JOB COMPLETION REPORT

FILE

STATE OF TEXAS

Project No. F3R4 Name Fisheries Investigations and Surveys of the Waters of Region 5-B.

Job No. B-10 Title Basic Survey and Inventory of Species in the Angelina River and its Watershed and in the Attoyac Bayou and its Watershed.

Period Covered: March 1, 1956 - February 28, 1957

ABSTRACT

1. This report concerns a basic survey and inventory of species on the Angelina River Drainage including the Attoyac Bayou Drainage in Region 5-B. The area worked covers portions of eight counties in East Texas. (Figures 1 and 3)

2. The soils found in this area are light colored, acid sandy loams and sands and clays, with native vegetation consisting of pines and various hardwoods.

3. The fairly high turbidity of the streams limit the amounts of aquatic vegetation to isolated growths.

4. The Angelina and Attoyac Drainages are treated as two separate but related subjects in this report.

5. A combined total of 93 water analyses was made and show that the waters of the tributaries are slightly acid while those of the river proper are slightly alkaline.

6. No active pollution in the sense that fish were being killed was encountered but evidence of industrial effluents were found on the drainage.

7. A combined total of 116 collections yielded a total of 73 species representing 13 families. This includes 49 species common to both drainages.

8. The game-forage-rough fish populations are in good proportions in both drainages with forage fish maintaining an excellent population.

9. The coefficient of condition data for most of the gill netted specimens is shown in Tables 5 and 11.

10. Recommendations for a follow up basic survey on McGee Bend Reservoir upon its completion is made.

OBJECTIVES

To gather fundamental data on the above waters in regard to their physical, chemical and biological aspects. To determine the distribution of fish species present, their relative abundance and the ecological factors influencing their distribution.

PROCEDURE

There were three methods of collection employed in making this study. By far the most common method was by seining with either a $\frac{1}{4}$-inch mesh, 26 by 6 foot bag seine or either a cotton or nylon common sense minnow seine, depending upon the size and depth of

the water. Usually only one or two drags were made with the seine. Some times as many as six drags were required to collect only one specimen. Gill nets of 3/4 to 3-inch bar mesh were used in the more open and deeper waters of the river. Hoop nets of various mesh sizes were used on two occasions. There were no rotenone collections made due to adverse public opinion of using poison in public waters.

Lake Tyler, in Smith County, is the only major impoundment on the watershed and it was reported previously under F3R1, Job B-4.

All seined specimens were preserved in ten percent formalin and brought to the laboratory for identification. Specimens from gill and hoop nets were identified, counted and weighed in the field. A record was kept of the length and weight of each fish and the coefficient of condition was determined on all netted specimens.

Ecological data included water and air temperature, weather conditions, surrounding vegetation types, description of the stream, turbidity, and color of the water. Analysis of the water included pH, methal orange alkalinity and chlorides. Water samples were taken at every station, with a few exceptions, and brought back to the laboratory for analysis. Dissolved oxygen was determined when pollution was suspected.

FINDINGS

A total of 116 collections was made on both the Angelina and Attoyac Drainages. These collections yielded 73 species representing 13 families. Forty-nine species were common to both drainages while the Angelina Drainage listed 11 species not found in the Attoyac. On the other hand, the Attoyac Drainage lists 13 species not found in the Angelina (See Table 1).

In addition there were 93 water analyses made on both drainages.

Because of the sizes of the streams involved, the Angelina River and the Attoyac Bayou were treated as separate but related surveys and shall be treated as such in this report although remaining under the same job. These shall be mentioned separately as the Angelina Drainage and the Attoyac Drainage.

ANGELINA RIVER AND ITS DRAINAGE

The Angelina River Drainage consists of approximately 3300 square miles, including the Attoyac Drainage, in Smith, Rusk, Shelby, Cherokee, Nacogdoches, Angelina, Jasper, Sabine and San Augustine Counties in East Texas. The river proper heads in southern Rusk County and flows in a generally southeast direction until it empties some 170 miles downstream into the Neches River at the head of Dam "B" Reservoir in Jasper County. A 25-year average discharge at US 59 bridge crossing north of Lufkin is 1341 cubic feet per second (cfs). A major portion of the tributary streams are permanent or intermittent spring-fed streams.

The soils found in this area are generally light colored, acid sandy loams and sands in the uplands, and darker colored, acid sandy loams and clays in the bottomlands. Native vegetation in the uplands include loblolly and shortleaf pines and various hardwoods such as oak, gum and hickory. In the lowlands hardwoods are prevalent with some cypress. Most of the land is used for timber and pasture with some truck crops. The famed East Texas Oil Field takes in the western portion of Rusk County and the southeast corner of Smith County. A major tributary of this area is Striker Creek on which a 2,300 surface acre reservoir is nearing completion.

Isolated to moderate growths of aquatic vegetation were found along the shores and banks of some of the waters of this drainage. These included willow (Salix nigra), saw grass (Zizaniopsis milacea), various sedges (Cyperaceae), smartweed (Polygonum), pondweed (Potamogeton sp.), duck potato (Sagittaria sp.) and various algaes including Chara sp. which were found in quiet pools and clear water.

Practically the entire Angelina River is characterized by huge trees that have fallen into the river either all the way across, in the upper sections, or partially blocking the river in the lower reaches where it widens out. This has been caused by undermining of the tree's root system by the river in many cases. Also it has been reported that the path of a tornado followed the river several years ago thereby felling many trees. This fact, along with low water levels due to drought conditions, makes the more desirable method of collecting by boat very impractical. As an indication of this, this writer and one field assistant covered only approximately six river miles in some eight and one-half hours due to the fact that we had to either push or lift the boat over or under tree trunks or through tree tops. This resulted in many blisters, barked shins, sore muscles and very few collections. The lower reaches of the river is navigable with a little effort during low water to draw over sand bars and rocky shoals.

WATER QUALITY

Routine water analyses were made for nearly every collecting station in order to determine the water quality (Table 2). Additional tests were made in areas where pollution was suspected. In all, 71 analyses were made on the Angelina Drainage during this study. The turbidity of the water in the river proper was considered to be from ry to moderately turbid while the waters of the tributaries, most of which were spring-ed, were slightly turbid to clear. Water surface temperature varied from a low of 54°F in March to a high of 94°F in August. Generally the spring-fed streams were much cooler in the summer months than the run-off fed streams. The pH varied from below 6.0 (our indicators only went to 6.0) to 7.6. Here, the river tended to be more on the alkaline side (7.2 - 7.6) than the tributaries. The total chloride content varied widely from 13 p.p.m. to 780 p.p.m. but followed no definite pattern. The extreme high chloride contents were found in the oil field drainage, Striker Creek. The methal orange alkalinity varied along the same trend as the pH, ranging from 4 p.p.m. to 110 p.p.m. Dissolved oxygen tests were run in suspected polluted areas and they ranged from 0.0 p.p.m. to 4.8 p.p.m.

COLLECTION STATIONS

A total of 72 collecting stations including 63 seining, 2 gill netting and 7 pollution stations were established and visited at least once during this survey. Table 3 gives the geographical location of each station. Figure 1 show the locations in relation to each other. As can be seen from the map the majority of these stations were located at road crossings due to the before mentioned fact that most of the river was unnavigable.

SPECIES PRESENT

A total of 60 species representing 13 families was collected in the waters of the Angelina Drainage. This yield was from a total of 66 collections. Table 4 lists each species phylogenetically and by family. The specific names are from Hubbs, A CHECK-ST OF TEXAS FRESHWATER FISHES, dated February 1957. Table 5 lists the relative abundance of each species as determined from actual collected specimens and field observations.

It should be noted that the Angelina Drainage has an excellent population of forage fish, especially of Notropis sp. Of all specimens collected Notropis sp. made up 51.24% of the total by count. All forage fish collected composed approximately 65% of the total population. Game fish, principally spotted bass, bluegill sunfish and white crappie made up some 10% of the population. Topminnows made up some 22% of the population and rough fish and miscellaneous species fill in the remainder. All of the above quoted percentages are from actual collected and counted specimens and only give an indication as to the population of species present in the drainage.

Two gill net collections were made in the Angelina River, one collection made with two experimental nets yielded only 3 species (4 specimens), and the other made with four experimental nets yielded 10 species and 90 specimens. The numbers in () recorded in Table 5 are the numbers of that species caught in gill nets. Table 6 gives the length-weight data and the coefficients of condition. At the time of the gill net collection G-2, the gates at Dam "B" had been opened allowing the waters to escape permitting rice farmers to flood their fields downstream. This caused a large number of fish to ascend both the Neches and Angelina Rivers. This is the apparent reason for the large number of white crappie and gizzard shad to be found at that time. It should be noted that the water in this section of the river (west of Jasper) had an excellent plankton bloom at the time and all the fish collected were in good condition.

