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FISH MANAGEMENT ON WOOD'S RESERVOIR

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INTRODUCTION

Wood's Reservoir is a 4,000-acre impoundment on the Elk River near Tullahoma, Tennessee, and was constructed by the Arnold Engineering Development Center for use as a source of water to cool wind tunnels. It reached full pool level for the first time in the winter of 1952-1953. It differs from other large reservoirs in Tennessee in that it was not built for a combination of flood control, navigation, and power. Water levels in Tennessee Valley Authority and United States Army Corps of Engineers storage reservoirs in Tennessee fluctuate seasonally to a great degree. The main stream impoundments fluctuate slightly, but are essentially enlarged rivers with a continuous flow of water. Therefore, fisheries management data collected on these other impoundments could not be directly applied to Wood's Reservoir. Furthermore, it is located in a section of Tennessee which had previously lacked adequate fishing waters to satisfy public demand. For the above-mentioned reasons the Tennessee Game and Fish Commission endeavored to follow closely the fishing and fish populations of this reservoir. This report summarizes the results of investigations and management from 1953 to 1956.

CHARACTERISTICS OF WOOD'S RESERVOIR

Wood's Reservoir has a maximum depth of 65 feet at the dam and an average depth of approximately 20 feet at full pool. Much of the reservoir above Morris Ferry Bridge is less than five feet deep, except for the area located over the old river channel. The deeper sections are located below Morris Ferry Bridge and these areas stratify thermally to a limited degree (Table 1). Surface temperatures were recorded three times a month by personnel of the Arnold Engineering Development Center at Morris Ferry Bridge and show maximum and minimum temperatures from June 20, 1953, to September 1, 1957, of 89° F. and 35° F., respectively (Table 2). Temperatures were regularly above 80° F. in July and August. During the best angling months, late April, May, and June, temperatures were between 70° and 80° F. The lake is typically eutrophic and high in its productivity of plankton (Yeatman, 1956). Yeatman found that the bicarbonate ions ranged from 85 to 122 ppm., classifying this water as hard. The wind tunnels had not been operated

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at capacity when these investigations were made, but engineers at the development center did not believe that lake temperatures would ever go above 90° F. due to consistent water circulation through the wind tunnel cooling system. Therefore, any problem of fish mortality due to overheated water would be alleviated.

The seasonal rule curve for water level fluctuation prior to 1957 featured a water level rise in April from elevation 957 to elevation 960. The lake was then lowered from 960 to 957.5 during a period extending from June through the middle of September to aid mosquito control. If necessary, the water level could be raised to 958.5 at the end of October and then lowered to 957 during the winter. This plan was followed except during the summer and fall of 1955 when the reservoir was lowered for construction work at the upper end. Plans for 1957 and 1958 called for lowering the water level in January and February to elevation 954 in order to control an overabundance of rooted aquatic plants in the shallow water areas.

TABLE 1. Temperatures in degrees Fahrenheit at Morris Ferry Bridge, Wood's Reservoir on June 3, 1953 at 1:00 p.m.

Depth in feet	Temperature
Surface	86
3	80
6	78
9	78
12	77
15	76
18	74
21	70
24	68
27	68

Methods of Investigation

Creel census information was collected in 1953 and in 1956. The census was designed to sample as many creels as possible during the heavy fishing season. One creel census clerk, using a boat, interviewed both shoreline and boat fishermen during each working day. The information collected included number, weight, and species of fish caught. Scale samples for growth measurement were also collected from fish creeled. This census was carried out from May 30 to June 30, 1953, and from March 1 to June 31, 1956. The 1953 census was conducted every day of the week, while the 1956 census was conducted only on two week days and each weekend. This type of census would show any pronounced changes in catch per fishing trip or species composition of the catch.

Fish population samples were collected from 1953 to 1956 with the use of emulsifiable rotenone. The method used, with an appraisal of its value, has been described by Chance and Miller (1952). Records were made of the numbers, lengths, and weights of all fish collected and scale samples were taken for growth determination. Since only small areas in shallow water (less than 15 feet) could be sampled, the population changes exhibited did not necessarily represent those of the entire reservoir fish population. The distribution of rotenone was partially affected by winds and currents, so the exact amount of water sampled could not be controlled. Therefore, statements on the exact area of water sampled must be accepted as approximations.

