2. *Silker, T. H.* 1948. Planting of water-tolerant trees along margins of fluctuating level reservoirs. Iowa State College Journal of Science, 22(4) :431-448.
3. *Hall, T. F. and G. E. Smith.* 1955. Effects of flooding on woody plants, West Sandy Dewatering Project, Kentucky Reservoir. Journal of Forestry 53(4) :281-285.
4. *Putnam, John A.* 1951. Management of bottomland hardwood. Occasional Paper 116, Southern Forest Experiment Station.
5. *Gamble, M. D.* Inundation tolerance of some grasses and legumes—A progress report (SCS, Oklahoma City, Okla., mimeographed report, undated, probably 1958).
6. *Broadfoot, M. W.* June, 1958. Study effects of impounded water on trees. Mississippi Farm Research 20(6) :1-2. Agricultural Experiment Station, State College, Mississippi.

THE BLACK AND WHITE CRAPPIES OF THE SANTEE-COOPER RESERVOIR

By ROBERT E. STEVENS
South Carolina Wildlife Resources Department

ABSTRACT

The reservoir has a surface acreage of 160,500 and contains two rather dissimilar lakes; namely, Lake Moultrie and Lake Marion.

A four-year continuous creel census indicated that three-fourths of the catch of crappies was made in Lake Marion.

Four distinct growth rates were encountered in a growth study of each species in each lake.

A food habit study of 149 full crappie stomachs showed insects to occur 77.1% of the time and fish 55.7% of the time.

A world record black crappie *(Pomoxis nigro-maculatus)* was caught in Lake Moultrie on March 15, 1957.

INTRODUCTION

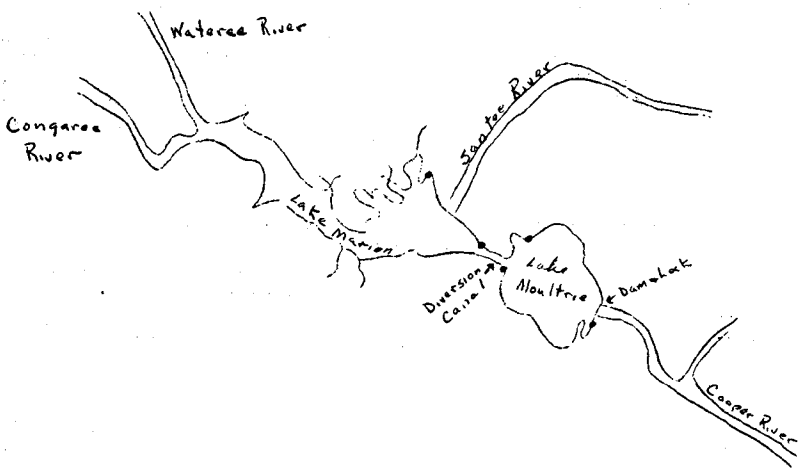
On November 12, 1941, the water of the Santee River was impounded and diverted to form the Santee-Cooper Reservoir. The reservoir contains 160,500 acres when full and is composed of Lake Marion which is 100,500 acres, and Lake Moultrie which is 60,000 acres. The lakes are joined by a canal which serves to divert the water of the Santee River down the Cooper River where it meets the ocean (Figure 1). The primary purpose of the reservoir is electrical power which is generated at Pinopolis Dam on Lake Moultrie. Also at Pinopolis Dam is a navigation lock which is 180 feet long, 60 feet wide and has a lift of 75 feet.

The reservoir is unique in that while it is one of the largest impoundments in existence, it is also very shallow. In the four years covered by a creel census, low water conditions have reduced the average surface acreage of the reservoir from 160,500 to approximately 108,000 acres with an average depth of only 14.3 feet. This, along with the fact that the water is turbid only after prolonged periods of heavy rain, goes a long way in explaining the unusual productivity of the reservoir.

Lake Marion: The upper impoundment is a relatively long narrow lake which has averaged 63,000 surface acres and only 12.4 feet in depth for the past four years. It is approximately 40 miles long and 3.5 miles wide. The shoreline is about 300 miles and includes many cove areas. The maximum depth is 35 feet.

Except for a small area near the dam, the forest was left standing at the time the basin was inundated. This forest of dead trees along with many sunken and derelict logs creates an ideal habitat for members of the sunfish

Figure 1 Map of the Santee-Copper Reservoir Showing the Locations of the Creel Census Stations



family *(Centrachidae)*. This lake supports the majority of the fishing effort except for striped bass *(Roccus saxatilis)*.

