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THE 1957-61 SPORT FISHERY IN AN ARKANSAS WATER SUPPLY RESERVOIR[1]

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ABSTRACT

A year-round creel census was conducted on Lake Fort Smith, Arkansas from August, 1957 through December, 1961. Typically, maximal fishing pressure began in March and April and terminated in May when turbidity from heavy runoffs made the lake less desirable for fishing; substantial pressure returned in July but dwindled by October. Yearly pressure varied from 12.72 to 28.70 man-hours/acre/year; largemouth bass dominated the catch. Fishing pressure was correlated with fishing success indicating the localized nature of the fishermen using the lake.

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INTRODUCTION

Water supply reservoirs, in addition to their primary purpose, may also augment regional recreation facilities. Lake Fort Smith was created in 1936 as a water supply reservoir for the city of Fort Smith, Arkansas, and has also provided continuous sport fishing for the residents and visitors to the area. Though less showy than the newer and larger flood control and hydroelectric reservoirs in the region, Lake Fort Smith is characteristic of smaller and older water supply lakes in Arkansas which have been open to public fishing for many years and have provided the experienced fishermen with continued pleasure. However, the fishing reputation of the lake prior to the study period had declined and the lake was therefore selected for experimental management centering around a threadfin shad *(Dorosoma petenense)* introduction. This paper reports the results of a year-round creel census conducted as a part of the experimental management program.

Lake Fort Smith is a 525-acre impoundment on Clear Creek (= Frog Bayou), a tributary of the Arkansas River, in the Boston Mountains 28 miles north of the city of Fort Smith. The limnology of the lake has been studied by Hoffman (1951a, 1951b), Hoffman and Causey (1952) and by Rorie (1960, unpubl. MS thesis, University of Arkansas). In 1956, a second lake of 750 acres, Lake Sheppard Springs, was created one mile upstream from Lake Fort Smith. Both lakes are oligotrophic and yet often become densely turbid following cloudbursts during May. This condition may persist until mid-summer. The watershed comprises 65 square miles of mountainous oak-hickory forest. The shorelines of both lakes are heavily wooded, rocky and steep.

CREEL CENSUS METHODS

Lake Fort Smith is unusually well suited to creel census study. Its shape is that of an elongate triangle; two sides are formed by steep mountainous slopes, the third, by an earthen dam. Normal access to the lake occurs at a single launching ramp and boat dock operated by the lake manager, Mr. Ira Cole. Although shore fishing is generally limited to the launch site, a few local residents walk in to the upper end of the lake from a dirt road along the western slope and were occasionally not interviewed by the clerk.

Catches were checked on each Saturday and Sunday and on one weekday during the week, this day being advanced one day each succeeding week throughout the year. The lake is usually open for fishing from sunrise to about one hour after sunset. The census clerk normally met the first returning boats and remained until the last boat was off the lake. The following information was obtained: number of fishermen, time spent fishing, composition of catch, type of boat and power, type of bait used, kind of fishing, and the name and residence of one member of the party. Normally, each fish caught was weighed and measured and scale samples taken. Certain of these data have been summarized in more detail elsewhere (Arkansas Dingell-Johnson F-8-R Report Series).

Data from the sampling program were expanded to estimate total harvest and total fishing pressure per acre per year. The one weekday sample was used as the best estimate of fishing for each week. To this was added information from both weekend days. The three main summer holidays, Memorial Day, Fourth of July and Labor Day, were treated separately and were individually censused. When a census day was missed, the fishing effort for the equivalent day from the previous week was averaged with that of the week immediately following to provide an estimate for the missing data. During the first year only a yearly estimation of harvest was determined; later quarterly and monthly estimations of harvest were made. The month of July 1957 was not censused and the July 1958 catch has been used as the best estimation for the missing data and was added to catch statistics obtained from August 1957 through June 1958 to complete the first year. An error in Cole and Finkelstein (1959) involving the omission of several days' data during early August 1957 is corrected in the present study. This publication should be consulted for further details in methodology.

