauna of Tennessee is the most diverse in the United States, with approximately 300 species of native fish and about 30 to 33 introduced species (Etnier and Starnes 1993). Region IV has 7,837 km of streams that total approximately 5,711 ha in 21 east Tennessee counties. There are approximately 1,287 km classified as coldwater streams. 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, Nolichucky 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 2000) as a primary goal.

This is the fifteenth annual report on stream fishery data collection in TWRA's Region IV. The main purpose of this project is to collect baseline information on game and non-game 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 management of fisheries resources in the region.

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

The information gathered for this project is presented in this report as river and stream accounts. These accounts include an introduction describing the general characteristics of the survey site, a study area and methods section summarizing site location and sampling procedures, a results section outlining the findings of the survey(s), and a discussion section, which allows us to summarize our field observations and make management recommendations.

METHODS

The streams to be sampled and the methods required are outlined in TWRA field request No. 01-4. A total of 5 streams were sampled and are included in this report. Stream surveys were conducted from July to October 2001. Twenty-seven (IBI and CPUE) fish samples and three benthic samples were collected.

SAMPLE SITE SELECTION

Index of Biotic Integrity (IBI) 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 positioned survey sites far enough upstream to decrease the probability of collecting transient species. Large river sampling sites (Nolichucky, North Fork Holston, Pigeon Rivers) were selected based on the length of the river and available access points. Typically we selected sample areas in these rivers that represented the best available habitat for any given reach being surveyed. Sampling locations were delineated in the field on 7.5 minute topographical maps and then digitally re-created using a commercially available software package.

WATERSHED ANALYSIS

Watershed size and/or stream order has historically been used to create relationships for determining maximum expected species richness for IBI analysis. This has been accomplished by plotting species richness for a number of sites against watershed areas and/or stream orders (Fausch et al. 1984). We chose to use watershed area (kilometer^2) to develop our relationships as this variable has been shown to be a more reliable metric for predicting maximum species richness. Watershed areas **(the area upstream of the survey site)** were determined from USGS 1:24,000 scale maps.

FISH COLLECTIONS

Fish data were collected by employing a slightly modified (Saylor and Alstedt 1990) Index of Biological Integrity (Karr et al. 1986). Fish were collected with standard electrofishing (backpack) and seining techniques. A 5 x 1.3 meter seine was used to make hauls in shallow pool and run areas. Riffle and deeper run habitats were sampled with a seine in conjunction with a backpack electrofishing unit (100-600 VAC). An area approximately the length of the seine^2 (i.e., 3 meter x 3 meter) was electrofished in a downstream direction. A person with a dipnet assisted the person electrofishing in collecting those fish, which did not freely drift into the seine. Timed (5-min duration) backpack electrofishing runs were used to sample shoreline habitats. In both cases (seining or shocking) an estimate of area (meter^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 obtained. Anomalies (e.g., parasites, deformities, eroded fins, lesions, or tumors) were noted along with occurrences of hybridization. After processing, the captured fish were either held in captivity or released into the stream where they could not be recaptured.

Catch-per-unit-effort samples (CPUE) were conducted in three rivers during 2001. Timed boat electrofishing runs were made in pool and shallower habitat where navigable. Efforts were made to sample the highest quality habitat in each sample site and include representation of all habitat types typical to the reaches surveyed. Total electrofishing time was calculated and was used to determine our catch-effort estimates (fish/hour).

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) for identification. Most of the preserved fish collected in the 2001 samples will be catalogued into our reference collection or deposited in the University of Tennessee Research Collection of Fishes. Common and scientific names of fishes used in this report are after Robins et al. (1991) and Etnier and Starnes (1993).

AGE and GROWTH

In order to address management questions pertaining to the age and growth characteristics of stream dwelling smallmouth bass (*Micropterus dolomieu*), spotted bass (*M. punctulatus*), largemouth bass (*M. salmoides*) and rock bass (*Ambloplites rupestris*) populations, statewide collection of otolith samples was initiated in 1995 by regional stream crews. No otoltihs were collected from black bass or rock bass in 2001 as collections were made from these rivers in 1998.

BENTHIC COLLECTIONS

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

Large particles and debris were picked from the samples and discarded in the field. The remaining sample was preserved in 50% isopropanol and later sorted in the laboratory. Organisms were enumerated and attempts were made to identify specimens to species level when possible. Many were identified to genus, and most were at least

identified to family. Dr. David A. Etnier (UTK) examined problematic specimens and either made the determination or confirmed our identifications. Comparisons with identified specimens in our aquatic invertebrate collection were also useful in making determinations. For the most part, nomenclature of aquatic insects used in this report follows Brigham et al. (1982) and Louton (1982). Names of stoneflies (Plecoptera) are after Stewart and Stark (1988) and caddisflies are after Etnier et al. (1998). Benthic results are presented in tabular form with each stream account.

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. 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 fish community health from a variety of perspectives (Karr et al. 1986). Given that IBI metrics were developed for the midwestern United States, many state and federal agencies have modified the original twelve metrics to accommodate regional differences. Such modifications have been developed for Tennessee primarily through the efforts of the TVA and Tennessee Tech University. In developing our scoring criteria for the twelve metrics we reviewed pertinent literature [North American Atlas of Fishes (Lee et al. 1980), The Fishes of Tennessee (Etnier and Starnes 1993), various TWRA Annual Reports and unpublished data] to establish historical and more recent accounts of fishes expected to occur in the drainages we sampled. Scoring criteria for the twelve metrics were modified according to watershed size. Watersheds draining less than 13 kilometer^2 were assigned different scoring criteria than those draining greater areas. This was done to accommodate the inherent problems associated with small stream samples (e.g., lower catch rates and species richness). Young-of-the-year fish and non-native species were excluded from the IBI calculations. After calculating a final score, an integrity class was assigned to the stream reach based on that score. The classes used follow those described by Karr et al. (1986) and are as follows:

Total IBI score (sum of the 12 metric ratings)	**Integrity Class**	**Attributes**
58-60	Excellent	Comparable to the best situations without human disturbance; all regionally expected species for the habitat and stream size, including the most intolerant forms, are present with a full array if size classes; balanced trophic structure.
48-52	Good	Species richness somewhat below expectation, especially due to the loss of the most intolerant forms; some species are present with less than optimal abundance or size distributions; trophic structure shows some signs of stress.
40-44	Fair	Signs of additional deterioration include loss of intolerant forms, fewer species, highly skewed trophic structure (e.g., increasing frequency of omnivores and green sunfish or other tolerant species); older age classes of top predators may be rare.

28-34	Poor	Dominated by omnivores, tolerant forms, and habitat generalists; few top carnivores; growth rates and condition factors commonly depressed; hybrids and diseased fish often present.
12-22	Very poor	Few fish present, mostly introduced or tolerant forms; hybrids common; disease, parasites fin damage, and other anomalies regular.
	No fish	Repeated sampling finds no fish.

Catch per unit effort analysis was performed on the three large rivers sampled during 2001. Total time spent electrofishing at each site was used to calculate the CPUE estimates for each species collected. Length categorization analysis (Gabelhouse 1984) was used to calculate Proportional Stock Density (PSD) and Relative Stock Density (RSD) for black bass and rock bass populations sampled during 2001.

Benthic data collected for the 2001 surveys were subjected to a biotic index that rates stream condition based on the overall taxa tolerance values and the number of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa present. The North Carolina Division of Environmental Management (NCDEM) has developed a bioclassification index and associated criteria for the southeastern United States (Lenat 1993). This technique rates water quality according to scores derived from taxa tolerance values and EPT taxa richness values. The final derivation of the water quality classification is based on the combination of scores generated from the two indices. The criteria used to generate the biotic index values and EPT values are as follows:

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

The overall result is an index of water quality that is designed to give a general state of pollution regardless of the source (Lenat 1993). Taxa tolerance rankings were based on those given by NCDEM (1995) with minor modifications for taxa, which did not have assigned tolerance values.

Little Pigeon River

Background

The Little Pigeon River has received national attention for some of the smallmouth bass caught in the river. It has been featured on ESPN's "The Fishing Hole" and draws a fair amount of angling pressure during certain times of the year, particularly in the spring. A well documented spawning run of quality smallmouth bass from the French Broad River by anglers and recently by TWRA electrofishing surveys has become a topic of concern. The spawning run of these larger bass has been occurring for at least the last 10 years and has grown in popularity with resident and non-resident anglers (Tony Proffit, TWRA, pers. comm.) Because of the value of this resource and its proximity to the heavily developed towns of Sevierville and Pigeon Forge, we were interested in assessing the characteristics of the sport fish population and begin developing some management strategies for the river. In 1997, the agency conducted a cooperative survey (with TVA) of the river at one location (Bivens et al. 1998). This sample primarily focused on community assessment and identifying any conditions indicating degradation to the river.

Recently, there have been inquiries from the public regarding a regulation that would protect the spawning smallmouth bass. In response, we conducted a survey to maximize the collection of resident smallmouth bass, as well as document the abundance and size of non-resident smallmouth bass entering the river during the spring months of April and May. Limited surveys within the watershed have been conducted by TWRA. Peterson (1984) evaluated the fish community of the West Prong Little Pigeon River and Bivens et al. (1997,1998) conducted IBI surveys on the West Prong Little Pigeon River and the East Fork Little Pigeon River. However, none of these has focused on assessing the resident and non-resident populations of smallmouth bass.

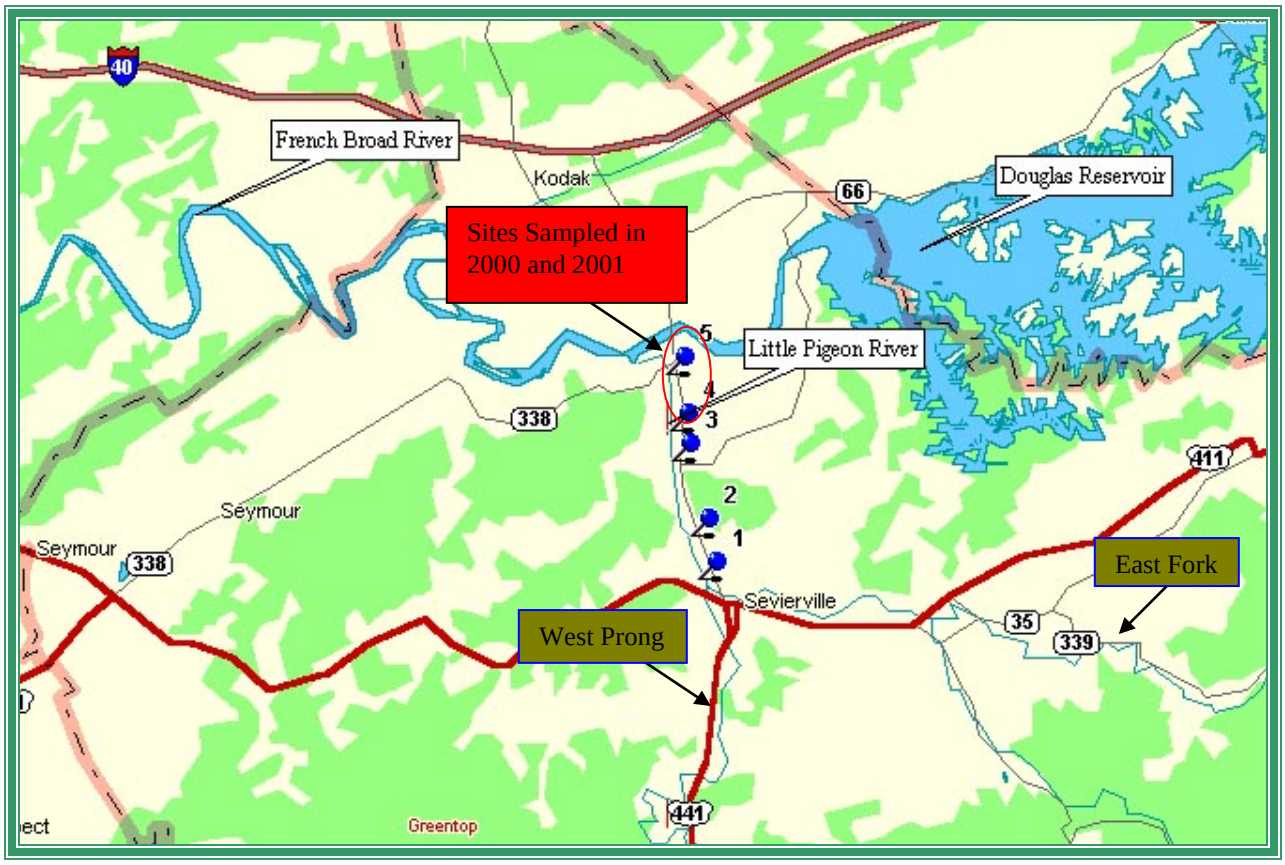
2000-01 River Investigations

On July 5, 2000, we conducted five fish surveys between Sevierville and the French Broad River (Carter et al. 2001) (Figure 1). On April 26, 2001 the lower two sites surveyed in July (sites 4 and 5) were re-sampled. Most of the habitat in the upper reaches of the river (Sites 1-3) has been altered by channelization. Very little instream cover is available and most of the natural riparian vegetation has been removed. In the lower two sites (4 and 5), the river retain much of its natural characteristics and available cover is more abundant.

Bass were collected by boat electrofishing in accordance with the standard large river sampling protocols (TWRA 1998). Fixed-boom electrodes were used to transfer 4-5 amps DC at all sites. This current setting was determined effective in collecting smallmouth bass. Catch-per-unit-effort (number/hour) values were calculated for

smallmouth bass at each site. Length categorization indices were calculated for smallmouth bass following Gabelhouse (1984).

Figure 1. Site locations for samples conducted on the Little Pigeon River during 2000-01.



Our assessment of the smallmouth bass population during different seasons indicated a strong spawning run of large bass from the French Broad River into the lower Little Pigeon River. The size structure of smallmouth bass collected in our July 2000 survey differed considerably from our April 2001 survey (Figure 2). Only 7.1% of the bass collected in the July sample were over 305 mm. In comparison, 50% of the bass collected in April 2001 were over 305 mm and 22.5% were 406 mm or larger. The catch rate of smallmouth bass for the lower two sample stations in April 2001 was also several times higher than in the July 2000 sample (Figure 3).

Figure 2. Length frequency distributions for smallmouth bass collected from the Little Pigeon River during July 2000 and April 2001 (July distribution includes all five survey sites).

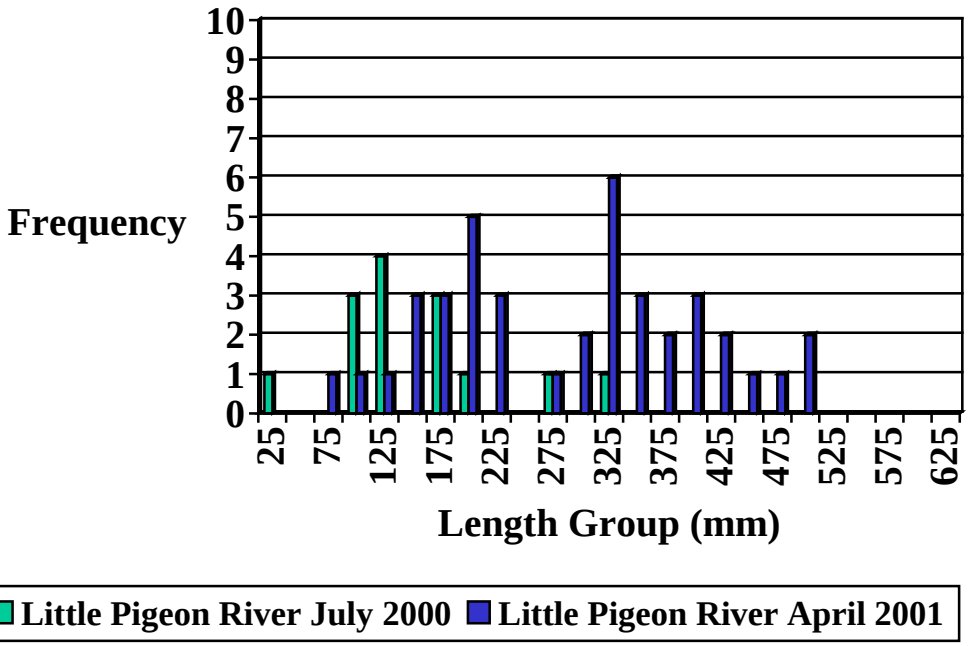
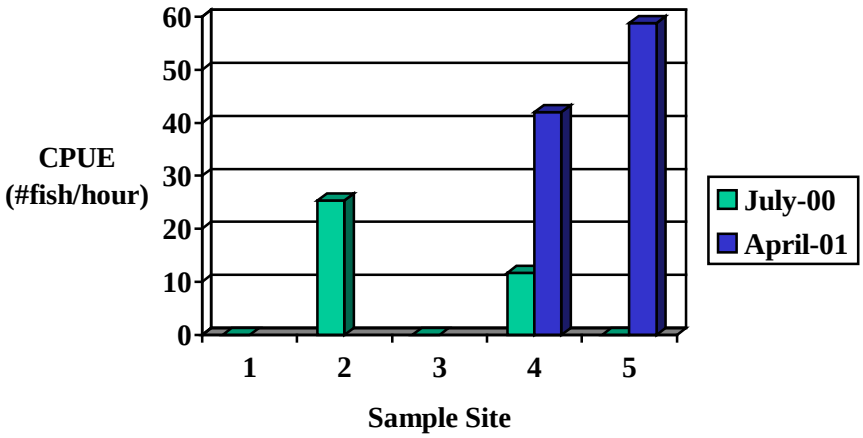
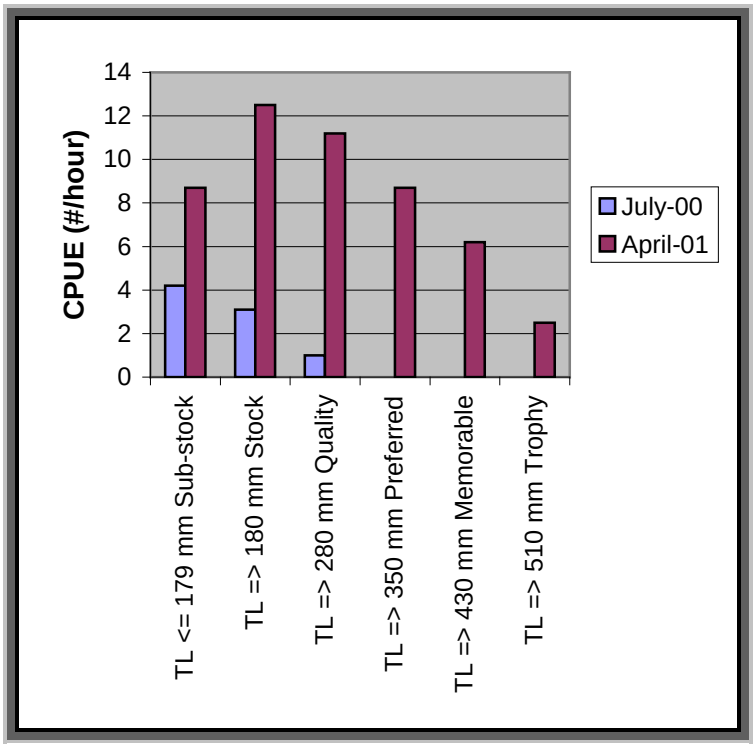


Figure 3. Catch per unit effort (CPUE) values for samples conducted on the Little Pigeon during 2000-01.



The relative stock density (RSD) of bass exhibited a dramatic change between the two sampling periods. The assessment for the July sample indicated that only 1.2 percent of the bass collected was considered to be quality fish (280 mm or greater), resulting in a catch rate of about one fish/hour (Figure 4). No smallmouth bass in the preferred (350 mm or greater), memorable (430 mm or greater), or trophy (510 mm or greater) categories were collected. However, in April all RSD categories were represented with smallmouth bass. Overall, about 57% of the bass collected in April were in the RSD-quality category or above. Thirty-five percent were in the preferred category or above and 5% were in the trophy category. Catch rates by RSD category also increased substantially between the two periods with a high percentage of the catch in April represented by preferred size (> 350 mm) and larger bass.

Figure 4. Relative stock density catch per unit effort by category for smallmouth bass collected from the Little Pigeon River during July 2000 and April 2001.



