OBSERVATIONS ON SUPPLEMENTAL FEEDING OF A 75-ACRE LAKE STOCKED WITH LARGEMOUTH BASS, BLUEGILL, REDEAR, AND CHANNEL CATFISH

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ABSTRACT

Barbour County Public Fishing Lake (75 acres) was stocked with approximately 500 channel catfish per acre in combination with the normal stocking rates of largemouth bass, bluegill, and redear sunfish. The lake was supplementally fed on one side only, in addition to receiving a regular fertilization program.

At the end of one year of fishing, 305.5 fishermen per acre had harvested 621.8 pounds of fish per acre. Of this total, bluegill comprised 381 pounds per acre.

There was no significant difference between the weights of bluegill collected from the fed and non-fed areas. There was a significant difference between the weights of bluegill collected shortly after the feeding program was inititated and bluegill collected 14 months later. Bluegill from Barbour County Public Fishing Lake were significantly heavier for a given length as compared to bluegill from three public lakes.

INTRODUCTION

Barbour County Public Fishing Lake is one of 19 lakes owned and managed by the Game and Fish Division of the Alabama Department of Conservation and Natural Resources. It contains 75 surface acres and is located in Barbour County near Clayton, Alabama.

It was constructed in 1951 and originally stocked during the winter and spring of 1952. It was opened to public fishing in June, 1953, and remained opened daily from sunrise to sunset until October, 1971.

During the latter years it was opened to fishing, an unbalanced condition developed resulting in poor fishing. After efforts to correct this condition failed, the lake was drained and its watershed renovated with 5% rotenone in October, 1971.

With the increased fishing pressure on the existing fishing areas in Alabama, a need for increased sport fish production was evident. In an effort to create a fishery that would yield a larger harvest and maintain itself under heavy fishing pressure, it was decided to supplementally feed a combination of largemouth bass, *Micropterus salmoides* (Lacepede); bluegill, *Lepomis macrochirus* Rafinesque; redear sunfish, *Lepomis microlophus* (Gunther); and channel catfish, *Ictalurus punctatus* (Rafinesque).

MATERIALS AND METHODS

The lake was initially stocked at the rate of 1,000 fingerling bluegill and redear (75% and 25% respectively), 110 fingerling largemouth bass, and 566 fingerling channel catfish per acre. Additional largemouth bass and channel catfish were correctively restocked after the first year (Table 1). The lake was fertilized at regular intervals from March through October of 1972 with a total of 7,200 pounds of 20-20-5 NPK fertilizer and 10,300 pounds of triple superphosphate. Fertilization was decreased slightly in 1973 due to the supplemental feeding program with a total of 7,200 pounds of 20-20-5 and 7,500 pounds of triple superphosphate being applied to the lake. All state-owned and managed public fishing lakes in Alabama are fertilized to increase fish production and inhibit the growth of obnoxious underwater vegetation. (Byrd and Swingle, 1964).

Table 1. Barbour County Public Lake Stocking Record.

Species	Number	Size	Date
Bluegill and Redear	61,000	2″	January 20, 1972
	14,000	3″	
Largemouth Bass	8,250	2″	May 18, 1972
	7,500	3″	July 11, 1973
	2,000	7″-8″	October 3, 1973
(Florida Bass)	3,500	1″	April 10, 1974
Channel Catfish	42,500	3″-5″	August 23, 24, 1972
	5,400	6″-7″	April 5, 1973
	7,500	6″-8″	October 24, 1973

A supplemental feeding program was initiated in September, 1972, utilizing Purina Floating Catfish Ration (form extruded, 95% - 100% held on No. 4 Tyler screen). Approximately 42 tons of the ration were fed from September, 1972, until June, 1974. Only one side of the lake was fed in an attempt to determine if the growth rate of the bluegill on the fed side would be significantly different from those on the non-fed side. The feeding rate varied from a total of 25 pounds per day to 525 pounds per day. The channel catfish were fed 3% of their body weight after stocking. Since the channel catfish could not be sampled easily, the feeding rate was adjusted assuming a 1.5 conversion rate. The channel catfish were fed according to this schedule until the lake opened. After this time the lake was fed 50 to 500 pounds per day according to the time of year. Feeding was discontinued in July, 1973, but was initiated again in September, 1973 (Table 2).

Table 2. Feeding Schedule for Barbour County Public Lake.

