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FISH HABITAT AND POPULATION CHANGES RESULTING FROM IMPOUNDMENT OF CLINCH RIVER BY MELTON HILL DAM

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INTRODUCTION

This report compares pre- and post-impoundment fish populations and seasonal temperature and dissolved oxygen conditions in the area of Clinch River included in Melton Hill Reservoir. Construction of this TVA dam at Clinch River Mile (CRM) 23.1 was started in September 1960 and the gates were closed May 1, 1963. The impoundment is 44 miles long and has a surface area of 5,720 acres. Annual fluctuation is 5 feet. The backwater extends to within 13 miles of Norris Dam at CRM 80. Watts Bar Reservoir begins almost immediately below Melton Hill Dam.

METHODS AND MATERIALS

TVA biologists investigated preimpoundment conditions at four stations (1, 4, 14, and 16) on the Clinch River (Fig. 1). Gill nets were set 18 times in various seasons between November 1960 and June 1962. Four to six nets of one- to three-inch bar mesh were set at each station and lifted approximately 24 hours later. Total set time was 117 net-days. Fish lengths and weights were recorded by species and scale samples were taken from all fish for growth analyses. Hoop nets were tried, but catches were insignificant and are not included in the analysis. Only one of three rotenone

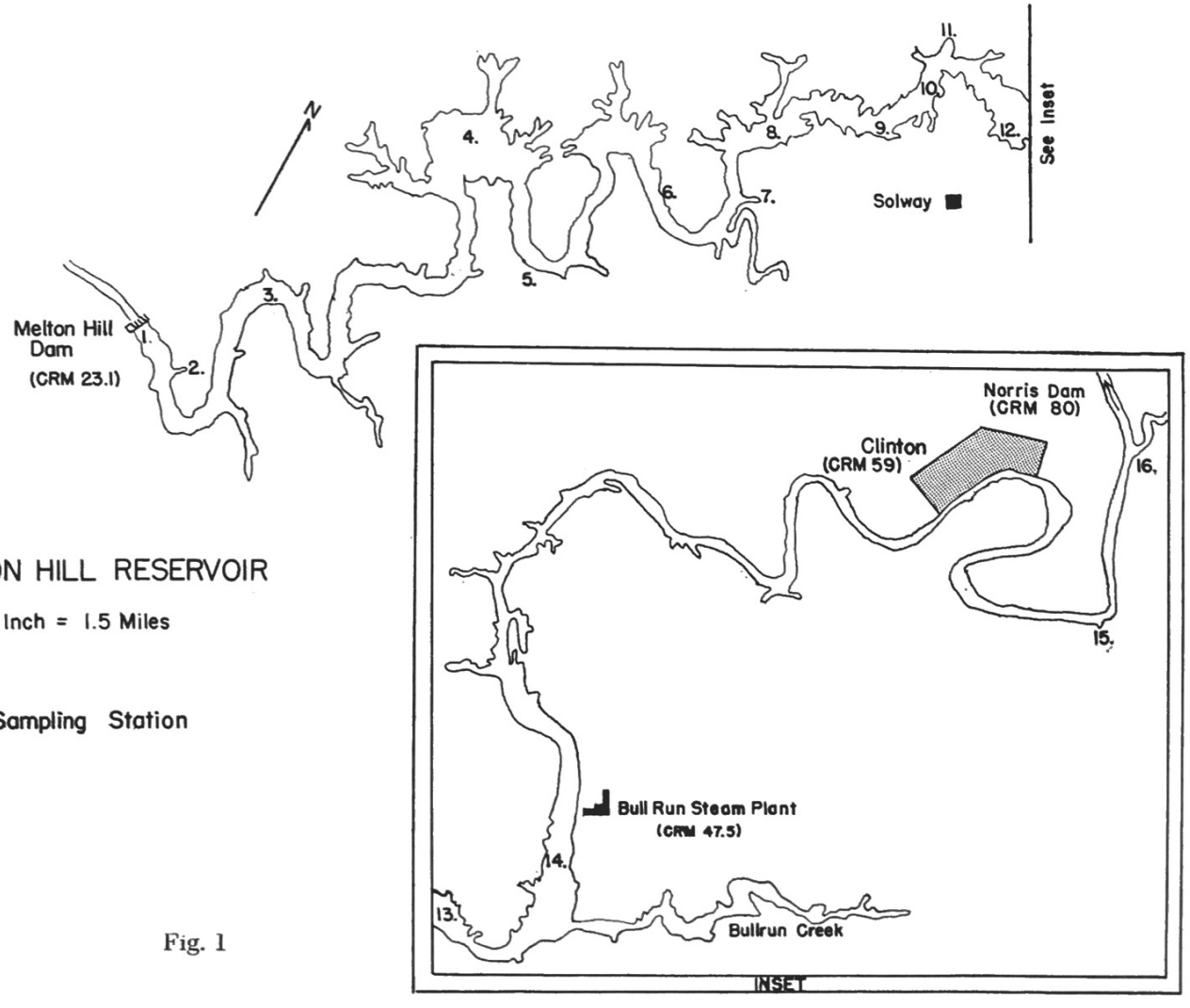

Fig. 1

samples (Station 15) produced significant results. Habitat data included surface water temperature at stations 1, 4, 14, and 16 for each sampling period and additional temperature and flow data supplied by TVA Hydraulic Data and Engineering Laboratory Branches.

After impoundment, seasonal gill-net sampling was continued at the same stations. In addition, fish were collected seasonally at six deep-water lake stations (3, 4, 5, 6, 9, and 14) with a 16-foot bottom trawl and at ten shoreline stations (3-5 and 8-14 inclusive) with a 30-foot bag seine. Trawl hauls averaged 5 minutes each and seine drags varied in length. Debris on the reservoir bottom made both trawling and seining difficult. The total sample included 62 gill-net sets, 34 trawl hauls, and 74 seine hauls between November 1963 and October 1964.

Finally, two small coves (Stations 2 and 7) were poisoned with rotenone in October 1964. They were blocked off with a nylon net, 300′ x 25′ x ½″ bar mesh to prevent movement of fish into or out of the treated area. The net also served as the outer boundary of the sample which was surveyed to determine exact surface area and water volume. Five-percent emulsifiable rotenone was applied at a concentration of 0.6 ppm and fish were picked up for three days. They were weighed, measured, and counted by species. Scale samples were taken from all species except shad.

Profiles of dissolved oxygen and temperature were developed at each net station from vertical samples taken every five feet. The modified Winkler method was used to determine oxygen; temperatures were read with an electric thermometer. Bottom samples of macroinvertebrates, collected with an Ekman dredge at the three downstream gill-net stations (1, 4, and 14), were screened and preserved in 5% alcohol for later examination. Stomachs for food analyses, taken primarily from fish collected with the trawl, were wrapped in cheesecloth, labeled, and preserved in 10-percent formalin.

