

FILE

JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-12-R-11

FISHERIES INVESTIGATIONS AND SURVEYS OF THE WATERS OF REGION 4-A

Job No. B-10 Fisheries Reconnaissance

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## Abstract

Taylor Bayou, Cow Bayou and part of the Neches River near Beaumont were surveyed. Fish collections were made in each body of water on four different occasions during the year.

In Taylor Bayou an overnight set of six gill nets yielded an average of 19.37 pounds of game fish. A similar net set in Cow Bayou and the Neches River yielded 1.82 pounds and 0.60 of a pound respectively. Taylor Bayou, Cow Bayou and the Neches River yielded 115.39, 36.36 and 21.43 pounds of other fish respectively.

Natural factors such as periodic intrusion of saline water into Cow Bayou and the Neches River may have been responsible for some of the differences in the fish collections. Pollution was found to be an important factor in the Neches River.

Fishermen preferred Taylor Bayou to the other bodies of water. None of the anglers contacted during the survey had a limit of fish. The bag limits for fish are apparently not serving any purpose in this area.

Pollution is not well understood and it is recommended that efforts be made to better define the problem. It is also recommended that the bag limits remain unchanged until other factors beyond the scope of this report are studied.

## JOB COMPLETION REPORT

State of Texas

Project No. F-12-R-11

Name: Fisheries Investigations and  
Surveys of the Waters of Region 4-A

Job No. B-10

Title: Fisheries Reconnaissance

### Objectives:

1. To obtain limited current information concerning species of fishes present, their relative abundances and factors influencing these populations for the public waters of Hardin, Jefferson and Orange Counties.

2. To obtain limited current information concerning fishing conditions in the public waters of Hardin, Jefferson and Orange Counties.

3. To analyze all data collected for use in recommending suitable fish harvest regulations for the counties under the regulatory authority of the Texas Parks and Wildlife Department.

### Procedures:

Experimental gill nets and a seine were used to make fish collections. Each gill net was 125 feet long by 8 feet deep; the nets were hobbled to 6 feet deep. Mesh sizes ran in one-half inch intervals from 1 inch to 3.5 inch square mesh. There were 25 feet of each mesh size. Seining collections were made with a 24 foot bag seine having 3/16-inch mesh.

Two overnight sets of six gill nets were made in each body of water four times during the year. Each net set will be referred to as a "standard unit of collection" for comparison and reporting purposes. Established collection sites were not used as originally planned. It was decided that more representative samples of the fish population would be obtained by randomly setting the nets because of the considerable area which was being sampled in each case. Each of the bayous studied has been deepened and straightened by dredging. The steep sides and soft mud bottoms of the bayous made seining difficult in most places; therefore, seining was not carried out extensively.

Fish taken by gill nets were all identified and weighed. A substantial portion of the fish captured were measured and the sexual development investigated. Incidence of parasitism was noted and spot checks of game fish stomachs were made.

In this report channel catfish, blue catfish, flathead catfish, white bass, spotted bass, largemouth bass, warmouth, redear sunfish, bluegill, white crappie and black crappie are considered game fish.

Water quality determinations included dissolved oxygen, alkalinity, chlorides, sulfates, phosphates, nitrates and pH. Visibility (Secchi disk) and surface temperature were also measured.

Some spot checks of fishermen creels were made on Cow Bayou and the Neches River at the time of the netting surveys. Fishing success was also determined through interviews. An extensive creel census was made of Taylor Bayou.

Aquatic vegetation, sources of siltation and pollution were noted if they created a problem.

#### Findings:

A total of 40 species and 16 families were collected. Table 1 is a check-list of the fish taken from Taylor Bayou, Cow Bayou and the Neches River.

