JOB COMPLETION REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

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Federal Aid Project No. F-6-R-9

FISHERIES INVESTIGATIONS AND SURVEYS OF THE WATERS OF REGION 8-B

Job No. B-17 Basic Survey and Inventory of Fish Species Present in Anzalduas Reservoir

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ABSTRACT

Anzalduas Reservoir, a newly built channel impoundment of approximately 530 surface acres on the Rio Grande River near Mission, Texas was surveyed during 1960 and 1961 to determine its chemical and physical characteristics and to determine the relative numbers of the fish species present in its fish population. It was found to be highly saline due to salt water entering the reservoir from a creek on the Mexican side of the river. During 1961, this salinity reached a level too high for the water to be used for irrigation and the lake was therefore drained and flushed in December 1961.

Prior to draining the lake, netting studies showed the fish population to be comprised of 82 per cent rough fish species, which accounted for 88 per cent of the weight of the total specimens collected. Rough fish species present included: alligator, spotted and longnose gars, gizzard shad, smallmouth buffalo, striped mullet, freshwater drum and Rio Grande perch. The principal game fish present were channel and blue catfish, and white bass.

Because the lake has a small capacity, an unstable water level and a deeply silted bottom, it is doubtful if any freshwater game species other than catfish will become established in numbers sufficient to create a good sport fishery. It is recommended, however, that periodic reconnaissance be made to determine any gross changes in the fish population.

JOB COMPLETION REPORT

State of Texas

Project No. F-6-R-9 Name: Fisheries Investigations and Surveys of the Waters of Region 8-B

Job No. B-17 Title: Basic Survey and Inventory of Fish Species Present in Anzalduas Reservoir

Period Covered: January 1 through December 31, 1961

Objectives:

To determine the chemical and physical characteristics of the Anzalduas Reservoir and the relative numbers of fish species present.

Techniques Used:

Field trips were planned on a bimonthly schedule but were actually made in March, April, June, September, October and December. Bad weather or time spent on other project work prevented making the scheduled bimonthly trips.

Experimental gill nets and a nylon seine were used to sample the fish population. The netted specimens were weighed in grams and measured in millimeters. They were then dissected to determine sex and stage of sexual maturity. Food in the stomachs of carnivorous species was identified in the field. Seined specimens were preserved in 10 per cent formalin and taken to the Mathis Laboratory for identification and tabulation.

Water analyses were made in April, October and December. Tests were made for dissolved oxygen, carbon dioxide, alkalinity and pH. Notes concerning physical and general ecological conditions were made and recorded. A list of fish taken during the survey, giving both scientific and common names, is included as Table 1. The scientific and common names used in this table were taken from Hubbs' A Checklist of Texas Fresh-Water Fishes, Texas Game and Fish Commission, IF Series, No. 3, June, 1961.

Findings:

Anzalduas Reservoir is a new channel impoundment on the Rio Grande River approximately 8 miles SE. of Mission in Hidalgo County, Texas. Recently completed, it was cooperatively built by the United States and Mexico and is administered through the International Boundary and Water Commission. The

Table 1. Checklist of Fish Species Recorded from Anzalduas Reservoir

Common Name	Scientific Name
Alligator gar	Lepisosteus spatula Lacépède
Spotted gar	Lepisosteus oculatus (Winchell)
Longnose gar	Lepisosteus osseus (Linnaeus)
Threadfin shad	Dorosoma petenense (Gunther)
Gizzard shad	Dorosoma cepedianum (LeSueur)
Mexican tetra	Astyanax mexicanus (Filippi)
Smallmouth buffalo	Ictiobus bubalus (Rafinesque)
Speckled chub	Hybopsis aestivalis (Girard)
Tamaulipas shiner	Notropis braytoni Jordan and Evermann
Ghost shiner	Notropis buchanani Meek
Bullhead minnow	Pimephales vigilax (Baird and Girard)
Channel catfish	Ictalurus punctatus (Rafinesque)
Rio Grande blue catfish	Ictalurus furcatus (LeSueur)
Gulf killifish	Fundulus grandis Baird and Girard
Sheepshead minnow	Cyprinodon variegatus Lacépède
Mosquitofish	Gambusia affinis (Baird and Girard)
Amazon molly	Mollienesia formosa (Girard)
Striped mullet	Mugil cephalus Linnaeus
Tidewater silverside	Menidia beryllina (Cope)
White bass	Roccus chrysops (Rafinesque)
Freshwater drum	Aplodinotus grunniens Rafinesque
Rio Grande perch	Cichlasoma cyanoguttatum (Baird and Girard)

