Kinne, O. 1960. Growth, food intake and food conversion in a euryplastic fish exposed to different temperatures and salinities. Physiol. Zool 33: 288-317.
Sokal, R. R. and F. J. Rohlf. 1969. Biometry: The principles and practice of statistics in biological research. W. H. Freeman and Company. 776 p.
Stickney, R. R. and J. W. Andrews. 1971. The influence of photoperiod on growth and food conversion of channel catfish. The Progressive Fish-Culturist. 33(4):204-205.
Tryon, C. A., Jr. 1943. The effect of covering hatchery troughs on growth of cutthroat trout (*Salmo clarkii*). Trans. Amer. Fish. Soc. 72:145-149.
West, B. W. 1966. Growth, food conversion, food consumption and survival at various temperatures of the channel catfish *Ictalurus punctatus* (Rafinesque). M. S. thesis, Graduate School, University of Arkansas. 65 p.

# FOOD HABITS, GROWTH, AND LENGTH-WEIGHT RELATIONSHIPS OF YOUNG-OF-THE-YEAR BLACK CRAPPIE AND LARGEMOUTH BASS IN PONDS

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## ABSTRACT

Food, growth and length-weight relationships of young-of-the-year largemouth bass (*Micropterus salmoides*) and black crappie (*Pomoxis* nigromaculatus) were studied. Stomachs of 220 bass and 186 crappie were examined. Crappie fed mainly on zooplankton but consumed more aquatic insects as their size increased. Bass fed on zooplankton and aquatic insects, but grew faster when small crappie were available. Crappie grew faster when their numbers were reduced by bass predation. Length-weight relationships were calculated for 601 bass and 496 crappie.

## INTRODUCTION

In the southeastern United States, a population of largemouth bass, *Micropterus salmoides* (Lacepede); bluegill, *Lepomis macrochirus*, Rafinesque; and redear, *Lepomis microlophus* (Gunther) can be maintained in a state of balance using the principles described by Swingle (1956). When crappie, *Pomoxis sp.*, are added to this combination, unbalanced conditions often develop. This unbalance usually results from inadequate bass predation due to relative spawning dates.

Crappie frequently overpopulate waters and become stunted (Goodson, 1966). Fishery biologists have observed that good crappie fishing tends to come in 2 to 5 year cycles (Bennett, 1944; Thompson, 1941).

No effective management techniques are known to alleviate the problems caused by crappie in artificial lakes in a bass-bluegill combination. Nail (1963) suggests that lakes smaller than 1,000 acres should not be stocked with crappie. The relationships of crappie in a bass-bluegill combination are not fully understood.

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The purpose of this research was to investigate the relationships between young-of-the-year black crappie, *Pomoxis nigromaculatus* (Lesueur), and young-of-the-year largemouth bass during their early life history. Food habits, growth, and length-weight relationships were used in this study.

## MATERIALS AND METHODS

Three ponds located on the Fisheries Research Unit of the Auburn University Agricultural Experiment Station, were used in this study. Ponds are designated S-11, S-12, and S-13, and acreage is 2.76, 2.20, and 2.10, respectively. Maximum depth is approximately 10 feet at the dam in all ponds. Ponds were fertilized as recommended by Swingle (1965).

Stocking is summarized in Table 1. Adult crappie and bass were stocked to produce large numbers of young. Bluegill and redear were stocked because these species normally produce balanced fish populations in combination with largemouth bass. There was no survival of redear in pond S-12. Fathead minnows, *Pimephales promelas*, Rafinesque, were added as a supplemental forage species. White amur, *Ctenopharnyngodon idella* (Cuvier and Valenciennes), were added to eliminate obnoxious growths of vegetation.

Samples of young-of-the-year crappie and bass were taken from May 28 to October 30 when the ponds were drained. When possible, samples were taken at two week intervals by seining, but at times, crappie were difficult to capture, so regular samples of crappie were not always collected. Night-seining and limited gill-netting were also attempted as sampling methods.

A sample consisted of about 20 crappie and 20 bass. Total length in millimeters and weight in grams were recorded for each fish. Ten fish from each sample were randomly selected for food habit studies. Stomach analysis consisted of removal of stomach, estimation of percent fullness, examination of contents, count of each food item, and estimation of percent volume of each food item.

