

JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

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Federal Aid Project No. F-6-R-10

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

Job No. B-18 Basic Survey and Inventory of the Fish Species Present
in the San Antonio River

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A B S T R A C T

The basic survey of the San Antonio River lying within Wilson, Karnes, Goliad and Refugio counties revealed that channel and flathead catfish are the principal game species. For that reason, every effort should be made to protect and propagate catfish in this drainage.

Soil pollution over many years has caused the formation of silt deposits along the banks of the relatively narrow river, which tend to favor "rough fish."

Rough fish species including alligator, spotted and longnose gars, gizzard shad, smallmouth buffalo, river carpsucker, carp, grey redhorse, and Rio Grande perch comprised 84.16 per cent by number and 97.40 per cent by weight of the fish taken in the netting collections.

Red shiners were found at all 15 seining stations and comprised 42.97 per cent of the fish taken in the seining collections.

No recommendations are made for developmental work at this time. However, reconnaissance checks should be made at least once a year to detect gross changes in fish populations.

JOB COMPLETION REPORT

State of Texas

Project No. F-6-R-10

Name: Fisheries Investigations and Surveys of the Waters of Region 5-B

Job No. B-18

Title: Basic Survey and Inventory of the Fish Species Present in the San Antonio River

Period Covered: January 1, 1962 through December 31, 1962

Objectives:

To determine the physical, chemical and ecological conditions and the relative numbers of fish species present in the lower portions of the San Antonio River lying within Wilson, Karnes, Goliad and Refugio Counties.

Procedure:

Maps prepared by the Texas Highway Department were used in the field to pinpoint seining, netting and water sampling stations. Tracings of U.S. Department of Agriculture aerial photographs were not made because of their large size. The project leader decided that such maps would not be practical for this work and that the expense of tracing the maps would not be justifiable.

Notes were made of pollution, aquatic vegetation and other ecological factors.

The fish populations were sampled with the standard, 125-foot long, gill nets and nylon minnow seines. The gill nets are constructed of nylon webbing, 8-feet deep, in five 25-foot long sections of 1-, 1½-, 2-, 2½-, and 3- inch square mesh. Specimens taken in the nets were weighed in grams and measured in millimeters in the field. Internal examinations were made to determine sex, stage of sexual development and incidence of parasitism. Stomachs of carnivorous species were examined to determine food habits.

Seined specimens were preserved in 10 per cent formalin and taken to the Mathis field office for identification and tabulation.

A list of the fish species taken in nets and seines is included in 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

Table 1. A List of Fish Species Recorded From San Antonio River

Common Name	Scientific Name
Alligator gar	<u>Lepisosteus spatula</u> Lacepede
Spotted gar	<u>L. oculatus</u> (Winchell)
Longnose gar	<u>L. osseus</u> (Linnaeus)
Threadfin shad	<u>Dorosoma petenense</u> (Gunther)
Gizzard shad	<u>D. cepedianum</u> (LeSueur)
Mexican tetra	<u>Astyanax mexicanus</u> (Filippi)
Smallmouth buffalo	<u>Ictiobus bubalus</u> (Rafinesque)
River carpsucker	<u>Carpiodes carpio</u> (Rafinesque)
Grey redhorse	<u>Moxostoma congestum</u> (Baird and Girard)
Carp	<u>Cyprinus carpio</u> Linnaeus
Golden shiner	<u>Notemigonus crysoleucas</u> (Mitchill)
Pugnose minnow	<u>Opsopoeodus emiliae</u> Hay
Speckled chub	<u>Hybopsis aestivalis</u> (Girard)
Red shiner	<u>Notropis lutrensis</u> (Baird and Girard)
Ghost shiner	<u>N. buchanani</u> Meek
Bullhead minnow	<u>Pimephales vigilax</u> (Baird and Girard)
Channel catfish	<u>Ictalurus punctatus</u> (Rafinesque)
Yellow bullhead	<u>I. natalis</u> (LeSueur)
Flathead catfish	<u>Pylodictus olivaris</u> (Rafinesque)
Tadpole madtom	<u>Schilbeodes gyrinus</u> (Mitchill)
Blackstripe topminnow	<u>Fundulus notatus</u> (Rafinesque)
Mosquitofish	<u>Gambusia affinis</u> (Baird and Girard)
Sailfin molly	<u>Mollienesia latipinna</u> (LeSueur)
Striped mullet	<u>Mugil cephalus</u> (Linnaeus)
Tidewater silverside	<u>Menidia beryllina</u> (Cope)
Largemouth bass	<u>Micropterus salmoides</u> (Lacepede)
Warmouth	<u>Chaenobryttus gulosus</u> (Cuvier)
Green sunfish	<u>Lepomis cyanellus</u> (Rafinesque)
Redbreast sunfish	<u>L. auritus</u> (Linnaeus)
Bluegill	<u>L. macrochirus</u> (Rafinesque)
Longear sunfish	<u>L. megalotis</u> (Rafinesque)
Logperch	<u>Percina caprodes</u> (Rafinesque)
Rio Grande perch	<u>Cichlasoma cyanoguttatum</u> (Baird and Girard)

