

A One-Year Creel Census on Fort Gibson Reservoir¹

ALFRED HOUSER and WILLIAM R. HEARD, Oklahoma Department
of Wildlife Conservation, Wagoner

A fishery investigation project was conducted from September, 1953, through October, 1956, on Fort Gibson Reservoir by the Oklahoma Game and Fish Department under a Dingell-Johnson federal-aid in fisheries grant. This paper presents the results of a one-year creel census on the reservoir covering the period September 1, 1955, through August 31, 1956. Except for occasional periods of gill net fishing, and rotenone collections made in July and August, all of the work during this period was concentrated on the creel census. The work was planned and supervised by the Project Leader. Field work was done by the Assistant Project Leader and one helper.

DESCRIPTION

A thorough description of this 19,000-acre federal reservoir, constructed for flood control and hydroelectric power purposes in 1952, has been presented previously (Anon., 1946, Jenkins, 1953).

MATERIALS AND METHODS

Two motor vehicles and one outboard boat and motor were used for transportation. Stop signs were employed for the halting of traffic while operating road blocks at access points. Automatic traffic counters used to estimate the number of cars entering the reservoir area were owned and operated by the U. S. Army, Corps of Engineers. For convenience of operation the reservoir was divided into four areas. Each weekly census was concentrated upon a single area so that the entire reservoir had been censused by the end of each month. Area divisions were chosen so as to place approximately the same number of concessions and access points within each area.

The estimated total sport-fishing pressure measured in fisherman-days was drawn from the combined use of automatic traffic counters placed at all access points to the reservoir, and through interview of occupants of cars passing through road-block check stations that were set up periodically at access points. It was observed that the character of weekday and weekend traffic exhibited considerable differences in the rates of entry and the number of anglers per car. Monthly unadjusted traffic-counter readings taken by the Corps of Engineers personnel were made available for use in this project. These readings were processed to obtain a total uncorrected traffic estimate for each area. One weekday and one weekend road block was performed in each area monthly. In order to separate the monthly area total counter registrations into weekday and weekend traffic, the sums of the products of the rates of entry times the number of weekdays and the weekends respectively, were considered to equal the total monthly counter registration for the given month. Numerical rates of entry were computed from this relationship, and corrected totals for both weekdays and weekend days were then determined. In accordance with observations made at each road block the errors introduced by boat

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trailers were deducted to yield a corrected number of cars. The number of fishermen per car observed in the road blocks was then used to estimate the total number of fishermen entering that area in the month. One fisherman day was assigned to each fisherman entering the reservoir area. Information gathered at road blocks included: numbers of cars entering, numbers of fishermen and passengers in each car, angler's home address, point of trip origin, and sex of angler. Weekday road blocks were performed on Tuesday, Wednesday or Thursday and those operated on weekends were on Saturday. Printed postal card forms were given to all fishermen passing through road blocks. Each angler was instructed to indicate the length of his fishing day on the card and to return it by mail.

While interviewing anglers on the lake, an attempt was made to contact all who were in the census area on the day of censusing. Data recorded at each interview included: date, fisherman's address, place of interview, time spent fishing, kinds of bait used, number of fishermen in each party and whether or not the fishing day had been completed, numbers and lengths of each species of fish in their possession. In order to

Table I. Summary of estimated total number of fisherman-days spent on Fort Gibson Reservoir in the year September 1955 through August 1956.

	Weekday	Weekend	Total	Percent of annual total
Sept	20,304	19,345	39,649	6.7
Oct	20,015	31,273	51,288	8.6
Nov	12,825	16,698	29,523	5.0
Totals	53,144	67,316	120,460	20.3
Dec	8,796	14,848	23,644	4.0
Jan	10,100	8,732	18,832	3.2
Feb.	9,725	11,827	21,552	3.6
Totals	28,621	35,407	64,028	10.8
March	25,258	40,749	66,007	11.2
April	24,099	45,819	69,918	11.8
May	42,271	43,279	85,550	14.4
Totals	91,628	129,847	221,475	37.4
June	50,344	31,792	82,136	13.9
July	31,385	26,240	57,625	9.7
Aug	29,884	17,063	46,947	7.9
Totals	111,613	75,095	186,708	31.5
Grand total	285,006	307,665	592,671	

facilitate a greater coverage each day no weights were taken and estimates were made later through length-weight relationship curves constructed from measurements taken in the rotenone and gill net fish collections.

