STANDING CROP, SUCCESS AND HARVEST IN A TROPHY BASS LAKE, LAKE JACKSON, FLORIDA[1]

by
STEPHEN LEE SMITH
Florida Game and Fresh Water Fish Commission
Eustis, Florida 32726

ABSTRACT

The fish population of Lake Jackson was sampled over a three year period. The standing crop estimate was 97 lbs. 11 oz. per acre with largemouth bass comprising 36.7% of this total. Evidence is presented indicating the possibility of an overcrowded bass population. A creel survey, conducted during the last year of the study, documented intense fishing pressure and high harvest in Lake Jackson. Largemouth bass comprised an unusually high proportion of the effort (71.6%) and harvest (41.5%), with one trophy bass (8 lbs.>) landed for each 13 acres of lake surface.

INTRODUCTION

Lake Jackson, a 4,000 acre natural lake, occupies a closed depression near Tallahassee, Florida. The lake has a history of fluctuating widely and has been essentially dry twice since 1900. Lake levels have been directly correlated with rainfall within the 43.2 square mile drainage basin (Hughes, 1967). The lake can be characterized as having a clean sand bottom, clear water and abundant submerged and emergent aquatic vegetation. Nutrient, water quality and phytoplankton productivity data were collected concurrently with this study by Turner (1974) who characterized the water quality as good to excellent, with the exception of the southern sectors of the lake. Recent development within the drainage basin threatens the ecosystem with southern portions of the lake already exhibiting evidence of environmental damage by siltation (Smith, 1974). A major portion of the lake, however, remains unaffected at this time and continues to maintain an excellent sport fishery.

Since 1965 Lake Jackson has received national acclaim for its largemouth bass fishery, especially for trophy-size fish (8 lbs.+). Although the factors responsible for this excellent fishery are not completely understood or documented, it is believed to be related to a natural drawdown of the lake in 1956. Bass fishing pressure is quite heavy and its effect on the fish population is not yet known. Prior to any management efforts by the Florida Game and Fresh Water Fish Commission a better understanding of the factors influencing the fishery was needed. Data on fish population structure, including standing crop estimates, fishing success, and harvest were gathered in an effort to achieve this goal.

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METHODS

Fish population structure and standing crop data were gathered during a three year period, June 1971—July 1974. The principal sampling method was the blocknet-rotenone technique with a total of 12 one-acre samples taken (four per year).

A computerized stratified creel survey with non-uniform probability sampling as described by Ware, et al (1972) was conducted during the final year of the study. Computer output for this program provides estimates of fishing pressure, both total and species-directed pressure in man-hours, total numerical catch by species, and fishing success by species (number of fish per man-hour of effort).

RESULTS AND DISCUSSION

Fish Population

The fish population of Lake Jackson is composed of 18 species (Table 1). The population is unusual for a Florida lake in that threadfin shad, *Dorosoma petenense*, gizzard shad, *Dorosoma cepedianum*, and chain pickerel, *Esox niger*, are not present. Prior to the severe drawdown in 1956, however, chain pickerel were "common" and threadfin shad "abundant" (Macomber and Crittenden, 1955).

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1. Contribution from Federal Aid in Restoration Funds under Dingell-Johnson Project F-12, State of Florida. Publication Number 21, Florida Game & Fresh Water Fish Comm., Fisheries Research Laboratory, P. O. Box 1903, Eustis, Florida 32726.

Table 1. Lake Jackson fish species.

