

Report of Fisheries Investigations  
Resurvey of Waters of Region 8-B

by

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Dingell-Johnson Project F-6-R-8, Job B-11  
January 4, 1960 - December 31, 1960

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## A B S T R A C T

Six public lakes in the region rechecked during 1960 were Fort Brown, Llano Grande and Campacuas, Casa Blanca, Delta Orchards and Bentsen State Park Lakes.

In Fort Brown Lake at Brownsville, gizzard shad, Dorosoma cepedianum, showed a relative increase in numbers compared to the previous work done in September, 1959. The largemouth bass, Micropterus salmoides, appear to be thriving.

Rough species remain dominant in both Llano Grande and Campacuas Lakes. Blue catfish, Ictalurus furcatus, were found in both lakes in sizable numbers.

Gizzard shad and river carpsuckers, Carpiodes carpio, showed relative increases in numbers in Casa Blanca Lake near Laredo while white crappie, Pomoxis annularis, showed a relative decrease. White bass, Roccus chrysops, were found in this lake for the first time.

In Delta Orchards Lake, near Raymondville, game fish comprise more than 50 percent by number but less than 50 percent by weight of the fish taken in netting collections.

Gill netting at Bentsen State Park Lake, near Mission, following the chemical treatment of the lake in January, 1960, showed that at least six small fish survived; five warmouth bass, Chaenobryttus gulosus, and one Rio Grande cichlid, Cichlasoma cyanoguttatum. Work done later in the year, after Rio Grande flood waters entered the lake, showed that gizzard shad and other rough species were present.

Periodic catches of white bass at Lake Corpus Christi indicated that they are becoming established. A total of 129,500 largemouth bass fingerlings was stocked in the lake to supplement the existing population. No seining or netting was done.

A preliminary trip was made in April to check the water hyacinths on the lower Guadalupe River. No control work was begun or proposed during this segment.

## Job Completion Report

State of TEXAS  
Project No. F-6-R-8 Name: Fisheries Investigations and Surveys  
of the Waters of Region 8-B.  
Job No. B-11 Title: Resurvey of Waters of Region 8-B.  
Period Covered: January 4, 1960 - December 31, 1960

### OBJECTIVES

To determine the present status of waters and fish populations which have been previously surveyed in Project F-6-R.

### PROCEDURE

Experimental gill nets were used to sample the fish populations. The nets were set at previously established netting stations overnight and run the following morning. In some instances, seining collections were made to supplement netting data.

The netted specimens were weighed in grams and measured in millimeters in the field. Sex and sexual development and the occurrence of parasites in the individual specimens were noted and recorded in the field. Seined specimens were preserved in 10 percent formalin and taken to the regional fisheries laboratory at Mathis for identification. A list of the common and scientific names of fish species encountered is included as Table 21.

For information purposes a comparison of netting success is included as Table 22.

### FINDINGS

#### Fort Brown Lake

Four experimental gill nets were set in April, 1960, and caught 107 specimens of six species. Gizzard shad comprised 27 percent by number and 45 percent by weight as compared to less than two percent by number and weight in the previous resurvey (F-6-R-7, Job B-11). Carp, Cyprinus carpio, were found in substantial numbers in the previous work but none were collected during this period. Following the resurvey work of September, 1959, an effort was made (see Job completion report for Job S-1, Project F-6-R-7) to net as many carp as possible; however, this proved almost useless. Current data tends to show that only small numbers of carp are present in the lake.

The game species (channel catfish, largemouth black bass and warmouth bass) appeared to be thriving despite the fact that they constituted less than 20 percent of the net collections by number. The black bass comprised 15.89 percent by number and 36.77 percent by weight while bluegill sunfish, Lepomis macrochirus, ranked first by number and third by weight. The recent creel census (see Job completion report for

Job B-15, Project F-6-R-8) revealed that white crappie are present in the lake but none were netted in this resurvey.

Table 1 shows the numbers and grams of fish taken at each netting station during this resurvey. According to this table, rough species comprised over 80 percent of the net catch although water clarity tends to indicate that they are not yet in critical numbers. Four Secchi disk readings ranged from 20- to 33 $\frac{1}{2}$ -inches which is very good for this comparatively shallow ox-bow lake.

Table 2 shows the lengths, weights, and "K" factors of fish taken from Fort Brown Lake in April, 1960. No appreciable changes occurred regarding the various fish collected.

Seining collections were not made on the lake due to thick growths of submerged vegetation which made seining almost impossible.

Submerged vegetation, principally Najas, Chara and Ceratophyllum, remains a problem in this lake. As yet, no summer kill of fish due to the abundance of vegetation has been observed or reported. Most complaints were aired by water skiers, however, the shallow areas along the banks are becoming choked with the weeds and will hinder sports fishing. Some control work through supervising treatment by sportsmen's groups may be done in the spring of 1961 to lessen the problem. Annual treatment will be necessary to obtain an effective control.

#### Llano Grande and Campacuas Lakes

In the latter part of August, four netting collections were made on Llano Grande Lake and two additional collections were made in the early part of October. Also, four netting collections were made on Campacuas Lake in October.

In the August collections, rough species comprised over 88 percent by number and over 86 percent by weight of the fish collected in the nets at Llano Grande. Similar information was found in the October collections. Gizzard shad, Dorosoma cepedianum, and spotted gar, Lepisosteus productus, longnose gar, Lepisosteus osseus, and Rio Grande cichlids, Cichlasoma cyanoguttatum, remain about the same as was found in the previous resurvey. However, alligator gar, Lepisosteus spatula, showed a relative decrease and carp showed a relative increase in numbers. Table 3 shows the numbers and weight of fish caught in the nets at Llano Grande Lake during August, 1960, and Table 4 shows the number and weight of fish caught during October.