Scales for growth determination were mounted dry between two glass slides and read on an Eberbach microprojector. A straight-line body-scale relationship was assumed for back calculations, and no allowance was made for length of fish at the time of scale formation. Stroud (1948) found after aging several fish species from T.V.A. reservoirs that such assumptions were valid for practical purposes. Most measurements in the field and all measurements in scale reading were made in millimeters but were converted to inches for presentation in this paper.

Fishes in Wood's Reservoir

Most fish species recorded in Wood's Reservoir were present in the Elk River prior to impoundment, or were present in ponds in the watershed. Two species were introduced and will be so indicated. A check list of species sampled, with their accepted common names, (American Fisheries Society, 1948) follows:[1]

	Signalosa petenensis atchefaylae (introduced in 1955)	Mississippi threadfin shad
Catostomidae		
	Minytrema melanops	spotted sucker
	Moxostroma erythrurum	golden redhorse
	Moxostoma duquesni	black redhorse
	Hypentelium nigricans	hog sucker
	Catostomus commersoni	white sucker
Cyprinidae		
	Carassius auratus	goldfish
	Campostoma anomalum	stoneroller
	Notropis spilopterus	spot-finned shiner
	Notropis cornutus	common shiner
	Notemigonus chrysoleucas	golden shiner
	Hyborhynchus notatus	bluntnose minnow
Ameiuridae		
	Ictalurus natalis	yellow bullhead

[1]No attempts were made to collect species other than in routine population studies. The list of Percidae and Cyprinidae is undoubtedly incomplete.

Clupeidae

Centrarchidae		
	Micropterus dolomieu	smallmouth bass
	Micropterus salmoides[1]	largemouth bass
	Chaenobryttus gulosus	warmouth
	Ambloplites rupestris	rock bass
	Lepomis megalotis	longear sunfish
	Lepomis macrochirus	bluegill
	Lepomis microlophus	redear sunfish
	Pomoxis annularis[2]	white crappie
Atherinidae		
	Labidesthes sicculus	brook silversides
Percidae		
	Percina caprodes	log perch
	Stizostedion vitreum (introduced in 1955)	yellow walleye

Fishermen's Catch

The number of fishermen contacted in 1953 was 1,543 and in 1956 was 1,721. Most fishermen (74.4 percent in 1953, 75.5 percent in 1956) were from Franklin and Coffee counties, the two counties bordering the lake. Shoreline fishing was more common than boat fishing in 1953 (56.1 percent). In 1956 shoreline fishing dropped to 39.3 percent.

The catch by sizes and numbers of fish caught changed greatly from 1953 to 1956 (Table 3). The numbers of fish caught per fishing trip decreased from 3.2 in 1953 to 1.0 in 1956. This change was principally due to the smaller numbers of largemouth bass, bluegills, and yellow bullheads caught in 1956. The average weight of the catch per fishing trip decreased from 1.49 pounds per fisherman in 1953 to 0.74 pounds in 1956. The increase in average weight per fish was due to larger largemouth and smallmouth bass. Yellow bullheads were an important part of the catch in both years. White crappie were introduced in 1955 and made up 8.7 percent of the catch of 1956. Rock bass and longear sunfish are primarily stream species and had practically disappeared from the catch by 1956. Smallmouth bass also decreased in number although those caught in 1956 averaged 3.7 pounds

CHANGES IN THE FISH POPULATION

Certain trends in the fish population were shown from the population studies (Table 4) and also from creel census information (Table 3). The yellow bullhead was becoming less common in the population, probably due to heavy predation by centrarchids. Bullhead populations in other reservoirs such as Dale Hollow were high during the first few years of impoundment, but became less common as predator fishes became abundant.

[1]Ten thousand fingerlings were stocked in June 1952.
[2]One specimen was collected prior to 1955, but 900 adults were stocked in March 1955.