CREEL CENSUS RESULTS

a. *Fishing pressure and yearly angler use.* Yearly use of the lake declined during the study (Table 1). Numbers of fishermen and trips on the lake changed little during the first two years but dropped markedly during the third and fourth years. Yearly pressure figures do not allow changes in fishing pressure to be interpreted as effectively as do seasonal or monthly figures (see Section c).

b. *Species composition of the catch.* The sport fishery in 1957-58 was dominated by a strong fishery for white crappie *(Pomoxis annularis)* which then underwent a precipitous decline and did not return to its former abundance in the remaining years of the census (Tables 2 and 3). The bluegill *(Lepomis macrochirus)* fishery also declined after the initial year and did not rebound. Though total fishing pressure

TABLE 1

Estimated total fishing pressure and fisherman activity, Lake Fort Smith, fiscal years, 1957-61 (based on 525.5 acres).

	1957-58	*1958-59*	*1959-60*	*1960-61*
Number of fishermen	3,381	3,334	2,094	1,752
Number of trips	1,647	1,625	1,044	773
Number of fishermen hours	15,087	13,240	8,206	6,685
Number of fish harvested	5,489	3,279	1,682	1,580
Pounds harvested/yr.	1,882	1,942	1,120	1,192
Pounds harvested/acre/yr.	3.58	3.70	2.13	2.27
Number harvested/acre/yr.	10.45	6.24	3.20	3.01
Man-hours/acre/yr.	28.70	25.20	15.46	12.72
Number caught/hr.	0.36	0.25	0.21	0.24
Pounds caught/hr.	0.13	0.15	0.14	0.18
Number fishermen surveyed	1,845	2,319	1,522	1,187
Dominant species in catch	WC	LMB	LMB	LMB
(in descending order of	BG	WC	BG	WC
importance)*	LMB	BG	SB	BG

*WC—White Crappie
BG—Bluegill
LMB—Largemouth Bass
SB—Spotted Bass

TABLE 2

Estimated total harvest by numbers and percentage of catch, Lake Fort Smith, by fiscal years (1 July 1957 - 30 June 1961).

	1957-58		*1958-59*		*1959-60*		*1960-61*	
Species	*Number*	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Largemouth bass	943	17.2	1,354	41.3	775	46.1	746	47.2
Spotted bass	67	1.2	230	7.0	171	10.1	81	5.1
White crappie	2,369	43.2	793	24.2	119	7.1	379	24.0
Black crappie	205	3.7	110	3.4	19	1.1	100	6.3
Warmouth	133	2.4	106	3.2	63	3.7	49	3.1
Bluegill	1,564	28.5	464	14.2	362	21.5	122	7.7
Green sunfish	95	1.7	134	4.1	84	5.0	80	5.1
Longear sunfish	63	1.1	48	1.5	80	4.8	16	1.0
Redear sunfish	6	0.1	11	0.3	0	0.0	0	0.0
Yellow bullhead	0	0.0	3	0.1	0	0.0	3	0.2
Black bullhead	0	0.0	0	0.0	0	0.0	2	0.1
Channel catfish	27	0.5	12	0.4	0	0.0	0	0.0
Flathead catfish	17	0.3	14	0.4	9	0.5	2	0.1
Total	5,489		3,279		1,682		1,580	

TABLE 3

Estimated total harvest by pounds and percentage of catch, Lake Fort Smith, 1957-61.

	1957-58		*1958-59*		*1959-60*		*1960-61*	
	Pounds	*%*	*Pounds*	*%*	*Pounds*	*%*	*Pounds*	*%*
Largemouth bass	757	40.2	1,142	58.8	730	65.2	786	65.9
Spotted bass	38	2.0	158	8.1	130	11.6	66	5.5
White Crappie	529	28.1	358	18.4	74	6.6	184	15.4
Black Crappie	83	4.4	43	2.2	14	1.3	66	5.5
Warmouth	41	2.2	32	1.7	23	2.1	18	1.5
Bluegill	341	18.1	118	6.1	83	7.4	38	3.2
Green sunfish	19	1.0	28	1.4	17	1.5	22	1.8
Longear sunfish	6	0.3	5	0.3	8	0.7	5	0.4
Redear sunfish	2	0.1	4	0.2	0	0.0	0.	0.0
Yellow bullhead	0	0.0	3	0.2	0	0.0	2	0.2
Black bullhead	0	0.0	0	0.0	0	0.0	2	0.2
Channel catfish	46	2.4	19	1.0	0	0.0	0	0.0
Flathead catfish	2	1.1	32	1.7	41	3.7	3	0.3
Total	1,882		1,942		1,120		1,192	

