

JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-7-R-10

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

Job No. E-5 Experimental Management of the Lake Marvin Fishery

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## ABSTRACT

Lake Marvin was lowered approximately 10 feet in early 1962 to permit repairs to the dam and outlet gate structure. Due to an unusually light amount of rainfall that occurred during the period following completion of repairs, the lake remained very low until late in the fall. Consequently, vegetation control test plots that were located on the exposed lake bed were not reflooded in time to be of any value.

Gill net surveys revealed that black bullhead catfish and bluegills are the problematical species present. Flathead catfish (49) were stocked to provide additional predation on these species. The flatheads were weighed, measured and tagged before being released, in order that future recoveries would show growth rates. A total of 23 tagged flatheads were recovered, and their individual and average weight changes were computed.

Additional sand and gravel spawning areas for bass are not needed in Lake Marvin, but 29 spawning devices for channel catfish were designed and constructed.

A shortage of time and personnel prevented the intended removal of sunfish with nets, traps and seines.

## JOB COMPLETION REPORT

State of Texas

Project No. F-7-R-10

Name: Fisheries Investigations and Surveys of the Waters of Region 1-A

Job No. E-5

Title: Experimental Management of the Lake Marvin Fishery

Period Covered January 1, 1962 - December 31, 1962

### Objectives:

To initiate and conduct experimental management practices at Lake Marvin to restore balance in the fish population through control of black bullheads, sunfish, carp, and excessive aquatic vegetation.

### Techniques Used:

A shortage of personnel due to the inability to hire an assistant project leader for this project, necessarily resulted in the omission of some of the work planned on this job. Because of a lack of time, little work was accomplished on bullhead and sunfish control through the use of nets, seines, traps, or chemicals.

Two netting collections were made to obtain population data, and two collections were made to check on the condition of flathead catfish stocked to control bullheads and sunfish. Lake Marvin was lowered about ten feet in early 1962 to permit repairs to the dam and to the outlet gate structure. While the lake level was low, about 40 acres of the lake bed was exposed and the lake surface was reduced to about 20 acres. Vegetation control test plots were measured off on the exposed lake bed and treated with Kurasol G and Kurasol SL at three application rates for each. It was assumed that following the repairs to the dam, the outlet gate would be closed and the lake would soon fill up flooding the test plots. An unusually dry period occurred and there was no runoff water to fill the lake until late fall; subsequently, the experimental vegetation control test plots were of no value.

Flathead catfish (49) were stocked to provide additional predation on sunfish and bullheads. Catfish spawning containers were constructed but were not installed due to low water level. They will be properly located in Lake Marvin sometime in March or April 1963, after the lake has completely filled. Observations made while the lake was drained indicated that there is no need for additional sand and gravel spawning areas for bass. Sand and gravel extends the entire length of the dam, as well as along portions of the east and west sides of the lake.

### Findings:

Gill net surveys were made in February and July to obtain data concerning the composition of the fish population present. The February survey was hampered

by extremely cold weather and only nine fish were taken in three gill nets. Two of the nine fish were golden shiners, three were bullheads, three were largemouth bass, and one was a bluegill (Table 1). In July, 77 fish were taken by gill nets of which 46 were game fish (includes sunfish) and the remaining were rough fish (Table 2). Largemouth bass and flathead catfish accounted for 10.39 and 12.98 per cent of the total number respectively, while the flathead catfish dominated the total weight of fish taken with 10 flatheads comprising 73.23 per cent. The black bullhead (40 per cent by number) can be expected to rapidly decrease in the face of heavy predation by the flatheads.

Table 1. Percentage Composition by Number and Weight and Average Weight of Fish Taken From Lake Marvin, February 28, 1962.

Species	Number	Per Cent by Number	Total Weight	Per Cent by Weight	Average Weight
Golden Shiners	2	22.22	0.38	3.78	0.19
Black Bullhead	3	33.33	1.30	12.96	0.43
Largemouth Bass	3	33.34	8.19	81.66	2.73
Bluegill Sunfish	1	11.11	0.16	1.60	0.16
Totals	9	100.00	10.03	100.00	
Game Fish	4	44.44			
Rough Fish	5	55.55			

Table 2. Percentage Composition by Number and Weight and Average Weight of Fish Taken From Lake Marvin, July 26, 1962.