Discussion

Given the data collected in the Little Pigeon River between July 2000 and April 2001, it is evident there is a seasonal shift in the abundance and size structure of smallmouth bass in the river. The popularity of the seasonal fishery has grown over the years and now supports some commercial guiding and attracts a fair number of non-resident anglers. The distribution of bass within the watershed during the seasonal spawning run has not been fully documented, however, it is known they do move into

that portion of the river between Sevierville and the French Broad River. There have been reports of these large spawning fish moving into the West Prong Little Pigeon and the East Fork, although we have not documented this. The West Prong and East Fork of the Little Pigeon River contain good resident populations of smallmouth bass that typify populations found in smaller east Tennessee streams. Although we have not quantitatively sampled smallmouth bass in the major tributaries to the Little Pigeon River, we do have some information that indicates these streams can produce quality size bass. Two separate fish kills on the West Prong near Pigeon Forge revealed good numbers of smallmouth bass and a few bass that were of memorable size (> 17 inches).

The popularity of the cities of Sevierville, Pigeon Forge, and Gatlinburg with resident and non-resident tourists could potentially increase the angling pressure on the local rivers, particularly one with a reputation for producing quality size smallmouth. The concentration of larger spawning bass in preferred habitat during April and May also increases their vulnerability. Given these two factors and the rising interest for protective regulations, there is probable justification for considering some type of regulatory action on the Little Pigeon.

Because the extent to which spawning bass migrate into the West Prong and the East Fork is unknown, the justification for a regulation change in these two tributaries is not as strong. However, based on reports from local fishermen, a percentage of these larger bass do make the 5 + mile journey in order to reach the West Prong and East Fork. Therefore, a regulation that would also encompass the West Prong and East Fork might be advisable and could potentially benefit the resident populations in the West Prong and East Fork.

Smallmouth bass migrating into the Little Pigeon River from the French Broad River have already been afforded some protection in 1997, by the reduction in the creel limit statewide from 10 to 5 on all black bass species.

Regulation Alternatives

The regulation alternatives below are a compilation of strategies that are in place within the region or have been proposed for smallmouth bass as a result of the statewide smallmouth bass project initiated in 1995. The remaining alternatives are those that the regional stream management unit feels would be viable options for the Little Pigeon River and major tributaries.

It must be noted that the implementation of a regulation on the Little Pigeon River would be best served by a strategy that could be used on other rivers within the region, or potentially statewide. This would allow for continuity in angling regulations for riverine smallmouth bass, at least on a regional basis, and would be beneficial to law enforcement programs and public understanding and perception. **The alternative in italics is the regulation that was recommended by the regional stream staff.**

Alternative 1: Retain current regulation of no length limit and a possession limit of (5).

Comment: The smallmouth bass within the region have already been given additional protection by the reduction of the daily possession limit from (10) bass to (5) in 1997.

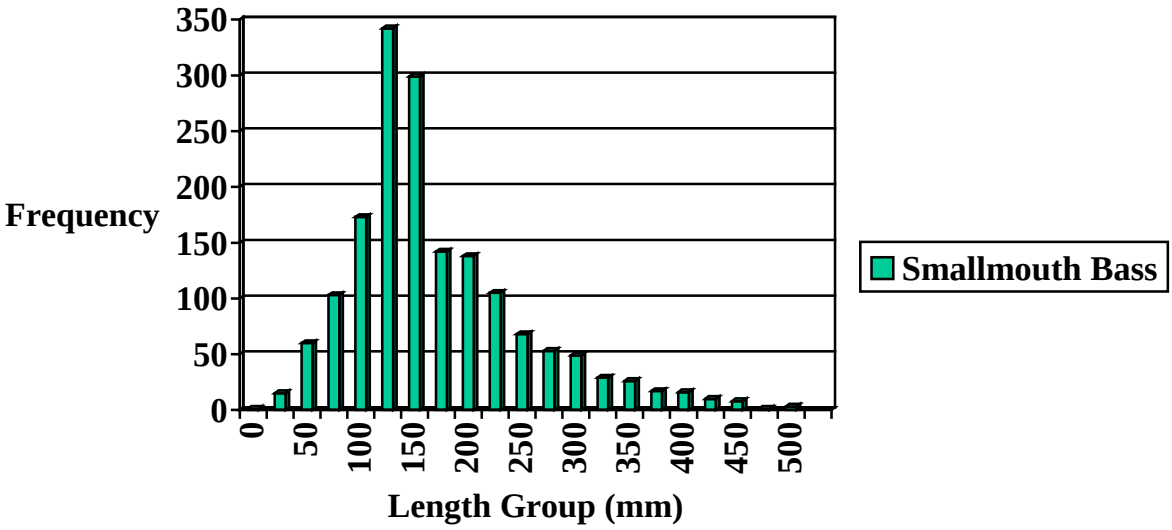
Alternative 2. 508 mm minimum length limit with a possession limit of (1) bass.

Comment: This regulation is currently in effect on the Pigeon River in Cocke County. It was implemented as a result of public interest and because of the current pollution status of the river.

Alternative 3: *330 mm to 432 mm protected length range (PLR) with a possession limit of (5) bass of which only (1) can exceed 432 mm.*

Justification: This strategy would protect a substantial percentage of the spawning bass (40% based on our data; see Figure 2) and would still allow an angler to retain a trophy fish and four smaller bass for consumption. This regulation would easily adapt to most of the larger riverine smallmouth populations within the region (Figure 5) and would have appealing characteristics to both the consumptive angler and the trophy angler. The PLR would potentially protect fish that have the genetic capacity to grow large but would still keep some pressure on the smaller size groups that could become overcrowded under a high minimum length limit (Figure 5).

Figure 5. Composite length frequency distribution for smallmouth bass in the Clinch, French Broad, Holston, Little Pigeon, Nolichucky, North Fork Holston, Pigeon, and Powell rivers between 1998 and 2001.



Alternative 4: 330 mm to 508 mm protected length range (PLR) with a possession limit of (5) bass of which only (1) can exceed 508 mm.

Comment: This strategy would protect a substantial percentage of the spawning bass (45% based on our data) and would still allow an angler to retain a trophy fish and four smaller bass for consumption. This regulation would easily adapt to most of the larger riverine smallmouth populations within the region and would have appealing characteristics to both the consumptive angler and the trophy angler. The PLR would potentially protect fish that have the genetic capacity to grow large but would still keep some pressure on the smaller size groups that could become overcrowded under a high minimum length limit.

Alternative 5: With the exception of **Alternative 1** any of the above strategies could be implemented on a seasonal basis (i.e. April 1 - June 1).

Comment: This would protect the large spawning bass that migrate from the French Broad during part of the year but would probably not have any effect on the resident populations of bass in the Little Pigeon River or major tributaries.

Figure 6. Smallmouth bass collected from sites 4 and 5 in the Little Pigeon River April 2001.

Public Input and Regulation Setting

On August 21, 2001 a public meeting was held at the Sevier County courthouse to discuss management of the Little Pigeon River fishery. Information pertaining to our sampling data and regulation alternatives were presented to the public. A post-meeting survey of the participants overwhelming indicated that those attending the meeting were in favor of ***Alternative 2***. On October 24, 2001 the Tennessee Wildlife Resources Commission passed ***Alternative 2.*** The regulation was implemented on March 1, 2002. Future surveys on the Little Pigeon River will focus on assessing any changes to the smallmouth bass fishery as a result of the new regulation.

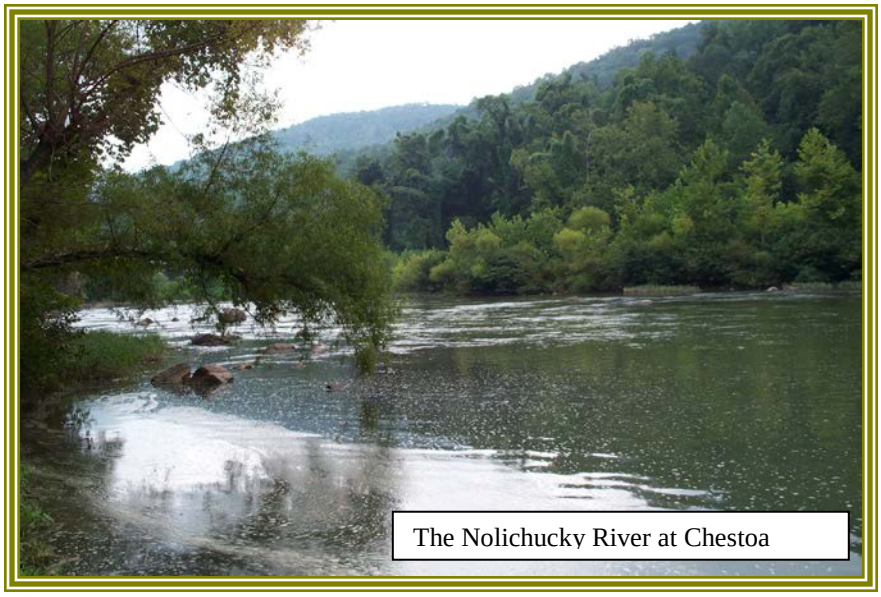
Nolichucky River

Introduction

The Nolichucky River represents an important recreational resource for the state both in consumptive and non-consumptive uses. It provides critical habitat for species of special concern and is home to approximately 50 species of fish and has historically contained at least 21 species of mussels (Ahlstedt 1986). Additionally, it supports one of east Tennessee's better warmwater sport fisheries. The Nolichucky River and its tributaries have been the subject of numerous biological and chemical investigations that span some 40 years. These investigations have concentrated on evaluating pollution levels and documenting sources for mitigation. Much of the upper reach of the Nolichucky River has been consistently impacted by sand dredging and mica mining in North Carolina and extensive agricultural development along the entire length in Tennessee. However, in recent years, the Nolichucky River has improved in water quality as a result of mitigation and education conducted during these early studies. The Agency has made limited surveys of the river that focused primarily on collecting basic fish, benthic, and water quality data (Bivens 1988). Extensive sport fish population surveys were conducted in 1998 (Carter et al. 1999) from the North Carolina state line to the French Broad River. Our survey of the Nolichucky River focused on re-evaluating the sport fish populations and developing long-term community assessment sites. Our 2001 assessment of the sport fish populations was derived from 10 sample sites between river mile 27.9 and mile 99.1. Our 1998 survey consisted of 31 sample sites, falling between river mile 7.6 and mile 99.1. After our initial evaluation in 1998, the Nolichucky River was put into a 3-year rotational sampling schedule with eight other rivers. Sport fish sampling sites were reduced to those that would best characterize these populations. An attempt was made to establish three long-term community assessment sites, however, only one of these (Chestoa) was sampled due to high water levels encountered throughout the summer months.

Study Area and Methods

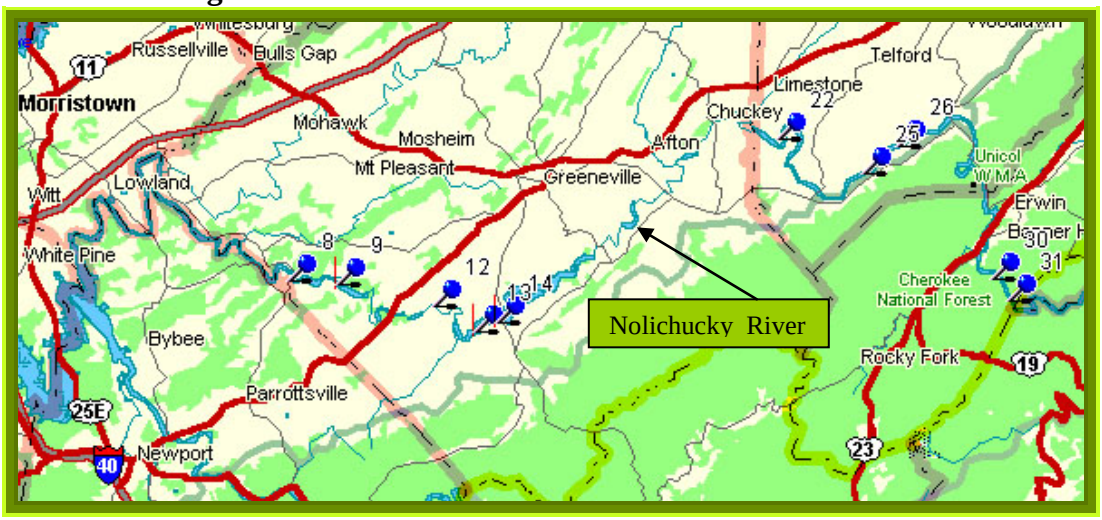
The Nolichucky River originates in North Carolina and flows in a southwesterly direction before emptying into the French Broad River near river mile 69.0. The river has a drainage area of approximately 2,827 kilometers^2. In Tennessee, approximately 159 kilometers of the Nolichucky River flows through the Blue Ridge and Ridge and Valley provinces of east Tennessee, coursing through or by the towns of Erwin, Greeneville and Morristown before joining the French Broad River near the community of White Pine.


The Nolichucky River at Chestoa

Public access (found in Unicoi, Washington, Greene, Cocke and Hamblen counties) along the river is primarily limited to bridge crossings and small "pull-outs" along roads paralleling the river. There are several primitive launching areas for canoes or small boats and five developed launching areas managed by the Tennessee Wildlife Resources Agency (Easterly Bridge, Birds Bridge, and Davy Crocket State Park), the City of Greeneville (Kinser Park) and the U.S. Forest Service (Chestoa).

Between July and August 2001, we conducted 11 fish surveys and one benthic survey between the North Carolina state line and the French Broad River (Figure 7).

Figure 7. Site locations for samples conducted on the Nolichucky River during 2001.



In our survey sites, the riparian habitat consisted primarily of wooded shorelines with interspersed agricultural fields. There were several reaches of the river where one or both sides of the river were confined within rock palisades. Submerged woody debri was fairly common in most of our sample areas. The river substrate was predominately boulder/cobble in riffle areas and bedrock with interspersed boulders/cobble in the pool habitat. Measured mean channel widths ranged from 50 meters to 100.6 meters, while

site lengths fell between 241 meters and 1,224 meters (Table 1). Water temperatures ranged from 26 C to 29 C and conductivity varied from 70 to 205 (Table 1).

Table 1. Physiochemical and site location data for samples conducted on the Nolichucky River during 2001.

Site Code	Site	Quad	River Mile	Latitude	Longitude	Mean Width (m)	Length (m)	Temp. C	Cond.	Secchi (m)
420010608	8	Parrottsville 172SE	27.9	360546	830305	87.3	1094	29	200	2.0+
420010609	9	Parrottsville 172SE	30.9	360534	830034	57.3	321	27.5	205	2.0+
420010612	12	Cedar Creek 181SW	39.1	360429	825537	59.6	663	N/A	N/A	1.0
420010613	13	Cedar Creek 181SW	42.5	360318	825413	100.6	650	28	200	1.0
420010614	14	Davy Crockett Lake 181SE	45.7	360354	825212	80.5	1224	27.5	190	1.0
420010622	22	Telford 190NE	71.4	361132	823718	66.3	300	N/A	N/A	2.0+
420010625	25	Telford 190NE	80.3	361007	823256	57.7	890	N/A	N/A	2.0+
420010626	26	Telford 190NE	82.9	361117	823105	50	769	26	100	2.0+
420010630	30	Chestoa 199SW	98	360527	822637	53.3	241	26	70	1.5
420010631	31	Chestoa 199SW	99.1	360536	822540	80.3	426	N/A	N/A	2.0+

Fish were collected by boat electrofishing in accordance with the standard large river sampling protocols (TWRA 1998). Fixed-boom electrodes were used to transfer 4-5 amps DC at all sites. This current setting was determined effective in narcotizing all target species (black bass and rock bass). Additionally, efforts were made to identify non-target species and compile a list for each survey site. All sites were sampled during daylight hours and had survey durations ranging from 1379 to 3434 seconds. Catch-per-unit-effort (CPUE) values were calculated for each target species at each site. Length categorization indices were calculated for target species following Gabelhouse (1984).

The community assessment site sampled at Chestoa followed those strategies outlined in the methods section of this report. An IBI fish survey, coupled with a benthic invertebrate survey, basic water quality measurements, and habitat evaluation were conducted at this site.

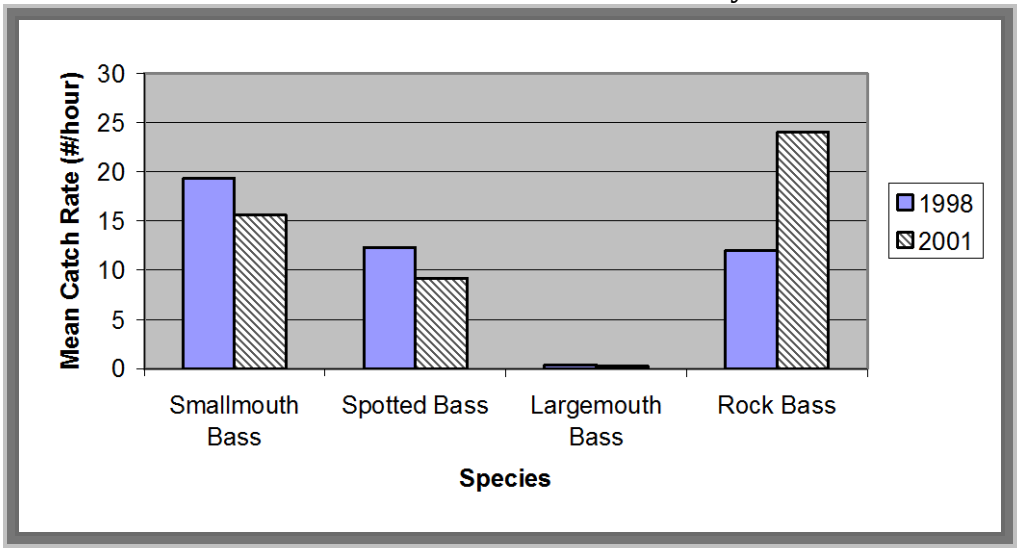
Results

CPUE estimates for smallmouth bass averaged 15.6/hour (SD 6.7), while the mean spotted bass estimate was 9.2/hour (SD 7.9). Largemouth and rock bass estimates were 0.3/hour (SD 1.0) and 24/hour (SD 30.0), respectively (Table 2). Comparatively, there was an overall decline in the mean catch rate of black bass species from our survey in 1998 (Figure 8). Surprisingly, the mean catch rate for rock bass increased 100% over our sample taken in 1998. Almost all of our sample sites showed increases, with the most noticeable ones being in the mid to upper reaches of the river.

Table 2. Catch per unit effort and length categorization indices of target species collected at 10 sites on the Nolichucky River during 2001.

Site Code	Smallmouth Bass CPUE	Spotted Bass CPUE	Largemouth Bass CPUE	Rock Bass CPUE
420010608	21.6	4.3	0	15.1
420010609	15.7	26.1	0	10.4
420010612	14.3	12.3	0	10.4
420010613	23.6	6.4	0	12.8
420010614	4.6	1.5	3.1	3.1
420010622	25.7	18.0	0	23.2
420010625	13.9	9.3	0	53.3
420010626	7.8	9.7	0	7.8
420010630	12.4	2.1	0	99.1
420010631	16.8	2.1	0	5.2
MEAN	**15.6**	**9.2**	**0.3**	**24.0**
STD. DEV.	**6.7**	**7.9**	**1.0**	**30.0**
	Length-Categorization Analysis	**Length-Categorization Analysis**	**Length-Categorization Analysis**	**Length-Categorization Analysis**
	PSD = 25.6	PSD = 25.0	PSD = 100	PSD = 22.3
	RSD-PREFERRED = 2.3	RSD-PREFERRED = 0	RSD-PREFERRED = 50	RSD-PREFERRED = 0
	RSD-MEMORABLE = 0	RSD-MEMORABLE = 0	RSD-MEMORABLE = 0	RSD-MEMORABLE = 0
	RSD- TROPHY = 0	RSD- TROPHY = 0	RSD- TROPHY = 0	RSD- TROPHY = 0

Figure 8. Trends in mean catch rate of black bass and rock bass collected between 1998 and 2001 from the Nolichucky River.



The size distribution of smallmouth bass between 1998 and 2001 changed somewhat among our 10 sampling stations (Figure 9). Generally, there were fewer bass below 150 mm and fewer above the 350 mm size class in 2001 sample. For the most part, bass in the 175 mm to 325 mm size range were more abundant in 2001, indicating good recruitment from previous year classes (1997-99). Lower recruitment into the smaller size classes during 2001 indicated relatively poor year class. This could be attributed to the drought conditions experienced over the last two years and the potential for the density of larger spawning size fish to be somewhat lower (Figure 10).

