

*ROUGH FISH CONTROL - SELECTIVE
KILL*

Report of Fisheries Investigations

Experimental Control of Gizzard Shad in Acid Water Area by Selective Kill

by

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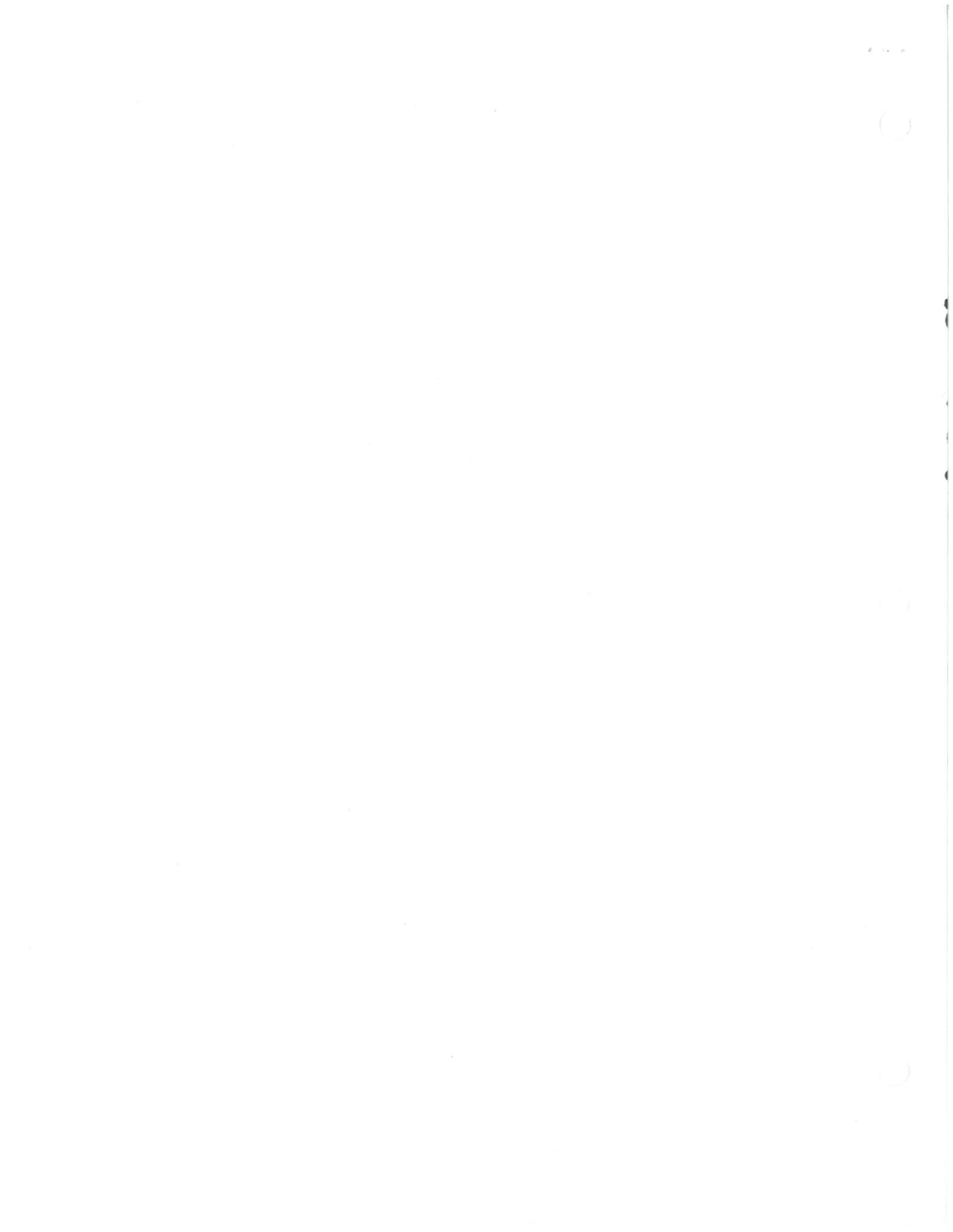
Dingell-Johnson Project F-4-R-5, Job E-6
November 1, 1957 - October 1, 1958

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JOB COMPLETION REPORT

Investigations Project

State of TEXAS

Project No. F4R5

Name: Fisheries Investigations and Surveys of the Waters of Region 4-B.

Job No. E-6

Title: Experimental Control of Gizzard Shad in Acid Water Area by Selective Kill.

