JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-6-R-12

FISHERIES INVESTIGATIONS AND SURVEYS OF THE WATERS OF REGION 5-B

Job No. B-20 Fisheries Reconnaissance

Project Leader: Charles T. Menn

J. Weldon Watson
Executive Director
Parks and Wildlife Department
Austin, Texas

Marion Toole
D-J Coordinator

Eugene A. Walker
Assistant Director for Wildlife

January 18, 1965

ABSTRACT

Seven lakes and a part of the San Antonio River were visited during this segment to see if any appreciable changes in the fish populations had occurred since the previous survey.

Blue catfish (Ictalurus furcatus), the only game fish species, comprised 17.24 per cent of the total number and 6.97 per cent of the total weight of the fish taken in the nets in Harlingen City Lake. There appeared to be a relative decrease in the game fish, both in numbers and in weight.

In Bentsen State Park Lake, rough fish species including spotted gar (Lepisosteus productus), smallmouth buffalo (Ictiobus bubalus), bluegill (Lepomis macrochirus) and Rio Grande perch (Cichlasoma cyanoguttatum) were dominant both in numbers and in weight with 86.36 per cent and 94.31 per cent, respectively.

Rough fish, primarily bluegill and gizzard shad (Dorosoma cepedianum) are dominant in Fort Brown Lake. Despite their predominance, the bass and catfish are in good condition.

Rough fish species including alligator gar (Lepisosteus spatula), spotted gar, longnose gar (Lepisosteus osseus), threadfin shad (Dorosoma petenense), gizzard shad, carp (Cyprinus carpio), freshwater drum (Aplodinotus grunniens) and Rio Grande perch comprised 94.85 per cent of the total number and 95.55 per cent of the total weight of fish taken in Llano Grande Lake.

Game fish species showed a relative increase both in numbers and in weight in Campacuas Lake. The game fishes include channel catfish (Ictalurus punctatus), blue catfish, warmouth (Chaenobryttus gulosus), white crappie (Pomoxis annularis) and black crappie (P. nigromaculatus).

In Delta Orchards Lake, near Monte Alto in Hidalgo County, game fish species including channel and blue catfish and freshwater drum showed a relative decrease both in number and in weight.

Rough fish species including spotted and longnose gars, gizzard shad, grey redhorse (Moxostoma congestum), yellow bullheads (Ictalurus natalis) and Rio Grande perch were dominant both in numbers and in weight in the San Antonio River.

The blue catfish population showed a relative increase in numbers in Lake Corpus Christi. Otherwise, there were no significant changes in the fish population.

Water hyacinth control work on Lake Corpus Christi should be continued. However, no other developmental or management work is recommended.

JOB COMPLETION REPORT

State of Texas

Project No. F-6-R-12 Name: Fisheries Investigations and Surveys of the Waters of Region 5-B

Job No. B-20 Title: Fisheries Reconnaissance

Period Covered: January 1, 1964 through December 31, 1964

Objectives:

To obtain current information concerning gross changes in fishing conditions, and to obtain current information regarding factors influencing fish populations.

Techniques Used:

Standard, 125-foot long, gill nets and common sense minnow seines were used to sample fish populations. The gill nets consisted of nylon webbing, 8 feet deep, with five 25-foot long sections of 1-, 1½-, 2-, 2½- and 3-inch square mesh. Nets were set overnight at previously established netting stations and fish specimens were taken from them the following morning. 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 recorded. Seined specimens were preserved and taken to project headquarters at Mathis for identification. A list of the common and scientific names of fish species taken during this study is included as Table 1.

Routine water quality analyses were made on the various lakes and a limited check was made of the surrounding area of each lake to determine land usage and possible sources of pollution.

The water level data for Lake Corpus Christi were obtained from officials at Wesley Seale Dam.

Fisherman usage of the various lakes was determined by talking to camp owners, game wardens and sometimes to fishermen. Public access is available to all the lakes and rivers studied in this segment.

Table 1. Checklist of species referred to in text and tables.

Common name	Scientific name
Alligator gar	Lepisosteus spatula Lacépède
Spotted gar	L. oculatus (Winchell)
Longnose gar	L. osseus (Linnaeus)
Threadfin shad	Dorosoma petenense (Günther)
Gizzard shad	D. cepedianum (LeSueur)
Mexican tetra	Astyanax mexicanus (Filippi)
Smallmouth buffalo	Ictiobus bubalus (Rafinesque)
Grey redhorse	Moxostoma congestum (Baird and Girard)
Carp	Cyprinus carpio Linnaeus
Pugnose minnow	Opsopoeodus emiliae Hay
Tamaulipas shiner	Notropis braytoni Jordan and Evermann
Red shiner	N. lutrensis (Baird and Girard)
Bullhead minnow	Pimephales vigilax (Baird and Girard)
Flathead minnow	P. promelas Rafinesque
Channel catfish	Ictalurus punctatus (Rafinesque)
Blue catfish	I. furcatus (LeSueur)
Black bullhead	I. melas (Rafinesque)
Yellow bullhead	I. natalis (LeSueur)
Flathead catfish	Pylodictus olivaris (Rafinesque)
Tadpole madtom	Schilbeodes gryinus (Mitchill)
Blackstripe topminnow	Fundulus notatus (Rafinesque)
Sheepshead minnow	Cyprinodon variegatus Lacépède
Mosquitofish	Gambusia affinis (Baird and Girard)
Sailfin molly	Mollienisia latipinna LeSueur
Amazon molly	M. formosa (Girard)
Striped mullet	Mugil cephalus Linnaeus
Tidewater silverside	Menidia beryllina (Cope)
White bass	Roccus chrysops (Rafinesque)
Largemouth bass	Micropterus salmoides (Lacépède)
Warmouth	Chaenobryttus gulosus (Cuvier)
Redear sunfish	Lepomis microlophus (Günther)
Bluegill	L. macrochirus Rafinesque
White crappie	Pomoxis annularis Rafinesque
Black crappie	P. nigromaculatus (LeSueur)
Freshwater drum	Aplodinotus grunniens Rafinesque
Rio Grande perch	Cichlasoma cyanoguttatum (Baird and Girard)
Naked goby	Gobiosoma bosci Lacépède

Findings:

Harlingen City Lake

This 20-acre lake is located in downtown Harlingen and is the city's water supply reservoir. Water in the lake originates from the Rio Grande River and reaches the lake through a system of gravity flow irrigation canals.