Date	Pounds of Feed Per Day	Total Pounds Per Period
September, 1972	25	750
October, 1972	50	4,000
March 19, 1973	150	2,100
April 2, 1973	160	2,240
April 16, 1973	180	2,520
April 30, 1973	200	2,800
May 14, 1973	250	3,500
May 28, 1973	320	4,480
June 11, 1973	410	5,740
June 25, 1973	525	5,250
July 5, 1973 Discontinued Feeding		
September 4, 1973	300	3,900
September 17, 1973	400	2,800
September 24, 1973	500	18,000
November 1, 1973	200	1,400
November 7, 1973	50	4,000
March 19, 1974	150	1,800
April, 1974	200	6,000
May, 1974	250	7,500
June, 1974	200	6,000

Initial plans called for the stocking of 500 fingerling channel catfish per acre in July at a size of 4 to 6 inches in total length. The catfish were not obtained until late August and were 3 to 5 inches in length with the majority of the fish being 3 to 4 inches. A delivery error resulted in the stocking of 566 channel catfish per acre. In an attempt to avoid excessive bass predation on the smaller catfish, the fish were placed in three wire cages. The cages were 8′ x 4′ x 4′ and constructed of ¼″ hardware cloth. These cages were placed in three locations on the same side of the lake approximately 300-500 yards apart. The fish were fed 25 pounds of the floating ration daily. The catfish were released at intervals into the lake. All fish were released from the cages by November, 1972. Feeding was continued in the areas where the cages had been located at a total of 50 pounds per day until the following March (Table 2). Feeding was carried out during this time on calm, sunny days only.

Catch data were obtained from complete catch records. Fish taken from the lake were counted and weighed by species before the fishermen left the lake.

Balance checks were conducted monthly from May to September by the seining technique described by Swingle (1956).

Electro-fishing gear was used to collect bluegill from the feeding area and the non-feeding area of Barbour County Public Lake in February, 1973, and again in April, 1974. Bluegill from Coffee, Crenshaw, and Pike County Public Lakes were also collected in April, 1974. These lakes are located in nearby counties and are 80, 53, and 45 surface acres respectively. A total of 530 bluegill, 3 to 8 inches in size, were collected from Barbour County Public Lake from the feeding and non-feeding areas. A total of 142 to 166 bluegill, 2 to 9 inches in length, were collected from Coffee, Crenshaw, and Pike County Public Lakes.

The data from Barbour County Public Lake were compared utilizing the analysis of variance of a 2 x 2 factorial arrangement. Weight was used as the unit of measurement. The factors were the fed and non-fed areas and the two sample periods (Snedecor and Cochran, 1967).

Analysis of covariance was used to compare data from Barbour, Coffee, Crenshaw, and Pike County Public Lakes. The regression of logarithm of weight on the logarithm of length was calculated for all lakes and compared at the 5% level of significance (Snedecor and Cochran, 1967).

RESULTS AND DISCUSSION

Barbour County Public Lake was stocked with 566 channel catfish per acre in combination with the normal stocking rates of largemouth bass, bluegill, and redear and supplementally fed to increase total fish production. A study on supplemental feeding in bass-bluegill populations conducted on the Agricultural Experiment Station at Auburn University demonstrated that fishing success over a four-year period was better than the average fishing success in 20 of Alabama's state-owned public fishing lakes over a 14-year period (Schmittou, 1968). Another study showed that good fishing could be obtained by stocking 500 channel catfish fingerlings per acre in combination with 50 largemouth bass fingerlings and 1,000 fathead minnows, *Pimephales promelas* Rafinesque, per acre with fertilization only (Prather, 1964). The stocking of channel catfish at approximately 500 per acre with supplemental feeding, in addition to the normal bass-bluegill-redear stocking rate, was initiated to determine if a better fishery under heavy exploitation could be established and maintained over a long period of time.

Since the channel catfish were stocked at a later date and were smaller than desired, it was felt that they would experience excessive bass predation. This was further substantiated when channel catfish were found in the stomachs of several bass sampled. In addition, the lake concessionaire reported seeing large numbers of largemouth bass and channel catfish in a large pool below the spillway following each heavy rain during the spring months of 1973. For these reasons, an additional 5,400 channel catfish, 6 to 7 inches in length, were stocked on April 5, 1973 (Table 1). This number was all that was available from hatchery sources.

The lake was opened to public fishing June 28, 1973. A $1.00 daily fishing permit, in addition to the appropriate fishing license, was required for all fishermen above sixteen years of age. The creel limit was set at 20 bluegill and/or redear, 6 largemouth bass, and 6 channel catfish per person per day. A quota on the number of largemouth bass to be harvested was set at 2,000. A quota system is part of the management program in Alabama'a state-owned and managed public fishing lakes. This system is used in an effort to prevent an over harvest of the largemouth bass from the lakes. There was also a charge of $.50 per pound for the channel catfish in an attempt to offset the cost of the feed.