TOTAL FISHING EFFORT

Based on road-block and traffic-counter data there were an estimated 592,671 fisherman-days spent on Fort Gibson Reservoir during this creel census year (Table I). The peak of angler activity was in May. The greatest seasonal angling effort, estimated at 221,475 fisherman-days (37.4 percent of the annual total), was observed in the spring (March, April and May). Lowest seasonal angling effort was seen in winter (December, January and February), when 64,028 fisherman-days (10.8 percent of the annual total) were estimated. January was the month of lowest activity.

Table II. Seasonal analysis of methods and baits used by anglers interviewed on Fort Gibson Reservoir, September 1955 through August 1956.

Where Interviewed	Fall		Winter		Spring		Summer		Totals	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Boat	85	80.2	30	7.7	306	37.9	348	56.7	769	40.1
Shore	9	8.5	4	1.0	197	24.4	160	26.0	370	19.3
Wading	—	—	—	—	33	4.1	35	5.7	68	3.5
Dock	12	11.3	356	91.3	272	33.6	71	11.6	711	37.1
Methods*										
Plugging	20	30.3	3	0.8	86	21.0	52	18.2	161	14.0
Flyfishing	—	—	—	—	—	—	7	2.4	7	0.6
Trotling	7	10.6	—	—	23	5.6	11	3.8	41	3.5
Strollfishing	35	53.0	387	99.2	282	68.9	194	67.8	898	78.0
Trotline	4	6.1	—	—	14	3.4	22	7.7	40	3.5
Archery	—	—	—	—	1	0.2	—	—	1	t*
Gig	—	—	—	—	3	0.7	—	—	3	0.3
Baits*										
Minnnows	49	62.8	387	98.5	583	66.0	386	43.6	1,405	62.7
Worms	8	10.2	3	0.7	128	14.5	179	20.2	318	14.2
Blood	12	15.4	—	—	19	2.1	28	3.2	59	2.6
Crayfish	2	2.6	—	—	41	4.6	74	8.4	117	5.2
Grasshoppers	—	—	—	—	2	0.2	23	2.6	25	1.1
Shrimp	3	3.8	3	0.7	19	2.1	51	5.8	76	3.4
Dough	—	—	—	—	61	6.9	62	7.0	123	5.5
Liver	—	—	—	—	—	—	15	1.6	15	0.6
Chicken entrails	—	—	—	—	2	0.2	10	1.1	12	0.5
Beef brains	—	—	—	—	—	—	2	0.2	2	0.1
Bread	—	—	—	—	—	—	9	1.0	9	0.4
Stink bait	—	—	—	—	—	—	9	1.0	9	0.4
Sunfish	2	2.6	—	—	7	0.8	20	2.2	29	1.3
Melt	—	—	—	—	4	0.5	7	0.8	11	0.5
Shad entrails	—	—	—	—	4	0.5	—	—	4	0.2
Cut gizzard shad	—	—	—	—	6	0.8	3	0.3	9	0.4
Cataipa worms	—	—	—	—	2	0.2	3	0.3	5	0.2
Cut carp	2	2.6	—	—	5	0.5	—	—	7	0.3
Bacon	—	—	—	—	—	—	2	0.2	2	0.1
Prepared bait	—	—	—	—	1	0.1	2	0.2	3	0.1

*Number of times observed in use.

