

FISHERIES INVESTIGATIONS IN LAKES AND STREAMS

DISTRICT IV

JULY 1, 1995 - JUNE 30, 1996

1996

ANNUAL PROGRESS REPORT

F-63-1-4

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JOB PROGRESS REPORT

STATE: South Carolina

PROJECT No.: F-63-1-4

PROJECT TITLE: - District IV Fisheries Investigations in Lakes and Streams

STUDY: Survey and Inventory

Study Title: Fisheries Surveys-
District IV

JOB NO.: 1

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District IV

PERIOD COVERED: July 1, 1995 through June 30, 1996

Summary

Survey and inventory of freshwater fisheries resources was conducted in the seven county central piedmont area of South Carolina that comprises Freshwater Fisheries District IV. Spring electrofishing was conducted in lakes Wylie, Wateree and Monticello to evaluate largemouth bass population parameters. Cove rotenone sampling and fall trap netting for crappie were conducted in Lake Monticello, and an age and growth study of largemouth bass was initiated. Stream survey was conducted in selected tributaries of the Catawba River in York, Lancaster and Chester counties. A study of fish distribution and abundance was begun in the Catawba River.

Introduction

The routine survey, inventory and assessment of selected fishery data is an integral part of managing the fishery resources of District IV. Stocking recommendations, creel limits, size limits and other management approaches must be based on accurate and up-to-date information. Standardized sampling techniques have been previously used to collect fisheries data in the District. Specific data needs and sampling schedules are based on Departmental priorities

established by management goals.

Materials and Methods

[Study area]

Lake Monticello is a 2,753 hectare (6,000 acre) pump-back reservoir located adjacent to the Broad River 45 kilometers north-northwest of Columbia. The reservoir is used for direct cooling of a single unit nuclear power station. The reservoir was constructed in 1978 and is totally dependent upon pumped water from the Broad River to maintain its water level. Daily fluctuations are approximately 1.5 - 2.5 meters and low water periods occur during the afternoon and at night. This reservoir is the least fertile reservoir in the District.

Lake Wateree is a 5,500 hectare (13,704 acre) reservoir located on the Wateree River 12 kilometers west-northwest of Camden. The impoundment is relatively fertile with a retention time of 27 days. Water levels are comparatively stable and seasonal fluctuations rarely exceed 1 meter.

Lake Wylie is located on the Catawba River and is bordered by both North Carolina and South Carolina. The impoundment is 9 kilometers north of Rock Hill and 2,613 hectares (6,456 acre) of its total 5,043 hectares (12,500 acre) are in South Carolina. The proximity of Lake Wylie to the large population centers of Charlotte, North Carolina and Rock Hill have resulted in a highly developed shoreline with increased levels of non-point siltation. Retention time is 32 days.

The free flowing section of the Catawba River between the Lake Wylie dam and the Highway 9 bridge was sampled during the project year. This 32 mile stretch of river is highly regulated by the Lake Wylie hydro station.

Stream surveys were initiated in York, Chester and Lancaster counties to update a historic data base. Tributaries to the Catawba River were sampled to complement the Catawba River

fisheries study. A multiple-pass depletion electrofishing technique was used.

[Methods]

[Relative Condition Factor]

During April and May, largemouth bass were collected using standard electrofishing techniques from Lake Monticello. A sample of bass was kept to conduct age and growth assessments. Data from bass captured electrofishing in lakes Wateree and Wylie were provided by Duke Power Company (DPC). Total length (mm) and weights (g) were taken from all fish. Data were utilized to calculate Kn using the formula:

$$Kn = \frac{W}{W^{\wedge}}$$

where

Kn = relative condition factor

W = measured weight of fish of a specific length

W^{\wedge} = computed weight of fish of a specific length

Values of W^{\wedge} were taken from Tables for Computing Relative Condition Factors of Some of South Carolina's Common Freshwater Fishes (May 1984), and from Tables for Computing Relative Condition of Some Common Freshwater Fishes (Swingle 1971).

