

JOB COMPLETION REPORT

STATE OF TEXAS

Project No. F6R4 Name Fisheries Investigations and Surveys of Waters of Region B-8.

Job No. B-8 Title Basic Survey and Inventory of Fish Species Present in Brownsville City Lake, Ringold Park.

Period Covered: July 1, through December 30, 1956

ABSTRACT

1. The fish populations of Brownsville City Lake, Ringold Park were investigated by monthly netting and seining samples from July 1, 1956 through December 30, 1956.
2. Chemical analysis was conducted and the lake found to have adverse conditions for game fish.
3. A physical description of the lake is given, as is its relation to the physiography, soil types, drainage, and geology of the area.
4. Aquatic vegetation, fishing accommodations, rough fish problems, and commercial clean up of the lake are discussed.
5. The results of netting and seining collections are discussed and the results are shown in table form. Only one game fish, a green sunfish, was found.
6. Stomach analysis, coefficient of condition, ranks, by weight and number are presented in table form.

OBJECTIVES

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

PROCEDURE

During the course of the survey 17 collections were made consisting of 5 seining and 12 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 25 feet. The nets were set at the designated locations each month (Map 1). Seining collections were made with 30 by 6 foot bag seines, one-fourth inch mesh, and common sense minnow seines from ten to twenty feet long and four feet deep.

A majority of the fish obtained in the seining collections were preserved in 10 percent formalin solution, for later laboratory identification and tabulation. In cases where large numbers of a single species were collected they were counted, recorded and discarded.

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. Turbidimeter readings were done in the laboratory. One chemical analysis station was selected at the center of the lake. (Map 1)

PHYSICAL CHARACTERISTICS

Brownsville City Lake, like many in this region of the Lower Rio Grande Valley, is a part of the "resaca" system. An extended period of drought has isolated this section of the Resaca Del Rancho Viejo and formed a long, shallow, and silty lake, which has a surface acreage of 17.05 acres and a capacity of 69.20 acre feet.

The lake is long and narrow, curving around the Fort Ringold Municipal playground. The depth at its deepest part is 5 feet but the general average is four feet. The banks are small and sharp due to wave action and water losses by evaporation. The bottom is fine silt and mud often covered with decomposed plant leaves wind-blown from the surrounding park and residential areas and residential areas.

Brownsville City Lake in Ringold Park is in the Gulf Coastal Plain physiographic region and is a segment of the great coastal plain that accompanies the Gulf Coast across the old south and crosses the Rio Grande into Mexico gradually narrowing as it swings through Texas southward into Mexico.

The lake is more precisely located in the Coastal Prairie subregion 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 forming catchment basins in alluvial and bolsun soil deposits, for the great quantities of underground water that is of great economic value. The surface structures of the whole Coastal Plain in this area are of the quaternary geologic period.

SOIL AND SOIL TYPES

The soil and 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 a broad, very gently undulating to rolling plain, with a very gradual slope to the southeast. Soils are generally of clay with occasional intrusions of the marsh type soils which are high in saline content.

DRAINAGE AREA

The water supply for this lake is generally rain run-off and underground seepage; connection with the Rio Grande has not been known since construction of flood control levees. All the "resaca" system is more or less interconnected during rain run-off periods, but as soon as the waters subside and irrigation from the resacas begins each resaca becomes isolated from the others.

AQUATIC VEGETATION

Except for a few very small stands of willows and a few spots with water lilies and plankton, there is no aquatic vegetation in Brownsville City Lake. In other parts of the "resaca" system water hyacinths predominate, but as yet they have not infiltrated into this lake in large numbers. The few plants that come down on rises are quickly removed by the crew at Ringold Park.

Vegetation along the banks consists of palms, willows, hackberrys, ash, and mesquites, while Carpet and Bermuda grasses also come to the edge of the lake.