POLLUTION

While no active pollution, in the sense that fish were being killed, was encountered on the watershed during this period there does exist a situation which does affect normal fish life and propagation. The Southland Paper Mill at Herty, near Lufkin, Angelina County, discharges from its plant an effluent which is 106 F (a winter temperature reading), at a rate of 23,328,000 gallons 24 hours period. This effluent flows (See Figure 2) into a 50-acre lake where a large amount of paper pulp is recovered and the BOD is reduced by natural bio-chemical processes. From here the water leaves by an overflow and enters a second 50-acre lake and again the BOD is reduced. Here again the water leaves by an overflow apparatus and comes out of a conduit at the bottom of the dam where there is a layer of foam several feet thick on top of the water. This foam on the water extends for one to two hundred yards downstream into a stream known as a tributary to Willis Creek. Along the banks of this creek below the outfall at the dam there is also a fine powdery substance, a thickness of several inches. This stream runs into Willis Creek from where it flows on into the Angelina River some 12 miles below the outlet of the second dam. At times during the summer this effluent increases the normal stream flow by 100%. The color of the water varies from milky tan to coal black as it leaves the plant and enters the river. This color is due to sodium lignate in solution. At all times below the outfall from the second pond there is a very strong odor of sulfides. Water samples were taken at various locations along this waterway but analyses were impossible at times because of the color of the water. Dissolved oxygen is zero for several miles then picks up and increases as the effluent becomes further diluted with fresh water of the river. Refer to Table 2 for a record of the analyses. On the bottom of the river there is a soft black deposit varying in thickness from two or three feet, which makes seining impossible. Also netting was impossible because of inaccessibility by boat due to fallen trees and brush. Collections were made several miles downstream indicating that this effluent does not kill fish. However, this writer believes that this "black water" does keep fish from moving upstream and the deposits on the stream bottom do destroy spawning beds, and prevent sunlight from penetrating to aid in production of plankton. Another detriment is that it discourages the fisherman from fishing the river, thereby eliminating a once desirable fishing water.

According to plant officials there is no known economical method of treating the effluent for color or odor. The BOD is greatly reduced by their present treatment which is an improvement over no treatment at all.

Another potential source of pollution is on Striker Creek from the East Texas Oil Field region. At the time of collection the chlorides were over 700 p.p.m. (Table 2) which is not harmful to fish life.

PROPOSED RESERVOIRS

There are two major reservoirs either in the planning stage or under actual construction on the Angelina Drainage and oddly enough both are below the above mentioned areas of pollution. McGee Bend Reservoir is being planned on the Angelina River 25.2 river miles above its confluence with the Neches River (See Figure 1). It is to be 141,300 surface acres at flood-control pool elevation. Construction is to be initiated in the fiscal year 1957. This lake is a U. S. Corps of Engineers project.

Striker Creek Reservoir is to be a 2340 surface acre lake due for impoundment April 1957. This reservoir is to be near New Salem, in Cherokee and Rusk Counties. It is being built by the Angelina-Nacogdoches Counties Water Control and Improvement District Number One. (See Figure 1).

COMMERCIAL FISHING

Jasper County is the only county permitting commercial fishing on the drainage. Only about six gill nets were encountered on this survey. One commercial fisherman was seen and apparently was operating on only a small scale.

THE ATTOYAC BAYOU AND ITS DRAINAGE

The Attoyac Bayou Drainage consists of approximately 750 square miles in Shelby, Rusk, Nacogdoches and San Augustine Counties in East Texas. The bayou proper heads in southeastern Rusk County (Figure 3) and flows in a generally southern direction until it empties some 85 miles downstream into the Angelina River. The bayou forms the county line between Nacogdoches and San Augustine Counties. A 14-year average discharge at State Highway 21 bridge crossing, about two-thirds of the way downstream, is 539 cfs. A major portion of the tributary streams are spring-fed and flow the year around while many others dry completely up during the dry summer months.

The soils found in this area are generally the same as the Angelina Drainage, that is, light colored, acid sandy loams and sands in the uplands, and darker colored, acid sandy loams and clays in the bottomlands. The native vegetation includes loblolly and shortleaf pines and various hardwoods. The land is used primarily for timber, pasture and a few truck crops.

Growths of aquatic vegetation along the banks and shores are isolated with the exception of willow (Salix) and it is pretty well widespread. Other vegetation includes cattails (Typha sp.), various sedges (Cyperaceae) and lilies (Nymphaeceae).

The Attoyac Bayou is characterized by having straight cut sandy loam banks with very heavy brush and timber growths. Navigation by boat was not feasible because

of the many snags and other natural barriers. There were also few access roads. The depth of the water at normal level probably averages four to six feet with deeper holes in places.

WATER QUALITY

Routine water analyses were made at least once at nearly every collection station in order to determine the water quality. In all 22 analyses were made during this study and are compiled in Table 7. The turbidity of the water in the bayou proper was considered to be from clear, in the upper reaches, to very turbid further downstream, depending upon the amount of runoff received due to rain. Most of the tributaries, which are spring-fed, were clear to moderately turbid. This is very much like the Angelina Drainage. The water surface temperatures varied from a low of 57°F in March to a high of 99°F in July. Again, like the Angelina Drainage, the spring-fed streams were much cooler in the summer than the run-off fed streams. The pH remained fairly well constantly acid, varying from 6.0 to 7.2. The average pH was 6.6. The total chloride content also remained fairly constant and low. It varied from 14 p.p.m. to 70 p.p.m. The methal orange alkalinity kept very much in line wth the pH, ranging from 8 to 90 p.p.m. The average alkalinity was approximately 30 p.p.m.

COLLECTIONS STATIONS

A total of 26 collecting stations including 23 seining, 2 gill netting and one hoop netting stations were established and visited at least once and many three times during the survey. Table 8 gives the geographical locations of these stations and Figure 3 shows the locations in relation to each other. As can be seen from the map the biggest part of these stations were located on tributary streams because of the characteristics of the bayou and the few access roads.

SPECIES PRESENT

Fifty collections yielded a total of 62 species representing 13 families in the waters of the Attoyac Drainage. Table 9 lists each species phylogenetically and by family. The specific names are from Hubbs, A CHECKLIST OF TEXAS FRESH-WATER FISHES, dated February 1957. Table 10 lists the relative abundance of each species as determined from the actual collected specimens and field observations. Forage fish make up some 40% of the collected population while game fish make up only about 12%. Rough fish and miscellaneous species make up the remaining 48%. This figure definitely does not represent the entire drainage however, because 1538 out of the total of 1546 black bullheads, representing 34.50% of the total collected population, came from one small pothole subject to overflow. Also this pothole yielded 300 of the 498 golden shiners collected. Keeping this in consideration, the population is in fairly good game-forage-rough fish proportion.

Table 11 gives the results of the two gill net collections made near the mouth of the Attoyac Bayou. This method of collection yielded four species not collected by other methods.

Table 12 shows the results of eleven hoop net sets. This method yielded two additional species. Combined, these two methods produced seven species not collected by seining. As Table 12 indicates, the fish collected in the hoop nets were of good average size.

POLLUTION

There was no active pollution or any potential pollution encountered during this survey on the Attoyac Drainage.

COMMERCIAL FISHING

There is no commercial fishing permitted in Rusk, San Augustine and Nacogdoches Counties and there is insufficient water of the drainage in Shelby County to support commercial fishing. Therefore no commercial fishing was encountered during this survey. There is possibly some isolated "outlaw" fishing done on the bayou.

RECOMMENDATIONS

In view of the fact that McGee Bend Reservoir is going in on the lower Angelina River it is recommended that as a follow-up to this survey and upon completion of the reservoir, a basic survey be conducted on the reservoir. Factors to be determined would be the occurrence of additional species and changes in populations of game fish and rough fish. In addition the possible stocking of white bass (Roccus chrysops) should be considered.

A basic survey of Striker Creek Reservoir is already planned and will commence this year.

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Approved by Marion Toole
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Date May 14, 1957