The opening day catch was quite impressive with a harvest of 74 pounds per acre. The bluegill and redear catch was 55.3 pounds per acre, the largemouth bass catch was 9.8 pounds per acre, and the channel catfish catch was smaller than expected at only 8.9 pounds per acre (Table 3). Upon questioning fishermen, it was discovered that many of the channel catfish were returned to the lake after being caught. The fishermen were satisfied catching large bluegill and did not wish to pay the $.50 per pound for channel catfish. The average weight of bluegill and redear on opening day was 0.37 pound each. However, there were numerous limits of bluegill in which the fish averaged 0.4 pound or more. It appeared that the bluegill had utilized the feed more than anticipated.

Table 3. Barbour County Public Lake Opening Day Catch (June 28, 1973).

Species	Number	Weight	Average Weight	Weight / Acre
Bluegill and Redear	11,303	4,151	.37	55.3
Largemouth Bass	830	733	.88	9.8
Channel Catfish	676	670	.99	8.9
Total Fish	12,809	5,554	-	74.0
Total Fishermen	1,200			
Fishermen/Acre	16			

The feeding program was discontinued from July, 1973, until September, 1973. Seining checks showed a heavy spawn of golden shiners, *Notemigonus crysoleucas* (Mitchill), during the spring of 1973. The source of introduction of the golden shiners was unknown. Golden shiners began to utilize the feed heavily, and it was felt that if they were allowed to continue feeding many would outgrow the forage size range for the largemouth bass population. Fingerling largemouth bass were stocked in July, 1973, in an effort to reduce the number of shiner fingerlings (Table 1). The feeding program was resumed in September, 1973, after seining checks indicated that the lake was still in balance, and it appeared that the shiner population had been reduced.

After the first three months of fishing, the catch of bluegill and redear was 265.5 pounds per acre, the catch of largemouth bass was 20.5 pounds per acre, and the catch of channel catfish was 77.2 pounds per acre. During this period, 183.6 fishermen per acre had harvested a total catch of 363.2 pounds per acre (Table 4). The quota on largemouth bass was reached on August 22, and the lake was closed to the harvest of largemouth bass.

Table 4. Barbour County Public Lake Catch After Three Months (June 28, 1973, to September 30, 1973).

Species	Number	Weight	Average Weight	Weight / Acre
Bluegill and Redear	65,878	19,914	.30	265.5
Largemouth Bass	2,009	1,543	.77	20.5
Channel Catfish	5,404	5,794	1.07	77.2
Total Fish	73,291	27,251	-	363.2
Total Fishermen	13,774			
Fishermen/Acre	183.6			

In October, 1973, advanced largemouth bass fingerlings, 7 to 8 inches in length, were correctively restocked in an effort to compensate for the largemouth bass lost over the spillway and to help further reduce the golden shiner population. Channel catfish were also added at 100 per acre to replace the catfish that had been harvested (Table 1).

Since a heavy spawn of golden shiners was anticipated in the spring of 1974, one-inch largemouth bass from Welaka Hatchery, Welaka, Florida were stocked on April 10, 1974 (Table 1). Since these bass were spawned at an earlier date than our native largemouth bass, it was hoped that they were large enough to effectively prey on the golden shiner fry.

At the end of one full year of fishing, 305.5 fishermen per acre havested a total of 621.8 pounds of fish per acre. This represents slightly over two pounds of fish per fishermen. Of the total catch, 381 pounds per acre were bluegill and redear, 30.8 pounds per acre were largemouth bass, and 210 pounds per acre were channel catfish (Table 5). The catch of largemouth bass was limited to a three-month period due to the closing to bass harvest from August 22, 1973, until June 1, 1974. Without this closing, the largemouth bass population would undoubtedly have been over harvested. The limit on catfish was changed on June 1, 1973. The limit was lowered to three catfish per person per day and the charge of $.50 per pound was discontinued. It had become evident that the fishermen were not willing to pay the additional cost for the channel catfish. There was very good response to the new limit as indicated by the attendance of 400 fishermen on June 1, 1974, the date the new limit went into effect. From June 1 until June 27, 1974, a total of 5,173 pounds of channel catfish were harvested. Up until this date only 10,579 pounds of channel catfish had been harvested.

Table 5. Barbour County Public Lake Catch After One Year (June 28, 1973 - June 27, 1974).