Period Covered:

November 1, 1957 through October 1, 1958

ABSTRACT:

Fincastle Lake is a slightly acid water lake located on the Trinity River watershed in Henderson County near Larue, Texas. This lake covers about fifty-four acres and has a volume of 382 acre feet.

An excessive population of gizzard shad was noted during the work of the previous segment which indicated a need for control. Laboratory tests were made to determine the concentration of chemical needed for selective kill of shad in this lake. It was determined that best results could be obtained by the use of two equal applications of synergized emulsifiable rotenone at an interval of about eighteen hours. These applications to total .13 parts per million of rotenone.

The application of chemical was made with both drum type applicators and a spray boat which was used in shallow stumpy areas.

A shoreline count of dead fish was not possible because of heavy vegetation but an estimate was made that indicated 36,960 shad weighing 16,592 pounds were killed. No young of the year shad were killed since spawning had not yet occurred. A total of forty-one game fish were observed which included twenty-five sunfish, fifteen largemouth bass and one white crappie.

Investigations before and after the kill indicate that the shad population has been reduced from 69.1 percent to 1.5 percent of the nettable fish population.

OBJECTIVES:

To adapt selective kill, used previously in alkaline waters, to the acid water area of East Texas or to develop new methods and chemicals for use in this area.

INTRODUCTION:

The survey and inventory of the Trinity River watershed, which was completed during the previous segment, revealed the need for control of gizzard shad in many of the small lakes of the area. Since considerable work had been done on the control of shad in alkaline water in other regions it was decided to confine this job to the

the development of a selective control of shad in acid waters. A check of the data from previous work indicated that Fincastle Lake would offer a good opportunity for development of this type of control.

Fincastle Lake covers fifty-four surface acres and has a volume of 382 acre feet. It is located on the headwaters of Catfish Creek in the southeast corner of Henderson County near Larue, Texas. The pH varies from 6.8 to 7.2 with the higher pH occurring after heavy rains wash alkaline fertilizer from the fields and pastures into the lake. The 6.8 pH reading is obtained throughout the majority of the year.

METHODS:

Work on this job was divided into two parts. Field work was conducted to determine the relative abundance of the species present both before and after the selective kill and laboratory work determined the concentration of chemical that would produce the maximum shad kill with a minimum damage to game species.

LABORATORY DETERMINATION:

Laboratory work was divided between Fincastle Lake and the fisheries laboratory in Fort Worth. This was made necessary by the absence of shad from hoop net, gill net, and seine samples during the period when the testing was being done at the lake. Water from Fincastle Lake was transported to the laboratory and the experiment was repeated with shad and other game fish from Eagle Mountain Lake. The results were identical as far as game species were concerned.

Chem Fish Regular, a 5 percent emulsifiable rotenone liquid, was used as the piscicide since previous work indicated that selectivity could be obtained by applying .12 parts per million of this chemical in two applications of .07 ppm followed by .05 ppm in approximately 20 hours. Laboratory tests also indicated that similar results could be obtained by the use of Pro-Noxfish, a 2.5 percent synergized rotenone liquid, in two applications of .065 ppm at eighteen hours interval.

The application of Pro-Noxfish in the above concentrations resulted in the death of all shad within 30 minutes while bass, crappie and sunfish survived the 18 hours of the test. Test animals in the untreated controls survived the experiment.

FIELD INVESTIGATIONS:

Net checks made during the previous segment indicated a need for the removal of a major portion of the gizzard shad population and further netting proved this to be true. Three netting trips with a total of 12 overnight net sets were made prior to the selective kill experiment which was followed by three netting trips with a total of 13 overnight net sets. These nets were 100 foot gill nets 8 feet deep and having 3 inch stretch mesh. The same net stations were maintained throughout the study. The results of these netting trips were tabulated as to species and weight in order that a comparison might be made with regard to the conditions before and after the treatment.

FINCASTLE LAKE TREATMENT:

The area of the lake was determined from aerial photographs and the volume calculated by soundings. The lake was divided into five sectors with the volume of each sector calculated separately and the proper amount of chemical for each area determined.

Application of 2.5 percent synergized rotenone liquid to the lake was accomplished by the use of the drum boat developed for the selective kill of shad in Inks Lake. One drum boat was placed in each of three sectors with a spray boat taking care of the two shallow, stump filled sectors. The treatment was begun at 2:00 P.M. on May 20, 1958 when the first application of .065 ppm was made. Shad started showing distress within thirty to forty five minutes and continued to die throughout the night. The shad were still in distress at 8:00 A.M. on May 21, when the second .065 ppm application was made. The shad continued to die at an accelerated rate until night and were still dying in smaller numbers on the morning of May 22, when the final check was made.

