Summary of a Three-Year Creel Census on Lake Eucha and Spavinaw Lake, Oklahoma, With Comparisons of Other Oklahoma Reservoirs[1]

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The values of creel census information as an aid in fishery management have been discussed by Eschmeyer (1936,1938), Fukano (1948), Thompson and Hutson (1951), and other workers. The evaluation of the creel census data on the Spavinaw Lakes, collected from September through August, for years 1954-55, 1955-56 and 1956-57, was primarily to determine total annual harvest, catches per fisherman-hour and fisherman-day, species composition of fish harvested and intensity of utilization of these waters. Secondarily, this creel census furnished information on the percentage of fishermen utilizing boats and fish harvested from boats (of value to concessionaires), baits used, tackle utilization, distance traveled to lakes, relative fishing pressures on various species, trends in creel composition to be utilized in determining management methods needed in the maintenance of a fishery of various species, and fishing pressure and harvest in various sections of the lakes.

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Description

Lake Eucha and Spavinaw Lake are municipal reservoirs located in northeastern Oklahoma, supplying water to the city of Tulsa, Oklahoma. Lake Eucha, impounded in 1952 (Jackson, 1957), is located in Delaware county, approximately 5 miles south of Jay, Oklahoma, and encompasses 2,880 surface acres at spillway level of the dam. Spavinaw Lake, impounded in 1923, is located in Mayes and Delaware counties near Spavinaw, Oklahoma, and comprises 1,637 surface acres of impounded water at spillway level of the dam (Jackson 1956, 1957).

Methods

A permit system in effect on these lakes provides a fairly accurate check on the estimations derived from the creel census information. Census information on both lakes was obtained by the regular lake patrolmen in the course of their daily patrol duties on the respective lakes, and was recorded on City of Tulsa reservoir creel census forms. Catches were recorded by species or groups of species. All sunfishers were recorded as miscellaneous sunfish, largemouth bass and spotted bass recorded under the heading of largemouth bass; and white crappie and black crappie under the heading of crappie. The total numbers and aggregate weights were recorded, as was the average total-lengths. Each census-taker carries a "DeLier" spring scale and tape measure to determine total-lengths and weights of fish.

It was determined by analysis of permit sales and number of contacts made during the census period that a 10.0 percent sample was being taken on the lower lake (Spavinaw Lake) and a 4.0 percent sample on the upper lake (Lake Eucha). The estimations contained within this report are based on these assumptions.

Results

The number of anglers fishing on Lake Eucha was 25,563, 23,466, and 35,974, for the periods of 1954-55, 1955-56 and 1956-57, respectively (Table I). The estimated numbers and estimated weights of fish harvested during the three periods were: 63,234 fish weighing 77,640 pounds in 1954-55; 75,990 fish weighing 89,650 pounds in 1955-56 and 149,076 fish weighing 131,170 pounds during 1956-57 (Table I). Although the census indicated a decline in the number of fishermen during the 1955-56 period, the numbers and weights of fish harvested continued to increase through 1956-57.

The number of anglers frequenting Spavinaw Lake was 7,650, 6,680 and 6,120, for the periods of 1954-55, 1955-56 and 1956-57, respectively. (Table II). The estimated numbers of fish and estimated weights of fish harvested for these three periods were: 22,920 fish weighing 16,740 pounds during 1954-55; 22,320 fish weighing 18,880 pounds during 1955-56 and 18,270 fish weighing 15,050 pounds during 1956-57 (Table II). These figures indicate a decline in the number of fishermen and consequently a decline in the number of fish harvested, the numbers of fish per hour and weight of fish caught per hour remaining fairly constant. (Table II).

The average numbers of fish caught per fisherman-hour on Lake Eucha were 0.6, 0.7, and 1.0 for the respective periods (Table I). The average percentage of successful fishermen for the three periods was 71.4 percent. The average numbers of fish per fisherman-day and average weights of fish per fisherman-day were 2.4 fish weighing 3.0 pounds; 3.5 fish weighing 3.9 pounds and 5.4 fish weighing 4.8 pounds, for the three years. The lengths of the average fisherman-day were 4.1 hours, 5.4 hours and 5.4 hours for the respective periods (Table I).

TABLE I

Summary of three-year creel census information from Lake Eucha, Oklahoma, 1954-55, and 1956-57.

	1954-55	1955-56	1956-57
Estimated number of fishermen	25,563	23,466	35,974
Percent male	84.2	78.1	76.8
Percent female	15.8	21.9	23.2
Total fisherman hours	106,519	98,597	152,864
Average Fisherman-day	4.1	5.4	5.4
Estimated total catch	63,234	75,990	149,076
Estimated weight of total catch (in pounds)	76,640	89,650	131,170
Fish harvested per surface acre	30.2	32.5	55.4
Weight of fish harvested per surface acre (in pounds)	37.2	35.7	46.2
Average catch per fisherman-day	2.4	3.5	5.4
Average weight (in pounds) of fish per fisherman-day	3.0	3.9	4.8
Average total catch per fisherman-hour	0.6	0.7	1.0
Average weight (in pounds) of total catch per fisherman-hour	0.7	0.7	0.9
Percent successful fishermen	73.1	67.6	73.6
Composition of catch:			

