Report of Fisheries Investigations

Basic Survey and Inventory of Fish Species Present in Fort Brown Lake

by

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Dingell-Johnson Project F-6-R-5, Job B-8
July 1, 1957 - August 31, 1957

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Austin, Texas

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JOB COMPLETION REPORT

State of TEXAS

Project No. F6R5   Name: Fisheries Investigations and Surveys of the Waters of Region
8-B.

Job No.   B-8   Title: Basic Survey and Inventory of Fish Species Present in Fort
Brown Lake.

Period Covered: July 1, 1957 - August 31, 1957

ABSTRACT:

1. The fish populations of Fort Brown Lake, near Brownsville were investigated
for a period of two months. Eight netting and two seining collections were made.

2. Chemical analysis was conducted and the lake was found to have adequate
but not optimum conditions for fish propagation.

3. A physical description of the area is given including the physiography,
soil types and geology.

4. The results of the netting and seining collections are discussed and pre-
sented in table form.

5. Stomach analysis, coeffecient of condition, ranks by weight and number are
presented in table form.

6. Fort Brown Lake is a long, murky, winding, shallow, silty bottomed, ox-bow
type lake that has long ceased to have any natural connection to the Rio Grande or other
waters. Rough fish predominate and the populations are so high that the only recourse
open for a sound fisheries program is a complete kill and subsequent re-stocking. Ade-
quate fish screens should first be placed at the pump discharge to prevent re-introduction
of undesirable fish from the Rio Grande.

OBJECTIVES:

To determine the chemical and physical characteristics of the lake and the
fish species present.

PROCEDURE:

During the course of the survey ten collections were made consisting of two
seining collections and eight netting collections. Gill net collections were made with
experimental nets 125 feet long and eight feet wide. The mesh ranged from one to three
inches square, graduating one-half inch every twenty-five feet. The nets were set at
the designated locations in July and August (Map 1.). Seining collections were unorthodox,

as the sharp, cliff-like banks made regular seining impossible. Collections were made by "flipping" the net out from the bank and then lifting up.

Water analysis tests made in the field consisted of air temperature, water temperature, pH, dissolved oxygen, carbon dioxide, ph-th alkalinity, methyl orange alkalinity, and salinity. Jackson turbidimeter readings were done in the laboratory from a well shaken water sample. Surface water samples were collected at the center of the lake to represent the apparent single ecological condition.

PHYSICAL CHARACTERISTICS AND DESCRIPTION:

Fort Brown Lake is located two miles east of the city of Brownsville and like many in this area was at one time part of the "resaca system" that has long been isolated from the river and no longer has a natural connection with the Rio Grande. A twelve-inch pump is connected to the Rio Grande to bring in water to the lake at times of excess water in the river and thus prevent its entry and loss into the Gulf of Mexico. This lake is owned and operated by the City of Brownsville, and is used to furnish recreational facilities to the people of the area.

Fort Brown Lake has a surface area of 32.68 acres, with a total volume of 168.78 acre feet. The deepest part of the lake is seven feet but the average is slightly over five feet. The lake is long and narrow, curving around Southmost College on the northwest and private homes on the east. The bottom, for the most part, is silt with some areas of sandy silt that support some stands or emergent vegetation in the form of willows, other vegetation is relatively absent.

Fort Brown Lake is in the Gulf Coastal Plain physiographic region and is a segment of the great coastal plain across the southern states and crosses the Rio Grande into Mexico, gradually narrowing as it swings through Texas and southward. The lake is more precisely located in the Coastal Prairie sub-region of the Gulf Coast Plain. Geologically the lake is located in the coastal syncline of the Rio Grande Embayment. In this area the substructures dip generally to the southeast. The surface structures of the whole Coastal Plain in this area are of the quaternary geologic period.

The soil types found in this area are characteristic of the Rio Grande Plain soil belt that occupies the southern part of Texas. The area is generally broad, very gently undulating to rolling plain with a gradual slope to the southeast. Soils are generally clay with occassional intrusions of marsh type soils which are high in saline content.

DRAINAGE AREA:

The water supply for this lake is direct from the Rio Grande by means of a twelve-inch centrifugal pump. At times of excess water in the river, water is pumped into the lake to prevent its loss into the Gulf of Mexico. This is one of the lakes in the whole valley that has possibilities for a fisheries management program, because of its regulated water inlet and supply that can be screened. Because of the high banks of the lake there is no run-off water, but water can be drained from the lake by means of pumps at the southeast end.