TABLE I

GILL-NET COLLECTION DATA FROM FOUR STATIONS IN CLINCH RIVER AND MELTON RESERVOIR—NOVEMBER 1960 - OCTOBER 1964

Station and Date	Game Fish		Rough Fish		Av/net-day			Station and Date	Game Fish		Rough Fish		Av/net-day		
	No.	Wt. (lb.)	No.	Wt. (lb.)	Net days	No.	Wt. (lb.)		No.	Wt. (lb.)	No.	Wt. (lb.)	Net days	No.	Wt. (lb.)
STATION 1				*RIVER*								*LAKE*			
Nov. 14-15, 1960	2	1.3	272	283.4	7	39.2	40.7	Nov. 13, 1963	4	4.8	71	111.7	4	18.8	29.1
Feb. 9-10, 1961	1	1.2	6	4.9	6	1.2	1.0	Feb. 11, 1964	7	4.6	55	78.6	4	15.5	20.8
June 22-23, 1961	3	1.6	105	172.1	6	18.0	29.0	May 18, 1964	8	4.2	71	44.5	4	19.8	12.9
Dec. 14-15, 1961	0	0.0	12	9.7	6	2.0	1.6	Aug. 14, 1964	15	10.1	72	33.5	4	21.8	10.9
								Oct. 6, 1964	23	27.9	40	58.1	2	31.5	48.0
Total	6	4.1	395	470.1	25	16.0	18.0		57	51.6	309	326.4	18	20.3	21.0
STATION 4															
Nov. 9-11, 1960	5	5.9	81	136.9	14	6.2	10.2	Nov. 13, 1963	3	1.5	66	94.5	4	17.3	24.0
Feb. 9-10, 1961	1	1.6	11	17.8	6	2.0	3.2	Feb. 11, 1964	3	0.6	23	21.3	4	6.5	5.5
June 22-23, 1961	1	1.4	46	82.6	6	7.9	14.0	May 19, 1964	14	5.6	119	49.0	4	33.3	13.7
Dec. 14, 1961	0	0.0	2	2.9	6	0.3	0.5	Aug. 14, 1964	10	8.8	93	55.0	4	25.8	16.0
June 16, 1962	2	1.3	8	16.5	6	1.7	3.0								
Total	9	10.2	148	256.7	38	4.1	7.0		30	16.5	301	219.8	16	20.7	14.8
STATION 14															
Nov. 7-9, 1960	4	6.0	174	264.6	8	22.3	33.8	Nov. 13, 1963	20	12.5	27	35.3	4	11.8	12.0
Jan. 6-7, 1961	2	2.6	68	108.4	6	11.7	18.5	Feb. 11, 1964	1	0.4	5	3.5	4	1.5	1.0
June 22-23, 1961	5	2.5	46	88.9	6	8.5	15.2	May 19, 1964	8	5.6	64	36.8	4	18.0	10.6
Oct. 8, 1961	3	1.6	102	163.3	6	17.5	27.5	Aug. 14, 1964	4	2.9	30	10.7	4	8.5	3.4
June 17, 1962	0	0.0	18	41.8	6	3.0	6.9								
Total	14	12.7	408	667.0	32	13.2	21.2		33	21.4	126	86.3	16	9.9	26.9
STATION 16															
Feb. 10-11, 1961	1	0.5	6	3.6	4	1.8	1.0	Nov. 13, 1963	1	0.2	8	13.6	4	2.3	3.5
June 22-23, 1961	18	10.0	113	173.0	6	23.7	30.5	Feb. 11, 1964	0	0.0	4	4.1	4	1.0	1.0
Oct. 8, 1961	16	10.0	215	194.3	6	38.5	34.1	May 19, 1964	20	14.1	114	151.7	4	33.5	41.5
June 17, 1962	3	3.6	111	171.0	6	19.0	29.1								
