

JOB COMPLETION REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

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FISHERIES INVESTIGATIONS AND SURVEYS OF THE WATERS OF REGION I-A

Job No. E-3 Experimental Management of the Rita Blanca Fishery

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ABSTRACT

The experimental management program at Rita Blanca Lake has included three phases of activity. Predator fishes, including white crappie, largemouth bass, black crappie and flathead catfish were stocked to prey on undesirable species. Habitat improvements included installing of spawning facilities for flathead catfish and channel catfish, and brush piles for shelter and protection of white crappie. Manual control of undesirable species consisted primarily of removal by seining.

At the beginning of this job, the golden shiner was the dominating species and comprised up to 70 per cent of the gill net collections. Predation and parasitism reduced the shiner population greatly, and during 1961 and 1963 no shiners were taken in gill nets and relatively few were taken by seining. The bullhead population has remained essentially unchanged, indicating an insufficient amount of predation by flathead catfish. A potentially troublesome population of goldfish has been controlled.

The present status of the fishery is good. Adequate numbers of white crappie (natural spawn) and channel catfish (mostly from hatchery sources) exist. Crappie fishing has improved and channel catfish will be harvested in increasing numbers as they attain suitable size.

Ecological problems have been brought about as a result of changing water quality and a prolonged drought on the lake watershed.

JOB COMPLETION REPORT

State of Texas

Project No. F-7-R-11

Name: Fisheries Investigations and Surveys of the Waters of Region I-A

Job No. E-3

Title: Experimental Management of the Lake Rita Blanca Fishery

Period Covered January 1, 1963 - December 31, 1963

Objectives:

1. To evaluate the results of previous work.
2. To continue efforts to maintain a balance of controlling excessive populations of black bullheads, goldfish, and golden shiners.
3. To control noxious algae.

Techniques Used:

Two netting surveys were made during this segment to obtain evaluation data. These data were tabulated and compared with data from previous years to show any changes in relative abundance of fish species that might be attributable to the experimental management practices employed. Seining to reduce overabundant undesirable species was attempted with limited success. Laboratory experiments were conducted to determine if copper sulphate could be used to selectively remove bullhead catfish or to control algae.

Findings:

Survey results show a definite increase in the white crappie population. In 1962, four surveys produced 18.52 per cent white crappie. During 1963, two netting surveys produced about 30 per cent crappie. Tables 1 and 2 give the netting results for the two surveys made in 1963. The increase in the crappie population was noted in 1962 from seine sample data which revealed that out of 10,719 fish taken with 200- and 300-foot seines, 5,247 were white crappie.

In September of 1962, brush piles were placed in the lake to provide added cover. It is apparent that by providing cover and protection, greater survival of young crappie was attained, and that this survival produced the increase in crappie.

At present, the white crappie are definitely well established and should provide much added fishing.

On August 28 and 29, 1963, considerable seining effort was expended to determine spawning success and to attempt to reduce undesirable species. During the two days, 19 hauls were made with a 300-foot one-half inch mesh seine. Since daylight seining failed to produce in appreciable numbers of undesirable

Table 1. Percentage Composition by Number and Weight and Average Weight of Fish Taken from Rita Blanca Lake. May 14, 1963. (Four Double-Unit Standard Survey Gill Nets)

<u>Species</u>	<u>No.</u>	<u>% by No.</u>	<u>Wt. lbs.</u>	<u>% by Wt.</u>	<u>Average Wt.</u>
Carp	1	0.22	2.05	0.67	2.05
Goldfish	27	6.10	33.33	10.94	1.23
Hybrid Carp	9	2.03	23.66	7.76	2.63
Channel Catfish	29	6.54	64.02	21.01	2.21
Black Bullhead	275	62.08	46.24	15.17	0.17
Flathead Catfish	8	1.81	97.04	31.85	12.13
White Bass	2	0.45	2.78	0.91	1.39
Largemouth Bass	4	0.90	15.04	4.94	3.76
Bluegill	1	0.23	0.24	0.08	0.24
White Crappie	86 <u>1/</u>	19.41	20.21	6.63	0.24
Black Crappie	1	0.23	0.11	0.04	0.11
Totals	443	100.00	304.72	100.00	
Game fish <u>1/</u>	131	29.57	199.44	65.45	
Rough fish	312	70.43	105.28	34.55	

1/ Note that 150 white crappie taken from the gill nets during this survey were immediately released back into the lake and are not included in this table.