[Cove Rotenone]

Cove rotenone sampling was used to assess standing stocks of fish in Lake Monticello in August of 1995. Three coves totaling 1.84 hectares (4.54 acres) were sampled at Lake Monticello. These coves were the same coves used in sampling conducted in 1987 and 1988. Surface acreage and depths were determined for all coves. Coves were blocked with 9.5 mm mesh netting to prevent the passage of fish to and from the sample area. A gasoline powered pump was used to disburse diluted 5% emulsifiable rotenone at a concentration of 1 mg/l. On the

first day, all fish collected were identified, sorted into inch groups, counted and weighed. On the second day, fish were picked up, sorted to species and inch groups, and counted. Weights for fish picked up on the second day were calculated from the first day weights by finding the average weight of each species by inch group and multiplying the average weight by the number of fish counted on the second day. If a new species was collected the second day, weights were derived from length-weight relationships of common South Carolina freshwater fish (May 1984). If a species could not be located in a length-weight table or from historic data, a weight from a similar species was used for the calculations. All data were presented in English units to aid in comparisons with previous data collections. Computer analysis of the data were accomplished with a personal computer using SAS software for data analysis (1985).

[Trap Netting]

Trap nets following specifications recommended by Colvin and Vasey (1986) were used in Lake Monticello to collect crappie for this study. Trap nets consisted of two rectangular (3' x 6') steel frames with center braces and four hoops (2.5' diameter). Rectangular frames were spaced 30 inches apart. The first hoop was 32 inches from the second rectangular frame, and the hoops were spaced 24 inches apart. One-half-inch square treated nylon was used for netting. Netting covering the first and second 3' x 6' frames was slit to provide an opening. The cod end of the net had a draw string closure. The 85' leads were constructed of ½" square knotless nylon hung on treated nylon twine. Leads were 2.5' deep with cork floats spaced at 3-foot intervals and 1.5 ounce weights spaced at 2-foot intervals. Also, due to previous inefficiency with trap nets in Lake Monticello presumably due to the daily changes in water level, wire baskets were used to sample crappie. Two baskets constructed of one-inch square mesh chicken wire and measuring approximately 48 inches long, 48 inches wide and 24 inches high and two baskets measuring

baskets measuring 36 inches by 36 inches by 24 inches were fished over eight nights. Forty-one crappie were captured in the baskets for a mean catch rate of 1.41 crappie per basket night.

Black crappie were captured in the 3 through 12 inch size groups, with the highest frequencies occurring in the 7 and 9 inch groups (Figure 9). Of 64 crappie examined, males comprised 27% (N=17) of the sample and females comprised 41% (N=26) of the catch. Twenty-one fish (33%) were sexually immature.

Examination of 62 otoliths revealed 1+ year-old individuals comprised 79% of the population. Two year old fish comprised 5%. There were no fish older than 2+ years of age. Ten young-of-the-year fish were captured. Mean length at capture for age I fish was 109 mm (Table 1). Growth of crappie in Lake Monticello appears to be slower than growth observed in more fertile reservoirs (Table 2).

Due to the poor success of using trap nets in Lake Monticello, trap netting will be discontinued. Efforts will continue to collect crappie with baskets in the fall of 1996.

[Cove Rotenone]

In 1995, standing stocks of fish in the three coves ranged from 112 lbs/acre to 182 lbs/acre. Standing stocks averaged 136 lbs/acre for the three coves sampled. Twenty-seven species of fish were captured (Table 3). Only nine of the twenty-seven species collected contributed more than one pound per acre. Gizzard shad (31%), channel catfish (22%), white bass (20%) and bluegill (12%) comprised 84% of the total standing stocks (Table 4.)

Standing stocks were lower in 1995 (138 lbs/acre) than in 1987 (274 lbs/acre) or in 1988 (251 lbs/acre). Large declines in standing stocks were observed between the 1988 and the 1995 studies for bluegill (50 to 16 lbs/acre), channel catfish (68 to 32 lbs/acre), and white catfish (50 to 0.3 lbs/acre).

Table 3. Standing stocks (pounds) of fish collected from summer cove rotenone sampling in Lake Monticello, South Carolina, for 1987, 1988, and 1995.