Total	38	24.1	445	541.9	22	22.0	25.7		21	14.3	126	169.4	12	12.3	15.3
Grand Total	67	51.1	1,396	1,935.7	117	12.5	17.0		141	103.8	862	801.9	62	16.2	14.6

Results

Fish Populations Preimpoundment netting yielded 1,463 fish weighing 1,987 pounds. Rough fish dominated the catch at all stations (Table I). Of the 33 species caught, 21 were rough fishes and at least 12 have commercial value (Table II). The game fish proportion was only 5% by number and 2.6% by weight. Game species included sauger, white bass, white crappie, spotted bass, bluegill, rock bass, warmouth, and rainbow trout. Mooneye were most numerous, followed by gizzard shad, shorthead and silver redhorses, and river carpsucker in that order. Rotenone samples were dominated by gizzard shad, drum, golden redhorse, and norther hog sucker (Table III).

Table II

Species Taken In Gill Nets In Melton Hill Reservoir

Species	Percent by Number		Percent by Weight	
	River	*Lake*	*River*	*Lake*
Mooneye	28.1	—	10.9	—
Gizzard shad	12.5	7.8	5.9	3.0
Shorthead redhorse	10.0	4.8	9.3	4.5
Silver redhorse	7.2	1.4	14.7	4.8
River carpsucker	4.9	0.8	8.8	0.7
Smallmouth buffalo	4.3	1.6	7.0	3.5
Black redhorse	4.2	2.3	4.9	3.6
River redhorse	3.6	0.3	6.5	0.5
Golden redhorse	3.3	1.5	4.3	2.2
Longnose gar	2.9	0.7	6.9	2.5
Northern hog sucker	2.7	0.6	2.0	0.5
Freshwater drum	2.1	1.8	0.6	2.1
Skipjack herring	1.7	29.5	1.2	45.5
Blue sucker	1.6	—	5.7	—
Channel catfish	1.6	1.9	1.3	5.1
Sauger	1.5	0.5	1.3	0.6
Carp	1.4	26.4	3.0	7.0
Rainbow trout	1.3	0.4	0.7	0.5
Black buffalo	1.2	—	2.0	—
Threadfin shad	0.8	0.6	0.1	0.1
Quillback	0.7	0.1	1.0	0.2
White crappie	0.6	1.1	0.1	0.3
Rock bass	0.5	0.1	0.2	T
Bluegill	0.5	1.1	0.1	0.2
Spotted gar	0.2	—	0.8	—
Bigmouth buffalo	0.2	—	0.4	—
White sucker	0.1	2.8	0.1	2.2
White bass	0.1	7.8	0.1	7.1
Spotted bass	0.1	0.2	0.1	0.1
Warmouth	0.1	0.1	T	T
Largemouth bass	—	2.1	—	1.9
Brown bullhead	—	0.1	—	0.1
Redbreast sunfish	—	0.1	—	T
Redear sunfish	—	0.1	—	T
Walleye	—	0.5	—	0.7
Spotted sucker	—	0.1	—	0.2
Highfin carpsucker	—	0.8	—	0.3

Table III

Species Taken In Clinch River Preimpoundment Rotenone Samples.