Table 2. Percentage Composition by Number and Weight and Average Weight of Fish Taken from Rita Blanca Lake. Aug. 27, 1963 (Four Double-Unit Standard Survey Gill Nets)

<u>Species</u>	<u>No.</u>	<u>% by No.</u>	<u>Wt. lbs.</u>	<u>% by Wt.</u>	<u>Average Wt.</u>
Carp	1	0.20	4.71	2.60	4.71
Goldfish	24	4.80	27.75	15.34	1.15
Hybrid Carp	2	0.40	4.02	2.22	2.01
Channel Catfish	5	1.00	6.43	3.55	1.29
Black Bullhead	374	74.80	70.24	38.82	0.19
Flathead Catfish	5	1.00	52.54	29.04	10.51
White Crappie	83	16.60	13.80	7.63	0.17
Black Crappie	6	1.20	1.44	0.80	0.24
Totals	500	100.00	180.93	100.00	
Game fish	99	19.80	74.21	41.02	
Rough fish	401	80.20	106.72	58.98	

species, several seine drags were made at night between the hours of 9 p.m. and 1 a.m. It was thought that rough species might have been entering the shallows at night to feed, so better success was expected at this time. Such was not the case and neither day nor night seining was of much value in reducing rough fish. Table 3 gives a comparison of seining results in 1962 and 1963. Note that bullheads show a considerable increase, but very few young-of-the-year were taken which indicates limited spawning success of bullheads this year.

Fish Stocking

Due to a lack of channel catfish spawning success during the last three years, a heavy stocking of hatchery-reared fish was made. About 30,000 catfish, ranging from 4 to 6 inches in total length, were made available from the Austin National Fish Hatchery. These fish were in excellent condition when stocked and should provide much fishing, provided survival and adequate growth are attained. Earlier in 1963, 3,500 channel catfish and 800 black crappie were seined from a ranch lake and were transported to Rita Blanca.

The black crappie has shown rapid growth in this lake, but no reproduction was ever noted and the population has been greatly reduced. This stocking of black crappie was an effort to get the species reestablished. It is known that the black crappie is less likely to overpopulate lakes in the Texas Panhandle than is the white crappie, and, therefore, is considered a better fish for this area.

Flathead Catfish

Complete data concerning the growth of flatheads in Rita Blanca Lake during the past year are lacking due to the fact that no tagged flatheads were recovered during the latter part of the segment. Netting of flatheads was purposely postponed until late in the segment when the water temperature would be cooler. Experience has shown that there is much less injury and mortality from netting in colder months. However, during the latter part of this segment, other duties and a prolonged ice cover on the lake prevented netting.

A critical problem in obtaining growth data lies in the fact that the gill tags used to mark the fish are not staying attached. At Lake Marvin, where all of the 49 flatheads that were stocked were tagged with gill tags, recent recoveries of these fish show that only one out of five fish has retained its tag. It is now realized that better tagging or marking methods should have been employed, but in March 1962 when the 97 flatheads were transferred to Rita Blanca Lake, gill tags were the only type immediately available. Presently, a study is under way to determine the success with tattooing and subcutaneous tags.

Of the 30 flatheads recovered from Rita Blanca Lake this segment, 17 were tagged. The amount of data provided by these recoveries indicate that the rate of weight increase is considerably slower than that shown by previous data. Table 4 gives the tag numbers and weight change data for tagged fish recovered this year. Table 5 gives the length-weight data for those additional fish that were marked during this segment.