Public angling is permitted on this lake without restrictions or limitations, but little fishing is done due to the sizable rough fish population.

Netting - Three netting collections were made on this lake in February. All told, 29 fish of five species were taken (Table 2). The game fish species included blue catfish (Ictalurus furcatus) only. Channel catfish (Ictalurus punctatus), white bass (Roccus chrysops), largemouth bass (Micropterus salmoides) and white crappie (Pomoxis annularis) and black crappie (P. nigromaculatus) were all taken in previous surveys but none were found in this survey.

Table 2. Results of gill netting, Harlingen City Lake, February, 1964

Species	Numbers Taken	Per Cent of Total Number	Weight (pounds)	Per Cent of Total Weight
Longnose gar	5	17.24	16.2	32.27
Gizzard shad	10	34.48	2.6	5.18
Smallmouth buffalo	3	10.35	24.6	49.00
Blue catfish*	5	17.24	3.5	6.97
Freshwater drum	6	20.69	3.3	6.58
Total	29	100.00	50.2	100.00
Per Cent Game Fish		17.24		6.97
Per Cent Rough Fish		82.76		93.03

* Indicates game fish

On the basis of the limited netting data, game fish showed a relative decrease both in numbers and in weight. In 1963, game fish species comprised 22.54 per cent of the total number and 3.64 per cent of the total weight as compared to 17.24 per cent of the number and 6.97 per cent of the weight in 1964.

Gizzard shad (Dorosoma cepedianum), freshwater drum (Aplodinotus grunniens), longnose gar (Lepisosteus osseus) and smallmouth buffalo (Ictiobus bubalus), in

that order, were the most abundant rough fish species taken. Collectively, they comprised 77.46 per cent of the total number and 96.36 per cent of the total weight of the fish netted.

The length-weight statistics of the fish taken in nets are shown in Table 3. The average "K" factors are in line with those of the 1963 reconnaissance survey.

Table 3. Length-weight statistics of fish taken with gill nets, Harlingen City Lake, February, 1964

Species	Standard length (mm.)		Weight (grams)		"K" factors	
	Range	Average	Range	Average	Range	Average
Longnose gar	435-860	640	281-2778	1468	0.34-0.51	0.41
Gizzard shad	163-198	183	84-168	130	1.86-2.33	2.06
Smallmouth buffalo	403-531	465	2240-5358	3723	3.42-3.64	3.54
Blue catfish	258-292	273	239-421	320	1.38-1.81	1.53
Freshwater drum	185-240	211	145-365	246	2.28-2.66	2.51

Seining - Seining collections were made at two stations. All told, 152 fish of 7 species were taken in the seining collections (Table 4). Mosquitofish (Gambusia affinis), red shiners (Notropis lutrensis) and tidewater silversides (Menidia beryllina), in that order, comprised 95.40 per cent of the total number. The most noticeable change concerned the threadfin shad (Dorosoma petenense); they comprised less than 1 per cent by number as compared with more than 40 per cent in 1963. This apparent "reduction" is probably due to a seining error.

Table 4. Seining results, Harlingen City Lake, February, 1964

Species	Numbers Taken	Per Cent of Total Number
Threadfin shad	1	0.66
Red shiner	45	29.61
Flathead minnow	2	1.31
Mosquitofish	70	46.05
Amazon molly	1	0.66
Tidewater silverside	30	19.74
Naked goby	3	1.97
Totals	152	100.00

Lake Conditions - Submerged vegetation is lacking due to the turbidity. Shoreline vegetation, however, consists mainly of bulrushes mixed with a few cattails.

Secchi disc readings of light penetration ranged from 11 to 13 inches. It is believed that the turbidity is caused by bottom-feeding fishes which keep silt in suspension rather than the prevailing southeasterly wind.

Recommendations - Fishermen should be encouraged to fish for catfish and crappie. A commercial fisherman might be necessary and desirable to harvest the rough fish in the near future.

Bentsen State Park Lake

Netting - Three gill netting collections were made on this lake in May, 1964. The second check, scheduled for November, was not made due to the extremely low water conditions. There were only a few areas where the water was as much as two feet deep. A total of 22 fish of five species was taken in the netting collections. Rough fish species, including spotted gar (Lepisosteus oculatus), smallmouth buffalo, bluegill (Lepomis macrochirus) and Rio Grande perch (Cichlasoma cyanoguttatum) were dominant both in number and in weight (Table 5). The only game fish species taken in the nets, warmouth (Chaenobryttus gulosus), comprised less than 15 per cent of the total number and 5.69 per cent of the total weight.

Table 5. Results of gill netting, Bentsen State Park Lake, May, 1964

Species	Numbers Taken	Per Cent of Total Number	Weight (pounds)	Per Cent of Total Weight
Spotted gar	3	13.64	5.8	27.49
Smallmouth buffalo	1	4.54	12.5	59.24
Warmouth*	3	13.64	1.2	5.69
Bluegill	10	45.45	0.9	4.26
Rio Grande perch	5	22.73	0.7	3.32
Total	22	100.00	21.1	100.00
Per Cent Game Fish		13.64		5.69
Per Cent Rough Fish		86.36		94.31

* Indicates game fish

Seining - The seining results are shown in Table 6. Mosquitofish and threadfin shad comprised 93.02 per cent of the total number of fish taken. Though there is a good supply of forage fish, it appears that there are few bass and crappie in the lake to crop them.

