

**TENNESSEE VALLEY STREAMS:  
THEIR FISH, BOTTOM FAUNA, AND AQUATIC HABITAT**

**THE EMORY RIVER**

1968

**Division of Forestry, Fisheries, and Wildlife Development  
Tennessee Valley Authority  
Norris, Tennessee**

**April 1970**

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This is the first in a series of reports on a study designed to evaluate the relative abundance (standing crop) and habitat of aquatic life of streams which are tributary to the Tennessee River. The project has a threefold purpose:

To test and, hopefully, validate methodology for making such evaluations—methodology which will also permit comparisons among streams.

To record present standing crop, provide data from which potential abundance may be predicted, and provide a base from which the impact of future developments (e. g. , changing land use practices, mining, sanitation, pollution, dam building, etc.) may be measured.

To develop a "formula" by which other streams may be evaluated without making detailed field surveys such as reported in this series.

Reported here are findings of a study of the Emory River made in August 1968. Similar reports are planned for the Buffalo and Flint Rivers in the Highland Rim, Sequatchie and Powell Rivers in the Great Valley, and the Upper Little Tennessee River in the Blue Ridge province.

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## THE EMORY RIVER

This survey measured the standing crop of fish and bottom fauna in streams of the Emory River Basin during late summer of 1968.

### Description of the Basin

The Emory River drains parts of Cumberland, Morgan, and Roane Counties in east central Tennessee. Total drainage area is 865 square miles. Mean annual streamflow at Oakdale (ERM 18.4) for the past 40 years was 1,406 cfs. Quarterly averages for 1966-68 were 960 cfs for the first quarter, 2,160 for the second, 1,230 for the third, and 535 for the fourth. During the study period of August 19 to September 5, 1968, flow averaged 12 cfs at Oakdale, well below the August 1966 and 1967 average of 364 cfs.

The basin is characterized by rugged topography with narrow streams rapidly descending from the Cumberland Plateau to the Tennessee Valley. Many have cut deep, V-shaped valleys which drop 400 to 600 feet below the surrounding ridges. Pools make up 47 percent of the stream and riffles 53 percent. The average pool is 230 feet long and 50 feet wide, the average riffle 185 feet long and 45 feet wide. Canopy cover over the streams averages 22 percent.

Forest covers about four-fifths of the million-acre watershed, of which approximately 80,000 acres are in the Catoosa Wildlife Management Area. The forest is about 70 percent hardwood and 30 percent pine. Only 10 percent of the basin is devoted to cropland and much of this is either idle or in pasture.

The plateau area of Cumberland and Morgan Counties ranges in elevation from 1,700 to 3,000 feet above mean sea level. Geology of this basin is characterized by relatively flat, alternating beds of shale, limestone, sandstone, and coal of the Pennsylvanian age. Soil in the watershed is of the Ramsey-Porters stony land association, which is most

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suitable for forest growth, or the Hartsells-Ramsey association, which is only fair for agricultural use. Runoff waters are generally soft, low in dissolved solids, and infertile.

The eastern rim of the basin in Morgan and Roane Counties contains 92 million tons of known recoverable coal reserves. Active mining now occurs largely in the watershed of the upper Emory River proper. Stream disturbance here is primarily from silt. Crab Orchard Creek was receiving acid pollution from stripping operations as recently as 1967. The upper Obed River is polluted periodically from domestic and industrial wastes.

Rainfall over the watershed averages 53 inches annually, 25 of which fall during the growing season (April through September). March is the wettest month, October the driest. Nearly 30 days of drought occur in an average year, usually between August and October. Streamflow varies accordingly from raging torrents following heavy winter and spring rainfall to near cessation of flow during summer and fall drought periods.

### Procedures

Emory River and its five major tributary streams (Obed River; Clear, Daddys, Greasy, and Crab Orchard Creeks) were sampled for fish population, bottom fauna and water quality at 16 locations (Figure 1, Table 1). Each sampling location covered approximately one-half mile of the streambed. Dimension of the riffles and pools in the sampling area were derived from aerial photographs. Where aerial photos were unavailable or where photographic features were too small to allow accurate measurements, four on-site transects approximately 880 feet apart were used. Pool and riffle measurements were expanded to one-mile sections to provide a basis for determining the estimated number and weight of fish per stream mile. Physical and chemical characteristics of the various streams are listed in Table 2.



Two one-square-foot Surber bottom samples and one water quality grab sample (temperature, dissolved oxygen, CO<sub>2</sub>, pH) were taken at each station. Where available, water quality data from other sources (TVA 1963 revised) were used to supplement the 1968 sample information, and these are summarized in Table 3. Bottom samples were screened through a No. 30 mesh sieve; resultant fauna was preserved in formalin and returned to the Norris Fisheries Laboratory for sorting and identification.

Fish populations were estimated by removing fish from representative stream sections which included a typical riffle and a pool. Each section was defined by block nets and treated with cresol (phenol coefficient of 30) or 5-percent emulsifiable rotenone. Rotenone was applied at not less than 0.6 ppm. and neutralized by potassium permanganate. Both rotenone and cresol were applied by hand. All fish were picked up with dip nets. Easily recognizable ones were sorted by species, counted, weighed, and measured in the field. Others were preserved in a 10-percent formalin solution and returned to the laboratory for measurement and classification. At each sample location scales were taken from small, intermediate, and large specimens of game fish for determination of growth rates.

This inventory provides information on stream fish and bottom fauna populations in the Emory basin during low-flow conditions. Pools and riffles sampled were representative of most of those in the streams, but a few pools too large to sample did exist, so the estimate of fish per stream mile is considered conservative.