Species	Percent by Number	Percent by Weight
Gizzard shad	28.7	25.6
Drum	9.3	16.2
Golden redhorse	6.5	24.8
Northern hog sucker	3.9	6.2
Black redhorse	2.5	10.8
Carp	1.1	6.8
Smallmouth bass	1.1	1.1
Smallmouth buffalo	0.6	2.5
Rock bass	0.6	0.5
River redhorse	0.3	1.6
Shorthead redhorse	0.3	0.7
Mooneye	0.3	0.5
Miscellaneous minnows	44.8	2.7

These samples indicated that the future Melton Hill Reservoir would have a large rough fish population and should support a sizeable commercial fishery. Also, considerable seasonal fish movement was expected upstream from Watts Bar Reservoir into the Melton Hill tailwater and through the lock into the reservoir. Game species anticipated in this movement were sauger, white bass, and crappie. Suckers and other species were expected to migrate toward the tailwaters of Norris Dam in the spring.

After impoundment rough fishes continued to dominate gill-net catches, but the proportion of game fishes increased to 14% by number and 11% by weight (Table II). Average catch of game fish per net-day also increased (Table I). Of the five most abundant species, white bass ranked fourth. River herring outnumbered all other species; carp, gizzard shad, and shorthead redhorse ranked second, third, and fifth respectively. Other game fishes caught in the lake were sauger, bluegill, white crappie, spotted and largemouth bass, trout, walleye, and various sunfishes.

The Tennessee Game and Fish Commission has stocked Norris Dam tailwater with trout every year since 1950, and downstream migrants were the nucleus of a population in the headwaters of Melton Hill Reservoir. In addition, almost 130,000 three-inch fingerling rainbow trout were stocked in Melton Hill in 1963. These fish spread throughout the reservoir and some passed through the lock or sluice gates to be caught below the dam.

Trawl and seine samples showed an excellent spawn of many species in the spring of 1963. Small carp, buffalo, carpsucker, white crappie, and shad were abundant at all stations that fall. Gizzard shad were most abundant, followed by carpsuckers, carp, minnows, and bluegill in seine samples and by carp, buffalo, bluegill, and white crappie in trawl samples. Trawls were most successful in the lower part of the reservoir, seines in the upper (Tables IV and V).

TABLE IV

FISH CATCH PER MINUTE BY TRAWL, MELTON HILL RESERVOIR.

Date	Trawl station 3	4	5	6	9	14	Total minutes	Ave. catch per min.
May 21, 1963	—	0.3	—	—	0.1	0.4	37	0.2
Sept. 19, 1963	22.1	205.4	17.6	9.1	7.0	1.3	42	43.8
Nov. 13, 1963	0	0.2	10.4	0.4	2.0	0.5	44	2.3
Feb. 10, 1964	1.9	0	0	0.3	1.5	0.2	46	0.7
May 19, 1964	3.2	8.4	3.2	1.6	86.7	0.7	39	18.5
Aug. 13, 1964	0.3	3.4	34.5	10.3	32.0	0.4	40	11.3
Ave. catch/min.	5.6	31.1	12.8	4.3	15.0	0.6	248	13.0

Species composition of trawl samples

Total catch	3,218 fish
Gizzard shad	46.9%
Carp	34.8%
Smallmouth buffalo	6.6%
Bluegill	4.6%
White crappie	2.8%
14 others	4.3%

TABLE V

NUMBER OF FISH TAKEN IN SEINES, MELTON HILL RESERVOIR.