#### Taylor Bayou

Taylor Bayou runs in a west to east direction and divides Jefferson County into 2 nearly equal parts (Map 1). The part of the bayou which was surveyed extends from where the bayou divides into the North Fork and South Fork to the salt water gate and barge locks. The channel distance between these 2 points is about 22 miles and the Bayou area is about 1,080 acres. The Taylor Bayou system also includes 3 smaller bayous: Mayhaw Bayou, Hillebrant Bayou and Bighill Bayou. The banks of Taylor Bayou are generally wooded over the western half of the survey area and marsh-like over the eastern half. Rice farming is common and the water from Taylor Bayou and the bayous associated with it is used for irrigation. There are between 15 and 20 individual pumping plants (Crout, J. D., Symmank, D. G., Peterson, G. A. 1965. Soil Survey Jefferson County, Texas. U. S. Department Agriculture, Soil Conservation Service, Series 1960, No. 21:1-73).

Fish were collected during January, April, July and October. The results of the gill net collections are given in Tables 2 and 3. Species collected by seining are found in Table 4.

Details of sport fishing are given in Completion Report F-12-R-11, Job B-13. This area was more popular with sport fishermen than Cow Bayou or the part of the Neches River which was surveyed.

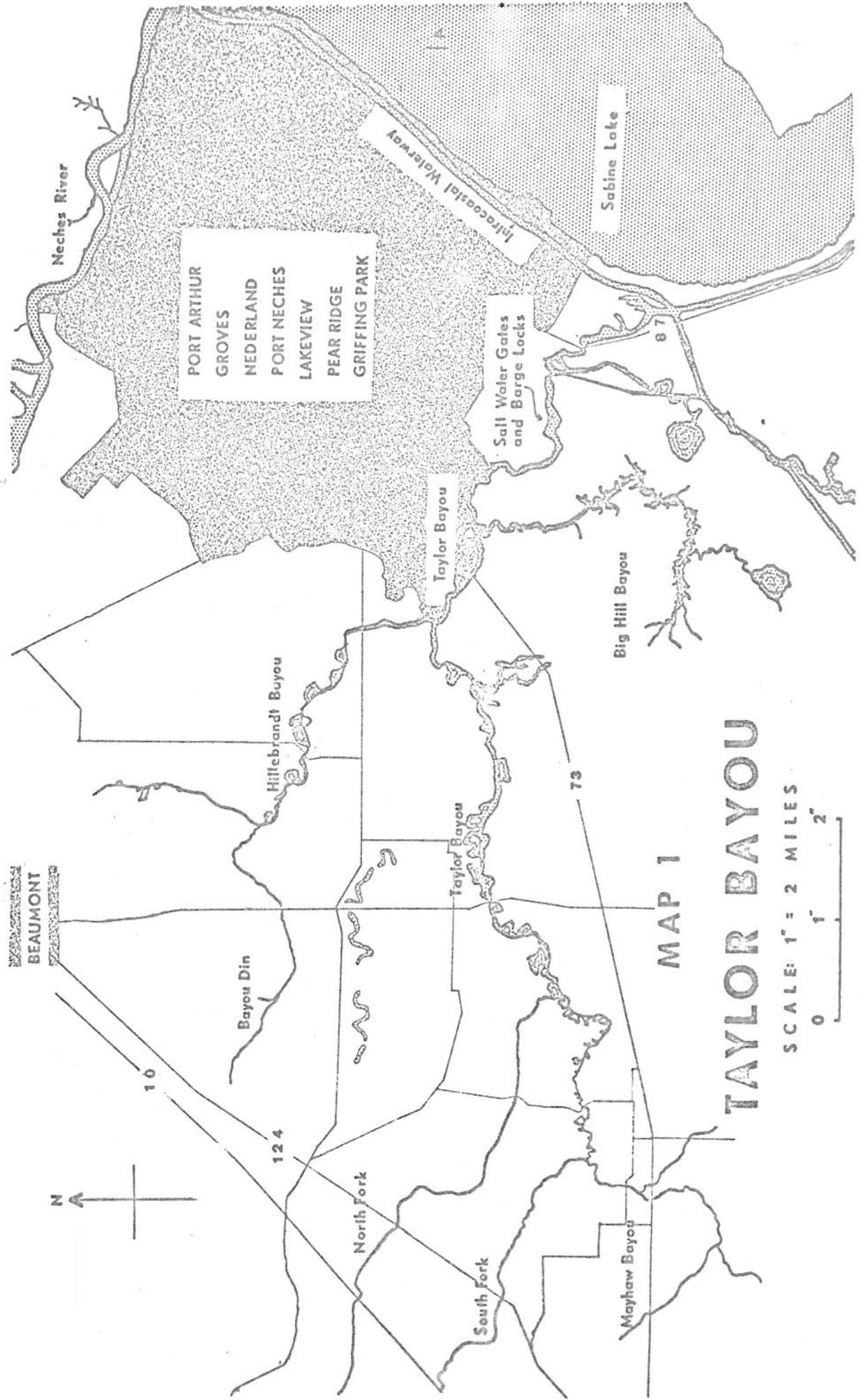
Human activities are disturbing Taylor Bayou. The Bayou is often muddy in the spring for extended periods of time. This condition is apparently due to the release of water from rice fields. One result of the turbid water is a reduction of sport fishing. On one occasion oil field pollution was noted after a heavy rain. Oil was seen flowing into Hillebrant Bayou from Bayou Din for several hours.