Interviews with anglers at road blocks together with those on the reservoir revealed that 1,900 (83.7 percent) of the 2,269 individuals contacted traveled one-way distances of less than 50 miles. Anglers from 26-50 miles numbered 1,340 (59.0 percent). There were 1,804 (47.8 percent) who came from Tulsa. Twenty-seven percent of the anglers interviewed were women.

METHODS OF FISHING AND BAITS

Among the 1,918 anglers interviewed on the reservoir, 769 or 40.1 percent were found fishing from boats; 711 or 37.1 percent were in indoor fishing docks, and 370 or 19.3 percent were on shore (Table II). There were 68, or 3.5 percent, who were wading. Except in the winter season, the greatest percentage of the anglers fished from boats. During the winter season indoor dock fishermen composed 91.3 percent of the total.

An analysis of the methods used by fishermen revealed that in the entire year 78 percent stillfished and 14 percent plugged with artificial baits. During the winter season 99.2 percent stillfished. Live minnows were the most commonly used bait in all seasons, and composed 62.7 percent of the total bait-use observations. The great popularity of the indoor heated fishing docks was evidenced by the extremely high percentage of fishermen (91.3 percent) observed in the docks during the winter season.

SEASONAL COMPOSITION OF CATCH

The fall (Sept.-Nov.) angler harvest was estimated at 759,400 fish weighing 339,180 pounds, which was 25.7 percent of the annual total in numbers and 23.9 percent by weight (Table III). White crappie dominated the fall fishing catch, totaling 492,420. This species contributed 64.8 percent of the season's harvest. The largest seasonal harvest of largemouth:

Table III. Analysis of sport fishing harvest in Fort Gibson Reservoir during the *fall* season of 1955 (September, October, and November).

	Average length inches	Total number of fish	Percent of total number	Total weight pounds	Percent of total weight
Largemouth bass	13.7	45,740	6.0	54,890	16.2
Spotted bass	12.3	1,930	0.3	2,120	0.6
White crappie	8.7	492,420	64.8	147,730	43.6
Black crappie	8.3	1,480	0.2	430	0.1
White bass	11.3	77,330	10.2	43,300	12.8
Channel catfish	14.5	18,990	10.7	75,320	22.2
Bluegill	5.8	45,850	6.0	5,870	1.7
Warmouth	6.1	4,250	0.6	770	0.2
Carp	13.0	9,410	1.2	8,750	2.6
Total		759,400		339,180	
Percent of total for the year			25.7		23.9

Table IV. Analysis of sport fishing harvest in Fort Gibson Reservoir during the winter season of 1955-1956 (December, January, and February).

Species	Average length inches	Total number of fish	Percent of total number	Total weight pounds	Percent of total weight
Largemouth bass	14.0	1,130	0.3	1,640	1.6
Spotted bass	11.6	70	t*	60	.6
White crappie	8.8	265,410	83.5	84,930	84.9
Black crappie	8.2	44,640	14.0	12,500	12.5
Channel catfish	10.7	650	t	180	0.2
Bluegill	5.8	5,130	1.6	660	0.6
Green sunfish	6.2	510	t	80	0.1
Warmouth	5.3	150	t	30	t
Total		317,690		100,080	
Percent of total for the year			10.8		7.1

*t, less than .1

bass was made in the fall when 45,740 pounds were taken.

The total winter (Dec.-Feb.) catch was estimated at 317,490 fish weighing 100,080 pounds, constituting 10.8 percent of the annual catch in numbers and 7.1 percent by weight (Table IV). The winter catch was also dominated by white crappie. There were 265,410 individuals of this species weighing 84,390 pounds, representing 83.5 percent of the total number of all fish harvested in the season. These fish composed 84.9 percent by weight of the winter catch.

Increased angler activity in the spring season (Mar.-May) resulted in the largest seasonal catch of the year. An estimated 1,179,130 fish weighing 691,130 pounds were harvested, representing 40 percent of the annual catch in numbers, and 48.8 percent by weight (Table V). In the spring season the greatest seasonal catch of white crappie was experienced. This species provided 595,160 fish weighing 208,310 pounds in the seasonal harvest, which was 50.4 percent by numbers and 30.1 percent by weight.