TABLE 2. Surface water temperatures in degrees Fahrenheit at Morris Ferry Bridge, Wood's Reservoir from June 20, 1953 to September 1, 1957. Temperatures are means of three taken on the 1st, 10th, and 20th of each month.[1]

Year	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
1953	—	—	—	—	—	89	83.7	85.6	86.0	72.6	56.6	45.7
1954	42.0	48.6	51.0	61.3	70.3	78.3	85.0	84.0	80.0	69.6	56.0	44.0
1955	48.0	44.3	55.0	62.3	73.3	75.6	82.3	85.3	81.0	70.0	53.3	42.5
1956	38.6	47.3	51.0	56.6	70.0	78.0	83.3	86.6	76.3	71.3	59.4	49.7
1957	44.6	51.0	49.6	57.6	72.6	78.0	81.0	81.3	80	—	—	—
Average	43.3	47.8	51.7	59.5	71.6	79.8	83.1	84.6	80.7	70.9	56.3	45.5

[1]Only one temperature was taken on June 20, 1953, and September 1, 1957.

TABLE 3. Species composition of anglers catch on Wood's Reservoir, Tennessee, from May 30 to June 30, 1953, and from March 1 to June 30, 1956, as determined from creel census. Included are total number (N), percentage by number (P), and total weight (W) in pounds.[1]

Fish species	May 30-June 30, 1953			March 1956			April 1956			May 1956			June 1956			Total, 1956		
	N	P	W	N	P	W	N	P	W	N	P	W	N	P	W	N	P	W
Redhorses										31	3.5	100.0				31	1.8	100.0
Yellow bullhead	1,527	30.8	647.8	19	16.2	8.6	177	51.3	35.1	210	23.7	69.0	158	47.4	44.6	564	33.6	157.3
Largemouth bass	1,013	20.5	1,015.0	69	59.5	219.7	109	31.6	433.7	23	2.6	51.7	29	8.7	49.7	230	13.7	754.8
Smallmouth bass	122	2.5	143.7	9	7.8	32.0	4	1.1	18.1				1	0.3	1.2	14	0.8	51.3
Bluegill	1,863	37.6	332.5	16	13.8	3.3				437	49.3	46.3	117	35.1	8.8	570	33.9	58.4
Longear sunfish	22	0.4														22	0.4	
Redear sunfish										14	1.6	10.6				14	0.8	10.6
White crappie				3	2.6	3.1	53	15.4	44.0	72	8.1	22.1	19	5.7	6.8	147	8.8	76.0
Warmouth	226	4.6	77.0							94	10.6	31.0	6	1.8	1.2	100	5.9	32.2
Rock bass	180	3.6	89.8							3	0.3	0.8				3	0.2	0.8
Yellow walleye										2	0.2	2.0	3	0.9	3.8	5	0.3	5.8
Other							2	0.6	1.0							2	0.2	1.0
Total	4,953	100.0	2,305.8	116	99.9	266.7	345	100.0	531.9	886	99.9	333.5	333	99.9	116.1	1,680	100.4	1,248.2

[1]Total weight in 1953 was estimated from weighing 50 percent of the catch.

The reproduction of largemouth bass has not been normal, as suggested by the population studies and by the age class distribution of the angler's catch in 1956 (Table 5). Few Age Class I or II largemouth bass entered the catch in 1956, whereas they usually make up the largest percentage of the catch in in similar reservoirs. Stroud (1948) found that in Norris Reservoir Age Class I and II largemouth bass made up 42.1 and 54.9 percent, respectively, of the catch in 1943 and 1946. Age Class 0 bass were never collected in large numbers after May 1953. Possible reasons for this poor reproduction or survival of young bass will be discussed later. The lack of natural recruitment of smallmouth bass was expected since the species is predominantly a stream fish in this area and few shallow reservoirs of this type support good smallmouth populations.