Lake Moultrie: This is a relatively round lake with 115 miles of shoreline and has almost no cove areas. The lake is approximately 10 miles across and has a maximum depth of 75 feet. Lake Moultrie, for the past four years, has averaged 44,000 surface acres and 17.4 feet in depth. All trees were removed from the basin before impoundment. This lake produces the majority of the catch of striped bass and contains most of the deep areas in the reservoir.

Diversion Canal: This canal joins the two lakes and is 6.5 miles long and 200 feet wide.

CREEL CENSUS

August 31, 1958, marked the end of the fourth consecutive year of a partial creel census of the reservoir.

The census measures a small but unknown percent of the fishing effort. The only information which indicates the size of the sample is an aerial count of fishermen made between 11:00 A. M. and 12:45 P. M. on November 19, 1956. The ground census for that day was 11.0 percent of the aerial count. The aerial count missed those fishermen which left the lake before the flight or entered upon the lake after the flight, but it does give at least an indication of the coverage of the census.

Except for a short time during the first year, the census has been maintained in the same locations by the same people. The number of days checked each year and the number of fishermen checked each day for the four-year period are very close. It is for these reasons that I believe the relative information and the trends that are apparent in the data are accurate.

Several salient features of the creel census method should be emphasized as follows:

1. The two species of crappies are not separated by the census takers and are therefore treated as one species in the census data. A sample of 568 crappies taken from the creel in Lake Marion in the spring of 1958 showed black crappie to be the dominant species with 77.3% of the creel. A netting study in Lake Moultrie at the same time which took 235 crappies, gave a ratio of 84.3% black crappie to 15.7% white crappie.
2. Only successful fishermen are considered since the catch of each game fish is analyzed in terms of average catch per trip. Fishermen who are unsuccessful cannot be satisfactorily assigned to any species.

3. An examination of Figure 1, which marks the location of the creel census stations, shows that the census does not cover the upper 35 miles of Lake Marion. If it did, the role of crappie, bream and largemouth bass in the data would increase while that of striped bass would decrease.

Table I compares the catch of crappie between lakes and shows that about three-fourths of the crappie fishing is produced by Lake Marion. This is true even though Lake Moultrie has good creel census coverage while the area covered in Lake Marion is only about 15% of the total area (Figure 1). The average catch is also superior in the upper impoundment amounting to 8.1 fish per trip against 6.7 fish per trip for Lake Moultrie.

TABLE I

A COMPARISON OF THE CATCH BETWEEN EACH LAKE FOR THE FOUR-YEAR PERIOD

	Catch	*Percent*	*Successful Fishermen*	*Percent*	*Average Catch*
Lake Marion	142,351	79.0	17,567	75.6	8.1
Lake Moultrie	37,877	21.0	5,670	24.4	6.7
TOTAL	180,228	100.0	23,237	100.0	7.8

Table II reduces by year the catch, successful fishermen and average catch. Crappies accounted for about one-half of the total catch in each of the first three years of the census.

TABLE II

CREEL CENSUS DATA ON CRAPPIES FOR FOUR YEARS BETWEEN SEPTEMBER 1, 1954 AND AUGUST 31, 1958

	1954–55	*1955–56*	*1956–57*	*1957–58*
Total Catch	43,485	55,155	58,325	23,263
Percent of Total Catch	45.4	55.3	48.3	31.4
Number of Successful Fishermen	6,533	8,155	5,781	2,768
Percent of Total Successful Fishermen	36.8	38.2	29.3	19.3
Average Catch Per Man	6.7	6.9	10.1	8.4
Average Weight (4,855 Fish)	1.10	0.74	0.83	1.00

The percent of the total successful fishermen represented by crappie fishermen, on the other hand, dropped last year to 29.3% from an average in the previous two years of 37.5%. The drop was despite a large improvement in the average catch per trip.