Average rate of weight increase data have been collected seven times since the tagged flatheads were released in March 1962. The time periods between release and recoveries have ranged from 2 to 17 months. Actual recovery dates were 2, 4, 7, 9, 10, 12, 14, and 17 months following the date of tagging.

Relative weight changes noted last year were minus 4 per cent in May (two months after release), plus 30 per cent in July (four months after release), plus 41 per cent in October (seven months after release) and plus 23 per cent in December (nine months after release). The 41 per cent increase shown in October was based on only two fish recovered during that month and may not be representative. In 1963, recoveries were made in March (one year after release), May (14 months after

Table 3. Comparison of Seining Results 1962 and 1963.
(300-foot one-half inch mesh)

<u>Species</u>	<u>No.</u>	<u>1963</u> <u>% by No.</u>	<u>1962</u> <u>% by No.</u>	<u>Relative Change from 1962</u>
Carp	5	0.17	0.14	+ 0.03
Goldfish	251	8.68	10.21	- 1.53
Hybrid Carp	24	0.83	0.47	+ 0.36
Golden Shiner	444	15.37	9.02	+ 6.35
Plains Minnow	2	0.07	0.00	+ 0.07
Fathead Minnow	20	0.69	0.06	+ 0.63
Channel Catfish	126	4.36	0.40	+ 3.96
Black Bullhead	1,655	57.26	28.34	+ 28.92
White Bass	0	0.00	0.05	- 0.05
Largemouth Bass	93	3.22	1.58	+ 1.64
Green Sunfish	1	0.04	0.00	+ 0.04
Bluegill	11	0.38	0.59	- 0.21
Orangespotted Sunfish	2	0.07	0.00	+ 0.07
Hybrid Sunfish	0	0.00	0.18	- 0.18
White Crappie	254	8.79	48.96	- 40.17
Logperch	2	0.07	0.00	+ 0.07

Black bullheads comprised 57 per cent of the seine collections this year. Golden shiners totaled 15 per cent, goldfish and crappie about 8 per cent each. Largemouth bass at 3 per cent and channel catfish at 4 per cent were the only other species of importance. In comparing these figures with data from last year, important changes in relative abundance occurred in golden shiners (6 per cent increase), bullheads (29 per cent increase), channel catfish (4 per cent increase), and white crappie (40 per cent decrease). The great decrease in relative abundance of white crappie indicates limited spawning success this year, but this may be good since a general lack of forage exists and gill netting indicates an abundance of adult crappie already present. Growth rate and physical condition of crappie were decreasing and added crappie would probably have resulted in overpopulation and stunting.

Habitat Improvement

Additional catfish spawning devices were placed in Rita Blanca Lake during this segment to enhance natural reproduction of this species. Last year, 40 such devices were placed in the lake in scattered areas surrounding the lower lake section where boating and skiing activity is very heavy during the spawning season. Since the spawning of channel catfish may have been discouraged by the heavy activities of boating and skiing in all areas in the lower lake, this year all of the spawning devices (50) were placed in the upper end of the lake where both boating and skiing are prohibited. The spawning devices were placed in 2 to 3 feet of water at sites extending from the barrier cable marking the restricted area to the extreme upper end of the lake. Channel catfish spawning success will be noted during the next year in an effort to determine whether natural reproduction has occurred.

Table 4. Growth Data for Flatheads Recovered in 1963

5621	March	March	12	660	13.75	45	+ 4.63				
5675	May	March	10	670	14.85	0	+ 3.53				
5598	March	March	12	700	14.00	15	+ 1.25				
5610	March	March	12	595	15.25	20	+ 1.00				
5574	March	March	12	595	9.50		+ 0.96				
5659	May	March	10		7.05		+ 0.40	6.29%	11.14	12.37	2.41%
5652	March	March	12	585	10.00	7	+ 0.25				
5563	March	March	12	520	7.00	22	+ 0.18				
5646	March	March	12	630	10.50	0	+ 0.12				
5583	March	March	12	575	9.50	10	0.00				
5582	March	May	14	660	12.50		+ 4.33				
5640	March	May	14	620	10.25		+ 2.39				
5593	March	May	14	645	13.25	26	+ 1.28				
5562	March	May	14	585	10.00		+ 0.33	11.94%	11.33	12.69	4.03%
5596	March	May	14	650	13.25		+ 0.05				
5639	March	May	14	560	8.75		- 0.26				
5563	March	August	17	520	7.00	50	+ 1.43	20.43%	7.00	8.43	9.62%