Table 1. Distribution of Species and Numbers Collected by Station

SPECIES	Angelina River Drainage (counts at stations, left to right)	Angelina Total	Attoyac Bayou Drainage (counts at stations, left to right)	Attoyac Total	Grand Total
Lepisosteus productus	1, 1	2		2	[illegible]
L. osseus	2, 12	14	1, 1, 2	2	16
Dorosoma cepedianum	1, 2, 2, 7, 4, 3, 1, 19, 5, 19, 4, 10, 22, 1, 24	240	98, 33, 25, 2	[illegible]	418
Esox americanus	2, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1	12	1, 1, 3, 4, 1, 6, 2, 4, 2, 1	25	37
Ictiobus bubalus	13	13	9, 5	14	27
Carpiodes carpio		0	8	8	8
Moxostoma carinatum	3, 1, 2, 3, 13, 3	25	4	4	29
M. poecilurum	1, 1, 1, 1, 1	5	1	1	6
Minytrema melanops	2	2	1	1	3
Erimyzon sucetta	1, 5	6	1, 2, 1	4	10
E. oblongus	1	1	1, 7, 1, 2, 38	49	50
Notemigonus crysoleucas	2, 1, 3, 12, 1, 5, 6, 2, 6, 8, 1, 1, 1	47	18, 300, 64, 15, 27, 19, 2, 56	498	545
Semotilus atromaculatus	1	1		0	1
[illegible]	1, 2, 5, 22	30	1, 64, 20, 5, 3, 29	122	152
Hybopsis [illegible]		0	2	2	2
H. aestivalis	15, 1, 22	38		0	38
[illegible]	14, 6, 4, 1, 5, 1, 14, 1, 9	55	2, 3, 4	9	64
N. Fumeus		0	22	22	22
N. [illegible]bilis	1	1	1, 13	14	15
N. [illegible]	41, 13, 6, 3, 3, 1, 1, 4, 4, 2, 3, 36, 2, 8, 1, 21, 8, 1, 10, 40, 25, 16, 66, 3, 66, 1, 96, 33, 4, 1	639	18, 1, 2, 75, 15, 1, 3, 57, 25, 11, 4, 2	[illegible]	835
N. [illegible]		0	6, 23, 4, 1, 4	38	38
N. [illegible]	3, 10	13		0	13
N. [illegible]	9, 16, 10, 1, 1	37	7, 2, 1, 1	11	48
N. potteri	1, 51, 7, 1, 2	62		0	62
N. sabinae	6	6		0	6
N. amnis	17, 14, 57, 4, 21, 5, 39, 18, 17, 11	193	3, 4	3	196
N. venustus	4, 19, 42, 43, 8, 1, 8, 4, 1, 6, 2, 16, 10, 3, 5, 13, 2, 6, 4, 6, 48, 5, 7, 1, 1, 1, 2	265	30, 93, 4, 1, 58	[illegible]	451
N. lutrensis	1, 1, 1, 1, 5	8	1, 1, 3	[illegible]	13
N. deliciosus	3, 1, 38, 27, 8, 6, 11, 2, 11, 1, 27, 6, 3, 19, 4, 3, 6, 9, 8, 25, 18, 1, 1, 5	240	17, 6, 10, 8, 10, 13, 16, 1	81	321
N. atrocaudalis	4, 118, 22, 6, 1, 1, 2, 4, 3, 7, 25, 78, 41	379	9, 5, 22, 16, 1, 23, 11, 61, 7, 4, 7, 4	170	549
N. volucellus	6, 16, 1, 14, 1, 5, 1, 4, 1, 11, 12, 2, 37, 9, 46, 83, 6, 3, 1	243	3, 10, 10, 2, 1, 34, 7, 7	[illegible]	317
Hybognathus nuchalis	9, 8	17	21, 5, 1, 5, 18	50	67
H. placita		0	5, 2, 1, 15, 11, 5	38	38
Pimephales vigilax	3, 2, 2, 2, 1, 9, 37, 3, 6, 29, 1, 2, 4, 1, 5, 12, 4, 1, 5, 4, 5, 11, 3	150	5, 4, 10, 2, 3	24	174
P. promelas		0	1, 1	2	2
Ictalurus punctatus	1, 1, 2, 2, 1, 3	10	1, 1	2	12
I. furcatus		0	1	1	1
I. melas		0	2, 1539, 5	1546	1546
I. natalis	2	2		0	2
Pylodictis olivaris	1	1	O, 1	1	2
Schilbeodes gyrinus	1	1	1	1	2
S. nocturnus	1, 2	3		0	3
Fundulus chrysotus	180, 6, 3	189	9	9	[illegible]
F. olivaceus	1, 9, 4, 30, 3, 3, 8, 3, 2, 1, 5, 5, 1, 9, 14, 4, 30, 4, 3, 6, 3, 2, 2, 9, 30, 5, 12, 9, 12, 1, 2, 21, 14, 7, 1, 3, 35, 7, 2, 20, 3, 5, 52, 7, 3	409	3, 1, 1, 28, 12, 7, 39, 13, 8, 11, 8, 21, 1, 9, 1, 12, 5	[illegible]	508
Gambusia affinis	9, 8, 1, 13, 5, 1, 34, 11, 6, 2, 2, 1, 1, 11, 1, 1, 30, 3, 2, 6, 1, 1, 1, 13, 3, 1, 7, 19, 30, 1, 18, 13, 1	257	3, 1, 9, 18, 77, 21, 27, 4, 7, 1, 1, 11, 0	[illegible]	439
Aphredoderus sayanus	1	1	1, 2, 11, 1, 1	16	17
Labidesthes sicculus	3, 1, 1, 2, 7, 12, 3, 9, 4, 5, 8, 1, 5, 1, 13	75	20, 2, 14	36	111
Micropterus punctulatus	1, 1, 4, 2, 4, 4, 4, 4, 2, 2, 3, 1, 1, 5, 1, 3, 1, 2, 2, 12, 1, 1, 2, 2, 2, 8, 2, 2, 10, 1, 1	90	1, 4, 6, 2, 1, 5, 5, 7, 2	33	123
M. salmoides		0	1, 1, N	2	2
Chaenobryttus gulosus	1, 1, 1	3	1, 1, 3, 2, N, 1	8	11
Lepomis cyanellus	1	1	1, 14, 3, 3, 4, 1, 6	32	33
L. punctatus	1, 2, 3, 2, 12, 7, 2, 1, 1, 1, 1, 6, 6, 4, 1	48	1, 1, 9, 24, 20, 17, 10, 1, 6, 2, 2, 2	[illegible]	[illegible]
L. microlophus	2, 3, 1	6	19, 8, 19	[illegible]	[illegible]
L. macrochirus	5, 1, 1, 1, 2, 2, 4, 19, 4, 1, 17, 27, 8, 3, 8, 6, 4, 1, 1, 2	107	16, 11, 1, 6, 34, 1, 25, 14, 7, 2, 59, 1	183	290
L. humilis	1	1	1, 8, N	9	10
L. auritus		0	2	2	2
L. megalotis	1, 1, 1, 1, 2, 1	7	7, 8, 4, 1, 1, 3, 38, 10	72	79
Pomoxis annularis	50, 9, 2, 2, 1, 3, 18	85	3, 72, 8, 1, 2	87	172
P. nigromaculatus	15, 2, 1, 2, 3	23	2, 10, 2, 11, 6	31	54
Centrarchus macropterus		0	1	1	1
Elassoma zonatum	1, 10	11	1, 38	39	[illegible]
Hadropterus maculatus	1, 1, 3	5	1	1	[illegible]
H. shumardi	1, 1, 1, 1	4	3, 1, 5	9	13
Percina caprodes	1	1		0	1
Ammocrypta vivax	3, 2, 12, 2, 2, 2, 5, 4, 4, 6, 2, 1	45	1, 5, 5	11	[illegible]
A. clara	1, 3	4		0	4
Etheostoma chlorosomum	2, 4, 7, 2, 4	19	1, 12, 13, 1, 2, 15, 1, 9, 6	59	[illegible]
E. histrio		0	7	7	7
E. gracile	1, 5, 2, 1, 1, 1, 1, 2, 2	16	1, 10, 1, 1, 3, 5, 1, 3, 9, 1	34	[illegible]
E. grahami	1	1		0	1
E. proeliare		0	1	1	1
E. fonticola	3	3		0	3
Aplodinotus grunniens	2, 1, 13	16	2	2	[illegible]

Table 2. Ecological and Chemical Data on the Angelina Drainage.

Station Number	Name of Water	Date	Temperature Air	Temperature Surface	Turbidity	Color	pH	M.O. Alk p.p.m	Chlorides p.p.m.	Dis. O p.p.m.
1	Brumley Creek	3/12/56	51	55			6.2	18	13.184	-
2	Scoober Creek	3/12/56	50	55		Brown	6.4	14	21.276	-
3	Johnson Creek	3/12/56	50	55	Clear		7.0	50	35.460	-
4	Mud Creek	3/12/56	53	54			6.6	26	21.276	-
5	Caney Creek	3/12/56	50	55		Greenish	6.2	13	35.460	-
6	Twin Creek	3/12/56	50	57		Greenish-blue	6.0	4	35.460	-
7	Angelina River	6/25/56	94	84	Very	Tannish	6.7	25	179.290	-
8	Angelina River	6/25/56	94	84	Very	Tannish				-
9	Angelina River	6/25/56	94	84	Very	Tannish	6.6	22	179.290	-
10	Angelina River	6/26/56	85	84	Moderate	Green	6.0	10	141.840	-
11	Angelina River	6/26/56	89	87	Very	Tannish	6.6	50	49.634	-
12	Angelina River	6/27/56	83	84	Moderate	Blackish-brown	6.8	48	84.104	-
13	Angelina River	6/27/56	83	84	Moderate	Blackish-brown				-
14	Angelina River	6/27/56	86	85	Moderate	Dark brown	6.8		92.196	-
15	Angelina River	6/27/56	90	86	Very	Milky brown				-
16	Angelina River	6/27/56	93	85	Moderate	Milky brown	6.7	43	84.104	-
17	Angelina River	6/27/56	88	86	Moderate	Milky brown				-
18	Angelina River	6/27/56	99	86	Moderate	Milky tan	6.9	43	84.104	-
19	Jarrell Creek	8/2/56			Moderate	Brownish-green	6.6	100/	21.276	-
20	Ham Creek	8/2/56			Clear	Green	7.2	100/	21.276	-
21	Trib. E. Fork Angelina River	8/2/56			Very	Milky tan	6.6	100/	21.276	-
22	E. Fork Angelina	8/2/56			Moderate	Brown	6.8	100/	21.276	-
23	E. Fork Angelina	8/2/56			Moderate	Green	7.6	100/	35.460	-
24	Trib. Angelina R.	8/2/56			Very	Green	7.2	80	49.634	-
25	Angelina River	8/2/56			Very	Milky tan	6.2	35	184.382	-
26	Mud Creek	8/2/56			Very	Milky brown	7.2	90	14.184	-
27	Angelina River	8/2/56			Moderate	Milky tan	7.2	45	120.554	-
28	Angelina River	8/2/56			Very	Brownish-green	7.2	42	92.196	-
29	Angelina River	8/2/56				Milky tan	7.0			-
30	Ayish Bayou	8/9/56	92	78	Clear	None	6.0	30	21.276	-
31	Ayish Bayou	8/9/56	92	79	Very	Brown	6.2	20	141.840	-
32	Trib. to Ayish B.	8/9/56	94	84	Very	Brown	6.4	32	21.276	-
33	Ayish Bayou	8/9/56	94	92	Very	Milky brown	7.4	150	35.460	-
34	Trib to Ayish B.	8/9/56	94	90	Very	Greenish-brown	6.6	50	21.276	-
35	Bear Creek	8/9/56	104	84	Moderate	Greenish-brown	6.8	68	35.460	-
36	Bear Creek	8/9/56	104	88	Mod te	Grayish-green	7.0	25	14.184	-

Table 2. (Continued).