Growth curves for crappie and bass were drawn by plotting average lengths of each sample. Indices of condition were calculated using the formula:

$$\text{Index of condition} = \frac{\text{Weight in grams } X10^5}{(\text{Length in millimeters})^3}$$

Table 1. Stocking summary of ponds S-11, S-12, and S-13 for 1970.

| Species | No. | Size Range (inch) | Weight (lbs.) | Date |
|---|---|---|---|---|
| | Pond S-11 (2.76 acres) | | | |
| Bluegill | 2760 | ½-1 | 3.3 | Dec., 1969-Jan., 1970 |
| Fathead minnow | 2760 | 2-3 | 13.8 | Feb. 26, 1970 |
| Largemouth bass | 8 | 10-13 | 5.0 | Feb. 26, 1970 |
| Black crappie | 8 | 7-13 | 5.3 | Feb. - Mar., 1970 |
| White amur | 39 | 6-8 | 10.3 | Mar. 24, 1970 |
| | Pond S-12 (2.20 acres) | | | |
| Redear sunfish | 2200 | ½-1 | 2.7 | Dec. 17, 1969 |
| Fathead minnow | 2200 | 2-3 | 11.0 | Feb. - Mar., 1970 |
| Largemouth bass | 7 | 10-13 | 4.5 | Feb. 17, 1970 |
| Black crappie | 7 | 7-13 | 4.2 | Feb. - Mar., 1970 |
| White amur | 31 | 6-8 | 7.7 | Mar. 24, 1970 |

| Species | No. | Size Range (inch) | Weight (lbs.) | Date |
|---|---|---|---|---|
| | Pond S-11 (2.76 acres) | | | |
| Fathead minnow | 2100 | 2-3 | 10.5 | March, 1970 |
| Largemouth bass | 6 | 10-13 | 3.4 | Feb. 17, 1970 |
| Black crappie | 7 | 7-13 | 4.17 | Feb. - Mar., 1970 |
| White amur | 29 | 6-8 | 6.8 | Mar. 24, 1970 |

## RESULTS AND DISCUSSION

### *Food Habits*

#### POND S-11

*Black crappie.* — Data on stomach analyses for largemouth bass and black crappie from S-11 are presented in Figure 1. Black crappie collected on April 28 (16-26 mm), May 28 (57-71 mm), and June 11 (46-72 mm), fed primarily on zooplankton. Chironomidae, *Chaeboras,* and Hemiptare were also utilized, but to a lesser degree.

On July 8, six crappie (85-100 mm) were collected by night-seining. Zooplankton occurred in the stomachs of all specimens, but made up only a small volume. Bluegill fry occurred in all six stomachs and averaged 63 percent of the volume.

*Largemouth bass.* — Zooplankton was found in stomachs of bass (10-22 mm) in significant quantities only on April 28, and on this date 20 percent of the stomachs examined contained fathead minnows. On May 12, Hemiptera occurred in 90 percent of the bass stomachs (34-42 mm), and fathead minnows again occurred in 20 percent.

On May 28, and June 11 crappie comprised 100 percent of the stomach volumes of 70 percent of bass (50-88 mm and 58-108 mm, respectively) sampled. Crappie occurred in 30 percent of bass samples (111-154 mm) on June 29. On July 1, a sample of bass (139-168 mm) was collected in deep water using gill nets. Eighty percent of the stomachs examined from this group contained an average of two crappie per stomach. Evidently, bass were feeding heavily on crappie in deep water at this time. Crappie did not occur again in bass stomachs of any sample from S-11.

Bass (71-186 mm) collected on July 23, August 11, and September 8, fed primarily on bluegill fry and aquatic insects.

*Competition.* — There was little competition in S-11 between bass and crappie for food. Crappie fed primarily on zooplankton and secondarily on insects, while bass primarily fed on fish and secondarily on insects. From April to early July forage fish were crappie, and from mid-July to October forage fish were bluegill fry.

From May to July the major competition in this pond was obviously among bass for crappie as forage. Draining records (Table 2) substantiate that the crappie population was significantly reduced. At the end of October there were two young crappie remaining in the pond. From early July, crappie were competing with bass for bluegill.

#### POND S-12

*Black crappie.* — Figure 2 summarizes data on the stomach analyses of bass and crappie from S-12. Zooplankton appeared to be an important food item of crappie on all sampling dates. As crappie increased in size, the occurrence of aquatic insects in the diet increased. On July 8, Chironomidae occurred in 80 percent of the stomachs (86-99 mm) and Trichoptera in 40 percent. Only July 23,