Table 5. Length-Weight Data from Flathead Catfish in Rita Blanca Lake, Tagged Since December 1962.

<u>Date Tagged</u>	<u>SL (mm)</u>	<u>Wt. (lb)</u>	<u>Gill Tag</u>	<u>Tattoo No.</u>	<u>Subcutaneous Wire Tag Code</u>
August 26, 1963	600	8.93	6385		
	550	6.72	6383		
	585	10.44	6379		
	680	18.00	6397		
March 6, 1963	834	34.50	6374		
	640	13.26	6375		
	722	25.50	6360		
	723	21.50	6663		
January 31, 1964	521	6.83	6381	1	000101
	730	18.96	6377	2	000110
	787	23.00	6386	3	000111
	742	22.25	6391	4	001000
	557	7.77	6395	5	001001

release) and August (17 months after release). Relative weight changes for these three collections were 1.29, 11.94 and 20.43 per cent respectively. Relative weight changes as shown in Figure 1, show a cyclic trend which is undoubtedly related to seasonal changes in the condition of the fish. Data indicate that the flatheads reach a peak in physical condition (fatness) in September and October and rapidly lose weight throughout the winter and reach a low point in condition in early spring.

The average growth in standard length at the end of one year was 2.41 per cent or 0.6 inch based on eight fish. Individual increases ranged from zero to 6.82 per cent for the same group. The average growth increment was about one inch (total length). McCoy ^{2/} reported on the growth rate of flathead catfish in 21 Oklahoma lakes and gives 3.0 as the average annual increment in total length for flatheads in age group seven, which is the probable average age of the fish collected at Rita Blanca.

Copper Sulphate Tests

Laboratory tests using copper sulphate at concentrations of 2.5 to 4.5 ppm were made to determine if selective control of bullheads would be possible. Six 5-gallon containers were used, one of which was a control. The five remaining containers were treated at 2.5, 3.0, 3.5, 4.0 and 4.5 ppm. Test fish in each container included two individuals of white crappie, golden shiners, channel catfish, and black bullheads. After three days duration, the test showed

^{2/} McCoy, 1953. The Rate of Growth of Flathead Catfish in Twenty-one Oklahoma Lakes. Prog. Oklahoma Academy of Science. 34: 47-52.

