JOB COMPLETION REPORT

Investigations Project

FILE

State of TEXAS

Project No. F2R5 Name: Fisheries Investigations and Surveys of the Waters of Region 6-B.

Job No. A-5 & A-7 Title: A Basic Survey of the Lavaca River (A-7) and A Basic Survey of the Navidad River (A-5).

Period Covered: March through July 1957

ABSTRACT:

A basic survey and inventory of fish species was conducted on the Lavaca River and its major tributary the Navidad River. The drainage has its source in the southern part of Fayette County and flows thence across Lavaca and Jackson Counties before entering Lavaca Bay on the Gulf of Mexico.

The rivers rise on the Blackland Prairie and flow through the Post Oak Belt and the Coastal Prairie. Both streams were either dry throughout most of their length during the drought years immediately preceding the survey or were reduced to an intermittent state. The upper portions of the stream beds are mud which is replaced by sand as the streams enter the Post Oak Belt. Both the Navidad and Lavaca are generally confined between low to moderate steep-cut banks.

Water quality in both streams is normal for rivers in this region. The pH ranged from 7.4 at the height of the flood, during February 1957, to pH 9.0 in June. The average pH value during periods of normal flow is approximately 8.8. No permanent pollution was discovered.

Twenty-four species of fresh water fishes were collected during the survey and several others, including some salt water species, are known to occur in the drainage. The stream supports a trotline and pole and line fishery during years of adequate water with the channel catfish the most sought after species. Largemouth bass, flathead catfish and several species of bullheads and sunfish also contribute to the catch. On the lower river several marine game fish enter the catch.

OBJECTIVES:

To gather fundamental data on the Lavaca and Navidad Rivers in regard to their physical, chemical and biological aspects and to obtain a checklist of the freshwater fish species.

METHODS:

Ecological notes were made at each of 20 stations on the two rivers (Figure 1). Data recorded included: bottom type, cover, vegetation, stream width, depth, relative

turbidity, pH, velocity and volume of flow.

At 16 of these stations fish samples were obtained by means of small mesh seines. The fish collection stations were limited to stations within the freshwater portions of the stream. No collections were made in the brackish, or saltwater portions.

All specimens taken were preserved for subsequent identification and frequency of occurrence analysis. In some cases, a dominant species was so abundant at a given locality that preservation of complete collections of the species was impracticable and under these conditions estimates of the abundance for this species were used. The identification of all fish specimens was verified by Dr. Clark Hubbs, Department of Zoology, University of Texas.

PHYSICAL CHARACTERISTICS:

The Lavaca River and its major tributary, the Navidad River, flow southeast from Fayette County approximately 60 miles to their confluence and thence approximately 15 miles to the mouth of the Lavaca River in Lavaca Bay on the Gulf of Mexico (Figure 1). Throughout their course the two streams flow parallel and from ten to fifteen miles apart. After leaving Fayette County the streams cross Lavaca and Jackson Counties before entering the Gulf.

Both streams rise at an elevation of approximately 200 feet. The origin of the Lavaca is in the extreme southwest corner of Fayette County and that of the Navidad two miles northeast of the town of Schulenburg, also in Fayette County. This area is on the edge of the Blackland Prairie where the soils are deep, fertile and black and where corn and cotton are the principal crops, with livestock grazing as an additional important land use.

The watershed enters the narrow east-west extension of the Post Oak Belt in the northern part of Lavaca County. In this region soils are sands and sandy loams and the principal land uses are generally farming in the bottom lands, and grazing in other areas. The principal crops are corn, cotton and truck crops.

South of Hallettsville the streams enter the Coastal Prairie. The soils vary in this area and include black and gray clays and some sandy types. Cattle grazing becomes more important on the coarse grass cover of the level prairie, but cotton, corn, and rice are important crops.

The Lavaca River drains an area of approximately 2,500 square miles. Almost 1,500 square miles of this area is drained by the Navidad River which, with an average annual discharge of 400,700 acre feet near Ganado, contributes almost twice as much water as the Lavaca itself at a comparable station at Edna. The total average annual discharge is in excess of 750,000 acre feet.

From its headwaters downstream to Station 4, near Breslau, the Lavaca is a mud bottomed stream flowing between low to moderately steep-cut mud banks. The stream is occasionally shaded by willow, elm and hackberry trees but for the most part flows through relatively open pasture land (Figures 3 and 4). The stream in this area maintains a rather close succession of pools and riffles. The pools are long and have

widths of up to 40 feet and are often two to four feet deep. In July the river had uninterrupted flow throughout this section. In August however this upper length of stream had been reduced to intermittent pools.

