

JOB COMPLETION REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-4-R-14

FISHERIES INVESTIGATIONS AND SURVEYS OF THE WATERS OF REGION 2-A

Job No. B-36: Evaluation of the Pre-impoundment Rotenone
Treatment of Hubbard Creek Lake

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Abstract

The pre-impoundment rotenone treatment performed on Hubbard Creek Reservoir was not effective and failed to be of any advantage to the "game species" population in that lake.

Job Completion Report

State of Texas

Project No. F-4-R-14

Name: Fisheries Investigations and Surveys of the Waters of Region 2-A

Job No. B-36

Title: Evaluation of the Pre-Impoundment Rotenone Treatment of Hubbard Creek Lake

Period Covered: November 1, 1966 - December 31, 1967

Objective:

This study was conducted in an effort to evaluate the effectiveness of reservoir pre-impoundment rotenone treatments. The lakes involved in this study were Proctor Lake and Hubbard Creek Lake.

Techniques Used:

Forty-two farm ponds and sloughs in the basin of the Hubbard Creek Lake were treated with rotenone at the rate of 1.5 ppm. Hubbard and Sandy Creeks were also treated at the same rate. These steps were taken in order to eliminate the existing fish populations in the basin area. (Project F-14-D-6, Job 16a37). There was no pre-impoundment fish kill treatment performed on Proctor Lake.

Description of Lakes:

Hubbard Creek Lake

Hubbard Creek Lake is located about 6 miles northwest of Breckenridge, Stephens County, Texas. It was built by the City of Abilene and is controlled by the West Central Texas Municipal Water District. The earthen dam, across Hubbard Creek below the confluence with Sandy Creek, impounds 16,000 surface acres of water. The primary purpose of the lake is to supply water to Abilene and smaller surrounding cities. No efforts were made to provide recreational facilities. Construction was completed in the fall of 1962 and 2,000 surface acres of water were impounded that year.

Soils on the watershed are primarily of clay-loam with underlying limestone. Shoreline vegetation is limited. Mesquite is the predominant tree while the shoreline supports bermuda grass, sunflowers and various range grasses and weeds.

Proctor Lake

Proctor Lake is located in the Brazos River Basin in Comanche County, 9 miles northeast of Comanche on the Leon River, a tributary to the Brazos River. The dam was built by the U. S. Army Corps of Engineers for flood control and water conservation. Work on the dam was completed in the spring of 1963. Due to heavy rains on the watershed the lake was filled immediately.

Lake Proctor has 4,600 surface acres of water which is supplied by Rush Creek, Sabanna River, and Leon River. Soils on the watershed are primarily sand with underlying clay. Peanuts and watermelons are the principle crops grown on the immediate watershed. The shoreline has a variety of trees, but consists mostly of large pecan trees interspersed with post oak. Bermuda is the predominant grass.

Launching ramps, camp sites, picnic areas and paved roads, built by the Corps of Engineers make the lake very attractive and extremely accessible to the public.

Stocking of Lakes

After eradication was completed on Hubbard Creek Reservoir, heavy rains inundated 2,000 acres of fertile pasture land. The lake was stocked with 150,000 channel catfish, 37,000 blue catfish and 10,000 bass fingerlings. This stocking took place the last week of August. Subsequent stockings of both Proctor and Hubbard Creek Lakes are tabulated in Table 1.

Table 1
Stocking of Hubbard Creek Lake & Proctor Lake

Hubbard Creek Lake					
<u>Date</u>	<u>Largemouth Bass</u>	<u>Channel Catfish</u>	<u>Catfish Blue</u>	<u>Flathead Catfish</u>	<u>Crappie White</u>
8-62	10,000	2,000			
9-62	5,000	103,050	12,000		
10-62	19,000	10,700	24,000	2,000	
4-63	<u>350,000</u>	_____	_____	_____	<u>1,096</u>
Totals	384,000	115,750	36,000	2,000	1,096
Proctor Lake					
<u>Date</u>	<u>Largemouth Bass</u>	<u>Channel Catfish</u>	<u>Catfish Blue</u>	<u>Flathead Catfish</u>	<u>Crappie White</u>
6-63	167,700				
8-63		76,980			
10-63				5,050	
Totals	167,700	76,980		5,050	

Gill nets were used to sample fish populations and were set at stations established during the initial (F-4-R-11) segment of this job. The nets were 150 feet long and 6 feet deep with square mesh graduated from 1 inch to 3½ inches, changing every 25 feet. Nets were set in the afternoon and raised the following morning. Netting trips were distributed more or less randomly over the segment periods. The yearly net footages for each lake are shown in Table 2.