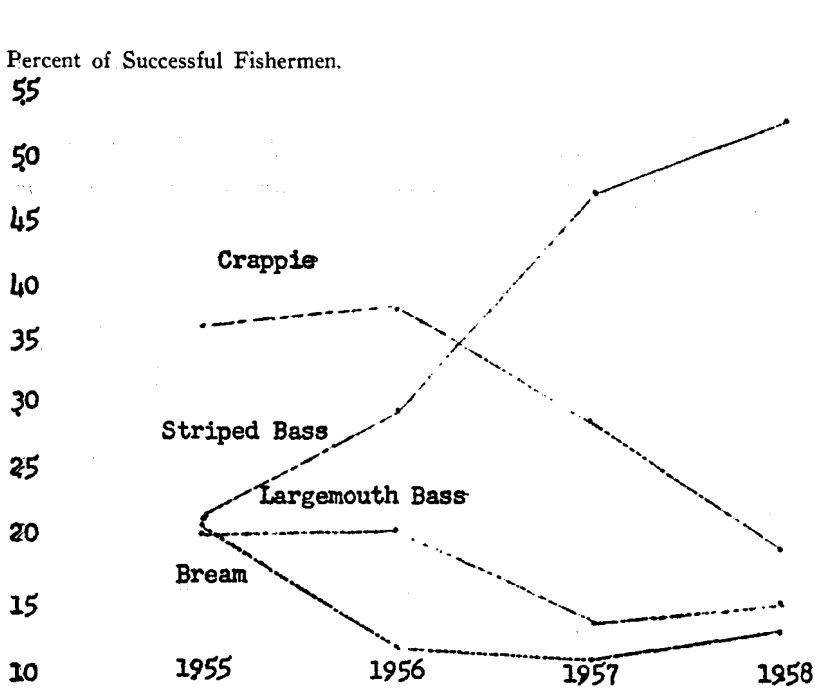
A similar anomaly occurred also with largemouth bass and bream fishing and shows a change in preference to striped bass fishing by fishermen (Table III). This change coincided with the rapid increase in the striped bass population in 1956 and 1957.

TABLE III

A COMPARISON OF THE PERCENT OF SUCCESSFUL FISHERMEN BY SPECIES

	1955	*1956*	*1957*	*1958*
Striped Bass	21.7	30.0	47.1	52.9
Largemouth Bass	20.3	20.6	13.2	15.0
Bream	21.2	11.2	10.4	12.8
Crappie	36.8	38.2	29.3	19.3
TOTAL	100	100	100	100

The creel census last year showed 1958 to be the poorest year on record. This fact can be explained, I believe, entirely in terms of inclement weather. December marked the beginning of one of the coldest, wettest winters in recent years. This accompanied by turbid water and high winds depressed the fishing effort until mid-summer. The total catch of all species was only 61.2% of last year while the catch of crappies amounted to only 39.9% of the catch of crappies last year.



The successful crappie fishermen dropped another 10% to only 19.3% of the total successful fishermen in 1958. This additional drop is due more to the fact that the bad weather virtually eliminated crappie fishing during most of the crappie season than to an additional change in preference to striped bass fishing.

During the four-year period, sample weights of 4,855 crappies were taken from fishermen's creels (Table II). The average weight of these fish was 0.87 pounds.

AGE—GROWTH

The growth of each species in each lake amounts to four distinct rates of growth.

Both species in Lake Moultrie grow more rapidly than their counterparts in Lake Marion.

White crappie (*Pomoxis annularis*) in Lake Moultrie is the fastest growing population of crappies in the reservoir. Black crappie in the same lake ranks second, with white crappie in Lake Marion third, and finally, black crappie in Lake Marion being the slowest grower (Table IV).

TABLE IV

A COMPARISON OF THE RATE OF GROWTH BY SPECIES AND BY LAKE

	Number	*I*	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*
Lake Moultrie:									
White Crappie	37	2.2	8.2	11.3	13.4	14.6	15.0	14.9	...
Black Crappie	198	2.3	6.3	10.6	12.4	13.2	14.0	15.0	15.0
Lake Marion:									
White Crappie	129	1.9	6.9	9.9	11.2	12.3	12.6	13.1	...
Black Crappie	239	1.8	4.8	7.9	10.1	11.4	12.6	12.5	13.4
White Crappie:									
Lake Moultrie	...	2.2	8.2	11.3	13.4	14.6	15.0	14.9	...
Lake Marion	...	1.9	6.9	9.9	11.2	12.3	12.6	13.1	...
Black Crappie:									
Lake Moultrie	...	2.3	6.3	10.6	12.4	13.2	14.0	15.0	15.0
Lake Marion	...	1.8	4.8	7.9	10.1	11.4	12.6	12.5	13.4

The individual calculated growths and growth increments are illustrated in Tables V, VI, VII and VIII.