Table 6. Results of seining, Bentsen State Park Lake, May, 1964

Species	Numbers Taken	Per Cent of Total Number
Threadfin shad	107	20.19
Gizzard shad	4	0.75
Red shiner	1	0.19
Sheepshead minnow	1	0.19
Mosquitofish	386	72.83
Tidewater silverside	2	0.38
Bluegill	2	0.38
Rio Grande perch	27	5.09
Total	530	100.00

The length-weight statistics are shown in Table 7. No appreciable changes were noted for any species.

Table 7. Length-weight statistics for fish taken with gill nets, Bentsen State Park Lake, May, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Spotted gar	479-494	486	794-936	870	0.65-0.82	0.76
Smallmouth buffalo	490-490	490	5670-5670	5670	4.81-4.81	4.81
Warmouth	147-165	155	142-224	176	4.46-4.98	4.64
Bluegill	94-112	101	32-59	43	3.56-4.57	4.02
Rio Grande perch	69-144	109	14-113	64	3.73-5.20	4.43

Lake Conditions - The water level has been extremely low all year. The upper portion of this oxbow lake is dry, but a total of approximately 10 acres of water still remains in the lake. By November, the lake had gone down even lower than it was in May. For that reason the lake was not checked as originally planned.

Recommendations - Since the water level is so erratic, no management or developmental work is proposed or planned. Should a more favorable water supply become available, some management work should be initiated.

Fort Brown Lake

This 33-acre lake, located in downtown Brownsville, was drained in the spring of 1962, dredged in the summer of that same year and refilled in the fall. The water used in refilling the lake came from the Rio Grande River and contained many undesirable fishes. Therefore, the lake was treated with rotenone to remove all fishes. The state fish hatchery near Brownsville stocked a large number of largemouth bass fingerlings in December, 1962.

Netting - Four gill netting collections were made in February, 1964, and took a total of 162 fish of 7 species (Table 8). Of the seven species, three were classed as game fish (channel catfish, white bass and largemouth bass). All told, the game fish species comprised 16.66 per cent of the total number and 37.64 per cent of the total weight.

Table 8. Results of gill netting, Fort Brown Lake, February, 1964.

Species	Numbers Taken	Per Cent of Total Number	Weights (pounds)	Per Cent of Total Weight
Threadfin shad	9	5.56	1.1	1.30
Gizzard shad	61	37.65	44.7	52.89
Channel catfish*	6	3.70	11.1	13.14
White bass*	2	1.23	1.9	2.25
Largemouth bass*	19	11.73	18.8	22.25
Bluegill	64	39.51	6.7	7.93
Rio Grande perch	1	0.62	0.2	0.24
Totals	162	100.00	84.5	100.00
Per Cent Game Fish		16.66		37.64
Per Cent Rough Fish		83.34		62.36

* Indicates game fish

The most noticeable change in the fish population since the 1963 check is the presence of rough fish. None were found in the 1963 check, but this year they comprised 83.34 per cent of the total number and 62.36 per cent of the total weight. Doubtless, these fish entered the lake from the Rio Grande which is its main source of water.

The length-weight statistics are presented in Table 9. All values are considered normal for fishes in this area of Texas.

Table 9. Length-weight statistics of fish taken with gill nets, Fort Brown Lake, February, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Threadfin shad	119-145	131	51-78	63	2.44-3.56	2.82
Gizzard shad	187-288	237	163-652	328	1.97-2.75	2.38
Channel catfish	270-388	335	391-1247	840	1.93-2.31	2.09
White bass	205-244	222	306-567	436	3.55-3.90	3.72
Largemouth bass	155-331	241	94-1049	473	2.40-3.67	3.02
Bluegill	92-111	100	29-67	46	3.71-5.12	4.45
Rio Grande perch	127-127	127	112-112	112	5.47-5.47	5.47

Seining - One seining collection was made and took 22 fish of four species (Table 10). Bluegills and mosquitofish, in that order, comprised 90.90 per cent of the collection. One specimen of largemouth bass, approximately 3 inches in length, was taken and indicated that the bass had spawned. In addition to the fish, 46 freshwater shrimp (Palaemonetes sp.) were taken in the collection.

Table 10. Seining results, Fort Brown Lake, February, 1964

Species	Total Number	Per Cent of Total Number
Mosquitofish	3	13.63
Largemouth bass	1	4.55
Bluegill	17	77.27
Rio Grande perch	1	4.55
Total	22	100.00

Lake Conditions - Secchi disc readings ranged from 19 to 28 inches, as compared with 60 to 82 inches a year earlier. This noticeable change is almost certainly due to the abundance of rough fish, most of which are bottom feeders. The higher turbidity should aid in the prevention of excessive submerged vegetation.

Chemical analysis of a surface water sample revealed the following: dissolved oxygen 3.9 p.p.m., carbon dioxide 0.8 p.p.m., pH 8.8, and methyl orange alkalinity 130.0 p.p.m.

Recommendations - A selective shad kill would probably be in order within the near future. It would be beneficial to the small game fish. If the submerged vegetation becomes worse, control measures will be recommended.

Llano Grande Lake

Llano Grande Lake, approximately 250 acres in size, is located 5 miles south of Weslaco in Hidalgo County, Texas. Formerly, it was an old stream bed of the Rio Grande River. Reconnaissance surveys were made in April and September, 1964. Each survey consisted of six gill netting collections and one seining collection. Generally, public access is limited to the road crossings, but public angling is permitted without additional local restrictions.

Netting - Twelve gill netting collections were made on this lake. A total of 466 fish of 14 species was taken in the netting collections (Table 11). The game fish species included channel catfish, white bass, largemouth bass, warmouth, white and black crappie. All together, they comprised 5.15 per cent of the total number and 4.45 per cent of the total weight.