37	Ayish Bayou	8/9/56	104	88	Moderate	Greenish-brown	7.2	95	35.460	-
38	Angelina River	8/9/56	100	94	Very	Blackish-brown	7.2	125	127.656	-
40	Rocky Creek	8/10/56	90	79	Very	Milky brown	6.6	59	42.552	-
41	Angelina River	8/10/56	97	92	Very	Tan	6.4	69	78.012	-
41a		8/29/56				Dark tan	7.0	110	127.656	-
42	Indian Creek	8/10/56	97	78	Clear	None	6.2	19	21.276	-
43	Angelina River	8/10/56	94	90	Very	Reddish-tan	7.1	80	85.104	-
44	Angelina River	8/28/56	88	84	Very	Dark brown stain	7.4	110	127.656	-
45	Angelina River	8/28/56	88	82	Very	Dark brown stain	7.4	110	127.656	-
46	Angelina River	8/28/56	78	82	Very	Dark brown stain	7.4	110	127.656	-
47	Angelina River	8/28/56	85	83	Very	Milky brown	7.4	110	127.656	-
48	Angelina River	8/28/56	83	82	Very	Milky brown	7.4	110	127.656	-
49	Angelina River	8/28/56	82	84	Very	Milky brown	7.4	110	127.656	-
50	Angelina River	8/29/56	78	82	Very	Dark tan	7.0	95	85.104	-
51	Angelina River	8/29/56	76	80	Very	Dark tan	7.2	95	85.104	-
52	Angelina River	8/29/56	78	80	Very	Dark tan	7.2	110	127.656	-
53	Shawnee Creek	12/6/56	82	62	Moderate	Brown stain	6.8	58	35.460	-
54	Barnhardt Creek	12/6/56	82	64	Clear	Brown stain	6.8	17	35.460	-
55	Barnhardt Creek	12/6/56	83	61	Slight	Black stain	7.0	43	35.460	-
56	Shawnee Creek	12/6/56	84	72	Clear	Brown stain	6.8	53	35.460	-
57	Angelina River	12/6/56	83	60	Slight	Dark stain	7.0	47	35.460	-
58	Striker Creek	12/6/56	84	67	Clear	Green	*6.0	9	709.200	-
59	Striker Creek	12/6/56	85	68	Clear	None	*6.0	5	709.200	-
60	Beaver Run	12/6/56	85	68	Clear	Green	6.8	49	780.120	-
61	Gilley Creek	2/25/57	85	65	Very	Milky tan	6.4	56	283.680	-
62	Mud Creek	2/25/57	67	59	Moderate	Greenish-tan	6.4	26	141.840	-
63	West Mud Creek	2/25/57	67	58	Moderate	Tannish	6.4	32	638.280	-
64	Shakleford Creek	2/25/57	67	59	Very	Light brown	6.5	25	354.600	-
G-1	Angelina River	8/9/56	85	85	Very	Black	7.2	93	141.840	-
G-2	Angelina River	8/29/56	82	82	Very	Dark tan	7.2	42	127.656	-
P-1	Plant outlet	12/12/56	80	106	Very	Tan	6.1	26	est141.64	-
P-2	Trib. Willis Ck.	8/3/56				Blackish-gray	6.6		198.567	0.0
P-3	Willis Creek	8/3/56				Brownish-gray	7.6	220	21.276	3.4
P-4	Angelina River	8/3/56			Very	Black	7.2		177.300	0.0
		7/11/56				Brownish-black	6.6			1.8
P-5	Angelina River	7/11/56				Black	7.1			0.8
		8/3/56				Black	7.2		est177.300	0.0
P-6	Angelina River	7/10/56				Brownish-black	7.2			
P-7	Angelina River	8/3/56				Brown				4.8

*Believed to be less than 6.0.

Table 3. Location of Collecting Stations on the Angelina Drainage.

Station Number	County	Name of Water	Location
1	Rusk	Brumley Creek	3 mi SW Henderson on US 79
2	Rusk	Scoober Creek	7 mi SW Henderson on US 79
3	Rusk	Johnson Creek	10 mi SW Henderson on US 79
4	Cherokee	Mud Creek	3 mi SW Troup on FM 347
5	Cherokee	Caney Creek	3 mi S Troup on SH 110
6	Cherokee	Twin Creek	2½ mi N New Summerfield on SH 110
7	Cherokee	Angelina River	1 mi downstream from SH 204
8	Cherokee	Angelina River	1½ mi downstream from SH 204
9	Cherokee	Angelina River	2 mi downstream from SH 204
10	Nacogdoches	Angelina River	9 mi E Alto on SH 21
11	Angelina	Angelina River	9 mi N Lufkin on US 59
12	Angelina	Angelina River	14 mi E Lufkin, ¼ mi downstream from SH 103
13	Nacogdoches	Angelina River	14 mi E Lufkin, 3/4 mi downstream from SH103
14	Nacogdoches	Angelina River	14 mi E Lufkin, 3 mi downstream from SH 103
15	Angelina	Angelina River	14 mi E Lufkin, 4 mi downstream from SH 103
16	Angelina	Angelina River	14 mi E Lufkin, 5 mi downstream from SH 103
17	Angelina	Angelina River	14 mi E Lufkin, 6 mi downstream from SH 103
18	Angelina	Angelina River	14 mi E Lufkin, 8 mi downstream from SH 103
19	Rusk	Jarrell Creek	8 mi SE Henderson on SH 26
20	Rusk	Ham Creek	3½ mi NE Mount Enterprise on SH 26
21	Rusk	Trib. E. Fork Ang.	4 mi SW Mount Enterprise on County Road
22	Rusk	E. Fork Angelina R.	3 mi N Cushing on FM 225
23	Rusk	E. Fork Angelina R.	6 mi NW Cushing on County Road
24	Rusk	Trib. to Angelina	3½ mi E Reklaw on US 84
25	Rusk	Angelina River	3 mi E Reklaw on US 84
26	Cherokee	Mud Creek	1 mi SW Reklaw on US84
27	Cherokee	Angelina River	12 mi E Rusk on FM 343
28	Cherokee	Angelina River	7½ mi NE Wells on County Road
29	Angelina	Angelina River	16 mi NW Lufkin on SH 7
30	San Augustine	Ayish Bayou	4 mi N San Augustine on County Road
31	San Augustine	Ayish Bayou	1½ mi N San Augustine on County Road
32	San Augustine	Trib. Ayish Bayou	8½ mi SSW San Augustine on FM 705
33	San Augustine	Ayish Bayou	10 mi SSW San Augustine on SH 103
34	San Augustine	Trib. Ayish Bayou	9 mi W Pineland on County Road
35	Sabine	Bear Creek	3 mi WNW Pineland on County Road
36	Sabine	Bear Creek	3 mi WSW Brookland on County Road
37	San Augustine	Ayish Bayou	5 mi WSW Brookland on County Road
38	San Augustine	Angelina River	8 mi WSW Brookland on County Road
40	Angelina	Rocky Creek	6 mi NE Zavalla on County Road
41	Jasper	Angelina River	10 mi W Jasper, 1 mi downstream from SH 63
42	Jasper	Indian Creek	7½ mi W Jasper on SH 63
43	Jasper	Angelina River	9 mi W Jasper on FM 1745
44	Jasper	Angelina River	12 mi NW Jasper, 1 mi upstream from Ayish Bayou
45	Jasper	Angelina River	11 mi NW Jasper, mouth of Ayish Bayou
46	Jasper	Angelina River	9 mi NW Jasper, 2 mi downstream from Ayish Bayou

Table 3 (Continued).

