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JOB PROGRESS REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-4-15

REGION 2-A FISHERIES STUDIES

Job No. B-38: Meridian State Park Lake Crappie Removal Experiment

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Summary

Creel census results showed that 19.38 per cent of the sports fish catch at Meridian was white crappie. The average length of the crappie caught was 6.57 inches or 166.87 mm.

One hundred eighty-six fish (960 crappie) were tagged and 118 tags were returned for a return rate of 10.86 per cent. Fourteen fish that had been at large from 11 to 51 days showed an average weight loss of -11.92 grams. No weight losses were observed in fish that had been at large longer than 51 days. Forty-two crappie were at large an average of 112 days. During this time, they grew an average of 16 mm. in length and gained an average of 25.21 grams in weight.

Various trapping methods were tried. A box trap with either single or double leads was found to be specific for taking crappie.

As this was the first year in a 4-year study, no conclusions or recommendations were made.

Job Progress Report

State of Texas

Project No. F-4-15 Name: Region 2-A Fisheries Studies

Job No. B-38 Title: Meridian State Park Lake Crappie Removal Experiment

Period Covered: January 1, 1968 to December 31, 1968

Background:

The alkaline waters of Central Texas reservoirs containing white crappie (Pomoxis annularis) populations traditionally fail to maintain a good fishery for this species. The white crappie invariably overpopulates its ecological niche, resulting in a stunted population. Several years following impoundment, the average size of crappies has diminished to the point where sport fishermen consider them undesirable. The removal of restrictions on bag limits has failed to alleviate this condition and crappie populations are not utilized. By removing individual fish by reducing intraspecific competition.

Results of work in other states, principally Tennessee, indicate that removal of crappie from a reservoir at the rate of 5 or 6 pounds per surface acre will improve the average size of individual crappie.

Objectives:

1. To review existing literature relative to removal of crappie and its effects on the fish population.
2. To establish the rate of catch of white crappie by creel census techniques.
3. To initiate the tagging and recapture of crappie, bass, and catfish.
4. To evaluate crappie removal techniques.

Procedures:

SIE was contacted relative to information available concerning crappie removal efforts by other states. Similar requests were also made to the Library Reference Service of the Conservation Library at Denver. The libraries at T.C.U. and Texas A&M as well as the Department library were checked for pertinent information. Correspondence with other workers was used to obtain first hand information for various aspects of this job.

Creel census was initiated on a 7-day, every other week basis for 6 months. At the end of 6 months, it was decided to extend the creel census for an additional 6 months

in order to project a better picture of the sport fishery at Meridian. Fishermen were contacted and the length and number of each fish in their creel, as well as the number of hours they had been fishing, was recorded on a standard creel census card.

Crappie, bass, and catfish were tagged with yellow plastic anchor tags. The tags were marked with the words TURN IN PWD and a 5-digit number. They were attached behind the dorsal fin with the new tagging gun manufactured by Floy Tag Co. Fish were weighed and measured when tagged and other pertinent information was recorded. Whenever possible, the same information was collected when the fish were recaptured.

Fish for the tagging program were captured by means of various traps. Different variations of traps were tried in an effort to determine which type of traps were most effective in taking crappie.

Findings:

The supposition that growth rates of fishes may be improved by reducing the density of the population is not new in the field of fisheries management. Review of existing literature on this subject yields many different results ranging from complete failure to limited success. Literature Review has been grouped into 2 categories: 1) General experiments testing the "density-thinning" principle, and 2) Experiments applied directly to crappie populations.

General

Ricker (1963) suggested 2 ways that a natural population can compensate for fish removal: 1) An increase in the growth rate of the remaining fish and 2) An increase in the annual recruitment.

Wenger (1968) stated in a review of literature on the effects of netting, that one of the consistent characteristics among the various experiments was that changes that could definitely be related to netting pressure occurred only to those fish species that were subjected directly to netting.

Kuehn (1948) estimated that a reduction of about 75 per cent by number would be necessary to improve the growth rate and average size of sunfish in Clear Lake, Minnesota.