Table 5 shows the minimum, maximum, and average lengths, weights and "K" factors of the fish taken in the nets. No significant changes were noted.

Table 6 shows the seining results on Llano Grande. Redhorse shiners, Notropis lutrensis, Rio Grande tetras, Astyanax fasciatus, and threadfin shad, Dorosoma petenense, all good forage species, were found to be abundant. Collectively, these three species comprised about 61 percent of the collection.

Apparently a good stock of blue catfish, Ictalurus furcatus, survived the rotenone treatment of the lake in May, 1959, since they comprised about 10 percent by number in both lakes.

Six Secchi disk readings were taken on Llano Grande and were found to range from 6- to 11-inches with the majority being less than 10-inches. This comparatively shallow lake coupled with the thick silt bottom and numerous rough fish keeps the turbidity high.

Inspection of the far west end of Llano Grande, in October revealed that there was some organic material entering the lake via "Paradise Creek". Only one game species, a blue catfish, was taken in a net in the heavily polluted area; carp and alligator gar were the most abundant species taken in this particular net.

A few scattered water hyacinths were seen on Llano Grande Lake but are of minor significance at this time. Occasional rises from rain water runoff wash them downstream but the stock of hyacinths which are in several drainage ditches, above the lake could cause a serious problem should conditions for their reproduction become favorable. Therefore, the hyacinths should be watched and the appropriate measures applied before they become established in the lake. Bulrushes and cattails are numerous around the perimeter of the lake. Only a small amount of duck weed, Lemna, was seen in Llano Grande; it is far from being a problem however. Many ducks visit this lake in the winter time and are for the most part left unmolested. No doubt the ducks crop the duck weeds sufficiently.

Sports fishing has increased somewhat on Llano Grande and the local game warden reports that anglers are taking some nice bass and catfish. No fishermen were seen on the lake when visited. Commercial minnow fishermen from Falcon Reservoir and Medina Lake have been taking large numbers of tetras, Astyanax fasciatus, from Llano Grande Lake. The once-large tetra population in Falcon Reservoir has diminished considerably and the sizable numbers present in Llano Grande Lake give the tetra much commercial value.

Four gill net collections were made on Campacuas Lake during this period and took a total of 96 fish of twelve species. Only channel catfish and blue catfish and two crappie were taken as representatives of game species which accounted for 14.58 percent by number and 10.06 percent by weight of the fish collected. Previous work on Campacuas Lake (November, 1959, see Job Completion Report for Job B-11, F-6-R-7) took only five species of fish as compared to 12 species taken during this segment. The percentages of rough fish and game fish remained about the same. In the previous resurvey, gizzard shad comprised approximately 52 percent by number whereas presently this species comprised less than 32 percent, a reduction of about 20 percent which might largely be attributed to a netting error. Table 7 shows the numbers and grams of fish collected during this resurvey period. Table 8 shows the results of the seining collection made on the lake. Threadfin shad comprised over 55 percent of the catch.

Table 9 shows the minimum, maximum, and average lengths, weights and "K" factors of the various species netted in Campacuas Lake. As compared to work done a year earlier, there was no substantial change concerning the species. One species, Mugil cephalus, was unrecorded since the rotenone treatment in May, 1959. However, one specimen was taken in the nets during this resurvey.

Secchi disk readings were taken at each netting station and found to range from 8- to 10-inches. This lake being similar to Llano Grande Lake was not expected to be much clearer.

Shoreline vegetation, primarily bulrushes, Scirpus, line over half of the lake's shore. No submerged or floating vegetation was seen.

Only one fisherman was on the lake at the time it was visited and he was using a trotline to catch some nice blue catfish. No other reports were heard concerning fishing on the lake.

One seining collection was made on Llano Grande Lake and one was made on Campacuas Lake. No young bass, indicating reproduction, were found in either seining collection.

"Green's Ditch" which is located close to and crosses the Llano Grande Floodway is being widened and concreted as a part of the federal government's "urban renewal program". It remains to be seen what effect this will have on future management of the two lakes.

#### Casa Blanca Lake

A total of 17 netting collections was made on this lake in April and July and 797 specimens were netted. Five seining collections were also made.

Gizzard shad comprised over 44 percent of the number of fish netted in April as compared to less than 20 percent in the resurvey work done in October and December, 1959. However, gizzard shad comprised only 16.81 percent of the total net catch in July. This wide difference might be attributed to seasonal activity of the shad. River carpsucker, Carpionoxenus carpio, comprised 8.62 percent by number in the July collection and 20.17 percent in the April collection. In the previous resurvey (October and December, 1959) river carpsucker comprised 12.40 percent of the species collected and thus they appear to have made a relative increase in numbers or possible difference in seasonal activity.

Table 10 shows the numbers and grams of fish netted during April, 1960, and Table 11 shows the numbers and grams of fish netted in July, 1960. Table 12 shows the minimum, maximum and average lengths, weights, and "K" factors for April and July, 1960. No noticeable changes were found.

In July, two white bass were collected in one of the nets close to the dam. It was the first time that this species was collected in this lake. No doubt, these fish were stocked by anglers who, more than likely, got them from the Rio Grande and wanted to do a "good turn". These fish are not expected to spawn in the lake because of their reproductive requirements; flowing water is essential for these fish to reproduce successfully. If it were possible to stock large numbers of white bass every two or three years, some natural control of gizzard shad might be accomplished. At the same time, anglers could have more variety and added sport.