47	Jasper	Angelina River	11 mi NW Jasper, 2 mi ENE Ebernezer Road
48	Jasper	Angelina River	10 mi NW Jasper, 1½ mi S Ebernezer Road
49	Jasper	Angelina River	12 mi WNW Jasper, ½ mi upstream from SH 63
50	Jasper	Angelina River	10 mi W Jasper, 1 mi below FM 1745
51	Jasper	Angelina River	9 mi W Jasper, 2 mi upstream from FM 1745
52	Jasper	Angelina River	11 mi W Jasper, half way between FM 1745 and SH 63
53	Rusk	Shawnee Creek	6 mi S Henderson, 3/4 mi W FM 225
54	Rusk	Barnhardt Creek	7 mi S Henderson on FM 225
55	Rusk	Barnhardt Creek	3 mi NW Laneville on County Road
56	Rusk	Shawnee Creek	3½ mi NE Laneville on County Road
57	Rusk	Angelina River	5 mi SW Laneville on FM 1662
58	Rusk	Striker Creek	1 mi SW New Salem on FM 839
59	Cherokee	Striker Creek	6 mi E New Summerfield on US 79
60	Rusk	Beaver Run	2 3/4 mi SW Carliele on FM 13
61	Smith	Gilley Creek	9 mi W Troup on FM 848
62	Smith	Mud Creek	3 mi W Troup on SH 110
63	Smith	West Mud Creek	3½ mi NE Bullard on FM 344
64	Smith	Shakleford Creek	4 3/4 mi NNE Bullard on FM 346
G-1	San Augustine	Angelina River	8 mi NE Zavalla on SH 147
G-2	Jasper	Angelina River	9 mi W Jasper on SH 63
P-1	Angelina	Plant outlet	Southland Paper Mill at Herty
P-2	Angelina	Trib. to Willis	1 mi W Moffett on FM 842
P-3	Angelina	Willis Creek	1 mi W Moffett on FM 842
P-4	Angelina	Angelina River	2½ mi NNE Moffett below Mill Creek
P-5	Angelina	Angelina River	14 mi E Lufkin on SH 103
P-6	San Augustine	Angelina River	8 mi NE Zavalla on SH 147
P-7	Angelina	Angelina River	4 mi N Moffett above Mill Creek

Table 4. A Checklist of Angelina Drainage Fishes.

I. Family: LEPISOSTEIDAE

1. Lepisosteus productus - spotted gar
2. L. osseus - longnose gar

II. Family: CLUPEIDAE

3. Dorosoma cepedianum - gizzard shad

III. Family: ESOCIDAE

4. Esox americanus - grass pickeral

IV. Family: CATOSTOMIDAE

5. Ictiobus bubalus - smallmouth buffalo
6. Moxostoma congestum - gray redhorse
7. M. poecilurum - blacktail redhorse
8. Minytrema melanops - spotted sucker
9. Erimyzon sucetta - lake chubsucker
10. E. oblongus - creek chubsucker

V. Family: CYPRINIDAE

11. Notemigonus crysoleucas - golden shiner
12. Semotilus atromaculatus - creek chub
13. Opsopoeodus emiliae - pugnose minnow
14. Hybopsis aestivalis - speckled chub
15. Notropis atherinoides - emerald shiner
16. N. amabilis - Texas shiner
17. N. fumeus - ribbon shiner
18. N. brazosensis - Brazos river shiner
19. N. roseus - central weed shiner
20. N. potteri - broadhead shiner
21. N. sabinae - longnose shiner
22. N. amnis - pallid shiner
23. N. venustus - blacktail shiner
24. N. lutrensis - red shiner
25. N. deliciosus - sand shiner
26. N. atrocaudalis - blackspot shiner
27. N. volucellus - mimic shiner
28. Hybognathus nuchalis - silvery minnow
29. Pimephales vigilax - parrot minnow

VI. Family: AMEIURIDAE

30. Ictalurus punctatus - Southern channel catfish
31. I. natalis - yellow bullhead
32. Pylodictus olivaris - flathead catfish
33. Schilbeodes gyrinus - tadpole madtom
34. S. nocturnus - freckled madtom

VII. Family: CYPRINODONTIDAE

35. Fundulus chrysotus - redspot topminnow
36. F. olivaceus - blackspot topminnow

VIII. Family: POECILIIDAE

37. Gambusia affinis - common mosquitofish

IX. Family: APHREDODERIDAE

38. Aphredoderus sayanus - pirate perch

X. Family: ATHERINIDAE

39. Labidesthes sicculus - brook silversides

XI. Family: CENTRARCHIDAE

40. Micropterus punctulatus - spotted bass
41. Chaenobryttus gulosus - warmouth
42. Lepomis cyanellus - green sunfish
43. L. punctatus - spotted sunfish
44. L. microlophus - redear sunfish
45. L. macrochirus - bluegill sunfish
46. L. humilis - orangespotted sunfish
47. L. megalotis - longear sunfish
48. Pomoxis annularis - white crappie
49. P. nigromaculatus - black crappie
50. Elassoma zonatum - banded pigmy sunfish

XII. Family: PERCIDAE

51. Hadropterus maculatus - blackside darter
52. H. shumardi - river darter
53. Percina caprodes - logperch
54. Ammocrypta vivax - Arkansas sand darter
55. A. clara - western sand darter
56. Etheostoma chlorosomum - bluntnose darter
57. E. gracilie - western swamp darter
58. E. grahami - redspot darter
59. E. fonticola - fountain darter

XIII. Family: SCIAENIDAE

60. Aplodinotus grunniens - freshwater drum

Table 5. Relative Abundance of Species in the Angelina Drainage.

Species	# in River	# in Trib.	Total	% of Total	Relative abundance
Lepisosteus productus	1 (1)*	0	2	0.04	Rare
Lepisosteus osseus	0 (14)	0	14	0.33	Frequent
Dorosoma cepedianum	228 (25)	7	260	6.23	Abundant
Esox americanus	1	11	12	0.29	Frequent
Ictiobus bubalus	13	0	13	0.31	Frequent
Moxostoma congestum	25	0	25	0.59	Common
Moxostoma poecilurum	2	3	5	0.12	Rare
Minytrema melanops	2	0	2	0.04	Rare
Erimyzon sucetta	0	6	6	0.14	Rare
Erimyzon oblongus	0	1	1	0.02	Rare
Notemigonus crysoleucas	27	20	47	1.12	Common
Semotilus atromaculatus	0	1	1	0.02	Rare
Opsopoeodus emiliae	10	20	30	0.72	Common
Hybopsis aestivalis	38	0	38	0.91	Common
Notropis atherinoides	27	28	55	1.32	Common
Notropis amabilis	0	1	1	0.02	Rare
Notropis fumeus	367	262	629	15.09	Very abundant
Notropis brazosensis	13	0	13	0.31	Frequent
Notropis roseus	1	36	37	0.89	Common
Notropis potteri	62	0	62	1.48	Common
Notropis sabinae	6	0	6	0.14	Rare
Notropis amnis	186	7	193	4.63	Abundant
Notropis venustus	234	31	265	6.35	Abundant
Notropis lutrensis	8	0	8	0.19	Rare
Notropis deliciosus	75	165	240	5.75	Abundant
Notropis atrocaudalis	132	247	379	9.93	Abundant
Notropis volucellus	215	28	243	5.87	Abundant
Hybognathus nuchalis	8	9	17	0.40	Frequent
Pimephales vigilax	124	26	150	3.59	Abundant
Ictalurus punctatus	7 (3)	0	10	0.24	Frequent
Ictalurus natalis	0	2	2	0.04	Rare
Pylodictus olivaris	1	0	1	0.02	Rare
Schilbeodes gyrunus	1	0	1	0.02	Rare
Schilbeodes nocturnus	1	2	3	0.07	Rare
Fundulus chrysotus	0	189	189	5.34	Abundant
Fundulus olivaceus	126	283	409	9.81	Very abundant
Gambusia affinis	81	176	257	6.15	Abundant
Aphredoderus sayanus	1	0	1	0.02	Rare
Labidesthes sicculus	46	29	75	1.79	Common
Micropterus punctulatus	80	10	90	2.16	Common
Chaenobryttus gulosus	2 (1)	0	3	0.07	Rare
Lepomis cyanellus	0	1	1	0.02	Rare
Lepomis punctatus	48	0	48	1.15	Common
Lepomis microlophus	4	2	6	0.14	Rare
Lepomis macrochirus	62 (2)	43	107	2.56	Abundant
Lepomis humilis	0	1	1	0.02	Rare
Lepomis megalotis	1	6	7	0.16	Rare
Pomoxis annularis	65 (18)	2	85	2.04	Common
Pomoxis nigromaculatus	20 (3)	0	23	0.55	Common
Elassoma zonatum	0	11	11	0.26	Frequent

Table 5. (Continued).

Hadropterus maculatus	1	4	5	0.12	Rare
Hadropterus shumardi	3	1	4	0.09	Rare
Percina caprodes	1	0	1	0.02	Rare
Ammocrypta vivax	45	0	45	1.08	Common
Ammocrypta clara	1	3	4	0.09	Rare
Etheostoma chlorosomum	4	15	19	0.45	Frequent
Etheostoma gracilie	3	13	16	0.38	Frequent
Etheostoma grahami	0	1	1	0.02	Rare
Etheostoma fonticola	0	3	3	0.07	Rare
Aplodinotus grunniens	2 (14)	0	16	0.38	Frequent
Total	2492	1706	4198		

* - () Number of specimens taken in gill nets.

Table 6. Results of Two Gill Net Collections (6 sets) on the Angelina River.