FISHING ACCOMODATIONS

Boats and motors are not available for use on Brownsville City Lake as it is too small and too shallow for navigation. All the fishing on the lake is done from the bank or off special piers set up for the purpose. Fishing pressure on the lake is small but constant by cane pole and rod and reel. Most of the catches are Rio Grande perch with a few gars and sunfish. Repeated stocking of largemouth bass has not been successful because of the rough fish that are present in the lake and the unsuitable water conditions.

In August of 1956 the rough fish situation was made known to the Park Manager, Colonel Lockhead, and to Mr. E. Watt, City Manager. It was agreed by them to make the lake available to commercial fishermen for a whole or partial clean-up of the lake. Netting for rough fish was done with $3\frac{1}{2}$ inch nets and continued for three days and two nights. The netting was supervised by the Park Manager and his personnel, the local game warden, and members of the City Manager's office. A total catch of 3800 pounds of buffalo and 1200 pounds of gar was made. After the netting operation the fish numbers caught in experimental nets somewhat decreased.

CHEMICAL ANALYSIS

The results of the chemical analysis from the central location (Map 1) in Brownsville City Lake, are shown on Table 1. Samples were taken from the surface as the lake has only an average depth of four feet. The table shows only the average readings.

Dissolved oxygen tests were higher in the fall and winter than in the late summer months. The highest recorded reading of 10.2 p.p.m. occurred in November, while the lowest reading of 9.6 p.p.m. occurred in July at the beginning of the project period. Too much difference in the readings could not be expected because of the shallowness of the lake.

Carbon dioxide tested lower in July and August and higher in September and October. The highest reading of 3.0 p.p.m. occurred in September while the lowest reading of 0.0 p.p.m. occurred in July.

The ph-th alkalinity readings have shown up for the first time in any of the Rio Grande Valley lakes surveyed. A high reading of 28 occurred in July. Readings were also observed during August, September, and October. No ph-th alkalinity was recorded in November. The small quantity of water compared with the large amounts of windblown organic additives (leaves and grass clippings) probably explain the presence of ph-th alkalinity. Salinity for Brownsville City Lake was rather high in correlation with terrain and soil types found in this area, and lack of water inflow, and discharges. A high reading of 1346 p.p.m., that was double checked, occurred in July 1956. A low reading of 754 p.p.m. occurred in October after general rains in this area placed some of the rain run off in the lake.

Turbidity readings were rather constant in the lake, with a slight decrease in September. Jackson Turbidimeter readings ranged from a high of 180 p.p.m. of suspended solids to a low of 148 p.p.m. Bottom samples would certainly have shown a much higher turbidity.

Water temperatures ranged from a high of 87 degrees Fahrenheit in July to a low of 66 degrees in December. The range difference during the six month's period of study was only 11 degrees, and this is characteristic of the lakes located in the southeastern tip of Texas.

RESULTS OF FISH COLLECTIONS

During the survey two netting stations were selected. These stations represent essentially the same ecological conditions with slightly deeper water at Station 2.

A check list of the fish found in the lake is shown on Table 2, the results of the seining collections may be seen on Table 3. Table 4 shows the number of fish taken monthly in experimental nets, while Table 5 shows the pounds of fish taken in experimental nets. Table 6 shows the success of experimental gill netting in Brownsville City Lake in terms of number and pounds of fish taken during the project period. Table 7 shows stomach analysis of the specimens that contained food in their stomachs. Table 8 shows the ranks, lengths, weight and "K" factors of the fish caught. Table 9 shows the sexual condition of the fish taken from this lake.

SEINING COLLECTIONS

Five seining collections were made on Brownsville City Lake during the project period. Collections show a very noticeable absence of anything that may be classified as a game fish. The same fact is verified by the netting collections. This may be accounted for by the fact that the lake is overpopulated with rough fish, there is not adequate cover for the game fish, and the chemical and turbidity conditions of the lake are a long way from being a suitable aquatic habitat for the game fish.

Of the fish species recovered from the lake by seining collections 2, or 25 percent are typical brackish or salt water inhabitants. While 3, or 37.50 percent are very hardy species that will survive in most any type of water. The remaining 3 species are composed of forage fish and sunfish, which only by a stretch of the imagination might be considered a game fish.

