RESULTS OF STOCKING LARGEMOUTH BASS, BLUEGILL, AND REDEAR SUNFISH IN PONDS LESS THAN 0.25 ACRE

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ABSTRACT

A study was undertaken during the period of 1962-65 to determine the minimum acreage of water which can produce and sustain a balanced largemouth bass, *Micropterus salmoides* (Lacepede), Bluegill, *Lepomis macrochirus* Rafinesque, and redear sunfish, *Lepomis microlophus* (Gunther), population.

Thirty-three ponds ranging from 0.17 to 0.25 acre and which contained no fish were selected in North Alabama during 1962-63. The ponds were stocked by the State Fish Hatchery during the 1962-63 season. Suggestions that would aid in the management of a pond to obtain the maximum production of fish were offered to each pond owner.

Balance checks were conducted on these ponds during the first and second year of fishing. These checks on 30 usable ponds the first year indicated that 16 ponds contained a balanced fish population. Seven ponds contained a crowded bluegill population, and 7 ponds were crowded by competitive species. Checks on 29 usable ponds the second year indicated that 7 ponds contained a balanced fish population. Fourteen ponds contained a crowded bluegill population, and 8 ponds were crowded by competitive species. The low percentage of ponds that maintained a balanced fish population indicated that it is not feasible to stock ponds that are smaller than 0.25 acre with a largemouth bass, bluegill, and redear sunfish combination.

INTRODUCTION

To provide more and better fishing in the State, the Fisheries Section of the Game and Fish Division, Alabama Department of conservation, initiated a program whereby fishery biologists would check all ponds before they were stocked with hatchery fish (Kelly, 1961). Ponds were checked in the owner's presence and the owners were advised of the proper methods of stocking and management which have resulted from fisheries research in Alabama.

In Alabama a large number of stock watering ponds, which are less than 0.25 acre, have been constructed recently in conjunction with an Agricultural Stabilization and Conservation Service Program. The prestock program, the large number of small ponds recently constructed, and improved management techniques made it desirable to reaffirm the minimum acreage of water which can produce and sustain a balanced largemouth bass, *Micropterus salmoides* (Lacepede), bluegill, *Lepomis macrochirus* Rafinesque, and redear sunfish, *Lepomis microlophus* (Gunther), population, and therefore, increase the amount of fishable water in Alabama. Swingle (1950) defined balance as a condition within a fish population that results in sustained annual crops of harvestable fish satisfactory in amount in relation to the basic fertility of the body of water containing it.

In previous years, all ponds below 0.25 acre were rejected for stocking with the bass-bream combination (Swingle, 1949). It was suggested to these pond owners that channel catfish or bait minnows would be suitable for this size pond; but in many instances, the owners were not in favor of this type of stocking. As a result, the pond was useless as far as producing desirable fishing.

It was the objective of this project to reaffirm Swingle's previous findings that balanced fish populations could not be obtained and sustained in ponds less than 0.25 acre. Swingle (1951) recommended stocking ponds in the Southeast with 100 largemouth bass fry or fingerlings and 1000 to 1500 bluegill fingerlings per acre for fertilized ponds where the carrying capacity was determined to be between 300 and 500 pounds per acre. In an attempt to obtain a balanced fish population all ponds in this study were stocked with 25 largemouth bass fingerlings. A bass stocking rate of 100 to 150 fingerlings per acre was therefore present. Bream numbers remained within the successful range of 1000 to 1500 fingerlings per acre.

PROCEDURE

During the normal process of conducting pre-stocking checks of ponds in the 1962-63 season, a total of thirty-three ponds were selected. Two basic criteria were used in the selection of the ponds. The surface area had to range from 0.17 to 0.25 acre and the pond had to be free of wild fish. Surface acreage was determined by pacing around the pond. Each pond was seined with a 15 foot minnow seine in an effort to determine if wild fish were present.

Suggestions were offered to each pond owner that would aid him in the management of the pond for a maximum production of fish. Special emphasis was placed on the desirability of following a good fertilization program. Each individual was advised not to fish the pond until June, one complete year from the time of stocking. It was explained to each pond owner that the stocking of his pond was experimental with no guarantee of obtaining a balanced fish population.

The ponds were stocked by the State Fish Hatchery during the 1962-63 stocking season. Bream were stocked during the period of November through March and bass in May and June.

Balance determinations of the fish populations in these ponds were conducted in June of 1964 and 1965 by the methods described by Swingle (1956). In June, 1964, 30 of the original 33 ponds were checked. Two ponds were eliminated as a result of fish kills and one pond had gone dry. In June, 1965, 29 of the original 33 ponds were checked.

RESULTS

Based on the results of the balance determination, the ponds were placed into two categories. The categories consisted of ponds that contained a balanced population of fish and those that contained an unbalanced population. The ponds that contained balanced populations were subdivided into two groups, those than contained balanced fish populations and those that were in temporary balance due to crowded bass. Ponds that contained unbalanced populations were also subdivided into two groups, those with fish populations that were overcrowded with bluegill and those that were crowded due to species competitive with bluegill.