Grice (1957) found that in 4 Massachusetts ponds (small lakes) an average removal of 15 pounds per acre per year with fyke nets was insufficient to cause significant increases in the growth rates of the fishes involved, but a single intensive removal in 1 year of 44 pounds per acre resulted in greatly increased growth of bullheads, bluegills, and yellow perch. He concluded that removal can be an effective temporary tool if a considerable portion of the standing crop is taken.

J. E. Williams and W. H. Tody of Michigan reporting at a panel discussion at the 14th Tri-State Fisheries Conference at Higgens Lake, Michigan in 1958, felt that in their experience, it was probably necessary to remove about 70 per cent of the standing crop of any panfish to obtain a significant increase in growth. (Quoted by Scidmore 1959).

Scidmore (1959) reports that an investigation of the effects of removal in 5 Minnesota lakes where 1.3 to 21.3 pounds of sunfish per acre were removed by seine and trap nets indicated that removal of these amounts was ineffective for increasing average size or rate of growth of bluegills. It was concluded that the amounts removed were not sufficient to produce the desired effects.

Beckman (1940) described accelerated growth in rock bass in a small Michigan lake after a removal with rotenone of 21.8 pounds per acre of all species of which 3.4 pounds were rock bass.

Essbach (1959) relates efforts to improve size and growth of stunted yellow perch in a small New Jersey lake. Here, over a 3-year period, removal of perch with gill nets was accompanied by destruction of all perch egg masses with copper sulfate. This combination of the 2 techniques resulted in an increased growth rate for all age groups of perch. Removal of adults with gill nets amounted to 2.4, 2.7, and 1.3 pounds per acre over the 3-year period. It was felt that in view of this rather light removal of adults it would seem that the nearly complete elimination of 3-year classes through destruction of egg masses was the primary factor in obtaining the desired effect. Essbach also felt that the intensity of removal necessary for accelerating growth also depends on the fertility of the lake and the size of the standing crop.

Experiments on Crappie

King (1954) described efforts to remove part of the fish population from a 154-acre reservoir in Oklahoma over a 3-year period and found this method ineffective for improving growth rates of crappies and bluegills. Twenty acres, 30 acres, and finally nearly all of the shoreline was treated; presumably eliminating almost all the fish in these areas without increasing growth rates.

Carter (1963) reported netting .01 per cent of the estimated crappie population from Dewey Lake, Kentucky. He reported that the total harvest of crappie was below that considered necessary to significantly reduce competition within the population. Any effect this removal may have had on the fish population was obscured by a drawdown of the lake after removal operations.

Hall, Jenkins, and Finnell (1954) stated it is highly probable that intraspecific competition contributes more to crappie stunting than does competition from other species.

Boussu (1954-55) concluded that the removal of about 80 per cent of the standing crappie population was largely negated within 1 year by recruitment, and that no appreciable benefit was accorded this species as regards general condition. The possibility exists, however, that increased growth rate may have accrued to young-of-the-year and 1-year-old fish. Boussu also stated that "it appears that thinning of panfish species must be accomplished at a very high level in order to bring about any decisive improvement of the habitat. Unless other species are involved which would make the use of toxicants inadvisable, it is probable that chemical control would be more satisfactory than netting."

Carlander and Moorman (1957) in an experiment to thin an established crappie population reported that a study of scales from the removed crappies and from a series of 45 crappies taken the following year showed that the year classes so prominent in 1950 had grown from a mean length of 7.5 inches to a mean length of 10.8 inches during the year. In the same period, the 1950 class had grown to a length of 6.7 inches.

Jenkins (1955) reported that first year growth had increased 2 inches over pre-rotenone rates for both species (black and white crappie) after a drastic (50 to 95 per cent) reduction in numbers.