Water quality data are given in Table 5.

Table 1

Checklist of Fishes Mentioned in This Report

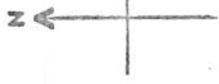
<u>Common Name</u>	<u>Scientific Name</u>
Chestnut lamprey	<u>Ichthyomyzon castaneus</u>
Alligator gar	<u>Lepisosteus spatula</u>
Spotted gar	<u>Lepisosteus oculatus</u>
Longnose gar	<u>Lepisosteus osseus</u>
Bowfin	<u>Amia calva</u>
Skipjack herring	<u>Alosa chrysochloris</u>
Finescale menhaden	<u>Brevoortia gunteri</u>
Gizzard shad	<u>Dorosoma cepedianum</u>
Bay anchovy	<u>Anchoa mitchilli</u>
Grass pickerel	<u>Esox americanus</u>
Smallmouth buffalo	<u>Ictiobus bubalus</u>
River carpsucker	<u>Carpiodes carpio</u>
Spotted sucker	<u>Minytrema melanops</u>
Carp	<u>Cyprinus carpio</u>
Blacktail shiner	<u>Notropis venustus</u>
Red shiner	<u>Notropis lutrensis</u>
Fathead minnow	<u>Pimephales promelas</u>
Channel catfish	<u>Ictalurus punctatus</u>
Blue catfish	<u>Ictalurus furcatus</u>
Flathead catfish	<u>Pylodictus olivaris</u>
Blackstripe topminnow	<u>Fundulus notatus</u>
Sheepshead minnow	<u>Cyprinodon variegatus</u>
Mosquitofish	<u>Gambusia affinis</u>
Striped mullet	<u>Mugil cephalus</u>
Tidewater silverside	<u>Menidia beryllina</u>
Brook silverside	<u>Labidesthes sicculus</u>
White bass	<u>Roccus chrysops</u>
Yellow bass	<u>Roccus interruptus</u>
Spotted bass	<u>Micropterus punctulatus</u>
Largemouth bass	<u>Micropterus salmoides</u>
Warmouth	<u>Chaenobryttus gulosus</u>
Redear sunfish	<u>Lepomis microlophus</u>
Bluegill	<u>Lepomis macrochirus</u>
Orangespotted sunfish	<u>Lepomis humilis</u>
Longear sunfish	<u>Lepomis megalotis</u>
White crappie	<u>Pomoxis annularis</u>
Black crappie	<u>Pomoxis nigromaculatus</u>
Freshwater drum	<u>Aplodinotus grunniens</u>
Spot	<u>Leiostomus xanthurus</u>
Black drum	<u>Pogonias cromis</u>