The amount of forage fish and crayfish that is present in the lake is not enough to support the growth of the rough fish populations much less be of any benefit to the few, if any game fish that might be present in this lake.

Bad liminological conditions in the lake may also be accounted by the facts that the lake is essentially a still water environment, having water changes and fluctuations only during periods of rain run off and surface agitation only due to winds. Deep silt on the bottom of the lake has also prevented either the attachment or growth of any great amount of aquatic vegetation.

Netting collection in this lake also repeated some of the conclusions formed from the seining collections. Not one single fish species was caught either by the Game and Fish Commission Biologist or commercial fishermen that could be classified as a game fish. However, there is some fishing pressure on the lake by some of the gar fishermen who seek gar as a game and food fish. Forage fish are present in the lake but the fish population of the lake is overbalanced toward the rough fish side, even after the commercial fishermen took out 3800 pounds of buffalo and 1200 pounds of gar. The percentages of the fish shown by the experimental nets shows only a slight change in the overall biological picture of the lake.

STOMACH ANALYSIS

Stomach analysis was conducted on all of the fish caught that had food in their stomachs. The reason was two fold, one to see if the fish contained other food besides fish and to see if the rough fish were cropping off any select items of diet such as game fish. Analysis failed to show signs of any game fish, which was being sought due to their pronounced absence in nets. (See Table 6)

RECOMMENDATIONS

Brownsville City Lake is an intermittently flowing part of the extensive "resaca" system of the Lower Rio Grande Valley. It represents essentially a still water environment having current and water movement only during periods of rain run off. The soil underlying the lake is typical coastal prairie soil having a high saline content that is imparted to the water.

Rough fish populations predominate in this lake and as long as the lake remains a part of the interconnected "resaca" system not much fisheries improvement or management can be done. The City of Brownsville is planning to build dikes across the ends of the lake to raise the water level of the lake and prevent the connection of the lake with the other resacas. Without such dikes it is recommended that no further stocking or other management procedures be tried because they would be useless. If the dikes are built and a water supply, uncontaminated by rough fish, is furnished it is recommended that the lake be renovated. A complete fish kill by rotenone followed by re-stocking with game and forage fish could provide a very desirable fishing lake for the park visitors. Fresh water fishing facilities in this area are very limited and a great number of residents and tourists need such facilities.

Prepared by Lou Guerra
Project Leader

Approved by

Marion Toole
Chief Aquatic Biologist

Date May 28, 1957

Table 1. Brownsville City Lake, Chemical Analysis.

Month	Oxygen	Carbon Dioxide	ph-th Alkalinity	M.O. Alkalinity	pH	Salinity	Turbidity	Degrees Fahr.
July	9.6	0.0	28	156	10.2	1346	148	87
August	9.8	2.2	26	158	9.2	886	165	85
September	9.8	3.0	22	160	8.8	880	160	86
October	10.0	2.6	20	145	8.8	754	165	78
November	10.2	2.0	0	145	8.8	754	180	78
December	10.0	2.6	0	180	8.9	886	165	66
Range	10.6-9.6	3.0-0.0	28-0	180-145	10.2-8.8	1346-754	180-148	87-66

Table 2. A List of Fish Species Recorded from Brownsville City Lake, Ringold Park.

Scientific Name	Common Name
<u>Lepisosteus spatula</u>	alligator gar
<u>Lepisosteus productus</u>	spotted gar
<u>Lepisosteus osseus</u>	longnose gar
<u>Astyanax fasciatus m.</u>	Rio Grande Tetra
<u>Ictiobus bubalus</u>	smallmouth buffalo
<u>Gambusia affinis a.</u>	Gambusia
<u>Mugil cephalus</u>	striped mullet
<u>Menidia beryllina</u>	tidewaters silversides
<u>Lepomis cyanellus</u>	green sunfish
<u>Cichlasoma cyanoguttata c.</u>	Rio Grande Perch
<u>Eleotris pisonis</u>	spinycheek sleeper

Table 3. Seining Collections Brownsville City Lake, Ringold Park, July through December 1956.