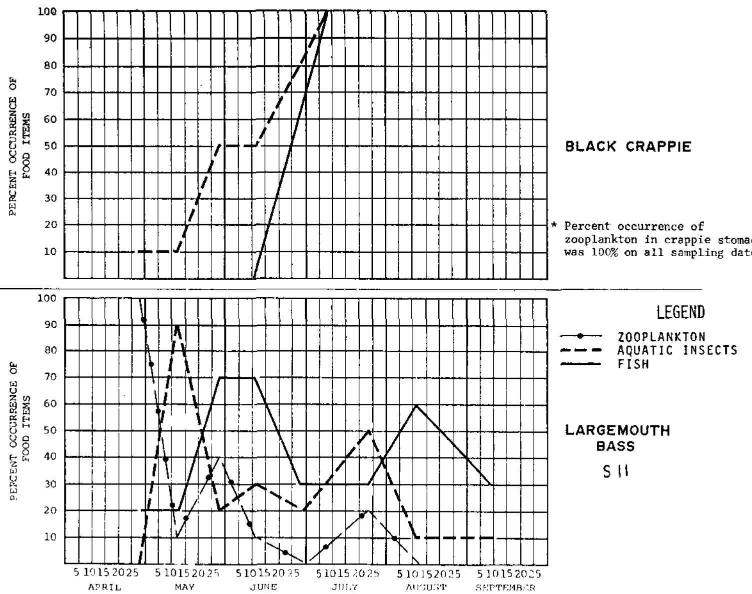


Figure 1. Food habits of bass and crappie from Pond S-11, April-September, 1970.

Table 2. Population values from ponds S-11, S-12, and S-13 at draining (end of October, 1970).

| | S-11 | S-12 | S-13 |
|---|---|---|---|
| E[1] black crappie | 2.00 | 64.00 | 44.00 |
| E largemouth bass | 28.00 | 12.00 | 16.00 |
| E bluegill | 52.00 | --- | --- |
| E grass carp | 18.00 | 24.00 | 40.00 |
| Young/acre (crappie) | .72 | 1609.00 | 985.00 |
| Young/acre (bass) | 321.00 | 415.00 | 461.00 |
| Standing crop[2] (black crappie) | 2.70 | 134.70 | 85.50 |
| Standing crop (largemouth bass) | 44.70 | 24.30 | 30.50 |
| Standing crop (bluegill) | 82.70 | --- | --- |
| Total standing crop | 158.80 | 210.40 | 192.90 |

[1]Swingle, (1950).
[2]lbs./acre

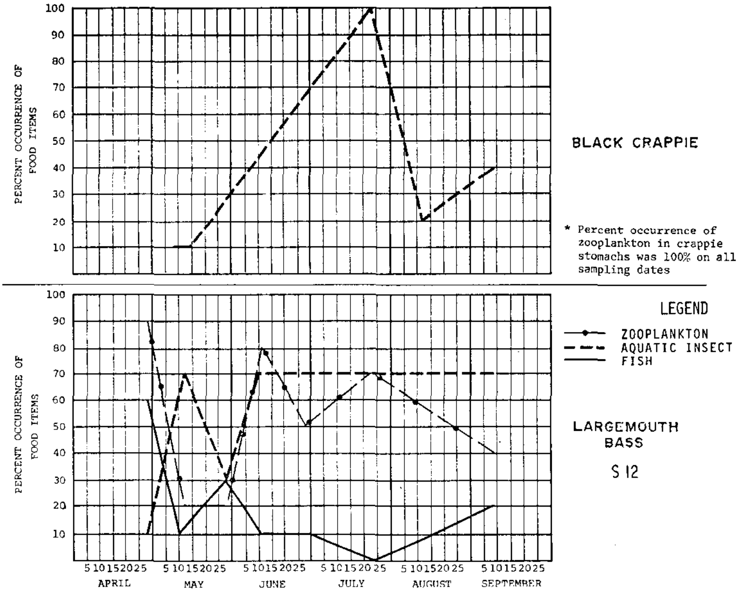


Figure 2. Food habits of bass and crappie from Pond S-12, April-September, 1970.

Chironomidae occurred in 100 percent of the stomachs (92-100 mm), *Chaoboras* in 50 percent, Heleidae in 40 percent, and Trichoptera in 60 percent. Insects also appeared in the diet on August 11 and September 9, but in lesser amounts than on previous dates.

*Largemouth bass.* — On April 28, 60 percent of bass stomachs (20-30 mm) examined contained fathead minnows. Bass were also feeding fairly heavily on zooplankton. Insects (Hemiptera and Coleoptera) were main food items on May 12 (55-64 mm). On May 28, June 11, and June 29 (62-139 mm), aquatic insects (Chironomidae and Trichoptera) were important food items. Cannabalism was also occurring on these dates. Trichoptera larvae appeared to be a major food item of bass (84-228 mm) on July 23 and September 9. Percent occurrence was 70 on both dates, and volumes were 72 and 64 percent respectively. Chironomidae were also being utilized in moderate amounts on these dates.

*Competition.* — In the absence of forage species (fathead minnows had disappeared from the population by May 14) bass and crappie in S-12 competed for food organisms. Crappie were too large to be eaten by bass. Zooplankton was much more important in the diet of crappie than bass, but from the first of July there was no marked difference in the utilization of aquatic insects by bass and crappie.