Species	Number	Weight	Average Weight	Weight / Acre
Bluegill and Redear	111,185	28,579	.26	381.0
Largemouth Bass	3,002	2,309	.77	30.8
Channel Catfish	9,528	15,752	1.65	210.0
Total Fish	123,715	46,640	-	621.8
Total Fishermen	22,913			
Fishermen/Acre	305.5			

The cost of feed increased drastically after the feeding program was initiated. Initially feed was $146.10 per ton; however, the price increased to $265.00 per ton. The cost of the 42 tons of feed was approximately $6,370. From June 28, 1973, to May 31, 1974, 10,579 pounds of catfish were harvested with the charge of $.50 per pound in effect. The revenue from this amounted to approximately $5,290. The lake concessionaire received 20% of this for his time and effort in feeding and weighing the channel catfish separately. The state's share was 80% and resulted in a revenue of $4,232. The charge of $.50 per pound for the catfish was not sufficient to offset the cost of feed.

From strictly a production standpoint, the total catch at Barbour County Public Lake was considerably greater than under normal circumstances. The average total catch and attendance for the first year of fishing in Alabama's state-owned and managed public fishing lakes has been reported to be 223.9 pounds per acre with 194 fishermen trips per acre (Byrd, 1959). The total catch at Barbour County Public Lake the first year was 621.8 pounds per acre with 305.5 fishermen per acre. Excluding the catch of channel catfish, the catch at Barbour County Public Lake was 411.8 pounds per acre. This figure is still considerably higher than the average catch for the first year in public fishing lakes. The average total catch at 20 of Alabama's state-owned public fishing lakes opened to fishing from 1 to 14 years was 173 pounds per acre with a total of 135 fishermen trips per acre (Byrd and Crance, 1965). Again the total catch at Barbour County Public Lake was higher. This points to the fact that total production and the bluegill production was increased considerably by the feeding program.

The analysis of variance was used to analyze the data obtained from the collection of bluegill from Barbour County Public Lake. There was no difference at the 5% level of significance between the weights of bluegill collected from the feeding and non-feeding areas of Barbour County Public Lake. The data from both sample periods were combined into a fed and non-fed category. The bluegill from the fed and non-fed areas were combined for each sample period and bluegill collected from Barbour County Public Lake in April, 1974, were significantly heavier than the bluegill collected in February, 1973. The date indicated that there was no significant difference in the weights between the fed and non-fed area, and it would appear that feeding only one side of the lake did not result in a significant size difference between the bluegill. This could be explained by the migration of bluegill in and out of the feeding area, the dispersal of the feed by wind and wave action, or the generalized increased fertility brought about by the feeding. The fact that the bluegill collected in April, 1974, were significantly heavier was probably a direct result of the feeding program since bluegill collected in February, 1973, had not been subjected to heavy feeding. Heavy fishing pressure had also taken place between the two periods which may also have influenced the growth rate of the remaining fish.

The comparison of the data from Barbour County Public Lake utilizing the regression of log weight on log length for the fed and non-fed areas showed no difference at the 5% level of significance. These data were combined, and the combined length-weight regression for Barbour County Public Lake had a slope greater at the 5% level of significance than for the data on Coffee, Crenshaw, and Pike County Public Lakes. This indicated that for a given length, the weight of bluegill from Barbour County Public Lake was significantly heavier than bluegill from each of the other three lakes. This would appear to be a direct result of the feeding program.

CONCLUSIONS

1. The stocking of approximately 500 channel catfish per acre in combination with the normal stocking rate of largemouth bass, bluegill, and redear with supplemental feeding resulted in a much higher total production the first year of fishing than the average for state-owned public fishing lakes.
2. The lake remained in a balanced condition throughout the first year even though it was subjected to heavy fishing pressure.

3. The late stocking and small size of the channel catfish subjected the fish to more intense bass predation. An unknown number of channel catfish was lost over the spillway during periods of high water.

4. Fishermen did not wish to pay the $.50 per pound charge for the channel catfish and were satisfied catching the larger bluegill. The cost of the feed was offset slightly when the charge was in effect. However, increased feed prices made this type of program uneconomical.

5. There was no significant difference between the weight of bluegill from the fed and non-fed areas. This indicates that the entire bluegill population benefited from feeding only one side of the lake.

6. The weights of bluegill collected April, 1974, were heavier than the weights of bluegill collected February, 1973. This would appear to be a direct result of the feeding program.

7. There was a significant difference between the weights of bluegill from Barbour County Lake and Coffee, Crenshaw, and Pike County Public Lakes. For a given length, a bluegill from Barbour County Public Lake was heavier than a bluegill from the other three lakes.

8. The feeding program resulted in increased production. However, the increasing cost of feed limited the scale on which the program could be carried out.

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