Figure 9. Length frequency distributions for smallmouth bass collected from the Nolichucky River in 1998 and 2001.

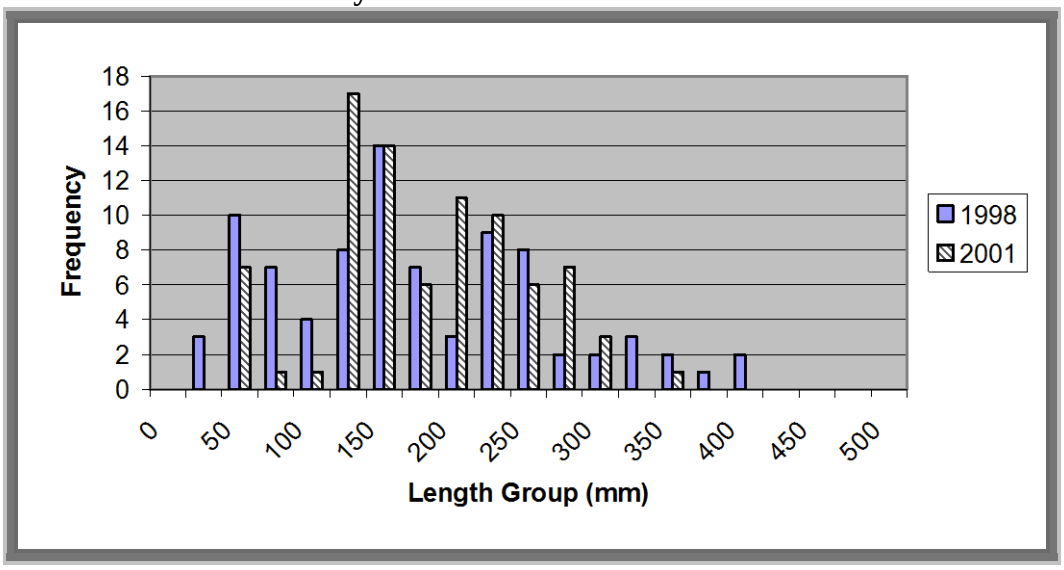
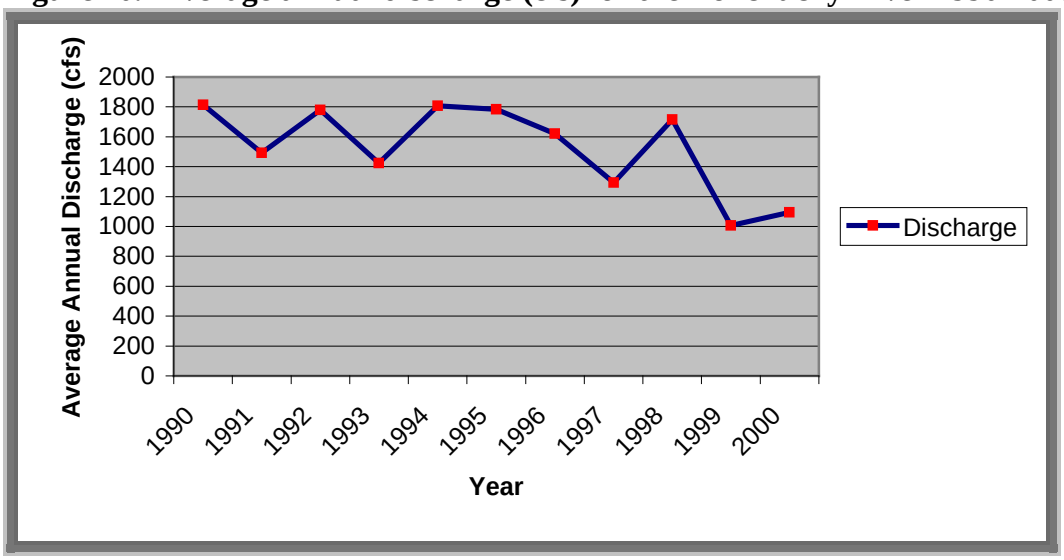


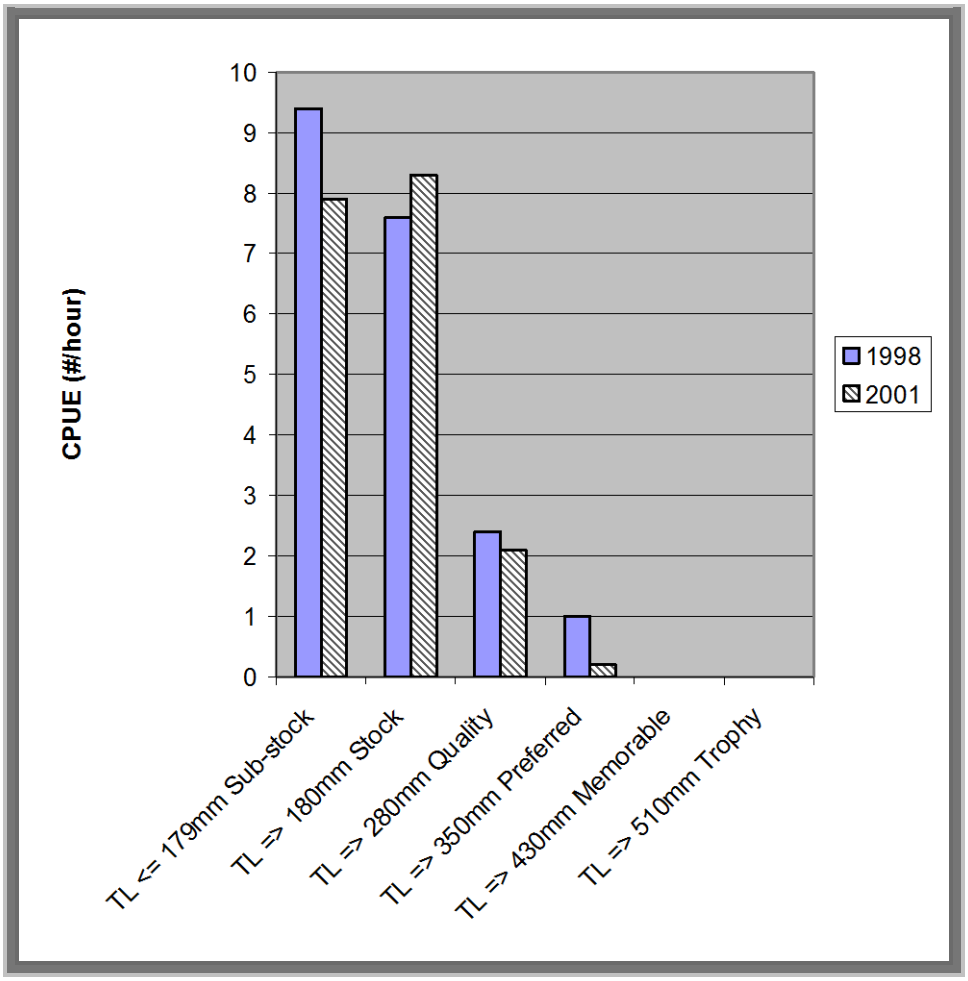
Figure 10. Average annual discharge (cfs) for the Nolichucky River 1990-2000.



Only one bass over 14 inches was observed in 2001, compared to five collected during 1998.

Length categorization analysis indicated the relative stock density (RSD) of preferred smallmouth bass (TL $\geq$ 350 mm) was 2.3 (Table 2). RSD for memorable (TL $\geq$ 430 mm) and trophy (TL $\geq$ 510 mm) size bass were 0 and 0, respectively. The PSD of smallmouth bass (ratio of quality size bass to stock size bass) was 25.6. In comparison, the value for 1998 was considerably higher for bass in the preferred category (13.2). Values for memorable and trophy remained at 0. Catch per unit effort estimates by RSD category in 1998 and 2001 indicated a slight decline in the catch of sub-stock smallmouth bass (Figure 11). The values for stock and quality size bass in 2001 remained fairly consistent when compared to 1998. The catch rate of smallmouth bass in the preferred category was somewhat lower in 2001.

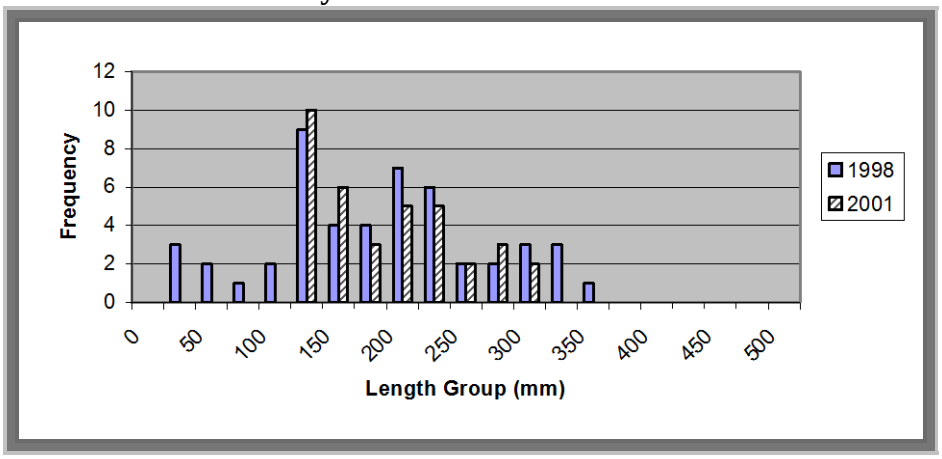
Figure 11. Relative stock density (RSD) catch per unit effort for smallmouth bass collected from the Nolichucky River in 1998 and 2001.



Age and growth characteristics for the smallmouth bass population in the Nolichucky River were characterized in 1998 (Carter et al. 1999). For the most part, the Nolichucky River has had growth rates similar to other large river populations with the same age structure. We did not collect otoliths from smallmouth bass in 2001, assuming that the values generated from the 1998 survey typify the general growth characteristics of this population. In general it takes a smallmouth bass in the Nolichucky River about 3.8 years to reach 305 mm (12 inches), and about 7.8 years to attain a length of 406 mm (16 inches).

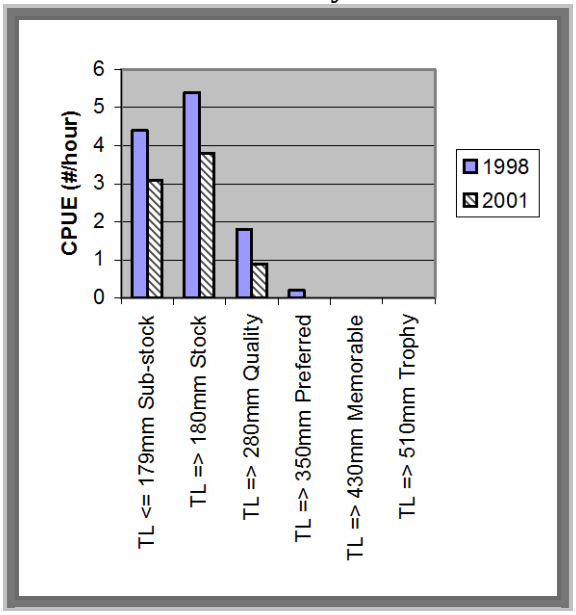
The majority of spotted bass from the Nolichucky River were within the 125 mm and 225 mm size groups (Figure 12). Based on the length frequency distributions between 1998 and 2001, there appears to have been very little spotted bass reproduction in 2001 when compared to 1998. No spotted bass under 125 mm were collected in 2001 compared to 8 (16.3% of the sample) in 1998. This occurrence may be related to the low water conditions experienced over the last two years.

Figure 12. Length frequency distributions for spotted bass collected from the Nolichucky River in 1998 and 2001.



Length categorization analysis indicated the RSD for preferred spotted bass (TL $\geq$ 350 mm) was 0 in 2001 compared to 3.7 in 1998. RSD for memorable (TL $\geq$ 430 mm) and trophy (TL $\geq$ 510 mm) size bass was 0. The PSD for spotted bass decreased from 33.3 in 1998 to 25.0 in 2001. Catch per unit effort estimates by RSD category revealed very few spotted bass above the RSD-S category indicating a relative lack of larger fish available to anglers (Figure 13). Comparatively, there was a substantial difference in the RSD categories between 1998 and 2001. Catch rates were lower in all RSD categories in 2001. As with the smallmouth bass low water conditions probably had an adverse impact on the survival and recruitment of spotted bass in the Nolichucky over the last two years.

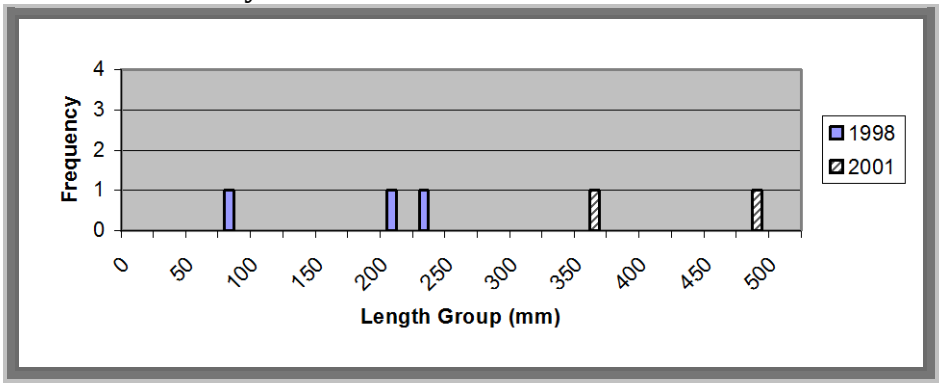
Figure 13. Relative stock density (RSD) catch per unit effort by category for spotted bass collected from the Nolichucky River in 1998 and 2001.



The few (2) largemouth bass that were collected in the 2001 sample fell between the 350 mm and 500 mm size classes (Figure 14). All of the largemouth bass collected in

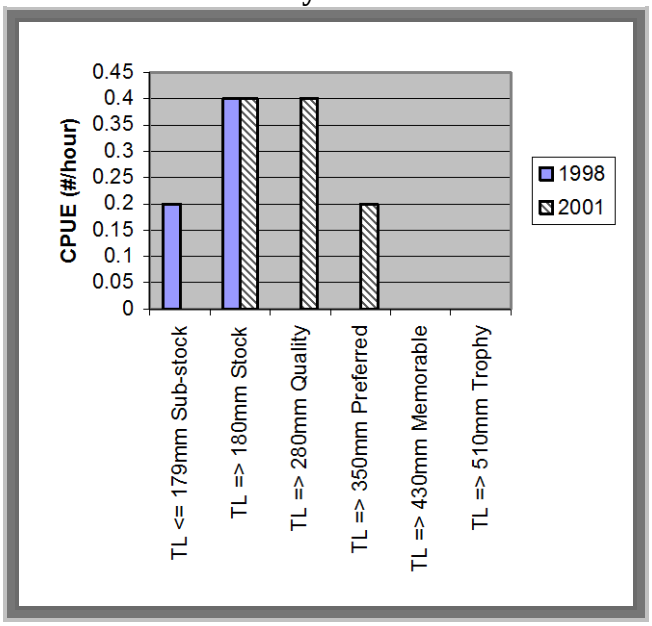
2001 were just below Davy Crockett Dam. The collection of largemouth bass in the Nolichucky River between 1998 and 2001 was sporadic and generally restricted to the lower reaches of the river where preferred habitat occurs. This is fairly typical of most large river systems in east Tennessee where largemouth bass contribute very little to the overall fishery.

Figure 14. Length frequency distributions for largemouth bass collected from the Nolichucky River in 1998 and 2001.



Length categorization data for largemouth bass revealed that there are very few fish available to anglers in the quality and above categories (Figure 15). This supports the length frequency data above and decisively indicates that the Nolichucky River does not provide much of an opportunity for largemouth bass angling.

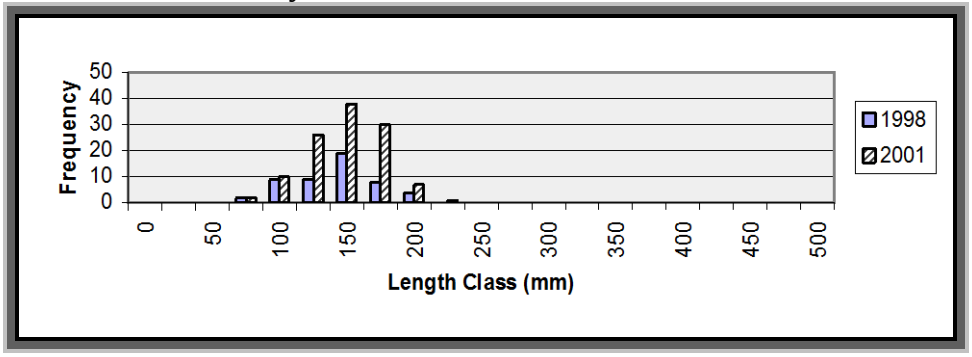
Figure 15. Relative stock density (RSD) catch per unit effort for largemouth bass collected from the Nolichucky River in 1998 and 2001.



Individuals in the 100 to 200 mm range represented the majority of rock bass in our samples in 1998 and 2001 (Figure 16). There was a definite increase in the number

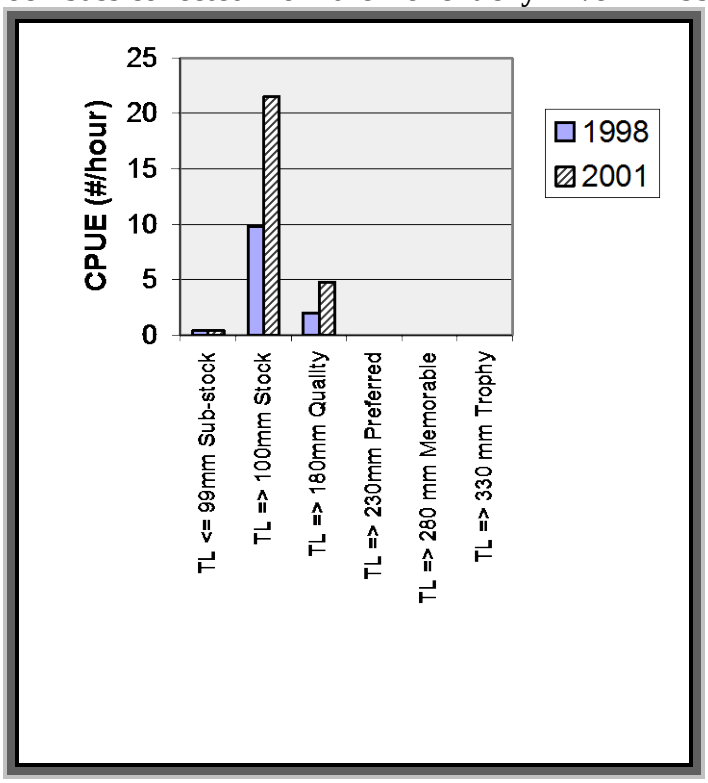
collected in this size range between the two samples. Almost half of the rock bass we collected in the 2001 sample came from site 30 (Chestoa). Length categorization

Figure 16. Length frequency distributions for rock bass collected from the Nolichucky River in 1998 and 2001.



analysis indicated the RSD for preferred rock bass (TL $\geq$ 230 mm) was 0. RSD for both memorable (TL $\geq$ 280 mm) and trophy (TL $\geq$ 330 mm) size rock bass was 0. The PSD of rock bass was 22.3. Catch per unit effort estimates by RSD category indicated the majority of our catch was stock size fish with few quality size rock bass represented in the sample (Figure 17). The sub-stock catch of rock bass was low, but probably does not indicate poor recruitment due to the fact that sampling efficiency is usually lower with this size group.

Figure 17. Relative stock density (RSD) catch per unit effort by category for rock bass collected from the Nolichucky River in 1998 and 2001.



Because of our confidence in determining age and growth characteristics (based on previous samples) we did not collect any otolith samples from rock bass in 2001. Therefore, no mortality or potential population growth statistics could be calculated. Age and growth and mortality of rock bass in the Nolichucky River are assumed to be similar to those reported from our 1998 assessment (Carter et al. 1999).