Five seining collections were made during the course of this resurvey; four in April and one in July. A total of 290 specimens of 10 species was collected in the five collections. Table 13 shows the seining results of April and July.

#### Delta Orchards Lake

Eight netting and two seining collections were made on Delta Orchards Lake during the year. Five netting and one seining collection was made in March and the other work was done in December.

The "lake" is bisected by Farm-Market Highway 88 and actually consists of two lakes that are joined by a conduit under the roadway. One portion on the west side of the highway consists of approximately 510 acres and the other portion on the east side of the highway consists of about 1,760 acres. The lakes are under the jurisdiction of the Hidalgo and Willacy Counties Water Control and Improvement District Number 1. The lakes are open to the public for angling with limitations. A fee of 25 cents per person per day is charged of all persons over 15 years of age. A portion of the money collected is paid the concession manager-game warden and the remainder goes to the Water District. In the first three months of 1960, 7,000 fishing permits had been sold. This is some indication of the popularity of the lake.

Five nets set in March took 234 fish of eleven species of which four were listed as game species; blue catfish, bluegill sunfish, white crappie, and freshwater drum, Aplodinotus grunniens. Ordinarily bluegill sunfish and freshwater drum are not considered game species in this area, but Delta Lake is an exception since many anglers take large numbers of these fish the year around. According to Table 14, the game fishes comprised 65.81 percent by number of the net catch but only 28.62 percent by weight.

At the time the lakes were resurveyed, it was recommended to the General Manager of the Water District that a commercial fisherman be allowed to take gar, gizzard shad, smallmouth buffalo, carp and mullet with three-inch square mesh gill nets. The Water District granted a six-month contract, from June 6 to December 6, to a commercial fisherman. He will be required to keep a record of the numbers, kinds and approximate weights of fish removed. All catfish taken in the nets were returned to the lake immediately.

The lakes were revisited in December and three netting collections were made. Also, one seining collection was made. The nets were set in the east lake at locations previously used. This trip, made following the expiration of the commercial fisherman's contract, was to determine, if possible, what affect the netting had on fish population. Table 15 shows the results of the December netting. Cold and rainy weather prevented making the two additional collections in the west lake. A slight increase, probably a netting error, was found in the relative numbers of game fish taken in the east lake in December as compared to March. However, game fish represented 40.62 percent by weight in the December collections as compared to 28.51<sup>1</sup> percent in March.

Tables 16 and 17 show the lengths, weights and "K" factors of the fish netted in March and December, 1960. The "K" factors for the white crappie ranged from 1.88 to 2.68 with an average of 2.22 in March as compared to 2.26 to 3.37 in December with an average of 2.64. Thus an increase in the "K" factors was found concerning crappie. A slight increase in "K" factors was found in the blue catfish as well.

Table 18 shows the March and December seining collections.

During the six-month period the rough fish contract was effective, the netter removed an estimated 53,000 pounds of fish, mostly smallmouth buffalo. The breakdown was as follows: 45,000 pounds of buffalo, 6,000 pounds of carp and 2,000 pounds of gars. Still the netting collection of December revealed that buffalo represented 46.56 percent by weight of the fish collected. The General Manager of the Water District has assured us that the contract will be renewed soon after the first of the year if the commercial fisherman wishes to do so.

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<sup>1</sup>Based on the first three nets.

If possible, this lake should be revisited around March 1961, in an effort to gather data similar to the resurvey in March, 1960. The commercial netting should be continued since this seems to be one of the most economical means of managing this lake. Water is pumped from the Rio Grande and is unscreened. Consequently rough fish gain entrance and remain in the lake until taken out or die of old age.

#### Bentsen State Park Lake

This lake was treated with rotenone in January, 1960, to eradicate the existing fish population and restocked with black bass in March. Following the chemical treatment, 22 experimental gill nets were set to determine the success of the treatment. It was found that at least six small fish including five warmouth bass, Chaenobryttus gulosus, and one Rio Grande cichlid, Cichlasoma cyanoguttatum, survived the chemical treatment. The lake was practically pumped dry in the late spring as a result of cotton irrigation and then the Rio Grande River flooded into the lake in June, introducing native fish. Attempts by the project leader to screen the gate valve inlets in the dam were not successful.

Two netting collections made in August took 24 fish of two species; 11 gizzard shad and 13 black bass (Table 19). The shad undoubtedly entered the lake from the Rio Grande since they were mostly adults and none were collected in the post-treatment netting. The black bass ranged from 8- to 10-inches in length and were in good physical condition. At the time this lake was resurveyed in August, 1960, it contained about 6 surface acres of water. Its capacity is approximately 96 surface acres.

Table 20 shows the seining results at Bentsen State Park Lake. It was found that smallmouth buffalo are present in addition to the gizzard shad. Only one seining collection was made.

The lake was thickly choked with Najas, Potamogeton, and Ceratophyllum. The plant problem should lessen as the lake fills again. If the water level remains as is, ducks and other kinds of wildlife may aid in cropping the weeds.

During the spring and summer months, several private citizens who own land adjacent to the lake, pump water to irrigate their crops. Consequently, the lake is always subject to being pumped almost dry. Since the Rio Grande is the lake's only significant source of water and can be taken only during "free water periods", it is imperative to develop an effective means of screening river water before any further development work is undertaken.