#### Summary of Findings

Average stream population—2,484 fish weighing 43.1 pounds per acre (Table 4).

Samples ranged from 0 to 18,360 fish and 0 to 557.2 pounds per mile (Tables 5 and 6).

Distribution of fish—The basin contains a diverse fish population—42 species were collected (Table 7). Six species (rock bass, smallmouth bass, northern hog sucker, stoneroller, warpaint shiner, and greenside darter) were common to all six subdrainages (Tables 5 and 8). Longear sunfish and redline darter were found in five. The average number of species per subdrainage was 21. Emory River had the greatest number (30) of species, while Crab Orchard Creek had the least (12). Nine species were taken at only one of the 16 sampling stations (Table 9).

Estimated population within sampled area—Over 2,800,000 fish weighing over 26,000 pounds (Table 10).

Major fish classes by number—Game 14 percent, rough 14 percent, and forage 76 percent (Table 8).

Major fish classes by weight—Game 41 percent, rough 32 percent, and forage 27 percent (Table 8).

Dominant species by number—Stoneroller 14 percent, whitetail shiner 12 percent, creek chub 9 percent, rock bass 8 percent, and golden redhorse 7 percent (Table 8).

Dominant species by weight—Rock bass 27 percent, northern hog sucker 16 percent, flathead catfish 11 percent, stoneroller 6 percent, and smallmouth bass 6 percent (Table 8).

Growth and size range of fish—Growth rates of Emory basin game fish (Table 11) are slower than those in Watts Bar, its receiving reservoir (TVA, 1964). Growth data for the Clinch River basin show rock bass growth to be slower in tributary streams than in the main river (Fitz, 1968).

Food Conditions—Forage fish were numerous, comprising nearly three-fourths of the total basin population. Bottom fauna standing crop was greatest in Daddys and Clear Creek basins and least in areas influenced by mining activities or industrial

pollution—lower Emory River, lower Crab Orchard Creek, and the upper Obed River (Table 12). Mayflies and true midges were the predominant bottom organisms.

Per-acre production—The average standing crop of fish was 43.1 pounds per acre, invertebrates 34.2 pounds. Fish production was highest in Greasy Creek, upper Crab Orchard, and lower Obed River and lowest in those stream sections where bottom fauna production was also poor.

### General Conclusions

The 1968 survey of the Emory River shows the basin contains a diverse fish population of 42 species. In terms of standing crop it is composed generally of the rock bass-smallmouth bass-hog sucker community; in terms of numerical abundance, minnows and other forage fish dominate (72 percent).

Game fish comprised 14 percent of the total population sample by number but 41 percent of the weight, primarily because of the large rock bass population. Compared with its tributary streams the main Emory River has a sparse population of game fish.

Fish abundance (standing crop) varied considerably between sample stations in the same subdrainage as well as between subdrainage areas. No chemically toxic conditions were found, but species distribution suggests that degraded stream conditions from mining or industrial activity is limiting both the variety and total number of fish in some sections of the Obed and Emory Rivers. Further, no fish were found in lower Crab Orchard Creek which runs through an abandoned strip mine below the sample station. Water temperature here was 10 to 20° F. higher than at other stations and the stream bottom was predominantly bedrock and boulders. High sulphate measurements in both the lower Emory River and Crab Orchard Creek are indicative of mine drainage.

Samples of bottom food organisms were insufficient to determine distribution patterns; however, those tributaries which drain watersheds least disturbed by man (Clear and Daddys Creeks) had the greatest variety and density of organisms.

#### Literature Cited

- Fitz, Richard B. 1968. Fish habitat and population changes resulting from impoundment of Clinch River by Melton Hill Dam. J. Tennessee Acad. Sci. 43(1):7-15.
- Tennessee Valley Authority. 1963. Mineral quality of surface waters in the Tennessee River Basin. Div. Water Control Planning, Hydraulic Data Branch Report No. 0-6392, 161 pp.
- Tennessee Valley Authority. 1965. Fish inventory data, Watts Bar Reservoir. Fish and Wildlife Branch. 15 pp.