TABLE V

AVERAGE CALCULATED LENGTHS AND ANNUAL LENGTH INCREMENTS IN INCHES OF WHITE CRAPPIE FROM LAKE MOULTRIE

Age Group	*No. of Fish*	*Avg. Total Length*	*Calculated Total Length at End of Year of Life* 1	2	3	4	5	6	7
0	3	2.0	. .	. . .	. . .	. . .	. . .	. . .	. . .
I	0	. . .	. .	. . .	. . .	. . .	. . .	. . .	. . .
II	11	14.1	2.1	11.1	. . .	. . .	. . .	. . .	. . .
III	8	14.1	1.9	7.3	11.5	. . .	. . .	. . .	. . .
IV	5	14.3	2.0	6.7	10.5	12.9	. . .	. . .	. . .
V	6	15.5	3.0	7.7	12.0	14.0	14.9	. . .	. . .
VI	2	15.9	2.3	4.5	11.5	13.6	15.0	15.7	. . .
VII	2	15.5	1.5	5,5	10.0	12.4	13.5	14.2	14.9
GRAND AVERAGE AND TOTAL	37	. . .	2.2	8.2	11.3	13.4	14.6	15.0	14.9
INCREMENTS OF GROWTH	. . .	. . .	2.2	6.0	3.1	2.1	1.2	0.4	. . .

TABLE VI

AVERAGE CALCULATED LENGTHS AND ANNUAL LENGTH INCREMENTS IN INCHES OF BLACK CRAPPIE FROM LAKE MOULTRIE

Age Group	*No. of Fish*	*Avg. Total Length*	*Calculated Total Length at End of Year of Life* 1	2	3	4	5	6	7	8
0	. .	. . .	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .
I	66	4.6	3.0	. .	. . .	. . .	. . .	. . .	. . .	. . .
II	31	8.6	2.0	6.2	. . .	. . .	. . .	. . .	. . .	. . .
III	26	13.4	1.9	7.2	11.6	. . .	. . .	. . .	. . .	. . .
IV	30	14.5	2.2	7.2	11.9	13.4	. . .	. . .	. . .	. . .
V	36	14.3	2.0	5.5	9.4	12.0	13.4	. . .	. . .	. . .
VI	6	14.8	2.0	4.8	8.0	10.5	12.5	14.2	. . .	. . .
VII	2	16.4	2.0	5.7	9.3	11.2	12.9	14.3	15.5	. . .
VIII	1	15.4	1.3	3.8	6.6	7.6	8.9	12.6	13.9	15.0
GRAND AVG. AND TOTAL	198	. . .	2.3	6.3	10.6	12.4	13.2	14.0	15.0	15.0
INCREMENTS OF GROWTH	. . .	. . .	2.3	4.0	4.3	1.8	0.8	0.8	1.0	. . .

TABLE VII

AVERAGE CALCULATED LENGTHS AND ANNUAL LENGTH INCREMENTS IN INCHES OF WHITE CRAPPIE FROM LAKE MARION

Age Group	*No. of Fish*	*Avg. Total Length*	*Calculated Total Length at End of Year of Life* 1	2	3	4	5	6	7	8
0	. .	. . .	. .	. .	. . .	. . .	. . .	. . .	. . .	. . .
I	2	9.2	1.8	. .	. . .	. . .	. . .	. . .	. . .	. . .
II	52	10.1	2.0	8.0	. . .	. . .	. . .	. . .	. . .	. . .
III	47	11.5	1.8	6.7	10.6	. . .	. . .	. . .	. . .	. . .
IV	15	12.4	1.9	6.2	9.4	11.7	. . .	. . .	. . .	. . .
V	7	14.0	1.6	4.8	9.3	11.6	13.2	. . .	. . .	. . .
VI	4	14.1	1.4	3.5	7.1	10.1	11.8	13.3	. . .	. . .
VII	2	13.4	1.9	3.5	5.9	7.6	9.9	11.2	13.1	. . .
GRAND AVG. AND TOTAL	129	. . .	1.9	6.9	9.9	11.2	12.3	12.6	13.1	. . .
INCREMENTS OF GROWTH	. . .	. . .	1.9	5.0	3.0	1.3	1.1	0.3	0.5	. . .