reservoir's primary purpose is to provide gravity-flow water to large irrigation ditches on both the American and Mexican side of the Rio Grande Valley. The reservoir is approximately 25 miles in length, has an approximate capacity of 4,240 acre-feet and covers some 530 surface acres. Since the bulk of the water is contained within the natural river banks, there is little or no flooding of adjacent lands.

Netting Collections

Four netting stations were set up approximately 2, 8, 14 and 20 miles above the dam, all on the Texas side. One net was set at each station six times during the survey with the exception of Station 4. No net was set at this station in December because the water in the reservoir was being flushed out to reduce accumulated salinity. All told, 23 netting collections took 281 fish, of 11 species, which weighed 473.2 pounds. Table 2 shows the numbers of fish netted and Table 3 shows the weight in pounds of fish taken each month. Table 4 shows the numbers and weights of fish taken at each station during the survey.

Rough fish species including alligator gar, spotted gar, longnose gar, gizzard shad, smallmouth buffalo, striped mullet, freshwater drum and Rio Grande perch comprised 82.21 per cent of the number and 88.26 per cent of the weight of the fish netted. Gizzard shad alone comprised over 42 per cent of the number of fish taken in the nets, while longnose gar comprised over 19 per cent and Rio Grande blue catfish comprised almost 14 per cent. Curiously, carp, Cyprinus carpio Linnaeus, are found in Llano Grande, Campacuas, Fort Brown, Delta Orchards, Falcon and Casa Blanca Lakes but not in Anzalduas Reservoir. Also, river carpsuckers, Carpiodes carpio (Rafinesque), are found in Casa Blanca and Falcon Lakes but not in Anzalduas. White crappie, Pomoxis annularis Rafinesque, are found in numbers in many lakes in south Texas but, again, none was found in Anzalduas. Besides Rio Grande blue catfish, channel catfish and one specimen of white bass were the only representatives of game fishes found. However, it is known that the flathead catfish, Pylodictus olivaris (Rafinesque), is also present. In September two fishermen reported catching a "nice" (10- to 12-pound) flathead on a trotline using "cut perch".

The white bass taken at Station 3, approximately 14 miles upstream from the dam, probably came from Falcon Lake, about 85 river miles upstream. It is a known fact that anglers take many largemouth bass, Micropterus salmoides (Lacépède), and white bass in the spring and fall below Falcon Dam. For that reason, it was anticipated that these species might become established in Anzalduas, but thus far they apparently have not.

Table 4 shows the numbers and pounds of fish taken at each netting station. Two alligator gar, taken at Station 2, weighed over 20 pounds each and are not included in the table. The maximum measurable weight of the project scales is 20 pounds.

Table 5 shows the length-weight statistics of fish taken during the survey. The "K" factors of channel catfish and Rio Grande blue catfish in Anzalduas are slightly lower than "K" factors for these species recorded from other waters in this region. Otherwise, no significant difference was noticed

Table 2. Numbers of Fish Caught Each Month in Experimental Gill Nets, Anzalduas Reservoir, 1961