The white bass catch in the spring was 364,290 fish, weighing 338,790 pounds, which was 30.9 percent of the seasonal harvest in numbers and 49 percent by weight. Trotline fishermen were spurred to greater activity and a considerably increased catch of the catfishes resulted. During this season there were 65,580 channel catfish harvested that weighed 46,560 pounds. Drum totalling 36,370 and weighing 31,640 pounds, were taken during the spring.

The black basses continue to attract a major share of the total fishing effort but the catch has not been comparable to that of other major game species. Local, skilled bass fishermen were encountered repeatedly in censusing, and the catch of larger bass was attributed almost exclusively to a few anglers. There were an estimated 26,680 largemouth bass weighing 21,340 pounds caught during the spring. Bluegills contributed an important share of the annual harvest. The ease with which they are taken provided excellent recreation for many elderly anglers and children who came to the reservoir in increasingly greater numbers with the approach of summer. In the spring this species provided 37,230 fish weigh-

Table V. Analysis of sport fishing harvest in Fort Gibson Reservoir during the *spring* season of 1956 (March, April, and May).

Species	Average length inches	Total number of fish	Percent of total number	Total weight pounds	Percent of total weight
Largemouth bass	11.6	26,680	2.3	21,340	3.1
Spotted bass	11.0	6,920	0.5	5,190	0.8
White crappie	9.0	595,160	50.4	208,310	30.1
Black crappie	8.9	15,650	1.3	5,730	0.8
White bass	12.5	364,290	30.9	338,790	49.0
Channel catfish	13.7	65,580	5.6	46,560	6.7
Bluegill	5.9	37,230	3.2	4,840	0.6
Green sunfish	5.8	4,190	0.3	500	t*
Warmouth	4.8	760	t	70	t
Longear sunfish	4.6	9,100	0.8	730	0.1
Carp	15.1	12,130	1.0	18,200	2.6
Flathead catfish	19.0	2,480	0.2	6,940	1.0
River carpsucker	12.6	790	0.1	690	0.2
Drum	12.9	36,370	3.1	31,640	4.6
Smallmouth buffalo	13.1	1,170	0.1	1,170	0.2
Yellow bullhead	9.5	980	t	430	t
Total		1,179,480		691,130	
Percent of total for the year			40.0		48.8

*t, less than 0.1

ing 4,840 pounds in the harvest. Doughball fishing for carp has become an increasingly popular sport in the reservoir. Although these fish are not always used for food when caught, they are being taken in greater numbers each year with the largest share being taken purely for sport. The largest carp catch was made in the springtime when 12,130 individuals, weighing 18,200 pounds, were taken.

The estimated summer harvest (June-August) totaled 693,090 fish, weighing 285,660 pounds. This catch was 19.1 percent of the annual harvest in numbers, and 15.9 percent by weight. White crappie dominated the summer fishing, and 237,010 individuals (34.2 percent of the seasonal total) were caught. Their estimated total weight was 75,840 pounds, representing 26.5 percent of the summer harvest (Table VI). The channel catfish gained greatest prominence in the angler harvest during the summer season, when 177,570 fish, weighing an estimated 87,000 pounds, were taken. The 164,740 bluegills taken during the summer represented the largest seasonal harvest of this species.

ANGLER SUCCESS BASED UPON RATE OF CATCH PER DAY AND PER HOUR

In the fall season 106 fishermen who were interviewed had fished an aggregate of 322.7 hours and caught 302 fish. Their rate of catch was 0.93 fish per hour (Table VII). Successful anglers numbered 81, representing 76 percent of the total interviewed. Postal card surveys and fisherman interviews revealed that the average fall fishing day comprised 6.7 hours. The rate of catch by weight was 0.4 pounds of fish per hour. It was also estimated that the average fall fishing day produced a catch of 6.3 fish weighing 1.5 pounds.