TABLE VIII

AVERAGE CALCULATED LENGTHS AND ANNUAL LENGTH INCREMENTS IN INCHES OF BLACK CRAPPIE FROM LAKE MARION

Age Group	*No. of Fish*	*Avg. Total Length*	*Calculated Total Length at End of Year of Life*							
			1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
0	...	...	...	...	...	...	...	...	...	...
I	2	8.3	2.3	...	...	...	...	...	...	...
II	19	8.8	2.1	6.5	...	...	...	...	...	...
III	78	10.0	1.8	4.9	8.7	...	...	...	...	...
IV	68	11.4	1.8	4.7	8.0	10.7	...	...	...	...
V	34	12.8	1.7	4.3	7.3	9.6	11.7	...	...	...
VI	26	13.6	1.7	4.3	7.5	10.0	11.7	13.2	...	...
VII	10	13.0	1.6	3.9	6.2	7.9	10.2	11.5	12.5	...
VIII	2	13.8	1.6	4.2	5.0	7.0	9.1	10.6	12.1	13.4
GRAND AVG. AND TOTAL	239	...	1.8	4.8	7.9	10.1	11.4	12.6	12.5	13.4
INCREMENTS OF GROWTH	...	...	1.8	3.0	3.1	2.2	1.3	1.2	0.1	0.9

The greatest growth increments occur in the second and third years for each species in each lake. White crappie, however, make the greatest increase in the second year while black crappie make the greatest increase in the third year.

No white crappie beyond year class VII or black crappie older than year class VIII was encountered.

Figure 2 graphically compares the length-weight relationship of the two species of crappie within the reservoir and shows that for a given total length above 8 inches, black crappie are slightly heavier than white crappie. Despite this, from the standpoint of the greatest weight produced in the shortest time, white crappie are superior growers to black crappie in both impoundments.

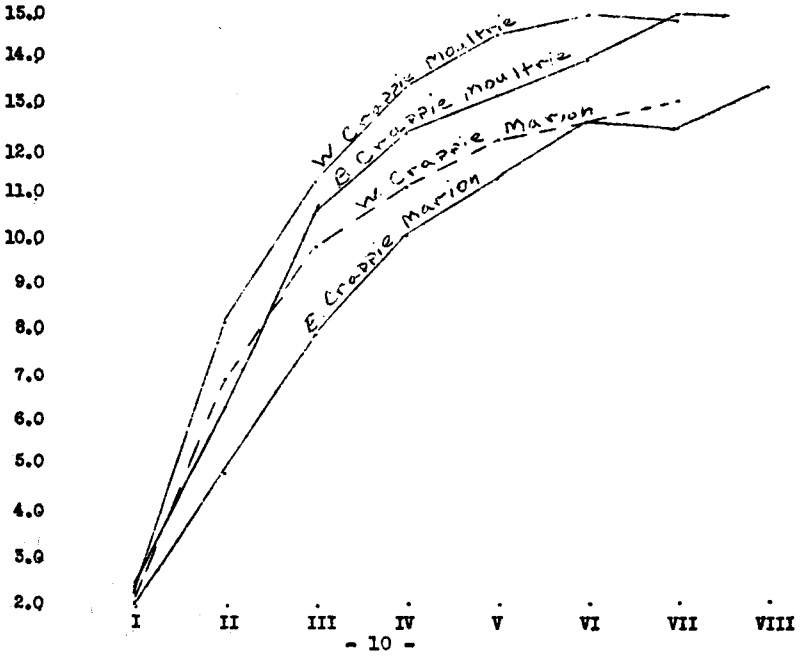
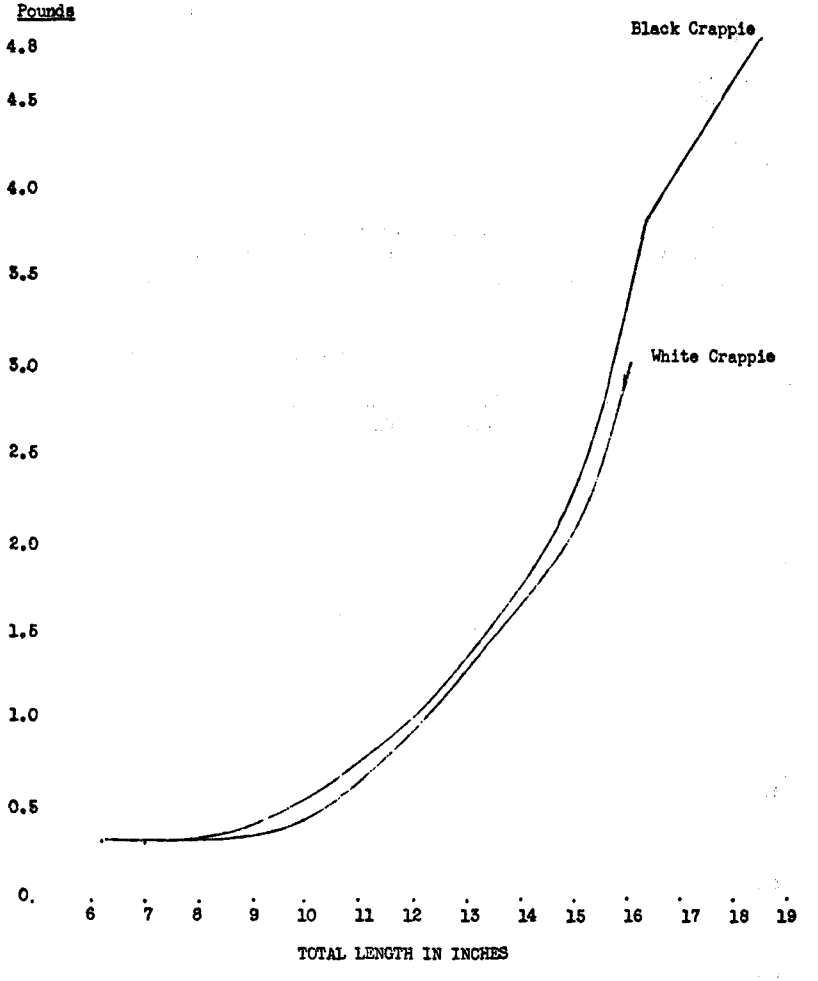