A large number of bluegill-longear sunfish hybrids were collected in 1955. These were not observed by the author in other large impoundments in this area. White crappie and threadfin shad, both introduced species, were becoming an important part of the fish stock by 1956. Spotted suckers were more abundant in Wood's Reservoir than in other impoundments in Tennessee. The increase in warmouth bass from 1953 to 1956 may be related to the increased growth of rooted aquatic plants since this species is commonly associated with such a habitat (Larimore, 1957). Bluegills were abundant in Wood's Reservoir, but their average size was small. Longear sunfish were also reproducing regularly, although this species was not common in other large TVA impoundments. Martin and Campbell (1953) found that the bluegill, longear sunfish, and brook silversides spawned very successfully during the first year of impoundment of Clearwater Lake, Missouri. Largemouth bass populations expanded during the second year of impoundment in Clearwater Lake.

GROWTH RATES

Largemouth bass

Scales from 357 largemouth bass, all caught by angling, were used for the present study. One collection from 226 fish was made during the first month the reservoir was open to fishing in 1953, and all other scales were collected in 1956. Annuli were forming on the scales of largemouth bass from April 29 to May 30 and many fish in both samples were forming annuli when collected. The group collected in 1953 showed the growth rates during the period when the reservoir was filling up, and while the bass were growing under stream conditions. Young-of-the-year bass grew much faster during the period when the reservoir was filling up than prior to impoundment (Table 6). During this period they grew 11.0 inches, while in years prior to

Table 4. Numbers and total weights (lbs.) of fish collected from six population studies on Wood's Reservoir, Tennessee, from 1953 to 1956. Surface area in acres and mean depths in feet, shown for each population study.

Fish species	May 29, 1953		Sept. 4, 1953		Oct. 22, 1954		Aug. 10, 1955		Aug. 11, 1955		Aug. 17, 1956	
	0.75 acres		0.5 acres		0.5 acres		1.0 acres		0.7 acres		1.0 acres	
	3 feet		3 feet		4 feet		6 feet		3 feet		6 feet	
	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
Threadfin shad	0		0		0		323	8.7	319	8.8	54	0.4
White sucker	0		0		0		0		11	7.0	0	
Spotted sucker	8	2.4	0		3	1.4	484	57.5	250	103.8	91	29.9
Golden redhorse	41	10.0	7	4.0	1	1.0	27	34.1	47	18.6	9	7.9
Black redhorse	0	0	0		0		9	11.5	35	12.5	0	
Hog sucker	0	0	2	0.3	0		0		0		0	
Stone Roller	0	0	12	0.2	24	0.6	0		0		5	0.2
Goldfish	0	0	0		0		0		0		1	Tr.[1]
Golden shiner	0	0	0		4	0.1	0		0		192	6.9
Common shiner	0	0	0		2	0.1	0		0		0	
Yellow bullhead	214	6.4	1,121	3.8	0		57	5.3	7	1.1	21	3.0
Smallmouth bass	5	3.5	1	0.1	0		6	Tr.[2]	0		0	
Largemouth bass	2,005	9.6	2	0.2	1	0.4	307	4.2	31	5.2	10	1.1
Warmouth	0	0	5	1.4	103	1.5	55	1.3	973	21.7	267	6.2
Rock bass	0	0	0		0		0		1	0.5	0	
Longear sunfish	71	1.6	14	0.4	20	0.5	401	8.4	341	14.2	55	1.9
Bluegill	847	36.6	2,036	7.8	109	2.5	1,230	32.0	538	11.7	5,705	33.5
Redear sunfish	0	0	4	0.3	4	0.4	13	0.7	68	9.9	38	6.6
White crappie	0	0	0		1	Tr.[2]	1,831	40.3	9	0.4	43	5.8
Brook silversides	0	0	3	Tr.[2]	7	Tr.[2]	0		0		114	0.4
Walleye	0	0	0		0		8	0.7	0		0	
Log perch	0	0	11	0.2	40	0.3	0		0		76	0.7
Misc. minnow[3]	0	9	0		60	0.3	2,886	25.3	1,318	14.5	243	1.1
Bluegill X longear sunfish hybrids[4]	0		0		0		3,812	94.2	1,143	33.8	0	
Total	3,191	70.1	3,218	18.7	379	9.1	11,449	324.2	5,091	263.7	6,924	105.6

[1]Many were not picked up because large numbers of small specimens were on bottom
[2]Less than 0.1 lb.
[3]Includes log perch, common shiner, golden shiner, bluntnosed minnow, spot-finned shiner, and brook silversides.
[4]Includes principally hybrids although all were not sorted.