#### Lake Corpus Christi

On January 8, 1960, an angler caught a white bass in the lower reaches of the Frio River, a tributary of the Nueces River above Lake Corpus Christi. This white bass was apparently stocked in Lake Corpus Christi in the fall of 1958. The specimen was brought to the regional fisheries office for identification. Other catches were reported during the year but since they were not seen, were not confirmed by this office. The park manager at Lake Corpus Christi State Park reported that another angler caught a white bass weighing about one-half pound near the dam this summer. It appears that this smaller fish might have been spawned in the river since a two-year old white bass in this area would normally be expected to be larger.

In June 1960, 129,500 black bass fingerlings were stocked in the lower portions of Lake Corpus Christi. Most of the bass were stocked in Pernitas Creek which is approximately one-half mile from the dam. The remainder of the fish were stocked in likely spots around the State Park slough. These fish were supplied by the National Fish Hatchery, Uvalde, Texas. No netting or seining checks were made.

Lower Guadalupe River

An investigation of the water hyacinth problem in the lower Guadalupe River was made in April, 1960. The river empties into Mission Bay which in turn empties into San Antonio Bay. A number of bayous in the area are completely choked with hyacinths and the borrow ditches along State Highway 35, between Tivoli and Port Lavaca, are likewise filled with the weeds. Up to this time, periodic floods on the Guadalupe River have been sufficient to wash the plants out of the river into the bay, but when Canyon Dam is completed on the upper Guadalupe River, in Comal County, floods may be less severe and thus create a serious hyacinth problem in the lower portions of the river.

CONCLUSIONS AND RECOMMENDATIONS

Fort Brown Lake will probably need some early summer treatment for submerged vegetation control. A selective gizzard shad kill may become necessary.

In the future, the resurvey job will be a more intensive study of previously surveyed waters. Work such as we have been doing under the existing resurvey job will be done under the reconnaissance job (F-6-R, B-20). The information acquired from this limited study will point out the lakes which will require a more detailed study under the resurvey job.

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Date February 20, 1961

Table 1. Results of collections with experimental gill nets, Fort Brown Lake, April 1960.

Species	Numbers of fish collected					Percent of total number	Weights of fish collected (grams)					Percent of total weight
	Stations				Total		Stations				Total	
	1	2	3	4			1	2	3	4		
Gizzard shad	2	9	6	12	29	27.10	941	4,340	3,481	6,628	15,390	44.95
Channel catfish*	1	0	0	0	1	0.93	1,134	0	0	0	1,134	3.31
Largemouth bass*	9	2	5	1	17	15.89	6,523	1,357	4,402	310	12,592	36.77
Warmouth*	1	0	0	0	1	0.93	50	0	0	0	50	0.14
Bluegills	10	19	10	13	52	48.61	1,047	1,199	591	1,268	4,105	11.99
Rio Grande cichlids	0	4	1	2	7	6.54	0	503	215	255	973	2.84
Totals	23	34	22	28	107	100.00	9,695	7,399	8,689	8,461	34,244	100.00
Percent game fish						17.75						40.22
Percent rough fish						82.25						59.78

\* Indicates game fish

Table 2. Length-weight statistics for fish from Fort Brown Lake, April 1960.

Species	Standard length (millimeters)		Average	Weight (grams)		"K" Factors		
	Range	Range		Range	Average	Range	Range	Average
Gizzard shad	200-325	165-794	292	531	1.23-2.47			2.04
Channel catfish	370-370	1134-1134	370	1134	2.24-2.24			2.24
Largemouth bass	155-390	65-1956	271	741	1.75-3.31			2.65
Bluegills	90-150	25-160	121	79	2.97-5.57			3.99
Rio Grande cichlids	112-160	85-215	137	139	4.56-6.05			5.31
Warmouth	118-118	50-50	118	50	3.04-3.04			3.04

Table 3. Results of collections with experimental gill nets, Llano Grande Lake, August, 1960.

Species	Number of fish collected					Percent of total number	Weights of fish collected (grams)					Percent of total weight
	Stations				Total		Stations				Total	
	4	6	8	9			4	6	8	9		
Alligator gar	1	0	0	1	2	1.60	9,497	0	0	964	10,461	14.04
Spotted gar	2	0	0	0	2	1.60	1,701	0	0	0	1,701	2.28
Gizzard shad	0	47	12	2	61	48.80	0	4,035	891	**	4,926	6.61
Smallmouth buffalo	1	1	0	0	2	1.60	1,843	1,418	0	0	3,261	4.38
Carp	14	4	5	8	31	24.80	24,013	5,188	4,849	9,781	43,831	58.81
Channel catfish*	0	1	0	0	1	0.80	0	680	0	0	680	0.91
Blue catfish*	0	3	6	2	11	8.80	0	1,595	5,331	1,389	8,315	11.16
Largemouth bass*	0	0	0	1	1	0.80	0	0	0	567	567	0.76
Warmouth*	0	0	0	1	1	0.80	0	0	0	190	190	0.25
Rio Grande cichlid	4	3	5	1	13	10.40	254	92	217	39	602	0.80
Totals	22	59	28	16	125	100.00	37,308	13,008	11,288	12,930	74,534	100.00
Percent game fish						11.20						13.08
Percent rough fish						88.80						86.92

\* Indicates game fish  
 \*\* indicates no weight recorded.

Table 4. Results of collections with experimental gill nets, Llano Grande Lake, October 1960.