We expanded our sampling scheme in the Nolichucky during 2001 to include some community assessment samples (IBI samples) that would give us a relative measure of the river's health. We chose three stations along the length of the river to conduct the assessments. These included an upper sample station at Chestoa (river mile 98.0), a mid-river station at Ripley's Island (river mile ~ 62.0), and a downstream station near Enka (river mile ~ 8.0). Unfortunately, we were only able to complete the sample at Chestoa due to several untimely rain events that kept the river at levels, which prevented wade sampling. Fortunately, the Tennessee Valley Authority had completed community assessments in close proximity to Ripley Island and Enka sites during 2000. We have incorporated their data in this report to better describe the condition of the River along its length. The TVA had conducted an IBI survey at Chestoa in 1990. Table 3 below lists our IBI analysis for the Chestoa survey conducted in 2001. The value derived from our survey indicated the river at this point was in good to excellent condition based on the IBI score of 56. This was a slight improvement over the value (48) recorded from the 1990 TVA survey. The two most dramatic differences in the samples were the increased percentage of specialized insectivores and the lower occurrence of anomalies on the fish. Both of these metrics received a score of 1 in 1990 compared to 5 in 2001. The one biological factor that was most notable was the increased number of tennessee, telescope, and warpaint shiners.

Table 3. Nolichucky River (at Chestoa) Index of Biotic Integrity analysis.

Metric Description	Scoring Criteria 1 3 5	Observed	Score
Number of Native Species	<12 12-22 >22	26	5
Number of Darter Species	<3 3-4 >4	6	5
Number of Sunfish Species less *Micropterus*	<0 1 >1	2	5
Number of Sucker Species	<2 2-4 >4	3	3
Number of Intolerant Species	<2 2 >2	4	5
Percent of Individuals as Tolerant	>20 20-10 <10	0.6	5
Percent of Individuals as Omnivores	>16 16-9 <9	13.6	3
Percent of Individuals as Specialists	<25 25-50 >50	60.1	5
Percent of Individuals as Piscivores	<2 2-4 >4	5.9	5
Catch Rate	<7.8 7.8-15.4 >15.4	17.1	5
Percent of Individuals as Hybrids	>1 1-TR 0	0	5
Percent of Individuals with Anomalies	>5 5-2 <2	1.3	5
		Total	**56 (Good/Excellent)**

Benthic macroinvertebrates collected in our sample comprised 31 families representing 36 identified genera (Table 4). The most abundant group in our collection was the mayflies comprising about 44.2% of the total sample. Overall, a total of 42 taxa were identified from the sample of which 18 were EPT. Based on the EPT taxa richness and overall biotic index of all species collected, the relative health of the benthic community was classified as "good" (4.0).

Table 4. Taxa list and associated biotic statistics for benthic macroinvertebrates collected from the Nolichucky River.

ORDER	FAMILY	*SPECIES*	NUMBER	PERCENT
ANNELIDA				0.2
	Oligochaeta		1	
COLEOPTERA				15.6
	Dryopidae	*Helichus* adults	8	
	Elmidae	*Dubiraphia (*prob*. vittata)* adult	2	
		Macronychus adults	6	
		Promoresia elegans larvae and adults	37	
	Gyrinidae	*Dineutus discolor* male and female	2	
		Dineutus larvae	7	
	Hydrophilidae	*Berosus* larva	1	
DIPTERA				3.7
	Chironomidae		5	
	Simuliidae		9	
	Tipulidae	*Antocha*	1	
EPHEMEROPTERA				44.2
	Baetidae	*Baetis*	63	
	Ephemerellidae	*Serratella*	19	
	Heptageniidae	*Heptagenia*	3	
		Stenonema early instars	13	
		Stenonema mediopunctatum	8	
		Stenonema modestum	4	
	Isonychiidae	*Isonychia*	62	
	Leptohyphidae	*Tricorythodes*	7	
GASTROPODA				1.5
	Ancylidae	*Ferrissia*	4	
	Physidae		1	
	Pleuroceridae	*Pleurocera,* smooth elongate, olive	1	
HETEROPTERA				0.2
	Veliidae	*Rhagovelia obesa*	1	
MEGALOPTERA				3.2
	Corydalidae	*Corydalus cornutus*	12	
		Nigronia serricornis	1	
ODONATA				6.7
	Aeshnidae	*Boyeria vinosa*	11	
	Calopterygidae	*Hetaerina americana*	10	
	Coenagrionidae	*Argia*	1	
		Enallagma	1	

Table 4 Continued on next page

Table 4. Continued.

ORDER	FAMILY	*SPECIES*	NUMBER	PERCENT
	Gomphidae	*Hagenius brevistylus*	1	
		Hylogomphus viridifrons	2	
	Macromiidae	*Macromia*	1	
PELECYPODA				1.7
	Corbiculidae	*Corbicula fluminea*	7	
PLECOPTERA				1.2
	Peltoperlidae	*Peltopera*	1	
	Perlidae	*Acroneuria abnormis*	2	
		Paragnetina sp. brown, concolorous	2	
TRICHOPTERA				21.7
	Brachycentridae	*Micrasema* pupae	2	
	Hydropsychidae	*Ceratopsyche morosa*	29	
		Ceratopsyche sparna	10	
		Cheumatopsyche	3	
		Hydropsyche early instars	10	
		Hydropsyche venularis	29	
	Leptoceridae	*Triaenodes*	1	
	Philopotamidae	*Chimara*	2	
	Polycentropodidae	*Neureclipsis* (prob. *crepuscularis)*	2	
	TOTAL		**405**	

Taxa Richness = 42
EPT Taxa Richness = 18
Bioclassification = 4 (GOOD)

The mid and lower sites surveyed by TVA in 2000 scored relatively high (48 = good) given the amount of intensively utilized agricultural land that could potentially impact the aquatic communities at these sites. Although not as intensive as out 1998 survey, we managed to collect 52 species (61 in 1998) from our survey sites that were recorded for TADS purposes. We also captured two blue suckers in close proximity to the collection made in 1998. A list of these species can be found in Table 5.

Table 5. Distribution of fish species collected from the Nolichucky River during 2001 ( = presence).

Nolichucky River Mile	27.9	30.9	39.1	42.5	45.7	71.4	80.3	82.9	98.0	99.1
Site Code	4 2 0 0 1 0 6 0 8	4 2 0 0 1 0 6 0 9	4 2 0 0 1 0 6 1 2	4 2 0 0 1 0 6 1 3	4 2 0 0 1 0 6 1 4	4 2 0 0 1 0 6 2 2	4 2 0 0 1 0 6 2 5	4 2 0 0 1 0 6 2 6	4 2 0 0 1 0 6 3 0	4 2 0 0 1 0 6 3 1
Species										
Catostomidae										
Black Buffalo										
Black Redhorse										
Blue Sucker										
Golden Redhorse										
Northern Hogsucker										
River Carpsucker										
River Redhorse										
Shorthead Redhorse										
Silver Redhorse										
Smallmouth Buffalo										
Centrarchidae										
Black Crappie										
Bluegill										
Green Sunfish										
Largemouth Bass										
Redbreast Sunfish										
Redbreast x Green Hybrid										
Redear Sunfish										
Rock Bass										
Smallmouth Bass										
Spotted Bass										
Warmouth										
White Crappie										
Clupeidae										
Gizzard Shad										

Table 5 continued on next page

Table 5. Continued.

Nolichucky River Mile	27.9	30.9	39.1	42.5	45.7	71.4	80.3	82.9	98.0	99.1
Site Code	4200010608	4200010609	4200010612	4200010613	4200010614	4200010622	4200010625	4200010626	4200010630	4200010631
Species										
Cottidae										
Banded Sculpin										
Cyprinidae										
Bigeye Chub										
Carp										
Mimic Shiner										
Mirror Shiner										
River Chub										
Rosyface Shiner										
Spotfin Shiner										
Stargazing Minnow										
Stoneroller										
Telescope Shiner										
Tennessee Shiner										
Warpaint Shiner										
Whitetail Shiner										
Ictaluridae										
Channel Catfish										
Flathead Catfish										
Yellow Bullhead										
Lepisosteidae										
Longnose Gar										

Table 5 continued on next page

Table 5. Continued.

Nolichucky River Mile	27.9	30.9	39.1	42.5	45.7	71.4	80.3	82.9	98.0	99.1
Site Code	4200010608	4200010609	4200010612	4200010613	4200010614	4200010622	4200010625	4200010626	4200010630	4200010631
Species										
Spotted Gar										
Percidae										
Banded Darter										
Bluebreast Darter										
Gilt Darter										
Greenfin Darter										
Greenside Darter										
Logperch										
Sharphead Darter										
Snubnose Darter										
Tangerine Darter										
Petromyzontidae										
Lamprey sp.										

Discussion

The Nolichucky River provides anglers with the opportunity to catch all species of black bass, rock bass, muskellunge, channel catfish, and flathead catfish. During the winter months the upper reaches of the Nolichucky are stocked with rainbow trout from the U.S. Fish and Wildlife Service hatchery in Erwin. This provides additional recreational opportunities for winter anglers frequenting the river. In recent years, the river has seen an increase in use, with the establishment of several rafting companies and the increased recognition of the river's sport fishery.

Currently we have no angler use/harvest data on the river to aid in evaluating the effects that angler use may or may not have on the sport fishery. It is imperative that we obtain this data in order to answer fish management questions as well as public inquiries.

The occurrence of musky in the river warrants continued stocking when fish become available. Based on our observations and information from anglers the stocking program has met with some success and there have been rumors of reproduction in the river although these claims have not been verified. We have requested 1,000 fish for the 2002 stocking season and would like to see stocking continue at some level.

Surveys on the Nolichucky River will be conducted on a three-year rotation in order to assess any changes in the fishery. Our return trip in 2004 will in all likelihood repeat the surveys conducted in 2001.

Management Recommendations

1. Initiate an angler use and harvest survey.

2. Develop a fishery management plan for the river.

3. Continue to stock musky when available.

Pigeon River

Introduction

The Pigeon River has had a long history of pollution problems, stemming primarily from the 80 plus-year discharge of wastewater from the Champion Paper Mill in Canton, North Carolina. This discharge has undoubtedly had a profound effect on the recreational use of the river and after the discovery of elevated dioxin levels in the 1980's raised concerns about public health (TDEC 1996). Although the river has received increased attention in recent years, the recreational use of the river has not developed its full potential. In terms of the fishery, consumption of all fish was prohibited up until 1996 when the ordinance was downgraded, limiting consumption of carp, catfish , and redbreast sunfish (TDEC 1996). Despite the continued posting of consumption advisories, the river draws a substantial amount of angling pressure. Since 1988, cooperative Index of Biotic Integrity samples have been conducted at two localities near river mile 8.2 (Tannery Island) and river mile 16.6 (Denton).

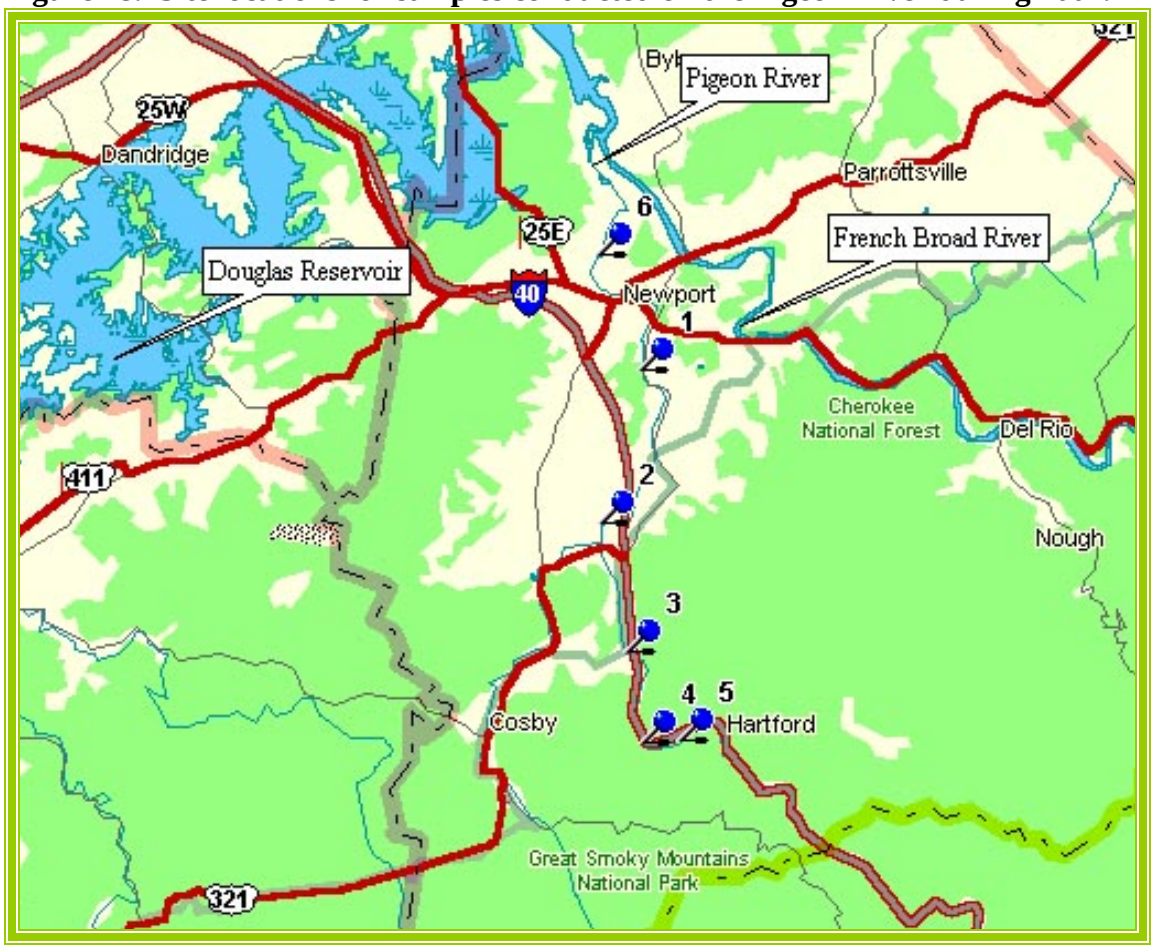
Our 2001 surveys focused on continuing our collection of catch effort data for black bass and rock bass. Catch effort data along with otolith samples from rock bass and black bass were collected from three sites in 1997 (Bivens et al. 1998) and five sites in 1998 (Carter et al. 1999). Since 1999, data has been collected at six sites between river mile 4.0 and 20.5. During 1998, a 508 mm minimum (20-inch) length limit on smallmouth bass with a one fish possession limit was passed by the Tennessee Wildlife Resources Commission (TWRC). This regulation was implemented on March 1, 1999.

Study Area and Methods

The Pigeon River originates in North Carolina and flows in a northwesterly direction before emptying into the French Broad River near river mile 73.8. The river has a drainage area of approximately 1,784 km^2 at its confluence with the French Broad River. In Tennessee, approximately 35 kilometers of the Pigeon River flows through mountainous terrain with interspersed communities and small farms before joining the French Broad River near Newport. Public access along the river is primarily limited to bridge crossing and small "pull-outs" along roads paralleling the river. There are a few primitive launching areas for canoes or small boats.

Between June 20 and July 13, 2001, we conducted six fish surveys between Newport and the community of Hartford (Figure 18). Because this portion of the river is a tailwater, habitat availability fluctuates with water releases. However, in our survey sites during low flow, the habitat consisted primarily of wooded shorelines with interspersed rock outcroppings. Submerged woody debris was fairly common in most of our sample areas. The river substrate was predominately boulder/cobble in riffle areas and bedrock with interspersed boulder/cobble in the pool habitat.

Figure 18. Site locations for samples conducted on the Pigeon River during 2001.



Measured channel widths ranged from 35.3 to 64.3 m, while site lengths fell between 80 and 869 m (Table 6). Water temperatures ranged from 21 to 24 C and conductivity varied from 130 to 195 µs/cm (Table 6).

Table 6. Physiochemical and site location data for samples conducted on the Pigeon River during 2001.

Site Code	Site	County	Quad	River Mile	Latitude	Longitude	Mean Width (m)	Length (m)	Temp.	Cond.	Secchi (m)
420010401	1	Cocke	Newport 173NW	8.1	355633N	831043W	53.6	392	N/A	N/A	N/A
420010402	2	Cocke	Newport 173NW	13	355322N	831147W	64.3	869	22.5	180	2.0
420010403	3	Cocke	Hartford 173SW	16.6	355039N	831104W	N/A	414	N/A	N/A	N/A
420010404	4	Cocke	Hartford 173SW	19	354847N	831041W	35.3	80	21	130	N/A
420010405	5	Cocke	Hartford 173SW	20.5	354849N	830945W	47.3	839	N/A	N/A	N/A
420010406	6	Cocke	Newport 173NW	4.0	355857N	831156W	54	193	24	195	N/A

Fish were collected by boat electrofishing in accordance with the standard large river sampling protocols (TWRA 1998). Fixed-boom electrodes were used to transfer 4-5 amps DC at all sites. This current setting was determined effective in narcotizing all target species (black bass and rock bass). All fish collected were returned to the river. Additionally, efforts were made to identify non-target species encountered at each survey site. All sites were sampled during daylight hours and had survey durations ranging from 1000 to 8033 seconds. Catch-per-unit-effort (CPUE) values were calculated for each target species at each site. Length categorization indices were calculated for target species following Gabelhouse (1984).

Results

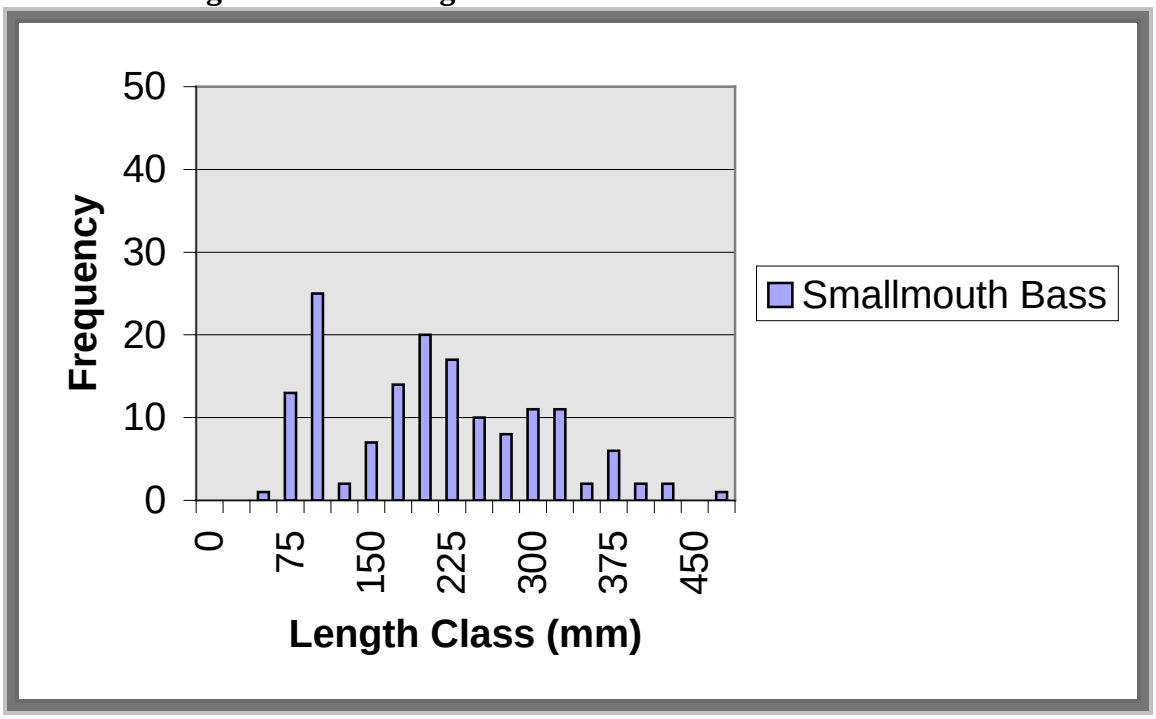
During our surveys, smallmouth bass and rock bass were collected from all the sample sites. The collection of spotted bass and largemouth bass was more sporadic. Smallmouth bass was the most abundant black bass species at any of the survey sites. CPUE estimates for this species averaged 32.0/hour (SD 17.3), while the spotted bass and largemouth bass estimates were 1.0/hour (SD 2.0) and 5.5/hour (SD 5.4), respectively (Table 7). There was a general trend of increasing catch rates for smallmouth bass in the intermediate reaches (sites 3-5) of the river (Table 7). Rock bass CPUE was highest between sample sites 2 and 4, averaging 15.7/hour (SD 18.0). The highest catch rate for this species was recorded at site 3 (51.4/hour), which also had the highest value in 2000.