Table 5. Age distribution of largemouth and smallmouth bass caught by anglers as determined by creel census in 1953 and in 1956 in Wood's Reservoir, Tennessee.

Species	Age Class						
	I	II	III	IV	V	VI	Total
Largemouth bass							
1953	183	35	4	1			223
1956	8	4	51	56	13	2	134
Smallmouth bass							
1953	12	22	22	4		2	62
1956			1	2	5	1	9

impoundment the maximum recorded calculated growth was 4.7 inches. Age Class II fish showed a growth increment of 7.6 inches during the same year; this was a much larger increment than was demonstrated previously.

Table 6. Calculated growth rates (total lengths in inches) of largemouth bass caught by anglers in Wood's Reservoir from May 18 to June 26, 1953.

Age Class	Number of fish	Average calculated growth at annulus				Average length at capture[1]
		1	2	3	4	
I	186	11.0				11.5
II	35	4.7	12.3			12.6
III	4	3.5	7.9	11.9		13.7
IV	1	1.9	7.3	12.7	16.5	17.1

[1]Annulus forming on edge of scale on some fish.

The collections from 1956 included principally Age Class III and IV fish and showed a faster growth rate than the fish of similar age classes caught in 1953 (Table 7).

Table 7. Calculated growth rates (total lengths in inches) of largemouth bass caught by anglers in Wood's Reservoir from March 1 to June 30, 1956.

Age Class		Number of fish	Average calculated growth at annulus						Average length at capture[1]
			1	2	3	4	5	6	
I	(1955)	8	10.9						11.0
II	(1954)	4	7.4	13.0					13.8
III	(1953)	51	6.3	13.9	16.9				17.0
IV	(1952)	56	6.7	12.6	16.7	18.3			18.3
V	(1951)	13	5.9	11.1	15.6	18.3	18.9		18.9
VI	(1950)	2	4.5	9.6	13.7	16.6	16.8	19.4	19.4

[1]Annulus forming on edge of scale on some fish.

Smallmouth bass

Smallmouth bass was the most common predator species in the Elk River prior to impoundment, and growth rate calculations were made from 62 scale samples collected in 1953 (Table 8). The growth rate of Age Class I fish increased greatly as a result of impoundment. Growth rates under stream conditions showed that smallmouth bass reached catchable size (assumed to be ten inches) during their fourth year, while after impoundment they could presumably reach this size in two years.

Table 8. Calculated growth rates (total lengths in inches) of smallmouth bass caught by anglers in Wood's Reservoir from March 1 to June 30, 1953.

Age Class	Number of fish	Average calculated growth at annulus					Average length at capture
		1	2	3	4	5	
I	12	7.6					9.0
II	22	3.7	10.6				11.6
III	22	3.0	7.1	11.8			12.4
IV	4	2.5	5.6	8.6	13.1		13.8
VI	2	2.1	4.8	8.6	11.1	16.0	16.8

Rock bass

Only 18 rock bass scale samples were collected by a combination of angling and capture with rotenone from 1953 to 1956. The rock bass is primarily a stream species and these were caught principally where streams enter the reservoir. The mean calculated total lengths in inches for all age groups were: first year, 3.0; second year, 6.1; third year, 8.3; and fourth year, 9.6.

Bluegill

Bluegills were abundant in Wood's Reservoir, as determined from both population studies and creel census. Scales were collected in 1953 and 1956 by angling, and on August 10, 1955, by capture with rotenone. A summary of the rates of growth (Table 9) shows that means of the samples of bluegills were 3.2 inches at Age Group I and 5.1 at Age Group II. Lane (1954) summarized the growth rates of bluegill in several reservoirs and natural lakes. The Wood's Reservoir bluegills were growing faster than the average. The rotenone sample of 1955 probably represents the true growth rate of the population; however, these were growing at about the same rate as those in Clearwater Lake, Missouri, during its first years of impoundment.