Table 11. Results of gill netting, Llano Grande Lake, April and September, 1964

Species	Numbers Taken	Per Cent of Total Number	Weight (pounds)	Per Cent of Total Weight
Alligator gar	1	0.21	4.5	1.60
Spotted gar	15	3.22	34.4	12.24
Longnose gar	2	0.43	3.8	1.35
Threadfin shad	21	4.51	3.8	1.35
Gizzard shad	75	16.09	43.1	15.33
Carp	39	8.37	127.6	45.39
Channel catfish*	6	1.29	5.9	2.10
White bass*	1	0.21	1.0	0.36
Largemouth bass*	4	0.86	2.5	0.89
Warmouth bass*	7	1.50	2.6	0.92
White crappie*	1	0.21	0.4	0.14
Black crappie*	5	1.08	0.1	0.04
Freshwater drum	1	0.21	2.4	0.85
Rio Grande perch	288	61.81	49.0	17.44
Total	466	100.00	281.1	100.00
Per Cent Game Fish		5.15		4.45
Per Cent Rough Fish		94.85		95.55

* Indicates game fish

Of the total fish netted, game fish showed a relative increase both in numbers and in weight. In 1963, they comprised 3.70 per cent of the number and 4.20 per cent of the weight as compared with 5.15 per cent of the number and 4.45 per cent of the weight in 1964.

Rio Grande perch, gizzard shad, and carp (Cyprinus carpio) are the most abundant rough fish present. All together, they comprised 86.27 per cent of the total number and 78.16 per cent of the total weight. These findings are in line with those of the 1963 survey.

The length-weight statistics are presented in Table 12. Spotted gar, threadfin shad, gizzard shad, and warmouth showed slight decreases in "K" factors, while carp, channel catfish and Rio Grande perch showed increases in "K" factors.

Table 12. Length-weight statistics of fish taken with gill nets, Llano Grande Lake, April and September, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	637-637	637	2055-2055	2055	0.79-0.79	0.79
Spotted gar	465-556	499	822-1389	1042	0.73-1.01	0.83
Longnose gar	472-643	558	465-1276	871	0.44-0.48	0.46
Threadfin shad	110-229	152	38-318	103	1.71-2.92	2.36
Gizzard shad	191-339	260	144-936	454	1.85-2.93	2.36
Carp	122-503	343	57-3600	1564	2.55-5.32	3.13
Channel catfish	151-448	212	61-2268	442	1.59-2.52	1.85
White bass	243-243	243	442-442	442	3.08-3.08	3.08
Largemouth bass	204-215	211	217-334	281	2.55-3.45	2.99
Warmouth	112-160	148	59-221	172	3.90-5.69	4.62
White crappie	163-163	163	159-159	159	3.67-3.67	3.67
Black crappie	120-155	142	57-138	109	3.29-3.82	3.64
Freshwater drum	305-305	305	1106-1106	1106	3.89-3.89	3.89
Rio Grande perch	77-155	118	29-198	91	3.77-7.41	5.12

Seining - The seining results are shown in Table 13. The two collections, one was made in April and the other in September, 1964, took a total of 971 specimens of 8 species. Mosquitofish and threadfin shad comprised 91.24 per cent of the total number taken. Both Mexican tetra (Astyanax mexicanus) and red shiners were abundant in the 1960 collections, but were lacking again in this survey.

Table 13. Seining results, Llano Grande Lake, April and September, 1964

Species	Number Taken	Per Cent of Total Number
Threadfin shad	140	14.42
Mexican tetra	1	0.10
Red shiner	1	0.10
Sheepshead minnow	30	3.09
Mosquitofish	746	76.82
Sailfin molly	1	0.10
Tidewater silverside	41	4.23
Rio Grande perch	11	1.14
Total	971	100.00

Lake Conditions - Twelve Secchi disc readings were recorded on Llano Grande; they ranged from 4 to 11 inches, with a mean average of 8 inches. This comparatively shallow lake coupled with the thick silt bottom and numerous rough fish keep the turbidity high.

Bulrushes and cattails are numerous around the shoreline of the lake. But, these plants are not considered a problem. A few water hyacinths have been observed in the past, but none were seen during this survey.

Dissolved oxygen ranged from 5.1 to 6.4 p.p.m., carbon dioxide ranged from 1.2 to 2.0 p.p.m., methyl orange alkalinity from 175.0 to 190.0 p.p.m. and pH from 8.0 to 8.2.

Recommendations - In view of the high turbidity and nature of the stream, no developmental work is proposed or recommended. A commercial fisherman should be allowed to harvest unlimited numbers of rough fish so long as state and local regulations are complied with.

Campacuas Lake

Campacuas Lake is located in the same floodway as Llano Grande and covers an area of approximately 120 acres. The lake is located between Weslaco and Mercedes in Hidalgo County, Texas.

Netting - Eight gill netting collections were made on this lake in April and September. A total of 149 fish of 14 species weighing 189.1 pounds was taken in the netting collections (Table 14). The game fish species included channel and blue catfish, warmouth, white and black crappie.

Table 14. Results of gill netting, Campacuas Lake, April and September, 1964

Species	Number Taken	Per Cent of Total Number	Weight (grams)	Per Cent of Total Weight
Alligator gar	4	2.69	14.1	7.46
Spotted gar	40	26.85	84.0	44.42
Threadfin shad	6	4.03	0.5	0.26
Gizzard shad	38	25.50	11.0	5.82
Smallmouth buffalo	3	2.01	9.2	4.87
Carp	9	6.04	13.0	6.87
Channel catfish*	9	6.04	17.5	9.25
Blue catfish*	1	0.67	4.6	2.43
Striped mullet	2	1.34	3.8	2.01
Warmouth*	13	8.72	2.3	1.22
White crappie*	4	2.68	1.2	0.63
Black crappie*	1	0.67	0.2	0.11
Freshwater drum	14	9.40	27.4	14.49
Rio Grande perch	5	3.36	0.3	0.16
Total	149	100.00	189.1	100.00
Per Cent Game Fish		18.78		13.64
Per Cent Rough Fish		81.22		86.36

* Indicates game fish

Since the 1963 survey, game fish species showed relative increases both in number and in weight. In 1963, they comprised 3.75 per cent of the total number and 1.11 per cent of the total weight as compared to 18.78 per cent of the number and 13.64 per cent of the weight in 1964. This "change" in large part is due to the fact that more data are available from the 1964 survey and that the state fish hatchery stocked a sizable number of crappie in the lake.

