

CREEL CENSUS ON BUSSEY BRAKE RESERVOIR FOR THE FIRST THREE YEARS¹

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ABSTRACT

Bussey Brake Reservoir is a 2,200-acre impoundment located in northeast Louisiana near Bastrop, Louisiana. This lake was stocked by the Louisiana Wild Life and Fisheries Commission in 1959. It was opened to public fishing on April 30, 1960. Creel data collected through April, 1963, are reported.

Fishing pressure varied from 46,000 to 59,000 fisherman trips per year during this period. From 91 to 109 man-hours were spent per acre to catch 76 to 102 pounds of fish per acre. The success ratio varied from 1.74 to 2.29 fish per hour. The fish averaged 0.37 to 0.53 pounds.

The average size of fish increased and the fishing success declined, but was high throughout the three-year period. With continued extensive usage of the lake, harvest rates of the same general magnitude should be possible for several years.

INTRODUCTION

Many studies have been reported of the fishing pressure and success ratio in a new impoundment. This study was designed to determine initial success and the subsequent decline of these factors. This report covers the first three years. The fishing pressure and success have both declined. Near the end of this portion of the study, active management of the fish population was initiated. Subsequent reports will indicate the success or failure of management in attempting to achieve the fishing pressure and success of the first months.

DESCRIPTION OF STUDY AREA

Bussey Brake Reservoir is a 2,200-acre lake located seven miles northwest of Bastrop, Louisiana, in Morehouse Parish (Hughes & Davis, 1961). The lake is generally circular with a regular shoreline of 7.8 miles. Bands of trees were left in the lake to reduce wave action. The outermost band, 150 yards wide, completely encircled the lake at a distance of 100 to 600 feet from the levee. Two other bands of trees were left standing in the center of the lake. These bands were 100 yards wide and so arranged as to divide the center portion of the lake into three approximately equal size areas. The major portion of the trees was a hardwood complex of predominately oak, pecan and elm. The trees died prior to the beginning of the second year of fishing.

International Paper Company constructed the lake to provide an adequate freshwater supply for their two paper mills located in Bastrop. The lake was completed in 1958. The company's interest in possible recreational uses resulted in the establishment of a cooperative fish management agreement with the Louisiana Wild Life and Fisheries Commission.

This lake was constructed entirely above ground, therefore, no watershed runoff comes into the lake. The lake was filled through the use of a 30-inch centrifugal pump out of Bayou Bartholomew at a point adjacent to the lake. Depth of the lake at pool stage varies from four feet to 30 feet with an average depth of 11 feet.

Water was pumped into the lake beginning in late 1958. Stocking of fish began in January, 1959. Stocking by the Louisiana Wild Life and Fisheries Commission was limited to largemouth bass, *Micropterus salmoides*; bluegill, *Lepomis macrochirus*; black crappie, *Pomoxis nigromaculatus*; and channel catfish, *Ictalurus punctatus* (Amer. Fish. Soc., 1960).

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The lake was opened to public fishing on April 30, 1960. Wave action caused by high speed operation of outboard motors resulted in damage to the levee. For this reason, the use of outboard motors on the lake was forbidden during the period May 4-May 16, 1960. On the latter date the use of electric trolling motors was permitted. One year later outboard motors of three horsepower or less were admitted to the lake with the regulation that the motors were not to be operated closer to the levee than 100 yards.

Docking facilities on the lake were limited to one boat livery and concessionaire. Six other entrances were opened but were limited to stiles and boat tie-up facilities.

Aquatic vegetation became a nuisance and was detrimental to fishing by late summer 1960. During the remainder of that year and 1961, research on possible chemical controls was conducted. Results from these studies were essentially negative. For this reason, it was decided to attempt weed control through water level fluctuation. The water was drawn down during November 1962. The lake was being refilled at the completion of this study. Evaluation of the success of this management practice will be the subject of subsequent reports.

CREEL CENSUS METHODS

During the first five days of fishing, only one entrance to the lake was available. An accurate count of the fishermen using the lake was made. Due to the large number of fishermen, approximately 50 percent were interviewed for creel data.

After the fifth day, seven entrances to the lake were available. A revision of the creel census procedures was necessitated. Further minor revisions were necessary at a later date. The basic portion of this new plan has remained unchanged.

Seven census days per month were chosen at random with each day of the week equally represented. For the months of July and September, eight days were censused. The extra day was necessary to evaluate the effect of the holiday.