POND S-13

*Black Crappie.* — Figure 3 summarizes results of stomach analyses of bass and crappie from S-13. On April 28, May 12, and May 28, crappie (10-59 mm) fed almost solely on zooplankton. Beginning June 11, crappie fed regularly on aquatic insects, as well as zooplankton. Chironomidae, Heleidae, Odonata and Hymenoptera occurred regularly in crappie stomachs (90-110 mm) on July 8, July 23, and August 11

*Largemouth bass.* — On April 28, bass (25-28 mm) were feeding on zooplankton and fathead minnows in significant amounts. Zooplankton was almost completely lacking in bass stomachs (40-56 mm) on May 12, while aquatic insects (Chironomidae, Heleidae, Odonata, and Coleoptera) and tadpoles comprised most of the bass diet.

On May 28, tadpoles occurred in 40 percent and crappie in 20 percent of bass stomachs (57-99 mm), while percent occurrence of aquatic insects (Chironomidae) was 20. Crappie occurred in one bass stomach (85-121 mm) on June 11, and bass were feeding more on aquatic insects. Bass stomachs examined from June 29, July 23, and September 9 samples (75-222 mm) indicated that aquatic insects (Chironomidae, Odonata, Trichoptera, Hemiptera, and Coleoptera) were major food items.

*Competition.* — Two samples, May 28 and June 11, indicated that bass were utilizing crappie to a small degree. From June 11, the competition between bass and crappie for food in S-13 was similar to the situation in S-12. Zooplankton was always important in the crappie diet, however, bass and crappie competed for the same groups of insects.

### *Food Habit Discussion*

Stomach analyses of black crappie and largemouth bass from S-11, S-12, and S-13 indicated that under certain conditions crappie and bass competed for food items. When crappie and bass were abundant, when the crappie were too large to be eaten by most bass, and when there was no forage available to bass, there was competition for food. According to Bennett (1948), the ability of an individual fish to select a staple food item in preference to some less satisfactory substitute is determined by the degree of competition. Bennett further states that if two species of fish compete slightly for food under favorable conditions, they may,

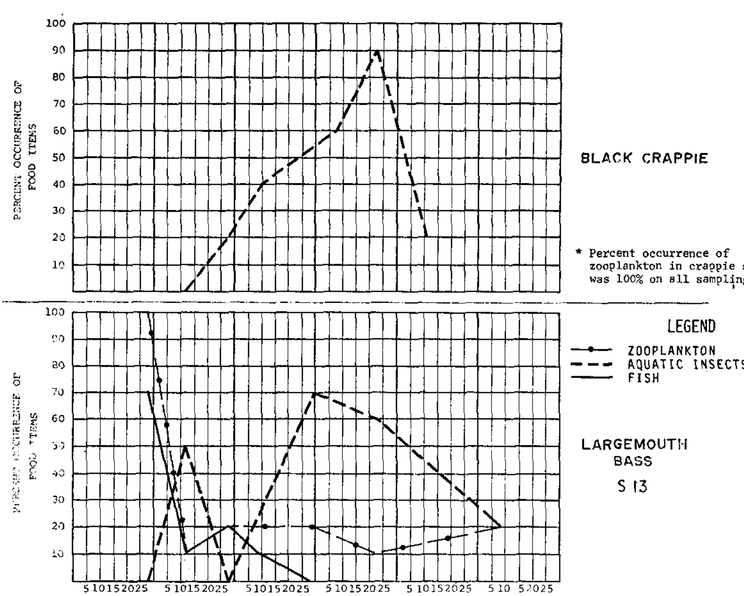


Figure 3. Food habits of bass and crappie from Pond S-13, April-September, 1970.

under crowded conditions, be forced to change their normal feeding habits and become highly competitive.

Zooplankton always appeared to be a more significant item in crappie diets than in bass diets. As the crappie grew, consumption of aquatic insects increased. However, zooplankton did not become insignificant.

Keast (1968) suggested that plankton feeding of black crappie was associated with long gill rakers. Assuming that black crappie can utilize their gill rakers to feed on zooplankton, in the absence of forage fish, crappie would have more of a variety of food available than bass. Bass could feed only on aquatic insects while crappie could feed on zooplankton as well as aquatic insects. Condition factors fluctuated less for crappie than for bass (Figure 4). The ability of crappie to filter-feed could be a logical explanation of this phenomenon.

Bass will utilize crappie for food if the crappie are small enough to be ingested. If forage such as bluegill fry is available, crappie will utilize it for food.

None of the crappie sampled from any pond in this study had empty stomachs. Empty stomachs frequently occurred in bass samples. Seaburg and Moyle (1964) observed that the average percentage of empty crappie stomachs was considerably less than that for the larger game fishes, suggesting that crappie have a more regular feeding program.

