SEGMENT COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-5-R-14

REGION I-B FISHERIES STUDIES

Job No. 11 Pre-innundation Investigation for Robert Lee Reservoir

Project Leader: Billy J. Follis

J. R. Singleton
Executive Director
Parks and Wildlife Department
Austin, Texas

Marion Toole
D-J Coordinator

Eugene A. Walker
Director, Wildlife Services

April 10, 1967

ABSTRACT

Construction on the Robert Lee Dam is under way and progressing slightly ahead of schedule. Hydrological data, maps, construction plans and similar material have been obtained.

The fish populations of the immediate watershed were checked through the use of gill nets and seines. Although the existing fish population is predominantly composed of undesirable species, a chemical treatment cannot be justified.

The use of local ranch ponds to rear brood game fish has been employed to assure adequate stocking when the reservoir begins to fill.

SEGMENT COMPLETION REPORT

State of Texas

Project No. F-5-R-14 Name: Region 1-B Fisheries Studies

Job No. 11 Title: Pre-innundation Investigation for Robert Lee Reservoir

Period Covered: March 1, 1966 to February 28, 1967

Objectives:

1. To determine if topographic and construction features may be employed to advance future game fish production and harvest.

2. To determine if existing waters may be benefited through proven management methods or experimental methods.

3. To determine what measures are necessary to assure adequate stocking.

4. To determine measures required to assure preservation of rare and endemic fish.

Procedures:

Liaison with the Colorado River Municipal Water District was established and maintained. The following types of information were obtained:

(1) projected construction progress and closure dates

(2) projected estimates of capacities, variations in shapes and other hydrological data

(3) maps, aerial photographs and similar material

(4) water usage and releases.

Existing waters in and near the reservoir area were sampled with gill nets and seines to evaluate the current fish population. Fish species and population relative abundance were determined and recorded.

Stocking needs were projected to coincide with various capacities and elevations. These stocking problems were studied and measures to assure adequate stocking of this reservoir were begun.

A checklist of scientific names is presented so that common names may be used in this report. These names are specified in "A list of Common and Scientific Names of Fishes from the United States and Canada", Second Edition, American Fisheries Society, Special Publication Number 2, 1960.

Longnose gar	Lepisosteus osseus
Gizzard shad	Dorosoma cepedianum
Carp	Cyprinus carpio
Plains minnow	Hybognathus placita
Red Shiner	Notropis lutrensis
Sharpnose shiner	Notropis oxyrhynchus
Fathead minnow	Pimephales promelas
Bullhead minnow	Pimephales vigilax
Longnose dace	Rhinichthys cataractae
River carpsucker	Carpiodes carpio
Smallmouth buffalo	Ictiobus bubalus
Channel catfish	Ictalurus punctatus
Flathead catfish	Pylodictis olivaris
Rio Grande killifish	Fundulus zebrinus
Mosquitofish	Gambusia affinis
Green sunfish	Lepomis cyanellus
Orangespotted sunfish	Lepomis humilis
Bluegill	Lepomis macrochirus
Longear sunfish	Lepomis megalotis
White crappie	Pomoxis annularis

Findings:

Robert Lee Reservoir Basic Information

Bids for the construction of the Robert Lee Dam, located on the Colorado River two miles West of Robert Lee, Coke County, Texas, were received by the Colorado River Municipal Water District in October 1966. The contract was awarded shortly thereafter and actual construction began in early November 1966. The contract documents state that the dam and its related facilities must be substantially completed by March 1, 1969. At this time the construction is progressing ahead of schedule. There is good possibility that a limited amount of water can be impounded in the fall of 1968.

The dam, when completed, will impound 488,760 acre-feet and will back water up 18 miles to a point adjacent to the Mitchell - Coke County line. When full, the lake will have a surface of 14,950 acres and a shoreline of approximately 135 miles. The reservoir will have a maximum depth of 108 feet and an average depth of 33 feet. The average annual runoff into the reservoir according to historical records will be 140,000 acre-feet per annum.