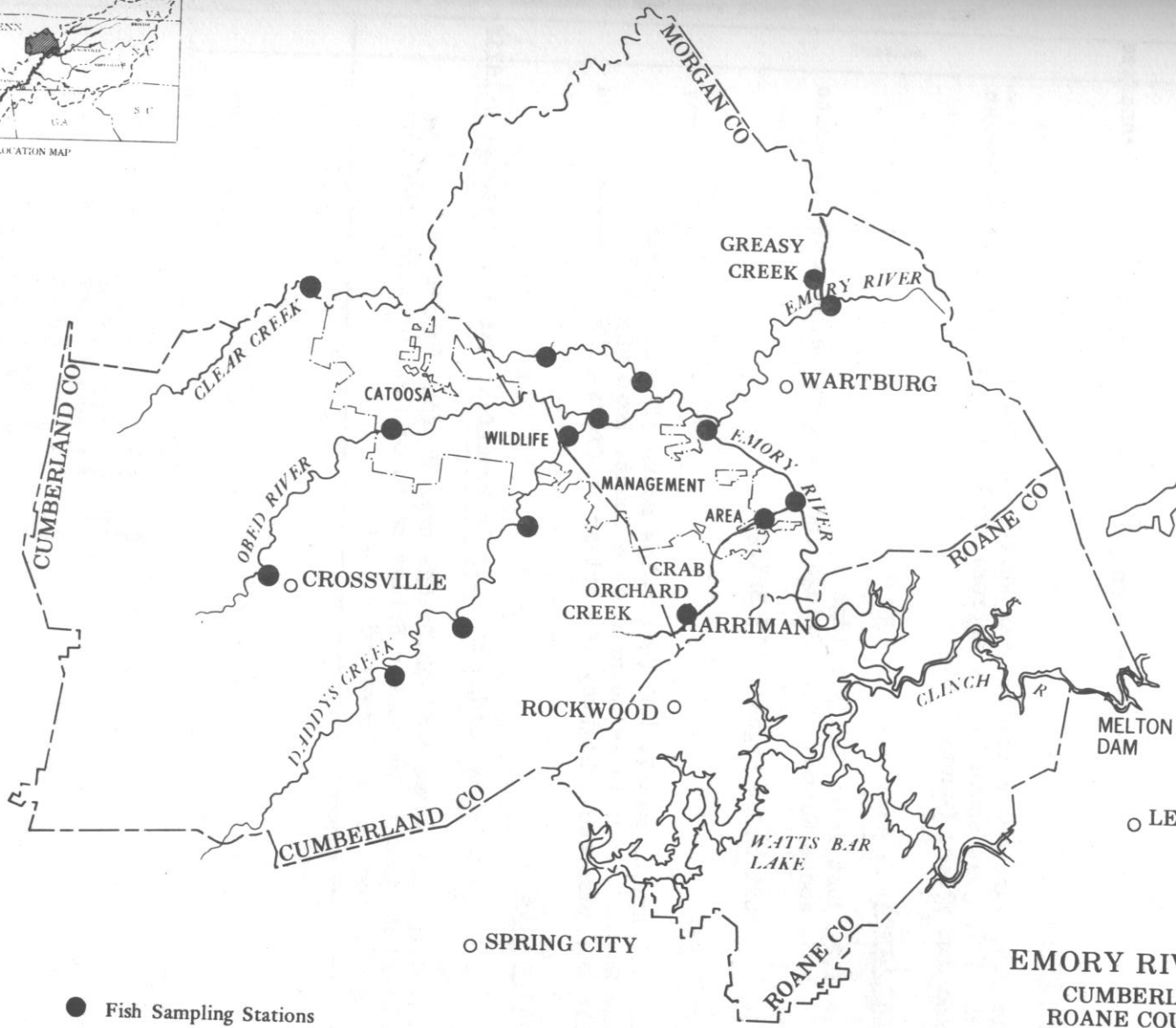
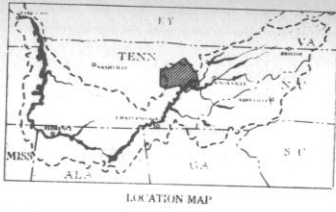


Figure 1. Sampling stations in the Emory River drainage, August 1968.

Table 1. Fish sampling stations, Emory River Basin, August 1968

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Emory River

Mile 21, just below Camp Austin Bridge  
Mile 28, just above Nemo Bridge between Wartburg and Catoosa, Tennessee  
Mile 40.8, just below bridge, 1.5 miles east of Gobey, Tennessee

Greasy Creek

Mile 0.3, just below bridge on County Road 2394 north of Gobey, Tennessee

Crab Orchard Creek

Mile 2.5, just above bridge near White Oak Church  
Mile 10.8, just above bridge approximately 0.25 mile below the Morgan  
and Cumberland County line

Clear Creek

Mile 1.2, just below Lilly Bridge  
Mile 8.8, above Wattman Ford Bridge and 300 feet below mouth of White  
Creek  
Mile 29, just below Highway 127 Bridge

Obed River

Mile 10, approximately 400 feet below mouth of Daddys Creek  
Mile 24.5, half mile below bridge on County Road 4252  
Mile 40, just above Highway 70S Bridge in Crossville, Tennessee

Daddys Creek

Mile 2.3, just below bridge at Devil's Breakfast Table in Catoosa Wildlife  
Area  
Mile 9.1, just above Antioch Bridge near Watson, Tennessee  
Mile 17.2, just below Center Bridge north of Crab Orchard, Tennessee  
Mile 26, just below Highway 68 Bridge

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Table 2. Physical and chemical characteristics of sample stations in the Emory River Basin, August 1968