Table 2
Yearly Net Footages

<u>Segment</u>	<u>Hubbard Creek Lake</u>	<u>Lake Proctor</u>
63-64	8,550 feet	8,350 feet
64-65	6,450 feet	6,000 feet
65-66	<u>7,200 feet</u>	<u>7,200 feet</u>
Totals	22,200 feet	21,550 feet

Scientific names of fish mentioned in this report are shown in a checklist (Table 3). The checklist also categorizes the various species included in the terms "rough fish", "game fish" and "miscellaneous sunfish" as used in this report.

Table 3
Checklist of Fishes Mentioned in This Report

Rough Fish

Spotted gar
Longnose gar
Gizzard shad
Smallmouth buffalo
River carpsucker
Carp
Black bullhead
Yellow bullhead
Freshwater drum

Lepisosteus oculatus
Lepisosteus osseus
Dorosoma cepedianum
Ictiobus bubalus
Carpiodes carpio
Cyprinus carpio
Ictalurus melas
Ictalurus natalis
Aplodinotus grunniens

Table 3 (continued)

Checklist of Fishes Mentioned in This Report

Game Fish

Channel catfish	<u>Ictalurus punctatus</u>
Blue catfish	<u>Ictalurus furcatus</u>
Flathead catfish	<u>Pylodictis olivaris</u>
Largemouth bass	<u>Micropterus salmoides</u>
White crappie	<u>Pomoxis annularis</u>

Miscellaneous Sunfish

Warmouth	<u>Chaenobryttus gulosus</u>
Green sunfish	<u>Lepomis cynellus</u>
Redear sunfish	<u>Lepomis microlophus</u>
Bluegill	<u>Lepomis macrochirus</u>
Longear sunfish	<u>Lepomis megalotis</u>

It should be noted that water analyses were made on each lake at an established station during the segments. Tests were made to determine dissolved oxygen, carbon dioxide, pH, and alkalinity. The results of these tests showed both lakes to be similar in water quality.

Data:

The netting data for segment 3, 1965-66, are shown in Tables 4 and 5. Netting data from previous segments can be found in the Job B-31 completion report F-4-R-12. Table 6 consists of the tabulated netting data for all three years in regards to per cent of number and per cent of weight. These are also graphically illustrated (Table 7).

Table 6

Per Cent of Number and Weight

	Hubbard Creek Lake					
	Per Cent of Number			Per Cent of Weight		
	<u>1963-64</u>	<u>1964-65</u>	<u>1965-66</u>	<u>1963-64</u>	<u>1964-65</u>	<u>1965-66</u>
Rough Species	40.65	61.85	45.15	55.36	65.39	62.84
Game Species	35.51	32.20	34.41	41.95	34.06	35.21
Miscellaneous Species	23.84	5.95	20.44	2.69	0.55	1.95

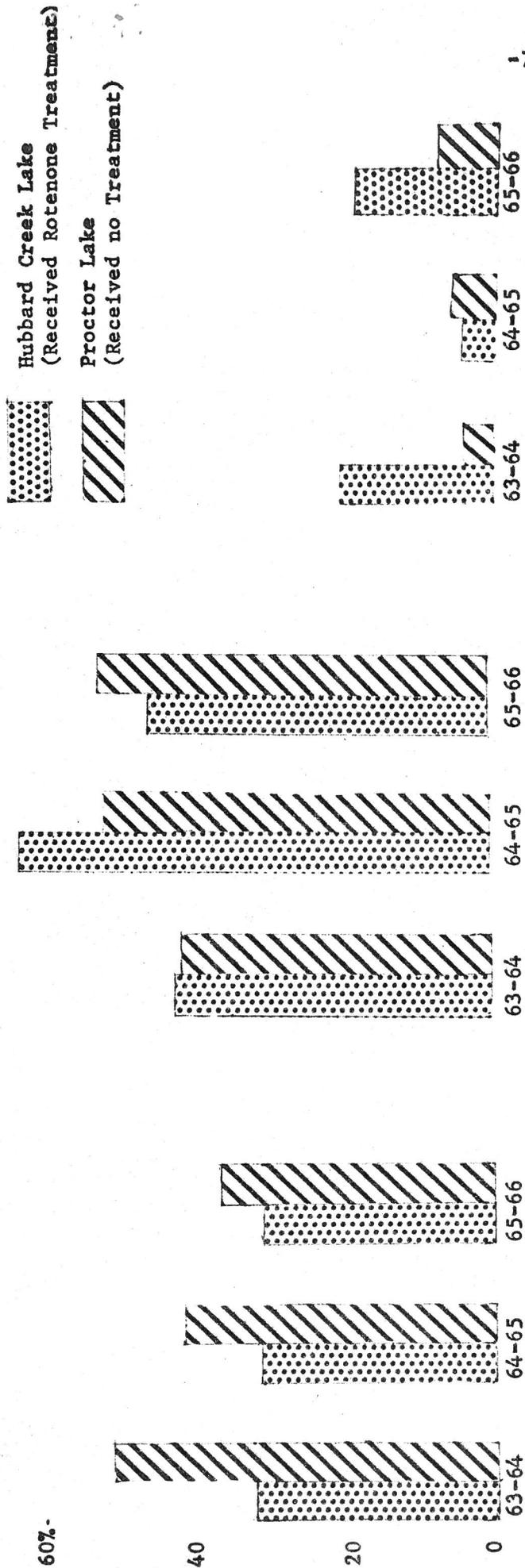
Table 4. Hubbard Creek Netting 1965-1966 (F-4-R-13)