Series No. 3, June 1961.

Findings:

Physical Description

The San Antonio River rises within the City of San Antonio and flows approximately 180 miles in a southeasterly direction to its confluence with the Guadalupe near San Antonio Bay on the Texas coast. With a relatively small watershed of only 4,460 square miles and a semi-arid climate, the mean annual flow of the river near its mouth is a meagre 350,000 acre feet.

The major tributaries of the San Antonio are the Medina River and Cibolo Creek. Both are spring fed streams and differ somewhat in water quality from the San Antonio, particularly in turbidity.

Normally the San Antonio River is a rapidly moving, turbid stream with an average width of some 40 feet and an average depth of five feet. In the portions of the river included in the study, the banks are mostly sharply cut, indicating frequent flooding. The stream bottom varies from limestone, in Wilson County, to sand and sandstone in Karnes and Goliad counties to sand, sandstone and mud in the lower portions of Refugio County. Silt deposits are found near the banks along the river, but are lacking in the main current.

Pecan, hackberry, ash, cottonwood and cypress trees are numerous along the river. Also, willow, huisache and mesquite trees are frequently encountered along the San Antonio. Bloodweeds, grapevine, sunflowers and prickly pear combine to form dense thickets lining a considerable part of the river.

Netting Collections

Five netting stations were set up during this survey; three on the San Antonio River and two on Cibolo Creek. The netting stations on the creek were located in Wilson County and those on the San Antonio River were in Karnes, Goliad and Refugio counties. No suitable netting water on the San Antonio River was found in Wilson County. An overnight set was made at each station twice during the study period.

All told, 120 fish of 17 species weighing 215.2 pounds were taken in the netting collections. Game fish species including channel catfish, flathead catfish, largemouth bass, warmouth, bluegill, redbreast and long-ear sunfish comprised 15.84 per cent of the netted fish and 2.60 per cent of their weight.

Rough fish species including alligator, spotted and longnose gars,

gizzard shad, smallmouth buffalo, river carpsucker, carp, grey redhorse, and Rio Grande perch dominated the netting collections both in numbers and in weights with 84.16 per cent of the number and 97.40 per cent of the weight. Tables 2 and 3 show the results of netting by station.

Gars of one species or another were taken at all stations, but were more abundant in the lower portions of the river in Goliad and Refugio counties. Unidentifiable fish remains were found in four gar stomachs and five were empty. No parasites were found.

Gizzard shad were taken only at Station No. 3, at Conquista Park in Karnes County, and at station No. 5, near the mouth of the San Antonio River in Refugio County. The shad comprised only 6.67 per cent of the number and 3.67 per cent of the weight of the fish netted. The relatively small shad population is probably due to the abundance of predators such as gars and catfish.