AQUATIC VEGETATION:

Except for a few stands of willows along the east end of the lake and some deep rooted Bermuda grasses along the edges the lake does not have much in the nature of

vegetation, either of a beneficial or detrimental nature. The high turbidity found in this lake is probably due to bottom feeding rough fish that prevent the establishment and growth of subsurface vegetation.

CHEMICAL ANALYSIS:

The results of the chemical analysis from a central location (Map. 1) in Fort Brown Lake are shown in Table 1. Samples were taken from the surface as the lake depth averages only five feet. The table shows the readings for the months of July and August and the general average for the two-month study period. There are not any definite conclusions that can be formed from the short period of tests on water, however, significant results of the high saline contents of the water are clearly shown. In all probabilities this is a direct result of the high saline content of the ground underlying the lake and this salinity is significant because it is over 600 p.p.m. over that of nearby lakes and the average is over 400 p.p.m. of the Rio Grande water during flood stages.

RESULTS OF FISH COLLECTIONS:

Seining Collections

Two seining collections were made in Fort Brown Lake during the project period. Collections show a large number of bass fingerlings, and juveniles, with some small yearlings. Analysis of the seining collections can not be considered because the seining method used was the only one possible and does not establish a fair criteria for analysis of the small fish present in the lake as may be seen on Table 3.

Stocking records for this lake show that 10,000 bass fry were stocked on March 3, 1955, 15,000 on March 30, 1956, and 10,000 on March 4, 1957. Also 7,000 catfish fry were stocked on November 1, 1956. Seining collections show a large percentage of game fish, this may be accounted for by the recent heavy stockings, that the non-game fish have not had a chance to crop off because of the abundance of other forage fish such as shad and topwater minnows. Fishing pressure on this lake is small but evident, as water skiers using this lake prevent any still shore fishing and make other methods impossible. Seining collections and their relative abundance may be seen on Table 2.

Netting Collections

During the survey four netting stations were selected. These represent essentially the same ecological conditions but were so selected to insure accurate results over the two-month study period. The netting results are tabulated on Table 3. Rough fish comprise 98.16 percent of the total number and 95.53 percent by weight of the fish caught in experimental nets. Freshwater drum have not been considered in this report as a game fish because of their undesirability by the fishermen of the area. The present fish population of Fort Brown Lake is typical of the old ox-bow lakes of this area, often flooded by "resaca" run-off water. Although isolated from all sources of water except the Rio Grande the lake still shows a typical "resaca" liminological conditions and aquatic environments.

A check list of the fish found in Fort Brown Lake is shown on Table 4 and their relative abundance is noted. Pounds and numbers of game and rough fish as well as percentages, ranks by weight, and numbers have been combined into one master table.(Table 3)

success of experimental gill netting table has not been included in this report because of the small number of collections. Table 5 shows the ranks, lengths, weight and "K" factors of fish caught. A table of sexual condition is not shown because the short period of time would not indicate any trends at this time of the year.

STOMACH ANALYSIS:

Stomach analysis were conducted on all fish that had food in their stomachs. The reason was two fold, one to see if the fish contained other foods besides fish and to see if the rough fish of the lake were cropping off what few game fish were present. (Table 6). Fifteen stomachs contained either game or forage fish. One catfish contained one bass fingerling, while the rest contained shad and top water minnows.

RECOMMENDATIONS:

1. Because of the heavy rough fish populations, a complete kill of the fish populations and subsequent re-stocking with game fish is recommended.

2. Repeated stocking with game fish principally bass and catfish should be discontinued until such time the city of Brownsville, that has shown an earnest desire to improve this lake constructs a fish screen to prevent rough fish entry into the lake when filled by pumping from the Rio Grande which is heavily populated with rough fish.

3. Brownsville City Manager E. W. Watts is to be commended for his efforts to improve this lake to provide fishing facilities for many winter visitors in the area and has shown a willingness for the city to do the rough fish clean up when the complete ill takes place.

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             Assistant Project Leader   Chief Aquatic Biologist

Date   October 18, 1957

Table 1. Chemical Analysis of Fort Brown Lake, Brownsville, Texas.

Date	Oxygen	Carbon Dioxide	ph-th Alkalinity	M. O. Alkalinity	pH	Salinity p.p.m.	Turbidity	Degrees Fahr.
July	9.4	2.2	0	158	9.2	1346	160	87
August	9.4	2.6	0	160	8.8	880	165	85
Average	9.4	2.4	0	159	9.0	1113	163	86

Table 2. Seining Collections, Fort Brown Lake, Brownsville, Texas, July through
August 1957.