RESULTS:

A shoreline count of dead shad was not possible because of the heavy brush cover along the entire shore on the down wind side of the lake. This shoreline has a length of 1,848 feet and the drifted shad were estimated to cover this shoreline in a band ten feet wide along the entire length of this shore. The shad were estimated at a density of two shad per square foot in this band which would give a total of 36,960 shad killed. The average weight of the shad before the selective kill was .45 pounds which would give a total of 16,592 pounds of shad killed. Since the kill occurred before the shad spawned, no young-of-the-year shad were present.

There were no drum or white bass present and the kill included approximately 25 sunfish, 15 largemouth bass and one crappie for a total of 41 game fish noted. The lake was small and could be examined rather closely, therefore the estimate of the game fish kill is considered rather accurate since several observers obtained approximately the same estimate.

DISCUSSION:

Table 1 presents the number of fish taken and percentage of the total catch represented by the various species caught in gill nets. The 317 shad made up 69.1 percent of the 459 fish taken before the selective kill while after the kill only three shad were taken comprising 1.5 percent of the total catch. This indicates a 99 percent reduction in the shad population. Game species were more prominent in the catch after the shad kill since the redear, bluegill and crappie catch increased by 19.7, 16.1, and 11.2 percent, respectively. An increase in the catch of spotted gar was also noticed following the kill along with a corresponding increase in the number of yellow bullheads taken.

Table 2 shows the number of pounds of each species taken in gill nets both before and after the treatment together with the percentage of the total catch represented by each species. Here again the percentage is dominated before the kill by gizzard shad which species made up 60.7 percent of the total weight but

drops to 2.9 percent after the treatment. The increase in size of the shad after the kill indicates that the drastic reduction of competition for food resulted in an accelerated growth rate for the survivors. The reduction in total weight of the shad population appears to be approximately 97 percent.

Table 3 presents the comparative data concerning the game and rough species before and after the kill. The increase in average weight per specimen following the kill appears to be due to the more rapid growth of the rough fish since there is little change in the average weight of the game species. The rough species composed 81 percent of the total weight and 75 percent of the total number of fish taken before the kill but represented only 60 percent of the total weight and 23 percent of the total number taken after the kill.

CONCLUSIONS:

The results of both experimental and field work indicate that a very good shad control may be obtained by the use of Pro-Noxfish in two applications of .065 ppm each applied at eighteen hours interval. The advantage of the split application appears to rest in the length of time that toxicity is sustained since no time for recovery is allowed and those fish that are weakened by the first application are not able to withstand the second shock.

Interviews with fishermen indicate that crappie fishing has been better since the shad kill than at any time during the previous four years. The success of the gill nets in taking this species tends to confirm the opinion of the fishermen since 61 percent of all crappie caught in nets were taken after the kill.

The kill was quite selective since only 0.11 percent were game fish. The 41 game fish observed dead included sunfish, largemouth bass and crappie, with the majority being sunfish. No channel catfish appear to be present in this lake.

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Table 1 Numbers and Percentages of Various Species Taken in Gill Nets from Fincastle Lake before and after the Selective Kill of Gizzard Shad.

BEFORE SELECTIVE KILL								
Month	July-1957		August-1957		January-1958		Totals	
Species	No.	%	No.	%	No.	%	No.	%
Alligator Gar	-	-	-	-	-	-	-	-
Spotted Gar	6	8.2	8	2.7	-	-	14	3.1
Gizzard Shad	30	41.1	214	71.8	73	82.8	317	69.1
Chubsucker	1	1.4	1	.3	6	6.7	8	1.7
Black Bullhead	1	1.4	-	-	-	-	1	.2
Yellow Bullhead	1	1.4	4	1.4	1	1.6	6	1.3
Largemouth Bass	-	-	1	.3	-	-	1	.2
Warmouth	-	-	-	-	-	-	-	-
Redear Sunfish	21	28.7	30	10.1	2	2.2	53	11.5
Bluegill Sunfish	12	16.4	25	8.4	2	2.2	39	8.5
White Crappie	1	1.4	15	5.0	4	4.5	20	4.4
Black Crappie	-	-	-	-	-	-	-	-
Totals	73	100.0	298	100.0	88	100.0	459	100.0