The length-weight statistics are presented in Table 15. Since the 1963 check, there appears to be a relative increase in the average "K" factors of the gizzard shad and smallmouth buffalo. But there appears to be a relative decrease in the average "K" factors of the channel catfish, warmouth and freshwater drum. Otherwise, the average "K" factors appear to be the same.

Table 15. Length-weight statistics of fish taken with gill nets, Campacuas Lake, April and September, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	318-893	548	251-7598	2718	0.78-1.06	0.90
Spotted gar	336-610	508	115-2041	1068	0.61-0.92	0.77
Threadfin shad	126-135	130	39-49	43	1.74-2.33	1.96
Gizzard shad	122-276	206	31-417	190	1.52-2.02	1.78
Smallmouth buffalo	280-382	322	879-2296	1389	3.53-4.11	3.88
Carp	157-352	261	120-1361	658	2.82-3.68	3.08
Channel catfish	193-418	329	111-2041	882	1.49-2.16	1.85
Blue catfish	438-438	438	2098-2098	2098	2.49-2.49	2.49
Striped mullet	307-335	321	737-992	865	2.54-2.63	2.59
Warmouth	106-162	122	22-184	79	3.19-4.55	3.91
White crappie	152-162	156	115-158	134	3.27-3.71	3.51
Black crappie	144-144	144	103-103	103	3.44-3.44	3.44
Freshwater drum	181-360	291	159-1505	887	2.58-2.58	2.58
Rio Grande perch	94-100	98	36-43	40	4.10-4.43	4.28

Seining - Two seining collections were made; the results are shown in Table 16. Sailfin molly (Mollienesia latipinna), threadfin shad, and pugnose minnow (Opsopoeodus emiliae), in that order, comprised 86.89 per cent of the total numbers taken. All told, 648 fish of 12 species were taken in the two collections.

Table 16. Seining results, Campacuas Lake, April and September, 1964

Species	Numbers Taken	Per Cent of Total Number
Threadfin shad	185	28.55
Mexican tetra	6	0.92
Tamalipas shiner	18	2.78
Red shiner	2	0.31
Mosquitofish	25	3.86
Tidewater silverside	2	0.31
Bullhead minnow	3	0.46
Pugnose minnow	117	18.06
Sheepshead minnow	18	2.78
Sailfin molly	261	40.28
Rio Grande perch	10	1.54
Naked goby	1	0.15
Total	648	100.00

Lake Conditions - Eight Secchi disc readings were taken; they ranged from 5 to 10 inches with a mean average of 7 inches. Strong, southeasterly winds, coupled with the thick silt bottom and numerous rough fish, keep the turbidity high. As a result, submerged vegetation is not a problem. Shoreline vegetation consists of bulrushes and cattails.

Recommendations - A commercial fisherman should be allowed to crop the rough fish. No developmental work is proposed or recommended.

Delta Orchards Lake

Delta Orchards Lake, a 2,200 acre surface irrigation reservoir near Monte Alto, is a part of the Hidalgo and Willacy County Water Control and Improvement District No. 1. The reservoir contains approximately 20,000 acre-feet of water which is used to irrigate nearly 70,000 acres of farm land. Most of the water comes from the Rio Grande River via a system of gravity flow irrigation canals.

Public angling is permitted for a 25-cent fee per person per day. But trotline fishing is prohibited except to certain persons who are issued special permission.

Netting - In May and November, 1964, 10 netting collections took a total of 128 fish of 9 species (Table 17). The game fish species taken in the nets included channel and blue catfish, and freshwater drum. Normally, the drum is considered a rough fish species here in south Texas, but it is classed as a game fish in this case because anglers at Delta Orchards Lake harvest them in large numbers the year around.

Table 17. Results of gill netting, Delta Orchards Lake, May and November, 1964

Species	Number Taken	Per Cent of Total Number	Weights (pounds)	Per Cent of Total Weight
Spotted gar	21	16.41	28.8	13.16
Longnose gar	28	21.88	100.6	45.98
Gizzard shad	22	17.19	4.4	2.01
Smallmouth buffalo	6	4.69	18.4	8.41
Carp	17	13.28	13.1	5.99
Channel catfish*	3	2.34	5.6	2.56
Blue catfish*	25	19.53	30.9	14.12
Striped mullet	4	3.12	15.9	7.27
Freshwater drum*	2	1.56	1.1	0.50
Total	128	100.00	218.8	100.00
Per Cent Game Fish		23.43		17.18
Per Cent Rough Fish		76.57		82.82

* Indicates game fish

Of the total fish taken in the nets, game fish species comprised 23.43 per cent of the number and 17.18 per cent of the weight. A year before, they comprised 52.91 per cent and 34.24 per cent by number and weight, respectively. Therefore, it appears that there is a definite decrease both in numbers and in weight. Most of this decrease may be attributed to the disappearance of the crappie. For this reason a sizable number of crappie have been stocked by the state fish hatchery at Brownsville. The freshwater drum has also declined, both in numbers and in weight. In 1963, they comprised 17.44 per cent of the number and 8.36 per cent of the weight as compared to 1.56 per cent of the number and 0.50 per cent of the weight in 1964. This "decline" is not understood.

The average "K" factors, or indices of physical condition, of all fish remained about the same. The length-weight statistics are presented in Table 18.