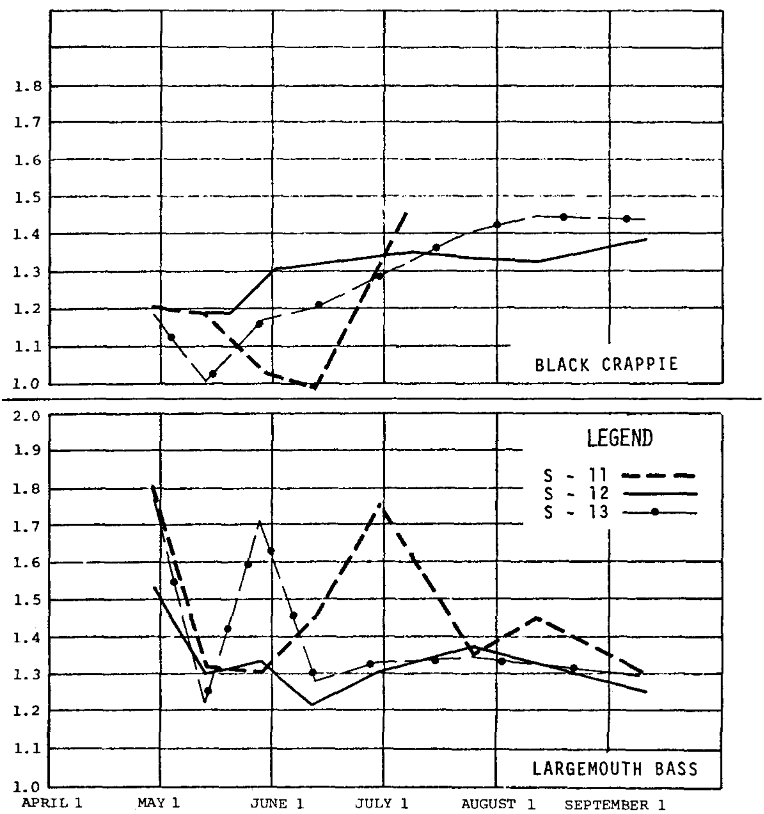


Figure 4. Fluctuations of condition index for largemouth bass and black crappie in S-11, S-12, and S-13, May to October, 1970.

*Growth*

Growth is an important factor in the relationships between two species of fish. When one of the species is primarily piscivorous, the relative sizes of both species at a given time is very important. If a forage fish can fit into a largemouth bass mouth, it is susceptible to predation.

A bass that eats the maximum size forage fish possible is feeding very efficiently. Growth would be expected to be fast, and as the bass increases in size, he increases his ability to grow, because the diameter of his open mouth increases enabling him to eat larger prey if available. This phenomenon is known as the autocatalytic concept of growth (Rounsefell and Everhart, 1953).

A point is usually reached when feeding efficiency decreases. This decrease occurs because optimum size forage fish are no longer available, so the predator must revert to smaller prey. Thus he is expending more energy per pound of fish eaten than before, and his growth rate decreases. Autocatalytic growth is a determining factor in the sigmoid growth curve of a piscivorous fish such as the largemouth bass.

The growth curves for bass and crappie in ponds S-11, S-12, and S-13 are presented in Figures 5 and 6. From April 28 to May 28, there was little variation in bass growth in any pond. From May 28, growth of bass in S-12 and S-13 began slowing down, while bass growth in S-11 increased rapidly until early July.

Food habits of bass in all ponds during this period (April-September) possibly explains the phenomenon of increasing and decreasing growth. Samples taken on May 28, June 11, June 29, and July 1, indicate that S-11 bass were eating crappie at a rapid rate, while in S-12 and S-13, utilization of crappie was much less, if at all. Autocatalysis probably influenced bass growth in S-11. Bennett (1948) found that in Illinois lakes, cladocerans and aquatic insects were not conducive to rapid growth of largemouth bass. He found that there seemed to be a direct relationship between bass growth rate and the percentage by weight of fish and crayfish in the diet. The consumption of crappie by bass in S-11 probably influenced the growth rate of largemouth bass.

The fact that bass in S-11 were able to utilize crappie significantly is probably due to a combination of factors. Time of spawning and degree of spawning would be very important. Seining indicated that on April 30,. crappie fry were present in S-11, while on the same date, the smallest crappie in S-12 and S-13 was one inch. A one-day difference in spawning could cause significant difference in sizes of young fish from pond to pond.

A heavier spawn would cause slower growth of young fish. Lambou (1958) stated that the availability of food is the main factor determining the growth rate of young fish, and competition among young fish determines the availability of food. A heavier crappie spawn would have caused slow initial growth, enabling bass to feed on small crappie. Although stocking rates of adult bass and crappie were similar in all ponds, difference in sex ratios and fecundity could cause significant variation in the number of young produced. Mraz and Cooper (1957) found that for largemouth bass, black crappie, and bluegill there was little apparent correlation between number of adult fishes stocked and strength of the resulting year classes.