PORT ARTHUR  
GROVES  
NEDERLAND  
PORT NECHES  
LAKEVIEW  
PEAR RIDGE  
GRIFFING PARK

MAP 1  
**TAYLOR BAYOU**

SCALE: 1" = 2 MILES  
0 1' 2'



BEAUMONT

10

124

73

87

Neches River

Intracoastal Waterway

Sabine Lake

Salt Water Gates  
and Barge Locks

Taylor Bayou

Big Hill Bayou

Hillebrandt Bayou

Bayou Din

Taylor Bayou

North Fork

South Fork

Mayhaw Bayou

Table 2

Taylor Bayou Netting Collections

Species	Number Caught	Percent of Number	Weight in Pounds	Percent of Weight	Average Weight
Alligator gar	5	0.78	55.18	5.11	11.04
Spotted gar	194	30.35	207.69	19.27	1.07
Longnose gar	1	0.20	6.00	0.55	6.00
Bowfin	2	0.31	13.06	1.21	6.53
Gizzard shad	56	8.76	24.00	2.23	0.43
Smallmouth buffalo	90	14.08	273.95	25.41	3.04
River carpsucker	2	0.31	3.06	0.28	1.53
Carp	67	10.48	275.68	25.57	4.11
Channel catfish*	13	2.03	21.70	2.01	1.67
Blue catfish*	46	7.19	84.99	7.88	1.85
Flathead catfish*	2	0.31	7.94	0.74	3.97
Striped mullet	18	2.81	25.87	2.40	1.44
White bass*	5	0.78	5.69	0.53	1.14
Yellow bass	18	2.81	4.51	0.42	0.25
Largemouth bass*	4	0.62	3.87	0.36	0.97
Warmouth*	3	0.46	1.00	0.09	0.33
Bluegill*	22	3.44	4.69	0.43	0.21
Longear sunfish	1	0.20	0.07	0.01	0.07
White crappie*	54	8.45	25.12	2.33	0.47
Freshwater drum	36	5.63	34.13	3.17	0.95
Total	639	100.00	1,078.20	100.00	
* Game fish	149	23.64	155.00	14.37	
Other fish	490	76.36	923.20	85.63	

Table 3

Average Standard Units of Collection for Taylor Bayou,  
Cow Bayou and the Neches River

Species	Taylor Bayou		Cow Bayou		Neches River	
	Number	Pounds	Number	Pounds	Number	Pounds
Alligator gar	0.63	6.90	0.75	10.77	0.50	3.81
Gar sp.					0.88	0.99
Spotted gar	24.25	25.96	12.00	28.77	2.50	4.74
Longnose gar	0.13	0.75	1.38	8.07	1.13	4.84
Bowfin	0.25	1.63			0.25	1.17
Finescale menhaden			1.38	0.03		
Skipjack herring					0.25	0.41
Gizzard shad	7.00	3.00	0.38	0.29	2.00	0.73
Smallmouth buffalo	11.25	34.24	14.63	53.98	5.50	17.85
River carpsucker	0.25	0.38			1.00	0.98
Carp	8.38	34.46	1.00	2.98	0.25	0.91
Channel catfish*	1.63	2.71	0.50	0.42	0.50	0.23
Blue catfish*	5.75	10.62	0.25	0.50	1.00	1.00
Flathead catfish*	0.25	0.99	0.13	0.13		
Striped mullet	2.25	3.23	1.13	0.70	1.75	1.55
White bass*	0.63	0.71				
Yellow bass	2.25	0.56	1.13	0.52		
Spotted bass*					0.25	0.20
Largemouth bass*	0.50	0.48	0.25	0.37	0.13	0.04
Warmouth*	0.38	0.13			0.38	0.05
Redear sunfish*			0.13	0.01	0.25	0.07
Bluegill*	2.75	0.59	0.63	0.13	0.50	0.06
Orangespotted sunfish			0.25	0.05		
Longear sunfish	0.13	0.01			0.13	0.03
White crappie*	6.75	3.14	0.13	0.18	0.50	0.24
Black crappie*			0.25	0.08	0.38	0.06
Freshwater drum	4.50	4.27	0.50	0.42	2.00	0.98
Spot			0.13	0.02		
Black drum <sup>1/</sup>			1.25	1.56		
Total	79.91	134.76	38.18	109.98	22.03	40.94
* Game fish	18.64	19.37	2.27	1.82	3.89	1.95
Other fish	61.27	115.39	35.91	108.16	18.14	38.99