Collectively, smallmouth buffalo, river carpsucker and grey redhorse comprised 35.83 per cent by number and 25.65 per cent by weight of the fish taken in the netting collections. Of the three species, smallmouth buffalo appear to be dominant in the lower portions of the river, while grey redhorse are limited to the clearer waters of Cibolo Creek and probably to the clearer, upper portions of the river.

It is interesting to note that only one specimen of carp was taken during the survey. The lone carp was taken at netting Station No. 3, at Conquista Park in Karnes County. A state fisheries survey made in 1953 by Kuehne (IF Report Series No. 1, Texas Game and Fish Commission) also found that carp were lacking in the San Antonio basin. Thus, it appears that the San Antonio River is one of the few drainages in the state lacking a sizeable carp population.

Rio Grande perch were taken only at the Conquista Park netting stations in Karnes County. However, this species was taken in several seining collections in the upper portions of the river and in Cibolo Creek. Apparently cold water during winter months controls their numbers in downstream areas, since none were taken in either nets or seines. Apparently spring areas in the upper portions of the river and in Cibolo Creek afford sufficient protection for their survival.

The largemouth bass, in this drainage, appears to be limited to the upper portions of the San Antonio River and to Cibolo Creek. Only three specimens were collected in netting collections and this occurred at the Conquista Park site. Murky water apparently prevents development of a good bass population in most of the river. To offset poor reproduction of the species, 11,000 largemouth bass fingerlings were stocked during May 1962 in areas of Cibolo Creek where sufficient food and cover were available.

Channel catfish and flathead catfish seem to be well established in the river. Only four channel and flathead catfish were taken in the nets, but 127 channel catfish were taken in seining collections at various places

Table 2. Results of netting, San Antonio River, 1962

Species	Stations					Totals	Per cent of total
	1	2	3	4	5		
Alligator gar	0	0	0	0	1	1	0.83
Spotted gar	0	2	0	1	2	5	4.17
Longnose gar	1	1	2	5	16	25	20.83
Gizzard shad	0	0	7	0	1	8	6.67
Smallmouth buffalo	0	0	2	0	5	7	5.83
River carpsucker	0	0	6	0	0	6	5.00
Grey redhorse	11	19	0	0	0	30	25.00
Carp	0	0	1	0	0	1	0.83
Channel catfish *	0	1	1	0	0	2	1.67
Yellow bullhead	1	0	0	0	0	1	0.83
Flathead catfish *	0	1	0	1	0	2	1.67
Largemouth bass *	0	1	3	0	0	4	3.33
Warmouth *	0	3	1	0	0	4	3.33
Bluegill *	0	2	1	0	0	3	2.50
Redbreast sunfish *	0	2	0	0	0	2	1.67
Longear sunfish *	0	0	2	0	0	2	1.67
Rio Grande perch	0	0	17	0	0	17	14.17
Totals	13	32	43	7	25	120	100.00
* Indicates game fish						Game fish	15.84
						Rough fish	84.16
						Total	100.00