Stream characteristic	Station										
	Emory River Mile 21	Emory River Mile 28	Emory River Mile 40.8	Creasy Creek Mile 0.3	Crab Orchard Creek Mile 2.5	Crab Orchard Creek Mile 10.8	Clear Creek Mile 1.2	Clear Creek Mile 8.8	Clear Creek Mile 29	Obed River Mile 10	Obed River Mile 24.5
Water flow <sup>1/</sup>	C	C	C	P	C	P	C	C	C	C	C
Avg. velocity <sup>2/</sup>	S	S	S	S	R	S	S	S	S	S	S
Percent stream in pools	70	55	26	32	40	39	62	72	41	44	40
Percent stream in riffle	30	45	74	68	60	61	38	28	59	56	60
Avg. riffle length (ft.)	270	172	163	115	123	115	185	226	151	246	123
Avg. riffle width (ft.)	104	49	14	20	32	11	69	55	30	85	30
Avg. pool length (ft.)	627	194	62	58	87	74	279	313	157	280	217
Avg. pool width (ft.)	133	49	34	23	43	37	102	75	33	73	23
Avg. riffle depth (ft.)	0.9	0.3	0.6	0.2	0.3	0.2	0.2	0.3	0.1	0.6	0.5
Avg. pool depth (ft.)	2.3	1.5	1.2	0.7	1.0	0.8	1.8	2.5	0.8	2.0	1.6
Percent canopy cover (shade)	0	2	69	75	5	25	1	8	14	5	41
Length (ft.) of sampling area	100	220	112	105	110	130	250	200	125	220	156
Estimated percent composition of riffle bottom											
Mud	-	-	12.5	-	-	-	-	5	-	-	2.5
Silt	5	-	5	-	-	-	-	-	-	-	-
Sand	2.5	-	12.5	2.5	-	6.6	2	20	10	-	7.5
Clay	-	-	-	-	-	-	-	-	-	-	-
Gravel	2.5	5	25	2.5	-	8.3	-	25	30	5	7.5
Rubble	10	10	25	22.5	10	8.3	15	20	20	30	22.5
Boulders	35	85	5	70	45	46.6	15	30	40	65	6.0
Bedrock	45	-	15	2.5	45	30	68	-	-	-	-
Estimated percent composition of pool bottom											
Mud	-	-	35	55	-	-	-	1.6	6.6	-	5
Silt	12.5	-	25	10	-	-	-	-	11.6	-	7.5
Sand	12.5	5	10	10	3.3	15	7.5	3.3	11.6	12.5	7.5
Clay	-	-	-	5	-	-	-	-	-	-	-
Gravel	-	8.9	5	7.5	-	10	5	5	15	10	10
Rubble	20	8.9	15	2.5	8.3	5	5	15	18.3	27.5	15
Boulders	55	45	-	-	13.3	10	5	43.3	36.6	55	52.5
Bedrock	-	36	10	10	75	60	77.5	31.6	-	-	-
Temperature (°F)	72	80	79	74	87	77	72	78	64	75	66
Dissolved oxygen (mg/l)	8.7	7.9	7.4	7.2	7.8	8.1	8.1	7.8	7.6	7.9	7.2
Alkalinity (mg/l) <sup>3/</sup>	27	23	18	21	8	9	14	16	12	12	17
pH	6.9	7.2	6.4	7.8	6.9	7.4	7.6	7.3	6.5	7.2	7.1
Free CO <sub>2</sub> (mg/l)	4.2	1.3	2.7	3.4	2.3	1.2	1.4	3.6	6.7	2.4	2.9

<sup>1/</sup> C = continuous, P = in pools only.

<sup>2/</sup> S = sluggish (< 1/2'/sec.), R = rapid (> 1/2'/sec.).

<sup>3/</sup> Total alkalinity as CaCO<sub>3</sub>.

Year of Collection	Number of samples	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved Solids (residue of 180°C)	Hardness as CaCO <sub>3</sub> (Calcium Magnesium Carb)
<u>EMORY RIVER NEAR SUGAR GROVE, TENNESSEE, MILE 3.9</u>														
700 feet below Kings Creek, drainage area 855 square miles. Analyses by State of Tennessee.														
1960	5	4.9	0.50	6.9	2.6	1.3	0.4	25	9.0	5.0	0.0	0.70	32	28
<u>EMORY RIVER AT HARRIMAN, TENNESSEE, MILE 10.7</u>														
At No. 1 sewage pump station. Analyses by State of Tennessee.														
1960	5	5.6	0.30	2.5	1.0	1.0	0.5	9	8.0	3.0	0.0	0.40	41	10
<u>EMORY RIVER AT OAKDALE, TENNESSEE, MILE 18.4</u>														
At county road bridge, drainage area 764 square miles. Analyses by State of Tennessee, TVA, USGS.														
1960	5	5.2	0.40	1.9	1.6	1.0	0.5	13	7.0	2.0	0.0	0.50	60 <sup>a</sup>	12
1965	2	3.1	0.02	6.0	1.3	1.3	0.7	19	14.0	1.8	0.0	0.00	38	24
1966	4	2.4	0.00	7.0	1.2	1.7	2.2	14	13.2	2.9	-	0.20	48	22
1967	8	3.6	0.02	5.2	1.0	1.3	1.0	10	10.2	1.9	0.0	0.30	28	17
<u>EMORY RIVER NEAR WARTBURG, TENNESSEE, MILE 35.3</u>														
Midstream 300 feet below bridge on Highway 62. Analyses by TVA and USGS.														
1964*	1	4.5	0.00	10.0	2.4	1.7	2.7	19	24.8	1.5	-	0.00	55	36
1965	1	-	0.10	-	-	-	-	15	8.6	0.8	-	0.10	-	17
1966	6	4.7	0.00	8.8	2.0	1.5	2.4	19	17.7	1.5	-	0.20	55	30
1967	9	4.3	0.00	5.7	1.4	1.5	1.2	13	11.4	1.7	-	0.30	37	20
1968	4	3.7	0.06	7.1	0.5	1.3	1.2	14	9.4	1.6	-	0.10	33	19
<u>EMORY RIVER NEAR MACEDONIA CHURCH, TENNESSEE, MILE 45.5. Analyses by TVA.</u>														
1966	1	5.0	0.00	17.0	6.3	2.5	2.7	20	57.0	1.5	-	0.30	111	69
1967	3	5.4	0.08	9.8	2.7	2.0	1.5	18	25.5	1.2	-	0.10	52	36
1968	5	4.3	0.12	18.6	5.7	1.6	1.8	10	62.2	1.3	-	0.20	109	59
<u>CRAB ORCHARD CREEK NEAR DEERMONT, TENNESSEE, MILE 0.5. Analyses by TVA.</u>														
1966	6	4.1	0.00	9.1	5.2	0.8	2.2	2	43.8	2.2	-	0.02	76	44
1967	10	3.8	0.00	4.5	2.8	0.8	1.0	2	22.0	1.3	-	0.09	40	23
1968	4	4.0	0.04	7.2	4.2	0.8	1.1	1	34.8	1.5	-	0.08	61	34
<u>GREASY CREEK ABOVE MIKE HOLLOW NEAR GOBEY, TENNESSEE, APPROXIMATELY MILE 3. Analyses by TVA.</u>														
1966	1	5.7	0.00	3.3	0.4	1.5	1.5	10	4.8	1.5	-	0.0	24	10
1967	3	6.0	0.03	3.0	0.6	1.4	1.1	12	3.0	1.2	-	0.1	19	10
1968	4	5.2	0.06	3.2	0.9	1.2	0.9	8	5.5	1.0	0.00	0.0	10	9
<u>OBED RIVER AT ALLEY FORD BRIDGE NEAR LANCING, TENNESSEE, MILE 1.4. Analyses by TVA and USGS.</u>														
1964	1	2.6	0.00	5.7	1.2	1.1	0.8	18	7.2	1.1	0.00	0.0	21	19
1965	5	2.2	0.00	4.4	0.8	1.4	1.6	17	3.7	2.2	0.05	0.2	27	15
1966	9	2.5	0.00	4.1	0.6	0.9	1.6	11	3.5	2.2	-	0.2	23	12
1967	8	2.5	0.02	3.6	0.4	1.0	0.9	9	3.1	2.1	0.00	0.3	19	10
1968	3	2.7	0.03	3.2	0.3	0.9	1.1	7	4.5	1.7	0.00	0.4	23	9
<u>OBED RIVER 0.1 MILE BELOW DADDYS CREEK</u>														
From left bank at old bridge pier. Analyses by TVA and USGS.														
1965	1	-	0.10	-	-	-	-	18	2.6	1.3	-	0.2	-	15
1966	1	2.9	0.00	3.9	0.4	1.1	1.3	9	3.6	2.5	-	0.4	29	11
1967	3	1.1	0.04	5.5	0.6	1.3	1.1	17	2.3	2.7	-	0.1	28	16
1968	5	1.6	0.06	6.1	0.3	2.2	1.6	15	3.2	5.0	-	0.5	37	16
<u>DADDYS CREEK NEAR HERBERTSBURG, TENNESSEE</u>														
From gaging station on left bank, upstream of bridge. Analyses by TVA and USGS.														
1963	11	1.8	0.00	6.6	1.3	1.2	1.6	23	3.4	1.7	-	0.1	32	21
1965	2	3.2	0.06	5.3	-	-	-	24	4.7	1.5	-	0.2	-	20
1966*	1	3.1	0.00	3.9	0.6	0.8	1.0	8	5.0	2.0	-	1.1	27	12