<sup>1/</sup> Some of the fish were partially eaten by crabs.  
This is an estimated weight.

Table 4

Fish Species Taken by Seining

<u>Species</u>	<u>Taylor Bayou</u>	<u>Cow Bayou</u>	<u>Neches River</u>
Spotted gar	x		
Bay anchovy		x	
Grass pickerel	x		x
Pugnose minnow	x		
Blacktail shiner			x
Red shiner			x
Fathead minnow	x		x
Channel catfish	x		
Blue catfish	x		
Sheepshead minnow		x	x
Mosquitofish	x	x	
Tidewater silverside	x	x	
Largemouth bass	x		x
Warmouth	x		x
Redear sunfish	x		x
Bluegill	x		x
Orangespotted sunfish			x

Table 5

## Water Quality

	pH Range	Chloride Range	Alkalinity*	Visibility Range	Sulfates*	Phosphates*	Nitrates*
Taylor Bayou	7.2 - 8.0	128 - 430	70	5" - 30"	65	0.8	Trace
Cow Bayou	7.2 - 7.6	35 - 8,000	40	7" - 27"	40	0.6	1.8
Neches River Beaumont	7.4 - 8.3	27 - 3,264	50	12" - 26"	42	0.3	0.2
Neches River Evadale			50		22	0.3	0.5

Chlorides, alkalinity, sulfates, phosphates and nitrates are given in parts per million. Visibility was measured with a Secchi disk.

\* These tests were made September 30, 1966.

### Cow Bayou

Cow Bayou runs in a north to south direction to about the center of Orange County where it turns southeastward (Map 2). It enters the Sabine River near that river's mouth. The banks of the bayou are wooded, becoming marsh-like between Bridge City and the Sabine River. Cow Bayou was surveyed from about 2 miles above Highway 90 almost to its mouth, a distance of approximately 16 miles. This part of the bayou has a surface area of about 600 acres. There is no salt water barrier and saline water moves freely in and out of the bayou.

Fish were collected during March, June, September and December. The results of the gill net collections are given in Tables 3 and 6. Species collected by seining are found in Table 4.

During the whole survey period only 3 sport fishermen were encountered. The local Game Warden reported that there was little sport fishing activity. In years past, Cow Bayou is said to have produced good fishing.

The only pollution observed was oil which blackened the banks of the bayou in the immediate area of the Orangefield Oil Field. This oil field is located a short distance north of Bridge City.

Water quality data are given in Table 5.

### Neches River

The Neches River rises in Northeast Texas and empties into Sabine Lake near Port Arthur (Maps 2 and 3). The total length of the river is about 260 miles. The part of the river which was surveyed extends from half a mile below the mouth of Lake Bayou to about 6 miles above Pine Island Bayou. This wooded section of the river is about 11 miles long. The Neches River carries a considerable volume of water. From a water stage recorder located at Evadale, which is near the survey area, an average flow of 4,628,000 acre feet of water per year has been calculated (Anonymous, 1963. Surface Water Records of Texas, U. S. Department Interior, Geological Service, 1-421). Saline water moves freely in and out of the lower part of the river, including the survey area. Almost every year a dam is placed in the river near Pine Island Bayou to keep salt water out of the canal system of the Lower Neches River Authority.