Date	Number per haul at station 3	4	5	8	9	10	11	12	13	14	Total hauls	Ave. catch per haul
May 21, 1963	—	—	—	2.0	3.0	—	—	—	2.0	—	4	2.5
June 28, 1963	157.5	392.0	605.5	747.0	348.3	0	218.0	120.0	184.0	195.0	13	329.2
Sept. 17, 1963	3.0	15.5	3.5	16.0	38.0	30.5	118.0	—	8.0	583.5	16	94.1
Nov. 14, 1963	5.0	0.5	3.0	9.5	—	26.0	—	—	—	158.0	12	33.7
Feb. 11, 1964	39.5	0	0	0	—	0	—	—	—	0	12	6.6
May 18, 1964	—	1.0	19.0	12.0	—	26.0	—	—	27.0	15.0	7	18.1
Aug. 7, 1964	27.0	13.0	72.0	26.5	—	8.5	—	—	—	20.0	10	23.5
Ave. catch/haul	48.6	45.1	131.5	78.6	161.0	15.6	168.0	120.0	49.6	173.3	74	89.7

Species composition —of seine samples

Total catch	6,640 fish
Gizzard shad	57.2%
Carpsucker	16.9%
Carp	15.0%
Common shiner	2.4%
Emerald shiner	2.3%
Bluegill	1.6%
White bass	0.9%
18 others	3.7%

No largemouth bass were taken before impoundment, but native stock spawned heavily in 1963 and this species was prominent in sport catches from Melton Hill Dam to Norris Dam. Growth was rapid and some of these young-of-the-year largemouth were 10 inches long and weighed 0.75 pound by October.

Two rotenone samples in October 1964 were dominated by shad. Young threadfins accounted for 78 percent of the number and 52 percent of the weight, gizzard shad 18 percent of the number and 25 percent of the weight. Bluegill, carp, buffalo, largemouth bass, and golden redhorse accounted for most of the remaining weight. The total indicated population of 49 to 158 pounds per acre (Table VI) was low compared with other east Tennessee reservoirs such as Cherokee (206 pounds) and Watts Bar (187 pounds).

TABLE VI

COVE POPULATIONS AS INDICATED BY TWO ROTENONE SAMPLES, MELTON HILL RESERVOIR, 1964.

Sampling area description	Fish Group	No. of Species	No. per acre	Weight per acre
Melton Hill				
Station 2 —	Game	9	197	18
1.8 acres (CRM 24)	Rough	9	94	24
	Forage	3	6,129	116
			6,420	158
Station 7	Game	5	32	1
2.0 acres (CRM 40)	Rough	5	25	5
	Forage	3	2,633	43
			2,690	49
	Grand Average		4,555	103

Species composition of two rotenone samples

	% by Number	% by Weight
Threadfin shad	78.3	52.2
Gizzard shad	17.7	24.8
Bluegill	2.2	5.0
Carp	0.6	4.6
Largemouth bass	0.2	2.8
Smallmouth buffalo	0.2	3.8
Golden redhorse	0.2	2.0
Hog sucker	0.2	1.3
16 others	0.4	3.5

Growth For walleye, largemouth bass, and some other species, preimpoundment growth data were calculated by scale analysis. Except for smallmouth bass, walleye, and bluegill, fish growth before impoundment was generally higher than eastern Tennessee averages (Tables VII and VIII). Average first-year growth was higher for white bass, white crappie, sauger, and largemouth bass.

TABLE VII

COMPARISON OF FISH GROWTH BEFORE AND AFTER IMPOUNDMENT, MELTON HILL RESERVOIR.

Species	Average annual growth in inches				Average first-year growth in inches			
	East Tennessee Valley average	River	Lake	Probability*	East Tennessee Valley average	River	Lake	Probability*
Rainbow trout	—	8.0	9.0		—	5.9	8.1	
Channel catfish	2.3	2.8	2.7	**NS	4.5	—	—	
Smallmouth buffalo	—	3.0	3.6	NS	—	4.6	4.6	
Carp	—	3.5	3.5	NS	—	3.6	4.6	5.0
River carpsucker	—	3.6	4.0	NS	—	6.2	5.7	
Quillback	—	4.5	5.2		—	9.3	5.5	
Drum	—	4.0	4.0	NS	—	5.8	7.9	
Spotted bass	—	2.9	6.1	0.1	—	2.2	6.6	0.1
White bass	3.0	6.7	6.1	NS	7.9	8.4	9.2	NS
White crappie	2.8	3.4	3.4	NS	2.5	3.3	3.0	
Bluegill	1.5	1.6	2.0	NS	2.1	1.6	2.7	0.1
Smallmouth bass	3.2	3.1	—		4.2	2.9	—	
Largemouth bass	3.3	6.1	7.4		4.7	6.1	8.3	NS
Sauger	3.8	5.5	5.9	NS	7.7	8.8	9.0	
Walleye	4.7	—	—		9.6	8.8	9.8	

* Percentage level of probability (95 or 99%) if significant difference between pre- and postimpoundment growth; no entry indicates insufficient data for comparison.