Table 9. Average calculated growth (total length in inches) for 190 bluegills from Wood's Reservoir. Age class distribution of samples included.

Year collected	Method of collection	Number of fish	Number of fish by age class		Average calculated growth at annulus	
			I	II	1	2
1953	angling	160	149	11	3.7	5.4
1955	rotenone	26	20	6	2.8	4.1
1956	angling	4	1	3	3.0	6.1
Total		190	170	20		
Unweighted average					3.2	5.1

Redear sunfish

This species is highly desired as a sport fish in this area although it had not become an important part of the fish stock in Wood's Reservoir by 1956. From an analysis of 74 scale samples collected from 1954 to 1956, this species is judged to be growing more rapidly (Table 10) than was recorded in Reelfoot Lake by Schoffman (1939) or in Claremore City Lake, Oklahoma (Jenkins, 1951).

Warmouth bass

The population of warmouth has increased since impoundment, but no consistent changes have been observed in growth rates (Table 11). Warmouths added little additional length after their second year. The average lengths of Age Group III, IV, and V fish varied from 6.3 to 7.0 inches. This growth was more rapid than that recorded for most lakes and ponds in Illinois by Larimore (1957).

Table 10. Average calculated growth (total lengths in inches) for 74 redear sunfish from Wood's Reservoir. Age class distribution of samples included.

Year collected	Method of collection	Number of fish	Number of fish by age class			Average growth at each annulus		
			I	II	III	1	2	3
1954	rotenone	45	43	2		1.5	7.4	
1955	rotenone	24	19	5		3.8	5.7	
1956	angling	5		3	2	3.7	5.7	8.8
Total		74	62	10	2			

Walleye

Walleye were stocked in May, 1955, as fry, and they entered the fishery in 1956. Five fish showed an average total length of 11.4 inches at their first annulus, and averaged 12.8 inches when captured by angling in 1956. This growth for first-year fish was greater than that recorded for Norris Reservoir (Stroud, 1949).

White crappie

Nine hundred white crappie were stocked in January, 1955, from Cherokee Reservoir. Nine Age Group I fish were caught by anglers in 1956 and these were presumably the progeny of adult stocking. The annulus had formed on all these fish by April 31, 1956. They had achieved an average of 8.0 inches of growth during the first year. Calculated first year growths from Cherokee, Douglas, and Hiawassee Reservoirs showed an average of 2.26 inches during the first year (Stroud, 1949).

Table 11. Average calculated growth (total lengths in inches) for 89 warmouth bass from Wood's Reservoir collected from 1953 to 1956. Age class distribution of samples included.

Year collected	Method of collection	Number of fish	Number of fish by age class					Avg. calculated growth at annulus				
			I	II	III	IV	V	1	2	3	4	5
1953	angling	54	4	26	21	2	1	3.0	5.0	6.3	7.0	6.8
1954	rotenone	10	9	1				3.5	7.8			
1955	rotenone	19	10	9				2.5	4.1			
1956	angling	6			2	4		2.5	5.1	7.1	7.0	

PAST MANAGEMENT OF WOOD'S RESERVOIR

The fish population in Wood's Reservoir was originally a mixture of native stream and farm pond species. There were none of the characteristic large river fishes such as buffaloes, river herring, carpsucker, gizzard shad, drum and catfishes that are so abundant in other large impoundments in Tennessee. These large river species commonly make up 80 to 90 percent of the total weight of the fish stock in most impoundments in Tennessee, while sport fishes such as the basses and crappie make up less than 20 percent. Therefore, it was possible in the management of Wood's Reservoir to avoid those fish species such as the carpsuckers, buffaloes, and drum, which have little value to most sport fishermen and which may reduce the production of sport fishes. The redhorse and the spotted sucker were the principal coarse fish species that could grow too large to be available as a forage species. The yellow bullhead had been abundant but was becoming less common after four years of impoundment. The management of Wood's Reservoir up to 1956 involved the introduction of threadfin shad, yellow walleye, and white crappie. It was known that the white crappie was present prior to stocking, since one adult was collected by rotenone in 1954, although none was reported by our creel census or by fishermen. A discussion of each introduction follows:

Threadfin shad

Threadfin shad were stocked in Wood's Reservoir to serve as a forage fish for bass and crappie. Although this reservoir had large numbers of small bluegills and minnows to serve as forage for larger predator species, there were no potential forage species that regularly inhabited the limnetic zone. The threadfin shad is a native limnetic species in many southern Tennessee reservoirs and is commonly utilized as a forage fish. Eschmeyer (1950) stated that the shad was the most important forage fish in T. V. A. waters, although he was referring principally to the gizzard shad. (*Dorosoma ceoedianum*). The threadfin shad has the desirable qualities of the gizzard shad, but rarely gets too large to be utilized as a forage species. The gizzard shad population in T. V. A. reservoirs include large numbers above ten inches which are too large to be used as forage except for unusually large fish. Another attribute of the threadfin shad is the fact that low temperatures (below 41° F. as recorded by Parsons and Kinsey, 1954) will cause mortalities; this serves as a natural block to overabundance . A winter mortality was observed in January, 1956, on Wood's Reservoir, but population studies in September, 1956, showed that enough survived to restock the water. Their prolific nature can be

demonstrated by the fact that while only 400 were stocked in Wood's Reservoir (4,000 acres) in March, 1955, 642 were recovered in 1.7 acres of water in September of the same year. Their influence on the growth and survival of the predator fish stocks could not be determined although several fishermen have reported "jump fishing" which can only be attributed to threadfin shad.

Yellow walleye

About 15,000 yellow walleye fry were stocked in late May of 1955. The walleye is highly desired as a game species and has not caused any known competition problems in Tennessee impoundments. It also grows unusually large where present and becomes a highly publicized trophy species. Shad were the principal food of walleyes in Norris Reservoir (Dendy, 1946), and it was expected that the stocking of threadfin shad would serve as forage in this case too. No walleyes were taken in population studies in 1956, probably because they inhabited deeper water than was sampled. The creel census in 1956 disclosed five walleye which averaged 1.2 pounds. In 1957 several four-pound walleyes were reported captured by fishermen[1] in the reservoir. For unexplained reasons, many walleyes were caught just below Wood's Reservoir in the Elk River. It is questionable whether or not walleyes will spawn successfully in this reservoir. Nevertheless, it would be a desirable low-cost management tool to establish a fry stocking program if this species provides good fishing.

White crappie

Although the bluegill is a desirable and successful pan fish in farm ponds, it has not been important in the game fish catch of most large impoundments in Tennessee. About 900 adult white crappie were introduced in March, 1955, to serve as a suitable pan fish. Crappie spawned in 1955, and a large number of young-of-the-year were collected in the fall. Age Class I fish entered the catch in 1956 and several large white crappie catches were reported caught in 1957. It is expected that this species will increase in importance in the sport fishery of this reservoir.

MANAGEMENT PROBLEMS

Largemouth bass

The natural recruitment of largemouth bass has not been adequate to sustain a good fishery. It is possible that the large 1952 year class was partially due to the stocking of 10,000 fingerlings in June. Most of the catch of 1956, however, included fish from the 1953 year class, which was the last year class to appear regularly in the catch. Low natural bass recruitment

[1]Personal communication from Eugene Ruhr.

has never been recorded in other unpolluted reservoirs in Tennessee, and this condition should be investigated. Bennett (1954) found that when too many other small fish, particularly bluegill, were present in Ridge Lake, the bass reproduction was poor. He believed that bluegill predation of young bass caused this poor reproduction. Such a condition may have existed in Wood's Reservoir, since no other large impoundments in Tennessee were known to have as many small bluegills and hybrids per acre as were observed in Wood's Reservoir. Possibly, the water level fluctuation in other reservoirs may reduce the success of bluegill spawning while the small fluctuations in Wood's Reservoir allowed more successful reproduction. Furthermore, the large amount of shallow water in Wood's Reservoir prevented effective bass predation on the bluegill population. Another possible reason for the heavy population of small bluegill is the lack of enough predator fishes other than the largemouth bass. Reelfoot Lake is a large, shallow lake (over 10,000 acres) with excellent bluegill and bass fishing. The reason for this condition may be due to the large number of predators such as gars, bowfin, and possibly the catfish. It may be possible that the sustained largemouth bass fishing in other large Tennessee impoundments is partially dependent on those trash species which many biologists presently feel are of little value to the sport fishermen.