declined one-half during the last two years of the study, the estimated number of largemouth bass *(Micropterus salmoides)* caught yearly fluctuated far less than did the other two dominant species. Data from the largemouth bass catch have been discussed at greater length by Cole (1966). Though thirteen species entered the creel to some extent throughout the study, the predominant species caught were largemouth bass, bluegill and white crappie. White crappie are most commonly taken during the spring fishery and are most likely to become unavailable to the fishermen during periods of high turbidity.

c. *Seasonal distribution of effort.* Quarterly and monthly effort data in total man-hours proved more useful than yearly summaries of fishing effort. Automatic data processing facilities were not yet available at the University of Arkansas during the study and it has not been possible to convert the earlier data to monthly summaries for more detailed comparison of seasonal and monthly differences in effort between years. Quarterly summaries (Table 4) and monthly summaries (Table 5) can, however, be used to understand certain aspects of fishing pressure in the earlier years of the census.

Although fishing is permitted year round in Arkansas, Lake Fort Smith is a seasonally fished lake with most of the pressure occurring in mid-spring and then again in late summer (Table 5, bottom line). Though some discrepancies can be built into an estimation of total hours fished because of sampling error, the basic pattern of fishing activity is suggested by these data.

Normally the lake was fished very lightly during January and February, usually the coldest months of the year. Fishing pressure was often very low during December depending upon weather conditions. Weather definitely improved by early to mid-March and fishing pressures increased. Heavy pressure continued until May when it was usually reduced severely by heavy rains and markedly increased turbidity. In

TABLE 4

Total number of fishermen hours (estimated), by quarters.

Year	*January-March*	*April-June*	*July-September*	*October-December*
1958	not available	not available	4,608.5	2,056.8
1959	893.8	5,681.0	5,031.5	1,095.8
1960	364.5	1,714.5	2,307.8	1,252.0
1961	822.0	2,303.5	3,738.5	584.5

the absence of extensive late spring rains, fishing pressure might remain high as during April-June, 1959. Pressure during these three months was more than double that reported for the same three-month period in 1960 and 1961 (Table 4). A gradual mid-summer increase in fishing starting in July continued through September. A marked decline started in October and by November fishing pressure was virtually gone. Peaks in fishing pressure first in April and then in mid-summer were accentuated in 1961 (Table 5). In 1961, the early peak of fishing pressure was reached in late March, was high throughout April, declined in May and June and reached an annual high in July and August. In 1960, the decline beginning in May lasted throughout the entire summer and the normal summer peak did not develop until September and October. A particularly heavy rainfall occurred in May, 1960 and the lake remained heavily turbid throughout August.

d. *Monthly changes in fishing quality.* Two indices of fishing quality, numbers of fish caught and weight of fish caught per angling hour, are useful in further evaluating this fishery (Tables 6 and 7). In general, the time of heaviest fishing pressure (Table 5) coincides with the time of highest angler success (Table 6 and 7). Data from December, 1960 and January, 1961 are exceptions and one can only infer that these data resulted from the successful efforts of a few experienced local anglers rather than from the general activities of a random sample of fishermen.

DISCUSSION AND CONCLUSIONS

Lake Fort Smith was censused during a period of continuing decline in angler use. The reasons for this decline were probably not only biological. Travel had become easier and fishermen may have moved to the more publicized and often more productive new impoundments in the area. The recently constructed reservoirs in Arkansas and eastern Oklahoma may have drawn may of the occasional fishermen who formerly fished in this lake. The more experienced fishermen familiar with the lake apparently still utilized it but their real role in contributing to the total catch could not be evaluated. However, other studies (Churchill and Snow, 1964) have indicated that as few as 10 percent of the anglers using a body of water will catch 50 percent or more of the harvest; this is doubtless true of this lake as well.

