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THE CRAIG LAKE POPULATION INVESTIGATION FOR THE SUMMER OF 1947

by

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Craig Lake, in Branch County, is one of the experimental regulation lakes designated by the Conservation Commission in 1946. Prior to its being placed on the experimental list, Craig Lake was the subject of other investigations. A regular lake inventory was made in June of 1938. In the spring of 1940, fall of 1940, and spring of 1941, population estimates were made through the use of trap nets and the marking, releasing, and subsequent recovery of marked fish. Creel censuses were conducted in the winter of 1938-39, the summer of 1939, the fall and winter of 1939-40, and the summer of 1940. The lake inventory provided a background for the management proposal for Craig Lake of not stocking with bass or bluegills. No plantings of warm-water species have been made in the lake since 1942.

With the placing of Craig Lake on the experimental list a collection of fishes was made in the spring of 1946, and a random sample system of creel censusing inaugurated. The creel census will continue until 1950.

Craig Lake is not an ideal lake for population studies, but, because of prior studies, was chosen for further work. It is unfortunate that the lake has both a large inlet and outlet through which fish can and do move. This immediately complicates any accurate population estimate. As population estimates made by our present methods involve the knowledge of the number of marked fish present in the lake, an error is introduced by marked fish migrating to other lakes in the system. For example, if we marked 100 fish and released them in the lake and 50 moved out, our population estimates would double. It was impossible to screen off the inlet or outlet and thus an unknown error is inherent in our figures because we do not know the extent to which fish moved out of Craig Lake during the operation of the estimates. We know that fish do move out of the lake because marked fish have been taken in other lakes in the Coldwater chain.

Secondly, our present method appears to the author to have some inherent error in the calculations of population. When the estimate of the numbers of each species is made and the total taken we obtain one figure, but when we take all the data for all species and combine them into one table and estimate the total population, we find a figure considerably smaller than that for the sum of the individual species. In fact, in some instances, the total figure for a single species greatly exceeds the total population estimate. In I.F.R. Methods Memorandum Number 3, Walter Crowe lists a number of factors influencing the population estimate. Whether these reasons are valid and how they can be compensated for is a problem which the author strongly urges be studied next summer. It would seem logical that we must have an idea

of what numbers of fish are present in a lake if we are to manage those fish to provide the best possible fishing. It is suggested that a population study be made on a lake which is to be poisoned next season. The netting should begin early in the spring and continue right up to the time of the poisoning. A thorough population study should be made with the trap nets and marking, and as many fish as is possible to net should be marked. Then a periodic breakdown of the data can be made for comparative calculations on a seasonal or time basis. The poisoning and subsequent pickup would give a good check on the accuracy of the population estimates.

Even though the population estimates are not all that they should be or could be, some information can be obtained on an analysis of the data. A total of 16 species of fish were taken in the nets during the investigations. The kinds and numbers taken are given in Table 1. It is of interest to note that the netting done in the summer of 1947 reflects the general fishing conditions experienced by anglers, that is the catch falls off during the hotter mid-summer period. The netting in the spring of 1940 lasted 28 days, in the fall of 1940 for 37 days, and in the spring of 1941 for 29 days, while in the summer of 1947 the netting lasted for 24 days. A similar experience was had in the demonstration netting in Burt, Black and Mullet lakes where spring fishing results were much better than those of the mid-summer netting (see Report 1130).

The vast majority of the fish taken were of legal length. This is due to the size of the mesh in the nets. The smallest fish taken in all the netting was 5.3 inches in total length. Few perch were caught because of their shape and relatively small size, so for all practical

Table 1.--Numbers of fish taken in nets in Craig Lake and percentage composition of species in nets and fishermen's catch.