Species	No.	lb.	No.	lb.	No.	lb.
Largemouth bass	34,463	69,615	50,214	81,044	58,876	80,636
Crappie	19,287	1,714	13,446	4,128	76,588	45,367
Misc. Sunfishes	4,490	1,010	9,724	2,402	11,710	3,121
Black bullhead	3,352	1,994	1,823	885	754	582
Channel catfish	62	78	303	611	492	812
Smallmouth bass	1,391	1,322	455	531	623	590
Carp	189	904	—	—	33	66
Flathead catfish	—	—	25	45	—	—
Totals	63,234	77,637	75,990	89,646	149,076	131,174

The average numbers of fish caught per fisherman-hour on Spavinaw Lake were 1.4, 1.4, and 1.2, for the three periods (Table II). The average percentage of successful fishermen for the three years was 58.6. This represents larger catches by fishermen familiar with the lake, while the occasional-fisherman catches were low. The average numbers and the average weights of fish per fisherman-day were 3.5 fish weighing 2.6 pounds, 4.2 fish weighing 3.5 pounds and 4.1 fish weighing 3.2 pounds for the three years. The lengths of the average fisherman-day were 2.6

TABLE II

Summary of three-year creel census information from Spavinaw Lake, Oklahoma, September through August, 1954-55, 1955-56, and 1956-57.

	1954-55	1955-56	1956-57
Estimated number of fishermen	7,650	6,680	6,120
Percent male	79.0	85.8	83.0
Percent female	21.0	14.2	17.0
Total fisherman hours	20,679	21,978	20,295
Average fisherman-day	2.6	3.5	4.1
Estimated total catch	22,920	22,320	18,270
Estimated weight of total catch (in pounds)	16,740	18,880	15,050
Fish harvested per surface acre	14.0	13.5	11.2
Weight of fish harvested per surface acre (in pounds)	10.2	11.4	8.8
Average catch per fisherman-day	3.5	4.2	4.1
Average weight (in pounds) of fish per fisherman-day	2.6	3.5	3.2
Average total catch per fisherman-hour	1.4	1.4	1.2
Average weight (in pounds) of total catch per fisherman-hour	1.0	1.1	0.9
Percent successful fishermen	52.3	63.7	59.8
Composition of catch:			

Species	No.	lb.	No.	lb.	No.	lb.
Crappie	11,391	5,149	10,290	4,949	5,780	2,488
White bass	4,974	4,810	6,160	7,164	5,080	4,570
Largemouth bass	2,292	2,910	2,812	2,006	1,680	2,723
Channel catfish	2,290	2,810	737	1,426	2,160	3,861
Misc. sunfishes	1,513	366	1,049	172	3,040	766
Drum	275	72	223	102	260	170
Carp	138	550	1,049*	3,147	20	50
Flathead catfish	69	69	—	—	20	80
Black bullhead**	—	—	—	—	210	327
Totals	22,920	16,740	22,320	18,880	18,270	15,050

* Carp derby during summer of 1956

**Restocked in lower lake during spring flood of 1957, by overflow from upper lake.

hours, 3.5 hours and 4.1 hours for the respective periods (Table II); the trend being toward more fishing effort required in the harvest of fishes on this lake.

Largemouth bass catches in Lake Eucha increased each year of the census and was the dominant species in the creel for the first two periods. This species contributed the largest total-weight for the three years (Tables I, III and IV). Only in the period of 1956-57 did the crappie catch numerically exceed the largemouth bass take. The largemouth bass harvested during the consecutive periods were 34,463 fish weighing 69,615 pounds (representing 54.5 percent by number and 90.9 percent by weight of total harvest), 50,214 fish weighing 81,044 pounds (representing 66.1 percent by number and 90.4 percent by weight of total harvest), and 58,876 fish weighing 80,636 pounds (representing 39.5 percent by number and 61.5 percent by weight of total harvest) (Tables I and IV). The crappie harvest increased from 19,287 fish weighing 1,713 pounds (30.5 percent by number and 2.2 percent by weight of total harvest) during the 1954-55 period to 76,588 fish weighing 45,367 pounds (51.4 percent by number and 34.6 percent by weight of total harvest) during the 1956-57 period (Tables I and IV).

Black bullhead catfish and smallmouth bass catches declined over the three-year period. Miscellaneous sunfishes and channel catfish increased in importance in the harvest over the three years (Tables I, III and IV).

Crappies (white and black) were the dominant species numerically in the harvest from Spavinaw Lake, representing 49.5 percent, 46.1 percent and 31.6 percent of the total harvest for the three periods (Table IV). White bass was second numerically in the catch, but represented the greatest harvest by weight over the three years, representing 21.7 percent by number and 28.8 percent by weight, 27.6 percent by number and 37.8 percent by weight, and 27.8 percent by number and 30.4 percent by weight, for 1954-55, 1955-56, and 1956-57, respectively (Table IV). White bass catches declined sharply after the spring floods in May, 1957, an indication that at least part of the white bass population left the lake via the overflow (up to 4 feet) over the Spavinaw Lake dam. (Periodic checks at the Spavinaw Lake dam during the flood periods indicated approximately 5,000 fish daily left the lake over a 60-day period). Channel catfish and largemouth bass ranked third and fourth in the total harvest from the lower lake (Tables II, III and IV). Largemouth bass represented approximately 10.0 percent of the total harvest numerically and 15.0 percent of the total harvest by weight for the three years. Channel catfish averaged 8.0 percent numerically and 17.0 percent by weight over the term of this census. Miscellaneous sunfishes, drum and carp also contributed to the total harvest in Spavinaw Lake.

