for Western Florida and Southern Alabama may be introductions.

The yellow perch was first collected in the upper Hiwassee River during the 1950's; no records of its introduction exist. It is possible that it was stocked inadvertantly along with walleye or sauger in North Carolina (personal communication, William B. Smith, North Carolina Wildlife Resources Commission). The Tennessee Valley Authority (TVA) first collected yellow perch in the following Upper Hiwassee Reservoirs: Chatuge Reservoir in 1953 (TVA, 1953); Hiwassee Reservoir in 1954 (TVA, 1954); and Apalachia Reservoir in 1959 (personal communication, Charles Chance, Tennessee Valley Authority).

Three hundred and fifty nine yellow perch, ranging in length from 7 to 23 centimeters, and comprising 5 percent of the total number of fish, were collected in a study of Chatuge Reservoir (TVA, 1953). Subsequent surveys have shown the species to exist in Chickamauga Reservoir (TVA, 1971) and in Nickajack Reservoir (TVA, 1972), the latter body is directly below Chickamauga Reservoir on the Tennessee River. The next mainstream reservoir on the Tennessee River is Guntersville Reservoir, and no yellow perch have been collected there. The Upper Hiwassee Reservoirs, where the yellow perch was introduced, and the Tennessee River Reservoirs where it is now present are shown in figure 1.

Other Tennessee reservoirs may also offer good habitat for the yellow perch. Trautman (1957) stated that clear waters of low gradients with an abundance of rooted aquatics and bottoms of muck, organic debris, sand, or gravel are preferred habitats. The yellow perch is occasionally taken by anglers in Tennessee, although adults collected at Nickajack Reservoir have not been larger than 20 centimeters. Yellow perch are a problem in some northern lakes. Large numbers of stunted fish with no large fish for the angler are present.

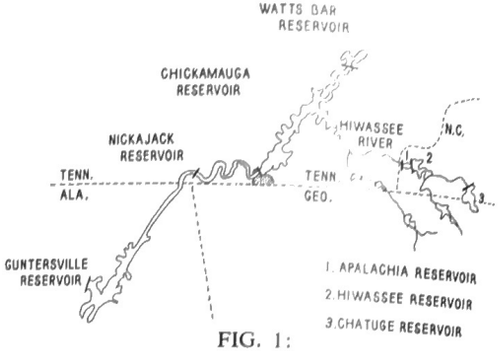

FIG. 1:

Diagrammatic Map of Reservoirs on the Hiwassee and Tennessee Rivers in Southeastern Tennessee and Northern Alabama.

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A STUDY OF TWO POPULATIONS OF INTRODUCED REDEYE BASS, *MICHROPTERUS COOSAE* HUBBS AND BAILEY

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ABSTRACT

A study of introduced redeye bass, *Micropetrus coosae* Hubbs and Bailey, in two Tennessee streams revealed that this species had established reproducing populations in both streams. Average growth was faster than that reported for a native population of redeye in another Tennessee stream, but slower than that reported in other southern states. The length-weight relationships for Spring Creek and Roaring River were Log W = −4.387 + 2.798 Log L and Log W = −4.576 + 2.870 Log L. Condition factors in the two streams averaged 1.42 and 1.28. Redeye bass fed primarily on terrestrial insects and crayfish. There was a distinct separation between redeye bass and native smallmouth bass populations, with redeye occupying the upland portions of both streams.

INTRODUCTION

The redeye bass or coosa bass, *Micropterus coosae* Hubbs and Bailey, is native to small upland streams in the Coosa, Talapoosa, Alabama and Savannah River systems (Fowler, 1945). A distinct race of this species is found in the Chattahoochee, Chipola and Flint River systems. In Tennessee, it occurs naturally in Sheed's Creek and Minewauga Creek which are tributaries to the Alabama River System.

Many small streams on the Eastern Highland Rim and Cumberland Plateau areas of Tennessee have few or no game fish populations although several of these streams have habitats which are similar to those of native redeye bass streams. Therefore, in 1952 and 1953, the Tennessee Game and Fish Commission stocked ten small streams in the Eastern Highland Rim area with redeye bass to determine if this species would produce a fishery outside its native range (Tatum, 1973). The progeny of this stocking is surviving and producing fishable populations in Spring Creek and Roaring River in Overton County and Upper Calf-Killer River in White County. This paper presents an evaluation of two of these populations by describing various life history aspects of the redeye bass in Spring Creek and Roaring River, Tennessee.

STUDY AREAS

Spring Creek

Spring Creek, a typical stream of the Eastern Highland Rim, has a steep gradient, few deep pools, and segments of the stream are intermittent during summer months. Water temperature of Highland Rim streams is generally higher than streams of the Cumberland Plateau. The land surrounding the streams is rolling to hilly with underlying limestone.