The presence of bluegill in S-11 could have also influenced the growth of crappie. As Figure 2 indicates, crappie growth in S-11 seemed to slow down from late May until the middle of June. Stomach analyses on May 28 and June 11 indicated that crappie in S-11 had begun to utilize chironomids and *Chaoboras*. These Diptera larvae are very important items in the diet of bluegills (Bennett, 1948). Competition with bluegills could have been a factor in suppressing crappie growth so bass could prey on them.

At draining, there were more bass per acre in S-12 and S-13 than in S-11. Table 2 indicates that there were 415 and 461 young bass per acre respectively in

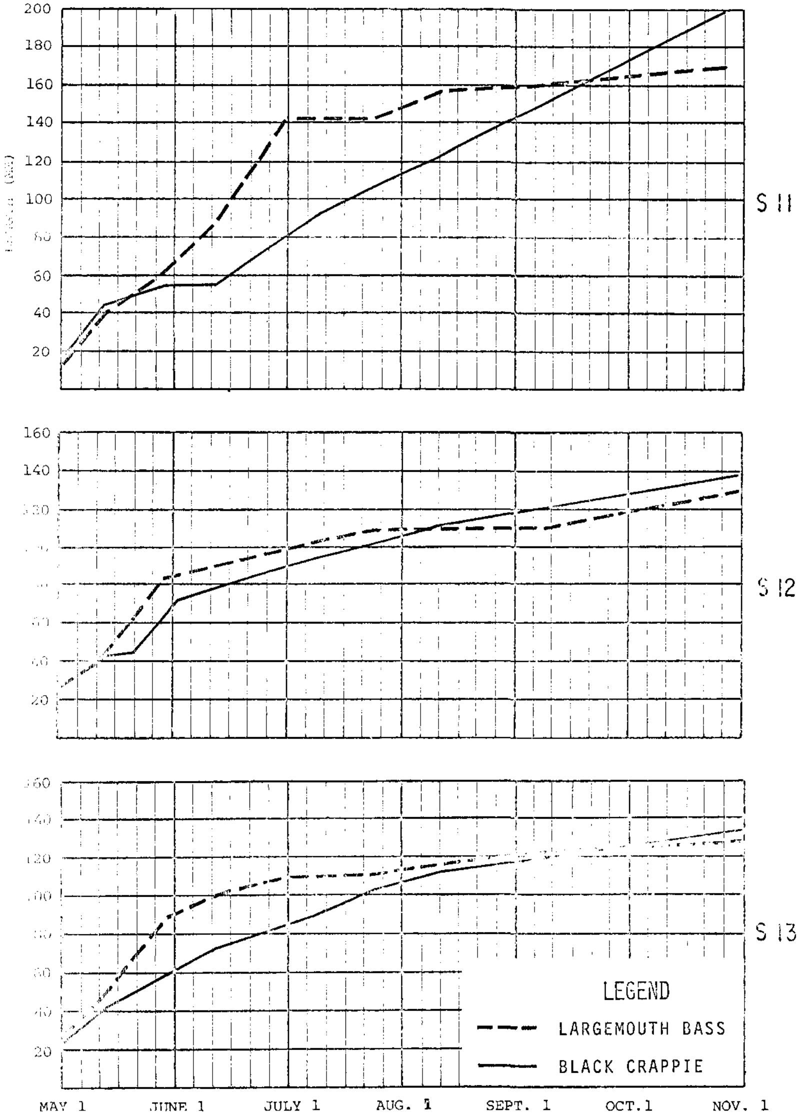


Figure 5. Growth curves for largemouth bass and black crappie from ponds S-11, S-12 and S-13, May to November, 1970.