Table VI. Analysis of sport fishing harvest in Fort Gibson Reservoir during the *Summer* season of 1956 (June, July, and August).

Species	Average length inches	Total number of fish	Percent of total number	Total weight pounds	Percent of total weight
Largemouth bass	12.8	18,720	2.7	19,670	6.9
Spotted bass	11.4	12,670	1.8	10,770	3.8
White crappie	8.8	237,010	34.2	75,840	26.5
Black crappie	7.8	15,380	2.2	3,380	1.2
White bass	14.6	28,480	4.1	42,720	14.9
Channel catfish	12.5	177,570	25.6	87,000	30.4
Bluegill	5.9	164,740	23.8	21,420	7.5
Green sunfish	4.6	6,670	1.0	370	0.1
Longear sunfish	4.7	10,400	1.5	830	0.3
Redear sunfish	4.7	520	t	30	t
Carp	15.7	7,907	1.1	15,380	5.4
Drum	10.5	10,970	1.6	6,580	2.3
Smallmouth buffalo	13.0	520	t	490	0.2
Orangespotted sunfish	4.0	300	t	10	t
Flathead catfish	13.8	1,170	0.2	1,170	0.4
Total		693,090		285,660	
Percent of total for the year			23.5		20.2

*t, less than .1

Among the 390 fishermen interviewed in the winter season, 318, or 81.6 percent, succeeded in catching fish. After fishing a total of 1,638 hours, these anglers caught 1,261 fish. The rate of catch was 0.77 fish, or 0.2 pounds, of fish per hour. The average winter fishing day lasted 5.9 hours and resulted in a catch of 5 fish weighing 1.5 pounds.

In the spring season 808 fishermen were interviewed who had fished for 3,660 hours, and their catch was 2,915 fish. Their average rate of catch was 0.79 fish, or 0.5 pounds, per hour. There were 618 fishermen, or 76.5 percent, who were successful. Length of the average fishing day was 5.3 hours. The average catch was 5.3 fish or 3.1 pounds per fishing day.

The 614 fishermen contacted in the summer season had fished a total of 2,149 hours and had caught 1,378 fish. The average rate of catch was 0.64 fish or 0.2 pounds per hour. There were 526 or 85.7 percent of the fishermen who were successful. Duration of the average fishing day was 5.8 hours and produced a catch of 3.7 fish that weighed 1.5 pounds.

The average rate of catch for the year derived from interviewing 1,918 fishermen who had fished an aggregate of 7,770.1 hours, was 0.75 fish, or 0.4 pounds, of fish per hour. Successful fishermen numbered 1,543, which was 80.4 percent of the total. Length of the average fishing day was 6.2 hours, and the average catch per fisherman day was 5 fish weighing 2.4 pounds.

ANNUAL HARVEST RATES

White crappie completely dominated the year's harvest. In all seasons they were caught in greater numbers than any other species. The harvest rate was 27.2 pounds, or 83.7 fish, per acre (Table VIII). White

Table VII. Summary of angler success through each season on Fort Gibson Reservoir, September 1955 through August 1956.

	Number of anglers contacted	Number of fish caught	Percent successful anglers	Hours per fisherman-day	Fish per fisherman-hour	Fish per fisherman-day	Pounds of fish per fisherman-hour	Pounds of fish per fisherman-day
Fall	106	302	76.0	6.7	0.93	6.3	0.4	2.8
Winter	390	1261	81.6	5.9	0.77	5.0	0.2	1.5
Spring	808	2915	76.5	6.3	0.79	5.3	0.5	3.1
Summer	614	1378	85.7	5.8	0.64	3.7	0.2	1.5
Totals and averages	1,918	5,856		6.2	0.75	5.0	0.4	2.4

Table VIII. Summary of sport fishing harvest in Fort Gibson Reservoir, September 1955 through August 1956.