Table 18. Length-weight statistics of fish taken from Delta Orchards Lake, May and November, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Spotted gar	337-600	442	317-1332	621	0.59-1.00	0.69
Longnose gar	429-885	672	306-3742	1630	0.34-0.64	0.47
Gizzard shad	125-220	160	41-219	91	1.77-2.33	2.03
Smallmouth buffalo	228-437	315	431-3232	1395	3.01-3.87	3.54
Carp	116-363	207	49-1446	350	2.47-3.70	3.14
Channel catfish	327-392	368	567-1021	841	1.57-1.69	1.63
Blue catfish	164-415	306	72-1361	561	1.30-1.93	1.59
Striped mullet	438-479	459	2155-2778	2400	2.34-2.69	2.48
Freshwater drum	190-209	200	238-265	252	2.90-3.47	3.19

Seining - Two seining collections took a total of 914 fish of 13 species (Table 19). Tidewater silversides, mosquitofish, sheepshead minnows (Cyprinodon variegatus) and red shiners, in that order, comprised 91.79 per cent of the total number. The most apparent increase concerned the red shiner. They comprised 0.27 per cent of the 1963 collections as compared to 13.02 per cent of the 1964 collections. The threadfin shad showed a relative decrease from 13.74 per cent in 1963 to 0.44 per cent in 1964, and the Tamaulipas shiner (Notropis braytoni) comprised 18.60 per cent of the 1963 collections as compared to 2.63 per cent in 1964. No other significant changes were noted.

Table 19. Seining results, Delta Orchards Lake, May and November, 1964

Species	Number Taken	Per Cent of Total Number
Threadfin shad	4	0.44
Gizzard shad	9	0.98
Mexican tetra	6	0.66
Tamaulipas shiner	24	2.63
Red shiner	119	13.02
Bullhead minnow	4	0.44
Gulf killifish	4	0.44
Sheepshead minnow	162	17.72
Mosquitofish	251	27.46
Sailfin molly	11	1.20
Tidewater silverside	307	33.59
Rio Grande perch	6	0.66
Naked goby	7	0.76
Total	914	100.00

Lake Conditions - Other than thick growths of algae, aquatic vegetation is lacking in the lake. This may be attributed to the fact that the prevailing strong, southeasterly winds keep the silt in suspension in this shallow lake.

Dissolved oxygen values ranged from 2.8 to 3.4 p.p.m., carbon dioxide values ranged from 0.20 to 1.0 p.p.m., methyl orange alkalinity ranged from 130 to 165 p.p.m., and pH ranged from 8.2 to 8.4. All values are considered normal for this area.

Recommendations - Since wild fish from the Rio Grande River have access to Delta Orchards Lake, population control work would be ineffective and, therefore, is not recommended. It is recommended that a commercial fisherman be permitted to harvest as many rough fish as possible.

Additional crappie should be stocked if they are needed.

San Antonio River

Netting - Five gill netting collections were made on the San Antonio River and Cibolo Creek in June, 1964. A total of 77 fish of 9 species weighing 73 pounds was taken (Table 20). Rough fish species, including spotted and longnose gars, gizzard shad, grey redhorse (Moxostoma congestum), yellow bullheads (Ictalurus natalis) and Rio Grande perch were predominant both in number and weight. Of the three game fish species taken, channel and flathead catfish (Pylodictus olivaris) are the most important sport fishes; however, their

numbers are limited. Again, no carp were taken. There was no significant change in the fish population since the basic survey of 1962 (see completion report for Job B-18, Project F-6-R-10).

Table 20. Results of gill netting, San Antonio River, June, 1964

Species	Number Taken	Per Cent of Total Number	Weights (pounds)	Per Cent of Total Weight
Spotted gar	7	9.09	11.2	15.34
Longnose gar	7	9.09	9.3	12.74
Gizzard shad	5	6.49	1.5	2.06
Grey redhorse	11	14.29	8.3	11.37
Channel catfish*	12	15.59	11.9	16.30
Yellow bullhead	1	1.30	0.2	0.27
Flathead catfish*	6	7.79	22.9	31.37
Bluegill*	4	5.19	0.4	0.55
Rio Grande perch	24	31.17	7.3	10.00
Total	77	100.00	73.0	100.00
Per Cent Game Fish		28.57		48.22
Per Cent Rough Fish		71.43		51.78

* Indicates game fish

The length-weight statistics are presented in Table 21. The average "K" factors are in line with those of the 1962 basic survey.

Table 21. Length-weight statistics of fish taken with gill nets, San Antonio River, June, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Spotted gar	379-560	459	327-1276	727	0.60-0.86	0.71
Longnose gar	412-675	530	288-1191	602	0.28-0.41	0.36
Gizzard shad	142-235	196	50-281	172	1.74-2.19	2.07
Grey redhorse	175-310	237	131-624	341	1.99-2.60	2.35
Channel catfish	190-439	273	109-1729	448	1.58-2.25	1.89
Yellow bullhead	158-158	158	89-89	89	2.25-2.25	2.25
Flathead catfish	316-495	443	510-2282	1729	1.61-2.03	1.86
Bluegill	93-98	95	35-43	40	4.14-5.20	4.68
Rio Grande perch	111-192	151	73-466	238	5.33-6.58	5.94

Seining - Ten seining collections were made during this survey. The results are presented in Table 22. Mosquitofish, red shiners and pugnose minnows, in that order, comprised 92.59 per cent of the seining collection. The red shiners, however, decreased from 62.14 per cent in 1963 to 22.68 per cent in 1964 while the mosquitofish showed an increase from 29.83 per cent in 1963 to 60.42 per cent in 1964.

Table 22. Seining results, San Antonio River, June, 1964

Species	Numbers Taken	Per Cent of Total Number
Smallmouth buffalo	1	0.12
Pugnose minnow	82	9.49
Red shiner	196	22.68
Flathead minnow	2	0.23
Channel catfish	19	2.20
Black bullhead	4	0.46
Tadpole madtom	2	0.23
Blackstripe topminnow	7	0.81
Mosquitofish	522	60.42
Sailfin molly	4	0.46
Amazon molly	1	0.12
Largemouth bass	20	2.31
Bluegill	1	0.12
White crappie	1	0.12
Rio Grande perch	2	0.23
Totals	864	100.00

Recommendations - Every reasonable effort should be made to prevent industrial, municipal and soil pollution in the river. This, of course, will require the combined efforts of many people and agencies.