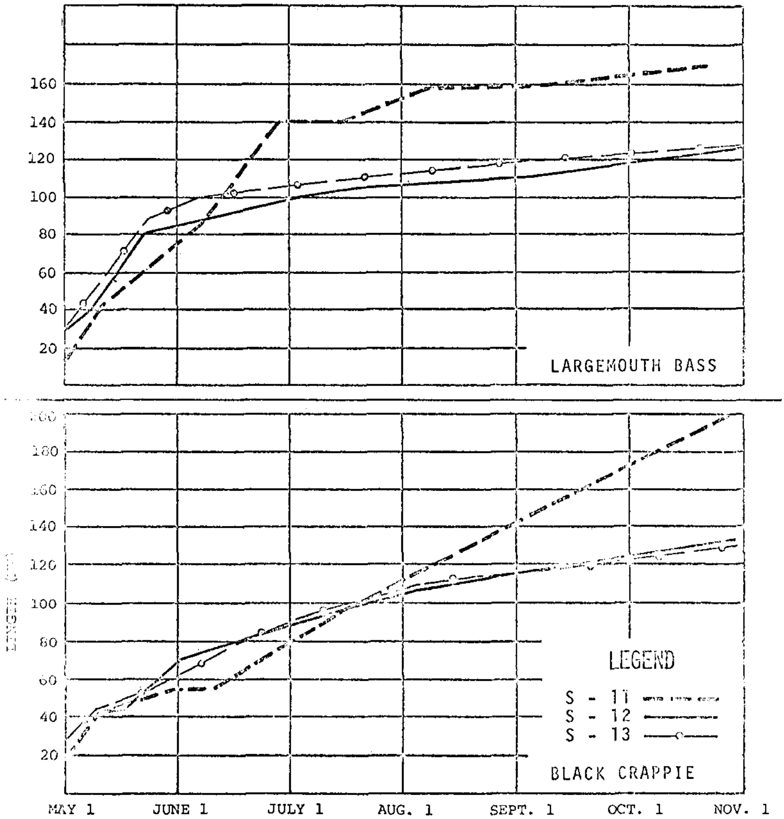


Figure 6. Growth curves for largemouth bass and black crappie from ponds S-11, S-12, and S-13, May to November, 1970.

S-12 and S-13 while in S-11 there were 321 bass per acre. More intraspecific competition among bass in S-12 and S-13 was a probable factor influencing bass growth. As bass in S-11 rapidly thinned the crappie population, growth of crappie began to increase. This increase in growth was probably due to a reuction of intraspecific competition. There was little difference in crappie growth in S-12 and S-13.

*Length-weight Relationships*

CONDITION

The condition index is often used to measure the well-being of a fish population. Bennett (1962) reported that some species of fish follow seasonal cycles of condition, while other species such as largemouth bass may have sudden changes of condition associated with availability of desirable food organisms. High condition factors are usually associated with rapid growth.

Condition factors for largemouth bass in S-11, S-12, and S-13 are shown in Figure 4. From approximately May 28 until July 23, bass in S-11 showed high indices of condition. The peak high was approximately June 29, and from July 23 to September 9 there was not much change in condition. Food habits studies indicated that bass were feeding heavily on crappie on May 28, June 11, June 29, and July 1. High condition of bass was probably due to feeding activity and food availability. During this period of high condition, there was also rapid growth (Figure 5).

There was little fluctuation in condition of bass in S-12. Stomach analysis indicated that consumption of fish by bass was light. Crappie were not found in the diet.

Bass in S-13 showed an interval of high condition from May 12 to June 11. Stomach analysis indicated that bass were feeding on crappie to a degree on May 28 and June 11. It appears that high condition of bass in S-11 and S-13 is associated with consumption of crappie.

There was comparatively little fluctuation in the condition indices of crappie in all ponds. As mentioned earlier, this lack of fluctuation could be associated with the ability of crappie to filter plankton through gill rakers. As summer progressed, crappie showed a trend of increasing condition indices (Figure 4). This increase is probably associated with growth.

*Length-weight Regression*

The length-weight relationships were as follows:

| | | |
|---|---|---|
| Largemouth bass | | |
| S-11 | log Y = 2.233 | log X - 3.372 |
| S-12 | log Y = 2.773 | log X - 4.419 |
| S-13 | log Y = 2.287 | log X - 3.457 |
| Black crappie | | |
| S-11 | log Y = 3.028 | log X - 4.928 |
| S-12 | log Y = 2.914 | log X - 4.710 |
| S-13 | log Y = 2.908 | log X - 4.695 |

Where Y equals weight in grams and X equals length in millimeters.

Swingle (1965) determined length-weight relationships of Alabama fishes. He used 17,328 black crappie and 6,472 largemouth bass from rivers and impoundments in his calculations. Swingle's calculated weights and calculated weights of bass and crappie in this study are compared in Table 3.

Table 3. Calculated weights (in pounds) of bass and crappie from S-11, S-12, and S-13 compared to standard calculated weights of fishes in Alabama rivers and impoundments.

| Inch group | S-11 | S-12 | S-13 | Alabama rivers and impoundments* |
|---|---|---|---|---|
| | | Largemouth bass | | |
| 2 | .0079 | .0044 | .0061 | .0039 |
| 3 | .016 | .014 | .015 | .013 |
| 4 | .030 | .031 | .030 | .030 |
| 5 | .049 | .057 | .050 | .058 |
| 6 | .074 | .095 | .076 | .10 |
| 7 | .10 | .15 | .11 | .16 |
| 8 | .14 | .21 | .15 | .23 |
| 9 | .18 | .29 | .19 | .33 |
| 10 | .23 | .39 | .24 | .45 |

| Inch group | S-11 | S-12 | S-13 | Alabama rivers and impoundments* |
|---|---|---|---|---|
| | | Black crappie | | |
| 1 | .0010 | .0009 | .0008 | .0005 |
| 2 | .004 | .0040 | .0040 | .004 |
| 3 | .013 | .013 | .013 | .012 |
| 4 | .031 | .030 | .030 | .028 |
| 5 | .06 | .06 | .06 | .06 |
| 6 | .11 | .10 | .10 | .10 |
| 7 | .17 | .15 | .15 | .15 |
| 8 | .25 | .23 | .23 | .23 |

*Values from tables of Swingle (1965).