Species	March	April	June	September	October	December	Total	Per Cent By Number
Alligator gar	1	1	4	0	0	0	6	2.14
Spotted gar	2	5	2	1	4	6	20	7.12
Longnose gar	8	11	16	9	6	4	54	19.22
Gizzard shad	9	15	25	29	27	15	120	42.71
Smallmouth buffalo	1	2	3	0	5	6	17	6.04
Channel catfish*	0	8	0	0	2	0	10	3.56
Rio Grande blue catfish*	6	7	11	3	5	7	39	13.88
Striped mullet	0	0	0	0	0	1	1	0.35
White bass*	0	0	0	1	0	0	1	0.35
Freshwater drum	0	3	0	3	1	5	12	4.28
Rio Grande perch	0	0	0	0	0	1	1	0.35
Totals	27	52	61	46	50	45	281	100.00

Per Cent Game Fish:	17.79
Per Cent Rough Fish:	82.21
Total:	100.00

* Indicates game fish

Table 3. Pounds of Fish Caught Each Month in Experimental Gill Nets, Anzalduas Reservoir, 1961

Species	March	April	June	September	October	December	Totals	Per Cent By Weight
Alligator gar	*	10.2	15.3	0	0	0	25.5	5.39
Spotted gar	6.9	8.2	4.2	1.4	6.5	14.6	41.8	8.81
Longnose gar	35.3	55.1	72.0	55.1	7.9	6.1	231.7	48.99
Gizzard shad	5.8	8.1	10.7	13.2	8.0	8.0	53.8	11.39
Smallmouth buffalo	2.7	6.2	11.0	0	23.3	14.8	58.0	12.26
Channel catfish**	0	4.1	0	0	0.5	0	4.6	0.97
Rio Grande blue catfish**	7.3	16.0	18.2	2.2	3.1	3.5	50.3	10.61
Striped mullet	0	0	0	0	0	2.6	2.6	0.54
White bass**	0	0	0	0.8	0	0	0.8	0.16
Freshwater drum	0	1.3	0	0.4	0.4	2.1	4.2	0.86
Rio Grande perch	0	0	0	0	0	0.1	0.1	0.02
Totals	58.0	109.2	131.4	73.1	49.7	51.8	473.2	100.00

Per Cent Game Fish:	11.74
Per Cent Rough Fish:	88.26
Total:	100.00

* No weight recorded, fish weighed more than 20 pounds

** Indicates game fish

Table 4. Numbers and Pounds of Fish Taken With Experimental Gill Nets, Anzalduas Reservoir, 1961

Species	STATIONS 1 No.	1 Wt.	2 No.	2 Wt.	3 No.	3 Wt.	4 No.	4 Wt.	Total No.	Total Wt.	Per Cent by No.	Per Cent by Wt.
Alligator gar	0	0	2	0*	4	25.5	0	0	6	25.5	2.14	5.39
Spotted gar	14	26.5	3	8.7	3	6.5	0	0	20	41.7	7.12	8.81
Longnose gar	15	96.8	25	75.4	4	8.3	10	51.2	54	231.7	19.22	48.99
Gizzard shad	23	11.5	74	33.1	13	5.3	10	4.0	120	53.9	42.71	11.39
Smallmouth buffalo	2	7.3	6	27.0	9	23.7	0	0	17	58.0	6.05	12.26
Channel catfish**	0	0	1	0.3	2	1.0	7	3.3	10	4.6	3.56	0.97
Rio Grande blue catfish**	16	20.5	17	20.1	4	5.0	2	4.6	39	50.2	13.88	10.61
Striped mullet	1	2.6	0	0	0	0	0	0	1	2.6	0.35	0.54
White bass**	0	0	0	0	1	0.8	0	0	1	0.8	0.35	0.16
Freshwater drum	2	0.8	5	1.3	4	1.9	1	0.1	12	4.1	4.27	0.86
Rio Grande perch	0	0	1	0.1	0	0	0	0	1	0.1	0.35	0.02
Totals	73	166.0	134	166.0	44	78.0	30	63.2	281	473.2	100.00	100.00
Per Cent Game Fish:											17.79	11.74
Per Cent Rough Fish:											82.21	88.26
Totals											100.00	100.00

* No weight recorded, fish weighed more than 20 pounds

** Indicates game fish

Table 5. Length-weight Statistics of Fish Taken with Experimental Gill Nets, Anzalduas Reservoir, 1961