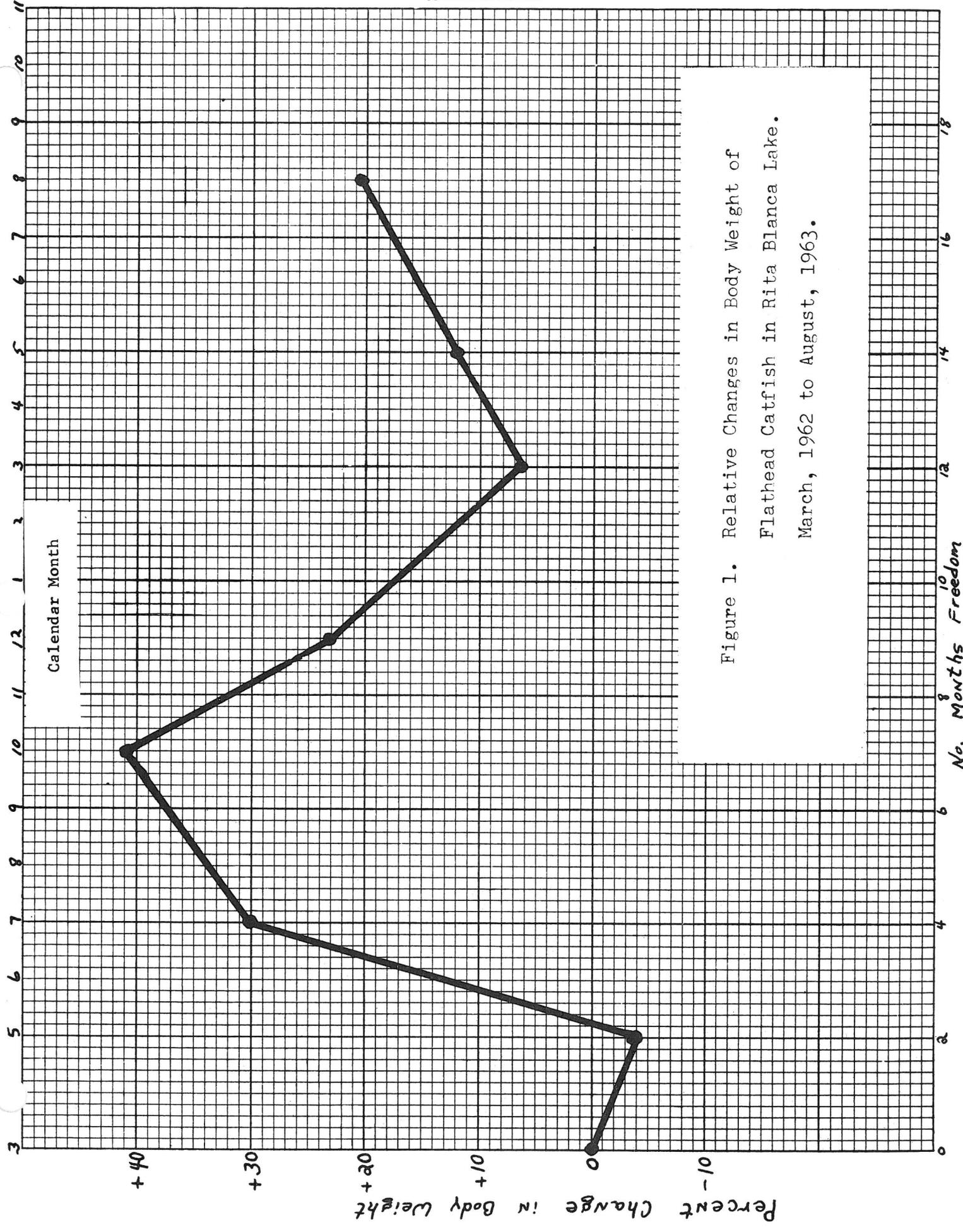


Figure 1. Relative Changes in Body Weight of Flathead Catfish in Rita Blanca Lake. March, 1962 to August, 1963.

No. Months Freedom

no selectivity on bullheads at any concentration, and 4.0 and 4.5 ppm killed all test fish. Laboratory tests in 1958 - 1969 under Job E-1 showed that bullheads could be selectively killed with copper sulphate, but this was before the beginning of addition of sub-surface water, which has increased the carbonate content of the lake water. The failure to get selective results during this year is due to the high carbonate content which tied up the Cu^{+2} in the form of insoluble copper carbonate.

In reference to algae control, however, there was a definite difference in water color in the test containers at the end of the test. Water in the control container remained greenish in color while in all the treated containers the water turned a brownish color. Effective algae control appeared to have been obtained at all concentrations of copper sulphate used.

Summary and Conclusions

Job E-3 under Project F-7-R was initiated in 1959. Problematical species at Rita Blanca Lake included the black bullhead catfish, golden shiners and goldfish, all three of which are difficult to completely eradicate with toxicants. While the population of undesirable species was relatively high, there was also a good population of channel catfish developing, and a lake renovation at the time would have destroyed the many channel catfish as well as other game species present.