Common Name	*Scientific Name*
Bowfin	*Amia calva*
Golden shiner	*Notemigonus crysoleucas*
Taillight shiner	*Notropis maculatus*
Lake chubsucker	*Erimyzon sucetta*
Yellow bullhead	*Ictalurus natalis*
Brown bullhead	*Ictalurus nebulosus*
Golden topminnow	*Fundulus chrysotus*
Mosquitofish	*Gambusia affinis*
Brook silverside	*Labidesthes sicculus*
Flier	*Centrarchus macropterus*
Bluespotted sunfish	*Enneacanthus gloriosus*
Redbreast sunfish	*Lepomis auritus*
Warmouth	*Lepomis gulosus*
Bluegill	*Lepomis macrochirus*
Redear sunfish (shellcracker)	*Lepomis microlophus*
Largemouth bass	*Micropterus salmoides*
Black crappie	*Pomoxis nigromaculatus*
Swamp darter	*Etheostoma fusiforme*

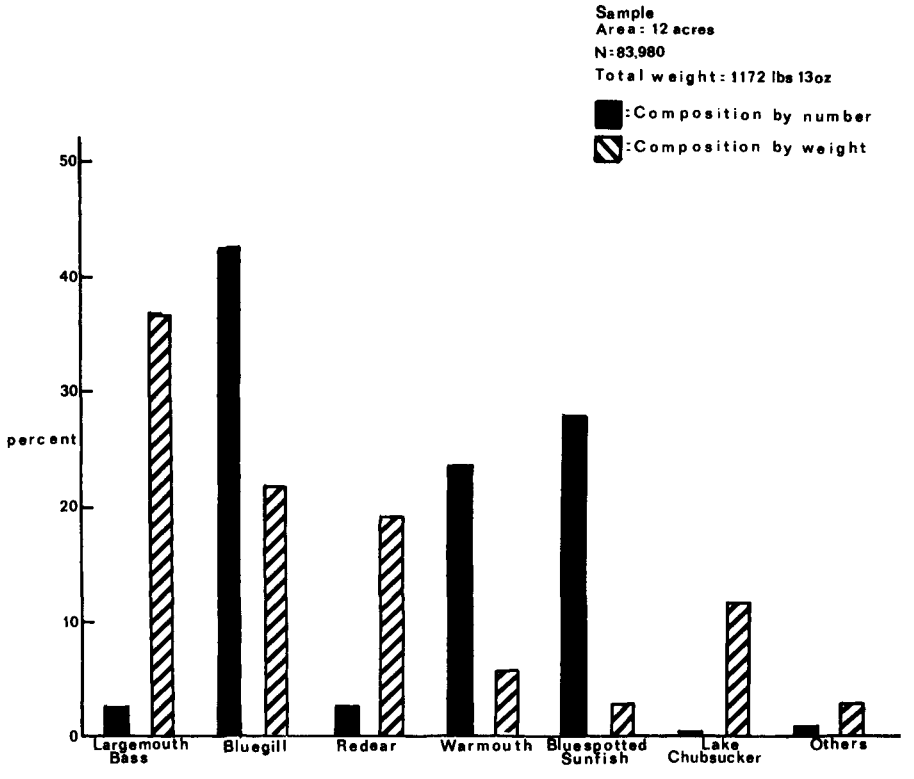

Figure 1. Lake Jackson fish population structure.

The structure of the fish population is illustrated in Figure 1. The mean for the 12 samples yields a standing crop estimate of 97 lbs. 11 ozs. per acre. It should be noted that largemouth bass, *Micropterus salmoides salmoides*, make up 36.7% of this standing crop. Although the standing crop estimate is lower than for most similar Florida lakes, the proportion of largemouth bass is appreciably higher.

Six of the 12 samples were taken at the same site. The lake level fluctuated widely during the study and a positive correlation of sample size (lbs./acre) to water depth at this site was noted for these six samples (Figure 2).

The high proportion of largemouth bass in the standing crop indicates the possibility of a crowded bass population. Both the F/C ratio of 1.71 and the Y/C ratio of 0.389 support this possibility (Swingle, 1950 and 1956). Length frequency data for largemouth bass over 3 inches (Figure 3) also supports this hypothesis, since the frequency of bass over 13 inches is low. In addition this indicates a possible stunting of bass, which is also supported by a reported decrease in the average size of the bass caught by the angler (personal communication by fish camp operators, guides, etc.).

