

Sabine River

JOB COMPLETION REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-12-R-13

REGION 4-A FISHERIES STUDIES

Job No. 2a Pollution Studies

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Abstract

A study of the Sabine River was made in which the fish and invertebrate populations were sampled, chemical and physical measurements were made, and the river vegetation was described.

These data, along with data to be collected, will be used to evaluate the effect of the Owen Illinois Glass Company paper mill effluent on the Sabine River.

JOB COMPLETION REPORT

State of Texas

Project No. F-12-R-13

Name: Region 4-A Fisheries Studies

Job No. 2a

Title: Pollution Studies

Period Covered: January 1, 1967 - December 31, 1967

Objectives:

1. To determine the extent of areas in which pollution-caused fish kills occur.
2. To determine the nature and source of pollutants causing fish kills.
3. To report instances of pollution to the Texas Water Pollution Control Board when abatement is needed to protect fish populations and aquatic habitat.
4. To determine the nature and location of industries which will in the future begin discharging wastes into public waters.
5. To determine certain chemical and biological features of public waters which will receive wastes from industries not yet in operation.
6. To compile and analyze chemical and biological data for future use in assessing the detrimental effects of wastes from specific sources.

Sabine River

Procedures:

Sampling stations were established at 12 stations located above and below the point where the Owen Illinois paper mill effluent enters the Sabine River (Figure 1).

Fish collections were made using gill nets, hoop nets, minnow traps, rotenone, wire traps, and seines.

The gill nets were made 150 feet long and 8 feet deep, hobbled to 6 feet. The bar mesh sizes increased in 0.5 inch intervals every 25 feet beginning with 1 inch and ending with 3.5 inches. In addition to gill nets, baited hoop nets with one inch bar mesh were used. Fish were also collected using minnow traps and rotenone. The type of wire trap used was made by rolling 1 x 2-inch mesh welded steel fabric into a cylinder 5 feet long and 1.5 feet in diameter. One end of this wire cylinder was open and had a double throat made of one inch



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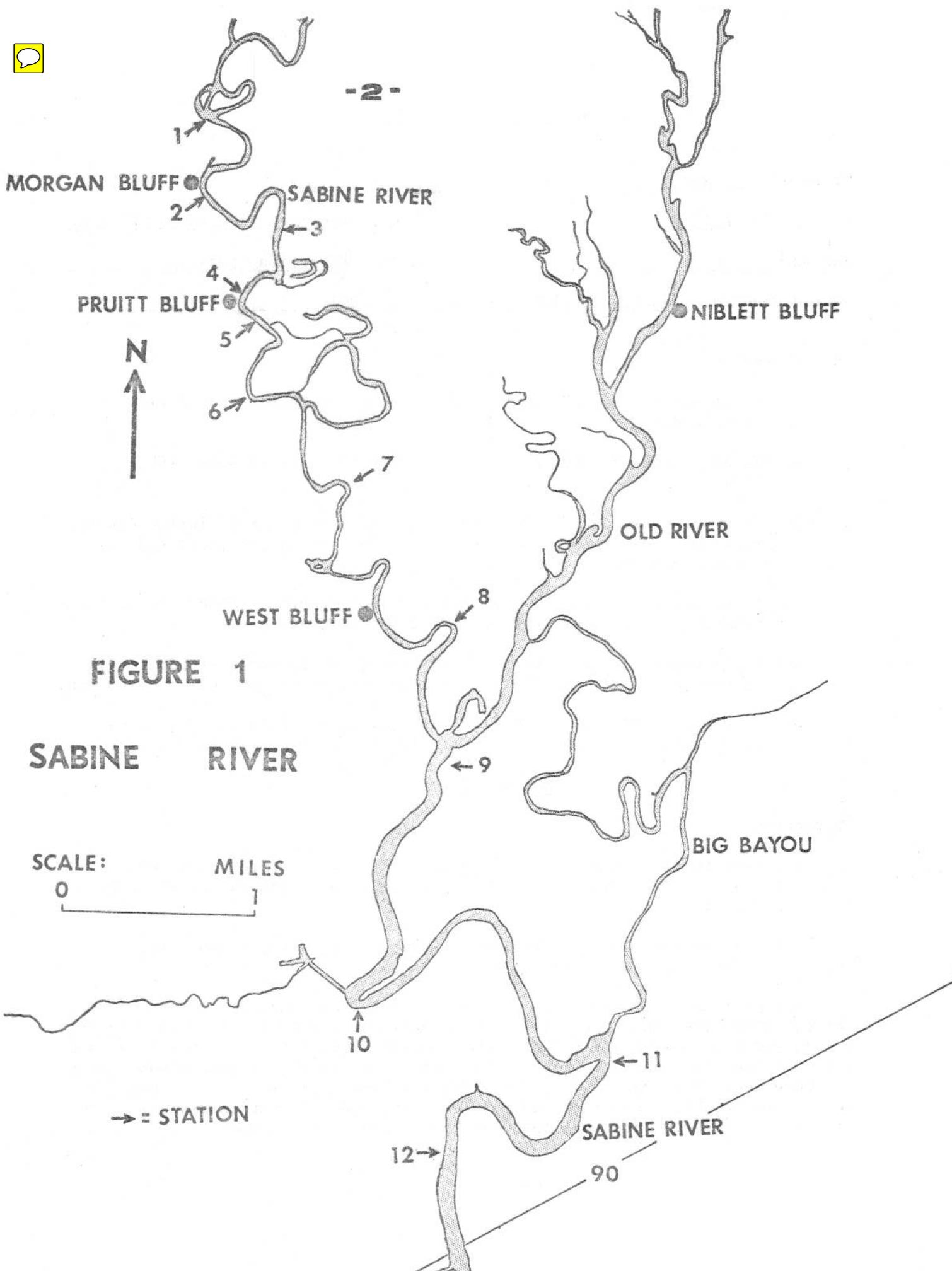