The District has purchased land up to elevation 1,900 feet above main sea level. This evelation is 2 feet above the elevation of the service spillway. A flood easement has been purchased to elevation 1,912 feet. Contained in the easement are certain restrictions in so far as sanitation and developing conditions are concerned. The property owners retain the right to lease or sell the property adjacent to the reservoir with the exception of five tracts of land containing a total of about 2,000 acres. These tracts will be developed by the District for public recreational areas.

The dam will be of earthen construction and approximately 4.2 miles long and 136 feet high at the river. It will be protected by two spillways. The

service spillway will be a gated morning glory structure located at the river and have a maximum capacity of 40,000 second feet. The emergency spillway is located at the South end of the dam and will be 3,200 feet wide. Based on historical records, it should be utilized no more than once every 62 years.

All the runoff will be impounded. The District is not required to release flood waters from the reservoir with the exception of very adverse conditions of existing down stream reservoirs. However, the permit from the Texas Water Rights Commission states in part that the normal flow of the river will not be interrupted.

The primary purpose of the reservoir is for municipal water supply for the cities of Odessa, Big Springs, Snyder and Midland. Based on hydrological records, it will have a safe yield of 50 million gallons per day. It is anticipated that water will be diverted for municipal use beginning January 1970.

The land surrounding the reservoir is predominately pasture land (95 per cent). Topographically, the area is rolling hills, plains and intermittent creek valleys. Vegatative cover is mesquite - grassland for the upland areas and salt cedar, mesquite, willow, and pecan in the low areas. Very little cultivation will be adjacent to the reservoir.

Contour and county maps and aerial photographs of the basin area have been obtained from various sources.

Fish Population

Sampling of the fish population was divided into the following four areas: (1) tributaries, (2) Colorado River above reservoir basin, (3) Colorado River in reservoir basin and (4) Colorado River below reservoir basin.

The tributaries were checked where access could be attained by highways, county roads and pasture or field roads. Permanent water was found only in Salt Creek and Pecan Creek. Both of these streams were confined to small, shallow, clear holes where only seining collections could be made. The results of these collections are given in Table 1.

Table 1

Seining Results of Tributaries to Colorado River and Reservoir Area
Seining results (10 drags with a 20' by 6' by 1/8-inch mesh seine)

Species	Number	Size Range in Inches
Red shiner	296	1-2
Fathead minnow	43	2-2½
Bullhead minnow	21	1-1½
River carpsucker	14	2-6
Mosquitofish	81	½-1½
Green sunfish	21	1½-6
Total	476	

Above the reservoir basin, the Colorado River is primarily shallow with a fairly constant flow. Due to the lack of deep water only 3 gill net collections were made. Rough fish, primarily longnose gar, accounted for 96 per cent of both weight and number of this netting sample (Table 2). Desirable species were channel catfish, flathead catfish, and white crappie. However, this portion of the river supports an enormous minnow population which will be of great benefit to the new reservoir. Red shiner is the most prominent of these small forage species.

Table 2

Survey Results of Colorado River above Reservoir Area
November 22, 1966

Results of Three Gill Nets

Species	Number	Per Cent by No.	Total Wt. Pounds	Avg. Wt. Pounds	Per Cent by Wt.	Average "K"
Longnose gar	63	47.01	153.74	2.44	68.03	
Gizzard shad	23	17.17	24.56	1.07	10.86	
Carp	1	.74	5.06	5.06	2.24	
River carpsucker	41	30.60	29.02	.71	12.85	
Smallmouth buffalo	1	.74	5.78	5.78	2.55	
Channel catfish *	2	1.50	3.40	1.70	1.51	1.84
Flathead catfish *	1	.74	2.75	2.75	1.22	1.90
White crappie *	2	1.50	1.67	.83	.74	3.21
Totals	134	100.00	225.98		100.00	
Game Fish *	5	3.73	7.82		3.47	
Rough Fish	129	96.27	218.16		96.53	

Seining Results (4 drags with a 100' by 8' by ½-inch mesh seine. 16 drags with a 30' by 6' by ¼-inch mesh seine and 20 drags with a 20' by 6' by 1/8-inch mesh seine)