Table IV lists the growth of each species in each lake in order of a decreasing rate of growth. An inspection of this table at year class IV, for an exaple, shows white crappie in Lake Moultrie to be 13.4 inches in total length. Black crappie in the same lake reach this approximate size at five years, while in Lake Marion, white crappie require seven and black crappie eight growing seasons to reach this length.

Fertility: No bottom study or other data have been collected to date which might demonstrate a difference in fertility, if any, between lakes. It is obvious

Figure 2 Length-Weight Relationships of Black and White Crappie in the Santee-Cooper Reservoir



from the creel census data that the populations of crappies in Lake Marion are much larger than in Lake Moultrie. It is assumed, therefore, that the difference in growth rate is due to the difference in size of the populations in each lake.

While the dead forest aspect of Lake Marion probably produces, in general, a more favorable habitat for crappie, it fails to explain the large discrepancy in the size of the populations within each lake.

Also, even though striped bass are much more prevalent in Lake Moultrie, no significant predation upon crappie was noticed in previous food habit studies of 1,634 full striped bass stomachs (Stevens, 1957). This study did not include striped bass under 8.5 inches, however, and would miss any predation which may occur in the fingerling or post-larval level.

Certain data which are not included herein indicate that there are sub-populations within each species of crappie in Lake Marion which differ significantly in growth rate. These data were not included for the sake of simplicity. They are mentioned, however, to point out that distinct sub-populations of all species of the more sedentary fishes probably exist in reservoirs as long and narrow as Lake Marion.

Giant Crappie: The largest crappie examined during the study was a black crappie caught in Lake Moultrie in May. This fish was 18.6 inches in total length, 16.3 inches in girth and weighed 4 pounds, 13 ounces. An examination of the scales of this fish showed it to have just completed its seventh year of growth.

On March 15, 1957, a black crappie was caught on the north shore of Lake Moultrie which has been accepted by *Field and Stream Magazine* as their official world record for this species. Mr. Mike Ball of that organization in personal correspondence stated the fish to be 19.2 inches in total length, 18.6 inches in girth and to have weighed 5 pounds and 0 ounces.

The largest white crappie examined during the study weighed 3.0 pounds. A photograph of a white crappie reported to have weighed 4 pounds and 10 ounces is on file. This fish was taken in Lake Marion but no confirmed size record is available. Crappie of five pounds or larger are reported each year by fishermen and creel census takers.

The literature contains several records of white crappie exceeding five pounds but nothing could be found on black crappie approaching this size.

The annulus was formed by both species in both lakes between March 26 and May 22 during the current year. Of 603 crappies of both species examined, only 5.5% exceeded five years of age.

Tables IX and X compare the growth rates of each species in each lake with crappies in other impoundments.

White crappie in Lake Moultrie were faster growers than white crappie in any of the several lakes listed in Table IX. White crappie in Lake Marion grow slightly more slowly than those in Kentucky Lake but faster than white crappie in several lakes in Oklahoma and in Lake Decatur, Illinois.

Black crappie in Lake Moultrie grow more slowly than black crappie in Norris Reservoir, and Onized Lake in Illinois, but faster than in several other impoundments in Tennessee, Florida, North Carolina and Oklahoma.

Black crappie in Lake Marion exceeded only two lakes in Florida and the growth was about equal to the state-wide average growth for black crappie in Oklahoma.