FIGURE 1

SABINE RIVER

chicken wire. The wire traps were baited. Various seines were also used to collect fish where seining was possible. Gill nets and wire traps were used in August and October. Hoop nets were used only in August. Rotenone, seines, and minnow traps were used only in October.

Bottom samples were taken using a Petersen dredge. Samples were taken every 20 feet along transects from bank to bank at stations 2 through 7. The samples were always taken starting from the east bank. The bottom material was washed through screens with mesh sizes of 8 x 8 and 15 x 18 per square inch. The material which accumulated in the 15 x 18 mesh screen at each station was put in a jar with a preservative and brought back to the laboratory for close examination.

Multiplate samplers made from 1/8-inch masonite were used as an artificial substrate to collect invertebrates. These samplers were made with seven 3-inch square masonite plates separated by six 1-inch square masonite plates. These sampler can easily be taken apart for removal of invertebrates. Samplers were placed in the river during the first of September and removed during the first part of October. About 72 per cent of the samplers recovered were placed less than 5 feet below the surface of the river. The deepest a sampler was placed was 20 feet. Most of the samplers hung free in the water; a few rested on the bottom. One hundred and seven samplers were set at sites 1 through 12 at different depths. Vascular aquatic plants were noted during the survey.

The pH, total alkalinity, turbidity, chlorides, dissolved oxygen, sulfates, and total hardness were measured at all stations. All measurements were made during the summer except the chlorides which were measured in October. At stations 2 through 7 samples of water were taken at the surface and near the bottom for all measurements except sulfates and total hardness which were measured only at the surface. At stations 1, 8, 9, 10, 11, and 12 only surface water was tested. Chemical tests and turbidity were measured using the Hach Engineer's Lab.

Findings and Discussion:

The Sabine River rises in Northeast Texas and represents the Texas-Louisiana border along much of its 360-mile length. The average discharge of this river over the period from 1924 to 1963 was 8,688 cubic feet per second measured at Ruliff, Texas, not far from the survey area. The part of the Sabine River studied in this report is located in Orange County and stretches about 11.4 miles north of the Highway 90 bridge (Figure 1). Much of the shore is wooded, and agriculture, much of which is irrigated from the river, is also present.