\* Source of data not located.  
a. Evaporation temperature of 103° C.

\* I N I D D D O O O C C C C C C E E E



Table 4. Per-acre production\* of fish and invertebrates, Emory River Basin, 1968

Station	Fish		Invertebrates	
	Number	Weight (pounds)	Number (x 1,000)	Weight (pounds)
Emory River Mile 21	1,578	31.3	304	0.9
Emory River Mile 28	1,412	6.6	174	4.5
Emory River Mile 40.8	1,604	13.4	566	1.4
Greasy Creek Mile 0.3	4,170	111.8	523	2.2
Crab Orchard Creek Mile 2.5	0	0	348	0.8
Crab Orchard Creek Mile 10.8	3,287	122.8	1,873	33.5
Clear Creek Mile 1.2	586	14.1	2,526	23.6
Clear Creek Mile 8.8	1,340	21.4	479	44.6
Clear Creek Mile 29	6,693	45.0	871	3.3
Obed River Mile 10	3,234	157.5	1,307	3.8
Obed River Mile 24.5	5,696	25.8	1,437	36.5
Obed River Mile 40	887	3.3	87	0.5
Daddys Creek Mile 2.3	962	9.3	3,223	14.5
Daddys Creek Mile 9.1	820	36.1	1,677	12.5
Daddys Creek Mile 17.2	4,240	70.9	2,178	8.4
Daddys Creek Mile 26	3,235	20.4	1,873	355.6
Average all samples (per acre)	2,484	43.1	1,215	34.2
Number and kilograms/hectare	6,135	48.3	3,001	38.4

\*Based on actual size of sampled area.

Table 5. Distribution by number of fish per stream mile at various stations in the Emory River Drainage Basin, August 1968

Species	Station												
	Emory River Mile 21	Emory River Mile 28	Emory River Mile 40.8	Greasy Creek Mile 0.3	Crab Orchard Creek Mile 2.5	Crab Orchard Creek Mile 10.8	Clear Creek Mile 1.2	Clear Creek Mile 8.8	Clear Creek Mile 29	Obed River Mile 10	Obed River Mile 24.5	Obed River Mile 40	Daddys Creek Mile 2.3
<b>Game Fish</b>													
Muskellunge								10					
Warmouth													
Rock bass	30	27	23	1,159		1,680	332	402	918	900	30		
Redbreast sunfish							69			830	1,320		89
Green sunfish													
Bluegill sunfish									34		15		
Longear sunfish	24					140		39		20	270		
Smallmouth bass	36	302	69	31		504		118	493	180	330		
Spotted bass			23	122		364	104	274		750	150		107
Largemouth bass								10	17				
<b>Rough Fish</b>													
White sucker													
Northern hog sucker	48	115	138	213		476						19	
Black redhorse				549		364	58	304	833	60	720		27
Golden redhorse													
Black bullhead		27	667								6,540		
Yellow bullhead								147	17		285		
Channel catfish	114	42	92										
Flathead catfish	138	14					69			1,310			18
<b>Forage Fish</b>													
Stoneroller		1,469	184	1,372									
River chub	18	388				448		235	1,632	1,080	5,985		303
Popeye shiner			874	671			115	804		1,030	150		142
Warpaint shiner		964		396				1,254		250	255		
Common shiner				4,697		224		274		140			1,086
Whitetail shiner	138	1,051											
Tennessee shiner		3,108											
Silver shiner	162	1,548								3,990	1,185		
Mimic shiner		3,024											
Steelcolor shiner													
Suckermouth minnow	24	677				5,824			34		645		383
Creek chub								176					
Greenside darter	12	432	437	1,677		28		20	7,123			342	
Blueside darter	12			122		56	288	108		160	90		80
Stripetail darter	60												
Spotted darter			230	366		56	12						
Redline darter	102	1,051	69	213						120			27
Tennessee sunnose darter	114						58	755		560	285		276
Banded darter		43											
Yellow darter	222	749											
Logperch	78	27	230	152			575	196		200	15		98
Gilt darter	66	27											
Olive darter	138	173											
Brook silversides	264						12	59		250	90		
<b>Total</b>	1,800	15,294	3,036	11,740		10,164	1,751	6,635	11,101	11,830	18,360	361	2,636