Species	Number	Per Cent by Number	Total Weight	Per Cent by Weight	Average Weight
Carp	1	1.30	4.57	4.59	4.57
Flathead Catfish	10	12.98	72.96	73.23	7.30
Black Bullhead	30	38.96	8.94	8.97	0.30
Largemouth Bass	8	10.39	10.98	11.02	1.37
Green Sunfish	1	1.30	0.12	0.13	0.12
Redear Sunfish	1	1.30	0.05	0.05	0.05
Bluegill Sunfish	26	33.77	2.01	2.01	0.08
Totals	77	100.00	99.63	100.00	
Game Fish	46	59.74			
Rough Fish	31	40.26			

Twenty-foot seine results, shown in Table 3, reveal that considerable numbers of young largemouth bass were present in July. Attempts were made in July to reduce the overabundant sunfish population by seining. The results of several drags with a 300 foot one-half inch mesh seine are given in Table 4. Although an estimated 4,000 sunfish were removed by this method, seining was not very effective owing to thick vegetation growing in the shallow areas.

Table 3. Results of Seining with a Twenty-Foot Minnow Seine From Lake Marvin July 26, 1962.

Species	Number	Per Cent
Largemouth Bass	42	82.36
Bluegill Sunfish	9	17.64
Totals	51	100.00

Table 4. Results of Seining with a Three-Hundred Foot Seine From Lake Marvin July 26 and 27, 1962

Species	Number	Per Cent
Channel Catfish	7	0.17
Black Bullhead	27	0.67
Largemouth Bass	1	0.02
Bluegill and Redear Sunfishes	4,000 *	99.14
Totals	4,035	100.00

\* Estimate based on total weight of sunfish removed.

The condition of species, as revealed by K factors shown in Table 5, was average or below. Flathead catfish averaged 1.7 and largemouth bass averaged 2.6; both figures are below normal. Bullheads averaged 2.3, carp 2.5, and bluegill 3.5.

The flathead catfish stocked in Lake Marvin were each weighed, measured, and tagged before being released. Figures I and II show flathead catfish recovered in February 1963, being weighed and measured to determine their individual and average weight changes. Nineteen flatheads were transferred from Lake Stamford on January 13, 1962, and the remaining thirty were transferred from the Colorado City Lake on March 8, 1962. Only one flathead was found dead following the transplant.

Table 5. K Factor Range and Average of Fish Taken From Lake Marvin, July 26, 1962.

Species		Range	Average
Carp	( 1)	2.5	2.5
Black Bullhead	(30)	2.0 - 2.9	2.3
Flathead Catfish	(10)	1.6 - 2.1	1.7
Largemouth Bass	( 8)	2.2 - 3.3	2.6
Green Sunfish	( 1)	3.2	3.2
Redear Sunfish	( 1)	3.1	3.1
Bluegill Sunfish	(26)	2.6 - 4.2	3.5

A total of 29 flathead catfish have been recovered with gill nets since they were released in Lake Marvin. Six of these 29 (about 20 per cent) had lost their tags. The tags used were clip-type, and were placed near the top of the right gill cover.



Figure I. One of eleven tagged flatheads recovered from Lake Marvin in February 1963.



Figure II. Flathead catfish in Lake Marvin showed a five per cent weight loss from March 1962 to February 1963.

Seven tagged flatheads, recovered on July 26, showed weight changes ranging from plus 0.94 to minus 2.02 pounds and averaging minus 0.28 pounds. In October five flatheads had weight changes ranging from plus 1.50 pounds to minus 0.50 pounds and averaging plus 0.45 pounds. In February 1963 (almost one year following their release), eleven flatheads had weight changes ranging from plus 0.50 pounds to minus 4.50 pounds and averaging minus 0.41 pounds. The flathead that lost 4.50 pounds was an exception, and was the only fish taken in February 1963, that showed a loss exceeding one pound. When weighed at the time it was tagged, this fish may have had a considerable quantity of food in its stomach making its recorded weight two to three pounds heavier than its body weight actually was. Tables 6 to 11 give individual and average weight changes of the tagged flathead catfish recovered on July 26, 1962, October 11, 1962, and February 19, 1963. Table 12 gives the length, weight, and tag numbers of all the flatheads in Lake Marvin.