Balance Determination the First Year of Fishing

In June, 1964, the first year of fishing (Swingle and Smith, 1947), 53.3 percent of the 30 ponds checked contained a balanced population of fish (Table 1). However, 68.8 percent of the ponds that contained a balanced population were in temporary balance. A total of 46.7 percent of the ponds contained an unbalanced population of fish. Based on the total number of ponds checked, 23.35 percent contained fish populations that were overcrowded with bluegill. Species competitive with bluegill were the cause of the unbalanced populations in 23.35 percent of the ponds. Of the 23.35 percent of the ponds that contained species competitive with bluegill, green sunfish, *Lepomis cyanellus* (Rafinesque), was found to be the competitive species in 71.4 percent. A combination of

green sunfish and yellow bullhead, *Ictalurus natalis* (Le Sueur) was present in 14.3 percent of these ponds. Yellow bullhead alone was found to be the competitive species in 14.3 percent of the ponds.

TABLE 1. Summary of conditions found by balance determinations of ponds in June 1964, the first year of fishing [1].

Balance condition	No. of ponds	No. of ponds	No. of ponds	Percentage of total	Percentage of total
Successful ponds			16		53.3
balanced population		5		16.6	
temporary balance		11		36.7	
Unsuccessful ponds			14		46.7
overcrowded bluegill		7		23.35	
competitive species		7		23.35	
green sunfish	5				
green sunfish and yellow bullhead	1				
yellow bullhead	1				
Totals		30	30	100	100

BALANCE DETERMINATION THE SECOND YEAR OF FISHING

In June 1965, the second year of fishing, 24.1 percent of the 29 ponds checked contained a balanced population of fish (Table 2). However, 14.3 percent of these ponds that contained a balanced population were in temporary balance. A total of 75.9 percent of the ponds contained an unbalanced population of fish. Based on the total number of ponds checked, 48.3 percent contained fish populations that were overcrowded with bluegill. Species competitive with bluegill were the cause of the unbalanced population in 27.6 percent of the ponds. Of the 27.6 percent of the ponds that contained species competitive with bluegill, green sunfish was found to be the competitive species in 75.0 percent. A combination of green sunfish and yellow bullhead was present in 12.5 percent of these ponds. Yellow bullhead alone was found to be the competitive species in 12.5 percent of the ponds.

TABLE 2. Summary of conditions found by balance determinations of ponds in June 1965, the second year of fishing [2].

Balance condition	No. of ponds	No. of ponds	No. of ponds	Percentage of total	Percentage of total
Successful ponds			7		24.1
balanced population		6		20.7	
temporary balance		1		3.4	
Unsuccessful ponds			22		75.9
overcrowded bluegill		14		48.3	
competitive species		8		27.6	
green sunfish	6				
green sunfish and yellow bullhead	1				
yellow bullhead	1				
Totals		29	29	100	100

1 First year of fishing began one year after bass fingerlings were stocked.
2 Second year of fishing began two years after bass fingerlings were stocked.

DISCUSSION

Since variables other than the size of a pond influence the fish population in obtaining a balanced condition, a brief discusson of a few of these variables is in order. A proper fertilization program in these ponds would enhance the possibility of obtaining balanced fish populations. For this reason, a detailed fertilization program was discussed with each pond owner. Kelly (1961) stated, "The number of applications of fertilizer required for any pond will vary from year to year, depending upon the fertility of the watershed, the amount of excessive water leaving the pond, and the amount of flood water the pond is subjected to from time to time." The number of applications of 100 pounds of 8-8-2 or its equivalent per acre could vary from 8 to 14 per year (Swingle and Smith, 1947). Therefore, in this project, a total of 8 applications or more per year was considered adequate. Of the ponds checked in 1964, 23.3 percent had received adequate fertilization. When the ponds were checked again in 1965, 3.5 percent had received adequate fertilization. Kelly (1961) reported that any evaluation of the effects of erratic fertilization programs on population balance in his study would be questionable because of unknowns such as mortalities in the fish population, addition of fish to the ponds, poaching prior to bass spawning, and mortalities of hatchery fish after they were added. Since the same unknowns were present in the ponds of this project, no evaluation of the effects of the erratic fertilization program on population balance could be made. Even with the presence of these unknown variables, there can be little doubt that a higher percentage of the ponds would have provided balanced fish populations had they received proper fertilization. The ponds in this project must be considered typical and would therefore indicate that the majority of owners of ponds less than 0.25 acre would not manage them properly.

Obnoxious aquatic vegetation was not a problem during the first two years of fishing although it will in all probability become a problem in the ponds that continue to receive inadequate fertilization (Swngle and Smth, 1947).

Another major factor which influenced the possibility of these ponds obtaining a balanced fish population was their inability to maintain a uniform water level during the spawning periods of the bass and bluegill. Lawrence (1949) reported that the red clays (Piedmont) and the clay loams (Limestone Valleys) of central and northern Alabama have fairly impervious subsoils, which may be underlain by decomposed porous rock or crevices. In this area of the state, pond sites with semipermanent or permanent streams or springs may be used if the watershed ratio is 5 to 20 acres of pasture land or 10 to 40 acres of woodland per acre of pond. Large watersheds and heavy rains produced heavy overflows from most of the ponds in this project during the spring months. The surface area was severely reduced in a large number of ponds during the summer months.