Table 6. Distribution by weight (pounds per stream mile) of fish at various stations in the Emory River Drainage Basin, August 1968

Table 6. Distribution by weight (pounds per stream mile) of fish at various stations in the Emory River Drainage Basin, August 1968

Species	Station												
	Emory River Mile 21	Emory River Mile 28	Emory River Mile 40.8	Greasy Creek Mile 0.3	Crab Orchard Creek Mile 2.5	Crab Orchard Creek Mile 10.8	Clear Creek Mile 1.2	Clear Creek Mile 8.8	Clear Creek Mile 29	Obed River Mile 10	Obed River Mile 24.5	Obed River Mile 40	Daddys Creek Mile 2.3
<b>Game Fish</b>													
Muskellunge	-	-	-	-	-	-	-	0.1	-	-	-	-	-
Warmouth	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock bass	4.8	2.7	3.8	207.4	-	176.4	5.2	15.7	12.4	35.7	2.3	-	-
Redbreast sunfish	-	-	-	-	-	-	1.1	-	-	74.0	6.9	-	5.1
Green sunfish	-	-	-	-	-	-	-	-	1.7	-	0.4	-	-
Bluegill sunfish	-	-	-	-	-	3.5	-	2.1	-	Tr.	0.2	-	-
Longear sunfish	1.8	-	-	-	-	14.6	-	5.9	1.5	0.4	2.3	-	-
Smallmouth bass	1.2	7.0	0.1	2.9	-	19.4	1.2	7.8	-	70.0	5.1	-	2.7
Spotted bass	-	-	6.5	0.5	-	-	-	-	-	-	-	-	-
Largemouth bass	-	-	-	-	-	-	-	0.5	0.1	-	-	-	-
<b>Rough Fish</b>													
White sucker	-	-	-	-	-	75.0	-	-	-	-	-	0.5	-
Northern hog sucker	19.8	5.4	6.9	21.6	-	51.2	15.3	41.4	7.9	69.0	3.8	-	0.2
Black redbhorse	-	-	-	4.7	-	-	-	-	-	-	-	-	-
Golden redbhorse	-	0.1	2.3	-	-	-	-	-	-	-	17.4	-	-
Yellow bullhead	-	-	0.5	-	-	-	-	-	-	-	-	-	-
Black bullhead	-	-	-	-	-	-	-	0.9	0.1	-	1.0	-	-
Channel catfish	0.4	0.3	-	-	-	-	-	-	-	-	-	-	-
Flathead catfish	3.6	0.2	-	-	-	-	12.6	-	-	196.9	-	-	2.5
<b>Forage Fish</b>													
Stoneroller	-	7.8	0.2	8.7	-	2.5	-	1.0	10.3	48.0	26.0	-	6.5
River chub	0.1	5.0	-	-	-	-	0.7	8.0	-	41.9	0.7	-	3.1
Popeye shiner	-	-	0.9	1.7	-	-	-	3.4	-	0.4	1.3	-	-
Warpaint shiner	-	2.2	-	1.2	-	3.1	-	1.3	-	0.2	-	-	2.2
Common shiner	-	-	-	40.7	-	-	-	-	-	-	-	-	-
Whitetail shiner	1.8	7.7	-	-	-	-	8.7	9.0	-	4.5	14.3	-	-
Tennessee shiner	-	4.2	-	-	-	-	-	-	-	-	-	-	-
Silver shiner	0.5	12.5	-	-	-	-	-	-	-	-	-	-	-
Mimic shiner	-	6.4	-	-	-	-	-	-	-	-	-	-	-
Steelcolor shiner	-	-	-	-	-	29.0	-	-	Tr.	-	1.4	-	0.2
Suckermouth minnow	0.1	2.2	-	-	-	-	-	0.7	-	-	-	-	-
Creek chub	-	-	0.5	19.0	-	3.1	-	0.1	40.6	-	-	0.8	-
Greenside darter	0.6	2.3	-	1.6	-	0.1	0.8	1.1	-	0.9	0.9	-	0.5
Blueside darter	0.1	-	-	-	-	-	-	-	-	-	-	-	-
Stripetail darter	0.1	-	0.2	1.3	-	0.1	0.1	-	-	-	-	-	-
Spotted darter	-	-	-	-	-	-	-	-	-	1.5	-	-	0.1
Redline darter	0.2	2.3	0.2	1.3	-	-	0.2	2.4	-	2.5	0.2	-	0.9
Tennessee snubnose darter	0.2	-	-	-	-	-	-	-	-	-	-	-	-
Banded darter	-	0.1	-	-	-	-	-	-	-	-	-	-	-
Yellow darter	1.2	14.1	-	-	-	-	9.6	3.5	-	7.5	Tr.	-	1.4
Logperch	1.2	0.8	0.9	1.5	-	-	-	-	-	-	-	-	-
Gilt darter	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-
Olive darter	0.2	0.3	-	-	-	-	0.3	1.0	-	3.8	0.2	-	-
Brook silversides	0.1	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>38.1</b>	<b>83.7</b>	<b>23.0</b>	<b>314.1</b>		<b>378.0</b>	<b>55.8</b>	<b>105.9</b>	<b>74.6</b>	<b>557.2</b>	<b>84.4</b>	<b>1.3</b>	<b>25.4</b>