Many studies (Bennett, 1954; Bowers and Martin, 1956) have shown that it is possible to fish a largemouth bass population down to a certain level rather quickly, but it takes expert fishermen to catch those bass remaining. This rapid harvesting may have taken place in 1953 on Wood's Reservoir and the remaining bass could not exert the necessary predatory pressure on the bluegills from 1954 to 1956. The large populations of bluegill, in turn, prevented future good bass reproduction.

Mosquito control

Due to the large amount of shallow water in the upper area of this impoundment, a malaria mosquito problem has been observed and several measures have been taken to reduce this hazard. As mentioned earlier, the lake was lowered regularly during the mosquito breeding season. In addition, the lake bottom was altered in the upper end of the reservoir in 1955. Most shallow areas were changed into a series of small islands with deep channels separating them.

The reduction of shallow water is desirable from a fishery standpoint since large areas of very shallow water (less than one foot) are not conducive to good sport fish production; deeper water with less cover gives the predator species a better opportunity to prey on small fish.

In 1954 and 1955 several large shallow areas were sprayed with DDT. One large fish mortality was observed in 1955 and could be attributed directly to this spraying. Small bluegills were the principal fishes killed because the spraying was confined to shallow water, although many dead young-of-the-year largemouth bass were observed. Population studies and creel census did not show that the bluegill population was harmfully reduced by spraying. It was possible that bass reproduction was reduced by spraying since the largemouth bass catch in 1956 showed few Age Class I fish. Our fall population studies, however, did not show any fewer small bass in 1955 than in 1954 or 1956. Thus, we cannot conclude that the spray program was the only factor that caused the 1956 year class largemouth bass to be rare in the 1956 catch. The future mosquito problem will be handled by fluctuating the reservoir and by small-scale spraying when considered necessary.

SUMMARY

Wood's Reservoir, a 4,000-acre artificial lake on Elk River, was first impounded in the winter of 1952-53, and this report describes fishery investigations and management from that time through 1956.

The reservoir is eutrophic, with a maximum depth of 65 feet and a mean depth of approximately 20 feet. It was regularly lowered in the summer for mosquito control. Temperatures were usually above 80° F. during July and August. The fishes present in Wood's Reservoir were original species in the Elk River and those stocked from farm ponds in the watershed. Twenty-one species were present and three species, threadfin shad, yellow walleye, and white crappie were introduced.

Data on fishermen's catches were collected in 1953 and in 1956. The number of fish caught per fishing trip decreased from 3.2 in 1953 to 1.0 in 1956, although the average size of fish increased. The decrease in number was due to fewer largemouth bass, bluegill, and yellow bullheads. Stream species such as rock bass, longear sunfish, and smallmouth bass decreased in the catch from 1953 to 1956.

The fish population was sampled by rotenone during all years. Yellow bullheads showed a downward trend. Largemouth bass reproduction was very low for several years. Hybrid bluegill X longear sunfish were abundant in the samples in 1955. White crappie and threadfin shad were becoming abundant by 1956. Bluegill were abundant in 1956, but few were large enough to enter the creel.

Growth studies showed a great increase in growth rate among largemouth bass and smallmouth bass after inpoundment of the reservoir. Yellow walleye and white crappie were growing rapidly during their first year.

A discussion on the management of Wood's Reservoir is presented. Reasons are given for the introduction of the threadfin shad and the yellow walleye. A potential white crappie fishery is discussed.

The large bluegill population is suggested as a possible cause of lack of natural largemouth bass recruitment. A mosquito problem developed to make DDT spraying necessary. One fish mortality was observed whic hcould be attributed to that spraying. The future mosquito control will be handled by water level fluctuation and small scale spraying.

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