Species	Standard length (millimeters) Range	Average	Weight (in grams) Range	Average	"K" Factors Range	Average
Alligator gar	803-803	803.00	4649-4649	4649.00	0.89-0.89	0.89
Spotted gar	430-642	521.60	482-1758	948.45	0.52-0.79	0.63
Longnose gar	402-990	726.30	192-6407	1983.85	0.29-0.67	0.41
Gizzard shad	132-282	220.21	45-442	222.45	1.31-2.45	1.92
Smallmouth buffalo	195-502	344.29	250-4678	1548.94	2.63-3.80	3.36
Channel catfish	140-342	239.50	38-405	206.70	1.01-1.55	1.35
Rio Grande blue catfish	195-599	313.37	83-3416	600.50	1.09-1.72	1.38
Striped mullet	390-390	390.00	1191-1191	1191.00	2.00-2.00	2.00
White bass	242-242	242.00	366-366	366.00	2.58-2.58	2.58
Freshwater drum	62-230	173.67	5-278	155.83	1.82-3.13	2.32
Rio Grande perch	98-98	98.00	46-46	46.00	4.88-4.88	4.88

in the condition of netted specimens.

Table 6 gives a summary on the success of netting in terms of numbers and weights of fish caught during the twelve-month survey. The heaviest catch was recorded in June. Sixty-one fish were taken in the four nets. They weighed a total of 131.4 pounds. A total of 45 fish was taken in three nets in December. This amounted to 15 fish per net, which was second only to the catch in June. Most of the fish were caught at Stations 1 or 2, in the lower portions of the lake. According to Table 4, 207 or 74 per cent of the 281 fish collected were caught at Stations 1 and 2.

Seining Collections

Results of the 13 seining collections are given in Table 7. The most frequently caught fishes were the mosquitofish, the Amazon molly, the Mexican tetra, and the Tamaulipas shiner. In all, 1,089 fish of 15 species were taken in the seining collections. Both threadfin and gizzard shad were collected in the seining collections at all stations. A careful check of the shad collected in the nets was made and no threadfins were found. Tidewater silversides were expected to be found in larger numbers because of their abundance in Falcon Lake. However, they comprised only 5.15 per cent of the fish taken in seining collections in Anzalduas. Stations A and B were located in silt 8 inches deep but Station C was located on a sandy beach.

Ecological Conditions

Secchi disc readings were made at each of the netting stations except at Station 4 in October and December. It was found that the water was decidedly clearer in the lower portions of the lake, that is, from the dam upstream about 10 miles. The average Secchi disc reading from the lower two stations is 14.7 inches as compared to an average of 9.9 inches for the upper two stations. Clearer water in the lower part of the lake can be explained in part by silt settling out before it reaches the lower portions of the lake.

Chemical analyses of water in Anzalduas were not carried out as planned because of insufficient reagents, low water conditions, or a lack of time. Water sample stations were established at net Stations 2 and 4. Samples were taken from the surface down to a depth of approximately 15 feet. Five sets of analyses were made during the course of this job: two in April, two in October, and one in December. The water was tested for dissolved oxygen, dissolved carbon dioxide, methyl orange alkalinity and pH. The chemist at San Marcos made salinity determinations for the samples taken in April.

Dissolved oxygen ranged from 6.2 to 13.6 parts per million and dissolved carbon dioxide ranged from 2.0 to 14.0 parts per million. Methyl orange alkalinity ranged from 106 to 198 parts per million with the average about 155 parts per million. The pH ranged from 7.8 to 8.6. All of these values are considered to be normal for this part of south Texas.