Species	Total Number	Relative Abundance
D. cepedianum	42	Abundant
A. fasciatus m.	2	Rare
I. bubalus	3	Rare
C. varigatus v.	18	Moderate
G. affinis a.	36	Abundant
M. latipinna	2	Rare
M. beryllina	18	Moderate
M. salmoides	25	Abundant
L. cyanellus	6	Few
C. cyanoguttatum	12	Moderate
Totals	164	

Table 3. Fish Caught in Experimental Gill Nets from Fort Brown Lake, July through August 1957. Four Experimental Gill Nets Per Month, A Total of 8 Net Sets.

Species	Total Number	% by Number	Weight in Grams	Weight in Pounds	% by Weight
Spotted gar	5	1.82	5274	11 lbs. 10 oz.	5.60
Gizzard shad	47	17.10	5180	11 lbs. 7 oz.	5.55
Smallmouth buffalo	93	34.20	19084	42 lbs. 1 oz.	20.55
Carp	23	8.20	20563	45 lbs. 5 oz.	21.85
Blue catfish	4	1.37	3700	8 lbs. 2 oz.	3.90
Flathead catfish	43	15.70	20989	46 lbs. 4 oz.	22.43
Largemouth bass	1	0.35	482	1 lb. 1 oz.	0.48
Freshwater drum	58	21.14	13699	40 lbs. 3 oz.	19.53
Game Fish	5	1.72	4182	9 lbs. 3 oz.	4.38
Rough Fish	269	98.16	84789	196 lbs. 14 oz.	95.53
Totals	274		88971	206 lbs. 1 oz.	99.91

Ranks by Number

1. Smallmouth buffalo
2. Freshwater drum
3. Gizzard shad
4. Flathead Catfish
5. Carp
6. Spotted gar
7. Blue catfish
8. Largemouth bass

Rank by Weight

1. Flathead catfish
2. Carp
3. Smallmouth buffalo
4. Freshwater drum
5. Spotted gar
6. Gizzard shad
7. Blue catfish
8. Largemouth bass

Table 4.   Check List of Fish Species Recorded from Fort Brown Lake, Brownsville,
Texas.

Scientific Name	Common Name	Abundance
Lepisosteus productus	spotted gar	few
Dorosoma cepedianum	gizzard shad	abundant
Astyanax fasciatus m.	banded Tetra	few
Ictiobus bubalus	smallmouth buffalo	abundant
Cyprinus carpio	carp	abundant
Ictalurus furcatus	blue catfish	rare
Pylodictus olivaris	flathead catfish	abundant
Cyprinodon varigatus	Sea pupfish	common
Gambusia affinis	Gambusia	abundant
Molliensia latipinna	sailfin molly	rare
Menidia beryllina	silversides	common
Micropterus salmoides	largemouth bass	rare
Lepomis cynellus	green sunfish	few
Aplodinotus grunniens	freshwater drum	abundant
Cichlasoma cynoguttatum	Rio Grande perch	common

Table 5. Ranks, Lengths, Weights, and "K" Factors of Fish Caught in Experimental Nets from Fort Brown Lake, Brownsville, Texas, July through August 1957.

| Species	Rank No.	By Wt.	Standard Length in mm.			Weight in Grams			"K" Factor		
			Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.
L. productus	6	5	479	632	540	369	1706	908	0.68	0.69	0.68
D. cepedianum	3	6	133	160	146	52	269	146	1.46	1.85	1.53
I. bubalus	1	3	126	274	236	60	1134	436	0.72	3.30	3.02
C. carpio	5	2	119	435	369	59	1814	1203	2.08	3.30	2.48
I. furcatus	7	7	202	536	362	128	2438	1044	1.30	1.58	1.46
P. olivaris	4	1	185	441	315	100	1162	527	1.37	1.60	1.48
M. salmoides	8	8		285			482			2.07	
A. grunniens	2	4	132	408	239	61	1701	596	2.20	2.63	2.54

Table 6. Stomach Analysis Showing Number of Stomachs Containing Various Food Items.