Table 3. Weights of fish taken in netting San Antonio River Survey, 1962

Species	Stations					Totals	Per cent of total
	1	2	3	4	5		
Alligator gar	0	0	0	0	20.5	20.5	9.53
Spotted gar	0	1.0	0	2.2	6.3	9.5	4.41
Longnose gar	0.8	1.0	0.7	18.9	90.5	111.9	52.00
Gizzard shad	0	0	7.1	0	0.8	7.9	3.67
Smallmouth buffalo	0	0	6.1	0	16.3	22.4	10.41
River carpsucker	0	0	10.7	0	0	10.7	4.97
Grey redhorse	10.3	11.8	0	0	0	22.1	10.27
Carp	0	0	0.3	0	0	0.3	0.14
Channel catfish *	0	1.0	0.2	0	0	1.2	0.56
Yellow bullhead	0.2	0	0	0	0	0.2	0.09
Flathead catfish *	0	0.8	0	0.3	0	1.1	0.51
Largemouth bass *	0	0.6	1.1	0	0	1.7	0.79
Warmouth *	0	0.7	0.1	0	0	0.8	0.37
Bluegill *	0	0.3	0.1	0	0	0.4	0.19
Redbreast sunfish *	0	0.2	0	0	0	0.2	0.09
Longear sunfish *	0	0	0.2	0	0	0.2	0.09
Rio Grand perch	0	0	4.1	0	0	4.1	1.91
Totals	11.3	17.4	30.7	21.4	134.4	215.2	100.00
* Indicates game fish.							
					Game fish		2.60
					Rough fish		97.40
					Total		100.00

along the river and Cibolo Creek. Insect remains were found in a channel catfish's stomach.

Table 4 shows the length-weight statistics for fish taken in netting collections. The "K" factors of all fish were considered better than average, indicating that they are in good condition.

Seining Collections

Originally 20 seining stations were planned, but only 15 suitable sites were found. Eleven stations were located at various places on the San Antonio River in Wilson, Karnes, Goliad and Refugio Counties, and four stations were located on Cibolo Creek in Wilson County. For the most part, the stations were set up near road crossings to facilitate access. They represented various types of habitat. Two collections were made at each station during the study period.

In all, 4,012 specimens of 21 species were taken in the 30 seining collections. Table 5 shows the number of each species recorded at each station.

The red shiner is the most abundant fish and best distributed in the San Antonio River, as well as Cibolo Creek. This minnow was taken at every station and comprised 42.97 per cent of the fish seined.

Mosquitofish, pugnose minnows, channel catfish, bullhead minnows and Rio Grande perch, in that order, were found to be well distributed throughout the river system and in lower Cibolo Creek.

Mexican tetras, speckled chubs, blackstripe topminnows and logperch were limited to the upper portions of the river, while threadfin shad, striped mullet and tidewater silversides were found only in the lower portions of the San Antonio.

Six grey redhorse were taken at a station on Cibolo Creek. This was the only place where this species was taken, although we suspect them to be present in good numbers in the creek.

Eight largemouth bass specimens were taken at a seining station on the San Antonio River at Conquista Park. Thus reproduction, although somewhat limited, is indicated. Under present conditions, primarily the high turbidity and silt, it is doubtful that a good bass population can become established in the river. Largemouth bass fingerlings were stocked in the clearer waters of Cibolo Creek in May 1962 to supplement the existing population. Sufficient food in the form of red shiners and cover were found in the creek. Therefore, these bass should be helpful in restoring that species.

Neither species of crappie was taken in either netting or seining collections. This seems rather odd since a number of areas appeared to be suitable for this species. The absence of crappie during this survey is in line with Kuehne's study in 1953.

Table 4. Length-weight Statistics for Fish from San Antonio River Survey, 1962

Species	Standard Length (Millimeters)		Weight (Grams)		"K" Factors	
	Range	Average	Range	Average	Range	Average
Alligator gar	1100-1100	1100	9299-9299	9299	0.70-0.70	0.70
Spotted gar	326-545	435	192-1474	833	0.55-1.13	0.84
Longnose gar	430-1065	747	65-5670	2863	0.33-0.74	0.53
Gizzard shad	184-358	271	25-1106	565	1.69-2.46	2.07
Smallmouth buffalo	294-386	340	794-2098	1446	3.12-4.05	3.58
River carpsucker	349-349	349	136-1474	805	3.46-3.46	3.46
Grey redbhorse	153-330	241	85-794	239	1.90-2.46	2.15
Carp	*	*	142-142	142	**	**
Channel catfish	161-298	229	79-474	276	1.79-1.89	1.84
Yellow bullhead	156-156	156	72-72	72	1.89-1.89	1.89
Flathead catfish	200-285	242	135-342	238	1.47-1.68	1.57
Largemouth bass	151-227	189	94-292	193	2.35-3.24	2.79
Warmouth	112-161	136	55-163	109	3.84-3.91	3.87
Redbreast sunfish	89-101	95	35-48	41	4.66-4.97	4.81
Bluegill	92-127	109	34-105	69	4.35-5.12	4.73
Longear sunfish	*	*	45-45	45	**	**
Rio Grande perch	91-178	134	41-321	181	5.08-5.69	5.38

* Indicates no length measurements recorded.