Spring Creek begins at an elevation of 1400 ft and joins Roaring River at an elevation of 580 ft. The average stream gradient is 36 ft per mile with an average width of 30 ft. The shoreline from the stream origin to the bottom of the gorge is mostly wooded on both sides of the creek. From this area to where Spring Creek joins Roaring River, the banks are more brush covered. About 85% of the bank and adjacent area is pasture, fields, and cultivated land.

Roaring River

The headwaters of Roaring River begin along the edge of the Cumberland Plateau, flow across the Highland Rim, and end at the Cumberland River in the Central Basin. The river begins at an elevation of 970 ft and enters the Cumberland River at an elevation of 500 ft. Stream gradient ranges from 5 to 30 ft per mile and stream width ranges from 20 to 70 ft.

A large portion of the upland area of the watershed is open land. The open land in the Central Basin is located on the slopes below the Chattanooga shale with the ridge tops in timber. The steep-sided slopes of the Highland Rim are in timber with the rolling upland cleared. The Highland Rim has a large percentage of land being used for crops and pasture; however, about 25 percent of this open land is idle. The tops of the benches of the Cumberland Plateau are used for crops and pasture, while the steep slopes are in woodland. For the most part hardwood trees grow alongside the river.

Roaring River and its tributaries have about 142 miles of stream channel bordered by floodplain; 91 miles of this channel being located in the Highland Rim section, and 51 miles in the Central Basin. The gorge section contains 15 miles of stream channel where the stream flows from the Highland Rim down into the Central Basin. Spring Creek and Blackburn Fork are the two major tributaries of Roaring River. The tributaries of Roaring River are mostly spring-fed and furnish a continuous flow of water to the main stream.

METHODS

The redeye bass, often mistaken for the smallmouth bass, differs from the latter in coloration, number of scale rows above the lateral line, number of dorsal rays and number of anal rays (Table 1). King and Parsons (1951) found that 71% of 69 redeye examined had glossohyal teeth on the tongue. No smallmouth collected in the present study had glossohyal teeth while many of the redeye had glossohyal teeth. The young of this species can be distinguished from other black basses by the absence of a subterminal black band across the caudal lobes.

Fish were collected from March through December, 1972 by angling, electrofishing and netting. After capture, weight and length were recorded, scale samples were taken and stomachs were removed from each specimen. Stomachs were examined and organisms found within were identified. Scale impressions were made on strips of clear cellulose acetate using a Carver Laboratory heated press. Impressions were examined on an Eberbach Laboratory Projector using a 40× scale-image magnification. The nomograph method was used to determine length at each successive annulus (Carlander and Smith, 1944). The intercept value (a), computed from the total length-scale radius relationship was used as a correction factor. The computed a value was 30.8 mm for Spring Creek redeye and 28.1 mm for Roaring River redeye. Length-weight relationships and condition factors (k) were calculated by methods described by Lagler (1956).

TABLE 1: *Fin Ray and Scale Count of* Micropterus coosae *and* Micropterus dolomieui.

	Micropterus coosae mean (range)	*Micropterus dolomieui* mean (range)
Number of scale rows above lateral line	9 (8-10)	12 (11-13)
Number of dorsal rays	12 (11-13)	14 (13-15)
Number of anal rays	10 (9-11)	11 (9-12)

RESULTS AND DISCUSSION

Age and Growth

A total of 91 redeye bass from Spring Creek and 57 redeye bass from Roaring River were collected for use in the age and growth study. The calculated mean lengths and average annual growth increments at each annulus are shown in tables 2 and 3. The majority of fish collected were in age groups II, III and IV with the oldest fish being six years old. Growth rate in Roaring River was faster than in Spring Creek and redeye from both streams showed a faster growth rate than those from Sheed's Creek, Tennessee (Parsons, 1954). Growth rates in both streams were slower, however, than those found in redeye bass populations in Chipola River, Florida (Parsons and Crittenden, 1959) and

Halawakee Creek, Alabama (Hurst, 1969). The faster growth rate of Chipola River redeye was believed to be related to the longer growing season, larger stream habitat, clear water and productive shoal areas (Parsons and Crittenden, 1959). However, the difference in growth rate may also be attributed to inherent differences of the two races of redeye bass. The record redeye bass for Tennessee is 0.5 pounds while the largest redeye on record is 3.6 pounds (Dendy, 1954).

Length-Weight Relationship and Condition

The length-weight relationship for 91 redeye bass from Spring Creek was Log W = −4.387 + 2.798 Log L, where W = weight in grams and L = total length in millimeters. The relationship for 57 redeye from Roaring River was Log W = −4.576 + 2.870 Log L. The slopes of the curves being less than 3.0, indicated that weight increases at a slower rate than the cube of the length.