Species	Number Caught	Total Weight Lbs.	Number Worked	Range Weight gms	Average Weight gms	Range Length* mm	Average Length* mm	Range "K"	Average "K"
Lepisosteus productus	1	2.06	1		936		535		0.6
Lepisosteus osseus	14	52.50	12	340-6804	1942	470-1050	728	0.3-0.3	0.3
Dorosoma cepedianum	25	15.56	24	57-539	280	127-300	239	1.7-2.8	2.0
Ictiobus bubalus	13	32.81	13	454-2240	1145	232-390	304	3.3-4.1	3.7
Ictalurus punctatus	3	2.69	3	255-567	406	243-320	285	1.6-1.8	1.7
Chaenobryttus gulosus	1	0.37	1		170		160		4.2
Lepomis macrochirus	2	0.19	2	28-28	28	90-93	91.5	3.6-4.0	3.8
Pomoxis annularis	18	11.37	18	28-624	287	91-263	195	2.7-3.8	3.2
Pomoxis nigromaculatus	3	1.19	3	28-312	170	90-210	156	3.4-4.0	3.6
Aplodinotus grunniens	14	12.94	13	28-737	379	83-302	222	2.6-3.3	3.1

* - Standard length

Table 7. Ecological and Chemical Data on the Attoyac Drainage.

Collection Number	Name of Water	Date	Temperature Air	Temperature Surface	Turbidity	Color	pH	M.O. Alk. p.p.m.	Cl p.p.m.
At-R-1	Attoyac Bayou	3/12/56		57	Very	Reddish-brown	6.6	10	14.184
1a		5/17/56	77	62		Brownish-yellow			
1b		7/10/56	99	85					
At-R-2	Golondrino Creek	3/12/56		57	Clear	Green	6.8	9	14.184
At-R-3	Golondrino Creek	3/12/56		57	Slight	Brown	6.8	8	14.184
		5/17/56	79	68		Brown	6.8	8	14.184
At-R-4	Attoyac Bayou	3/12/56		57	Clear	Brown	6.9	15	14.184
4a		5/17/56	80	73		Brownish-yellow			
4b		7/10/56	95	79					
At-Sh-1	Attoyac Bayou	3/12/56		57	Moderate	Brown	6.8	10	14.184
1a		5/17/56	86	62		Brownish-yellow			
1b			99	75	Very	Tan			
At-Sh-2	Sandy Creek	3/12/56		57	Very	Black	6.4	21	14.184
2a		5/17/56		66		Dark brown			
2b		7/10/56	98	94					
At-N-1	No-Named Creek	3/12/56		57	Slight	Brown	6.6		70.920
1a		5/17/56	80	73		Brownish-green			
1b		7/10/56	100	87					
At-N-2	Neconiche Creek	5/12/56		57	Clear	Brown	6.7	22	21.276
At-N-3	Barrow ditch	3/12/56		57	Very	Milky brown	7.2	80	56.736
3a		5/17/56		76		Brownish-yellow			
3b		7/10/56	95	99					
At-N-4	Neconiche Creek	3/12/56		57	Clear	Brown			
4a		5/17/56		72		Blackish-brown	6.6	55	21.186
4b		7/10/56	95	80					
At-N-5	Unnamed Creek	3/12/56		57	Clear	Brown			
5a		5/17/56	80	62			7.0	60	42.550
5b		7/10/56	105	94					
At-N-6	Turkey Creek	3/12/56		57	Very	Brown	6.6	10	14.184
6a		5/17/56		63		Brownish-yellow			
6b		7/10/56	98	86					
At-N-7	Attoyac Bayou	3/12/56		57	Moderate	Light brown	6.7	90	21.276
7a		5/17/56	84	76		Brown			
7b	Bar Ditch	7/10/56	98	96					
At-N-8	Polly Creek	3/13/56		57	Moderate	Brown	6.0	16	21.276
8a		5/17/56			Clear	Greenish-red			
8b		7/10/56	98	86					

Table 7. (Continued).

At-N-9	Tandakee Creek	3/13/56		57	Very	Brown	6.3	21	14.184
At-N-10	Alamodares Creek	5/17/56		70	Clear	Brown	7.0	28	21.186
At-N-11	Attoyac Bayou	7/10/56	90	88	Very	Grayish-green			
At-SA-1	Tributary Creek	3/13/56		57	Very	Light brown	6.2	32	14.184
1a		5/17/56	80	72		Brown			
1b		7/11/56	94	90					
At-SA-2	Attoyac Bayou	3/13/56		57	Very	Brown	6.9	42	21.276
At-SA-3	Prairie Creek	4/5/56	63	60	Very	Grayish Brownish			
At-SA-6	Spear Creek	4/18/56							
At-SA-7	Arenosa Creek	4/18/56		57	Very	Greenish-brown	6.5	27	21.276
7a		5/17/56		65		Greenish-brown			
7b		7/11/56	94	79					
At-SA-H-1	Attoyac Bayou	3/28/56			Moderate	Brown	6.8	25	28.368
At-SA-G-1	Attoyac Bayou	4/18/56	75	64	Very	Brownish-green	6.3	27	21.276
At-SA-G-2	Attoyac Bayou	4/18/56	75	62	Moderate	Brown	6.3	25	21.276

Table 8. Locations of Collections on the Attoyac Drainage.

Station Number	County	Name of Water	Location
At-Sh-1	Shelby	Attoyac Bayou	6 3/4 mi W. Timpson on US 84
At-Sh-2	Shelby	Sandy Creek	4½ mi NE Martinsville on County Road
At-Sh-3	Shelby	Barrow Ditch	2¼ mi NE of Garrison on US 59
At-R-1	Rusk	Attoyac Bayou	1½ mi N Caledonia on County Road
At-R-2	Rusk	Golondrino Creek	2½ mi SSE Concord on County Road off of FM 95
At-R-3	Rusk	Golondrino Creek	3 mi NNW Garrison on FM 95
At-R-4	Rusk	Attoyac Bayou	2 mi NE Garrison on US 59
At-N-1	Nacogdoches	NO-Named Creek	1½ mi NE Garrison on US 59
At-N-2	Nacogdoches	Neconiche Creek	5½ mi S Garrison on County Rd W of FM 1274
At-N-3	Nacogdoches	Bar Ditch	5 mi SE Garrison on County Rd E of FM 1274
At-N-4	Nacogdoches	Neconiche Creek	8 mi SSE Garrison on FM 1274 (3 bridges)
At-N-5	Nacogdoches	Un-named Creek	5 mi S Garrison on FM 1274
At-N-6	Nacogdoches	Turkey Creek	10 mi SSE Garrison on FM 1274
At-N-7	Nacogdoches	Attoyac Bayou	1 mi E Martinsville on SH 7
At-N-8	Nacogdoches	Polly Creek	2½ mi SE Martinsville on FM 1274
At-N-9	Nacogdoches	Tandakee Creek	4½ mi SE Martinsville on FM 1274
At-N-10	Nacogdoches	Alamodares Creek	2 mi N Chireno on FM 1274
At-N-11	Nacogdoches	Attoyac Bayou	7 mi SSE Chireno, 2 mi N SH 103 crossing
At-SA-1	San Augustine	Tributary Creek	3 mi E Chireno, 5 mi S SH 21 on FM 1196
At-SA-2	San Augustine	Attoyac Bayou	8 mi SSE Chireno on SH 103
At-SA-3	San Augustine	Prairie Creek	2 mi NE Broaddus on County Road
At-SA-6	San Augustine	Spear Creek	3½ mi S Denning on County Road
At-SA-7	San Augustine	Arenosa Creek	3 mi SSW Camp Worth on County Road
At-SA-G-1	San Augustine	Attoyac Bayou	1 mi upstream from mouth of bayou
At-SA-G-2	San Augustine	Attoyac Bayou	½ mi upstream from mouth of bayou
At-SA-H-1	San Augustine	Attoyac Bayou	Above and below SH 103 crossing

Table 9. A Checklist of Attoyac Drainage Fishes.

I. Family: LEPISOSTEIDAE

1. Lepisosteus productus - spotted gar
2. L. osseus - longnose gar

II. Family: CLUPEIDAE

3. Dorosoma cepedianum - gizzard shad

III. Family: ESOCIDAE

4. Esox americanus - grass pickeral

IV. Family: CATOSTOMIDAE

5. Ictiobus bubalus - smallmouth buffalo
6. Carpiodes carpio - river carpsucker
7. Moxostoma congestum - gray redhorse
8. M. poecilurum - blacktail redhorse
9. Minytrema melanops - spotted sucker
10. Erimyzon sucetta - lake chubsucker
11. E. oblongus - creek chubsucker

V. Family: CYPRINIDAE

12. Notemigonus crysoleucas - golden shiner
13. Opsopoeodus emiliae - pugnose minnow
14. Hybopsis storeriana - silver chub
15. Notropis atherinoides - emerald shiner
16. N. jemezanus - Rio Grande shiner
17. N. amabilis - Texas shiner
18. N. fumeus - ribbon shiner
19. N. umbratilis - redfin shiner
20. N. roseus - weed shiner
21. N. amnis - pallid shiner
22. N. venustus - blacktail shiner
23. N. lutrensis - red shiner
24. N. deliciosus - sand shiner
25. N. atrocaudalis - blackspot shiner
26. N. volucellus - mimic shiner
27. Hybognathus nuchalis - silvery minnow
28. H. placita - plains minnow
29. Pimephales vigilax - parrot minnow
30. P. promelas - fathead minnow

VI. Family: AMEIURIDAE

31. Ictalurus punctatus - southern channel catfish
32. I. furcatus - blue catfish
33. I. melas - black bullhead
34. Pylodictus olivaris - flathead catfish
35. Schilbeodes gyrinus - tadpole madtom

Table 9 (Continued).