Table 7. Common and scientific names\* of fishes in rotenone samples from Emory River Drainage Basin, 1968

Game Fish

Muskellunge	<u>Esox masquinongy</u>
Warmouth	<u>Chaenobryttus gulosus</u>
Rock bass	<u>Ambloplites rupestris</u>
Redbreast sunfish	<u>Lepomis auritus</u>
Green sunfish	<u>Lepomis cyanellus</u>
Bluegill sunfish	<u>Lepomis macrochirus</u>
Longear sunfish	<u>Lepomis megalotis</u>
Smallmouth bass	<u>Micropterus dolomieu</u>
Spotted bass	<u>Micropterus punctulatus</u>
Largemouth bass	<u>Micropterus salmoides</u>

Rough Fish

White sucker	<u>Catostomus commersoni</u>
Northern hog sucker	<u>Hypentelium nigricans</u>
Black redhorse	<u>Moxostoma duquesnei</u>
Golden redhorse	<u>Moxostoma erythrurum</u>
Black bullhead	<u>Ictalurus melas</u>
Yellow bullhead	<u>Ictalurus natalis</u>
Channel catfish	<u>Ictalurus punctatus</u>
Flathead catfish	<u>Pylodictis olivaris</u>

Forage Fish

Stoneroller	<u>Campostoma anomalum</u>
River chub	<u>Hybopsis micropogon</u>
Popeye shiner	<u>Notropis ariommus</u>
Warpaint shiner	<u>Notropis coccogenis</u>
Common shiner	<u>Notropis cornutus</u>
Whitetail shiner	<u>Notropis galacturus</u>
Tennessee shiner	<u>Notropis leuciodus</u>
Silver shiner	<u>Notropis photogenis</u>
Mimic shiner	<u>Notropis volucellus</u>
Steelcolor shiner	<u>Notropis whipplei</u>
Suckermouth minnow	<u>Phenacobius mirabilis</u>
Creek chub	<u>Semotilus atromaculatus</u>
Greensider darter	<u>Etheostoma blennioides</u>
Blueside darter	<u>Etheostoma jessiae</u>
Striptail darter	<u>Etheostoma kennicotti</u>
Spotted darter	<u>Etheostoma maculatum</u>
Redline darter	<u>Etheostoma rufilineatum</u>
Tennessee snubnose darter	<u>Etheostoma simoterum</u>
Banded darter	<u>Etheostoma zonale</u>
Yellow darter	<u>Percina aurantiaca</u>
Logperch	<u>Percina caprodes</u>
Gilt darter	<u>Percina evides</u>
Olive darter	<u>Percina squamata</u>
Brook silversides	<u>Labidesthes sicculus</u>

\*According to American Fisheries Society Special Publication No. 2, 1960.

Table 8. Species composition and frequency of occurrence in 16 samples, Emory River Basin, August 1968

Species	Percent		Frequency occurrence
	Total number	Total weight	
Stoneroller	13.9	6.3	75.00
Whitetail shiner	11.8	3.3	56.25
Creek chub	8.5	3.1	37.50
Rock bass	7.6	26.7	87.50
Golden redhorse	7.2	1.1	25.00
Steelcolor shiner	6.1	1.5	31.25
Warpaint shiner	5.3	0.8	56.25
Common shiner	4.1	2.0	6.25
Northern hog sucker	3.5	15.7	87.50
Redline darter	3.1	0.5	68.75
Popeye shiner	2.9	0.4	31.25
River chub	3.3	3.4	62.50
Tennessee shiner	2.7	0.2	6.25
Mimic shiner	2.7	0.3	6.25
Smallmouth bass	2.2	6.2	81.25
Yellow darter	2.1	2.1	56.25
Silver shiner	1.5	0.6	12.50
Longear sunfish	1.5	1.4	43.75
Flathead catfish	1.4	11.3	37.50
Redbreast sunfish	1.4	4.7	25.00
Greensider darter	1.4	0.5	75.00
Suckermouth minnow	0.8	0.2	18.75
Olive darter	0.7	0.3	43.75
Stripetail darter	0.6	0.1	31.25
Black redhorse	0.5	0.2	6.25
Bluegill sunfish	0.5	1.3	37.50
Tennessee snubnose darter	0.5	T	12.50
Black bullhead	0.4	0.1	18.75
Logperch	0.4	0.2	25.00
White sucker	0.4	3.7	12.50
Brook silversides	0.2	T	6.25
Green sunfish	0.2	0.8	31.25
Channel catfish	0.1	T	12.50
Gilt darter	0.1	T	12.50
Spotted darter	0.1	0.1	12.50
Largemouth bass	0.1	0.3	25.00
Spotted bass	0.1	0.3	12.50
Yellow bullhead	0.1	T	6.25
Warmouth	T	0.3	12.50
Muskellunge	T	T	6.25
Banded darter	T	T	6.25
Blueside darter	T	T	6.25

T = less than 0.05.