Species	Numbers of fish collected			Percent of total number	Weights of fish collected (grams)			Percent of total weight
	Stations		Total		Stations		Total	
	1	2			1	2		
Alligator gar	0	1	1	2.85	0	1,928	1,928	5.24
Spotted gar	5	0	5	14.29	5,388	0	5,388	14.67
Longnose gar	1	0	1	2.85	1,984	0	1,984	5.40
Gizzard shad	1	3	4	11.43	567	345	912	2.48
Smallmouth buffalo	0	2	2	5.71	0	5,160	5,160	14.01
Carp	10	4	14	40.03	13,382	3,912	17,294	47.14
Channel catfish*	0	1	1	2.85	0	510	510	1.38
Blue catfish*	1	3	4	11.43	1,304	1,928	3,232	8.79
Warmouth*	0	1	1	2.85	0	160	160	0.43
Rio Grande cichlid	0	2	2	5.71	0	170	170	0.46
Totals	18	17	35	100.00	22,625	14,113	36,738	100.00
Percent game fish				17.13				10.60
Percent rough fish				82.87				89.40

\*Indicates game fish

Table 5. Length-weight statistics for fish from Llano Grande Lake, August and October 1960.

Species	Standard length (millimeters)		Weight (grams)		K <sup>2</sup> factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	536-974	700.33	964-9497	4129.66	0.62-1.02	0.86
Spotted gar	445-531	497.71	680-1304	1012.71	0.70-0.96	0.81
Longnose gar	723-723	723.00	1984-1984	1984.00	0.52-0.52	0.52
Gizzard shad	140-298	185.18	49- 567	132.68	1.56-2.39	1.93
Smallmouth buffalo	320-464	382.00	1361-3799	2105.25	2.56-4.15	3.59
Carp	263-461	366.09	567-2495	1389.20	2.12-3.56	2.71
Channel catfish*	300-328	314.00	510- 680	595.00	1.88-1.92	1.90
Blue catfish*	263-432	352.00	319-1588	769.80	1.38-1.96	1.68
Largemouth bass*	300-300	300.00	567- 567	567.00	2.10-2.10	2.10
Warmouth*	158-170	164.00	160- 190	175.00	3.88-4.05	3.97
Rio Grande cichlid	90-141	103.40	29- 121	51.47	3.54-5.46	4.33

\*Indicates game fish

Table 6. Seining Results, Llano Grande Lake, October, 1960.

Species	Numbers of fish collected	Percent of total
Threadfin shad	10	11.11
Rio Grande tetra	11	12.22
Redhorse shiner	34	37.78
Variiegated cyprinodon	1	1.11
Mosquitofish	32	35.56
Sailfin molly	1	1.11
Rio Grande cichlid	1	1.11
Totals	90	100.00

Table 7. Results of collections with experimental gill nets, Campacus Lake, October 1960.

Species	Numbers of fish collected					Total	Weights of fish collected (grams)					Percent of total weight	
	Stations						Stations						
	1	2	3	4	Total		1	2	3	4	Total		
Alligator gar	5	5	2	2	14	14.58	9,299	11,396	2,325	2,665	25,685	27.01	
Spotted gar	0	2	1	0	3	3.12	0	1,814	794	0	2,608	2.74	
Longnose gar	0	0	0	1	1	1.04	0	0	0	1,106	1,106	1.16	
Gizzard shad	8	0	4	9	30	31.27	1,745	1,575	0	1,650	5,890	6.19	
Smallmouth buffalo	2	1	7	0	10	10.42	3,402	5,840	7,882	0	17,124	18.01	
Carp	3	8	6	3	20	20.83	4,593	14,912	7,569	5,386	32,460	34.19	
Channel catfish*	0	0	1	0	1	1.04	0	0	567	0	567	0.59	
Blue catfish*	6	1	3	1	11	11.46	4,856	567	1,693	0	7,853	8.25	
Striped mullet	1	0	0	0	1	1.04	440	0	737	0	440	0.46	
Bluegill	0	1	0	0	1	1.04	0	0	0	0	0	0.03	
White crappie *	0	0	2	0	2	2.08	0	35	0	0	35	0.03	
Rio Grande cichlid	0	0	2	0	2	2.08	0	0	1,162	0	1,162	1.22	
Totals	25	27	28	16	96	100.00	24,335	36,139	23,062	11,544	95,080	100.00	
Percent game fish													10.06
Percent rough fish													89.94

\*Indicates game fish

Table 8. Seining Results, Campacus Lake, October 1960.

Species	Numbers of fish collected	Percent of total
Threadfin shad	117	55.71
Variiegated cyprinodon	7	3.33
Mosquitofish	55	26.19
Sailfin molly	1	0.48
Tidewater silversides	30	14.29
Totals	210	100.00

Table 9. Length-weight statistics for fish from Campacus Lake, October, 1960.

Species	Standard length (Millimeters)		Weight (grams)		"K" factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	405-817	600.36	907-4536	1834.64	0.72-1.45	0.81
Spotted gar	465-505	483.33	794- 907	869.33	0.70-0.81	0.77
Longnose gar	585-585	585	1106-1106	1106	0.55-0.55	0.55
Gizzard shad	127-305	223.03	25- 510	203.10	0.80-2.27	1.61
Smallmouth buffalo	292-512	338.90	794-5840	1712.40	3.18-4.35	3.75
Carp	262-479	358.47	510-3629	1615.89	2.73-5.33	3.23
Channel catfish	307-307	307	567- 567	567	1.95-1.95	1.95
Blue catfish	232-395	332.82	150-1247	713.91	1.20-2.12	1.74
Striped mullet	277-277	277	440- 440	440	2.07-2.07	2.07
Bluegill	96- 96	96	35- 35	35	3.95-3.95	3.95
White crappie	254-260	257	510- 652	581	2.90-3.97	3.44
Rio Grande cichlid	92-132	112	40- 110	75	4.78-5.12	4.95

Table 10. Results of collections with experimental gill nets, Casa Blanca Lake, April 1960.