Species	Number	Size Range in Inches
Gizzard shad	1	3-12
Plains minnow	14	2-2½
Red shiner	2251	1-2½
Sharpnose shiner	44	1½-3
Fathead minnow	112	1½-2
Bullhead minnow	169	1-2
River carpsucker	5	4-6
Channel catfish	2	3-3½
Rio Grande killifish	40	1½-2½
Mosquitofish	47	1-2
Green sunfish	1	3½
Orangespotted sunfish	2	2½
Bluegill	2	2½
Longear sunfish	3	2-3
Total	2693	

The 18-mile segment of the river that will be in the reservoir was checked at several locations. It was found to be fairly clear and up to 10 feet deep in the larger holes. The normal flow is reduced by irrigation withdrawals during the spring and summer months.

Gill net collections were made at three locations in this area of the river. Table 3 reveals that longnose gar, gizzard shad, and river carpsucker comprised 89.32 per cent by number and 77.92 per cent by weight of the netting composite The percentage of game fish taken increased slightly over the sample from above the basin area.

The seining collection from the basin area, which was a composite of 55 seine drags, produced 17 species. Plains minnow and red shiner were very abundant (Table 3).

River conditions below the reservoir area were found to be very similar to those in the basin. The netting results for this area (Table 4) show a predominantly rough fish population. However, the number of gizzard shad in this sample was quite smaller than that of the basin area. Channel and flathead catfish were the only game fish taken in gill nets and accounted for only 6.50 per cent by number and 8.73 per cent by weight.

The seining collection was significantly smaller than in either of the areas above. Only three species were taken for a total of 62 fish. This may be due to the increased turbidity and water volume.

Rare or endemic fish were not found in the course of this study. Therefore, measures to preserve such species were unnecessary.

Stocking Plans

Hydrological data for the Colorado River at the location of the new dam indicates an average annual impoundment of 140,000 acre-feet. If construction goes as planned and this area receives an average rain fall, there will be about 50 to 60 thousand acre-feet impounded by late spring or early summer of 1969 and 200 thousand acre-feet by fall of 1970. Amistad Reservoir may fill at the same time and other reservoirs, now reduced by drouth, will also possibly catch water. Should this occur, the need for stocking these new waters will exceed regional hatchery production. For these reasons and the questionable success of stocking waters containing an established fish population with small hatchery fish, an attempt is being made to rear largemouth bass and channel catfish to brood size. These fish will then be stocked in the new reservoir when sufficient water is impounded.

For this rearing and holding of potential brood fish, the use of about 40 ranch tanks has been secured from land owners in and near the reservoir area. These ponds, most of which are ½ to 2 acres in size, were selected for (1) permanent water, (2) ease of future recovery activities which includes size, shape and depth, (3) location in relation to the new lake.

Table 3

Survey Results of Colorado River in Reservoir Area
June 28, 1966, August 16, 1966 and November 8, 1966

Results of Ten Gill Nets

Species	Number	Per Cent by No.	Total Wt. Pounds	Avg. Wt. Pounds	Per Cent by Wt.	Average "K"
Longnose gar	66	28.20	82.86	1.25	32.82	
Gizzard shad	60	25.65	56.53	.94	22.39	
Carp	7	2.99	26.11	3.73	10.34	
River carpsucker	83	35.47	57.34	.69	22.71	
Smallmouth buffalo	3	1.28	15.62	5.21	6.19	
Channel catfish *	4	1.71	2.94	.74	1.16	1.64
Flathead catfish *	4	1.71	9.42	2.35	3.74	1.82
Green sunfish *	1	.43	.12	.12	.04	3.48
Longear sunfish *	1	.43	.16	.16	.07	4.67
White crappie *	5	2.13	1.36	.27	.54	3.43
Totals	234	100.00	252.46		100.00	
Game Fish *	15	6.41	14.00		5.55	
Rough Fish	219	93.59	238.46		94.45	

Seining results (7 drags with a 100' by 8' by ½-inch mesh seine and 48 drags with a 20' by 6' by 1/8-inch mesh seine)