Species	Estimated number of fish	Average length (inches)	Average weight (ounces)	Estimated total (pounds)	Estimated pounds per acre	Estimated number of fish per acre
Largemouth bass	92,270	12.9	16.8	97,540	5.1	4.8
Spotted bass	21,590	11.3	13.1	18,140	0.9	1.1
White crappie	1,590,000	8.9	5.3	516,810	27.2	83.7
Black crappie	77,150	8.4	4.8	22,040	1.2	4.1
White bass	470,100	12.4	14.2	424,810	22.3	24.7
Channel catfish	324,790	13.5	11.5	209,060	11.0	17.1
Bluegill	252,950	5.9	2.1	32,790	1.7	13.3
Green sunfish	11,370	5.3	1.4	950	t*	0.6
Warmouth	5,160	5.8	2.7	870	t	0.3
Longear sunfish	19,500	4.7	1.3	1,560	t	1.0
Redear sunfish	520	4.7	1.0	30	t	t
Yellow bullhead	980	9.5	7.0	430	t	t
Drum	47,340	12.4	13.0	38,220	2.0	2.5
Orangespotted sunfish	300	4.0	0.5	10	t	t
Carp	29,510	14.7	23.7	42,330	2.2	1.5
River carpsucker	790	12.6	13.9	690	t	t
Smallmouth buffalo	1,690	13.1	15.8	1,660	t	t
Flathead catfish	3,650	17.9	40.8	8,110	0.4	0.2
Total-averages	2,949,660		7.9	1,416,050	74.6	155.2
*t, less than 0.1						

bass ranked second by producing 24.7 fish, weighing 22.3 pounds, per acre. The channel catfish harvest equalled 17.1 fish, weighing 11 pounds, per acre. Bluegills produced the fourth largest amount in the harvest, being harvested at the rate of 13.3 individuals, or 1.7 pounds, per acre. Black crappie and spotted bass contributed only moderately to the annual harvest, and neither could be considered as a major sport fish during this census year. No smallmouth bass were recorded in the catch.

The total angler harvest on Fort Gibson Reservoir during this creel census year was estimated at 2,949,660 fish weighing 1,416,050 pounds. The average weight per individual fish was 7.9 ounces (0.5 pounds) and the rate of harvest totaled 74.6 pounds per acre, represented by 155.2 fish per acre.

RELIABILITY OF CENSUS METHOD

It appears that the results of greatest significance in this creel census lie in the establishment of a procedure for the censusing of a large reservoir using a minimal number of personnel. The combined use of automatic traffic counters and regularly scheduled road blocks manned by trained census clerks provided a method through which an estimate of the total angler utilization could be made on this large reservoir which has many access points. The results presented in this creel census were sometimes subject to rather wide variations and by no means represent an exact description of the total angler activity. They do demonstrate definite trends which provide acceptable data for use in formulating general management recommendations. The analysis of the catch was based upon contacts with only 0.3 percent of the estimated total number of ang-

lers visiting the reservoir during the year. Much greater accuracy could probably have been attained with an increased sample of anglers interviewed. One can only speculate, however, whether a desire for greater accuracy could justify the increased expense which would have been incurred had the required additional personnel been employed.

The increased utilization which occurred during the summer months created considerable conflict between anglers and other water sports enthusiasts. Speedboat racing and water skiing in certain areas produced intolerable disturbance to many anglers, and in spite of increased overall attendance during the summer, fishing effort decreased from that experienced in the spring. In the creel census of the preceding year, angler activity had been greatest during the summer season. The shift in the peak of angling effort is attributed to the conflict which has developed.

LITERATURE CITED

- JENKINS, ROBERT M. 1953. A pre-impoundment survey of Fort Gibson, Reservoir, Oklahoma. Okla. Fish. Res. Lab. Rep. 29.
- Anonymous. 1946. Master plan for recreation and landuse, Fort Gibson Dam and Reservoir, Grand River Oklahoma. U.S. Army Corps of Engineers, District Office, Tulsa, Oklahoma.
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