Table 7. Catch per unit effort and length categorization indices of target species collected at six sites on the Pigeon River during 2001.

Site Code	Smallmouth Bass CPUE	Spotted Bass CPUE	Largemouth Bass CPUE	Rock Bass CPUE
420010401	15.4	0.0	4.3	10.3
420010402	28.3	0.0	10.3	11.2
420010403	30.0	5.1	0.0	51.4
420010404	54.0	0.0	0.0	14.4
420010405	51.1	1.1	13.3	4.4
420010406	13.2	0.0	5.3	2.6
MEAN	**32.0**	**1.0**	**5.5**	**15.7**
STD. DEV.	**17.3**	**2.0**	**5.4**	**18.0**
	Smallmouth Bass Length-Categorization Analysis	**Spotted Bass Length-Categorization Analysis**	**Largemouth Bass Length-Categorization Analysis**	**Rock Bass Length-Categorization Analysis**
	PSD = 39.2	PSD = 28.6	PSD = 88.9	PSD = 43.2
	RSD-Preferred = 12.7	RSD-Preferred = 0	RSD-Preferred = 0	RSD-Preferred = 1.1
	RSD-Memorable = 2.9	RSD-Memorable = 0	RSD-Memorable = 0	RSD-Memorable = 0
	RSD-Trophy = 0	RSD-Trophy = 0	RSD-Trophy = 0	RSD-Trophy = 0

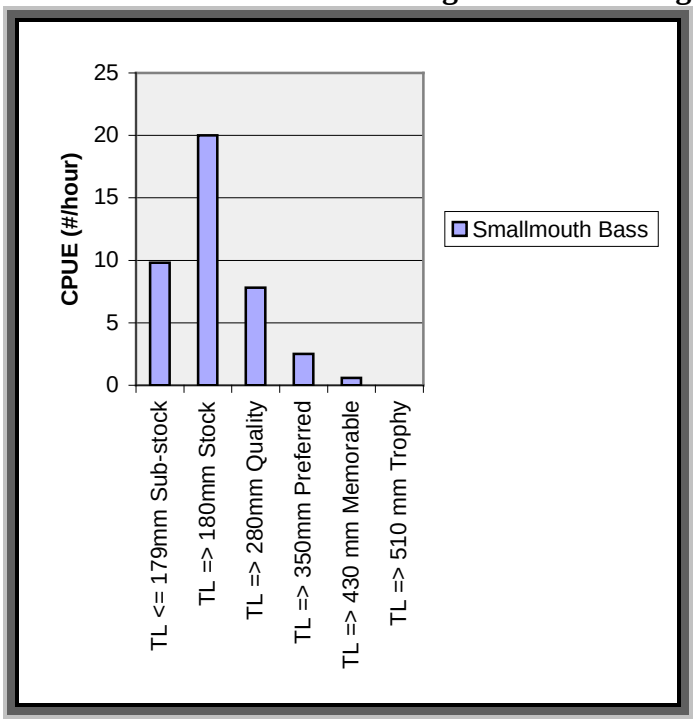
The majority of the smallmouth bass collected from the Pigeon River during 2001 fell within the 125 to 250 mm length range (Figure 19). Our data indicated that bass less than 100 mm were not completely vulnerable to the sampling gear. Length categorization analysis indicated the Relative Stock Density (RSD) for preferred

Figure 19. Length frequency distribution for smallmouth bass collected from the Pigeon River during 2001.



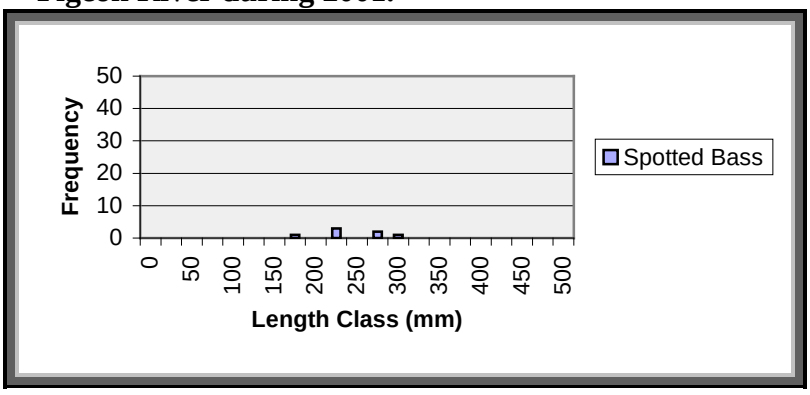
smallmouth bass (TL $\geq$ 350 mm) was 12.7, which was very similar to the value calculated in 2000 (12.8). RSD for memorable (TL $\geq$ 430 mm) and trophy (TL $\geq$ 510 mm) size bass were 2.9 and 0, respectively. The PSD of smallmouth bass (ratio of quality size bass to stock size bass) was 39.2. Catch per unit effort estimates by RSD category indicated smallmouth bass had the highest catch rates of any of the black bass species collected for the category RSD-Q and above (Figure 20). Recruitment into the RSD-S and above categories was good in 2001, which can be related to the high reproduction observed in 2000 (Carter et al. 2001). Additionally, we observed a 290% increase in the catch rate of RSD-Q size bass in 2001 when compared to the 2000 sample. The catch of sub-stock smallmouth was somewhat lower in 2001 declining by about 30% from the 2000 sample (Figure 20). Linear and curvilinear length-weight regression analysis has been calculated for previous (Carter et al. 1999) years data and is assumed to be similar for the 2001 data. No age and growth data was collected from this population in 2001; age and growth characteristics for smallmouth bass in the Pigeon River are well documented from recent surveys (Carter et al. 1999, 2000).

Figure 20. Relative stock density (RSD) catch per unit effort by category for smallmouth bass collected from the Pigeon River during 2001.



There were very few spotted bass collected from the Pigeon River in 2001. A total of seven spotted bass were collected in all of our samples. This was similar to the number collected in 2000 (8). Because there were so few spotted bass collected in the sample, no one size range dominated the length distribution (Figure 21). Length categorization analysis indicated the RSD for preferred spotted bass (TL $\geq$ 350 mm) was

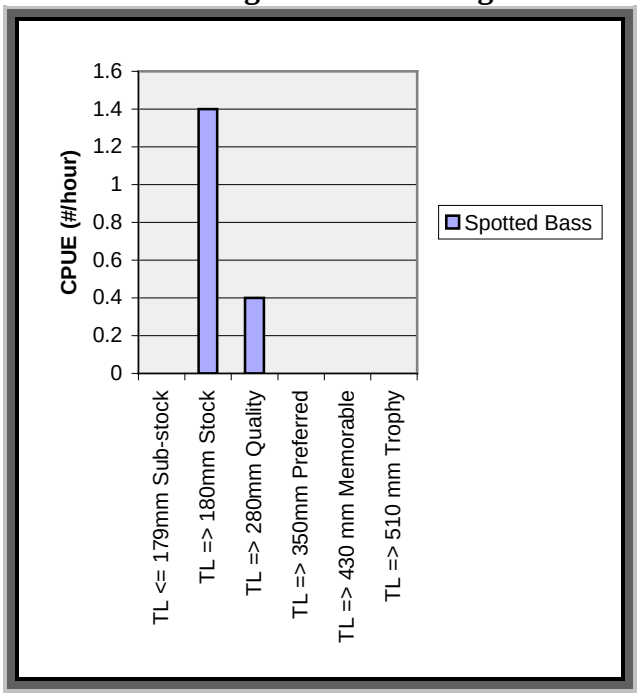
Figure 21. Length frequency distribution for spotted bass collected from the Pigeon River during 2001.



0. RSD for memorable (TL $\geq$ 430 mm) and trophy (TL $\geq$ 510 mm) size bass was 0. The PSD of spotted bass was 28.6. Catch per unit effort estimates by RSD category revealed very few spotted bass above the RSD-Q category, indicating a relative lack of larger fish

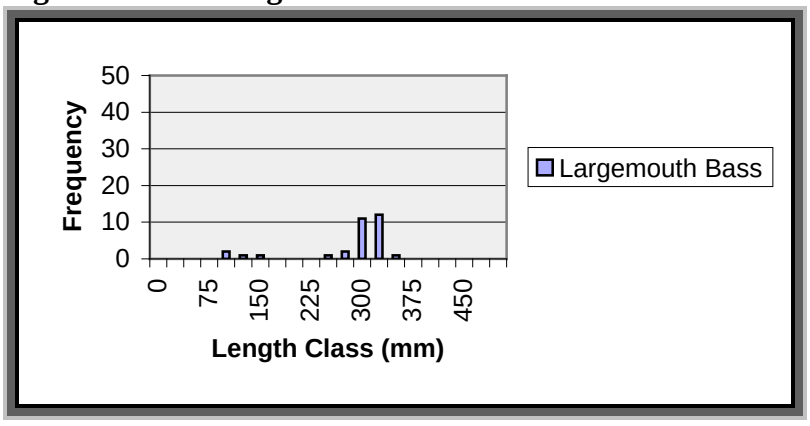
available to anglers (Figure 22). Additionally, the catch rate for sub-stock spotted bass was absent indicating little or no recruitment for 2001.

Figure 22. Relative stock density (RSD) catch per unit effort by category for spotted bass collected from the Pigeon River during 2001.



Most of the largemouth bass collected during 2001 fell within the 300 to 350 mm length range (Figure 23). Length categorization analysis indicated the RSD for preferred

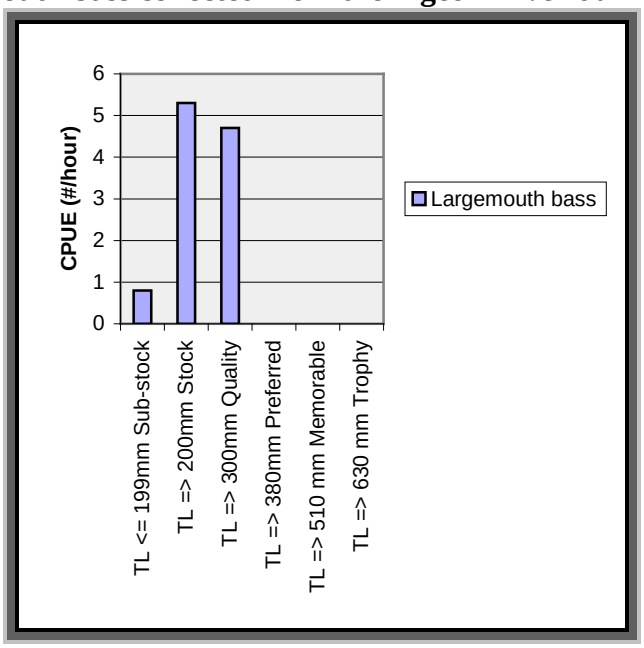
Figure 23. Length frequency distribution for largemouth bass collected from the Pigeon River during 2001.



largemouth bass (TL $\geq$ 380 mm) was 0. RSD for memorable (TL $\geq$ 510 mm) and trophy (TL $\geq$ 630 mm) size largemouth bass was also 0. The PSD of largemouth bass was 88.9. No largemouth bass above the RSD-Q category were collected (Figure 24). Recruitment

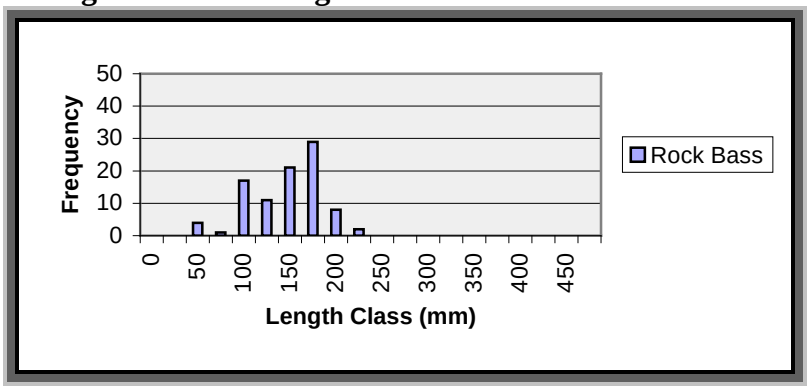
in 2001 was almost identical to the value observed in 2000. There were a few more quality size largemouth bass collected in 2001, however numbers still remain relatively low and do not offer much opportunity for anglers.

Figure 24. Relative stock density (RSD) catch per unit effort by category for largemouth bass collected from the Pigeon River during 2001.



Individuals in the 100 to 200 mm range represented the majority of rock bass in our sample (Figure 25). Length categorization analysis indicated the RSD for preferred rock bass (TL $\geq$ 230 mm) was 1.1, which was up from 0 in 2000. RSD for memorable (TL $\geq$ 280 mm) and trophy (TL $\geq$ 330 mm) size rock bass was 0. The PSD of rock bass

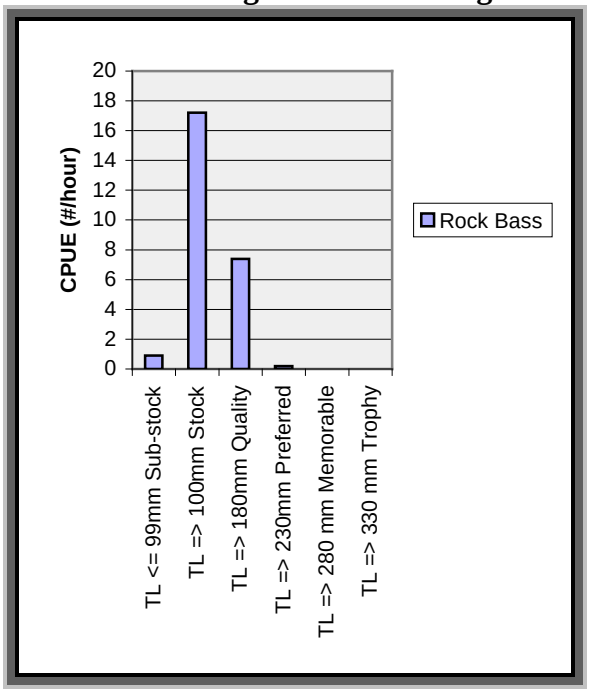
Figure 25. Length frequency distribution for rock bass collected from the Pigeon River during 2001.



was 43.2. Catch per unit effort estimates by RSD category indicated the majority of our catch was stock size fish (Figure 26) with about 41% of the catch representing quality size and above fish. The sub-stock catch of rock bass was low, but probably does not

indicate poor recruitment due to the fact that sampling efficiency is usually lower with this size group.

Figure 26. Relative stock density (RSD) catch per unit effort by category for rock bass collected from the Pigeon River during 2001.



Linear and curvilinear length-weight regression analysis has been calculated for previous years data (Carter et al. 1999) and is assumed to be similar for the 2000 data. No age and growth data was collected from this population in 2001, age and growth characteristics for rock bass in the Pigeon River are well documented from recent surveys (Carter et al. 1999, 2000).

During 2001 we had a sample of black bass and rock bass tested for disease by the U.S. Fish and Wildlife Service as part of the wild fish health survey. We were primarily interested in determining if there was a high incidence of disease among these species due to prolonged exposure to pollutants in the river. We were also interested in screening largemouth bass for largemouth bass virus (LMBV), which has been identified in some Tennessee reservoir populations. Our sample from the Pigeon River in 2001 did not indicate any disease commonly associated with the species tested. Table 8 lists the results of the analysis conducted by the U.S. Fish and Wildlife Service.

Table 8. Disease analysis for black bass and rock bass collected from the Pigeon River during 2001.

	LMBV	IHNV	IPNV	VHSV	OMV	CCV	Rsal	Yruc	Asal	Mcer	Bach
Species											
Largemouth Bass	(-)	(-)	(-)	NT	NT	NT	P	(-)	(-)	NT	(-)
Smallmouth Bass	(-)	(-)	(-)	NT	NT	NT	P	(-)	(-)	NT	(-)
Rock Bass	(-)	(-)	(-)	NT	NT	NT	P	(-)	(-)	NT	(-)

(-) = NEGATIVE
(+) = POSITIVE
NT = NOT TESTED
P = PENDING
LMBV = LARGEMOUTH BASS VIRUS
IHNV = INFECTIOUS HAEMATOPOIETIC
IPNV = INFECTIOUS PANCREATIC NECROSIS
Rsal = RENIBACTERIUM SALMONINARUM
Yruc = YERSINIA RUCKERI
Asal = AEROMONAS SALMONICIDA
Bach = BOTHRIOCEPHALUS ACHEILOGNATHI

Several other species were collected or observed (41) during our survey of the Pigeon River. None of the fish collected in the 2001 sample were listed by the U.S. Fish and Wildlife Service or the TWRA as threatened or endangered. A list of species occurrence by site can be found in Table 9.

Table 9. Distribution of fish species collected in the Pigeon River during 2001. ( = presence)

Pigeon River Mile	8.1	13.0	16.6	19	20.5	4.0
Site Code	4204001040101	4204001040402	4204001040403	4204001040404	4204001040405	4204001040406
Species						
Catostomidae						
Black Buffalo						
Black Redhorse						
Golden Redhorse						
Northern Hogsucker						
River Carpsucker						
River Redhorse						

Table 9 Continued on next page

Table 9. Continued.

Pigeon River Mile	8.1	13.0	16.6	19	20.5	4.0
Site Code	4 2 0 0 1 0 4 0 1	4 2 0 0 1 0 4 0 2	4 2 0 0 1 0 4 0 3	4 2 0 0 1 0 4 0 4	4 2 0 0 1 0 4 0 5	4 2 0 0 1 0 4 0 6
Species						
Shorthead Redhorse						
Silver Redhorse						
Smallmouth Buffalo						
Centrarchidae						
Bluegill						
Green Sunfish						
Largemouth Bass						
Redbreast Sunfish						
Rock Bass						
Smallmouth Bass						
Spotted Bass						
Clupeidae						
Gizzard Shad						
Cottidae						
Banded Sculpin						
Cyprinidae						
Bigeye Chub						
Carp						
Rosyface Shiner						
Silver Shiner						
Spotfin Shiner						
Stoneroller						
Telescope Shiner						
Whitetail Shiner						
Ictaluridae						
Channel Catfish						
Flathead Catfish						

Table 9 Continued on next page

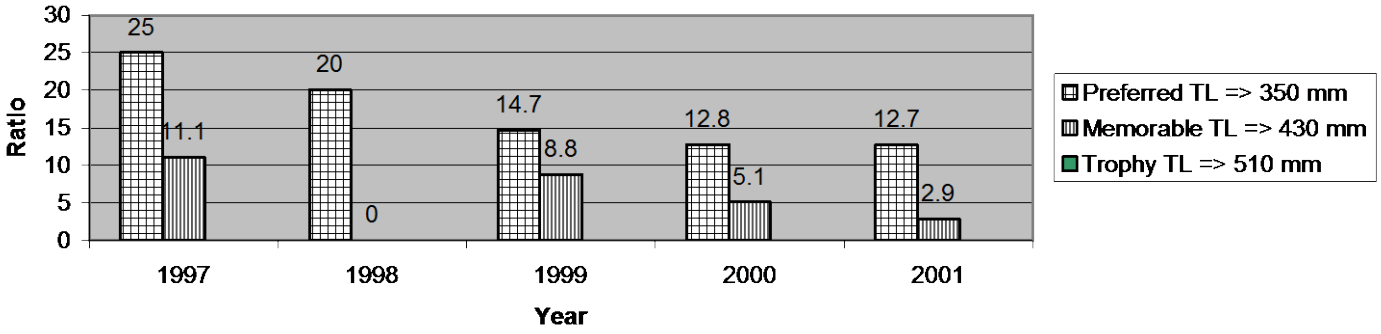
Table 9. Continued.

Pigeon River Mile	8.1	13.0	16.6	19	20.5	4.0
Site Code	4 2 0 0 1 0 4 0 1	4 2 0 0 1 0 4 0 2	4 2 0 0 1 0 4 0 3	4 2 0 0 1 0 4 0 4	4 2 0 0 1 0 4 0 5	4 2 0 0 1 0 4 0 6
Species						
Yellow Bullhead						
Moronidae						
White Bass						
Percidae						
Greenside Darter						
Logperch						
Redline Darter						
Sauger						
Snubnose Darter						
Walleye						
Petromyzontidae						
Chestnut Lamprey						
Icthyomyzon sp.						
Salmonidae						
Rainbow Trout						
Sciaenidae						
Drum						

Discussion

The Pigeon River provides anglers with the opportunity to catch all species of black bass and also rock bass. Perhaps the greatest potential for elevating this river's "trophy" status lies in the smallmouth bass population. Given that a fair percentage of smallmouth bass are reaching the preferred category (average 17% between 1997-2001) and that these fish are growing slightly slower than the statewide average (Carter et al. 1999), there would appear to be potential for managing the smallmouth bass population in this river. With the implementation of the 20-inch length regulation during the 1999-2000 season, shifts in the smallmouth bass population structure may be forthcoming (higher densities of larger bass). We are currently tracking trends in this segment of the smallmouth bass population (Figure 27).