** Not significant

TABLE VIII

AVERAGE GROWTH RATES FOR MELTON HILL FISHES — PRE- AND POSTIMPOUNDMENT.

Year class	No.	Calculated average total length (inches) at end of year								
		1	2	3	4	5	6	7	8	9
				River Carpsucker						
				10.9	11.5	—	18.7	—	—	—
Post 58, 60, 63	6	5.7	—	13.9	15.2	17.7	—	—	—	—
Pre 58, 60	2	5.7	9.4							
				Drum						
				—	—	—	—	—	—	—
Post 61, 62, 63	5	7.9	11.2	—	—	—	—	—	—	—
Pre 61, 62	11	5.8	7.7							
				Walleye						
				14.5	—	—	—	—	—	—
Post 62, 63	6	9.8	13.0	—	—	—	—	—	—	—
Pre 62	4	8.8	—							
				Channel Catfish						
				8.2	11.6	14.3	15.4	19.0	17.0	24.9
Post 54, 56, 62	17	—	5.9	9.4	11.8	13.6	14.4	15.3	—	—
Pre 54, 59	29	3.6	6.8							
				Bluegill						
				5.8	—	7.0	8.0	—	—	—
Post 58, 59, 61, 63	11	2.7	—	4.3	6.2	7.5	—	—	—	—
Pre 58, 59, 61	6	1.6	3.2							
				White Crappie						
				9.5	—	—	—	—	—	—
Post 61, 63	20	3.0	7.3	—	—	—	—	—	—	—
Pre 61, 62	10	3.3	6.1							
				Spotted Bass						
				—	—	—	—	—	—	—
Post 63, 64	5	6.6	10.2	—	—	—	—	—	—	—
Pre 58, 59	4	2.2	6.0							
				Sauger						
				14.5	—	—	—	—	—	—
Post 62, 63	8	9.0	13.3	15.2	17.4	—	—	—	—	—
Pre 57, 60	15	8.8	12.3							
				Rock Bass						
Pre 54, 56, 59	11	1.8	3.3	5.0	6.5	8.4	8.7	9.6	10.5	—
				Black Crappie						
Post 63, 64	5	3.6	6.5	—	—	—	—	—	—	—
				Rainbow Trout						
				17.3	—	—	—	—	—	—
Post 61, 63, 64	4	9.0	—	—	—	—	—	—	—	—
Pre 61	1	8.0	11.8							
				Quillback						
				—	16.0	—	—	—	—	—
Post 60, 63	8	5.5	—	13.5	—	—	—	—	—	—
Pre 60	1	9.3	11.7							
				Smallmouth Bass						
Pre 58, 60	7	2.9	6.5	9.1	12.7	—	—	—	—	—
				Largemouth Bass						
Post 62, 64	48	6.9	11.1	11.9	—	—	—	—	—	—
				Smallmouth Buffalo						
				10.8	16.6	15.3	15.6	—	—	—
Post 58, 63	17	4.6	8.0	10.6	11.6	12.6	13.6	—	—	—
Pre 57, 62	12	4.6	7.8							
				White Bass						
				13.1	18.9	19.9	—	—	—	—
Post 60, 64	37	9.2	10.9	15.8	—	—	—	—	—	—
Pre 60, 62	13	8.4	10.8							
				Carp						
				8.4	14.4	—	—	—	—	—
Post 58, 60, 63	54	4.6	6.6	13.5	18.0	20.9	23.2	—	—	—
Pre 58, 60, 62	36	3.6	8.7							

After impoundment, average annual growth rates of all Melton Hill species for which comparisons were possible exceeded the eastern Tennessee Valley averages. This was also true of average first-year growth rates (Tables VII and VIII).

Water Conditions (Temperature and Oxygen) Preimpoundment surface water temperatures indicated that the upper reaches of the lake at least would have suitable year-round trout habitat (Table IX). The few occasions when temperatures rose above a satisfactory level (70F) could be related to turbine shutoff at Norris Dam and this was not detrimental unless the shutoff continued for a week or more. Even then, deeper pools with cooler temperatures were available where trout could safely stay as long as oxygen levels remained high.