During the first year of census, all seven entrances were checked for 12 hours on designated census days. A reduction in personnel necessitated a change for the second year. The two major entrances (boat dock and spillway) were manned for a 12-hour day. Hourly counts of vehicles were made at the other five entrances. A further reduction in creel census personnel was made during the third year.

On weekdays the boat dock area was manned for 12 hours, and a four-hour check was made at the spillway during the heaviest fishermen returns. Hourly counts were made at all unmanned entrances. On weekends and holidays, 12-hour checks were made at two major entrances.

Counts were made of the fishermen entering the lake by the creel clerks. Any cars present at the beginning of the census day were noted and the fishermen recorded as they returned from the lake. Fishermen were interviewed upon completion of their fishing trip.

Creel census and count data were returned to the Monroe Office of the Louisiana Wild Life and Fisheries Commission for coding and tabulation. The count tabulations were expanded to determine the number of people using the lake. Creel census data was placed on punch cards and later verified, tabulated and computed with the aid of Univac 120.

FISHING SUCCESS

An estimated 160,946 fishermen used the lake between April 30, 1960, and April 30, 1963 (Table 1). Of this total, 15 percent or 24,162 fishermen were checked. The percentage checked each year varied from 9 to 20. During the first year, 11,218 fishermen fished for 43,980 hours. They caught 1.95 fish per hour with an average weight of 0.53 pound. Of these fishermen 85 per cent caught one or more fish during a 3.9 hour trip.

Fishermen checked during the second year numbered 8,702 and they spent 4.0 hours per trip to catch nine fish or an average of 2.29 fish per hour. These fish averaged 0.37 pound. Only 81 percent of the fishermen checked were successful in catching one or more fish.

TABLE 1. SUMMARY OF CREEL CENSUS DATA FOR BUSSEY BRAKE RESERVOIR, 1960-1963.

	April 1960- April 1961	May 1961- April 1962	May 1962- April 1963
Number fishermen checked	11,218	8,702	4,242
Number man-hours checked	43,980.25	34,685.00	18,710.75
Length fishing trip	3.93	3.99	4.41
Number fish checked	85,703	79,543	30,782
Number pounds checked	45,606.9	29,685.8	15,520.2
Number fish per hour	1.95	2.29	1.65
Number pounds per hour	1.03	0.86	0.83
Percent successful	85	81	79
Estimated number fishermen	55,872	59,172	45,902
Estimated number man-hours	223,097.25	239,315.75	201,284.50
Estimated number fish	416,552	555,806	352,826
Estimated number pounds	211,364.0	205,486.0	175,511.5
Number man-hours per acre	101.41	108.78	91.49
Number fish per acre	189.34	252.64	160.38
Number pounds per acre	102.83	91.75	76.20

During the third year, 79 percent of the 4,242 fishermen checked were successful. They spent 4.4 hours in their efforts to catch 1.65 fish per hour; these fish averaged 0.50 pound.

For the three-year period, there has been little change in the composition of the fisherman population. About 80 percent of the fishermen checked each year were male and from 85 to 90 percent of the fishermen checked were white. During the three-year period there has been an increase in the percentage of fishermen from beyond the local area and also out-of-state fishermen.

FISH HARVEST

Though only four species of fish were stocked in the lake, 23 species have been found in the creel. Netting in the lake has indicated that at least five other species are present.

Largemouth bass were the most sought after fish during the first year and over half the pounds of fish caught were bass (Table 2). By the end of the third year, this had diminished to the point that less than one-fifth of the pounds creeled were largemouth bass. The average size of the bass creeled during the three-year period increased from 1.07 pounds to 1.63 pounds. This makes them a more desirable fish, but apparently they have become much more difficult to catch.

Bluegill were the most frequently found fish in the creels of fishermen from Bussey Brake Reservoir for both the first and third years. The other sunfish present occupied a diminishing portion of the creel. The average weight of the bluegill checked increased only slightly during the three-year period from 0.33 to 0.35 pound.

Crappie fishermen were most prevalent in the second year and the weight of those caught for this year exceeded 45 percent of the total creel. During the third year the crappie harvest diminished to 30 percent of the total harvest. The size of the crappie in the creel more than doubled during this study with the average weight increasing from 0.27 to 0.56 pound.

During the first year, the miscellaneous fish portion of the creel exceeded 10 percent. During the third year this dropped to approximately 4 percent of the total pounds.