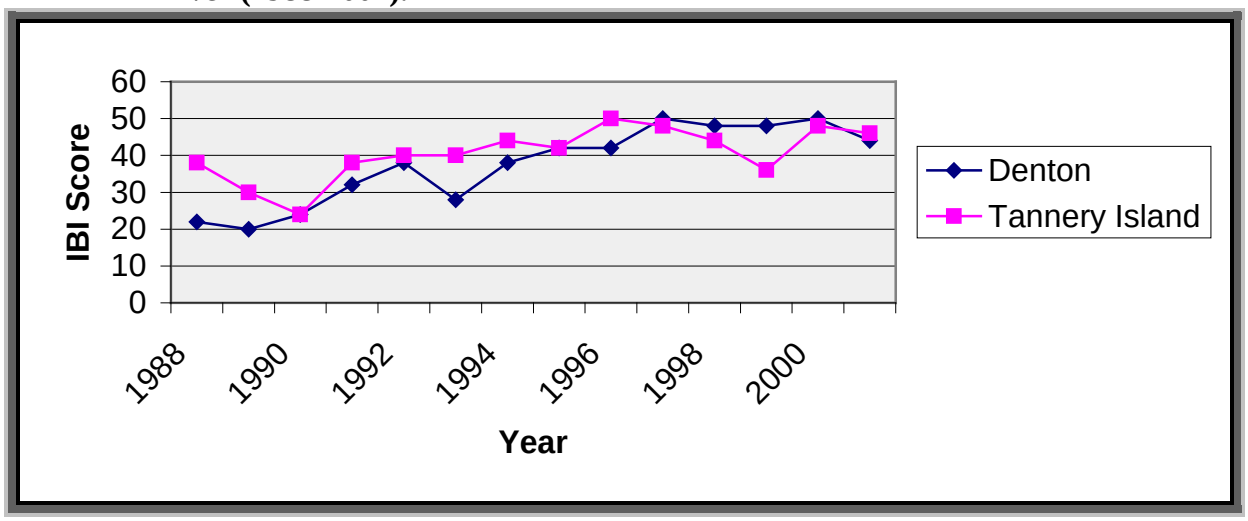
Figure 27. Trends in the ratio of preferred, memorable, and trophy smallmouth bass collected from the Pigeon River 1997-2001.



With the increase in recreational use on the river, it is important that angler use and harvest on the river be profiled. The collection of this type of data will aid in evaluating angler use of the resource and help in evaluating the current size and creel limit restrictions.

Over the last 14 years the IBI scores (TWRA and TVA data) at two stations on the Pigeon River have been steadily increasing (Figure 28).

Figure 28. Trends in Index of Biotic Integrity (IBI) at two stations on the Pigeon River (1988-2001).



This has primarily been the result of improved wastewater treatment at the Champion Paper Mill in Canton, North Carolina. The improved water quality has undoubtedly had an affect on the amount of recreation that is currently taking place, particularly whitewater rafting. It has also resulted in the return of a few species (e.g. Silver Shiner Telescope Shiner) previously not encountered in the annual surveys. The

continuation of improvements to the water quality of the Pigeon River will in all likelihood have dramatic impacts on the use of the river in the future.
Surveys on the Pigeon River will be conducted on an annual basis in order to assess any changes in the fishery that may result from the new regulation. Currently, there are ongoing projects to re-introduce selected fish, mussel, and snail species.

Management Recommendations

1. Implement an angler-use and harvest survey.

2. Continue monitoring the sport fish population, with detailed analysis focusing on the smallmouth bass fishery.

3. Continue the cooperative IBI surveys at the two established stations (Denton and Tannery Island).

4. Develop a management plan for the river.

Gulf Fork Big Creek

Introduction

Gulf Fork Big Creek is a transitional stream that originates in the Blue Ridge physiographic province of Cocke County and drains into the French Broad River (Ridge and Valley physiographic province) near the community of Del Rio. The majority of the watershed drains steep forested terrain.

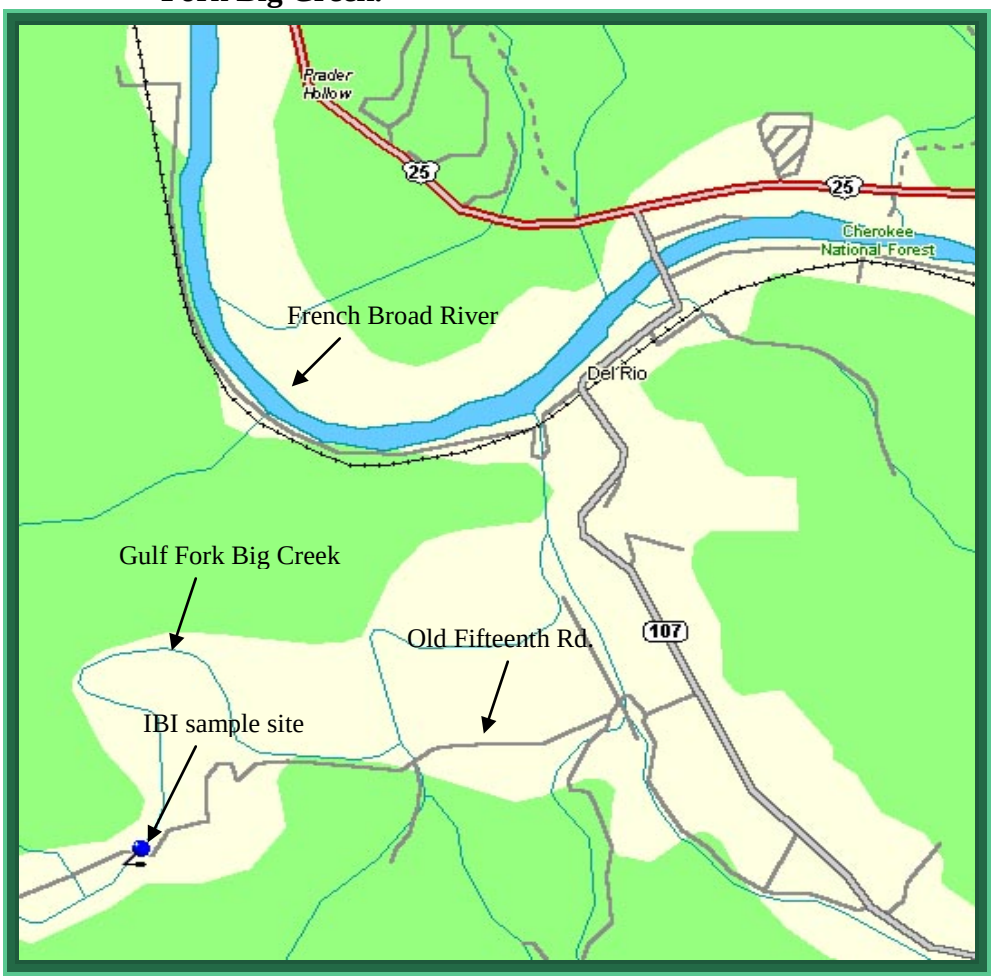
We were interested in surveying Gulf Fork Big Creek for two reasons. We wanted to assess the relative health of the stream based fish and benthic community and build a species list for TADS. The Tennessee Department of Environment and Conservation (TDEC) conducted a survey of Gulf Fork Big Creek in 1994 at the same location that we surveyed in 2001. TWRA surveyed the stream in 1988 (Bivens 1989).

Study Area and Methods

Our survey of Gulf Fork Big Creek was conducted near stream mile 2.9 along Old Fifteenth Road (Figure 29). The stream flows through forested terrain with interspersed residential development in the low-lying areas. The watershed encompasses approximately 49.3 km^2 in and is characterized by a second growth cove hardwood forest. The stream can best be described as moderately graded in the lower reaches, transitioning to higher gradient in the upper reaches. Pools in our sample reach were fairly common (60%) and well developed (area and depth). Instream cover was moderately abundant, comprised primarily of boulders, a few undercut banks, and woody debri. The streambed was primarily composed of gravel and cobble in the pools and cobble and boulders in the riffle areas. Basic water quality data collected at the site was within frequently observed ranges for this type of stream (water temperature 23.5 C, pH 6.2, and conductivity 80).

Our evaluation of the fish community was accomplished through an Index of Biotic Integrity (IBI) survey. Benthic organisms were collected with kick nets during a timed survey. Analysis of the fish and benthic samples followed procedures developed by Karr et al. (1986) and Lenat (1993).

Figure 29. Sample site location for the IBI survey conducted on Gulf Fork Big Creek.



Results

We collected a total of 585 fish comprising 20 species during our IBI survey (Table 10). There were five game species present, which included redbreast sunfish, rock bass, smallmotuh bass, rainbow trout, and brown trout. The two most dominant species collected in our sample were the telescope shiner and stoneroller. Together, these two species comprised 39.5% of the total number of fish in our sample. Five darter species were collected in the sample along with one sucker species, the northern hogsucker.

Table 10. Fish species encountered in Gulf Fork Big Creek during 2001.

Species	Number Collected
Banded Darter	1
Banded Sculpin	13
Bigeye Chub	4
Brown Trout	1
Greenfin Darter	1
Greenside Darter	3
Northern Hogsucker	20
Rainbow Trout	1
Redbreast Sunfish	5
Redline Darter	63
River Chub	18
Rock Bass	5
Rosyface Shiner	1
Smallmouth Bass	4
Snubnose Darter	11
Stoneroller	96
Telescope Shiner	135
Tennessee Shiner	82
Warpaint Shiner	84
Whitetail Shiner	37
Total	**585**

Overall, the IBI analysis indicated Gulf Fork Big Creek was in fair condition (IBI score = 42). The TDEC sample in 1994 derived an IBI score or 48, resulting in a classification of good. The most influential metrics on our 2001 score were the low number of sucker species, low percentage of piscivores, and the high percentage of anomalies on the fish (Table 11).

Table 11. Gulf Fork Big Creek Index of Biotic Integrity analysis.

Metric Description	Scoring Criteria 1 3 5	Observed	Score
Number of Native Species	<10 10-19 >19	17	3
Number of Darter Species	<3 3-4 >4	5	5
Number of Sunfish Species less *Micropterus*	0 1 >1	1	3
Number of Sucker Species	<2 2 >2	1	1
Number of Intolerant Species	0 1 >1	2	5
Percent of Individuals as Tolerant	>20 20-10 <10	0	5
Percent of Individuals as Omnivores	>30 30-15 <15	19.7	3
Percent of Individuals as Specialists	<25 25-50 >50	66.6	5
Percent of Individuals as Piscivores	<2 2-5 >5	1.6	1
Catch Rate	<16 16-32 >32	37.8	5
Percent of Individuals as Hybrids	>1 1-TR 0	0	5
Percent of Individuals with Anomalies	>5 5-2 <2	6.9	1
		Total	**42 (Fair)**

With the exception of the percentage of anomalies on the fish, the TDEC survey in 1994 had higher values for the number of sucker species and the percentage of piscivores in the sample. These were the most significant differences when the two evaluations were compared. Gulf Fork Big Creek was subjected to two major rain events in 2001. The high water associated with these events may have altered the fish assemblage at our survey site, resulting in the lower number of species collected during 2001.

Benthic macroinvertebrates collected in our sample comprised 29 families representing 37 identified genera (Table 12). The most abundant group in our collection was the mayflies comprising 26.8% of the total sample. Overall, a total of 44 taxa were identified from the sample of which 18 were EPT. Based on the EPT taxa richness and overall biotic index of all species collected, the relative health of the benthic community was classified as “good” (4.0).

Table 12. Taxa list and associated biotic statistics for benthic macroinvertebrates collected from Gulf Fork Big Creek.

ORDER	FAMILY	*SPECIES*	NUMBER	PERCENT
ANNELIDA				0.3
	Oligochaeta		1	
COLEOPTERA				8.6
	Dryopidae	*Helichus* adults	10	
	Elmidae	*Macronychus glabratus*	1	
		Promoresia elegans	11	
	Gyrinidae	*Dineutus discolor* male and females	3	
	Psephenidae	*Psephenus herricki* larva and adult	2	
DIPTERA				11.1
	Athericidae	*Atherix lantha*	9	
	Chironomidae		12	
	Simuliidae		13	
	Tipulidae	*Antocha*	1	
EPHEMEROPTERA				26.8
	Baetidae	*Baetis*	29	
	Ephemerellidae	*Drunella*	1	
		Serratella deficiens	20	
		Serratella sp.	3	
	Heptageniidae	*Epeorus rubidus/subpallidus*	2	
		Stenonema	5	
	Isonychiidae	*Isonychia*	24	
GASTROPODA				0.3
	Planorbidae		1	
MEGALOPTERA				6.4
	Corydalidae	*Corydalus cornutus*	13	
		Nigronia serricornis	7	
ODONATA				17.5
	Aeshnidae	*Basiaeshna janata*	1	
		Boyeria vinosa	12	
	Calopterygidae	*Calopteryx*	2	
	Coenagrionidae	*Argia*	1	
	Gomphidae	*Dromogomphus spinosus*	4	
		Gomphus lividus	22	
		Gomphurus rogersi	2	
		Hagenius brevistylus	4	
		Helocordulia uhleri	1	
		Ophiogomphus mainensis	1	
		Stylurus	1	

Table 12. Continued on next page

Table 12. Continued.

ORDER	FAMILY	*SPECIES*	NUMBER	PERCENT
	Macromiidae	*Macromia*	4	
PELECYPODA				1.3
	Corbiculidae	*Corbicula fluminea*	4	
PLECOPTERA				5.4
	Peltoperlidae	*Peltoperla*	5	
	Perlidae	*Acroneuria abnormis*	8	
	Pteronarcyidae	*Pteronarcys dorsata*	4	
TRICHOPTERA				22.3
	Brachycentridae	*Micrasema*	2	
	Hydropsychidae	*Ceratopsyche morosa*	6	
		Ceratopsyche sparna	40	
		Cheumatopsyche	8	
		Hydropsyche sp.	3	
	Hydroptilidae	*Leuchotrichia*	5	
	Limnephilidae	*Pycnopsyche*	1	
	Philopotamidae	*Chimara*	5	
	TOTAL		**314**	

TAXA RICHNESS = 44
EPT TAXA RICHNESS = 18
BIOCLASSIFICATION = 4.0 (GOOD)

Discussion

Gulf Fork Big Creek is typical of many streams within this region of Cocke County. The expansion of residential development since 1994 in the Del Rio community may have led to the lower score we derived from our IBI survey. Nonetheless, Gulf Fork Big Creek represents a valuable resource and has the potential to offer fair angling opportunities for smallmouth bass and rock bass in the lower reaches and rainbow trout in the upper reaches of the stream. The TWRA does maintain a routine stocking of catchable rainbow trout throughout the early spring and summer. We relocated approximately 120 wild brown trout from Laurel and Beaverdam creeks in Johnson County in an attempt to establish a reproducing brown trout population. Historical stocking efforts with hatchery stocks of brown trout have had little success. A new record of greenfin darter was recorded from the Gulf Fork in 2001. This represents a new record for the watershed.

Management Recommendations

1. Determine the effectiveness of the brown trout stocking, and restock if necessary.

2. Maintain the current stocking rate of catchable rainbow trout.

North Fork Holston River

Introduction

The North Fork Holston River has a reputation of being one of the regions best riverine smallmouth bass fisheries. This is supported by frequent reports of quality size smallmouth bass being caught in the 8.3 kilometer section between the TN/VA line and the confluence with the South Fork Holston River near Kingsport. Our interest in surveying the short reach that flows through Tennessee, was to gather data that would characterize the growth and longevity of smallmouth bass and rock bass and to continue compiling baseline catch per unit effort (CPUE) estimates on these populations. The Agency has conducted limited surveys (1 site each) of the river in 1989 and 1997 (Bivens and Williams 1990, Bivens et al. 1998) and a more extensive survey of sport fish populations in 1998 (Carter et al. 1999).

Study Area and Methods

The North Fork Holston River originates in Virginia and flows in a southwesterly direction before emptying into the South Fork Holston River near Kingsport. In Tennessee, the 8.3 kilometer reach of the river courses through the Ridge and Valley province of Hawkins and Sullivan counties. Land use is primarily residential with a few small farms interspersed. Public access along the river is primarily limited to bridge crossing and small "pull-outs" along roads paralleling the river. There are a few primitive launching areas for canoes or small boats.

During July 2001, seven fish surveys (6 CPUE, 1 IBI) were conducted on the North Fork between the TN/VA line and its confluence with the South Fork (Figure 30). We repeated our CPUE samples conducted in 1998, and teamed up with TVA to conduct a community assessment sample at Clouds Ford. The riparian habitat along this reach consisted primarily of wooded shorelines with interspersed fields and residential lawns. Submerged woody debri was fairly common in most of our sample areas. The river substrate was predominately composed of bedrock and boulders. Perpendicular/parallel (to flow) bedrock shelves were more abundant in the pool habitat, while a combination of boulder and bedrock comprised the majority of the riffle habitat. There were a few riffles within the survey areas that had cobble size substrate as the primary component. Measured mean channel widths ranged from 45.2 m to 68.3 m, while site lengths fell between 250 meters and 1,325 meters (Table 13). Water temperatures ranged from 24.5 C to 26 C and conductivity varied from 390 to 405 (Table 13).

Figure 30. Sample site locations for the North Fork Holston River Surveys during 2001.

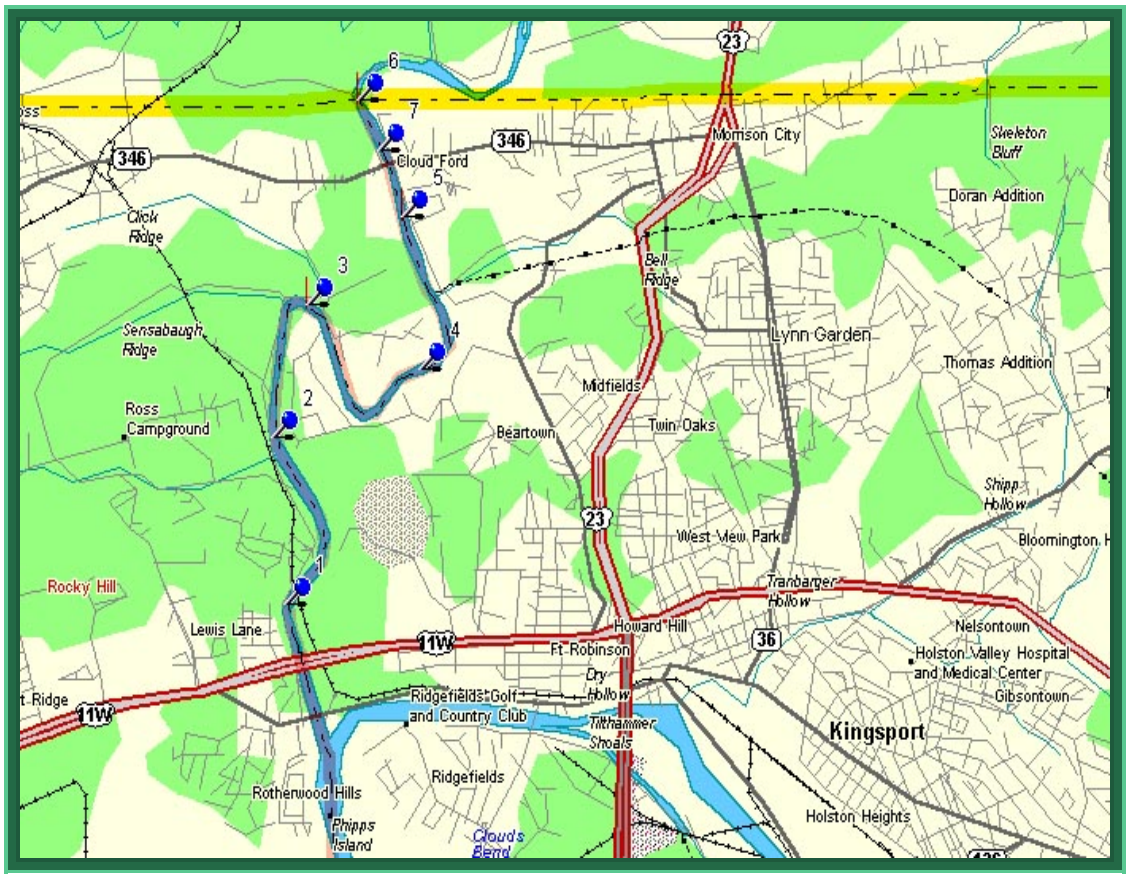


Table 13. Physiochemical and site location data for samples conducted on the North Fork Holston River during 2001.