Table 9. Fish populations by major fish groups in subdrainages, Emory River Basin, August 1968

Subdrainage area	Fish group	Number of species	Average number per stream mile	Average weight (lbs.) per stream mile
Emory River 3 samples	Game	4	178	9.3
	Rough	5	465	13.2
	Forage	21	<u>6,067</u>	<u>25.8</u>
			6,710	48.3
Greasy Creek 1 sample	Game	3	1,312	210.8
	Rough	2	762	26.3
	Forage	9	<u>9,666</u>	<u>77.0</u>
			11,740	314.1
Crab Orchard Creek 2 samples	Game	4	1,344	107.0
	Rough	2	420	63.1
	Forage	6	<u>3,318</u>	<u>18.9</u>
			5,082	189.0
Clear Creek 3 samples	Game	8	937	18.4
	Rough	3	476	26.0
	Forage	13	<u>5,083</u>	<u>34.3</u>
			6,496	78.7
Obed River 3 samples	Game	7	1,598	65.8
	Rough	5	2,978	96.2
	Forage	12	<u>5,608</u>	<u>52.3</u>
			10,184	214.3
Daddys Creek 4 samples	Game	8	869	39.4
	Rough	3	530	25.6
	Forage	11	<u>4,099</u>	<u>20.8</u>
			5,498	85.8
All areas 16 samples	Game	10	976	53.9
	Rough	8	968	41.3
	Forage	<u>24</u>	<u>5,185</u>	<u>33.5</u>
		42	7,129	128.7

Table 10. Estimated total population within sampled area

Drainage	Acres*	Fish		Invertebra
		Number	Weight (pounds)	Number (x 1000)
Emory River	215.8	330,390	3,690.2	750,984
Greasy Creek	0.8	3,336	89.4	453
Crab Orchard Creek	29.4	48,334	1,805.2	31,634
Clear Creek	223.2	641,254	6,001.8	288,374
Obed River	170.5	557,876	10,605.1	160,952
Daddys Creek	134.1	1,241,364	4,586.2	300,116
<b>Total</b>	<b>773.8</b>	<b>2,822,554</b>	<b>26,777.9</b>	<b>1,532,513</b>

\*Based on average width of stream within the sampling area.

Table 11. Average growth rates of various game fishes, Emory River Basin 1968

Species	Year class represented	Number of fish	Calculated average total length in inches at end year				
			1	2	3	4	5
Largemouth bass	1964-65	4	2.1	4.9	6.4	8.0	-
Smallmouth bass	1963-64-65-66-67	25	2.7	4.4	6.4	8.3	-
Rock bass	1963-64-65-66-67	59	1.5	2.9	4.2	5.4	6.5 6
Bluegill sunfish	1964-65-66-67	18	1.2	2.6	4.1	5.3	-
Redbreast sunfish	1963-64-65-66	18	1.8	3.6	4.9	5.4	7.2
Longear sunfish	1963-64-65-67	17	1.4	2.6	3.5	3.9	4.0
Green sunfish	1964-65-66-67	16	1.5	2.7	3.5	4.7	-

Table 12. Numbers of bottom organisms per square meter and their combined total weight at various stations in the Emory River basin, August

Species	Station											
	Emory River Mile 21	Emory River Mile 28	Emory River Mile 40.8	Greasy Creek Mile 0.3	Crab Orchard Creek Mile 2.5	Crab Orchard Creek Mile 10.8	Clear Creek Mile 1.2	Clear Creek Mile 8.8	Clear Creek Mile 29	Obed River Mile 10	Obed River Mile 24.5	Obed River Mile 40
Mollusca												
Pelecypoda (mussels)	-	-	-	11	-	-	-	-	-	-	-	-
Gastropoda (snails)	-	-	-	-	-	-	-	11	-	-	-	-
Crustacean												
Amphipoda	-	-	-	-	-	11	-	-	-	-	-	-
Decapoda (crayfish)	-	-	-	-	-	-	-	-	-	-	-	-
Odonata												
Coenagrionidae (damselfly)	-	-	-	-	-	-	21	-	-	11	-	-
Aeschnidae (dragon fly)	-	-	-	-	-	-	11	-	-	-	-	-
Plecoptera												
Nemouridae (stonefly)	-	-	-	-	75	-	-	-	-	-	-	-
Ephemeroptera (mayflies)												
Ephemeridae	-	-	-	32	-	32	11	-	-	-	-	-
Heptageniidae	11	-	65	-	-	129	108	11	97	27	75	-
Baetidae	32	-	22	-	-	32	75	43	54	-	-	-
Coleoptera (beetles)												
Psephenidae	-	11	-	-	-	-	11	-	-	-	-	-
Neuroptera												
Sialidae (dobsonfly or helgramites)	-	11	-	-	-	-	-	21	32	-	-	-
Trichoptera												
Hydropsychidae (caddisfly)	21	-	-	11	11	22	-	21	11	-	11	-
Diptera												
Chironomidae (true midges)	11	21	32	75	-	237	387	-	21	258	258	22
Tabanidae (horsefly)	-	-	-	-	-	-	-	-	-	-	-	-
Tipulidae (crane fly)	-	-	21	-	-	-	-	11	-	-	-	-
Simuliidae (blackfly)	-	-	-	-	-	-	-	11	-	-	-	-
Oligochaeta												
Tubificidae (Tubifex worm)	-	-	-	-	-	-	-	-	-	22	11	-
Turbellaria												
Planariidae (planarians)	-	-	-	-	-	-	-	-	-	5	-	-
Total organisms/square meter	75	43	140	129	86	463	624	129	215	323	335	22
Total weight* (gm)/square meter	0.10	0.50	0.16	0.25	0.10	3.76	2.65	4.99	0.37	0.43	4.09	0.05

\*Mollusca weights not included.