FISHERMAN EFFORT

As each fisherman's creel was checked, he was questioned to determine the kind of fish he was attempting to catch and the bait he was using. This information in addition to the number of hours spent fishing was used to determine the catch per hour for each type of fish and the relative success of different fishing methods.

During the first year the lake was open to fishing, 20,824.75 hours

TABLE 2. COMPOSITION OF CATCH OF FISH FROM BUSSEY BRAKE RESERVOIR
1960 - 1963

Class	1960-1961			1961-1962			1962-1963		
	Fish	Average		Fish	Average		Fish	Average	
		Pounds	Weight		Pounds	Weight		Pounds	Weight
Bass	21,786	23,327.0	1.07	4,881	5,787.3	1.19	1,900	3,101.8	1.63
Crappie	19,050	5,111.4	0.27	45,720	13,094.2	0.29	8,295	4,652.2	0.56
Bluegill	29,986	9,854.1	0.33	26,164	9,148.3	0.35	19,331	6,773.4	0.35
Other sunfish	10,107	2,041.2	0.20	1,958	531.4	0.27	753	295.4	0.39
Miscellaneous fish	4,774	5,273.2	1.10	820	1,124.6	1.37	503	697.4	1.39
Total	85,703	45,606.9	0.53	79,543	29,685.8	0.37	30,782	15,520.2	0.50

were spent, by fishermen checked, fishing for bass (Table 3). This is 47.4 percent of the total hours checked. During this period, bass fishermen averaged 0.95 bass per hour. This catch per hour declined to 0.58 bass per hour in the second year and 0.43 bass per hour in the third year. During both of the latter years, slightly over 20 percent of the fishermen hours checked were spent fishing for bass.

Crappie fishing was slow to develop in this lake. Slightly over 17 percent of the fishing effort expended during the first year was on crappie fishing. This increased sharply during the second year when 42.4 percent of the anglers' time was spent crappie fishing. The catch per hour increased from 2.1 to 3.0 crappie per man-hour during the

TABLE 3. DISTRIBUTION OF FISHING EFFORT ON BUSSEY BRAKE RESERVOIR, 1960-1963

	1960-1961	1961-1962	1962-1963
Number man hours fished			
Bass	20,824.75	7,088.75	4,040.50
Crappie	7,672.25	14,715.75	6,364.25
Sunfish	14,669.50	12,582.75	8,157.75
Catfish	706.75	290.75	148.25
Others	107.00	7.00	0
Total	43,980.25	34,685.00	18,710.75
Number fish per hour ¹			
Bass	0.95	0.58	0.43
Crappie	2.09	3.01	1.23
Sunfish	2.63	2.18	2.43
Catfish	1.46	0.88	1.25
Others	0.30	0.14	0
Number pounds per hour ¹			
Bass	1.05	0.72	0.72
Crappie	0.53	0.86	0.69
Sunfish	0.78	0.75	0.85
Catfish	1.42	1.04	1.70
Others	1.27	0.31	0

¹Caught while fishing for that type of fish.

second year. During the third year, the catch dropped to 1.2 crappie per man-hour and the fisherman effort dropped to 34 percent of the total time. The major portion of the third year produced very poor crappie catches. Late in February 1963, as the lake was returning to its normal pool stage, fishing effort for crappie increased markedly. By the end of April, crappie fishermen outnumbered all others combined.

The sunfish population in Bussey Brake Reservoir provided excellent fishing throughout the three-year period. The percentage of the fisherman's time spent attempting to catch sunfish increased steadily from 33.4 percent in the first year to 43.6 percent in the third year. The catch of sunfish per hour remained relatively high, varying from 2.18 to 2.63 fish per hour. The most sought-after sunfish was the bluegill and the catch of other sunfish was incidental.

The catfish fishery on Bussey Brake Reservoir has failed to develop during this three-year period. During the first year, yellow bullheads (*Ictalurus natalis*) and black bullheads (*Ictalurus melas*) comprise 1.6 percent of the fishing time. As the bullhead fishery declined and the channel catfish stocking failed to produce a fishable population, less than 1 percent of the fisherman's time was spent in the pursuit of catfish.