Temperature and oxygen profiles at the uppermost station (16) after impoundment showed generally suitable conditions for trout at all depths throughout the year (Table X). The 4.0 ppm. of dissolved oxygen on February 10, 1964, was considerably below saturation value at 41F, but no plausible reason for this was found. At the other three downstream stations summer surface temperatures were often above 70F and, therefore, too high for trout, but below 10 feet, temperatures were satisfactory. Lake stratification was evident in warm weather in the first 10 feet at station 14, also between 10 and 15 feet at station 4 and near the dam.

TABLE IX

SURFACE WATER TEMPERATURES (°F.), CLINCH RIVER AND MELTON HILL RESERVOIR.

Date	Station 1	Station 4	Station 14	Station 16
11-8-60	—	—	—	50
11-10-60	—	50	—	—
11-15-60	50	—	—	—
1-6-61	—	—	42	—
2-9-61	41	40	—	—
2-10-61	—	—	—	38
6-22-61	64	65	67	70
10-8-61	—	—	68	68
6-16-62	—	63	65	76
Impoundment				
11-15-63	57	58	60	63
2-10-64	42	42	41	41
5-11-64	77	87	81	56
8-13-64	81	74	57	51

NOTE: Temperatures below 70F are satisfactory for trout.

Oxygen concentrations were usually satisfactory for fish at all levels throughout the year, although on May 11, 1964, samples taken near the bottom in the downstream part of the lake showed only 4.0 ppm, which is near the lower desirable limit. The apparent oxygen stratification in November 1963 at stations 14 and 16 while temperatures were uniform from surface to bottom cannot be explained.

TABLE X

DISSOLVED OXYGEN AND TEMPERATURE PROFILES, MELTON HILL RESERVOIR.

Depth	Nov. 15, 1963 D.O. (ppm.)	Nov. 15, 1963 Temp. (°F.)	Feb. 10, 1964 D.O. (ppm.)	Feb. 10, 1964 Temp. (°F.)	May 11, 1964 D.O. (ppm.)	May 11, 1964 Temp. (°F.)	Aug. 13, 1964 D.O. (ppm.)	Aug. 13, 1964 Temp. (°F.)
				Station 1				
S	7.0	57	8.0	42	8.0	77	8.0	81
5	7.0	57		42		77		75
10	7.0	56		42	8.0	75	9.0	74
15	7.0	56		42		69	7.0	63
20	7.0	56		42	4.0	65		59
25	7.0	56		42		62	6.5	58
30	7.0	56	9.0	42	5.0	60	6.0	57
				Station 4				
S	7.0	—	9.0	42	9.0	87	8.0	74
5	7.0	58	9.0	42			8.5	73
10	7.0	57	9.0	42	6.0		8.5	71
15	7.0	57	9.0	42			6.5	60
20	7.0	57	9.0	42	4.0	72	7.0	58
				Station 14				
S	7.0	60	9.0	41	8.0	81	8.0	57
5		60	9.0	41	8.0	73	6.0	57
10	5.0	60	9.0	41	8.0	57		56
15		60	9.0	41	8.0	55	6.0	56
20		60	9.0	41	8.0	54		56
25	8.0	60	9.0	41	8.0	54	6.0	56
				Station 16				
S	7.0	63	4.0	41	11.0	56	8.0	51
5	5.0	63	4.0	41	10.0	51	8.0	51
10	9.0	63	4.0	41	10.0	50	8.0	51

Only postimpoundment bottom fauna samples were taken. These showed three macroinvertebrate groups: Tendipedidate, Naididae, and Tricoptera, with tendipeds the dominant group (Table XI).

TABLE XI

MACROINVERTEBRATES PER SQUARE FOOT OF BOTTOM, MELTON HILL RESERVOIR.

Date and Depth	Naididae Station 1	Naididae Station 4	Naididae Station 14	Tendipedidae Station 1	Tendipedidae Station 4	Tendipedidae Station 14	Tricoptera larva Station 1	Tricoptera larva Station 4	Tricoptera larva Station 14
11-14-63									
Shallow	4	24	0	56	180	0	0	0	0
Deep	4	0	12	40	0	4	0	0	4
2-10-64									
Shallow	0	4	16	16	20	20	0	0	0
Deep	0	4	8	0	4	20	0	0	0
8-17-64									
Shallow	0	4	16	0	8	8	0	0	0
Deep	0	4	52	0	12	20	0	0	0

The tendipeds were most numerous in the fall at station 4 in water less than 10 feet deep. The Naididae was most numerous in the summer, at station 14 in water more than 10 feet deep. Tricoptera larva were found only once; four were taken during the summer at station 14.