Table 6. Individual Weight Changes of Flathead Catfish Recovered From Lake Marvin, July 26, 1962.

Tag No. TGFC-A-	Date Tagged	Date Recovered	Weight When Tagged	Weight When Recovered	Weight Change
5531	March 8	July 26	5.00	5.24	0.24+
5535	March 8	July 26	5.00	5.94	0.94+
5530	March 8	July 26	8.75	7.89	0.86-
5552	March 8	July 26	12.00	12.60	0.60+
5533	March 8	July 26	6.75	6.06	0.69-
5548	March 8	July 26	11.00	8.98	2.02-
5543	March 8	July 26	5.00	4.83	0.17-
Totals			53.50	51.54	1.96-

Table 7. Average Weight Changes of Tagged Flathead Catfish Recovered From Lake Marvin, July 26, 1962.

Number of Fish Recovered	7
Average Weight When Tagged	7.64
Average Weight When Recovered	7.36
Total Weight Change of Group	1.96-
Average Weight Change Per Fish	0.28-
Average Weight Change Per One Pound of Body Weight	0.04-

Table 8. Individual Weight Changes of Tagged Flathead Catfish Recovered From Lake Marvin, October 11, 1962 .

Tag No. TGFC-A-	Date Tagged	Date Recovered	Weight When Tagged	Weight When Recovered	Weight Change
5529	March 8	Oct. 11	8.50	10.00	1.50+
5527	March 8	Oct. 11	7.00	7.50	0.50+
5548	March 8	Oct. 11	11.00	11.50	0.50+
5533	March 8	Oct. 11	6.75	7.00	0.25+
5555	March 8	Oct. 11	8.00	7.50	0.50-

Table 9. Average Weight Changes of Tagged Flathead Catfish Recovered From Lake Marvin, October 11, 1962.

Number of Fish Recovered	5
Average Weight When Tagged	8.25
Average Weight When Recovered	8.70
Total Weight Change of Group	2.25+
Average Weight Change Per Fish	0.45+
Average Weight Change Per One Pound of Body Weight	0.05+

Table 10. Individual Weight Changes of Tagged Flathead Catfish Recovered From Lake Marvin, February 19, 1963.

Tag No. TGFC-A-	Date Tagged	Date Recovered	Weight When Tagged	Weight When Recovered	Weight Change
5532	March 8	Feb. 19	12.25	12.75	0.50+
5527	March 8	Feb. 19	7.00	7.25	0.25+
5535	March 8	Feb. 19	5.00	5.25	0.25+
5529	March 8	Feb. 19	8.50	8.75	0.25+
5536	March 8	Feb. 19	10.00	9.75	0.25-
5533	March 8	Feb. 19	6.75	6.50	0.25-
5548	March 8	Feb. 19	11.00	10.75	0.25-
5555	March 8	Feb. 19	8.00	7.50	0.50-
5539	March 8	Feb. 19	17.25	12.75	4.50-
5526	March 8	Feb. 19	7.00	7.00	0.00
5546	March 8	Feb. 19	7.50	7.50	0.00

Table 11. Average Weight Changes of Tagged Flathead Catfish Recovered From Lake Marvin, February 19, 1963.

Number of Fish Recovered	11
Average Weight When Tagged	9.11
Average Weight When Recovered	8.70
Total Weight Change of Group	4.50-
Average Weight Change Per Fish	0.41-
Average Weight Change Per One Pound of Body Weight	0.04-

Table 12. Lengths and Weights of Tagged Flathead Catfish in Lake Marvin

Tagged January 13, 1962			Tagged March 8, 1962		
Tag*	L. mm	Wt. lb.	Tag**	L. mm	Wt. lb.
307	695	19.50	5527	559	7.00
209	850	34.50	5528	533	6.00
274	765	26.50	5529	584	8.50
275	870	40.00	5530	597	8.75
288	830	30.00	5531	520	5.00
208	725	18.50	5532	673	12.25
266	775	23.50	5533	559	6.75
264	715	15.25	5534	527	6.00

Table 12 (continued)