Several authors have reported on the commercial crappie fishery on Reelfoot Lake, Tennessee. Netch (1965) stated that in the 1955 to 1965 period following the cessation of commercial netting of white crappie, Pomoxis annularis Rafinesque, the crappie population in Reelfoot Lake grew progressively slower and had a progressively smaller average size. The catch rate in terms of the number of fish per man hour increased progressively. He stated that because of this, the Fish Management Division recommended the removal of white crappie and other over-abundant species. In an attempt to accomplish this, commercial fishing was permitted again.

Schoffman (1964) reported that the best growth rate of crappie occurred prior to the stopping of commercial fishing. He stated that the growth rate of game fish in Reelfoot Lake shows a decrease in both length and weight, since commercial fishing was abolished in 1955. Since 1955 more fish in the lower age groups are being taken.

Petit (1966) reported that the average weight of crappie taken in Reelfoot Lake was 4.5 ounces, up 0.4 of 1 ounce over the previous year after removal of 5 to 6 pounds to the acres.

Petit (1967) stated that the average weight of white crappie was 3.7 ounces, down 0.8 of an ounce from the previous year. He stated that crappie are now entering both commercial and sports harvest at an earlier age than they had previously. The crappie growth problem may be due to intraspecific competition at the point where crappie switch to piscivorous food.

In an effort to obtain a more detailed picture of the sports fishery at Meridian, the original 6-month creel census has been extended for an additional 6 months. This will yield sample data from all seasons. Due to the extension of the creel census, the final results cannot be tabulated at the writing of this report. The results presented in Tables 1 and 2 are based on information gathered through December 31, 1968.

In view of the fact that the creel census is incomplete, discussion of the data presented in Tables 1 and 2 will be limited to general observations. Information to date indicates that Meridian State Park Lake receives equal fishing pressure on weekdays and weekend days. The only difference noted was that weekday fishermen were slightly more successful.

Table 1. Summary of Creel Data at Meridian State Park Lake through December 31, 1968.

	Number of Days Censused	Number of Fishermen	Percent Unsuccessful	Man Hrs. Spent Fishing	Total Fish	Rate of Catch Fish/Hr.	Fishing Pressure Hrs./acre
Weekend Days and Holidays	30	384	18.75	917	1,225	1.33	11.46
Weekdays	86	303	13.53	916.5	1,714	1.87	11.45

Table 2. Species Composition of Fish Taken by Sport Fishermen at Meridian State Park Lake through December 31, 1968.

Species	Number	Percent Number	Average Size in Inches
Channel catfish	19	0.65	14.14
Largemouth bass	225	7.64	8.59
Warmouth bass	26	0.88	5.16
Green sunfish	9	0.31	5.16
Redear sunfish	645	21.90	6.00
Bluegill sunfish	1,450	49.24	5.08
White crappie	571	19.38	6.57
TOTAL	2,945	100.00	

Meridian has the reputation of being one of the better "sunfish" lakes in Texas. The fishermen seem to be as responsible for this fact as the existing fish population. The majority of fishermen fish primarily for redear and bluegills. Most were surprised to learn that crappie were to be found in the lake. Even the excellent bass population is barely utilized. The crappie fishery at Meridian is relatively poor. The crappie comprised 19.38 per cent of the sports catch; however, this represented large catches (as many as 84 fish in one instance) by a few individuals. Public interest in the

tagging program was a big factor in the crappie catch being as high as it was. The average length of the crappie caught by fishermen was 6.57 inches or 166.87 mm. From length-weight data collected to date, a crappie of this length will weigh approximately 111 grams or 3.5 ounces.

Fishing pressure has declined sharply since the Labor Day weekend. In September fishing pressure was 3.28 hours per acre and this dropped to 0.96 hours per acre in October and to almost zero in December. One main cause of this sharp decrease was the initiation of a $1.00 per day charge for the use of park facilities.

The tagging program began on April 8, 1968 and continued until November 1, 1968. At this time our initial order of 1,000 tags was exhausted and additional tags were not received until the last of the month. Tagging then continued until December 31, 1968. Data collected during the tagging program are being evaluated with 2 objectives in mind.