TABLE IX

A COMPARISON OF GROWTH OF WHITE CRAPPIE IN SEVERAL IMPOUNDMENTS IN ORDER OF DECREASING GROWTH RATE AT AGE GROUP THREE

Authority	*Impoundment*	*Number of Fish*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Stevens (1958)	Lake Moultrie, S. C.	37	2.2	8.2	11.3	13.4	14.6	15.0	14.9	...
Carter (1953)	Kentucky Lake, Ky.	925	4.6	7.9	10.4	11.9	12.8	...	...	...
Stevens (1958)	Lake Marion, S. C.	129	1.9	6.9	9.9	11.2	12.3	12.6	13.1	...
Jackson (1957)	Upper Spavinaw, Okla.	140	4.5	9.3	...	...	...	...	...	...
Jackson (1957)	Lower Spavinaw, Okla.	460	4.6	8.2	9.4	11.2	13.3	...	...	...
Hansen (1951)	Lake Decatur, Ill.	3,507	...	7.3	9.1	10.5	10.6	12.2	12.3	...
Hall et al. (1954)	Oklahoma State Average	10,560	2.9	5.9	7.8	9.8	11.9	13.2	14.2	15.0

TABLE X

A COMPARISON OF GROWTH OF BLACK CRAPPIE IN SEVERAL IMPOUNDMENTS IN ORDER OF DECREASING GROWTH RATE AT AGE GROUP THREE

Authority	*Impoundment*	*Number of Fish*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Eschmeyer (1941)	Norris Reservoir, Tenn.	211	5.0	10.9	12.2	...	...	...	...	...	...
Stroud (1948)	Norris Reservoir, Tenn.	925	3.2	9.5	11.8	12.7	13.7	...	...	...	...
Bennett (1945)	Onized Lake, Ill.	353	3.4	8.0	11.4	...	...	...	...	...	...
Stevens (1958)	Lake Moultrie, S. C.	198	2.3	6.3	10.6	12.4	13.2	14.0	15.0	15.0	...
Stroud (1949)	Cherokee Reservoir, Tenn.	85	1.8	7.2	10.3	...	...	...	...	...	...
Stroud (1949)	Hiawassee Reservoir, N. C.	9	2.9	7.5	10.2	11.5	...	...	...	...	...
Huish (1954)	Lake George, Fla.	943	4.4	8.1	9.9	11.5	12.5	12.1	...	...	...
Hall et al. (1954)	Oklahoma-State Average	2,406	3.1	6.3	8.2	9.9	11.6	13.5	15.2	...	...
Stroud (1949)	Douglas Reservoir, Tenn.	28	4.7	7.0	8.1	...	...	...	...	...	...
Stevens (1958)	Lake Marion, S. C.	239	1.8	4.8	7.9	10.1	11.4	12.6	12.5	13.4	...
Huish (1957)	Lake Eustis, Fla.	292	2.0	4.4	6.8	8.3	9.4	10.4	11.2	11.7	...
Huish (1957)	Lake Harris, Fla.	403	1.9	4.2	6.6	8.5	9.8	11.2	12.2	13.0	13.8

FOOD HABITS

A limited amount of food habit information was collected from both species of crappie in Lake Moultrie (Table XI). The severe winter greatly limited the success of a netting effort which was carried out in order to collect crappie for the study.

TABLE XI

A LIST OF FOOD ITEMS FOUND IN 149 FULL CRAPPIE STOMACHS TAKEN IN LAKE MOULTRIE BETWEEN JANUARY AND MAY, 1958; AND ANALYZED BY FREQUENCY OF OCCURRENCE

Species	*Frequency*	*Percent*
Shad *	12	8.1
Gizzard Shad	2	1.3
Threadfin Shad	20	13.4
Bream	5	3.4
Yellow Perch	2	1.3
Needlefish	1	0.7
Unidentified Fish Remains	51	34.2
Freshwater Shrimp	2	1.3
Mayfly Nymphs	57	38.3
Dragonfly Nymphs	42	28.2
Diptera Larvae	25	16.8
Damselfly Larvae	1	0.7
Beetle Larvae	3	2.0
Insect Remains	14	9.4
Annelid Worm	1	0.7
Algae	2	1.3
Vegetation	1	0.7

Species	*Total Stomachs*	*Full Stomachs*	*Empty Stomachs*
Black Crappie	136	116	20
White Crappie	38	33	5
	174	149	25

Fish occurred in 55.7% of the full stomachs.
Insects occurred in 77.1% of the full stomachs.

* Includes undifferentiated threadfin shad and gizzard shad.