Site Code	Site	County	Quad	River Mile	Latitude	Longitude	Mean Width (m)	Length (m)	Temp.	Cond.	Secchi (m)
420010501	1	Hawkins/Sullivan	Kingsport 188SE	0.8	355633N	831043W	68.3	293	N/A	N/A	N/A
420010502	2	Hawkins/Sullivan	Kingsport 188SE	2.0	355322N	831147W	54.4	1158	N/A	180	N/A
420010503	3	Hawkins/Sullivan	Kingsport 188SE	2.7	355039N	831104W	48.3	518	N/A	N/A	N/A
420010504	4	Hawkins/Sullivan	Kingsport 188SE	4.0	354847N	831041W	45.2	1325	N/A	130	N/A
420010505	5	Hawkins/Sullivan	Kingsport 188SE	4.4	354849N	830945W	52.0	953	N/A	N/A	N/A
420010506	6	Hawkins/Sullivan	Kingsport 188SE	5.0	355857N	831156W	58.0	250	24.5	405	2.0
420010507	7	Hawkins/Sullivan	Kingsport 188SE	4.9	363537N	823635W	N/A	N/A	26	390	2.0

Fish were collected by boat electrofishing in accordance with the standard large river sampling protocols (TWRA 1998). Fixed-boom electrodes were used to transfer 4 amps DC at all sites. This current setting was determined effective in narcotizing smallmouth bass (*Micropterus dolomieu*) and rock bass (*Ambloplites rupestris*). Efforts were made at each sample site to identify and compile a species list of non-target species. All sites were sampled during daylight hours and had survey durations ranging from 1158 to 3425 seconds. CPUE values were calculated for each target species at each site, with the exception of site 7 (IBI survey). Length categorization indices were calculated for target species following Gabelhouse (1984).

Results

Both smallmouth bass and rock bass were collected from all six sites. Smallmouth bass was the only black bass collected during our surveys. CPUE estimates for this species averaged 9.3/hour (Table 14).

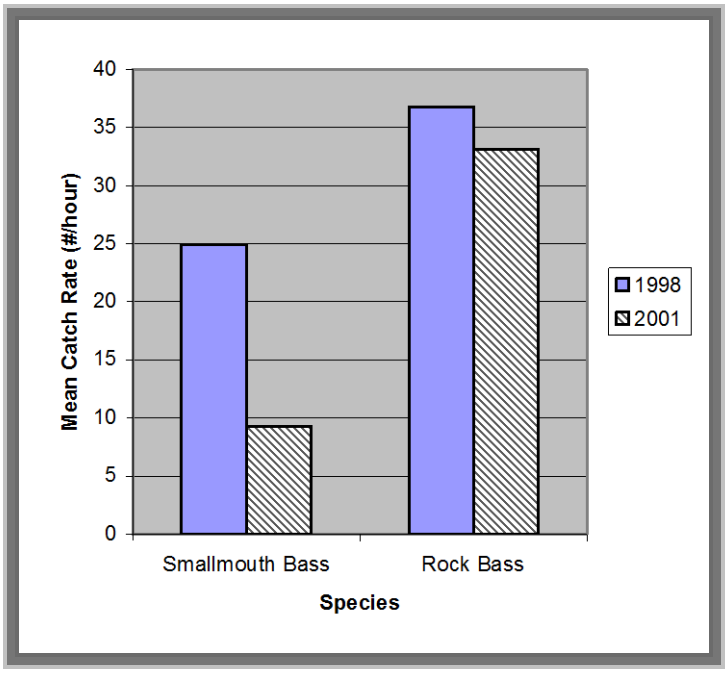
Table 14. Catch per unit effort and length categorization indices of target species collected at six sites on the North Fork Holston River during 2001.

Site Code	Smallmouth Bass CPUE	Rock Bass CPUE
420010501	6.2	28.0
420010502	15.8	33.6
420010503	8.0	47.8
420010504	9.3	10.9
420010505	8.6	21.4
420010506	8.1	56.9
MEAN	**9.3**	**33.1**
STD. DEV.	**3.3**	**17.0**
	Smallmouth Bass Length-Categorization Analysis	**Rock Bass Length-Categorization Analysis**
	PSD = 23.8	PSD = 15.3
	RSD-Preferred = 9.5	RSD-Preferred = 0
	RSD-Memorable = 4.8	RSD-Memorable = 0
	RSD-Trophy = 0	RSD-Trophy = 0

Sites 2 and 4 had the highest catch rates of the six sites sampled and were about 35% higher on average than the total sample average. We feel that this could be related to the higher occurrence of perpendicular/parallel bedrock shelves (and subsequent troughs) in these sites, which appeared to be, preferred habitat (smallmouth would hold in deeper troughs just below or to the side of bedrock shelves). Rock bass were generally more abundant than other game species encountered in our survey areas and had an average

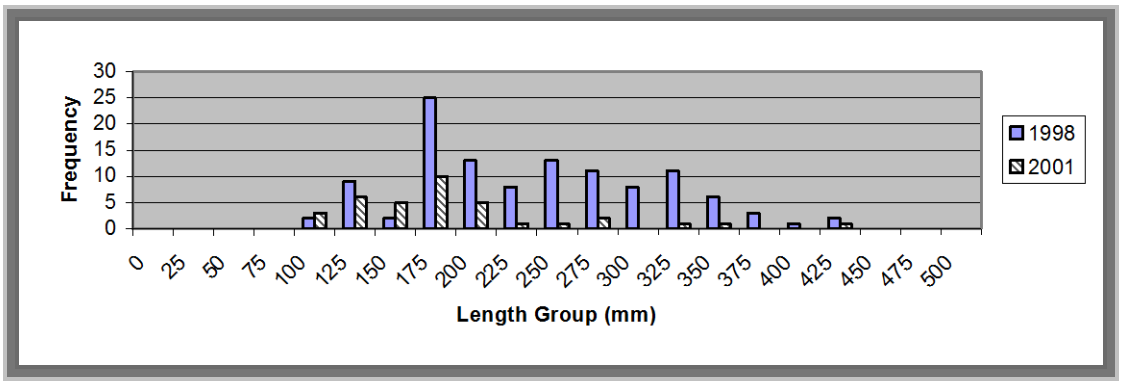
CPUE of 33.1 (Table 14). The sites where the catch rates were highest usually had at least one shoreline that had good boulder cover. There was no discernable trend from downstream to upstream in the catch of either species. Probably the most alarming finding from our catch effort data was 63% decline in the average catch rate for smallmouth bass between 1998 and 2001 (Figure 31). There could be several factors attributing to the observed decline. Potentially, drought conditions over the last two years may have had a detrimental effect. Fishing pressure on this small reach of river may have increased over the period. There is also the possibility that some form of contaminant from upstream industries may have lowered the smallmouth abundance. Comparatively, rock bass abundance only declined 10% over the same time period. This degree of fluctuation could be considered "normal".

Figure 31. Trends in mean catch rate of black bass and rock bass collected between 1998 and 2001 from the North Fork Holston River.



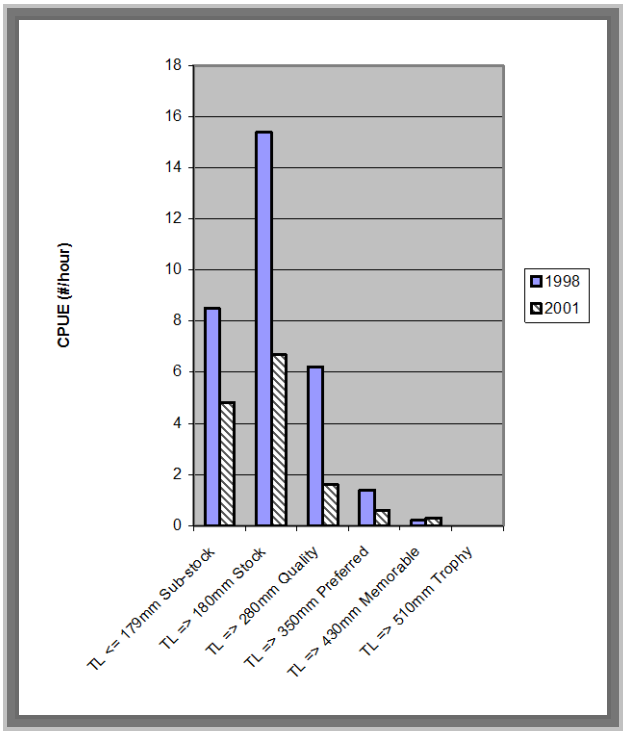
The majority of the smallmouth bass collected in the North Fork Holston River during 2001 fell within the 150 mm to 225 mm length range (Figure 32). The size distribution of smallmouth bass between 1998 and 2001 changed somewhat among our six sampling stations (Figure 32). Generally, there were fewer bass in all size categories in 2001 with the exception of the 125 mm to 150 mm size class. Poor recruitment into all size classes was the general case in 2001 and was especially evident in the 250 mm and above size categories.

Figure 32. Length frequency distributions for smallmouth bass collected from the North Fork Holston River in 1998 and 2001.



Length categorization analysis indicated the Relative Stock Density (RSD) for preferred smallmouth bass (TL ≥ 350 mm) was 9.5. RSD for memorable (TL ≥ 430 mm) and trophy (TL ≥ 510 mm) size bass was 4.8 and 0, respectively. The ratio of quality (TL ≥ 280 mm) smallmouth bass to stock size bass (TL ≥ 180 mm) was 23.8 (1998 value = 40.5). Catch per unit effort estimates by RSD category indicated the majority of the catch was in the RSD-S (Figure 33). Overall the proportional distribution of catch rates in each RSD category appeared to be similar to the trends observed in 1998, however, the total number of bass in each category was down substantially in 2001.

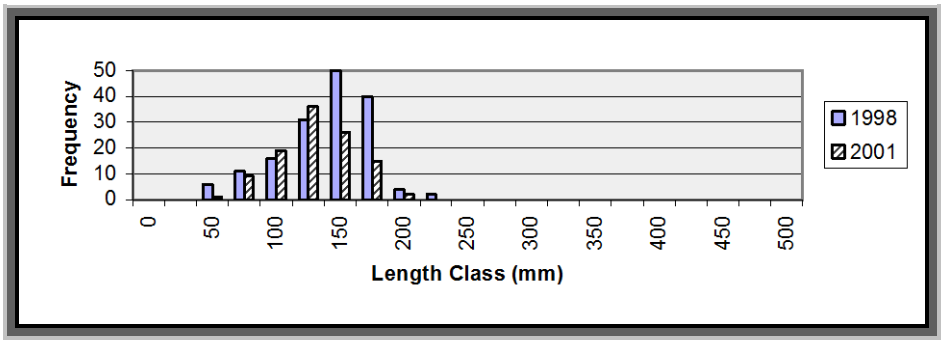
Figure 33. Relative stock density (RSD) catch per unit effort for smallmouth bass collected from the North Fork Holston River in 1998 and 2001.



Otoliths were not taken from smallmouth bass in 2001, therefore age and growth or mortality statistics were calculated. Growth, age and longevity of smallmouth bass were characterized in 1998 (Carter et al. 1999) and are assumed to be similar for the bass collected in 2001.

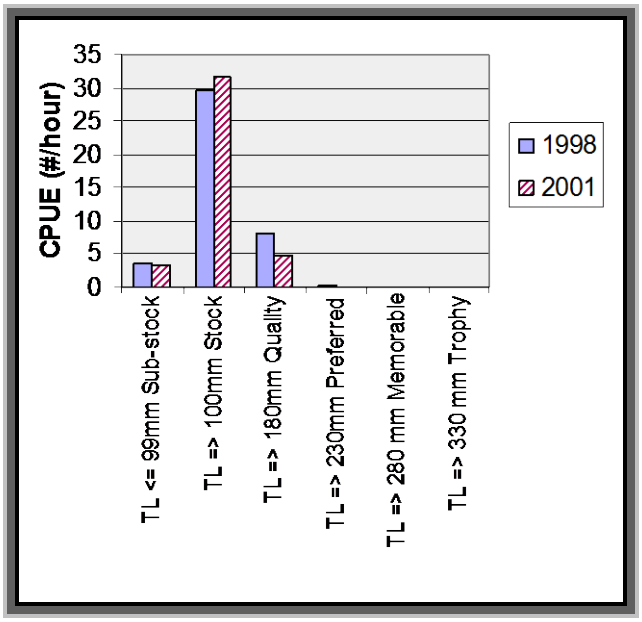
Individuals in the 100 mm to 200 mm range represented the majority of rock bass in our sample (Figure 34).

Figure 34. Length frequency distributions for rock bass collected from the North Fork Holston River in 1998 and 2001.



Length categorization analysis indicated the RSD for preferred rock bass (TL $\geq$ 230 mm) was 0. RSD for memorable (TL $\geq$ 280 mm) and trophy (TL $\geq$ 330 mm) size rock bass was 0. The ratio of quality (TL $\geq$ 180 mm) rock bass to stock size rock bass (TL $\geq$ 100 mm) was 15.3. Catch data by RSD category revealed a high number of rock bass in the RSD-S category with somewhat poor recruitment into the RSD-Q and above during 2001 (Figure 35).

Figure 35. Relative stock density (RSD) catch per unit effort by category for rock bass collected from the North Fork Holston River during 2001.



Because of our confidence in determining age and growth characteristics (based on previous samples) we did not collect any otolith samples from rock bass in 2001. Therefore, no mortality or potential population growth statistics could be calculated. Age and growth and mortality of rock bass in the North Fork Holston River are assumed to be similar to those reported from our 1998 assessment (Carter et al. 1999).

We expanded our sampling scheme in the North Fork during 2001 to include one community assessment sample (IBI sample) that would give us a relative measure of the river's health. Because this reach of the North Fork is so short we felt that one sample site would be sufficient in characterizing the North Fork. We cooperated with TVA in conducting one IBI sample at Clouds Ford near river mile 4.9. Overall the majority of the metrics scored well. The moderate percentages of omnivores and piscivores in the sample along with the low number of native and sucker species had the most negative influence on the overall score (Table 15).

Table 15. North Fork Holston River (at Clouds Ford) Index of Biotic Integrity analysis.

Metric Description	Scoring Criteria 1 3 5	Observed	Score
Number of Native Species	<20 20-39 >39	31	3
Number of Darter Species	<4 4-6 >6	8	5
Number of Sunfish Species less *Micropterus*	<2 2 >2	3	5
Number of Sucker Species	<4 4-6 >6	1	1
Number of Intolerant Species	<3 3-4 >4	6	5
Percent of Individuals as Tolerant	>20 20-10 <10	5.0	5
Percent of Individuals as Omnivores	>20 20-10 <10	10.3	3
Percent of Individuals as Specialists	<25 25-50 >50	79.3	5
Percent of Individuals as Piscivores	<25 25-50 >50	3.2	1
Catch Rate	<9 9-17 >17	33	5
Percent of Individuals as Hybrids	>1 1-TR 0	0	5
Percent of Individuals with Anomalies	>5 5-2 <2	0	5
		Total	**48 (Good)**

Benthic macroinvertebrates collected in our sample comprised 34 families representing 49 identified genera (Table 16). The most abundant group in our collection was the caddisflies comprising 32.9% of the total sample. Overall, a total of 58 taxa were identified from the sample of which 30 were EPT. Based on the EPT taxa richness and overall biotic index of all species collected, the relative health of the benthic community was classified as "good" (4.5). Of special interest was the collection of *Hydropsyche*

leonardi, which represented a new record for the state. Three specimens of *Io flovialis* were also collected at this site.

Table 16. Taxa list and associated biotic statistics for benthic macroinvertebrates collected from the North Fork Holston River.

ORDER	FAMILY	*SPECIES*	NUMBER	PERCENT
ANNELIDA				0.2
	Hirudinea		1	
COLEOPTERA				16.5
	Dryopidae	*Helichus* adult	2	
	Elmidae	*Macronychus glabratus* adults	12	
		Microcylloepus p. pusillus	2	
		Optioservus trivittatus adults	12	
		Stenelmis larvae and adults	56	
	Gyrinidae	*Dineutus discolor* adults & larva	3	
	Psephenidae	*Psephenus herricki* larvae & adult	6	
DIPTERA				2.5
	Athericidae	*Atherix lantha*	1	
	Chironomidae		11	
	Simulidae pupa		1	
	Tipulidae	*Hexatoma*	1	
EPHEMEROPTERA				26.5
	Baetidae	*Baetis*	6	
	Caenidae	*Caenis*	2	
	Ephemerellidae	*Serratella deficiens*	19	
	Ephemeridae	*Hexagenia*	14	
	Heptageniidae	*Heptagenia*	1	
		Stenacron interpunctatum	12	
		Stenonema early instars	22	
		Stenonema mediopunctatum	1	
		Stenonema pulchellum	2	
	Isonychiidae	*Isonychia*	68	
	Leptohyphidae	*Tricorythodes*	3	
GASTROPODA				9.6
	Pleuroceridae	*Io fluvialis* released	3	
		Leptoxis	40	
		Pleurocera sp. 1	5	
		Pleurocera sp. 2	6	
MEGALOPTERA				2.8
	Corydalidae	*Corydalus cornutus*	15	
	Sialidae	*Sialis*	1	
ODONATA				6.4
	Aeshnidae	*Basiaeshna janata*	1	

Table 16 continued on next page

Table 16. Continued.