Species	Actual numbers of fish caught in the nets				Percentage composition of fish caught in the nets				Percentage composition of fish caught by anglers						
	Spring 1940	Fall 1940	Spring 1941	Summer 1947	Spring 1940	Fall 1940	Spring 1941	Summer 1947	Summer 1939	Summer 1940	Summer 1946	Summer 1947	Winter 1938-39	Winter 1939-40	Winter 1946-47
Bluegill	4,307	3,370	4,235	1,610	53.9	39.2	47.8	58.8	45.1	37.5	61.8	53.2	92.2	95.3	96.3
Largemouth black bass	609	310	553	141	7.6	3.6	6.2	5.1	9.6	9.7	7.4	2.0	trace	trace	0.1
Black crappie	979	512	765	533	12.2	6.0	8.6	19.5	1.4	1.7	2.2	6.4	0.6	2.0	0.3
Pumpkinseed	109	161	205	55	1.4	1.9	2.3	2.0	7.8	6.9	3.7	11.9	1.0	0.5	1.9
Rock bass	7	37	4	0	0.08	0.4	0.05	0.0	0.1	0.2	0.2	0.1	0.2	0.3	trace
Pike	34	38	100	32	0.4	0.4	1.1	1.2	1.4	1.4	0.9	0.1	...	...	...
Warmouth bass	412	222	310	38	5.2	2.6	3.5	1.4	1.0	1.3	0.6	0.6	5.0	0.2	0.2
Brown bullhead	863	2,230	2,118	229	10.8	25.9	23.9	8.4	14.0	16.1	9.5	1.8	...	...	...
Yellow bullhead	366	1,597	254	41	4.6	18.5	2.9	1.5							
Carp	5	13	41	0	0.06	0.2	0.5	0.0	...	...	...	...	...	...	...
Dogfish	292	109	268	57	3.7	1.3	3.0	2.0	0.9	1.4	1.0	...	...	...	...
Chub sucker	0	4	4	0	0.0	0.04	0.05	0.0	...	...	...	...	...	...	...
Gar pike	1	0	0	0	0.01	0.0	0.0	0.0	...	...	...	...	...	...	...
Perch	5	0	2	2	0.06	0.0	0.02	0.07	18.6	23.7	12.6	23.9	1.0	1.5	1.2
Common sucker	1	0	0	0	0.01	0.0	0.0	0.0	...	...	...	...	...	...	...
Redhorse	0	0	1	1	0.0	0.0	0.01	0.04	...	...	...	...	...	...	...
Total	7,990	8,603	8,860	2,739	...	...	...	...	...	...	...	...	...	...	...

considerations of population estimates the perch must be excluded from the discussion, even though they make up from 12.6 to 23.9 percent of the fishermen's catches during the fishing season.

The population estimates for the four more important fishes of Craig Lake are given in Table 2. The fluctuation in the bluegill population may in part reflect the contention that many bluegills migrate into Craig Lake for the winter. The drop in the estimate for the spring of 1941 may also be due to migration out of the lake because only 22,000 fish were removed by winter fishing, leaving 100,000 to be accounted for by migration or natural death. Certainly natural death is not the entire factor in the decrease because the presence of 100,000 dead fish in a lake the size of Craig would be brought to the Department's immediate attention, and no such loss of fish has been reported from Craig Lake. The rise in the summer is in part due to the recruitment of fish from the under legal-sized fish of the spring and early summer. The decline in the largemouth black bass and the increase in the numbers of black crappies are reflected in the fishermen's take although the percentage of black bass remained nearly the same in proportion to the total fish caught in the nets. Continuation of the creel census should demonstrate the status of the largemouth black bass in future years.

Inasmuch as there were inherent errors in the method of estimating the total population, an analysis of the data was made on the basis of the percentage composition by species for the catches made at each netting period. These percentages are presented in Table 1. In general, a fairly stable fish population has been maintained in Craig Lake since 1940. A comparison between the percentages of each species as taken by the fishermen (also in Table 1) and those taken by nets show very close agreement.