A total of 174 stomachs were examined, of which 149 (85.6%) were full. The full stomachs included 116 black crappie and 33 white crappie. There was no significant difference in the feeding habits of the two species. Fish occurred in 55.7% of the full stomachs and insect life in 77.1% of the full stomachs. All fish were found to be in extremely good condition with large amounts of excess fat in the coelom. The 174 crappie examined averaged 13.4 inches in total length and, except for one 6.6 inch fish, ranged between 10.6 inches and 16.5 inches in length. The proportion of insect filled stomachs would undoubtedly have been larger had immature crappie been included in the study.

Spawning: Gravid fish of both species were found during the first week of April. The spawning season may occur earlier in years having more normal winter and spring temperatures.

CONCLUSIONS

In Lake Moultrie, there exists small but rapid growing populations of black and white crappies. Lake Marion on the other hand, contains a large but more slowly growing population of each species and, in turn, supports the majority of the crappie fishing found within the reservoir.

Of the two, the situation in Lake Marion is much more desirable even though the crappies are relatively more stunted than those in Lake Moultrie. Of the four populations of crappies, the black crappie in Lake Marion maintains the slowest rate of growth. It is also the largest population and provides the majority of the crappie fishing within the reservoir. From the standpoint of

sport fishing, therefore, the more slowly growing population in this case is also the most desirable one. The law of diminishing returns would soon enter the picture, however, if the growth rate of this population decreased appreciably because of an additional increase in the number of fish.

In reality all the populations contribute to the excellent crappie fishing in the reservoir—a fishery in which a successful crappie fisherman can expect to catch almost eight fish per trip weighing about one pound each and have a chance of taking a world record black crappie to boot!

ACKNOWLEDGMENT

I am indebted to Mr. J. C. Fuller of the South Carolina Wildlife Resources Department for his advice throughout the study. The field assistance of Mr. Oscar M. Dennis and Edward Wrenn was invaluable and the secretarial help of Mrs. Mabel Thomas is gratefully acknowledged.

LITERATURE CITED

1. Bennett, George W. 1945. Overfishing in a Small Artificial Lake, Onized Lake near Alton, Illinois. Bull. Ill. Nat. Hist., Vol. 22, No. 3, pp. 372-406.
2. Carter, Ellis R. 1953. Growth Rates of the White Crappie, *Pomoxis annularis* in Kentucky Lake. Fisheries Bulletin No. 12, Dept. of Fish and Wildlife Resources, Frankfort, Ky.
3. Eshmeyer, R. W., and Alden M. Jones. 1941. The Growth of Game Fishes in Norris Reservoir During the First Five Years of Impoundment. Trans. of the 6th North American Wildlife Conf.
4. Hall, Gordon E., Robert M. Jenkins and Joe C. Finnell. 1954. The Influence of Environmental Conditions Upon the Growth of White Crappie and Black Crappie in Oklahoma Waters. Okla. Fish Res. Lab. Rep. No. 40, March, 56 pp.
5. Hansen, Donald F. 1951. Biology of the White Crappie in Illinois, Bulletin of the Illinois Natural History Survey, Vol. 25, Art. 4.
6. Huish, Melvin T. 1954. Life History of the Black Crappie of Lake George, Fla. Trans. Am. Fish. Soc., Vol. 83 (1953), pp. 176-194.
7. ————————. 1957. Life History of the Black Crappie of Lakes Eustis and Harris, Fla. Eleventh Annual Conf. of the Southeastern Association of Game and Fish Commissioners, Mobile, Oct. 20-23, 1957.
8. Jackson, Samuel W., Jr. 1957. Comparison of the Age and Growth of Four Fishes from Lower and Upper Spavinaw Lakes, Okla. Eleventh Annual Conf. of the Southeastern Association of Game and Fish Commissioners, Mobile, Oct. 20-23, 1957.
9. Stevens, Robert E. 1957. The Striped Bass of the Santee-Cooper Reservoir, Eleventh Annual Conf. of the Southeastern Association of Game and Fish Commissioners, Mobile, Oct. 20-23, 1957.
10. Stroud, Richard H. 1948. Growth of the Basses and Black Crappie in Norris Reservoir, Tennessee. Journal, Tennessee Academy Sciences, Vol. 23, No. 1, pp. 31-39.
11. ————————. 1949. Rate of Growth and Condition of Game and Pan Fish in Cherokee and Douglas Reservoirs, Tennessee and Hiawassee Reservoir, North Carolina. Tenn. Acad. Sci. Jour. 24 (1) :60-74.