** Indicates unable to figure "K" Factor.

Table 5. Seining Results, by stations San Antonio River Survey, 1962

Species	Stations													Totals	Per cent of Total		
	1	2	3	4	5	6	7	8	9	10	11	12	13			14	15
Threadfin shad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0.07
Mexican tetra	0	0	2	0	0	2	0	0	1	0	0	0	0	0	5	5	0.12
Grey redborse	0	0	0	0	0	6	0	0	0	0	0	0	0	0	6	6	0.15
Golden shiner	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0.03
Pugnose minnow	0	0	348	0	0	68	109	0	1	6	0	9	1	2	3	583	14.53
Speckled chub	0	0	3	0	0	1	1	0	0	0	0	0	0	0	5	5	0.12
Red shiner	3	24	547	3	134	351	385	30	71	94	30	8	13	8	23	1724	42.97
Ghost shiner	1	0	0	0	0	0	23	1	0	0	0	0	0	0	25	25	0.63
Bullhead minnow	0	0	59	0	1	2	6	0	0	0	0	0	0	11	2	81	2.02
Channel catfish	1	0	5	0	0	108	5	0	1	1	0	2	0	3	1	127	3.17
Tadpole madtom	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.03
Blackstripe topminnow	0	0	0	0	1	0	0	5	0	0	0	0	0	0	6	6	0.15
Mosquitofish	6	0	1035	0	0	98	19	50	9	8	12	4	2	37	50	1330	33.15
Sailfin molly	0	0	0	0	0	1	0	0	1	10	0	0	0	2	0	14	0.35
Striped mullet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0.07
Tidewater silverside	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	7	0.17
Largemouth bass	0	0	8	0	0	0	0	2	0	0	0	0	0	0	0	10	0.25
Green sunfish	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	3	0.07
Bluegill	0	0	1	0	1	15	7	3	0	0	0	0	1	3	1	32	0.80
Logperch	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2	0.05
Rio Grande perch	2	0	10	0	1	3	28	0	0	0	0	0	0	0	44	44	1.10
Totals	13	24	2055	3	140	656	586	91	84	119	42	23	17	69	90	4012	100.00

Key to Stations:

- 1. Dennis Place - San Antonio River
- 2. Conquista Park - San Antonio River
- 3. Conquista Park - San Antonio River
- 4. Poth Crossing FM 541 - San Antonio River
- 5. Sunnyside Crossing - Cibolo Creek
- 6. Panna Maria Crossing - Cibolo Creek
- 7. Highway 97 Crossing - Cibolo Creek
- 8. Carpenter Crossing - Cibolo Creek
- 9. Charco Bridge - San Antonio River
- 10. Below Charco Bridge - San Antonio River
- 11. Riverdale Bridge - San Antonio River
- 12. Below Highway 59 Bridge - San Antonio River
- 13. Above Duke Bridge - San Antonio River
- 14. Above Highway 77 Bridge - San Antonio River
- 15. Below Highway 77 Bridge - San Antonio River

Chemical Analysis

Six water sampling stations were set up during this survey; four were on the San Antonio River and two were on Cibolo Creek. Each station was visited twice during the survey.

Surface water samples were tested for dissolved oxygen, dissolved carbon dioxide, total alkalinity and pH.