Species	Total Number	Percent of Total
<u>Dorosoma cepedianum</u>	103	6.93
<u>Astyanax fasciatus m.</u>	29	1.95
<u>Gambusia affinis a.</u>	838	56.35
<u>Mugil cephalus</u>	7	.47
<u>Menidia beryllina</u>	424	28.54
<u>Lepomis cyanellus</u>	1	0.06
<u>Cichlasoma cyanoguttata c.</u>	83	5.63
<u>Eleotris pisonis</u>	1	0.06
Total	1486	99.99

Table 4. Numbers of Fish Taken in Experimental Nets from Brownsville City Lake, July through December 1956.

Species	July	August	September	October	November	December	Total	Percent of Total
<u>L. spatula</u>	10				1	2	15	10.20
<u>L. productus</u>	1	3		2		1	7	4.73
<u>I. osseus</u>	1						1	0.68
<u>D. cepedianum</u>		1	13	10	20	10	54	36.73
<u>I. bubalus</u>	27	16	1	15	7	4	70	47.61
<u>M. cephalus</u>						2	2	1.36
Total	39	20	14	28	28	18	147	99.98
Number of Nets Set	2	2	2	2	2	2	12	
Average Number Fish/Net	19.50	10.00	7.00	14.00	14.00	9.00	73.50	

Table 5. Pounds of Fish Taken in Experimental Nets from Brownsville City Lake, July through December 1956.

Species	July	August	September	October	November	December	Total	Percent
<u>L. spatula</u>	110.74			17.98	42.80	36.22	207.74	37.13
<u>L. productus</u>	1.99	31.69		1.75			35.43	6.33
<u>L. osseus</u>	6.31						6.31	1.13
<u>D. cepedianum</u>		.99	1.85	1.16	3.10	1.54	8.64	1.54
<u>I. bubalus</u>	142.34	68.18	4.24	46.51	21.79	18.29	301.35	53.86
<u>M. cephalus</u>						.33	.33	.06
Total	261.38	100.86	6.09	67.40	67.69	56.38	559.47	99.90
Percent	46.72	18.03	1.08	12.04	12.09	10.07		

Table 6. Success of Experimental Gill Netting in Brownsville City Lake in Terms of Numbers and Pounds of Fish Caught, July 1, through December 1956.

Month	Number of Nets Set	Number of Feet of Net Set	Number of Fish Caught	Average Number of Fish/Net	Average Number of Fish/Foot of Net	Pounds of Fish Caught	Average Pounds of Fish/Net	Average Pounds of Fish/Foot of Net
July	2	250	39	19.50	.156	261.38	130.69	1.045
August	2	250	20	10.00	.080	100.86	50.43	.403
September	2	250	14	7.00	.056	6.09	3.04	.024
October	2	250	28	14.00	.112	67.40	33.70	.269
November	2	250	28	14.00	.112	67.69	33.84	.270
December	2	250	18	9.00	.072	56.38	28.19	.225
Total	12	1500	147	73.50	.588	559.47	279.89	2.236
Averages	2	250	24.50	12.25	.098	93.24	46.64	.372

Table 7. Stomach Analysis Showing Number of Stomachs Containing Various Food Items.