The reason for the interest in this section of river is the establishment of the Owen Illinois Glass Company paper mill near Pruitt Bluff.

It has often been difficult to evaluate situations where there has been a suspected change in a body of water because no information was available before the change occurred. Since there is a chance that the activity of the

Owen Illinois paper mill may result in a significant change in the river, it was decided to gather data concerning river conditions before the mill began operation. With this information in hand, it should be much easier to evaluate the effect of the paper mill on the river.

The common and scientific names of fish collected using all methods except seines and minnow traps are listed in Table 1.

The fishes collected using hoop nets, gill nets, and wire traps at the different stations are given in Table 2. The data from all three methods is combined; however, the wire traps and hoop nets were not used as extensively as gill nets and were not as effective. The data given in Table 2 would be little changed if only the gill net data were used. Therefore, the standard units of effort for gill nets gives a good estimate of the ease with which fish were taken. One standard unit of effort for a gill net is defined as one gill net (of the kind described earlier) set overnight.

The data show that one gill net set overnight yielded an average of only about six fish. This low yield was disappointing. Since one of the signs of pollution is a decrease in the average size of fish, such a small number of fish will make difficult a comparison with fish taken at a future date.

The data also show that the number of species collected from stations 2 through 4 was the same as for stations 5 through 7. The paper mill effluent will enter the river between stations 4 and 5. Since pollution often causes a decrease in the number of species that can inhabit a body of water, a significant decrease in the number of species found below the point of discharge compared to the number of species occurring above the point of discharge will indicate pollution, if it occurs.

One rotenone sample yielded no information of interest except that a bowfin was collected. This was the only specimen of this species collected.

Seining samples and minnow trap samples have not yet been processed due to a lack of personnel.

The data from the multiplate samplers (Table 3) show that some of the organisms such as those in the genus Mytilopsis became much more numerous as mouth of the river was approached. This was expected since the survey area is affected by the intrusion of salt water. Data collected by the multiplate samplers will be used to evaluate the effect of the paper mill effluent on the invertebrate population. Since many fish feed to a large extent upon invertebrates, injury of the invertebrate population in the river would undoubtedly reduce the productivity of the river for fish.

In contrast to the number of organisms collected with the multi-plate samplers, the bottom samples indicated that the sandy river bottom was relatively sterile. A total of eleven individual organisms were found in

Table 1

Checklist of Fishes Mentioned in This Report

<u>Common Name</u>	<u>Scientific Name</u>
Spotted gar	<u>Lepisosteus oculatus</u>
Longnose gar	<u>Lepisosteus osseus</u>
Alligator gar	<u>Lepisosteus spatula</u>
Bowfin	<u>Amia calva</u>
Ladyfish	<u>Elops saurus</u>
Gizzard shad	<u>Dorosoma cepedianum</u>
Carp	<u>Cyprinus carpio</u>
River carpsucker	<u>Carpionodes carpio</u>
Smallmouth buffalo	<u>Ictiobus bubalus</u>
Bigmouth buffalo	<u>Ictiobus cyprinellus</u>
Channel catfish	<u>Ictalurus punctatus</u>
Blue catfish	<u>Ictalurus furcatus</u>
Yellow bullhead	<u>Ictalurus natalis</u>
Striped mullet	<u>Mugil cephalus</u>
Yellow bass	<u>Roccus chrysops</u>
Bluegill	<u>Lepomis macrochirus</u>
Warmouth	<u>Chaenobryttus gulosus</u>
White crappie	<u>Pomoxis annularis</u>
Black crappie	<u>Pomoxis nigromaculatus</u>
Freshwater drum	<u>Aplodinotus grunniens</u>