Table 2.--Summary of Population Estimates for Craig Lake, Branch County

	Spring 1940	Fall 1940	Spring 1941	Summer 1947
Total fish caught	7,990	8,603	8,860	2,739
Total number marked	7,424	7,774	6,569	2,231
Total number recoveries	567	985	746	47
Percentage recoveries	4	13	11	2
Population estimates				
Bluegill	52,956	167,072	47,402	100,996
Pumpkinseed	996	2,275	1,037	no recoveries
Largemouth black bass	5,854	8,860	2,200	843
Black crappie	15,151	8,526	4,497	32,790
Total population estimate	48,489	32,503	54,929	87,509

No bluegills have been planted in Craig Lake since 1942, and the bluegill population has remained about the same. The slight increase in percentage taken in the net may indicate a real increase in the lake because the percentage taken by the fishermen also showed an increase. Similarly a slight decrease in the largemouth black bass population would be indicated by a drop in the fishermen's take, while an increase in the black crappies which have not been planted is indicated by both groups of percentages. However, another possible explanation might be in the type of fishing, particularly where the largemouths are concerned. A drop of one percent in the total population hardly seems likely to cause a drop of five percent in the fishermen's catch. A period of slow fishing for bass could easily cause the fishermen to drop bass fishing for awhile and with good bluegill fishing the fishermen might not fish as much for bass. Another explanation for a drop in bass fishing might be the increase in black crappies. Fishermen using small minnows for bass may be taking black crappies instead of bass, as the crappies will bite on bass-sized minnows. A decrease in both species of bullheads is noted both in the net catches and fishermen's take.

There is apparently a shift of fishing pressure for northern pike. The 1947 northern pike population has increased somewhat over that found in 1940, but the catch has decreased from 1.4 percent to 0.1 percent. This, it would seem, would indicate that people have practically quit fishing for pike. The increase in fishermen's take of pumpkinseeds is peculiar because the percentage of pumpkinseeds in the net catches has remained the same or nearly so. No estimate of the population of this species was possible for lack of recoveries of marked fish which may indicate a larger number of pumpkinseeds than in earlier years.

Of considerable interest is the catch per hour data (Table 3). In the summer of 1939, 1940, and 1946, the catch per hour was 0.7 fish. In 1947 the catch per hour rose to 1.1 fish per hour, but this figure is based upon incomplete returns and it is possible that there will be some slight change when the remainder of the data are incorporated. In the winters of 1938-39 and 1939-40 the catch per hour was 2.6 fish, but in 1946-47 a rise in catch per hour was shown to have occurred. The catch per hour in the winter of 1946-47 was 3.2 fish per hour. Whether this rise in catch per hour will be maintained is something that our future creel censuses alone can determine. Some fluctuation is to be expected.

At the time the population estimate was being conducted a number of fish were weighed, measured and scale sampled. Age determinations have been made on the bluegill samples and there has been no significant change in the rate of growth of the bluegills. Age determinations are not complete for the other species. Bluegills in Craig Lake attain the legal length of 6 inches during their fourth summer of life, which is average for the state as a whole.

In view of the preceding data, it is recommended that the present management program for Craig Lake be kept in effect. The bluegill population has maintained itself at a high level despite intensive winter fishing and no stocking. The largemouth black bass population has been maintained at about the same level as when stocking was being done, but the catch has declined. No stocking of bass is recommended at present.

Table 3.--Catch per hour on Craig Lake, Branch County, based on data from special creel censuses.

	Summer 1939	Summer 1940	Summer 1946	Summer 1947	Winter 1938-39	Winter 1939-40	Winter 1946-47
Catch per hour	0.7	0.7	0.7	1.1*	2.6	2.6	3.2
Number of fishermen	3,745	3,196	5,122	3,004*	2,478	2,687	2,700
Number of fish	8,918	6,035	11,283	9,339*	22,215	23,049	22,261
Hours fished	12,531	8,659	15,932	8,563*	8,427	8,999	6,973

*Incomplete summer data

With three more seasons of creel census to be conducted on Craig Lake under the experimental lake classification, the needed information will be gathered as the experimental plan calls for an intensive netting program during the last year of the experiment.

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