Salinity ranged from 1,200 to 2,600 parts per million. The higher reading was obtained from a sample taken about three miles below the mouth of El Morillo Drain, an extremely saline creek draining into Anzalduas from the

Table 6. Success of Experimental Gill Netting in Anzalduas Reservoir in Terms of Numbers and Pounds of Fish Caught

Month	Number of Nets Set	Number of Feet of Nets Set	Number of Fish Caught	Number of Fish/Net	Number of Fish/Foot of Net	Pounds of Fish Caught	Pounds of Fish/Net	Pounds of Fish/Foot of Net
March	4	500	27	6.75	0.054	57.9	14.47	.1158
April	4	500	52	13.00	0.104	109.3	27.32	.2186
June	4	500	61	15.25	0.122	131.4	32.85	.2628
September	4	500	46	11.50	0.092	73.1	18.27	.1462
October	4	500	50	12.50	0.100	49.7	12.42	.0994
December	3	375	45	15.00	0.120	51.9	17.30	.1384

Table 7. Seining Results, Anzalduas Reservoir, 1961

Species	Stations A	B	C	Total	Per Cent by Number
Longnose gar	1	0	0	1	0.09
Threadfin shad	23	18	1	42	3.86
Gizzard shad	14	8	18	40	3.67
Mexican tetra	19	76	40	135	12.41
Smallmouth buffalo	1	0	0	1	0.09
Speckled chub	6	0	18	24	2.20
Tamaulipas shiner	11	17	73	101	9.27
Ghost shiner	0	3	0	3	0.28
Bullhead minnow	0	0	1	1	0.09
Gulf killifish	1	0	0	1	0.09
Sheepshead minnow	5	0	2	7	0.64
Mosquitofish	387	56	61	504	46.28
Amazon molly	141	17	7	165	15.15
Tidewater silverside	4	50	6	60	5.51
Rio Grande perch	0	1	3	4	0.37
Totals	613	246	230	1089	100.00

Mexican side. Engineers at the Office of Water Control, at Anzalduas Dam, said that the salinity in the lake reached 1,800 parts per million at the dam in early December and since farmers refuse to take the water for irrigation when salinity reaches 1,600 parts per million, the International Boundary and Water Commission decided to flush out the saltwater in the lake. Anzalduas was lowered considerably on December 5 and "flushed out" by heavy releases of water from Falcon Dam. The final trip of this survey was made during the time the reservoir was being lowered.

Figure 1 shows the water levels, taken at the dam, for the period of October 1, 1960 through September 26, 1961, at 10-day intervals. The water level fluctuated approximately three feet during the period from January through September 1961.

Aquatic vegetation is lacking in Anzalduas. None was found on the Texas side of the lake and cursory examinations on the Mexican side did not reveal any vegetation of any kind. Obviously the high turbidity and ever-changing water level account for the absence of aquatic vegetation.

Most of the shoreline of Anzalduas is lined with willow trees. Mesquite, retama, huisache, ebony, castor beans and prickly pear are rather common on the shallow banks of Anzalduas. Cotton, corn, maize and various vegetables and citrus fruits are grown near Anzalduas on the Texas side. Cotton and corn appear to be the principal crops grown on the Mexican side.

Access and Fishing Pressure

Public access is limited on Anzalduas. Most farmers will permit access provided they are asked first. There are no commercial developments such as fishing camps, boat docks, or summer homes on either side of the lake.

Sports fishing is limited to catfish fishing. Trotlines, throwlines, and occasionally rods and reels are used to catch catfish. Only 15 sports fishermen were seen on Anzalduas during this survey. Most of them were on the Texas side. Two commercial minnow fishermen were "jugging" for Mexican tetras and were very successful.

Conclusions and Recommendations:

The basic survey furnished sufficient evidence which suggests that neither largemouth bass nor white bass populations are likely to become established in Anzalduas under present circumstances. The salinity is not considered detrimental to game fishes, but the turbidity and especially the fluctuating water level are. Channel catfish and Rio Grande blue catfish are the only important game species in Anzalduas at the present. Even though flatheads are present, they are not thought to be numerous since none were taken in either nets or seines and fishermen report they catch "blue cats" most of the time. Apparently forage species such as tetras and Tamaulipas shiners are able to produce good numbers without submerged vegetation. Should the water clear in the future, submerged vegetation will surely develop.