Fish were collected during February, May, August and November. The results of the gill net collections are given in Tables 3 and 7. Species collected by seining are found in Table 4.

Chestnut lampreys (Ichthyomyzon castaneus) were found attached to some of the captured buffalo. This part of the Neches is far south of the chestnut lamprey's range described by Hubbs (Hubbs C. 1961. A checklist of Texas Fresh-water Fishes, Division of Inland Fisheries, Texas Game and Fish Commission, IF Series No. 3:4-14).

During the survey fishermen were occasionally encountered. According to

# MAP 2

## COW BAYOU

SCALE: 1" = 2 MILES



Table 6  
Cow Bayou Netting Collections

Species	Number Caught	Percent of Number	Weight in Pounds	Percent of Weight	Average Weight
Alligator gar	6	1.96	86.19	9.79	14.37
Spotted gar	96	31.47	230.19	26.17	2.40
Longnose gar	11	3.61	64.57	7.34	5.87
Finescale menhaden	11	3.60	0.25	0.03	0.02
Gizzard shad	3	0.99	2.31	0.26	0.77
Smallmouth buffalo	117	38.35	431.81	49.08	3.69
Carp	8	2.62	23.81	2.71	2.98
Channel catfish*	4	1.31	3.37	0.38	0.84
Blue catfish*	2	0.66	4.00	0.46	2.00
Flathead catfish*	1	0.33	1.06	0.12	1.06
Striped mullet	9	2.95	5.62	0.64	0.62
Yellow bass	9	2.95	4.12	0.47	0.46
Largemouth bass*	2	0.66	2.94	0.33	1.47
Redear sunfish*	1	0.33	0.06	0.01	0.06
Bluegill*	5	1.64	1.00	0.11	0.20
Orangespotted sunfish	2	0.66	0.38	0.05	0.19
White crappie*	1	0.33	1.44	0.16	1.44
Black crappie*	2	0.66	0.63	0.07	0.32
Freshwater drum	4	1.31	3.38	0.38	0.85
Spot	1	0.33	0.13	0.02	0.13
Black drum	10	3.28	12.50 <sup>1/</sup>	1.42	1.25
Total	305	100.00	879.76	100.00	
* Game fish	18	5.92	14.50	1.64	
Other fish	287	94.08	85.50	98.36	

<sup>1/</sup> Some of the fish were partially eaten by crabs.  
This is an estimated weight.