Dissolved oxygen ranged from 4.8 to 7.0 p.p.m. on the San Antonio River and dissolved carbon dioxide ranged from 1.4 to 8.0 p.p.m. Methyl orange alkalinity values ranged from 136 to 206 p.p.m. and pH ranged from 7.7 to 8.4. All these values are considered normal for this area and are in line with previous findings.

Water quality of Cibolo Creek is similar to that of the San Antonio River with the exception of turbidity. Secchi disc readings ranged from 3- to 11-inches on the river and from 15- to 17-inches on Cibolo Creek.

During the course of this job, an investigation was made to determine the cause of a fish kill on the river in Wilson County. Since the investigation was made two days after the fish kill was reported, it was difficult to make an accurate estimate of the fish kill. No dead fish were seen along the river channel. However, in one slough, approximately 300 feet in length, there were some 20 smallmouth buffalo, 80 carp and 100 channel catfish. The fish had been dead for at least a day. Water samples were taken from the slough and tested for dissolved oxygen, dissolved carbon dioxide, pH and methyl orange alkalinity. All were considered normal and no definite cause for the fish kill could be determined.

Ecological Conditions

Rainfall in the San Antonio River basin ranges from about 27 inches in the western portion to about 34 inches near the coast.

Aquatic vegetation in the San Antonio River consists mostly of algae clinging to limestone. Water pennywort was found along the banks of pool areas and a small amount of Lemna sp. was found in the still, backwater areas. Due to the nature of the river in Wilson, Karnes and Goliad Counties, aquatic vegetation is not a problem and is not likely to become one under present conditions.

Spatterdock, algae, water pennywort and arrowhead comprised the aquatic forms of vegetation in Cibolo Creek. However, none of these is considered undesirable in the creek because of the protection they offer fish and aquatic invertebrates. Most likely winter-kills control the plants.

A limited amount of ranching is done in the vicinity of the river in Wilson and Karnes Counties. However, the trend is toward row crops and truck farming. In areas along the lower portion of the river, the land is hilly and farming is unprofitable.

Good soil conservation measures have been used, but more are needed in the form of terracing, planting cover crops and not overgrazing pasture land.

No nutria were found along the river nor was there any evidence indicating their presence.

Discussion:

Presently the portion of the San Antonio River studied during this segment has little potential for largemouth bass production. This is due to the silt and turbidity. It was reported that the river supported a sizeable bass population in previous years.

The catfish are the only significant game fish species in the river. Despite the rather low numbers taken in netting collections, sufficient evidence was found to indicate a moderate population in the river. Furthermore, it is apparent that the catfish are reproducing successfully.

Both largemouth bass and channel catfish were stocked in the lower portion of Cibolo Creek in Wilson County. These fish should do well in this relatively clear stream which offers ample food and cover.

Only 19 sport fishermen were seen during the course of this job. Most of them were seen on Cibolo Creek, however. In nearly every case, the anglers were fishing for catfish and they offered stories of good catches on previous trips.

Public access is limited to road crossings, both on the river and Cibolo Creek. Many landowners are accommodating to those who ask permission to fish on posted areas.

At least two major dams are proposed for the San Antonio River; one is to be located near Falls City in Karnes County and the other near Charco in Goliad County. Undoubtedly these proposed impoundments would be an asset to the basin in that they would provide water storage and help control floods.

Presently there are no fishing camps located along the river or Cibolo Creek.

Recommendations:

Every reasonable effort should be made to stop industrial, municipal and soil pollution on the river. This, of course, would require the combined efforts of many people and agencies, and much time for the river to revert to its original state. We have every reason to believe that the San Antonio River was at one time a beautiful stream, as reported.

The sports fishermen will be forced to fish for catfish 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 species in the San Antonio River system, commercial fishermen should not be allowed to take them and every effort should be made to protect and propagate them.

Annual checks should be made on the river to determine gross changes in fish populations.

No developmental work is presently proposed or recommended.

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Approved by Marion Toole
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Date February 4, 1963

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