Fishing had been poor at the lake and local pressures were for a total kill, but through the insistence of the biologist the total kill was postponed in favor of an experimental management program. The lake was small enough to afford a good opportunity to begin such a program, and by using various management practices such as the stocking of predator fish, habitat improvement, and removal of rough species with nets and seines, the fishery could be rehabilitated to an acceptable level.

At the beginning of this study, the golden shiner was the major problem due to its extreme overabundance. Gill net collections included as high as 70 per cent large shiners. Production of sunfishes and minnows was very low, due to competition with the shiners for food and space and predation by the shiners on eggs and fry. Commercial seining of shiners was encouraged and project personnel did as much seining as time permitted in an effort to reduce not only shiners but other rough species.

Introductions of predaceous species to feed on smaller shiners included stocking white and black crappie and largemouth bass. Flathead catfish were stocked to feed on the larger shiners, goldfish and bullheads.

Habitat improvement was designed to enhance reproduction and survival of game species.

From year to year, varying amounts of work was done on each of the three phases of the experimental program. Stocking of predators was the most active phase of the program at the beginning and included transferring some 10,000 white crappie from Lake McClellan, 10,000 advanced bass fingerlings from

hatcheries, and 285 adult flatheads from Lake Stamford. Stocking in 1962 and 1963 included 97 additional adult flathead catfish, 3,500 native channel catfish, 30,000 hatchery channel catfish, and 800 black crappie.

Habitat improvement work began with the installation of concrete or tile drainpipe to provide spawning places for flathead catfish. During the past two years, about 90 channel catfish spawning devices were placed in the lake. Habitat improvement to promote white crappie production included installing brush piles in both the deeper area of the lake along the dam for winter protection and in shallower water for the shelter and protection of young crappie.

Evaluation

The manner in which the experimental management program at Rita Blanca Lake was conducted does not lend itself to evaluation to the extent that it can be clearly shown by the data collected that any particular phase of the program produced any particular result in the fishery. The overall aim of this program was to improve the fishing at Rita Blanca Lake by attempting several means to reduce an overabundant supply of rough fish. Because several different management practices were being employed at the same time, determining the specific effects of one particular practice is not possible to the extent that would be desired.

Evaluation of the overall program is based on netting and seining data. Creel censuses were not made when this job was initiated because the project headquarters was located at Wichita Falls, some 300 miles distance and other important work was in progress. Neither sufficient time nor personnel were available to conduct a continuing creel census. Under these conditions of limited time and personnel, the essential aim of the job was to apply different management practices on an experimental basis and to evaluate each practice as best possible to determine if such work warranted further study and use on other similar waters in the area.

Probably the most interesting phase of this study dealt with the flathead catfish which has been acclaimed by many people as being an efficient predator, fond of eating bullhead catfish, carp, goldfish and other rough species. The flathead catfish has been credited with controlling bullheads in certain lakes where high natural populations of flatheads occur.

Rita Blanca Lake was stocked with adult flathead catfish at the rate of one per acre. This was felt to be the approximate density at which they occurred in the lakes from which they were netted. The average weight of 285 flatheads stocked in November 1959, was 11.1 pounds, which gave a total weight of 3,164 pounds. The question to be answered during the course of this job was whether this amount of flatheads would annually consume enough rough fish to effect a reduction and eventual control. Data collected since November 1959, show a fluctuating bullhead population, a drastic reduction of golden shiners, and a slight increase in goldfish. Netting data for the duration of this study are given in Table 6. In 1960, large golden shiners were very abundant in the gill net samples, and were the dominating species in the lake. In May 1960, for example, the golden shiner comprised 70.20 per cent of the netting collection. The smallest mesh size of the gill nets used was one inch and gives an indication of the large size of the shiners.

Table 6. Percentage Composition of Gill Net Collections From Rita Blanca Lake May 1960 to August 1963.