DISCUSSION

As each new lake is opened to public fishing in Louisiana, many people rush to try their luck. During the first five days of fishing on Bussey Brake Reservoir, an estimated 3,380 fishermen caught 38,194 fish (Hughes and Davis, 1961). Before the first year of fishing ended, an estimated 55,872 fishermen had fished the lake and harvested 102.83 pounds of fish per acre. During the next year, more fishermen, 59,172, used the lake. More fish were caught, but they were of smaller

average size, and only 91.75 pounds per acre were harvested. Fewer fishermen used the lake during the third year of census and only 76.2 pounds of fish per acre were harvested. The catch rate remained relatively high with a return of 1.65 fish to the creel per hour of effort. The average size of the fish caught during this year showed a definite increase.

A comparison of Bussey Brake Reservoir harvest with that reported for other lakes in the Southern United States is shown in Table 4. It is apparent that the harvest per acre averages higher than other lakes reported. Though the percent of successful fishermen is not as high as some other lakes, the number of fish captured per hour is easily the highest reported. Burress, 1962, indicated that the harvest of largemouth bass in Missouri was quite extensive for the first years of impoundment. He further indicated that other workers on comparable lakes had the same results. During the first year on Bussey Brake Reservoir, largemouth bass comprised 25.4 percent of the fish checked and 51.1 percent of the pounds. By the third year this had dropped to six percent of the total fish and 20 percent of the total pounds. Both the crappie and sunfish harvest increased substantially during this period as the lake progressed steadily towards a crappie-sunfish population.

At present, the authors are unable to explain the decline in harvest on this lake. A water level fluctuation program which was initiated in late 1962, began to affect the catch in the latter part of the census period. From preliminary reports it is apparent that the harvest will be greatly increased by this initial attempt at population manipulation.

TABLE 4. COMPARISON OF CATCH STATISTICS OF TEN LAKES IN SOUTHERN UNITED STATES

Name of Lake	Size of Lake	Fish /acre	Lbs. /acre	Fish /hr.	Per Cent Successful
Bussey	2,200	201.0	89.8	1.96	82
White River Arm ¹	2,300	75.8	73.4	0.80	77
Little North Fork Arm ¹	2,985	44.0	39.2	0.67	83
Fort Gibson ²	19,000	155.2	74.6	0.75	80
Grenada ³	9,800-64,000	—	—	1.18	91
Enid ³	6,100-28,000	—	—	0.91	91
Sardis ³	9,800-58,500	—	—	0.90	92
Eucha ⁴	2,880	39.4	39.7	0.80	71
Spavinaw ⁴	1,637	12.9	10.1	1.30	59
Clearwater ⁵	1,650	36.5	15.9	0.50	—

¹Burress, 1962

²Houser and Heard, 1958

³Barkley, 1960

⁴Jackson, 1958

⁵Kathrein, 1953

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RESISTANCE OF THREADFIN SHAD TO LOW TEMPERATURES

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ABSTRACT

Threadfin shad can be successfully maintained in aquaria for long periods on a diet of newly hatched brine shrimp. They quickly die at 5.0 and will survive the winter in a lake that does not go below 9.0°C.

INTRODUCTION

The Arkansas Game and Fish Commission and the University of Arkansas conducted a cooperative study (Federal Aid Project F-8-R-1 through 5) on the effects of stocking threadfin shad, *Dorosoma petenense* (Günther) in Lake Fort Smith, Crawford County, Arkansas. This lake, a city-water-supply impoundment, was surveyed for nearly two years, under the direction of Dr. Charles F. Cole, and then stocked with threadfin shad by the Arkansas Game and Fish Commission. They failed to survive the following winter and a study on their tolerance to low water temperatures was conducted in the laboratory to determine if they could be expected to survive the usual winter water temperatures recorded for Lake Fort Smith. Published observations (Parsons and Kinsey, 1954) and conversations with fisheries workers indicated that temperatures within the range of 5.0 to 9.0°C. would be pertinent to this study. I wish to thank Dr. Charles F. Cole for the use of Table 1.

METHODS AND RESULTS

To investigate the minimum survival temperatures of threadfin shad, approximately forty fish, that had been acclimated at 15.0°C. for over a month, were put in each of four tanks. The transfer of threadfin shad from one tank to another usually results in some deaths from injuries. Records of mortality were not kept until after injured fish had died and the temperature had been lowered to 11.0°C. Initial mortality was unusually high in the tank that was chosen to be lowered to 9.0°C. and was low in the other tanks. Fish for our experiments were raised at the Centerton and the Hot Springs state fish hatcheries. The stock originally came from southeastern Arkansas.

Loren G. Hill, a student supported by N.S.F. Grant 19342, fed newly hatched brine shrimp to the threadfin shad each morning and recorded