## SUMMARY

1. Young-of-the-year largemouth bass significantly reduced young-of-the-year black crappie when the crappie were small enough to be eaten.
2. When crowded, young-of-the-year bass and crappie competed for aquatic insects as food.
3. Growth of young bass was faster when they were significantly utilizing crappie for food.
4. Bass were in better condition when fish was a significant item in the diet.
5. Growth of young crappie increased when their numbers had been reduced by bass predation.
6. As young crappie grew in size, consumption of aquatic insects increased; however, zooplankton was always a significant item in the diet.
7. The ability of crappie to filter-feed by use of gill rakers and utilize zooplankton is the probable explanation for the lack of fluctuation in condition factors of young crappie.

## LITERATURE CITED

Bennett, G. W. 1944. The effect of species combinations on fish production. Trans. No. Amer. Wildl. Conf. 9:184-190.

. 1948. The bass-bluegill combination in a small artificial lake. Bull. of the Ill. Natur. Hist. Surv. 24(3):377-412.

.1962. Management of artificial lakes and ponds. Reinhold Publ. Corp. New York. 283 pp.

Goodson, L. F., Jr. 1966. Crappie, Inland Fisheries Management, edited by Alex Calhoun, California Dept. of Fish and Game, pp. 312-332.

Keast, Allen. 1968. Feeding biology of the black crappie. J. Fish. Res. Bd. Can. 25(2):285-297.

Lambou, V. E. 1958. Growth rate of young-of-the-year largemouth bass, black crappie, and white crappie in some Louisiana lakes. Proc. of La. Acad. Sci. 21:63-69.

Mraz, D. and E. L. Cooper. 1957. Reproduction of carp, largemouth bass, bluegills, and black crappie in small rearing ponds. J. of Wildl. Manage. 21(2):127-133

Nail, M. L. 1963. Controversial crappie. Alabama Conservation. Oct. - Nov. 2 pp.

Rounsefell, G. A. and W. H. Everhart. 1953. Fishery Science — its methods and application. John Wiley and Sons, Inc., New York. 444 pp.
Seaburg, K. G. and J. B. Moyle. 1964. Feeding habits, digestive rates, and growth of some Minnesota warmwater fishes. Trans. Amer. Fish. Soc. 93:268-285.
Swingle, H. S. 1950. Relationships and dynamics of balanced and unbalanced fish populations. Agr. Exp. Sta. of the Ala. Poly. Inst. Bull. No. 274 73 pp.
. 1956. Determination of balance in farm fish ponds. Trans. of the 21st No. Amer. Wildl. Conf. 298-318
. 1965. Fertilizing farm fish ponds. Agr. Exp. Sta. Auburn Univ. Highlights of Agr. Res. 12(1):11
Swingle, W. E. 1965. Length-weight relationships of Alabama fishes. Agr. Exp. Sta. Auburn Univ. Zool.-Entomol. Dept. Series. Fisheries No. 3. 87 pp.
Thompson, D. H. 1941. The fish production of inland streams and lakes. In A Symposium on Hydrobiology. The Univ. of Wisconsin Press. Madison. 206-217

# THE FEEDING ECOLOGY OF THE BLACK AND WHITE CRAPPIES IN BEAVER RESERVOIR, ARKANSAS, AND ITS EFFECT ON THE RELATIVE ABUNDANCE OF THE CRAPPIE SPECIES

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## ABSTRACT

Stomachs of black and white crappies (*Pomoxis nigromaculatus* and *P. annularis*) collected during the early impoundment (1964-1967) and the late impoundment (1969-70) periods from Beaver Reservoir were analyzed. Black crappie were dominant in the early impoundment period, whereas white crappie was the dominant crappie species in the late impoundment period. During the early impoundment period, large numbers of earthworms (January to April) and shad (during the remainder of the year) were consumed by both species, although white crappie appeared to concentrate on shad even when earthworms were available. During the late impoundment period 0-age fishes, zooplankton, and aquatic insects comprised the diet of both species. However, white crappie adults concentrated on fishes all year round, whereas black crappie adults concentrated on benthic insects in the spring and fishes in other seasons. The availability of earthworms and benthic insects in the early impoundment period and their lack of availability in the late impoundment period, along with the deterioration of much of the submerged terrestrial vegetation, appear to have been the major factors in determining the dominance of the two crappies.

## INTRODUCTION

The black crappie and the white crappie display an interesting pattern of relative abundance in Beaver Reservoir. The early impoundment period (1964-1967) was marked by a large black crappie population and a relatively small