The sportsmen will be limited to catfish angling in the river. Cibolo Creek has a moderate population of largemouth bass in addition to a good catfish population. Since the catfish is one of the principal game fish species in the river, commercial fishermen should not be allowed to take them and every effort should be made to protect and propagate them.

No developmental work is presently proposed or recommended.

Lake Corpus Christi

Netting - A total of 40 gill netting collections was made on Lake Corpus Christi during January, April, July and October, 1964. All told, these nets took 1,712 fish of 17 species (Table 23).

Table 23. Results of gill netting, Lake Corpus Christi, 1964

Species	Number Taken	Per Cent of Total Number	Weights (pounds)	Per Cent of Total Weight
Alligator gar	8	0.47	199.8	11.71
Spotted gar	137	8.00	286.2	16.77
Longnose gar	102	5.96	423.0	24.79
Gizzard shad	549	32.07	181.8	10.65
Smallmouth buffalo	31	1.81	76.0	4.45
Carp	8	0.47	19.0	1.11
Channel catfish*	112	6.54	34.9	2.04
Blue catfish*	360	21.03	234.7	13.75
Flathead catfish*	1	0.06	3.9	0.23
White bass*	50	2.92	28.7	1.68
Largemouth bass*	6	0.35	6.4	0.37
Warmouth*	2	0.12	0.3	0.02
Redear sunfish*	4	0.23	0.5	0.03
Bluegill	11	0.64	1.2	0.07
White crappie*	109	6.36	58.7	3.44
Black crappie*	26	1.52	15.4	0.90
Freshwater drum	196	11.45	136.3	7.99
Total	1712	100.00	1706.8	100.00
Per Cent Game Fish		39.13		22.46
Per Cent Rough Fish		60.87		77.54

* Indicates game fish

Rough fish species, including alligator gar (Lepisosteus spatula), spotted and longnose gars, gizzard shad, smallmouth buffalo, carp, bluegill, and freshwater drum comprised 60.87 per cent of the number of fish netted and 77.54 per cent of the total weight. In 1963, the rough fish species comprised 58.81 per cent of the number of fish netted and 72.86 per cent of the total weight. Overall, there does not appear to be any significant change in the fish population since the 1963 reconnaissance survey. Among the individual species, there appears to be a relative decrease in the gizzard shad populations. They comprised 32.07 per cent of the total number taken in 1964 as compared to 36.07 per cent in 1963. Otherwise, there were no significant changes.

The principal game fish species include channel, blue and flathead catfish, white bass, largemouth bass, warmouth, white and black crappie. Of these, the blue catfish population showed a relative increase. In 1963, they comprised 18.32 per cent of the total number and 11.50 per cent of the total weight as compared to 21.03 per cent of the number and 13.75 per cent of the weight in 1964. The other game fish species remained about the same as they did a year ago.

The white bass have not greatly increased in the last year. This, to a large extent was due to the unfavorable spawning conditions in the river. Crappie and catfish fishing remained good during the year but largemouth bass fishermen had less than good fishing. This was attributed to the extremely low water level during the spring.

The length-weight statistics are presented in Table 24. No significant changes were noted.

Table 24. Length-weight statistics for fish from Lake Corpus Christi, 1964

Species	Standard Length (mm.)		Weight (grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	612-1340	985	2070-26762	11340	0.90-1.12	1.04
Spotted gar	289-730	486	190-2665	948	0.51-1.00	0.73
Longnose gar	404-983	680	218-5330	1787	0.32-0.65	0.46
Gizzard shad	122-272	184	29-455	151	1.11-2.49	1.98
Smallmouth buffalo	127-438	283	77-3827	1112	3.41-5.24	4.09
Carp	265-377	324	510-1644	1077	2.73-3.29	3.00
Channel catfish	59-370	197	3-936	141	0.66-2.02	1.56
Blue catfish	135-556	250	33-2892	297	1.02-2.78	1.63
Flathead catfish	437-437	437	1758-1758	1758	2.10-2.10	2.10
White bass	130-318	194	66-1276	264	2.72-4.00	3.06
Largemouth bass	216-329	250	263-992	483	2.53-3.44	2.79
Warmouth	106-127	117	49-74	62	3.61-4.12	3.87
Redear sunfish	104-134	123	39-112	80	3.49-4.65	4.05
Bluegill	97-112	101	32-57	42	3.30-4.65	3.97
White crappie	78-269	191	14-624	248	2.59-5.65	3.13
Black crappie	113-234	188	45-539	273	2.84-5.06	3.57
Freshwater drum	120-346	210	44-1588	316	2.26-3.83	2.94

Seining - Thirty-five seining collections took a total of 20,148 fish of 19 species (Table 25). Tidewater silversides, mosquitofish, gizzard shad and red shiners, in that order, comprised 87.74 per cent of the fish seined. In addition to the large numbers of these fish, they were evenly distributed throughout the reservoir.

Table 25. Seining results, Lake Corpus Christi, 1964

Species	Numbers Taken	Per Cent of Total Number
Threadfin shad	7	0.03
Gizzard shad	3494	17.34
Mexican tetra	6	0.03
Pugnose minnow	432	2.15
Red shiner	2175	10.80
Bullhead minnow	196	0.97
Flathead minnow	3	0.01
Channel catfish	4	0.02
Sheepshead minnow	596	2.96
Mosquitofish	5988	29.72
Sailfin molly	266	1.32
Amazon molly	516	2.56
Tidewater silverside	6020	29.88
Largemouth bass	4	0.02
Warmouth	8	0.04
Redear sunfish	13	0.06
Bluegill	361	1.79
White crappie	1	0.01
Rio Grande perch	58	0.29
Total	20148	100.00