The coefficient of condition (k) expresses degree of well-being, relative robustness, plumpness, or fatness, where $k=\frac{W \cdot 10^5}{L^3}$ (Lagler, 1956). The mean condition factor for the entire sample of Spring Creek redeye was 1.42 and ranged from 0.93 to 1.88. Roaring River redeye had a mean condition factor of 1.28 with a range from 0.87 to 1.65. Since the weight of both populations of redeye increases at a slower rate than the cube of the length, the fish should decrease in condition with increase in length. Analysis of data, however, revealed no such trend. The relatively low condition factors indicate that redeye bass are more slender than other black basses (Parsons, 1954).

TABLE 2: *Mean Calculated Total Length and Mean Annual Increment of 91 Redeye Bass From Spring Creek, Tennessee, April-October, 1972.*

Year Class	Age Class	Number Of Fish	Mean Calculated Total Length (mm) at Annulus 1	2	3	4	5	6	Mean Total Length at Capture (mm)
1972	0	12							69
1971	I	5	49						82
1970	II	25	58	91					107
1969	III	26	60	95	117				139
1968	IV	15	61	94	123	162			182
1967	V	6	64	97	129	156	179		205
1966	VI	2	63	92	127	163	182	215	247
Mean weighted total Lengths (mm)			59.0 (2.3)[1]	93.2 (3.7)	120.3 (4.7)	160.3 (6.3)	179.0 (7.0)	215.0 (8.5)	
Mean annual Increments (mm)			59.0 (2.3)	34.2 (1.4)	27.1 (1.1)	40.0 (1.6)	19.0 (0.8)	36.0 (1.4)	

[1] Equivalent total length in inches.

TABLE 3: *Mean Calculated Total Length and Mean Annual Increment of 57 Redeye Bass From Roaring River, Tennessee, April-August, 1972.*

Year Class	Age Class	Number Of Fish	Mean Calculated Total Length (mm) at Annulus 1	2	3	4	5	Mean Total Length at Capture (mm)
1972	0	0						
1971	I	2	54					89
1970	II	25	64	97				118
1969	III	15	63	96	127			149
1968	IV	11	65	103	139	166		186
1967	V	4	68	99	128	167	186	211
Mean weighted total Length (mm)			63 (2.5)[1]	99 (3.9)	131 (5.2)	167 (6.6)	186 (7.3)	
Mean annual Increments (mm)			63 (2.5)	34 (1.3)	32 (1.3)	33 (1.3)	19 (0.7)	

[1] Equivalent total length in inches.

Food Habits and Spawning

Redeye bass fed primarily on terrestrial insects and crayfish (Table 4). Fish, primarily darters and minnows, made up the remainder of the diet. The heavy feeding on terrestrial insects could be due to the dense vegetation shading the upland portions of the streams which appeared to be the preferred habitat of the redeye.

Redeye bass were observed spawning on coarse gravel beds at a mean water temperature of 18 C. Spawning activity was noted in May and early June.

Distribution and Stocking Success

There was a distinct separation between redeye bass and native smallmouth bass populations in both streams, with redeye bass occupying upland and smallmouth occupying lower portions. At an area of apparent overlap, for example, sixty redeye bass and only two smallmouth bass were collected. Further downstream, many smallmouth but no redeye were collected. Both species showed little movement as few new fish moved into an area after bass had been removed by sampling. This could be due to the sedentary nature of the genus *Micropterus* as described by Fajen (1962), Funk (1957) and Larimore (1954). *Micropterus* species relocate only when the stream volume is decreased or the food supply reduced (Funk, 1957). Neither of these occurred during this study.

Redeye bass have successfully established breeding populations in the headwaters of the two streams and have provided a game fish for these sections of stream which had been unproductive for the fisherman. The redeye remains quite small in Tennessee streams, producing no recorded catch exceeding eight ounces. As redeye bass may be easily confused with the smallmouth bass by many fisherman, the possibility exists that larger redeye have been taken by sportsmen who erroneously identified them as smallmouth. Although small, the redeye bass does provide good sport and fills a habitat which appears to be unsuitable to the native smallmouth bass.

TABLE 4:

Number of Food Organisms Contained in the Stomachs of 35 Redeye Bass from Roaring River and 43 Redeye Bass from Spring Creek, Tennessee, June-September, 1972.

Organisms	Number (% of total) Roaring River	Spring Creek
Crustacea		
Decapoda	15 (41)	21 (29.6)
Pisces		
Etheostoma sp.	2	4
Notropis sp.	2	3
Pimephales notatus	—	1
Unidentified	—	4
TOTAL	4 (11)	12 (16.9)
Insecta		
Ephemeroptera	6	13
Coleoptera	1	3
Pepidoptera	3	2
Orthoptera	2	6
Hymenoptera	2	5
Unidentified	4	9
TOTAL	18 (48)	38 (53.5)

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