Information gained by questionnaires and by talking to the pond owners indicated that 60 percent of the ponds checked in 1964 overflowed in the winter and spring of 1963, with 20 percent having an overflow of 6 inches or more. No information could be obtained on 13 percent of the ponds.

In the summer and fall of 1963, the surface acreas of 7 percent of the ponds were not reduced, 23 percent were reduced by one-fourth, 23 percent were reduced by one-half, and 33 percent were reduced by three-fourths. No information could be obtained on 14 percent of the ponds.

The entrance of wild fish into these ponds was perhaps the largest single factor effecting the largemouth bass, bluegill, and redear sunfish population. Entrance of wild fish (competitive species) to these ponds was facilitated by the large number of ponds which overflowed. The possibility of one pair of wild fish gaining entrance to small ponds is

just as great as it is for large ponds. With all other factors being equal, larger bodies of water require a greater amount of time for the competitive species to effectively compete.

The large pond can absorb this pair and their young easier. There are also more total predators (bass) to feed on the reproduction of this pair.

Swingle (1951) reported that when there was no fishing, an average of 25.6 percent of the stocked bass could be expected to die within the first 6 months. In a pond stocked under this experiment this would leave only 17 bass in the pond on the opening day of fishing. One decent catch of bass at that time could therefore remove enough bass to eliminate any effective control of the intermediate bream and competitive fish.

This project was designed to determine the degree of balance in these ponds during the first and second year of fishing. For this reason, no recommendations such as eradication of the fish population and restocking or partial poisoning and adding bass were made, with the exception of the corrective restocking of bass fingerlings in one pond during the first year of fishing. The main recommendations that were made included following a good fertilization program and closing the pond to bass fishing. In September, 1964, six of the seven overcrowded bluegill ponds which had been closed to bass fishing were rechecked. Four of these six ponds contained a successful spawn of bream.

A total of 845 ponds, which were 0.25 acre or larger, were checked in 14 counties in east-central Alabama during the period of September, 1955, through September, 1959 (Kelly, 1961). Of the 845 ponds checked, 766 were approved and stocked while 79 were disapproved for stocking. Balance checks were conducted in 114 of the approved ponds during the first year of fishing (Table 3). These checks revealed that 91 ponds (79.8 percent) contained a balanced population of fish. Ten of the ponds (10.9 percent) that contained a balanced population were in temporary balance. A total of 23 ponds (20.2 percent) contained an unbalanced population of fish. Based on the total number of ponds checked, 20 ponds (17.6 percent) contained fish populations that were overcrowded with bluegill. Species competitive with bluegill were the cause of the unbalanced population in 3 ponds (2.6 percent).

Kelly reported the results of balance checks in 53 ponds during the second year of fishing.[3] These checks revealed that 35 ponds (67.9 percent) contained a balanced population of fish. One of the ponds (2.7 percent) that contained a balanced population was in temporary balance. A total of 17 ponds (32.1 percent) contained an unbalanced population of fish due to overcrowded forage fish populations. Overcrowded bluegill populations and populations containing species competitive with bluegill were placed in this category.

Thus 53.3 percent of the ponds checked in 1964 during the first year of fishing contained a balanced population of fish as compared to 79.8 percent in the group of ponds that were 0.25 acre or larger as reported by Kelly in 1961. With the 53.3 percent of balanced ponds in this study dropping to 24.1 percent the second year as compared to 67.9 percent in Kelly s study, it therefore does not appear feasible to stock ponds that are smaller than 0.25 acre with largemouth bass, bluegill, and redear sunfish. This project reaffirms the fact that only a small percentage of ponds smaller than 0.25 acre will provide balanced fish populations with successful fishing when stocked with this combination of fish. Ponds smaller than 0.25 acre would require continuous checking, renovation and restocking programs while providing a very limited amount of desirable fishing.

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3 Alabama Department of Conservation, Report for Fiscal Year October 1, 1958 - September 30, 1959. p. 160.

TABLE 3. Summary of conditions found by balance determinations of ponds smaller than 0.25 acre during the first and second year of fishing as compared to ponds larger than 0.25 acre.

Condition	First year of fishing				Second year of fishing			
	30 ponds less than 0.25 acre		114 ponds 0.25 acre and larger [4]		29 ponds less than 0.25 acre		53 ponds 0.25 acre and larger [5]	
	No.	%	No.	%	No.	%	No.	%
Successful balanced population	16	53.3	91	79.8	7	24.1	36	67.9
temporary balance	5	16.6	81	71.1	6	20.7	35	66.1
Unsuccessful overcrowded bluegill	11	36.7	10	8.7	1	3.4	1	1.8
competitive species	14	46.7	23	20.2	22	75.9	17	32.1
	7	23.35	20	17.6	14	43.8	..	..
	7	23.35	3	2.6	8	27.6	..	..

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5 Alabama Department of Conservation, Report for Fiscal Year October 1, 1958 - September 30, 1959. p. 160.