The crowded bass condition may have developed due to overharvest of intermediate size fish (13-20 inches) coupled with the lack of harvest of smaller fish (9-12 inches) and maintained by competition for the limited forage base. Bass reproduction remained high throughout the study with young of the year comprising 96.0% of the spring samples. Recruitment into the smaller size range (9-12 inches) appears to be high but recruitment into the intermediate size range (13-20 inches) is either very small or the high rate of harvest equals or exceeds any recruitment that occurs.

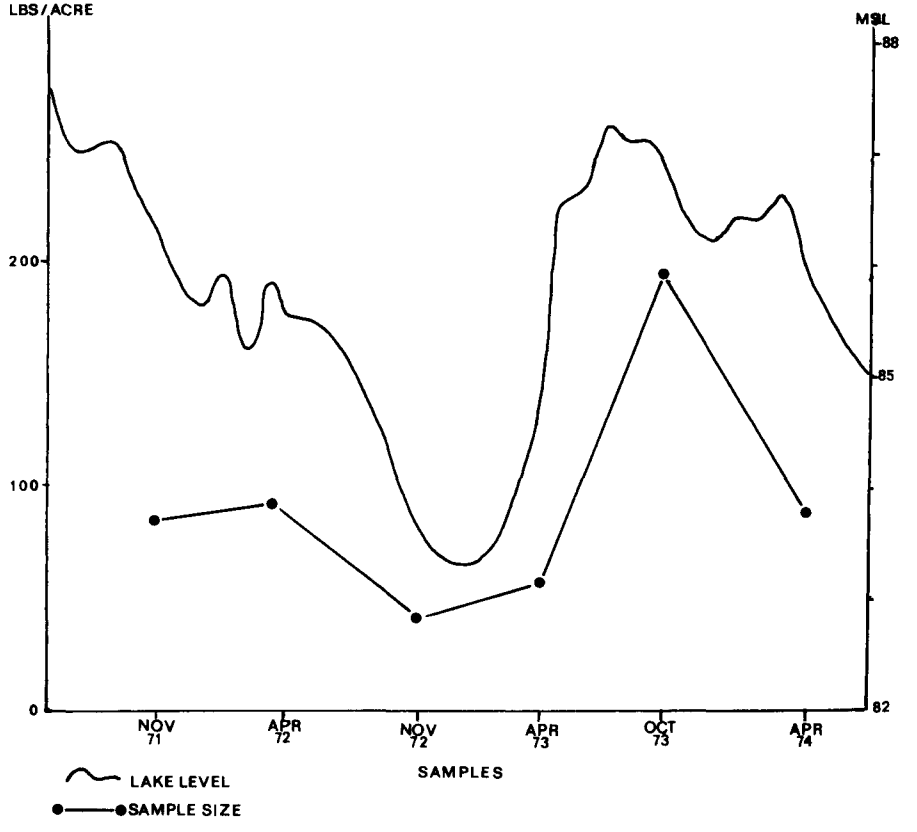

Figure 2. Lake Jackson lake level correlated with fish population sample size.