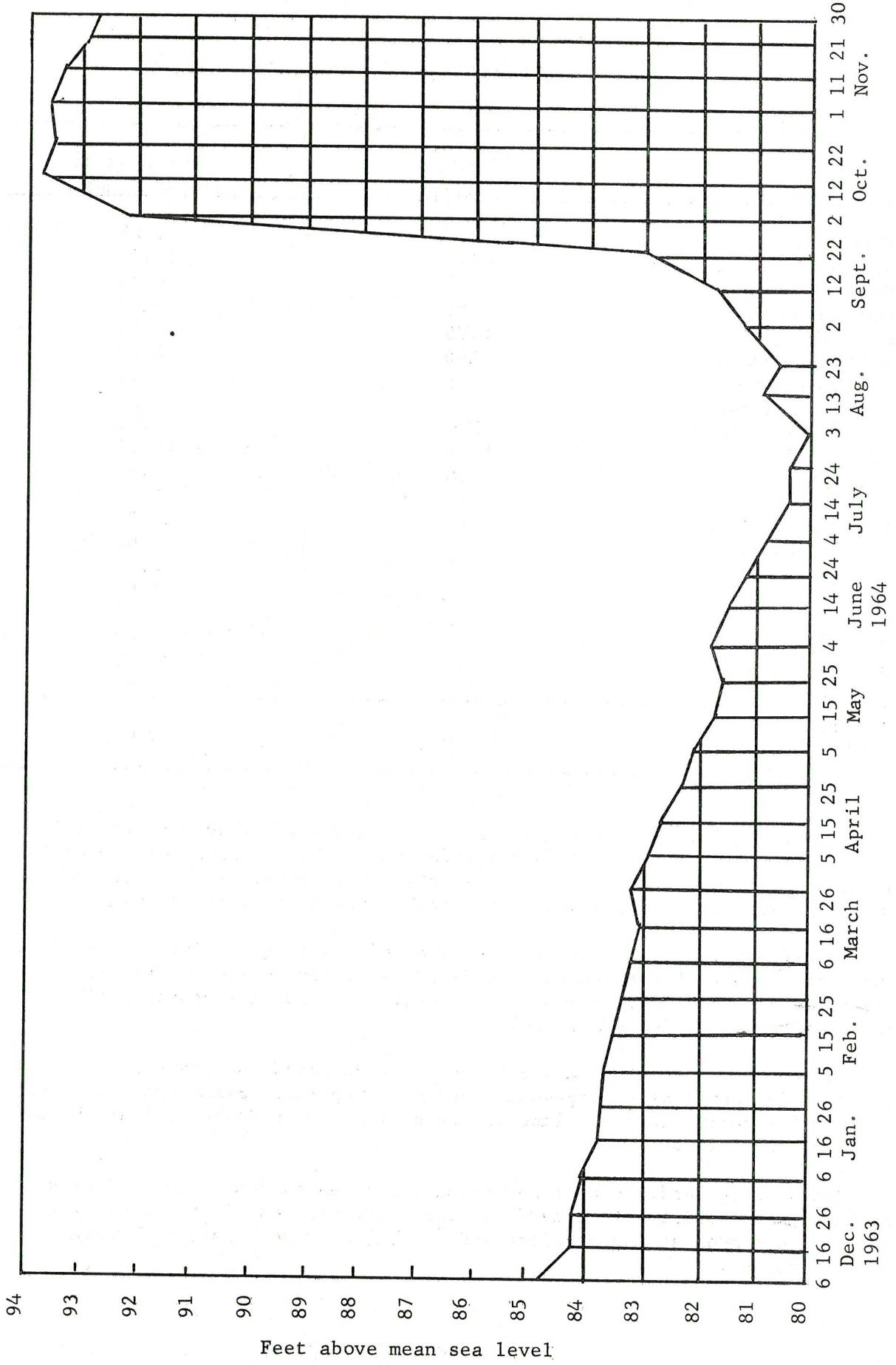
Stomach Analyses - Unidentifiable fish remains and shad were found in the stomachs of both alligator and spotted gars. Mostly shad were found in the white bass, white crappie and blue catfish stomachs. In addition to fish remains, a Rio Grande perch was taken from a largemouth bass' stomach.

Lake Conditions - The water level reached its lowest point on August 8, 1964, when the level was recorded at 79.77 feet. In July, the gates were closed and the heavy fall rains filled the lake to its new capacity of 94 feet on October 6, 1964 (Table 26).

Undoubtedly, the fluctuating water level affected the spawning of centrarchids, especially largemouth bass and crappies. Since there was very little water coming into the lake in the spring, it is doubtful that the white bass had a good spawn.

Secchi disc readings of light penetration ranged from 7 to 27 inches. The water was consistently clearer in the lower reaches of the lake. Water analyses were made at two stations and all values were considered normal for this region.

Table 26. Lake Corpus Christi water levels, December, 1963 through November, 1964



Recommendations - Water hyacinth control work should, if at all possible, be continued. The volume of Lake Corpus Christi has increased considerably and the water hyacinths will certainly become a major problem in the near future.

No other developmental or management work is recommended.

For information purposes a comparison of netting success is included as Table 27.

Prepared by Charles T. Menn
Project Leader

Approved by Marion Toole
Coordinator

Date January 18, 1965

Kenneth C. Jurgens
Regional Supervisor

Table 27. Success of gill netting in terms of number and pounds of fish caught

Body of Water	Number of Nets	Number of Feet of Nets	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
Harlingen City Lake	4	500	29	7.3	0.058	50.2	12.6	0.100
Bentsen State Park Lake	3	375	22	7.3	0.059	21.1	7.0	0.056
Fort Brown Lake	4	500	162	40.5	0.324	84.5	21.1	0.169
Llano Grande Lake	12	1500	466	38.8	0.311	281.1	23.4	0.187
Campacuas Lake	8	1000	149	18.6	0.149	189.1	23.6	0.189
Delta Orchards Lake	10	1250	128	12.8	0.102	218.8	21.9	0.175
San Antonio River	5	625	77	15.4	0.123	73.0	14.6	0.117
Lake Corpus Christi	40	5000	1712	42.8	0.342	1706.8	42.7	0.341