Eschmeyer (1958) noted in his four-year creel census summary of Fife Lake, Michigan, that a decrease in the catch of one species was accompanied by an increase in the number captured of one or more of the remaining species. This phenomenon occurred on both of these Oklahoma lakes throughout the census period (Tables III and IV).

To establish a basis for comparison of these two reservoirs with other Oklahoma reservoirs, data on average fisherman-day, average numbers of fish harvested (per-fisherman-day-and-fisherman-hour) and average weights of fish harvested (per fisherman-day and fisherman-hour), were utilized where information was available (Table V). Further comparison of harvest by pounds and numbers of fish per acre were made with Fort Gibson and Tenkiller Ferry Reservoirs (Houser, 1959a, b).

TABLE IV

Summary of sport-fishery harvest, by species, in percentages of total numbers and total weight, on Lake Eucha and Spavinaw Lake, Oklahoma, from September through August, for years 1954-55, 1955-56, and 1956-57.

Species	Lake Eucha						Spavinaw Lake					
	1954-55		1955-56		1956-57		1954-55		1955-56		1956-57	
	Percent number	Percent weight	Percent number	Percent weight	Percent number	Percent weight	Percent number	Percent weight	Percent number	Percent weight	Percent number	Percent weight
Largemouth bass	54.5	90.9	66.1	90.4	39.5	61.5	10.0	17.4	12.6	10.6	9.2	18.1
Crappie (White and black)	30.5	2.2	17.7	4.6	51.4	34.6	49.5	30.7	46.1	26.1	31.6	16.5
Misc. sunfish	7.1	1.3	12.8	2.7	7.8	2.4	6.6	2.2	4.7	0.9	16.6	5.1
Channel catfish	0.1	0.1	0.3	0.7	0.3	0.6	10.0	16.8	3.3	7.5	11.8	25.7
White bass	—	—	—	—	—	—	21.7	28.8	27.6	37.8	27.8	30.4
Black bullhead	5.3	2.6	2.4	1.0	0.5	0.4	—	—	—	—	1.2	2.2
Smallmouth bass	2.2	1.7	0.6	0.6	0.4	0.4	—	—	—	—	—	—
Carp	0.3	1.2	—	—	t	0.1	0.6	3.3	4.7	16.6	0.1	0.3
Flathead catfish	—	—	t	t	—	—	0.1	0.4	—	—	0.1	0.5
Drum	—	—	—	—	—	—	1.2	0.4	1.0	0.5	1.4	1.1

t, less than 0.1 percent.

TABLE V

Comparison of the sport-fishery harvest of Spavinaw Lake and Lake Eucha (1954-57) with six flood control reservoirs in the U. S. Engineers Tulsa District, (1952-57).

Reservoir	Author	Average Fisherman-day in hours	Average number fish harvested		Average weight fish harvested	
			per day	per hr.	per day	per hr.
Lake Eucha	Jackson	4.9	4.1	0 8	4.3	0.8
Spavinaw Lake	Jackson	3.4	3.9	1.2	3.4	1.0
Ft. Gibson	Houser, 1957 a	6.2	5.0	0.75	2.4	0.4
Tenkiller Ferry	Houser, 1957 b	5.0	4.1	0.8	1.7	0.3
Fall River	Thompson	5.5	1.6	0.3	1.9	0.5
Heyburn	Thompson	3.9	1.7	0.4	1.6	—
Hulah	Thompson	5.6	1.5	0 5	0.8	—
Wister	Thompson	4.7	4.9	—	2.8	—

Fort Gibson Reservoir produced total estimated harvests of 155.2 fish weighing 74.6 pounds per acre and Tenkiller Ferry Reservoir produced total estimated harvests of 108 fish weighing 44.4 pounds per acre during the period from September, 1955 through August, 1956 (Houser, 1957a, b). Lake Eucha produced an estimated total harvest of 55.4 fish weighing 46.2 pounds per surface acre during the period from September, 1956 through August, 1957. Spavinaw Lake produced only 11.2 fish weighing 8.8 pounds per surface acre during the same period.

Seasonal variations in catches were noted on both of the Spavinaw Lakes. Largest catches of largemouth bass, in both lakes, occurred in September and October, and March and April, with the largest numbers of largemouth bass being taken during the spring months. A decided drop-off in the take of this species was noted on both lakes after the spawning period in April and May. Crappies (white and black) appeared to have three peak periods on the lower lake; August-September, December-January and March-April. Only two peak periods of harvest were noted in the upper lake, August-September and March-April. Reduction in harvest was noted for these species after the spawning period of April and May.

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