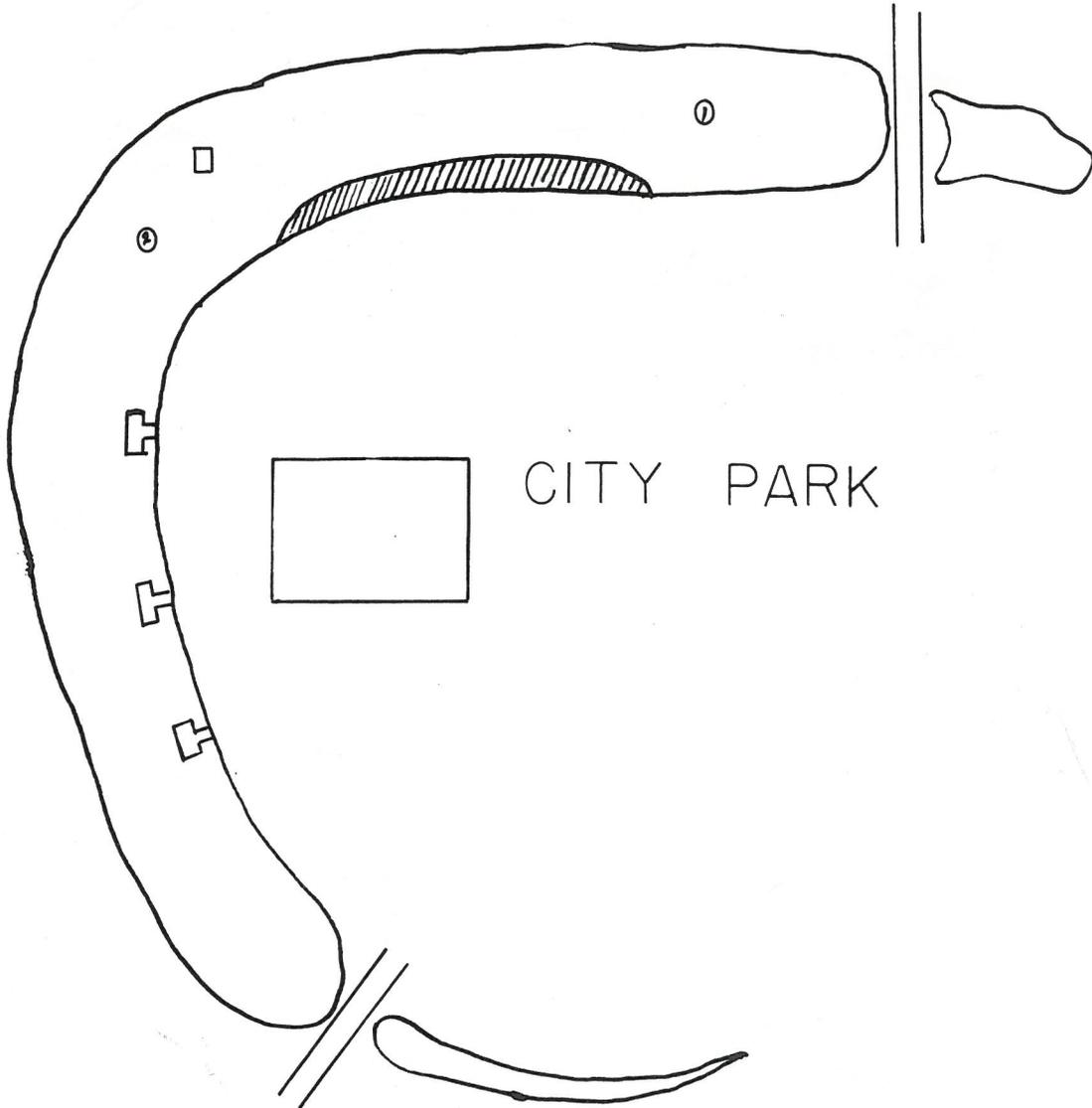
Species	Number of Stomachs	Total Volume in cc.	Crayfish	Game Fish	Forage Fish	Unidentified Fish Remains
<u>L. spatula</u>	14	504	3	0	9	2
<u>L. productus</u>	5	165	2	0	3	
<u>L. osseus</u>	1	42	0	0	1	
Total	20	711	5		13	2

Table 8. Ranks, Lengths, Weights, and "K" Factors of Fish Caught in Experimental Nets from Brownsville City Lake, Ringold Park July 1, through December 30, 1956.