Species	Total Number	Per Cent of Number	Total Lbs. Weight	Per Cent of Weight	No. Per 100 Ft. Net	Lbs. Per 100 Ft. Net	Length Range mm	Av. Length mm	Weight Range gm	Av. Weight gm	"K" Range	"K" Average
<u>Rough Species</u>												
Spotted gar	3	0.21	7.55	0.50	0.04	0.10	505-530	517	851-1106	1143	0.64-0.74	0.69
Longnose gar	37	2.59	125.65	8.49	0.51	1.75	455-940	639	384-4224	1370	0.23-0.51	0.38
Gizzard shad	229	16.09	36.53	2.46	3.18	.50	128-270	158	40-340	72	1.25-2.70	1.85
Smallmouth buffalo	120	8.42	355.98	24.03	1.67	4.95	160-405	335	140-4309	1346	2.40-4.20	3.39
River Carpsucker	30	2.11	46.53	3.15	0.41	0.64	195-390	302	190-1559	704	2.20-3.40	2.70
Carp	194	13.62	344.86	23.28	2.70	4.79	160-510	284	115-2948	807	1.90-3.40	2.54
Black Bullhead	16	1.13	4.52	0.30	0.22	0.07	120-220	246	58-238	128	1.57-4.00	2.33
Yellow bullhead	0	0	0	0	0	0	0	0	0	0	0	0
Freshwater drum	14	0.98	9.30	0.63	0.20	0.12	123-385	216	46-1332	301	2.00-4.10	2.47
Sub Total	643	45.15	930.92	62.84	8.93	12.92						
<u>Game Species</u>												
Blue catfish	14	0.98	37.78	2.55	0.19	0.53	350-445	391	851-1758	1225	1.70-2.67	1.99
Channel catfish	120	8.43	99.05	6.69	1.67	1.37	165-485	270	62-2392	374	1.07-2.40	1.58
Flathead catfish	9	0.63	66.08	4.46	0.12	0.92	240-690	481	460-7059	3131	0.22-3.90	2.07
Largemouth bass	106	7.45	223.87	15.11	1.47	3.11	185-420	310	155-2381	958	1.07-3.90	2.80
White crappie	240	16.85	94.06	6.35	3.34	1.31	100-320	174	30-1077	177	1.40-3.92	2.56
Black crappie	1	0.07	0.79	0.05	0.01	0.01	232	232	360	360	2.90	2.90
Sub Total	490	34.41	521.63	35.21	6.80	7.25						
<u>Miscellaneous Sunfish</u>												
Warmouth	1	0.07	0.31	0.02	0.02	0.01	166	166	142	142	3.10	3.10
Green sunfish	1	0.07	0.14	0.01	0.01	0.01	130	130	65	65	2.95	2.95
Redear sunfish	0	0	0	0	0	0	0	0	0	0	0	0
Bluegill sunfish	287	20.15	28.17	1.90	3.99	0.39	94-150	107	28-115	44	2.10-4.80	3.72
Longear sunfish	2	0.15	0.16	0.02	0.02	0.01	100	100	38	38	3.90	3.90
Sub Total	291	20.44	28.78	1.95	4.04	0.42						
Total	1424	100.00	1481.33	100.00	19.77	20.59						
1/ Less than												

Table 5. Proctor Lake Netting 1965-1966 (F-4-R-13)