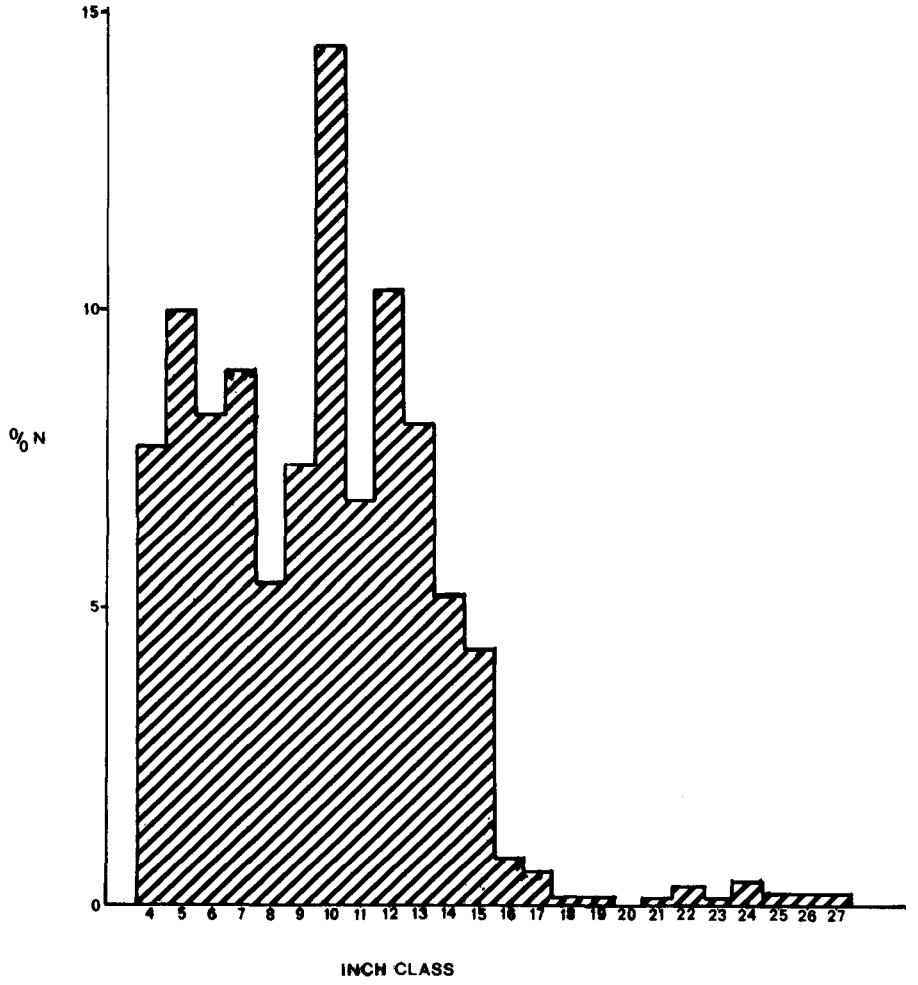

Figure 3. Lake Jackson length-frequency for largemouth bass (over three inches).

Table 2. Estimates of total harvest and species effort for Lake Jackson July 1973—June 1974.

	Summer 1973 *7-4 thru 9-25*		*Fall 1973* *9-26 thru 1-1*		*Winter 1974* *1-2 thru 5-23*		*Spring 1974* *5-24 thru 7-2*		*Year*	
	Harvest	*Effort*	*Harvest*	*Effort*	*Harvest*	*Effort*	*Harvest*	*Effort*	*Harvest*	*Effort*
Largemouth bass	6,316	20,583	5,907	18,704	19,359	68,037	21,457	44,678	53,039	152,002
Trophy bass (8 lbs.+)	49	——	26	——	256	——	0	——	331	——
Bluegill	22,505	13,129	513	1,511	275	629	20,532	14,565	43,825	29,384
Redear	12,990	10,136	894	1,829	1,641	3,277	9,420	11,817	24,945	27,059
Other	162	217	371	696	4,412	1,834	1,592	527	6,537	3,274
Total	42,022	44,065	7,711	22,740	25,943	73,777	53,001	71,587	128,677	212,169

Table 3. Comparison of effort and harvest in four Florida lakes during best years.

Lake	All Fish Size (acres)	Harvest (Fish/ac)	Effort (Hrs/ac)	Year	Largemouth Bass Harvest (Fish/ac)	Effort (Hrs/ac)	Year
Griffin[1]	9,100	33.07	35.94	'68-69	2.61	9.05	'68-69
Harris[1]	16,500	20.03	14.83	'70-71	2.37		'66-67
						5.03	'69-70
Tohopekaliga[2]	23,000	17.3	10.6	1970	1.02		1973
						2.98	1972
Jackson	4,300	29.9	49.3	'73-74	12.3	35.3	'73-74

[1] Ware, Forrest J., Wesley V. Fish, and Louie Prevatt. 1972. Five-year creel survey of two Florida lakes. Quart. Jour. Fla. Acad. Sci. 35(1) 1972.