Table 2

Number of Fish Collected with Nets and Traps

<u>Station</u>	Between						<u>Total</u>	
	2	3	3-4	4	5	6		7
<u>Species</u>								
Spotted gar		7	5	11	11	18	7	59
Longnose gar	1	4		3	4	1		13
Alligator gar		2		2				4
Ladyfish			2	1	2	7		12
Gizzard shad		1	3	1	3	3		11
Carp	1			4				5
River carpsucker	4	1	1	2	3	4		15
Smallmouth buffalo	1	1			2	4		8
Bigmouth buffalo						3		3
Channel catfish		2		1				3
Blue catfish	3		4	3	3			13
Yellow bullhead		1						1
Striped mullet	1		1			2		4
Yellow bass			1			1		2
Bluegill			2					2
Warmouth			1			1		2
White crappie	2	4		4	1	2		13
Black crappie	2			7	3	1		13
Freshwater drum	1	3		3	5	1		13
Flounder-like fish*	1					1		2
Total	17	26	20	42	37	49	7	198
Standard units of effort for gill nets	6	11	1	4	6	4	1	33

*These flat fish were not positively identified.

Table 3

Number of Organisms Collected at Each Site Using Multiplate Samplers

<u>Sites</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
<u>Genera</u>												
<u>Placobdella</u>			2									
<u>Nereis</u>								1				1
<u>Sphaeroma*</u>										1		
<u>Corophium</u>	52	40	30	40	19	11	9	20	106	159	198	146
<u>Gammarus</u>			32	17	14	6	3	8	14	120	91	124
<u>Ameletus</u>					2							
<u>Heptagenia</u>			2									
<u>Amphiagrion</u>	6	2	3	2					13	2		
<u>Chromagrion</u>	2											
<u>Libellula</u>	1		1		2							
<u>Neurocordulia</u>		2	2									
<u>Dineutus</u>									1			
<u>Galerucella*</u>	13	8	11	15	13	5	7					
<u>Haliphus</u>		2	1									
<u>Lutrochus</u>										1		
<u>Chironomus</u>	36	23	28	32	51	25	37	43	17	72	24	10
<u>Clinotanytus</u>		1							25			
<u>Musculium</u>	53	27	10	2	8							
<u>Mytilopsis</u>		3	10	4	20	25	360	603	2,420	2,675	2,350	556
<u>Neopanope</u>										10	3	42
<u>Unidentified</u>	1				1					2	2	
<u>Total</u>	164	108	132	112	130	72	416	672	2,596	3,042	2,668	879
<u>Multiplate samplers re-covered</u>	10	10	9	10	10	10	10	6	7	6	6	8

*This identification is tentative and needs verification.

the bottom samples.

Vascular aquatic plants were rare. The species that were identified were yellow water lily, Nuphar advena A. T.; swamp lily, Crinum americanum; coastal wapato, Sagittaria falcata Pursh.; alligator weed, Alternanthera philoxeroides, (Mart.) Standl.; and southern wildrice, Zizaniopsis miliacea (Michx.) Doell and Aschers.

The chemical measurements were similar for all stations except for the chlorides, sulfates, and total hardness. The pH readings usually were between 6.5 and 7.0, total alkalinity was usually between 25 and 35, the turbidity was usually less than 30 Jackson Turbidity Units, the dissolved oxygen ranged 5 to 9 ppm except for one value of 12 ppm. The sulfate values increased slightly at stations 10, 11, and 12. Readings at these three stations were over 30 ppm. The highest reading at any of the other stations was 18 ppm. The total hardness increased more noticeably. It was 20 to 30 ppm at every station except stations 10, 11, and 12 where total hardness was 200 ppm. Almost all of the above readings were made when the tide was out. The chloride values from the surface samples progressively increased from 132 ppm at station 2 to 1,120 ppm at station 7. Chlorides were present in much larger amounts in the samples of water taken near the bottom. A sample taken at station 2, near the upper end of the survey area, had over 1,500 ppm chlorides.

The Owen Illinois paper mill is now in operation. The activities described above will be repeated and the data will then receive more exhaustive treatment than it has here.

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