The annual largemouth bass harvest was rather uniform in spite of the decline in total pressure. Though no evidence exists to support a declining bluegill population, a constantly declining harvest of this species occurred. Only a general change in fishing interest during the four years can be hypothesized to explain this phenomenon. The white crappie fishery declined even more sharply. Fluctuation in crappie abundance is not considered to be the primary cause. Far more influential were the rains during the period when this fishery is normally productive. It is likely that local interest by experienced fishermen in the largemouth bass has sustained this fishery, while the transient angler more willing to fish for panfish has left the lake for other areas.

The policy of managing water supply reservoirs for maximum storage at all times has precluded using winter drawdowns to provide for potential storage of highly turbid spring floods and incidentally to enhance the potential values of the fishery. Were it possible to draw down the upper lake (Sheppard Springs) in the fall and winter, it might be possible to contain much of the spring runoff in the upper lake leaving the lower lake (Fort Smith) in a better fishing condition. This management practice can not be recommended for it would disregard the primary function of this two-lake system, namely, maximum water supply at all times.

Fishing activity on this lake measured in hours of effort per unit area generally follows fishing success when measured either in pounds or in numbers caught per unit time. This pattern noticed elsewhere (Churchill and Snow, 1964) is typical of local usage of fishing waters. The local angler's accurate knowledge of when and where to fish the lake contrasts with that of the occasional fisherman or tourist whose fishing effort is more closely controlled by favorable weather or time of vacation.

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TABLE 5

Estimated man-hours of fishing spent on Lake For Smith, 1959-61.

Year	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*
1959	xx	xx	xx	xx	xx	xx	2,249	1,569	1,214	673	282	141
1960	111	25	229	874	545	296	286	672	1,350	986	177	89
1961	44	209	570	1,103	335	866	1,671	1,461	607	533	43	10
Average	72.5	117	399.5	988.5	440	581	1,402	1,234	1,057	731	167	80.0

TABLE 6

Number of game fish per angling hour from July, 1959 through December, 1961.

Year	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*
1959	**	**	**	**	**	**	0.27	0.15	0.24	0.22	0.10	0.07
1960	0.08	0.00	0.03	0.27	0.12	0.09	0.06	0.31	0.38	0.15	0.23	0.79
1961	0.36	0.04	0.18	0.30	0.08	0.19	0.20	0.24	0.23	0.13	0.19	0.00

**Date not available.

TABLE 7

Weight of game fish per angling hour from July, 1959 through December, 1961.

Year	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*
1959	**	**	**	**	**	**	0.13	0.08	0.14	0.19	0.13	0.08
1960	0.08	0.00	0.03	0.33	0.06	0.06	0.03	0.22	0.25	0.13	0.20	0.13
1961	0.69	0.06	0.16	0.25	0.06	0.10	0.09	0.15	0.10	0.14	0.09	0.00

**Data not available.

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COOPERATION AMONG AGENCIES IN WILDLIFE PLANNING

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ABSTRACT

Man's overall manipulation of land and water resources has not always been in the best interests of recreational or aesthetic values. This will bear particular emphasis where the wildlife and fisheries aspects of recreation are concerned.

Governmental agencies designated to perform specific functions in land and water management have pursued their objectives with vigor and ever increasing efficiency but nevertheless with singleness of purpose. In delta regions, wildlife, fish and related recreational activities have, for the most part, been ignored in a vast plan of agricultural improvement which has transformed even the most remote niches of wildlife habitat into intensively farmed "biological deserts". Streams are channeled to provide accelerated drainage and wetlands and natural lakes are dried up by this form of progress.

Obviously, lands which fall into this category cannot readily be reclaimed; the effect of these programs on wildlife is, for all practical purposes, irreversible.

Wildlife agencies have traditionally accepted the role of a regulatory body, ascertaining that all citizens share an equal opportunity to harvest existing game and fish. In the past, poachers presented a more serious threat to wildlife than did agricultural endeavor and an agency which could effectively check illegal or destructive methods of hunting and fishing could consider it obligation to the public fulfilled.

Habitat destruction and alteration has outstripped the poacher's wildest dream in its disastrous effect on wildlife. As this basic threat to outdoor recreation appears and