[2] Wegener, William and Vince Williams. Completion Report, Lake Tohopekaliga drawdown study, July 1, 1970—June 30, 1974, Water Level Manipulation Project, D-J-F-29, Fla. Game & Fresh Water Fish Comm. (mimeo rept., 270 pp.).

Creel Survey

The creel survey initiated during the last year of the study documents the intense fishing pressure and large harvest exerted on the Lake Jackson sport fishery. Table 2 lists the results of the creel survey by species. It should be noted that bass accounted for 41.5% of the harvest and 71.6% of the total effort. Almost half (44.7%) of the total bass fishing effort occurred during the winter quarter, due to the fact that most trophy fish (77.3%) are caught during this period.

Comparing the Lake Jackson data with creel data available for other Florida lakes, the magnitude of the Lake Jackson harvest and pressure can be seen (Table 3). The overall harvest on Lake Jackson has been exceeded only by Lake Griffin and then in only one out of nine years. It should be noted that a large percent of the harvest of the other three lakes is composed of black crappie, *Pomoxis nigromaculatus*, which constitutes a negiligible portion of the Lake Jackson harvest. Largemouth bass comprises a much higher percentage of both effort and harvest on Lake Jackson than on the other lakes. Bass fishing effort is more than four times greater than the highest recorded for the other lakes and the harvest is nearly five times greater. For most years both effort and harvest are more than 10 times greater.

Although the bass fishing effort was very intense, the harvest remained correspondingly high and thus bass fishing success was very good. The lake was subdivided into four areas (Figure 4) and separate estimates of effort, harvest and success made for each area. Table 4 lists the bass effort and success by season for each area. The success figures range from 0.237 to 0.593 bass per hour with the yearly average for all areas equalling or exceeding 0.300 bass per hour. This compares favorably with other Florida lakes.

The bass fishing effort varied between areas from 30.5 hours per acre to 41.7 hours per acre. These figures are higher than total effort for all species on the other lakes (Table 3).

Due to the lake's national reputation for producing trophy fish, a large percentage of the bass fishing effort was directed at this segment of the population. A total of 331 trophy bass (8 lbs.+) were landed which is one trophy fish for each 13 acres (Table 5). A large percentage (60.1%) of the trophy fish were landed in area 2, where one trophy bass was landed for each eight acres.

A major portion of the trophy bass harvest occurred during the winter quarter when 77.3% of the total was caught. Although it was impossible to separate trophy bass effort from bass effort, during the winter quarter a very large percentage of the effort was directed solely at the trophy fish, evidenced by the principal fishing method employed, i.e., fishing with large shiners. During this quarter in the best area (#2) 167 man-hours of effort were required for each trophy fish caught. For the entire lake during the winter quarter this figure was 266 man-hours per trophy fish and for the entire year 459 man-hours per trophy bass.

In summary, Lake Jackson is a unique Florida lake in several ways: fish population structure, fishing effort and harvest, and especially the magnitude and importance of the largemouth bass fishery which differs significantly from other lakes in the state. The effect of the high bass fishing pressure and harvest on the Lake Jackson fishery is not yet completely understood, but future investigations will document further such effects and provide data for proper management of Lake Jackson's unique fishery.