# MAP 3

## NECHES RIVER

SCALE: 1" = 2 MILES

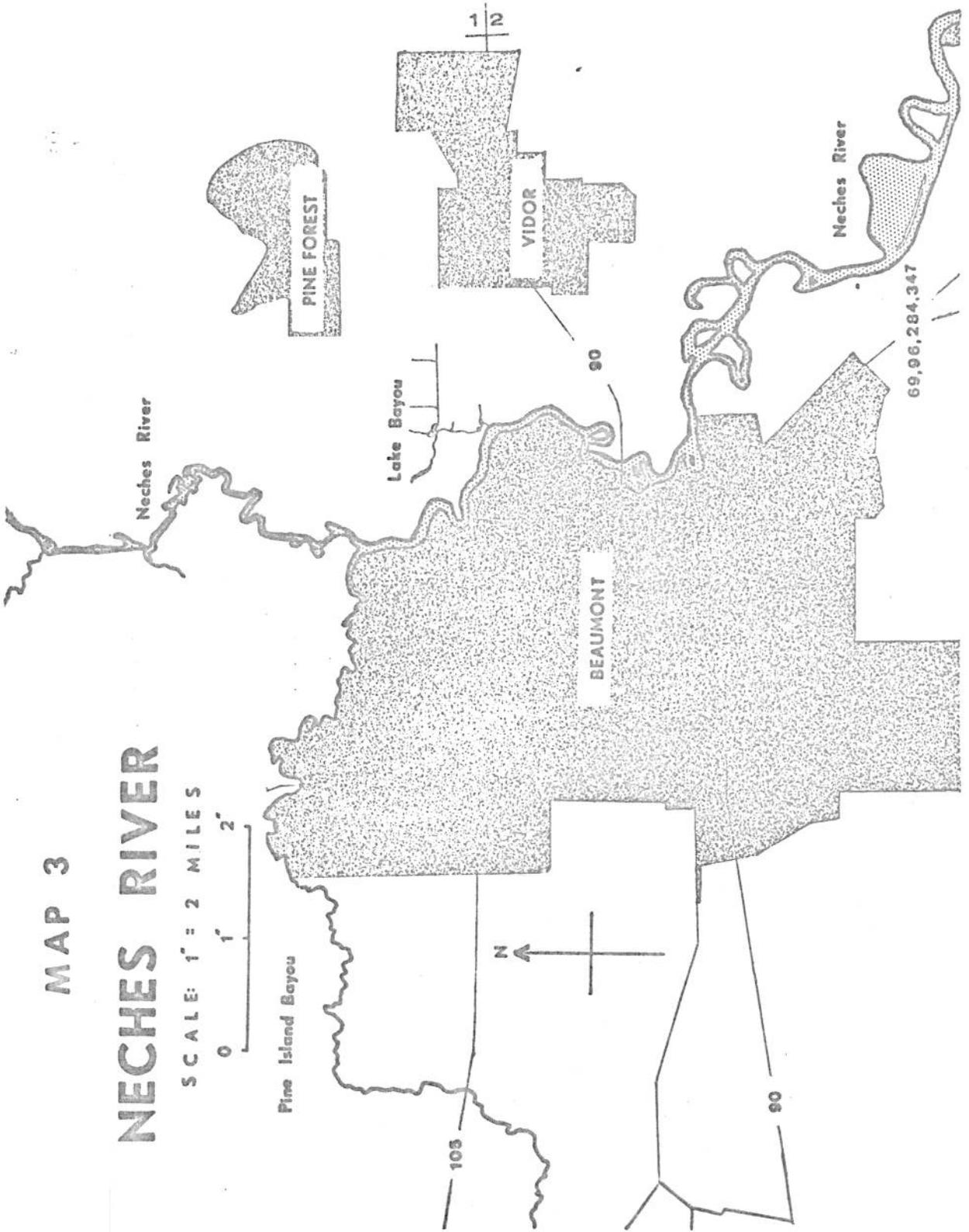


Table 7

Neches River Netting Collections

Species	Number Caught	Percent of Number	Weight in Pounds	Percent of Weight	Average Weight
Alligator gar	4	2.27	30.44	9.30	7.61
Gar species	7	3.98	7.94	2.43	1.13
Spotted gar	20	11.36	37.94	11.59	1.90
Longnose gar	9	5.11	38.69	11.82	4.30
Bowfin	2	1.14	9.37	2.86	4.69
Skipjack herring	2	1.14	3.25	0.99	1.63
Gizzard shad	16	9.09	5.81	1.78	0.36
Smallmouth buffalo	44	25.00	142.82	43.62	3.25
River carpsucker	8	4.55	7.81	2.38	0.98
Carp	2	1.14	7.25	2.21	3.63
Channel catfish*	4	2.27	1.81	0.55	0.45
Blue catfish*	8	4.55	8.00	2.44	1.00
Striped mullet	14	7.95	12.43	3.80	0.89
Spotted bass*	2	1.14	1.56	0.48	0.78
Largemouth bass*	1	0.57	0.31	0.10	0.31
Warmouth*	3	1.70	0.38	0.12	0.13
Redear sunfish*	2	1.14	0.56	0.17	0.28
Bluegill*	4	2.27	0.50	0.15	0.13
Longear sunfish	1	0.57	0.25	0.08	0.25
White crappie*	4	2.27	1.94	0.59	0.49
Black crappie*	3	1.70	0.50	0.15	0.17
Freshwater drum	16	9.09	7.83	2.39	0.49
Total	176	100.00	327.39	100.00	
* Game fish	31	17.61	15.56	4.75	
Other fish	145	82.39	311.83	95.25	

the local Game Warden, fishing was light in this area and to the south, heavy pollution eliminated all fishing.