Species	Rank No.	By Wt.	Standard Length in mm.			Weight in Grams			"K" Factor		
			Min.	Max.	Average	Min.	Max.	Average	Min.	Max.	Average
<u>L. spatula</u>	3	2	781	1640	926.50	3288	23608	8193.44	0.61	0.98	0.81
<u>L. productus</u>	4	3	584	986	738.66	907	9881	3218.22	0.73	0.98	0.80
<u>L. osseus</u>	6	5	648	648	648.00	1503	1503	1503.00	0.92	0.92	0.92
<u>D. cepedianum</u>	2	4	114	211	152.33	26	188	74.50	1.28	1.80	1.62
<u>I. tubalus</u>	1	1	153	430	322.66	879	4026	2161.20	3.01	4.10	3.31
<u>M. cephalus</u>	5	6	153	168	160.50	70	81	75.50	1.69	1.95	1.82

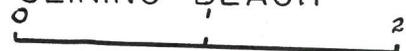
Table 9. Sexual Condition of Fish Taken in Experimental Nets from Brownsville City Lake, Ringold Park, July 1, through December 30, 1956.

Species	July					August					September					October					November					December				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
<u>L. spatula</u>																														
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BROWNSVILLE CITY LAKE
RINGOLD PARK

- NETTING STATIONS
- CHEMICAL STATION
- ▨ SEINING BEACH



SCALE 1. IN. = 50 YDS.

(Traced and adapted from City Managers Office)

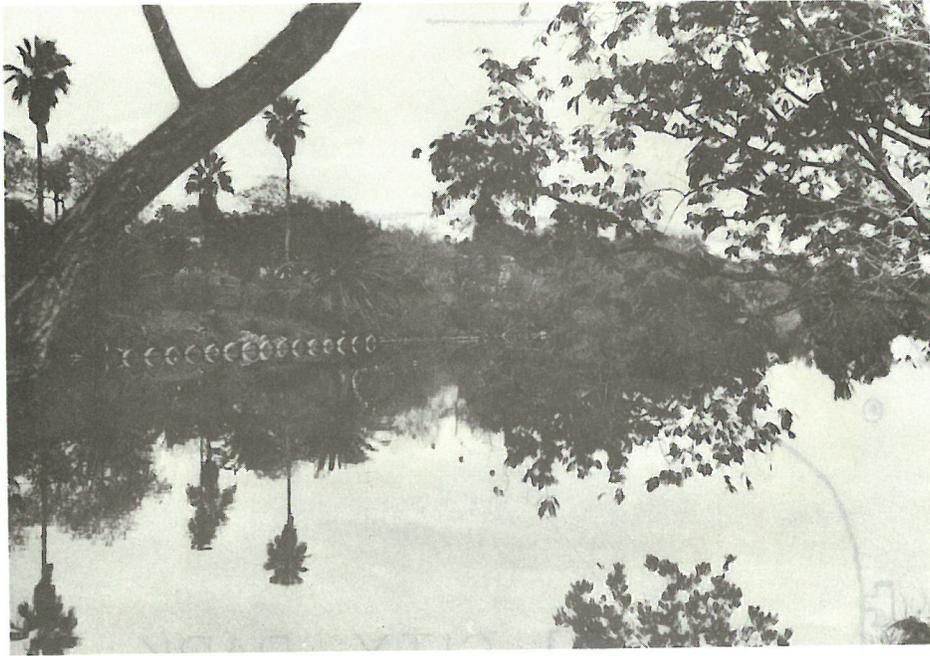


Figure 1.
Netting Station No. 1. Brownsville City Lake, Ringold Park.



Figure 2.
Netting Station No. 2. Brownsville City Lake, Ringold Park.



Figure 3
Chemical Analysis Station , Brownsville City Lake.