ORDER	FAMILY	*SPECIES*	NUMBER	PERCENT
ODONATA (cont.)		*Boyeria vinosa*	11	
	Calopterygidae	*Hetaerina americana*	3	
	Coensgrionidae	*Argia*	1	
	Gomphidae	*Dromogomphus spinosus*	13	
		Gomphus quadricolor	1	
		Gomphus vastus	1	
		Hagenius brevistylus	2	
	Macromiidae	*Macromia*	3	
PELECYPODA				0.5
	Corbiculidae	*Corbicula fluminea*	3	
PLECOPTERA				2.1
	Perlidae	*Acroneuria (*prob*. evoluta)*	2	
		Acroneuria abnormis	2	
		Agnetina flavesens	1	
		Neoperla	6	
		*Paragnetina (*prob*. media)*	1	
TRICHOPTERA				32.9
	Brachycentridae	*Brachycentrus nigrosoma*	19	
	Hydropsychidae	*Ceratopsyche cheilonis*	56	
		Cheumatopsyche	85	
		Hydropsyche leonardi	1	
		Hydropsyche sp.	2	
		Hydropsyche sp.	7	
	Hydroptilidae	*Hydroptila*	1	
	Leptoceridae	*Nectopsyche*	1	
		Triaenodes injustus	3	
	Limnephilidae	*Pycnopsyche (lepida* group*)*	2	
	Philopotamidae	*Chimara*	1	
	Polycentropodidae	*Neureclipsis crepuscalaris*	2	
		Nyctiophylax	2	
		Polycentropus	1	
	Uenoidae	*Neophylax ornatus*	3	
	TOTAL		**565**	

TAXA RICHNESS = 58
EPT TAXA RICHNESS = 30
BIOCLASSIFICATION = 4.5 (GOOD)

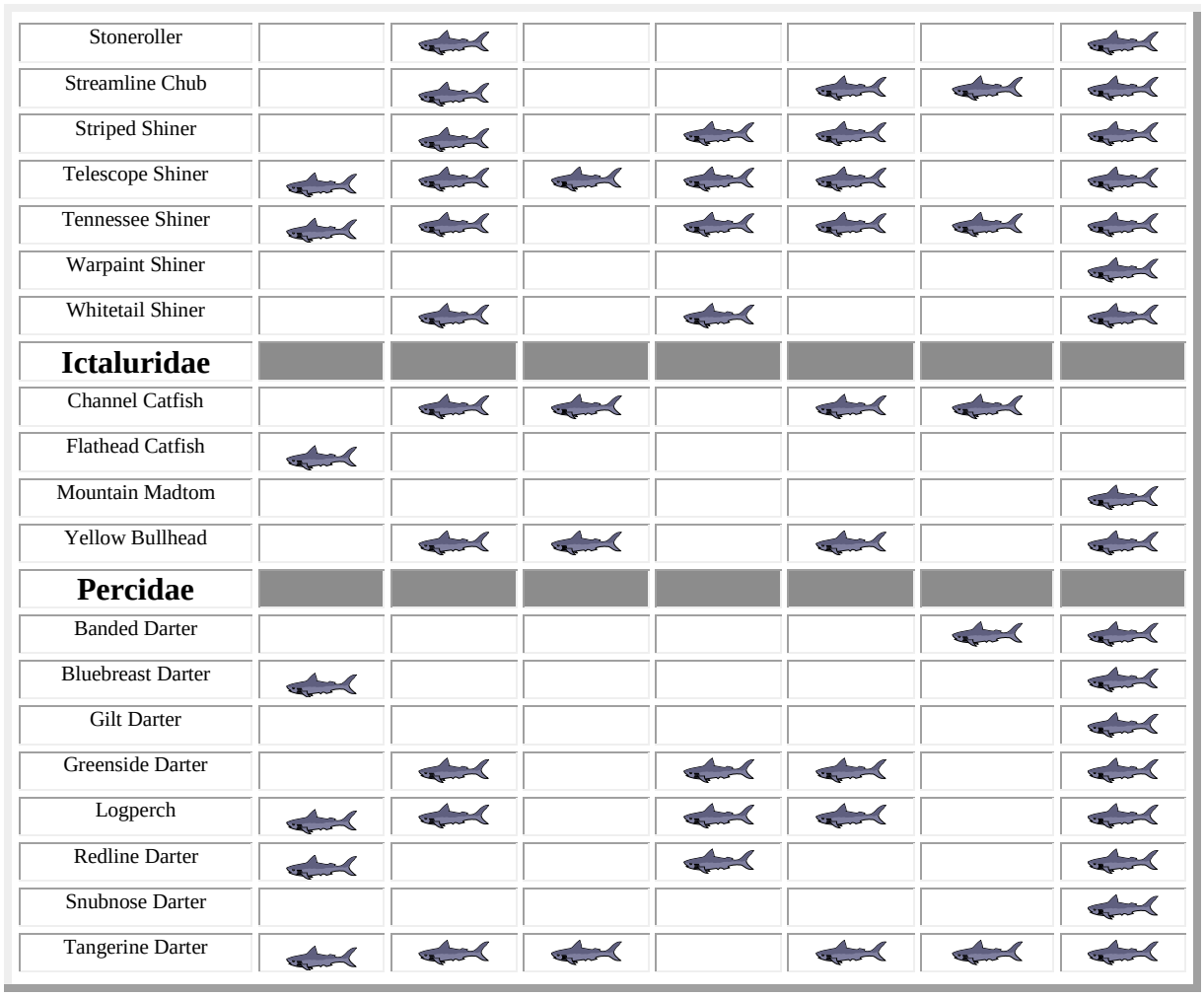
Several other fish species were collected or observed (31) during our survey of the North Fork Holston. A list of species occurrence by site can be found in Table 17. None of the fishes collected were listed as threatened or endangered by the U.S. Fish and Wildlife Service.

Table 17. Distribution of fish species collected from the North Fork Holston River during 2001 (= Presence).

North Fork Holston River Mile	0.8	2.0	2.7	4.0	4.4	5.0	4.9
Site Code	4 2 0 0 1 0 5 0 1	4 2 0 0 1 0 5 0 2	4 2 0 0 1 0 5 0 3	4 2 0 0 1 0 5 0 4	4 2 0 0 1 0 5 0 5	4 2 0 0 1 0 5 0 6	4 2 0 0 1 0 5 0 7
Species							
Catostomidae							
Black Redhorse	✓	✓	✓	✓	✓	✓	
Golden Redhorse		✓		✓		✓	
Northern Hogsucker	✓	✓	✓	✓	✓	✓	✓
Centrarchidae							
Longear Sunfish	✓		✓		✓		✓
Redbreast Sunfish	✓	✓	✓	✓	✓	✓	✓
Redear Sunfish							✓
Rock Bass	✓	✓	✓	✓	✓	✓	✓
Smallmouth Bass	✓	✓	✓	✓	✓	✓	✓
Clupeidae							
Gizzard Shad					✓		
Cottidae							
Banded Sculpin							✓
Cyprinidae							
Bigeye Chub				✓			✓
Bluntnose Minnow							✓
Carp	✓	✓			✓		
River Chub		✓	✓	✓	✓	✓	✓
Rosyface Shiner							✓
Sawfin Shiner			✓	✓			✓
Silver Shiner					✓		✓
Spotfin Shiner			✓	✓	✓		✓
Stargazing Minnow							✓

Table 17 continued on next page.

Table 17. Continued.



Discussion

The North Fork Holston River has provided anglers with the opportunity to catch substantial numbers of quality size smallmouth bass and rock bass. Although the numbers of smallmouth bass were down in 2001, the North Fork does offer good angling for this species as evidenced by the number anglers frequenting the river.

Surveys on the North Fork Holston River will be conducted on a three year rotation in order to assess any changes in the fishery. Development and implementation of an angler use survey in 2001 will be beneficial in determining exploitation rates and aid in evaluating any population effects resulting from angling. If negative reports regarding the smallmouth bass fishery in the North Fork become prevalent we may consider going to an annual sampling scheme for the river. If indications from our surveys and creel census data indicate angling may be having a negative influence, we may consider some type of angling regulation for the North Fork. Additionally, radio telemetry research currently being conducted by Tennessee Tech University will give

valuable insights into smallmouth bass movements between the North Fork Holston River and the mainstem Holston River.

Management Recommendations

1. Develop a fishery management plan for the river.

Summary

We surveyed four rivers and one stream, collecting 27 fish samples and three benthic samples. In the three large rivers sampled during 2001, mean CPUE values for smallmouth bass ranged from a high of 32.0/hour in the Pigeon River to a low 9.3/hour in in the North Fork Holston River. Overall, the most dramatic observation between the 1998 samples conducted on these rivers and the 2001 samples was the 63% decline in the average catch rate of smallmouth bass in the North Fork Holston River. Spotted bass were collected in two (Nolichucky and Pigeon) of the three large rivers sampled during 2001. Of these two, the Nolichucky River had the highest catch rate for this species (9.2/hour). Largemouth bass were scarce in all of the three rivers sampled during 2001. However, of the three, the Pigeon River had the highest recorded value (5.5/hour). Rock bass values remained fairly constant between the three rivers when compared to previous samples. All of the 2001 catch rate values for this species actually increased over the previous samples with the exception of the North Fork Holston, which declined about 10%.

Of the three IBI surveys conducted in 2001, the Nolichucky River scored the highest with (56) followed by the North Fork Holston (50) and Gulf Fork Big Creek (42). Benthic scores for these three samples all fell within the "good" category with scores ranging from 4.0 (Nolichucky and Gulf Fork) to 4.5 in the North Fork Holston.

Over the past eight years the stream survey unit has been conducting Index of Biotic Integrity surveys in various watersheds within the region. These have been done in response to requests made by TWRA personnel, cooperative effort requests, and general interest in determining the state of certain streams. Our compilation of these surveys has given us a reference database for many streams in the region that can be used for comparison purposes should we return for a routine survey or responding to a water quality issue. Table 18 lists our results for various streams surveyed during this time period.

Table 18. Index of Biotic Integrity and Benthic Biotic Index scores for samples conducted between 1994 and 2001.

Water	Watershed	Year Surveyed	County	IBI Score	Benthic BI Score
Capuchin Creek	Cumberland River	1994	Campbell	44 (Fair)	3 (Fair/Good)
Trammel Branch	Cumberland River	1994	Campbell	36 (Poor/Fair)	3 (Fair/Good)
Hatfield Creek	Cumberland River	1994	Campbell	42 (Fair)	3 (Fair/Good)
Baird Creek	Cumberland River	1994	Campbell	38 (Poor/Fair)	3 (Fair/Good)
Clear Fork (Site 1)	Cumberland River	1994	Campbell	52 (Good)	3 (Fair/Good)

Table 18 Continued on next page

Table 18. Continued.

Clear Fork (Site 2)	Cumberland River	1994	Claiborne	40 (Fair)	N/A
Clear Fork (Site 3)	Cumberland River	1994	Claiborne	24 (Very Poor/Poor)	1 (Poor)
Elk Fork Creek	Clear Fork	1994	Campbell	40 (Fair)	2 (Fair)
Fall Branch	Clear Fork	1994	Campbell	28 (Poor)	1 (Poor)
Crooked Creek	Clear Fork	1994	Campbell	38 (Poor/Fair)	2 (Fair)
Burnt Pone Creek	Clear Fork	1994	Campbell	38 (Poor/Fair)	2 (Fair)
Whistle Creek	Clear Fork	1994	Campbell	38 (Poor/Fair)	2 (Fair)
Little Elk Creek	Clear Fork	1994	Campbell	40 (Fair)	2 (Fair)
Lick Fork	Clear Fork	1994	Campbell	38 (Poor/Fair)	2 (Fair)
Terry Creek	Clear Fork	1994	Campbell	48 (Good)	2 (Fair)
Crouches Creek	Clear Fork	1994	Campbell	28 (Poor)	1 (Poor)
Hickory Creek (Site 1)	Clear Fork	1994	Campbell	46 (Fair/Good)	3 (Fair/Good)
Hickory Creek (Site 2)	Clear Fork	1994	Campbell	48 (Good)	2 (Fair)
White Oak Creek	Clear Fork	1994	Campbell	30 (Poor)	2 (Fair)
No Business Branch	Clear Fork	1994	Campbell	30 (Poor)	3 (Fair/Good)
Laurel Fork	Clear Fork	1994	Campbell	52 (Good)	3 (Fair/Good)
Lick Creek	Clear Fork	1994	Campbell	44 (Fair)	3 (Fair/Good)
Davis Creek	Clear Fork	1994	Campbell	38 (Poor/Fair)	2 (Fair)
Rock Creek	Clear Fork	1994	Campbell	54 (Good/Excellent)	3 (Fair/Good)
Little Tackett Creek	Clear Fork	1994	Claiborne	28 (Poor)	3 (Fair/Good)
Unnamed tributary to Little Tackett Creek	Clear Fork	1994	Claiborne	0 (No Fish)	3 (Fair/Good)
Rose Creek	Clear Fork	1994	Campbell	36 (Poor/Fair)	2 (Fair)
Rock Creek	Clear Fork	1994	Claiborne	28 (Poor)	2 (Fair)
Tracy Branch	Clear Fork	1994	Claiborne	34 (Poor)	2 (Fair)
Little Yellow Creek (Site 1)	Cumberland River	1994	Claiborne	38 (Poor/Fair)	N/A
Little Yellow Creek (Site 2)	Cumberland River	1994	Claiborne	38 (Poor/Fair)	N/A
Little Yellow Creek (Site 3)	Cumberland River	1994	Claiborne	36 (Poor/Fair)	N/A
Hickory Creek	Clinch River	1995	Knox	46 (Fair/Good)	3 (Fair/Good)
White Creek	Clinch River	1995	Union	34 (Poor) (Spring Creek)	4 (Good)
Little Sycamore Creek	Clinch River	1995	Claiborne	40 (Fair)	4.5 (Good/Excellent)
Big War Creek	Clinch River	1995	Hancock	50 (Good)	4 (Good)
North Fork Clinch River	Clinch River	1995	Hancock	46 (Fair/Good)	4 (Good)
Old Town Creek (Site 1)	Powell River	1995	Claiborne	40 (Fair)	4 (Good)
Old Town Creek (Site 2)	Powell River	1995	Claiborne	42 (Fair)	4 (Good)

Table 18 continued on next page

Table 18. Continued.

Indian Creek	Powell River	1995	Claiborne	N/A	4 (Good)
Sweetwater Creek	Tennessee River	1995	Loudon	30 (Poor)	3 (Fair/Good)
Burnett Creek	French Broad River	1995	Knox	46 (Fair/Good)	3 (Fair/Good)
Jockey Creek	Nolichucky River	1995	Greene	34 (Poor)	3 (Fair/Good)
South Indian Creek (Sandy Bottoms)	Nolichucky River	1995	Unicoi	38 (Poor/Fair)	4 (Good)
South Indian Creek (Ernestville)	Nolichucky River	1995	Unicoi	44 (Fair)	4 (Good)
Spivey Creek	Nolichucky River	1995	Unicoi	54 (Good/Excellent)	4 (Good)
Little Flat Creek	Holston River	1995	Knox	42 (Fair)	3 (Fair/Good)
Beech Creek	Holston River	1995	Hawkins	48 (Good)	4 (Good)
Big Creek	Holston River	1995	Hawkins	46 (Fair/Good)	4 (Good)
Alexander Creek	Holston River	1995	Hawkins	34 (Poor)	4 (Good)
Thomas Creek	South Fork Holston River	1995	Sullivan	54 (Good/Excellent)	4 (Good)
Hinds Creek	Clinch River	1996	Anderson	36 (Poor/Fair)	3 (Fair/Good)
Cove Creek	Clinch River	1996	Campbell	28 (Poor)	3 (Fair/Good)
Titus Creek	Clinch River	1996	Campbell	42 (Fair)	3 (Fair/Good)
Cloyd Creek	Tennessee River	1996	Loudon	36 (Poor/Fair)	4 (Good)
Sinking Creek	Little Tennessee River	1996	Loudon	34 (Poor)	4 (Good)
Baker Creek	Little Tennessee River	1996	Loudon	26 (Very Poor/Poor)	3 (Fair/Good)
Little Baker Creek	Little Tennessee River	1996	Blount	38 (Poor/Fair)	4 (Good)
Ninemile Creek	Little Tennessee River	1996	Blount	24 (Very Poor/Poor)	4 (Good)
East Fork Little Pigeon River	French Broad River	1996	Sevier	36 (Poor/Fair)	3 (Fair/Good)
Dunn Creek	French Broad River	1996	Sevier	32 (Poor)	4 (Good)
Wilhite Creek	French Broad River	1996	Sevier	44 (Fair)	4 (Good)
Watauga River (above Watauga Res.)	Holston River	1996	Johnson	42 (Fair)	4 (Good)
Stony Fork	Big South Fork	1996	Campbell	38 (Poor/Fair)	4 (Good)
Bullett Creek	Hiwassee River	1997	Monroe	50 (Good)	4.5 (Good/Excellent)
Canoe Branch	Powell River	1997	Claiborne	26 (Very Poor/Poor) (Spring Creek)	4.7 (Excellent)

Table 18 continued on next page

Table 18. Continued.

Town Creek	Tennessee River	1997	Loudon	34 (Poor)	2 (Fair)
Bat Creek	Little Tennessee River	1997	Monroe	30 (Poor)	1.5 (Poor/Fair)
Island Creek	Little Tennessee River	1997	Monroe	40 (Fair)	4 (Good)
Little Pigeon River	French Broad River	1997	Sevier	40 (Fair)	2 (Fair)
West Prong Little Pigeon River	French Broad River	1997	Sevier	46 (Fair/Good)	2 (Fair)
Flat Creek	French Broad River	1997	Sevier	30 (Poor)	3.8 (Good)
Clear Creek	French Broad River	1997	Jefferson	34 (Poor)	2.2 (Fair)
Richland Creek	Nolichucky River	1997	Greene	30 (Poor)	2.3 (Fair)
Middle Creek	Nolichucky River	1997	Greene	34 (Poor)	4 (Good)
Sinking Creek	Pigeon River	1997	Cocke	30 (Poor)	3.8 (Good)
Chestuee Creek	Hiwassee River	1998	Monroe	28 (Poor)	2.5 (Fair/Fair to Good)
Fourmile Creek	Powell River	1998	Hancock	36 (Poor/Fair)	4.5 (Good/Excellent)
Martin Creek	Powell River	1998	Hancock	50 (Good)	4 (Good)
Big Creek	Tellico River	1998	Monroe	46 (Fair/Good)	4 (Good)
Oven Creek	Nolichucky River	1998	Cocke	40 (Fair)	2.9 (Fair/Good)
Cherokee Creek	Nolichucky River	1998	Washington	36 (Poor/Fair)	2.8 (Fair/Good)
Bennetts Fork	Cumblerland River	2000	Claiborne	30 (Poor)	3.5 (Fair/Good)
Gulf Fork Big Creek	French Broad River	2001	Cocke	42 (Fair)	4.0 (Good)
Nolichucky River	French Broad River	2001	Unicoi	56 (Good/Excellent)	4.0 (Good)
North Fork Holston River	Holston River	2001	Hawkins	50 (Good)	4.5 (Good)

As is the case in many areas of east Tennessee, streams are suffering primarily from residential/commercial development and poor agricultural practices. The primary product of these activities, sedimentation, is ultimately regulating the full potential of many streams and rivers.

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APPENDIX A

Common and scientific names of fishes used in this report

Family	Common Name	Scientific Name
Catostomidae	Black buffalo	*Ictiobus niger*
	Black redhorse	*Moxostoma duquesnii*
	Blue sucker	*Cycleptus elongatus*
	Golden redhorse	*Moxostoma erythrurum*
	Northern hogsucker	*Hypentelium nigricans*
	River carpsucker	*Carpiodes carpio*
	River redhorse	*Moxostoma carinatum*
	Shorthead redhorse	*Moxostoma macrolepidotum*
	Silver redhorse	*Moxostoma anisurum*
	Smallmouth buffalo	*Ictiobus bubalus*
	White sucker	*Catostomus commersoni*
Centrarchidae	Black crappie	*Pomoxis nigromaculatus*
	Bluegill	*Lepomis macrochirus*
	Green sunfish	*Lepomis cyanellus*
	Largemouth bass	*Micropterus salmoides*
	Longear sunfish	*Lepomis megalotis*
	Redbreast sunfish	*Lepomis auritus*
	Redear sunfish	*Lepomis microlophus*
	Rock bass	*Ambloplites rupestris*
	Smallmouth bass	*Micropterus dolomieu*
	Spotted bass	*Micropterus punctulatus*
	Warmouth	*Lepomis gulossus*
	White crappie	*Pomoxis annularis*
Clupeidae	Gizzard shad	*Dorosoma cepedianum*
Cottidae	Banded sculpin	*Cottus carolinae*
Cyprinidae	Bigeye chub	*Hybopsis amblops*
	Bluntnose minnow	*Pimephales notatus*
	Carp	*Cyprinus carpio*
	Mimic shiner	*Notropis volucellus*
	Mirror shiner	*Notropis spectrunculus*
	River chub	*Nocomis micropogon*
	Rosyface shiner	*Notropis rubellus*
	Sawfin shiner	*Notropis* sp.
	Silver shiner	*Notropis photogenis*
	Spotfin shiner	*Cyprinella spiloptera*
	Stargazing minnow	*Phenacobius uranops*
	Stoneroller	*Campostoma anomalum*
	Streamline chub	*Erimystax dissimilis*
	Striped shiner	*Luxilus chrysocephalus*
	Telescope shiner	*Notropis telescopus*
	Tennessee shiner	*Notropis leuciodus*
	Warpaint shiner	*Luxilus coccogenis*
	Whitetail shiner	*Cyprinella galactura*
Ictaluridae	Channel catfish	*Ictalurus punctatus*

Family	Common Name	Scientific Name
	Flathead catfish	*Pylodictus olivaris*
	Mountain madtom	*Noturus eleutherus*
	Yellow bullhead	*Ameiurus natalis*
Lepisosteidae	Longnose gar	*Lepisosteus osseus*
	Spotted gar	*Lepisosteus oculatus*
Moronidae	White bass	*Morone chrysops*
Percidae	Banded darter	*Etheostoma zonale*
	Bluebreast darter	*Etheostoma camurum*
	Gilt darter	*Percina evides*
	Greenfin darter	*Etheostoma chlorobranchium*
	Greenside darter	*Etheostoma blenniodes*
	Logperch	*Percina caprodes*
	Redline darter	*Etheostoma ruflineatum*
	Sauger	*Stizostedium canadense*
	Sharphead darter	*Etheostoma acuticeps*
	Snubnose darter	*Etheostoma simoterum*
	Tangerine darter	*Percina aurantiaca*
	Walleye	*Stizostedium vitreum*
Petromyzontidae	Chestnut lamprey	*Ichthyomyzon castaneus*
	Lamprey sp.	*Ichthyomyzon* sp.
Salmonidae	Brown trout	*Salmo trutta*
	Rainbow trout	*Oncorhynchus mykiss*
Sciaenidae	Drum	*Aplodinotus grunniens*