First, length-weight data were collected on all crappie that were tagged. This information will be converted to logarithms and the sample of log weight on log length will be compared (analysis of covariance) with a similar sample to be taken after the removal segment of this job. Results of this segments length-weight informations will not be presented in this report due to the fact that computer programs are not complete at this time.

Second, data collected when the fish were tagged and agsin when the fish were recaptured provided such information as rate of growth, movement, etc. Table 3 shows the number and average size of the fish tagged during this segment.

Table 3. Number and Average Size of Each Species Tagged from April 8 to December 31, 1968.

Species	Number Tagged	Average Length mm.	Average Weight gms.
White crappie	960	169.39	114.89
Largemouth bass	120	185.14	124.38
Channel catfish	6	320.16	567.16
TOTAL	1,086		

Information from Table 3 represents 8 months of tagging. It should be noted that the average size of the crappie that were tagged is almost identical to the average

size of crappie removed by sports fishermen. The low number of tagged bass and catfish is the result of selectivity of trapping methods.

Of the 1,086 tags, 118 were returned during this segment. This represented a return rate of 10.86 per cent. Fishermen returned 72 of these tags and we were unable to gather any information from these fish since the majority had already been cleaned. Project personnel recaptured 46 tagged specimens and several observations were made from these recoveries. The 42 crappie were at large an average of 112 days. During this time, they grew an average of 16 mm. in length and gained 25.21 grams in weight.

Fourteen fish which had been at large from 11 to 51 days showed a weight loss. The weight losses ranged from -2 grams to -34 grams and averaged -11.92 grams. No weight losses were noticed on fish that had been at large more than 51 days. There seemed to be no direct correlation between days at large and weight loss; however, this correlation might have shown up if the sample had been larger. Three possible explanations for this weight loss are:

1). Ten of these fish were tagged prior to or during spawning season and recaptured during the latter days of the spawning season. Some of the observed weight loss may be due to reduced gonad weight after the spawning season.

2). Hansen (1951) in a study of white crappie at Lake Decatur, Illinois noticed a weight loss in early spring. By weighing gonads prior to and after spawning, he determined that this weight loss was considerably greater than the loss of weight caused by spawning activities. The weight loss of Meridian crappie recaptured during this period averaged 11 per cent of total body weight. This figure corresponds with the findings reported by Hansen. This fact could account for the weight loss of some of the crappie.

3). Part of the weight loss could be either directly or indirectly caused by the tag. This would seem to be the case of the weight losses observed in fish tagged and recaptured in summer and early fall. Although the tags were placed behind the dorsal fin and could not directly interfere with actual feeding, it is felt that the tags may have caused reduced activity in the fish.

The weight loss observed in these 14 fish could be due to any one or a combination of these factors.

Several instances of a homing tendency were observed during this segment. On several occasions fish that were trapped and tagged and then released on the opposite side of the lake returned to the same trap and were recaptured the following day.

Two attempts were made to effect a mark-recapture population estimate but on both occasions the original sample was not large enough to yield an estimate. The tagging program will be discontinued during the removal segment (F-4-16) and be resumed during the F-4-17 segment of this job.

Efforts on the evaluation of crappie removal gear were directly mainly at developing means, other than gill nets, of removing large numbers of crappie from the lake. As this study was designed to evaluate the effects of crappie removal on the remaining population, we tried to develop methods of removal which were somewhat selective for crappie. Traps and techniques developed during this segment will be tested and evaluated during the F-4-16 segment of this job. For this reason remarks concerning the evaluation of removal gear will be limited to general observations.

Cylindrical wire hoop traps were tested with different combinations of bait. These traps met with limited success in taking crappie. The baited traps were most effective in taking large numbers of bluegill, redear, and green sunfish.

A box trap with a lead net was found to be very effective in taking crappie. The traps and lead nets were made of 1" mesh nylon webbing and have been specific in taking crappie. These traps are not baited and the catch of species other than crappie seems to be almost coincidental. A more detailed description and evaluation of this trap and other removal gear will appear in the progress report for the F-4-16 segment of this job.

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