Species	Numbers of fish collected										Weights of fish collected (grams)								
	Stations									Percent of Total number	Stations								
	1	2	3	4	5	6	7	8	Total		1	2	3	4	5	6	7	8	
Threadfin shad	21	4	8	10	6	4	3	6	62	10.98	1,284	193	418	649	392	231	160	325	
Gizzard shad	19	12	21	64	28	34	26	46	250	44.24	1,854	1,694	1,921	7,193	3,658	4,572	3,749	3,461	
Smallmouth buffalo	0	0	2	2	10	5	1	3	23	4.07	0	0	3,941	4,224	13,099	10,432	2,268	5,046	
River carpsucker	22	28	8	30	0	5	3	18	114	20.17	20,783	29,059	7,375	29,032	0	6,917	5,131	15,365	
Carp	0	0	0	4	0	4	8	1	17	3.01	0	0	0	4,735	0	3,827	10,263	879	
Channel catfish*	0	0	0	2	2	0	0	1	5	0.89	0	0	0	4,990	5,358	0	0	1,336	
Black bullhead	0	0	0	0	0	0	1	0	1	0.17	0	0	0	0	0	0	245	0	
Largemouth bass*	0	0	0	0	1	1	1	1	4	0.71	0	0	0	0	2,742	1,701	652	1,701	
Redear sunfish*	0	0	0	2	0	0	1	0	3	0.53	0	0	0	114	0	0	35	0	
Bluegill	1	0	3	1	0	0	2	2	9	1.60	30	0	97	45	0	0	68	95	
White crappie*	12	5	15	1	17	2	4	2	58	10.26	2,352	708	2,373	170	4,640	620	740	565	
Freshwater drum	0	0	1	7	0	3	5	0	16	2.83	0	0	194	1,440	0	1,100	2,473	0	
Rio Grande cichlid	0	0	0	0	0	1	2	0	3	0.54	0	0	0	0	0	325	463	0	
Totals	75	49	58	123	64	59	57	80	565	100.00	26,303	31,654	16,319	52,592	29,889	29,725	26,247	28,774	
Percent game fish											12.39								
Percent rough fish											87.61								

\*Indicates game fish

Table 11. Results of collections with experimental gill nets, Casa Blanca Lake, July 1960.

Species	Numbers of fish collected											Weights of fish collected (grams)									
	Stations										Percent of Total number	Stations									
	1	2	3	4	5	6	7	8	9	Total		1	2	3	4	5	6	7	8	9	
Threadfin shad	0	0	0	5	2	0	0	0	0	7	3.01	0	0	0	230	102	0	0	0	0	
Gizzard shad	10	2	0	8	3	11	3	1	1	39	16.81	487	214	0	721	193	753	269	160	44	
Smallmouth buffalo	0	1	0	1	4	1	1	2	2	12	5.17	0	2,693	0	2,296	7,343	2,495	2,126	3,856	4,791	
River carpsucker	3	8	6	3	0	0	0	0	0	20	8.62	2,041	6,890	6,095	3,969	0	0	0	0	0	
Carp	0	1	0	0	0	0	0	1	1	3	1.29	0	652	0	0	0	0	0	680	879	
Channel catfish*	0	1	0	0	1	3	2	1	0	8	3.45	0	1,644	0	0	3,005	5,671	3,203	80	0	
Black bullhead	0	0	1	0	1	0	0	4	0	6	2.59	0	0	320	0	300	0	0	1,255	0	
Flathead catfish*	0	0	0	0	0	0	0	0	1	1	0.43	0	0	0	0	0	0	0	0	2,580	
White bass*	0	2	0	0	0	0	0	0	0	2	0.86	0	1,077	0	0	0	0	0	0	0	
Largemouth bass*	1	3	2	1	0	1	1	1	1	11	4.74	567	1,815	3,345	304	0	1,729	436	1,729	794	
Bluegill	1	4	1	2	1	0	3	0	0	12	5.17	42	206	30	75	42	0	107	0	0	
White crappie*	20	8	1	7	6	10	1	10	3	66	28.47	2,623	823	148	1,304	1,017	1,093	44	1,391	565	
Freshwater drum	0	0	4	0	1	6	9	7	16	43	18.53	0	0	698	0	301	1,672	1,865	2,748	4,267	
Rio Grande cichlid	0	2	0	0	0	0	0	0	0	2	0.86	0	254	0	0	0	0	0	0	0	
Totals	35	32	15	27	19	32	20	27	25	232	100.00	5,760	16,268	10,636	8,899	12,303	13,413	8,050	11,899	13,920	
Percent of game fish												37.95									
Percent of rough fish												62.05									

\*Indicates game fish

Table 12. Length-weight statistics for fish from Casa Blanca Lake, April and July, 1960.