VII. Family: CYPRINODONTIDAE

36. Fundulus chrysotus - redspot topminnow
37. F. olivaceus - blackspot topminnow

VIII. Family: POECILIIDAE

38. Gambusia affinis - common mosquitofish

IX. Family: APHREDODERIDAE

39. Aphredoderus sayanus - pirate perch

X. Family: ATHERINIDAE

40. Labidesthes sicculus - brook silversides

XI. Family: CENTRARCHIDAE

41. Micropterus punctulatus - spotted bass
42. M. salmoides - largemouth bass
43. Chaenobryttus gulosus - warmouth
44. Lepomis cyanellus - green sunfish
45. L. punctatus - spotted sunfish
46. L. microlophus - redear sunfish
47. L. macrochirus - bluegill
48. L. humilis - orangespotted sunfish
49. L. auritus - yellowbelly sunfish
50. L. megalotis - longear sunfish
51. Pomoxis annularis - white crappie
52. P. nigromaculatus - black crappie
53. Centrarchus macropterus - flier
54. Elassoma zonatum - banded pigmy sunfish

XII. Family: PERCIDAE

55. Hadropterus maculatus - blackside darter
56. H. shumardi - river darter
57. Ammocrypta vivax - Arkansas sand darter
58. Etheostoma chlorosomum - bluntnose darter
59. E. histrio - snubnose darter
60. E. gracile - western swamp darter
61. E. proliare - cypress darter

XIII. Family: SCIAENIDAE

62. Aplodinotus grunniens - freshwater drum

Table 10. Relative Abundance of Species in the Attoyac Drainage.

Species	Number Collected	% of Total	Relative Abundance
Lepisosteus productus	2	0.04*	Rare
Lepisosteus osseus	2	0.04*	Rare
Dorosoma cepedianum	158	3.52*	Abundant
Esox americanus	25	0.56	Frequent
Ictiobus bubalus	14	0.31*'	Frequent
Carpiodes carpio	8	0.18*	Rare
Moxostoma congestum	4	0.08	Rare
Moxostoma poecilurum	1	0.02	Rare
Minytrema melanops	1	0.02	Rare
Erimyzon sucetta	4	0.08	Rare
Erimyzon oblongus	49	1.09	Common
Notemigonus crysoleucas	498	11.11	Very abundant
Opsopoeodus emiliae	122	2.79	Abundant
Hybopsis storeriana	2	0.04	Rare
Notropis atherinoides	9	0.20	Rare
Notropis fumeus	22	0.49	Frequent
Notropis amabilis	14	0.31	Frequent
Notropis fumeus	206	4.82	Abundant
Notropis umbratilis	38	0.85	Common
Notropis roseus	11	0.24	Frequent
Notropis amnis	3	0.06	Rare
Notropis venustus	186	4.13	Abundant
Notropis lutrensis	5	0.11	Rare
Notropis deliciosus	81	1.80	Common
Notropis atrocaudalis	170	3.79	Abundant
Notropis volucellus	74	1.65	Common
Hybognathus nuchalis	50	1.12	Common
Hybognathus placita	38	0.85	Common
Pimephales vigilax	24	0.53	Common
Pimephales promelas	2	0.04	Rare
Ictalurus punctatus	2	0.04*	Rare
Ictalurus furcatus	1	0.02*	Rare
Ictalurus melas	1546	34.50	Very common
Pylodictus olivaris	1	0.02'	Rare
Schilbeodes gyrinus	1	0.02	Rare
Fundulus chrysotus	9	0.20	Rare
Fundulus olivaceus	179	3.99	Abundant
Gambusia affinis	180	4.01	Abundant
Aphredoderus sayanus	16	0.35	Frequent
Labidesthes sicculus	36	0.81	Common
Micropterus punctulatus	33	0.75	Common
Micropterus salmoides	2	0.04	Rare
Chaenobryttus gulosus	8	0.18*	Rare
Lepomis cyanellus	32	0.73	Common
Lepomis punctatus	93	2.07	Common
Lepomis microlophus	46	1.02	Common
Lepomis macrochirus	183	4.07	Abundant

Table 10. (Continued).

Lepomis humilis	9	0.20	Rare
Lepomis auritus	2	0.04	Rare
Lepomis megalotis	72	1.61	Common
Pomoxis annularis	87	1.76*'	Common
Pomoxis nigromaculatus	31	0.69	Common
Centrarchus macropterus	1	0.02	Rare
Elassoma zonatum	39	0.87	Common
Hadropterus maculatus	1	0.02	Rare
Hadropterus shumardi	9	0.20	Rare
Ammocrypta vivax	11	0.24	Frequent
Etheostoma chlorosomum	59	1.31	Common
Etheostoma histrio	7	0.16	Rare
Etheostoma gracile	34	0.77	Common
Etheostoma proliare	1	0.02	Rare
Aplodinotus grunniens	2	0.04'	Rare
Total	4517		

* includes or is gill net collection
' includes or is hoop net collection
*' includes or is both hoop net and gill net collection

Table 11. Results of Two Gill Net Collections (4 sets) on the Attoyac Bayou.

Species	Number Caught	Total Weight Lbs.	Number Worked	Range Weight gms	Average Weight gms	Range "K"	Average "K"
Lepisosteus productus	2	1.25	1		544		0.61
Lepisosteus osseus	2	3.00	2	680-680	587	0.3-0.3	0.30
Dorosoma cepedianum	2	1.50	2	340-340	257	2.05-2.05	2.05
Ictiobus bubalus	9	7.00	4	145-907	233	2.50-3.70	3.28
Carpio carpio	8	6.25	4	195-567	225	2.88-3.70	3.15
Pomoxis annularis	1	0.25	1		184		1.78
Ictalurus punctatus	1	1.00	1		280		2.05
Ictalurus furcatus	1	1.50	1		325		1.95
Chaenobryttus gulosus	1	0.12	1		123		2.88

Table 12. Results of One Hoop Net Collection (11 sets) on the Attoyac Bayou.

Species	Number Caught	Total Weight lbs.	Average Weight lbs.
Ictiobus bubalus	5	19.75	3.95
Pylodictus olivaris	1	6.06	6.06
Pomoxis annularis	2	2.00	1.00
Aplodinotus grunniens	2	5.75	2.87

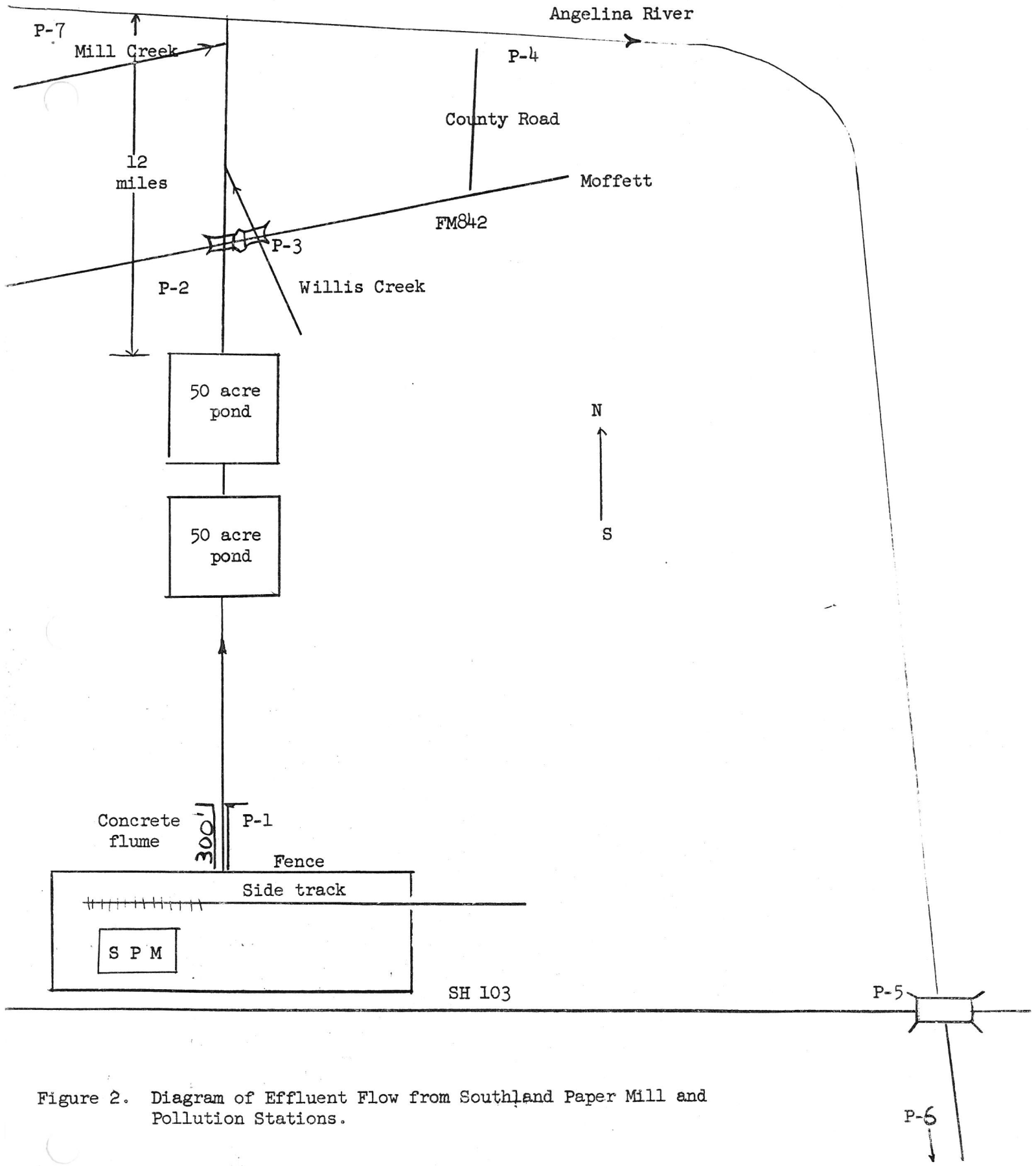

Figure 2. Diagram of Effluent Flow from Southland Paper Mill and Pollution Stations.