Pollution was found to be a major problem. The Eastex, Incorporated, which is a paper and pulp plant located at Evadale, transfers its effluent (about 28,000,000 gallons a day at the time of the survey) through a canal to a marsh not far from Beaumont. The marsh empties much of this effluent into Lake Bayou. The bayou was found to have less than 1 ppm dissolved oxygen except when there was an incoming tide which forced oxygenated river water into the bayou. Gill nets were placed in the bayou under low oxygen conditions and when the incoming tide increased the dissolved oxygen. A few gar were caught when water flowed from the river into the bayou; no fish were found in the bayou at any other time. Nets set in the river around the mouth of the bayou caught only a few gar. Lake Bayou is said to have produced good bass fishing at one time. Salt water pollution from oil fields has reportedly been severe enough at times to damage industrial equipment and threaten crops which are supplied by water taken from Pine Island Bayou (the Houston Chronicle, March 12, 1965).

Water quality data are given in Table 5.

#### DISCUSSION

The three bodies of water are found in the same general area; however, they are quite different in some respects. Taylor Bayou is always filled with fresh water; Cow Bayou and the part of the Neches River which was studied are both periodically penetrated by saline water. The Neches River passes a much larger volume of water than the sluggish bayous. These natural factors undoubtedly caused differences in the three fish populations.

One of the most striking differences between the gill net collections was the number of fish which were taken from each body of water (Tables 2, 6 and 7). Taylor Bayou yielded over twice as many fish as Cow Bayou, although Cow Bayou yielded almost as many pounds of fish. The Neches River was far inferior to the other waters in terms of the number and pounds of fish yielded. The value of Taylor Bayou, Cow Bayou and the Neches River to the sportman is best realized by comparing the average standard units of collection for the number and pounds of game fish yielded by each body of water (Table 3). Taylor Bayou was far superior to Cow Bayou and the Neches River. These data are consistent with the finding that Taylor Bayou supports more sport fishing than Cow Bayou or the Neches River.

One finding of the creel census was that none of the contacted fishermen had a limit of fish. The situation was the same as would exist if there were no bag limits at all.

One might argue that the fish population would benefit if the bag limit were lowered. For this argument to be valid it would be necessary to show that fishing pressure is an important factor in determining the size of the fish population. The findings show a small fish population was not associated with the greatest fishing pressure. The greatest fishing pressure was found

where the fish were most abundant. Apparently the game fish population was not a function of the fishing pressure. Evidently other causes were primarily responsible for the small game fish population. Aside from possible natural causes, such as salt water penetration, pollution is undoubtedly an important factor in the Neches River. The effect of pollution in Cow Bayou and Taylor Bayou was not so obvious.

#### RECOMMENDATIONS

In a survey of this type only the most obvious forms of pollution were noted since the main effort was not directed toward studying pollution. It is very possible that some more subtle forms of pollution were not detected. Some effort should be made to determine the magnitude of pollution and identify its sources. The situation as it exists now is one where pollution is largely an unknown factor.

In the particular waters studied the bag limits for black bass, spotted bass and catfish do not seem to be serving any purpose, so far as the welfare of the fish population is concerned. There are other possible considerations for having a bag limit: making fish available to more people, preventing a too rapid removal of fish from a new lake and for the sake of a uniform law when a limit is needed somewhere else. These other considerations are beyond the scope of this study but need to be evaluated. Until a fuller study of bag limits is made it is recommended that the bag limits remain unchanged.

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Date October 27, 1966

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Regional Supervisor