Species	Standard length (millimeters)		Weight (grams)		"K" factors	
	Range	Average	Range	Average	Range	Average
Threadfin shad	115-185	134.45	30- 135	57.74	1.47-3.29	2.37
Gizzard shad	125-283	174.09	41- 410	108.90	1.33-2.68	1.88
Smallmouth buffalo	295-445	381.34	765-2693	1871.91	2.98-4.19	3.29
River carpsucker	265-385	320.69	454-1899	989.46	1.37-3.77	2.90
Carp	298-460	347	652-2495	1095.75	1.98-2.97	2.55
Channel catfish	170-545	437.69	80-3402	1944.85	1.63-2.89	2.07
Black bullhead	225-262	234.43	245- 394	302.86	2.15-2.59	2.34
Flathead catfish	485-485	485	2580-2580	2580	2.26-2.26	2.26
White bass	262-275	268.50	482- 595	538.50	2.69-2.86	2.78
Largemouth bass	177-475	341.27	122-2742	1167.67	1.45-3.65	2.50
Redear sunfish	99-115	108	35- 60	49.67	3.61-4.06	3.87
Bluegill	88-130	100.81	30- 73	39.86	3.00-6.00	3.88
White crappie	98-294	183.88	21- 652	175.01	1.69-3.04	2.46
Freshwater drum	185-320	231.74	150- 680	294	1.46-2.88	2.25
Rio Grande cichlid	165-180	170.50	218- 325	260.50	4.85-5.57	5.22

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Table 13. Seining Results, Casa Blanca Lake, April and July, 1960.

Species	Numbers of fish collected					Total	Percent of total number
	Stations						
	1	2	3	4			
Threadfin shad	0	40	75	0	115	39.69	
Pugnose minnow	0	0	1	0	1	0.34	
Redhorse shiner	0	25	0	0	25	8.62	
Variegated cyprinodon	0	1	0	0	1	0.34	
Sailfin molly	0	2	0	0	2	0.69	
Tidewater silversides	0	86	6	0	92	31.72	
Largemouth bass	1	0	0	0	1	0.34	
Redear sunfish	3	4	0	1	8	2.75	
Bluegill	3	24	2	9	38	13.10	
Mosquitofish	0	7	0	0	7	2.41	
Totals	7	189	84	10	290	100.00	

Table 14. Results of collections with experimental gill nets, Delta Orchards Lake, March 1960.

Species	Numbers of fish collected					Percent of total number	Weights of fish collected (grams)					Percent of total wt.		
	Stations						Total	Stations					Total	
	1	2	3	4	5			1	2	3	4			5
Alligator gar	0	0	1	0	1	2	0	0	9,072	0	9,072	18,144	15.40	
Spotted gar	1	2	4	0	6	13	2,070	2,284	5,676	0	5,516	15,546	13.20	
Longnose gar	2	1	0	3	0	6	4,139	2,778	0	4,082	0	10,999	9.34	
Gizzard shad	3	0	4	1	21	29	455	0	359	43	1,970	2,827	2.40	
Smallmouth buffalo	6	4	8	1	2	27	6,662	5,585	11,452	2,013	7,342	33,054	28.06	
Carp	0	0	1	0	7	8	0	0	2,637	0	794	3,431	2.92	
Blue catfish*	6	3	9	1	1	20	5,427	278	1,718	5,228	1,021	13,672	11.60	
Freshwater needlefish	1	0	0	0	0	1	68	0	0	0	0	68	0.06	
Freshwater drum*	0	0	0	0	5	5	968	1,126	3,591	750	517	6,952	5.91	
Bluegill*	0	8	19	0	2	29	1,012	6,277	709	4,844	53	12,895	10.95	
White crappie*	6	0	3	5	2	16								
Freshwater drum*	5	36	3	28	1	73								
Totals	30	54	49	56	45	234	20,801	18,328	35,214	16,960	26,476	117,779	100.00	
Percent game fish						65.81							28.62	
Percent rough fish						34.19							71.38	

\*Indicates game fish

Table 15. Results of collections with experimental gill nets, Delta Orchards Lake, December 1960.

Species	Numbers of fish collected					Percent of total number	Weights of fish collected (grams)					Percent of total weight		
	Stations						Total	Stations					Total	
	1	2	3	4	5			1	2	3	4			5
Spotted gar	0	1	2	0	1	4	0	652	0	652	0	652	2.32	
Gizzard shad	1	2	2	1	6	11	49	288	118	0	455	1,306	1.62	
Smallmouth buffalo	3	3	2	2	6	16	3,884	2,353	6,832	0	13,069	46.56		
Carp	0	1	1	0	0	2	0	1,588	0	0	1,588	5.65		
Blue catfish*	3	2	1	0	0	6	2,952	386	0	0	3,338	11.89		
Striped mullet	0	0	0	0	1	1	0	0	907	0	907	3.23		
White crappie*	11	0	13	12	1	36	2,236	2,548	2,161	179	6,945	24.74		
Freshwater drum *	4	4	4	1	1	18	552	391	179	179	1,122	3.99		
*Indicates game fish														
Totals	22	25	25	21	1	68	9,673	8,206	10,197	28,076	100.00	40.62		
Percent game fish						100.00							59.38	
Percent rough fish						26.47								

Table 16. Length-weight statistics for fish from Delta Orchards Lake, March 1960.

Species	Standard length (millimeters)		Weight (grams)		K <sup>1/3</sup> factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	985-990	988	9072-9072	9072	0.93-0.94	0.94
Spotted gar	350-654	533	243-2070	1196	0.53-0.82	0.66
Longnose gar	550-843	715	652-2778	1833	0.39-0.57	0.47
Gizzard shad	122-210	177	39-169	97	1.38-2.14	1.63
Smallmouth buffalo	305-410	346	822-2155	1224	2.29-3.46	2.92
Carp	340-440	390	794-2637	1716	2.02-3.10	2.56
Blue catfish	130-556	270	23-2825	684	0.90-1.88	1.25
Freshwater needlefish	380-380	380	68-68	68	0.12-0.12	0.12
Bluegill	100-110	103	31-42	38	3.10-3.90	3.50
White crappie	110-256	193	34-342	174	1.88-2.68	2.22
Freshwater drum	143-262	235	53-387	177	1.74-2.65	2.24

Table 17. Length-weight statistics for fish from Delta Orchards Lake, December 1960.