AFTER SELECTIVE KILL								
Month	July-1958		September-1958		October-1958		Totals	
Species	No.	%	No.	%	No.	%	No.	%
Alligator Gar	1	2.9	-	-	-	-	1	.5
Spotted Gar	7	20.6	8	10.2	8	9.2	23	11.6
Gizzard Shad	1	2.9	1	1.3	1	1.1	3	1.5
Chubsucker	1	2.9	-	-	4	4.6	5	2.5
Black Bullhead	-	-	-	-	2	2.3	2	1.0
Yellow Bullhead	-	-	8	10.2	11	12.7	19	9.5
Largemouth Bass	-	-	1	1.3	1	1.1	2	1.0
Warmouth	-	-	1	1.3	-	-	1	.5
Redear Sunfish	7	20.6	26	33.4	29	33.4	62	31.2
Bluegill Sunfish	15	44.2	16	20.5	18	20.7	49	24.6
White Crappie	2	5.9	17	21.8	12	13.8	31	15.6
Black Crappie	-	-	-	-	1	1.1	1	.5
Totals	34	100.0	78	100.0	87	100.0	199	100.0

Table 2. Comparative Weights and Percentages of Various Species Taken in Gill Nets from Fincastle Lake before and after the Selective Kill of Gizzard Shad

BEFORE SELECTIVE KILL								
Month	July-1957		August-1957		January-1958		Totals	
Species	lbs.	%	lbs.	%	lbs.	%	lbs.	%
Alligator Gar	-	-	-	-	-	-	-	-
Spotted Gar	21.00	39.2	14.87	10.2	-	-	35.87	15.1
Gizzard Shad	14.50	27.1	99.87	68.6	29.66	78.0	144.03	60.7
Chubsucker	.81	1.5	.93	.7	4.97	13.1	6.71	2.8
Black Bullhead	1.75	3.3	-	-	-	-	1.75	.8
Yellow Bullhead	-	-	2.50	1.7	.66	1.7	3.16	1.3
Largemouth Bass	6.25	11.7	2.43	1.7	-	-	8.68	3.7
Warmouth	-	-	-	-	-	-	-	-
Redear Sunfish	5.75	10.7	9.50	6.5	.58	1.5	15.83	6.7
Bluegill Sunfish	3.00	5.6	9.37	6.4	.51	1.4	12.88	5.4
White Crappie	.50	.9	6.12	4.2	1.63	4.	8.25	3.5
Black Crappie	-	-	-	-	-	-	-	-
Totals	53.56	100.0	145.59	100.0	38.01	100.0	237.16	100.0

AFTER SELECTIVE KILL								
Month	July-1958		September-1958		October-1958		Totals	
Species	lbs.	%	lbs.	%	lbs.	%	lbs.	%
Alligator Gar	8.00	26.0	-	-	-	-	8.00	5.9
Spotted Gar	15.00	48.8	22.87	40.6	10.44	21.5	48.31	35.7
Gizzard Shad	.50	1.6	1.75	3.1	1.75	3.6	4.00	2.9
Chubsucker	.75	2.4	-	-	3.36	6.9	4.11	3.0
Black Bullhead	-	-	-	-	2.94	6.0	2.94	2.2
Yellow Bullhead	-	-	5.69	10.1	8.21	16.9	13.90	10.3
Largemouth Bass	-	-	6.50	11.5	2.62	5.4	9.12	6.7
Warmouth	-	-	.50	.9	-	-	.50	.4
Redear Sunfish	2.00	6.5	8.00	14.2	8.79	18.1	18.79	13.9
Bluegill Sunfish	3.50	11.4	3.25	5.8	4.29	8.8	11.04	8.2
White Crappie	1.00	3.3	7.75	13.8	5.22	11.4	13.97	10.3
Black Crappie	-	-	-	-	.67	1.4	.67	.5
Totals	30.75	100.0	56.31	100.0	48.29	100.0	135.35	100.0

Table 3. A Comparison of Game and Rough Species Caught in Gill Nets from Fincastle Lake before and after Selective Kill of Gizzard Shad.

	Before Kill	After Kill
Total number specimens caught	459	199
Total weight specimens caught (pounds)	237.16	135.35
Average weight per specimen (pounds)	.52	.68
Total weight of rough fish (pounds)	191.52	81.16
Total weight of game fish (pounds)	45.64	54.19
Total number of rough fish	346	53
Total number of game fish	113	146
Average weight per rough fish (pounds)	.55	1.53
Average weight per game fish (pounds)	.40	.37
Percent rough fish (by weight)	81%	60%
Percent game fish (by weight)	19%	40%
Percent rough fish (by number)	75%	27%
Percent game fish (by number)	25%	73%