Stomach Samples Stomach sampling, too, was done after impoundment only, and for these species: white bass, largemouth bass, sauger, rainbow trout, channel catfish, drum, and carp (Table XII). The channel catfish diet consisted of minnows, insects, crustaceans, and algae. Trout stomachs contained minnows, insects, and crustaceans. White bass and drum had eaten minnows and crustaceans. Sauger limited their diet to minnows. Most of the carp stomachs examined were empty, but a few contained insects.

TABLE XII

FOOD FOUND IN FISH STOMACHS — MELTON HILL RESERVOIR.

Fish Species	Number Stomachs	Empty Stomachs	Number of stomachs containing: Minnows	Insects	Crustaceans	Algae
Channel catfish	10	8	2	2	1	1
Rainbow trout	2	0	1	2	1	0
White bass	11	5	4	3	0	0
Drum	9	5	1	3	0	0
Largemouth bass	7	1	4	0	2	0
Sauger	4	3	1	0	0	0
Carp	12	9	0	3	0	0

DISCUSSIONS

Changes in the pre- and postimpoundment fish populations are evident (Table XIII). Although rough fish are still dominant (1967), they now account for a smaller proportion of the total population. Spawning and survival of carp, buffalo, carpsuckers, and shad were excellent the first year of impoundment. The two shads are the dominant lake species.

Largemouth bass, absent in preimpoundment samples, were taken during the first spring of impoundment in abundance, and in excellent physical condition. The second spring young-of-the-year were in poor condition and scarce. But second-year fish from the 1963 hatch were still growing rapidly. A scarcity of forage (plankton, insects, etc.) for small fish may have caused the poorer survival the second year.

White crappie, bluegill, and white bass increased in number after impoundment and this trend will probably continue. Large numbers of white bass have been taken only in the lower reaches of the lake. River herring, abundant the first year of impoundment, decreased the second year. Mooneye, numerous before impoundment, have not been taken in lake samples. Walleye showed up for the first time in October 1964, when a few harvestable-size individuals were taken. Catfish are scarce but in good condition.

Trout were scarce in postimpoundment samples but fishermen take them occasionally throughout the lake. These fish are remnants of early plantings. Water conditions are suitable for trout in the upper fifteen miles of the reservoir. Although spawning is not likely to occur, a good trout fishery can be maintained through a regular stocking program.

The physical features of the lake indicate that sport fishing will not be on a par with most mainstream reservoirs. The combination of cold water temperature, low basic productivity (plankton), and relative lack of cover and wide shallow acreas are not conducive to production and maintenance of a large game fish population. However, fishing success at times will probably approach that of tributary reservoirs like Norris.

The abundance of carp, buffalo, and carpsuckers will pose a problem for some time. Commercial seining for these fish in the fall of 1963 was discontinued because of the poor catch and the small average size of fish. As of the fall and winter of 1966-67, observations with electrofishing gear still were not indicative of profitable commercial fishing.

The Bull Run Steam Plant at CRM 47.6 began operating in late 1966 and may have some effect on local fish and invertebrate populations. The warmer discharge from the cooling condenser is expected to attract forage fish and protect shad against killing winter temperatures. Predator fish will move in to take advantage of these concentrations.

A significant difference in the number of predatory fish in Bullrun Creek embayment and the main channel of Melton Reservoir was confirmed with electrofishing gear in the summer of 1966. Summer temperatures in the river are consistently 10 to 20 degrees colder than in the creek embayment, and this is the only physical difference. When conditions were reversed in the late fall of 1966 and the embayment was 10 to 15 degrees cooler than the river, the catch of predators dropped off sharply in the embayment and increased in the main channel.

TVA fishery investigations on Melton Hill Reservoir will be resumed in February 1967, with a year-long study of the effects of Bull Run Steam Plant on the local fish population. The purpose is to determine whether there is a significant correlation between seasonal fish concentrations and one or more of the following factors: temperature, D.O., CO_2, pH, plankton, bottom-dwelling animal communities. Stations above, below, and in the plant discharge basin will be sampled biweekly. In addition, age and growth patterns will receive further study, and information on fish concentrations will be made available to fishermen.