Species	Total Number	Per Cent of Number	Total Lbs. Weight	Per cent of Weight	No. Per 100 Ft. Net	Lbs. Per 100 Ft. Net	Length Range mm	Av. Length mm	Weight Range gm	Av. Weight gm	"K" Range	"K" Average
<u>Rough Species</u>												
Spotted gar	6	0.26	17.12	0.96	0.08	0.23	310-680	523	210-2240	1295	0.49-0.82	0.69
Longnose gar	0	0	0	0	0	0	0	0	0	0	0	0
Gizzard shad	167	7.44	21.38	1.21	2.32	0.30	115-160	136	34-80	58	1.43-3.36	1.34
Smallmouth buffalo	64	2.85	100.86	5.69	0.89	1.40	260-400	289	442-1814	715	2.45-3.48	2.96
River carpsucker	400	17.82	489.29	27.62	5.55	6.80	170-340	265	225-964	555	1.15-3.42	2.82
Carp	136	6.06	111.55	6.29	1.89	1.55	130-480	222	55-2665	372	2.15-3.05	2.41
Black bullhead	78	3.47	16.23	0.92	1.08	0.22	149-243	159	60-341	94	1.46-2.50	2.05
Yellow bullhead	9	0.40	4.10	0.23	0.13	0.06	183-223	205	130-262	207	2.05-2.42	2.25
Freshwater drum	360	16.04	257.04	14.51	5.00	3.57	125-420	283	48-1758	324	1.85-2.78	2.35
Sub Total	1220	54.34	1017.57	57.43	16.94	14.13						
<u>Game Species</u>												
Channel catfish	118	5.25	183.20	10.34	1.64	2.54	140-600	308	40-4791	704	1.30-2.21	1.69
Flathead catfish	3	0.14	25.97	1.46	0.04	0.36	485-570	351	2098-5783	3931	1.80-2.11	1.95
Largemouth bass	130	5.79	224.95	12.70	1.81	3.13	150-460	271	65-3062	785	1.35-3.90	2.66
White crappie	500	26.72	200.87	16.98	8.33	4.18	100-320	191	28-680	227	0.94-4.80	2.96
Sub Total	851	37.90	734.99	41.48	11.82	10.21						
<u>Miscellaneous sunfish</u>												
Warmouth	6	0.27	1.35	0.07	0.08	0.01	105-170	136	48-220	102	2.55-4.50	3.51
Green sunfish	8	0.36	1.21	0.07	0.11	0.02	110-183	125	40-170	68	2.50-4.42	3.12
Redear sunfish	0	0	0	0	0	0	0	0	0	0	0	0
Bluegill sunfish	160	7.13	16.69	0.95	2.23	0.23	90-125	103	30-90	47	3.05-6.00	3.86
Longear sunfish	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total	174	7.76	19.25	1.09	2.42	0.26						
Total	2245	100.00	1771.81	100.00	31.18	24.60						