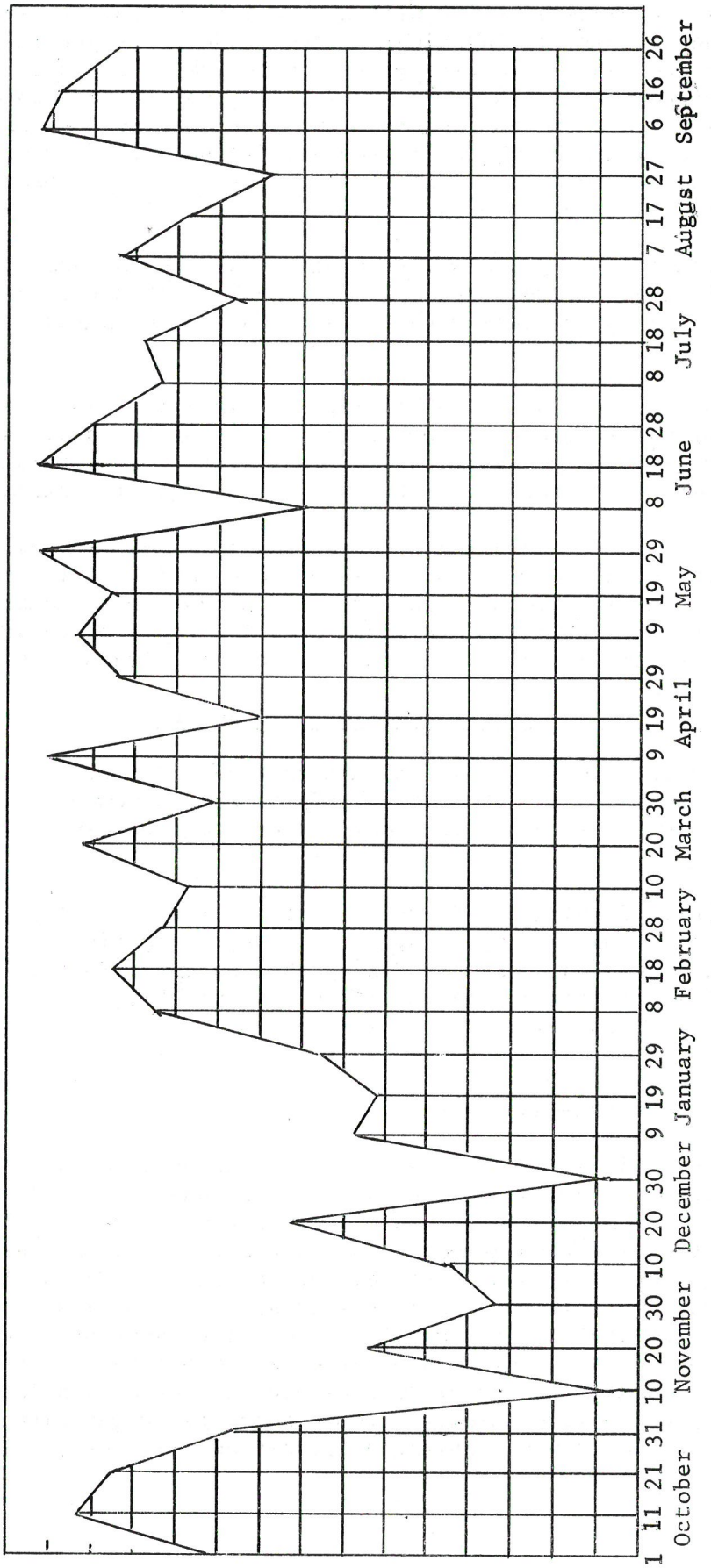

Figure 1. Anzalduas Reservoir Water Levels, October 1960 through September 1961

No developmental work of any kind is recommended because any rough fish control work would be almost impossible because the lake is an international boundary. Repopulation from the remainder of the watershed would be uncontrollable.

Annual or semiannual trips should be made in future segments to determine changes in the fish population. Such work should be done under the reconnaissance job (F-6-R, B-20).

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