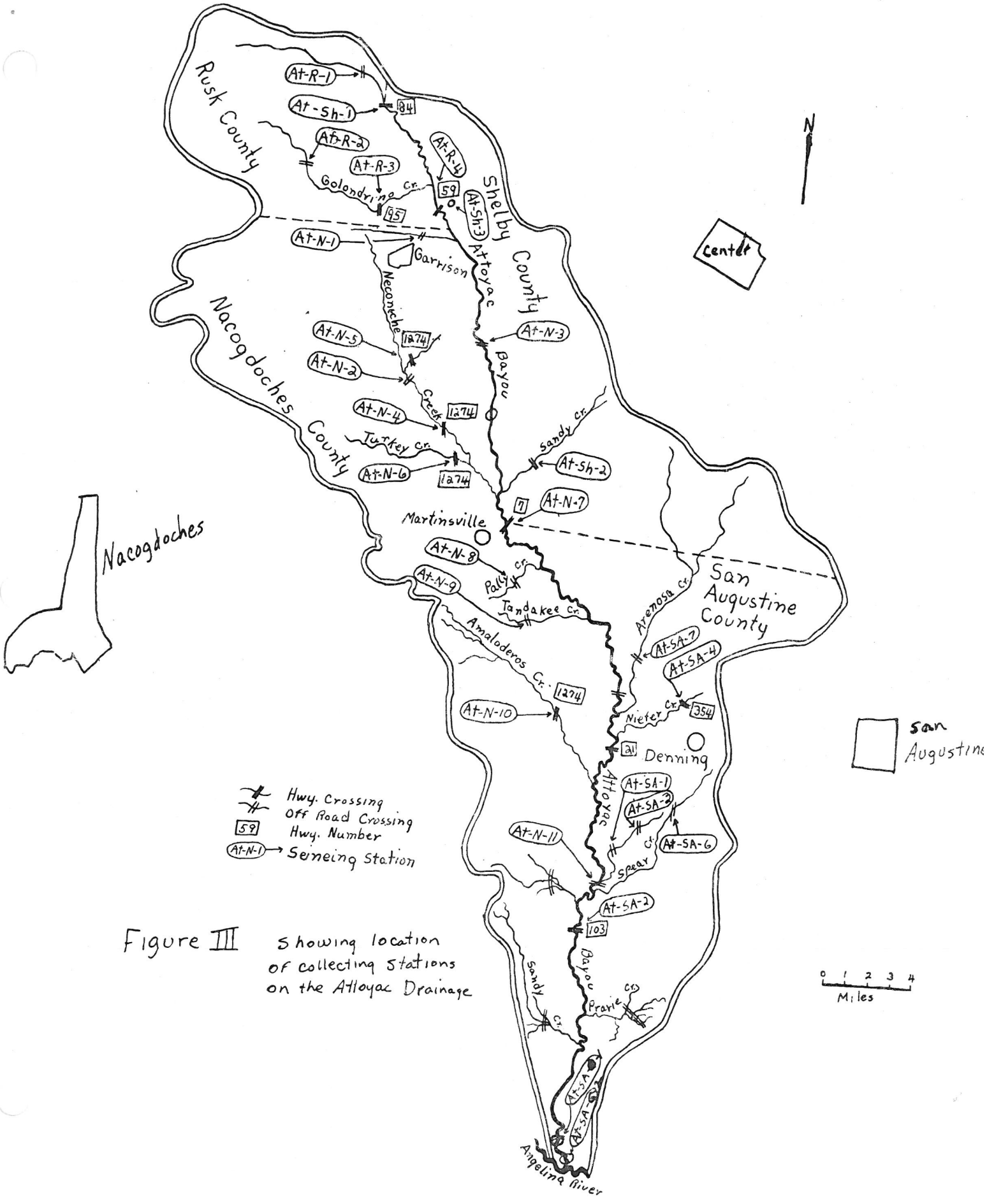

Figure III Showing location of collecting stations on the Attoyac Drainage

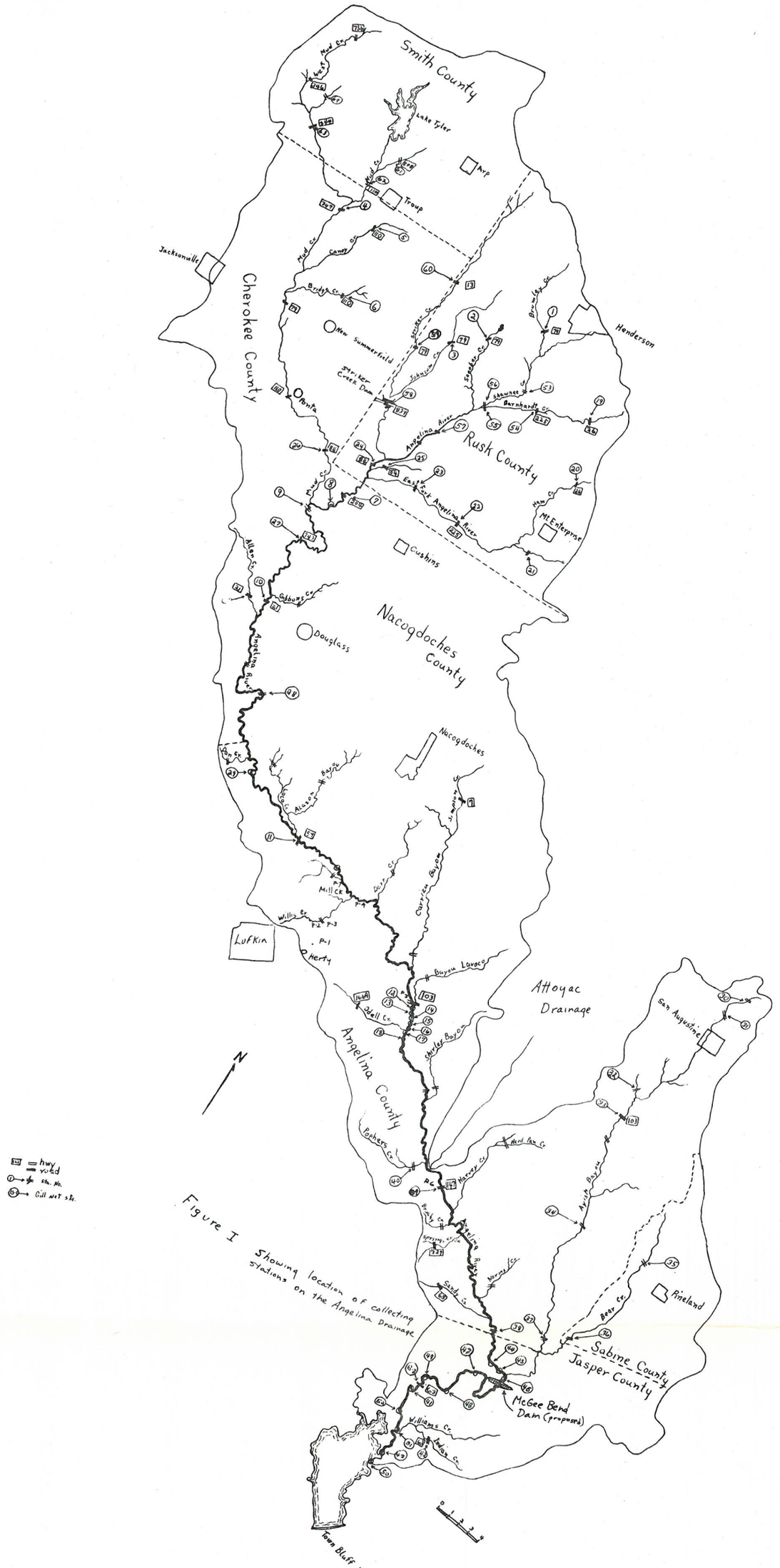

Figure I Showing location of collecting stations on the Angelina Drainage