Species	Standard length (millimeters)		Weight (grams)		K <sup>1/3</sup> factors	
	Range	Average	Range	Average	Range	Average
Spotted gar	448-448	448	652-652	652	0.73-0.73	0.73
Gizzard shad	140-195	179.50	49-148	113.75	1.78-2.00	1.86
Smallmouth buffalo	305-341	322	992-1701	1188.09	3.17-4.73	3.54
Carp	367-367	367	1588-1588	1588	3.21-3.21	3.21
Blue catfish	130-545	291.60	32-2665	667.60	0.96-1.65	1.29
Striped mullet	345-345	345	907-907	907	2.21-2.21	2.21
White crappie	166-240	193.16	122-313	192.91	2.26-3.37	2.64
Freshwater drum	122-210	168.77	38-218	124.66	1.86-2.70	2.36

Table 18. Seining results, Delta Orchards Lake, 1960.

Species	March, 1960		December, 1960	
	Fish collected	Percent of total	Fish collected	Percent of total
Threadfin shad	20	74.10	15	53.57
Gizzard shad	1	3.70	-	----
Carp	1	3.70	-	----
Redhorse shiner	-	----	1	3.57
Tidewater silversides	1	3.70	12	42.86
Freshwater needlefish	1	3.70	-	----
Striped mullet	1	3.70	-	----
Bluegill	1	3.70	-	----
Rio Grande cichlid	1	3.70	-	----
Totals	27	100.00	28	100.00

Table 19. Results of collections with experimental gill nets, Bentsen State Park Lake, August 1960.

Species	Numbers of fish collected			Percent of total number	Weights of fish collected (grams)			Percent of total weight
	Stations		Total		Stations		Total	
	1	2			1	2		
Gizzard shad	2	9	11	45.83	409	627	1,036	33.42
Largemouth bass	4	9	13	54.17	879	1,437	2,064	66.58
Totals	6	18	24	100.00	1,288	2,064	3,100	100.00

Table 20. Seining results, Bentsen State Park Lake, August 1960.

Species	Numbers of fish collected		Percent of total
	1	2	
Threadfin shad	1		0.38
Smallmouth buffalo	5		1.90
Variiegated cyprinodon	12		4.58
Mosquitofish	243		92.76
Warmouth	1		0.38
Totals	262		100.00

Table 21. Checklist of species referred to in text and tables.

Species	Scientific name
Alligator gar	<u>Lepisosteus spatula</u>
Spotted gar	<u>L. productus</u>
Longnose gar	<u>L. osseus</u>
Threadfin shad	<u>Dorosoma petenense</u>
Gizzard shad	<u>D. cepedianum</u>
Rio Grande tetra	<u>Astyanax fasciatus</u>
Smallmouth buffalo	<u>Ictiobus bubalus</u>
River carpsucker	<u>Carpiodes carpio</u>
Carp	<u>Cyprinus carpio</u>
Pugnose minnow	<u>Opsopoedus emiliae</u>
Redhorse shiner	<u>Notropis lutrensis</u>
Channel catfish	<u>Ictalurus punctatus</u>
Blue catfish	<u>I. furcatus</u>
Black bullhead	<u>I. melas</u>
Flathead catfish	<u>Pylodictus olivaris</u>
Freshwater needlefish	<u>Strongylura marina</u>
Variegated cyprinodon	<u>Cyprinodon variegatus</u>
Mosquitofish	<u>Gambusia affinis</u>
Sailfin molly	<u>Mollienisia latipinna</u>
Striped mullet	<u>Mugil cephalus</u>
Tidewater silversides	<u>Menidia beryllina</u>
White bass	<u>Roccus chrysops</u>
Largemouth bass	<u>Micropterus salmoides</u>
Warmouth	<u>Chaenobryttus gulosus</u>
Redear sunfish	<u>Lepomis microlophus</u>
Bluegill	<u>L. macrochirus</u>
White crappie	<u>Pomoxis annularis</u>
Freshwater drum	<u>Aplodinotus grunniens</u>
Rio Grande cichlid	<u>Cichlasoma cyanoguttatum</u>

Table 22. Success of gill netting on all lakes in terms of numbers and pounds of fish caught.

Lake and Date	Number of nets	Number of feet of nets	Number of fish caught	Average number of fish per net	Average number of fish per foot of net	Pounds of fish caught	Average pounds of fish per net	Average pounds of fish per foot of net
Llano Grande August & October, 1960	6	750	160	26.67	0.213	245.31	40.89	0.327
Campacuas October, 1960	4	500	96	24.00	0.192	209.62	52.41	0.419
Delta Orchards March & December, 1960	8	1,000	302	37.75	0.302	278.50	34.81	0.278
Fort Brown April, 1960	4	500	107	26.75	0.214	75.49	18.87	0.151
Casa Blanca April & July, 1960	17	2,125	797	46.88	0.375	155.42	91.42	0.731
Bentzen State Park January, February, & August, 1960	24	3,000	30	1.25	0.010	17.64	7.35	0.059