Species	Year		
	1987	1988	1995
Gizzard shad	75.4	33.0	41.8
Threadfin shad	14.7	9.5	1.53
Silvery minnow	--	0.3	0.01
Golden shiner	--	T	--
Whitefin shiner	0.5	0.1	0.13
Swallowtail shiner	--	--	0.04
River carpsucker	11.6	1.6	1.06
V-lip redhorse	13.0	6.0	0.86
Snail bullhead	--	0.1	0.07
White catfish	22.9	49.6	0.34
Blue catfish	--	--	6.85
Brown bullhead	--	--	T
Flat bullhead	0.3	T	0.37
Channel catfish	56.0	67.8	32.2
Mosquitofish	--	T	T
Brook silverside	--	--	T
White perch	--	--	0.45
White bass	0.6	0.3	26.8
Redbreast sunfish	0.3	0.1	0.03
Green sunfish	--	--	0.05
Pumpkinseed	3.1	4.9	0.77
Warmouth	1.3	0.8	0.01
Bluegill	51.2	49.9	16.5
Redear sunfish	0.9	1.9	0.77
Largemouth bass	4.1	5.7	3.74
White crappie	--	1.0	--
Black crappie	7.8	5.5	0.01
Tessellated darter	T	T	T
Yellow perch	9.8	13.2	--
Total standing stock	273.5	251.1	137.8

T= trace = <1%

Table 4. Standing stocks of fish by percent composition (E values), collected during summer cove rotenone sampling in Lake Monticello.

	Year		
	1987	1988	1995
Gizzard shad	27.5	13.1	30.3
Threadfin shad	5.4	3.8	1.11
Silvery minnow	--	0.1	0.01
Golden shiner	--	T	--
Whitefin shiner	0.02	T	0.09
Swallowtail shiner	--	--	0.03
River carpsucker	4.2	0.6	0.77
V-lip redhorse	4.8	2.4	0.63
Snail bullhead	--	T	0.05
White catfish	8.4	19.7	0.25
Blue catfish	--	--	4.97
Brown bullhead	--	--	T
Flat bullhead	0.1	T	0.27
Channel catfish	20.5	27.0	23.4
Mosquitofish	--	T	T
Brook silverside	--	--	T
White perch	--	--	0.33
White bass	0.2	0.1	19.4
Redbreast sunfish	0.1	T	0.02
Green sunfish	--	--	0.04
Pumpkinseed	1.1	2.0	0.56
Warmouth	0.5	0.3	0.01
Bluegill	18.7	19.9	12.0
Redear sunfish	0.3	0.8	0.56
Largemouth bass	1.5	2.3	2.72
White crappie	--	0.4	--
Black crappie	2.9	2.2	0.01
Tessellated darter	T	T	T
Yellow perch	3.6	5.3	2.54
	100.0%	100.0%	100.0%

T= trace value (0.001)

Out of the 27 species observed in the 1995 study, brown bullhead, blue catfish, brook silverside, green sunfish, swallowtail shiner, and white perch were species that had been previously unrecorded in the 1987 and 1988 studies. Golden shiner, which was present in the previous studies, was not recovered in the 1995 survey.

The presence of blue catfish in the Lake Monticello fishery is a concern. The lake has a relatively low prey base and it would not be a likely candidate for the introduction of any additional piscivorous species, including striped or hybrid bass or blue catfish. The unfortunate introduction of blue catfish may lead to competition for forage between white bass or white or channel catfish species.



[Stream Survey]

Stream survey was conducted in eight tributaries to the Catawba River in York, Chester and Lancaster counties. Multiple passes with a back-pack electrofisher were used to sample stream fisheries. All fish were identified to species and measured (total length, mm). Selected physical and chemical measurements were taken at all the sampling locations. Data were filed in the District IV fisheries office.

[Catawba River Sampling]

A cooperative river sampling initiative between Clemson University and Duke Power Company began during the project segment. The objectives were to determine species composition and relative abundance of fish in the river. Three 300 meter longitudinal transects were established at six primary sampling stations located in the 32 mile stretch between the Lake Wylie tailrace and the Highway 9 bridge. Stations were located in the tailrace, at a private access approximately one mile above I-77, at Manchester wastewater treatment plant, Highway 5, Landsford Canal and Highway 9. Boat electrofishing, hoop-netting, and egg-netting were

conducted in the spring (April and May) during the study period. Selected water quality parameters were measured at each primary site. Secondary sites were established between primary sites at areas where boat access was lacking. Fish were sampled at secondary sites with a backpack electrofisher and a blocknet. Selected physical and chemical parameters were measured.

Field work for the Catawba River sampling was not completed during the project segment. Results will be reported in a future report.

Recommendations

1. Continue using the survey techniques described in this report to evaluate fish populations.

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