<u>Species</u>	<u>May 1960</u>	<u>Oct. 1960</u>	<u>Sept. 1961</u>	<u>1962 3/</u>	<u>May 1963</u>	<u>Aug. 1963</u>
Carp	0.00	0.00	0.00	0.07	0.22	0.20
Goldfish	1.16	0.59	0.75	0.96	6.10	4.80
Hybrid Carp	1.08	0.00	1.27	0.34	2.03	0.40
Golden Shiner	70.29	39.10	0.00	0.00	0.00	0.00
Carp sucker	0.00	0.00	0.00	0.06	0.00	0.00
Channel Catfish	9.69	30.66	13.16	6.63	6.54	1.00
Black Bullhead	13.46	19.62	65.32	72.13	62.08	74.80
Flathead Catfish	2.97	0.00	1.02	0.75	1.81	1.00
White Bass	0.00	0.00	0.50	0.41	0.45	0.00
Largemouth Bass	0.27	0.00	0.00	0.13	0.90	0.00
Sunfish	0.00	1.74	0.00	0.00	0.23	0.00
White Crappie	1.17	8.29	17.73	18.52	19.41	16.60
Black Crappie	0.00	0.00	0.25	0.00	0.23	1.20

3/ Average of four surveys

By October 1960, the percentage of shiners had dropped to 39.10 per cent. This reduction is attributed to predation by flatheads primarily, and to a lesser degree to removal by seining.

In 1961, parasitism virtually eliminated the remaining shiner population. An anchorworm (*Learnea* sp.) apparently killed the entire population of larger shiners, and young shiners spawned in 1961 were found to be heavily parasitized. Throughout the period of 1961 to 1963 gill nets did not produce a single golden shiner. The elimination of the population of large shiners which ranged from about 9 to 11 inches in gill net samples was beneficial to the lake's fishery since they were not serving as forage, but was untimely in that it precluded any further evaluation of the experimental efforts to reduce the species.

Since population data from gill net collections indicate only relative abundance of species, the sudden absence of shiners reflected in the netting data as an apparent increase in bullheads. While in 1960, netting showed an average of about 55 per cent shiners and 16 per cent bullheads, in 1961 the netting data showed zero per cent shiners but 65 per cent bullheads. Thus, the relative decrease in shiners was almost equaled by the relative increase in bullheads, and there was little if any change in actual numbers of bullheads from 1960 to 1961. In fact, based on gill netting data, the bullhead population has not significantly changed since 1959 when the flathead catfish were stocked.

While there has been no apparent reduction of bullheads, the flathead catfish have probably been beneficial in controlling both bullheads and goldfish. Seining data collected in 1961 and 1962 revealed a high population of goldfish. In 1961 especially, seine drags with a 300-foot one-half inch mesh seine produced a high percentage of goldfish, many of which were young-of-the-year.

One year later, in the summer of 1962, a single seine drag caught over 300 individual adult goldfish averaging about one pound in weight. This indicated a great spawning potential and it was feared that goldfish were at the beginning of a rapid increase and that by the next year would be extremely abundant. However, since 1961 goldfish in gill net samples have shown only a slight increase (never exceeding seven per cent) and seining in 1963 (19 drags with a 300-foot seine) produced a total of only 251 goldfish, whereas the preceding year a single drag had produced over 300.

It might be concluded that flathead catfish prefer to eat golden shiners and goldfish more than bullheads, and that as long as the shiners and goldfish are present in sufficient abundance to supply the food demands of the flatheads present, there would be little predation on the bullhead population. If, however, the abundance of shiners and goldfish became depleted it is logical that the flatheads would by necessity turn to the bullhead and other species as their source of food.

It is not known what foods are preferred by the flathead - or for that matter - if they actually have a preference. It seems likely that they would prefer one type over another, but size of the food rather than type or species may be a more important factor in the choice of foods selected.