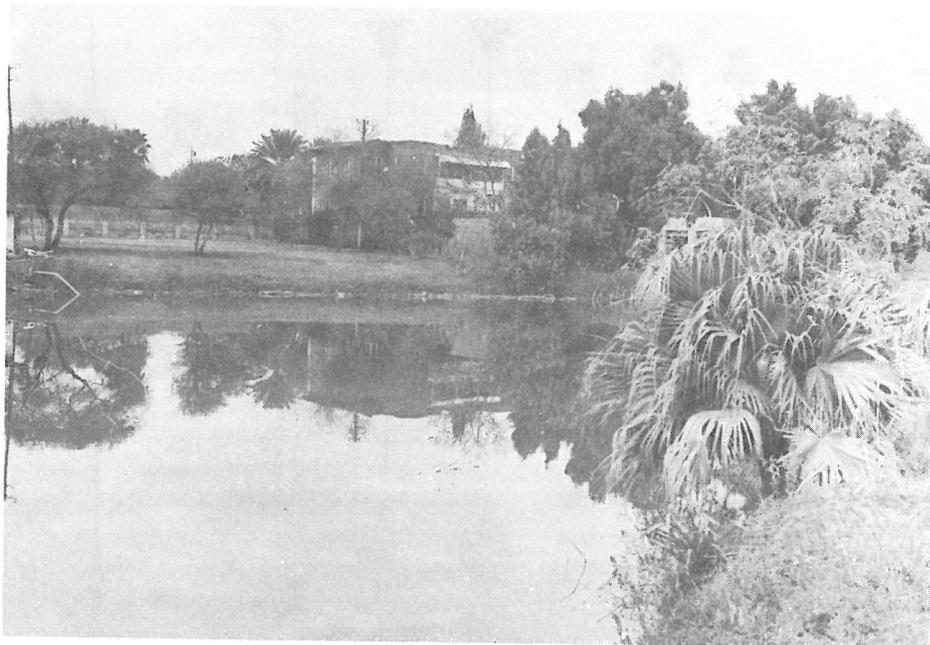


Figure 4.
Seining Station and Beach, Brownsville City Lake.

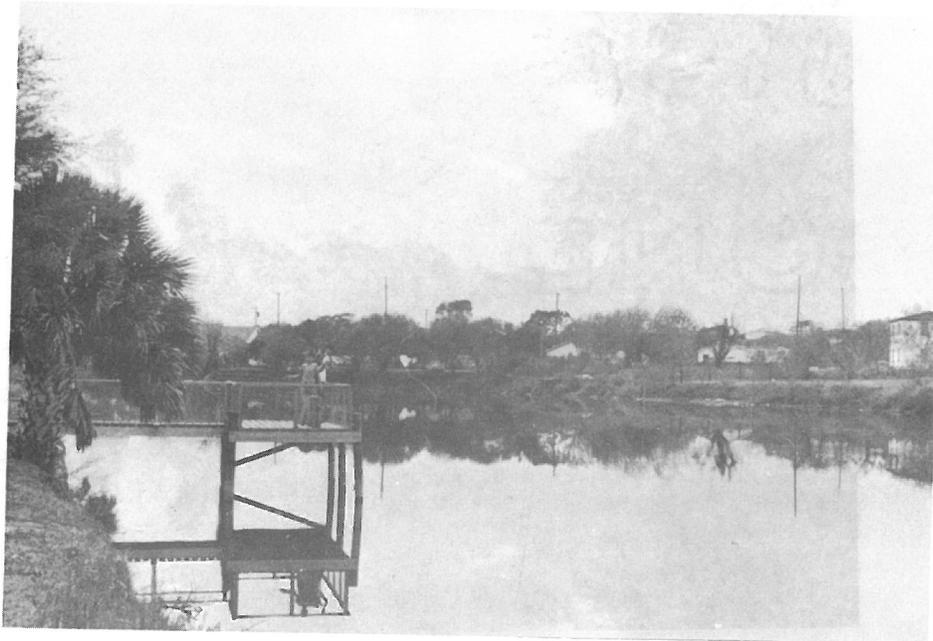


Figure 5

Special Childrens Fishing Piers, Brownsville City Lake.



Figure 6

Size and Depth of Banks During Low Water, Brownsville City Lake.