Tagged January 13, 1962			Tagged March 8, 1962		
Tag *	L.mm	Wt. lb.	Tag **	L.mm	Wt. lb.
211	435	3.75	5535	502	5.00
329	415	3.75	5536	641	10.00
205	760	22.50	5537	768	17.75
380	725	18.00	5538	584	7.00
236	665	14.00	5539	692	17.25
214	775	24.50	5540	616	11.00
285	780	24.00	5541	591	8.50
291	790	25.50	5542	692	11.50
235	810	25.50	5543	489	5.00
328	470	5.00	5544	578	9.00
311	525	7.00	5545	483	4.50
			5546	578	7.50
			5547	610	9.00
			5548	635	11.00
			5549	584	8.50
			5550	616	11.00
			5551	635	11.50
			5552	641	12.00
			5553	533	6.00
			5554	648	12.00
			5555	584	8.00
			5526	572	7.00

Tagged February 19, 1963 \*\*\*

Tag **	L.mm	Wt. lb.
6324	660	12.25
3334	480	5.25
2068	690	13.75
2059	855	37.00

\* Tags read "JK" plus the three digits above.

\*\* Tags read "TGFC" - A - plus the four digits above.

\*\*\* The four fish tagged on Feb. 19, 1963, had been previously tagged but had lost the original tag.

Although the flatheads in Lake Marvin have failed to gain weight at the end of the first year following their stocking, it is significant that they have survived, and did show a weight gain in October 1962. This is somewhat similar to the data collected at Rita Blanca Lake which showed an initial weight loss following the stocking of tagged flatheads, but good weight gains by the following October. The percentage of weight gain at Rita Blanca was also higher in October than it was later in mid-winter. It is probably natural for fish to be in poorer condition during cold weather when they are less active and do not feed to any great extent.

The extremely clear water in Lake Marvin and possibly the crowded condition existing throughout most of the time that the flatheads have been in Lake Marvin may be responsible for the poor growth rates noted. Lake Marvin has recently refilled, and the lake area has increased from the 20 acres that it covered for almost nine months to about 60 acres. The approximately 40 acres of the lake bed that was exposed by the lake draw-down grew up in thick weeds and grasses. Since most of this area is now reflooded, it will add greatly to the fertility of the lake, probably increasing the turbidity and thereby creating better conditions for the flathead catfish, as well as channel catfish and crappie. The increased turbidity should also help to control submerged vegetation.

The dominant species of submerged vegetation in Lake Marvin are coontail and Najas. Sago pondweed was also common in some areas. Thick vegetation, due to the water clarity, is the major problem affecting the fishery of this lake. Sunfish spawn very successfully in the shallow clear water, and due to the protection afforded by the submerged vegetation, rapidly become overabundant. Fertilization is the best possible thing that could be done to improve conditions at Lake Marvin. Fertilization with 300 pounds of 16-20-0 in three applications of 150 pounds per acre in April, 75 pounds per acre in June, and if necessary, 75 pounds per acre in mid-July is recommended. The algae bloom that would result would increase the turbidity, shading out much of the coontail, Najas, and sago pondweed. In the absence of protection, the sunfish would then be available to the game species present. Bottom fishing, previously almost impossible due to the vegetation, would be greatly enhanced by the control of submerged plants. Plankton produced by fertilization would also provide the much needed source of food for good production and growth of minnows and young game fish.

Increased turbidity is a necessity for future production of channel catfish and crappie in Lake Marvin. In February 1963, 720 channel catfish averaging about seven inches in length and 580 black crappie averaging about five inches in length were salvaged from a nearby ranch lake and stocked in Marvin. These fish may survive but surely will not reproduce under the conditions now present; however, a proper fertilization program can create the conditions needed for their success.

Catfish spawning containers of the type shown in job completion report F-7-R-10, Job E-3, were constructed for Lake Marvin. However, they were not installed during this segment due to the low water level that has existed. A total of 29 such spawning devices are presently stored at the lake and will be installed before the spawning season begins in the spring of 1963.

Recommendations:

Lake Marvin should be netted periodically to determine changes in the fish population and especially to determine the status of experimentally stocked flathead catfish. A fertilization program should be carried out to increase production of plankton, increase turbidity to shade out submerged vegetation, and to help control the sunfish population.

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