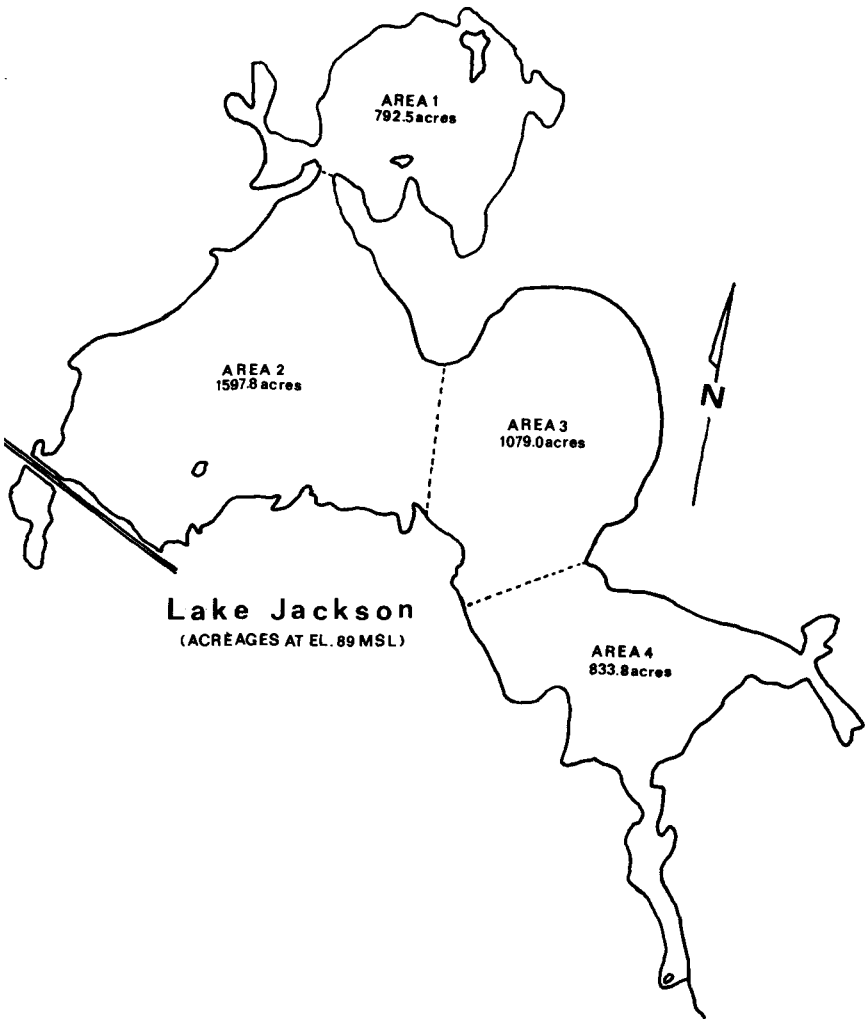

Figure 4. Lake Jackson creel survey areas.

Table 4. Lake Jackson bass fishing effort and success by area July 1973—June 1974.

	AREA 1		*AREA 2*		*AREA 3*		*AREA 4*	
	Effort (Man-hrs)	*Success (Bass/hr)*	*Effort (Man-hrs)*	*Success (Bass/hr)*	*Effort (Man-hrs)*	*Success (Bass/hr)*	*Effort (Man-hrs)*	*Success (Bass/hr)*
Summer 1973								
7/4 thru 9/25	2,739	.480	8,223	.256	5,952	.263	3,667	.291
Fall 1973								
9/26 thru 1/1	2,803	.272	7,998	.370	4,758	.410	3,144	—
Winter 1974								
1/2 thru 5/23	8,025	.318	25,165	.290	15,775	.289	19,071	.276
Spring 1974								
5/24 thru 7/2	10,586	.413	16,746	.585	8,452	.237	8,892	.593
Total effort	24,153		58,132		34,937		34,774	
Effort/acre	30.5		36.4		32.4		41.7	
Average success		.371		.375		.300		.387

Table 5. Lake Jackson trophy bass (8 lbs+) harvest by area July 1973—June 1974.

	Area 1	*Area 2*	*Area 3*	*Area 4*	*Entire Lake*
Summer 1973					
7/4 thru 9/25	0	32	17	0	49
Fall 1973					
9/26 thru 1/1	10	16	0	0	26
Winter 1974					
1/2 thru 5/23	35	151	37	33	256
Spring 1974					
5/24 thru 7/2	0	0	0	0	0
Total for Year	45	199	54	33	331

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