It is known that most fishermen who use trotlines for taking flatheads prefer a rather large bait, which is commonly either live carp or goldfish. Some fishermen who fish only for the larger catfish use heavy tackle and live baits up to 10 - 12 inches in length. The success of such fishermen in taking flatheads attests to the fact that relatively large foods may be preferred by flathead catfish.

We do know, however, that flatheads in Rita Blanca Lake feed on bullheads. The only four instances in which stomach contents of captured flatheads were examined revealed that all four had consumed bullhead catfish and one had consumed both a bullhead and a goldfish.

An attempt has been made to maintain the flathead population at one per acre. The original stocking of 285 flatheads made in November 1959, was depleted to about 220, based on known fishermen catches and natural mortalities. Since the natural death or fisherman removal of some flatheads probably went undetected, the population was estimated to be very near 200 flatheads in the spring of 1962. In March 1962, 97 additional flatheads were transferred to Rita Blanca Lake from the Colorado City Lake. These were weighed, measured and tagged before being released. Since this release, only three natural mortalities have been reported and less than ten flatheads have been taken by fishermen. The population at present then should be near to the one-per-acre desired. Low harvest of flatheads is mostly due to the fact that trotline fishing is prohibited and few anglers fish for flatheads.

Due to the lack of knowledge of food habits and requirements of the flathead, it is impossible to say whether the present population is capable of providing the amount of predation desired. The total annual production of goldfish alone in Rita Blanca may exceed the total annual food required by the present flathead population. If such is the case, unless reproduction by

flatheads occurs and the population is thus substantially increased, further significant reduction of rough fish (bullheads in particular) cannot be expected.

Lack of natural reproduction of game species has characterized the Lake Rita Blanca fishery, and only the white crappie has shown the ability to spawn successfully in recent years. In 1962, the successful spawn of crappie greatly added to the total game fish population.

Changes in water quality have had a great effect on the fishery since 1961. Prior to this time, the water was moderately clear and there were heavy growths of sago pondweed in the shallow upper end of the lake. Filamentous algae was abundant all around the lake in water up to four feet deep, and an abundance of small organisms existed. Clouds of large Daphnia were noted, amphipods were very abundant and a staple food of the channel catfish. Snails, insect larvae and various other small animal life were thick, on and under rocks and added to the general appearance of a rich and productive lake.

A striking change in the lake occurred beginning in the spring of 1961. A minute algae caused an increase in turbidity to the extent that pondweed and filamentous algae were shaded out. With this change, the abundance of small organisms present the previous year ceased to exist, and the parasitic copepod Learnea appeared and attacked the shiner population.

Lack of inflowing fresh water and decreasing fertility probably brought about this change. During the years of 1961 to 1963 a drought over the lake's watershed persisted and the lake level has been very low. Two irrigation wells in continuous operation cannot supply enough water during dry, hot months to keep pace with the evaporation and the lake steadily drops throughout the summer months.

Changing water quality due to the accumulation of salts from the sub-surface irrigation water may have brought about the bloom of the minute algae. This algae which has been abundant during the past three years is apparently not being utilized at the base of the food chain for there has been a critical lack of zooplankton and other small forage. Since the golden shiner was eliminated by parasitism, other forage species have either failed to reproduce, or else the young have failed to survive.

A heavy rain over the lake watershed would help to relieve the overall problem. Organic and nutrient materials washed in from the watershed plus the weed and grass covered areas flooded by a rising lake level would relieve the shortage of forage and somewhat stagnant conditions that have persisted for the past three years.

It was planned to transplant some white bass to Rita Blanca during this segment, but with the lack of forage and the increase in white crappie, the stocking of white bass was omitted.

Recommendations:

It is recommended that Job E-3 be terminated and that future changes as may occur in fish population be noted during periodic surveys conducted under Job B-18. Growth and food habits of flathead catfish should be especially

noted, and all untagged flathead catfish recovered in the future should be suitably marked or tagged so that future recoveries of the same fish will provide much needed growth data.

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Approved by Marion Toole
Coordinator

Date April 10, 1964

Leo D. Lewis
Regional Supervisor