Figure 1 Per Cent of Number



Miscellaneous Species

Rough Species

Game Species

PER CENT OF WEIGHT

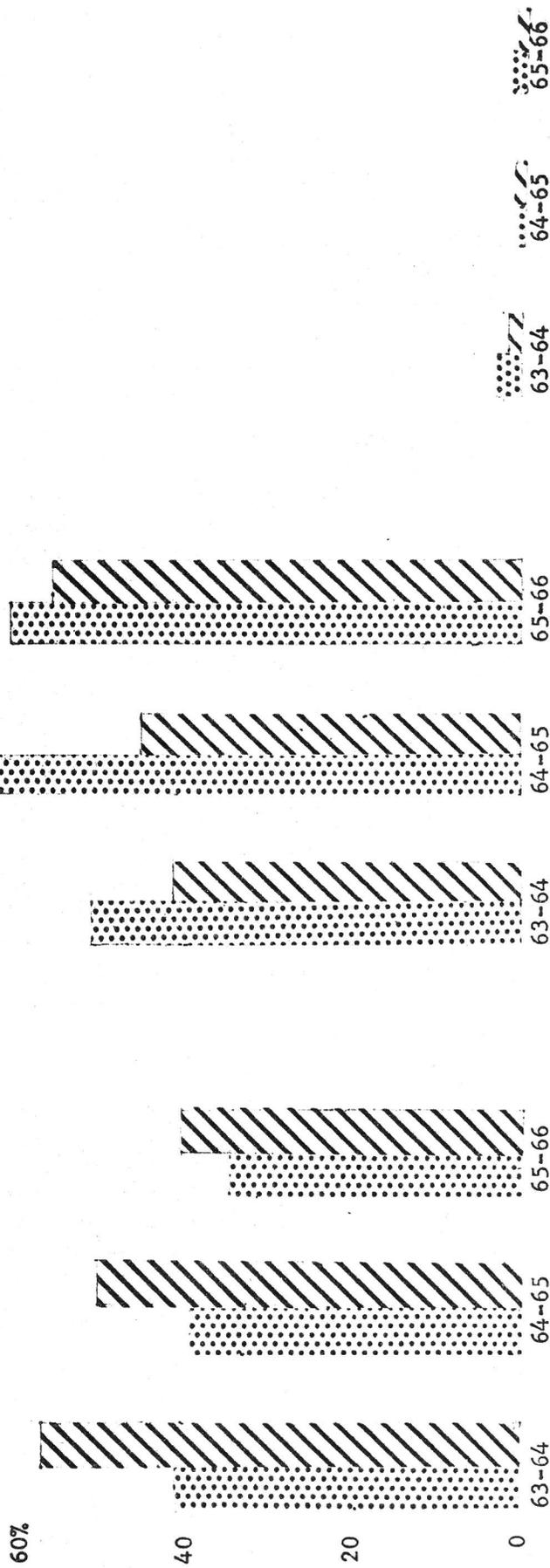


Table 6 (continued)

	Proctor Lake					
	Per Cent of Number			Per Cent of Weight		
	<u>1963-64</u>	<u>1964-65</u>	<u>1965-66</u>	<u>1963-64</u>	<u>1964-65</u>	<u>1965-66</u>
Rough Species	40.71	51.08	54.34	41.87	45.46	57.43
Game Species	54.97	42.73	37.90	57.15	53.64	41.48
Miscellaneous Species	4.32	6.19	7.76	0.98	0.90	1.09

Discussion:

To better understand the data and draw some conclusions several indices must be chosen. Several interesting facts can be seen by comparing such factors as per cent of numbers and per cent of weight (Table 6 and Figure 1).

The graph comparing per cent of numbers for both lakes shows several things:

1. Although Hubbard Creek Lake received pre-impoundment rotenone treatment, the total per cent of "rough species" in this lake for the first year was almost equal to the "rough species percentage" of Proctor Lake which was not treated before stocking.
2. The per cent of "game species" in Proctor Lake was greater than the percentage in Hubbard Lake during the first year. However, it must be noted that the per cent of "miscellaneous species" for the first segment were greater in the treated lake, Hubbard. ^{1/}

Numbers 1 and 2 seem to indicate that the pre-impoundment rotenone treatment had little or no influence on the fish populations in Hubbard Creek.

^{1/} If a rough fish - game fish comparison is used to determine effectiveness of pre-impoundment rotenone treatments, the role of the "miscellaneous species" cannot be overlooked. It must be realized that there is a possibility that the "miscellaneous fish" may occupy part of the habitat of either the game or the rough population. Since the "miscellaneous species" could influence either population, it is assumed that their affect will not greatly bias this study.

3. The data for the second year are perhaps the best indicators of the effectiveness of pre-impoundment treatment. The "miscellaneous species" percentage is almost equal for both Proctor and Hubbard and this allows a straight game fish-rough fish comparison to be made. The rough species were considerably more abundant in Hubbard and the percentage of game species was greater in Proctor which was not treated. These facts indicate that pre-impoundment treatment was not effective in Hubbard Lake.
4. Data from the third segment also showed that Proctor had a more favorable "game species" composition.

From the graph of per cent of weight, the same general trend can be seen throughout all three segments of this study. Hubbard Creek Lake revealed a greater rough fish percentage for the three segments while Proctor Lake showed a greater game fish percentage. This trend should have been reversed had pre-impoundment rotenone treatments been effective.

A check of the netting success (number per 100 feet of net) shows that while Hubbard Creek Lake had more nets run on it, the catch success (53.35 fish per 100 feet of net) was lower than it was on Proctor (81.94 fish per 100 feet of net). This balancing effect would tend to offset any bias due to heavier netting on one lake.

Conclusion:

From the data gathered and the all over picture of this study it is evident that pre-impoundment rotenone treatments did not have any beneficial effects on Hubbard Creek Lake. In fact, Proctor Lake seemed to have a better over all picture than Hubbard did. An honest effort was made to eliminate all bias from this study and in view of this fact it can be concluded that there is no benefit or advantage to pre-impoundment rotenone treatments.

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