Species	Number	Size Range in Inches
Longnose gar	16	2-28
Gizzard shad	96	2-10
Plains minnow	6489	½-3
Red shiner	6082	½-3
Sharpnose shiner	34	½-2½
Fathead minnow	35	1-2½
Bullhead minnow	722	½-2½
Longnose dace	6	1½-3
River carpsucker	23	2-8
Channel catfish	7	2-5
Rio Grande killifish	13	1½-2
Mosquitofish	33	1-2
Green sunfish	14	2-3
Orangespotted sunfish	210	1½-3
Bluegill	23	1½-3
Longear sunfish	25	1½-3½
White crappie	3	3-4
Total	13831	

Table 4

Survey Results of Colorado River below Reservoir Area
October 13, 1966

Results of Four Gill Nets

Species	Number	Per Cent by No.	Total Wt. Pounds	Avg. Wt. Pounds	Per Cent by Wt.	Average "K"
Longnose gar	26	33.76	31.37	1.21	22.02	
Gizzard shad	5	6.49	4.75	.95	3.34	
Carp	3	3.90	7.43	2.48	5.22	
River carpsucker	30	38.96	35.68	1.19	25.05	
Smallmouth buffalo	8	10.39	50.75	6.34	35.64	
Channel catfish *	3	3.90	4.18	1.39	2.93	1.51
Flathead catfish *	2	2.60	8.25	4.13	5.80	1.72
Totals	77	100.00	142.41		100.00	
Game Fish *	5	6.50	12.43		8.73	
Rough Fish	72	93.50	129.98		91.27	

Seining results (8 drags with a 30' by 6' by ¼-inch mesh seine and 8 drags with a 20' by 6' by 1/8-inch mesh seine)

Species	Number	Size Range in Inches
Gizzard shad	1	6
Red Shiner	48	1-2
Bullhead minnow	13	1-2
Total	62	

Several of these ponds were void of fish and the remainder were chemically renovated. A total of 20,000 largemouth bass fingerlings and 2,000 channel catfish fingerlings were stocked at various rates. Along with these fish each pond received 5 to 10 thousand red shiners which were seined from the Colorado River.

Also, two old city lakes at Robert Lee, 10 and 15 acres in size, were stocked with 1,400 largemouth bass. These fish were salvaged from various ranch ponds in the area and were ½ to 4 pounds in size. Minnows were also added to these lakes for forage.

Basic Water Data

Water samples were collected at several locations during the course of this study. These samples were returned to the Region 1 chemist for analysis. Additional water quality data was obtained from the Colorado River Municipal Water District. Information from these sources is combined to give the average water quality (Table 5). District officials reported that the quality of water will be well within the U. S. Public Health Department standards for municipal use.

Table 5

Colorado River Water Quality

Area	Number of Samples Averaged	pH	Chlorides (ppm)	Sulfates (ppm)	Pht. Alk. (ppm)	Tot. Alk. (ppm)	Hardness (ppm)
Waters Above Reservoir Area	5	8.0	259	963	6.0	119	1131
Waters In Reservoir Area	6	7.7	581	860	0.0	163	1116
Waters Below Reservoir Area	3	8.5	313	143	18.0	110	313

Conclusions and Recommendations:

Liaison should be maintained with the controlling authorities. Additional information, including up-to-date knowledge of planning, construction progress, structural and usage modifications and pertinent documents should be obtained. Plans for recreational usage and development will be appraised from a fisheries stand point.

A chemical treatment of the watershed is not justifiable at this time due to the length of the river, conflicting opinions of land owners, and the immediate reinfestation of rough fish from existing lakes on the upper watershed. However, additional study should be made of the fish population in the river in and near the reservoir area.

Necessary measures should be continued to provide adequate stocking for this new reservoir. If mature game fish can be introduced as soon as there is sufficient water impounded, a sizeable natural spawn would occur earlier and may be more desirable than hatchery fry. These brooders may also help to control the reproduction of some of the undesirable species already present.

Prepared by Billy J. Follis
Project Leader

Marion Toole
Coordinator

Date: April 10, 1967

Leo D. Lewis
Inland Fisheries Supervisor