Species	No. of Stomachs With Food	Total Volume in cc.	Crayfish	Game Fish	Forage Fish
L. productus	3	262	0	0	3[c]
P. olivaris	8	95	2	0	6[b]
I. furcatus	1	9	0	1[a]	0
M. salmoides	1	18	1	0	0
A. grunniens	7	80	2	0	5[b]

a: Bass fingerling

b: Shad and Gambusia

c: Silversides

PALM BLVD.

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PALM BLVD

PUMP

BOAT RAMP

E ELISABETH
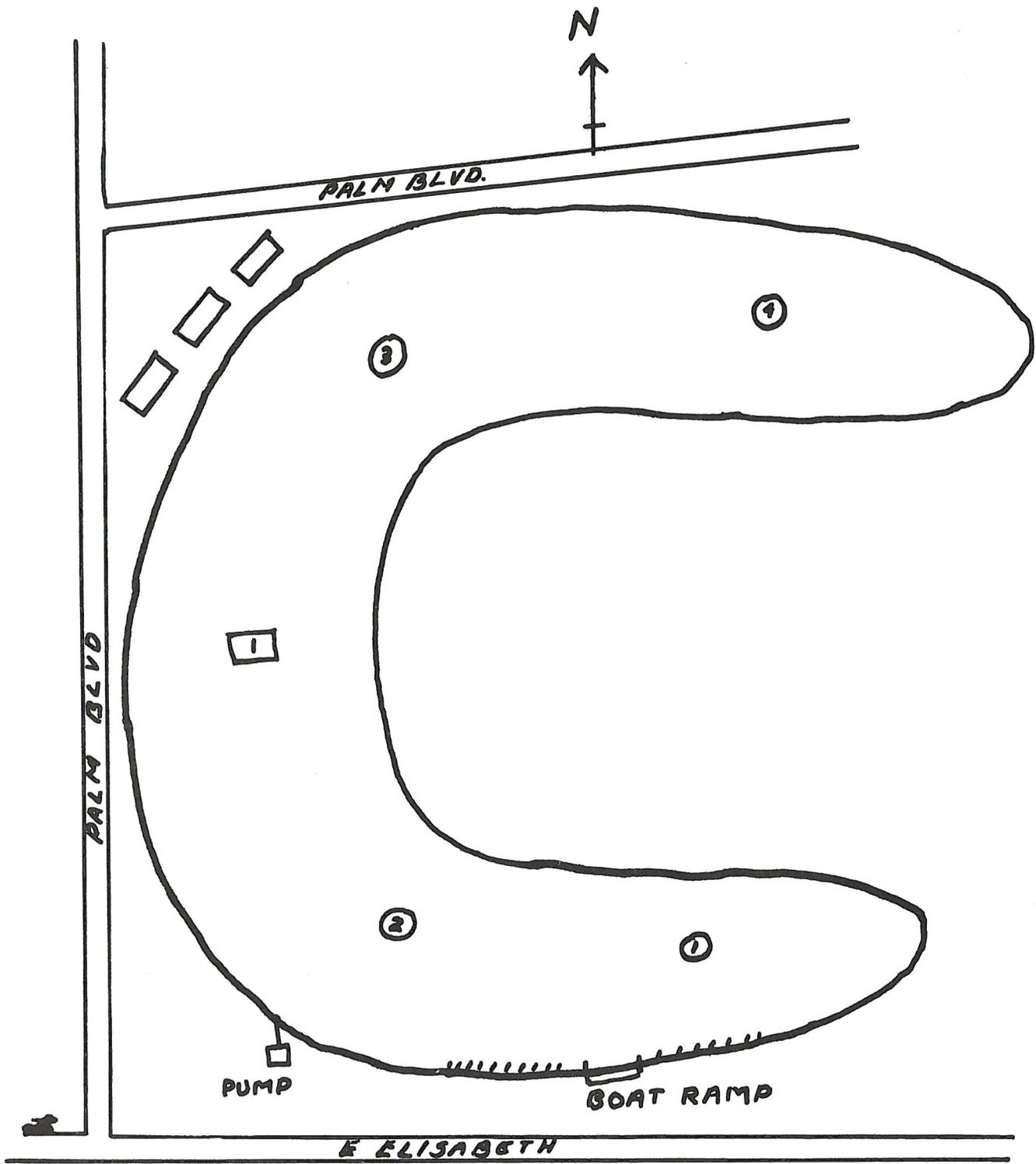
FORT BROWN LAKE, BROWNSVILLE, TEXAS

① = NETTING STATIONS

▢ = CHEMICAL STATION

⟋⟋⟋⟋ = SEINING BEACH