From Station 5, near Ezzell, downstream to the confluence with the Navidad the stream bottom becomes sand and fine gravel with the exception of Station 9, north of Vanderbilt, where a sand-silt bottom was found. In this region the stream flows between steep-cut mud banks which are heavily wooded to the waters edge (Figures 6 and 7). In many places this shoreline vegetation is so dense that access is difficult. Pecan, willow, oak, elm, and cottonwood trees all contribute to this dense cover and create a shaded condition over most of the stream course. Through Station 6 pools were continous. These pools were, however, usually shallow and seldom had a maximum depth of more than two feet. The average stream width ranged from 15 feet to 40 feet at the various stations, with an overall average width of approximately 25 feet. In July 1957 the volume of flow through this section was not in excess of 15 cu. ft./sec. at any of the stations. Turbidity was moderate at all points.

At Station 9 the river had become a wide sluggish stream with a velocity of less than 0.1 ft./sec., an average width of 40 feet, and an estimated average depth of 3.5 feet. The river is joined by the Navidad River, its major tributary, a few miles downstream and at Station 10 (Figure 8) had an average width of 150 feet.

At a point near Edna the Lavaca has had, during the period of 1938-50, an average flow of 310 cu. ft./sec.. During the same period the maximum discharge was 73,000 cu. ft./sec. on July 1, 1940, and the minimum 1.3 cu. ft./sec. on September 3, 1950.

Navidad River - The Navidad, which is the Lavaca's major tributary, is a much larger stream throughout than the Lavaca itself. Near its headwaters at Station 11 (Figure 9) the stream is 10 feet wide, has an average depth of 1 foot and flows between steep cut banks. The bottom material was primarily mud with some gravel in the riffles. This station was the only one on the Navidad where gravel bottom was encountered. The river at this point had been dry for three years prior to the heavy rains in February 1957. At the time of the survey the stream at this point had more or less continuous pools which were generally quite shallow.

At Station 12 the river continued to flow between steep cut banks, which were wooded with willows, oaks, and pasture grasses, but the bottom material had become sand, a condition that prevailed from this point to the river's mouth. Typical views of the river in this area are shown in Figures 10 and 11. The river maintained an average widthof approximately 40 feet throughout this distance and average depth which gradually increased from 1.5 feet to 3 feet. Pools were more or less continuous and at the lower stations were often two to four feet deep. At Stations 13 through 16 the volume of flow was approximately 50 cu. ft./sec. flowing at a velocity of approximately 1.5 ft./sec. At Station 18 the stream begins to increase rapidly in size and at Station 19 had a volume of flow of 160 cu. ft./sec. and at Station 20 an estimated flow of 450 cu. ft./sec. The river had reached a width of 90 feet at the latter point.

The Navidad, at a point near Ganado, had an 11 year average flow for the period 1939-50 of 552 cu. ft./sec. The maximum was 64,000 cu. ft./sec. on July 2, 1940 and the minimum 1.1 cu. ft./sec. on August 12, 1950.

AQUATIC VEGETATION:

Plant life in the Navidad was limited to periphyton algae. The shifting sand bottom of the stream would offer very little habitat for higher aquatics and none were observed.

At the upstream stations of the Lavaca aquatic plants were often abundant. Muskgrass (Chara sp.) occurred at Stations 1-4 and in these same water filamentous algae growths ranged from sparse to moderate abundance. Cattails (Typha sp.) were abundant at Station 1 but did not appear at any other station.

CHEMICAL CHARACTERISTICS:

Water quality in the Lavaca and Navidad Rivers was found to be satisfactory for diversified aquatic life at all points. The pH range during the June, July and August survey was from pH 8.4 in the upper Navidad to pH 9.0 in the lower Navidad. The Lavaca waters were uniformly near pH 8.8. At Station 13 where a record of pH 8.6 was made in June, a value of pH 7.4 had been recorded during the flood conditions of February.

No pollution was found during the survey except at a point directly below the town of Hallettsville where local sewage apparently created a very limited pollution problem.

FISH COLLECTIONS:

Twenty-four species of fish were taken in the seining collections from the Lavaca and Navidad Rivers (Table 1). In addition to these, eleven other species of fresh and salt water fishes are certain to occur in the drainage (Table 1), as well as an unknown number of marine fishes which may move into the lower river at certain times and under certain conditions.

The upper and middle portions of both of these rivers were dry or intermittent during the severe drought conditions of 1952 to 1956 and fishing was virtually eliminated in most of the river. Local residents and game wardens report that a significant fishery has existed in past years for the various species of catfish (Table 1) and the occurrence of large numbers of these species in the seining collections suggest that such a fishery will again develop. Largemouth bass and sunfish of various species were taken throughout the drainage and undoubtedly contribute to the sports fishery.

The fishes of the drainage and their general distribution and abundance are as follows: (See Figures 2a and 2b).

Family CYPRINIDAE

Eight of the 24 species collected were cyprinid minnows. These were primarily species of Notropis but also included Pimephales promelas, Opsopoeodus emiliae and Notemigonus crysoleucas.

Notropis lutrensis was the most generally distributed cyprinid and one of the three most common species of fish in the drainage. This minnowwas present in every collection from the Lavaca and in most of the collections from the Navidad River. Notropis volucellus was the next most common minnow and was taken in approximately half of the collections from each river.

The golden shiner (Notemigonus crysoleucas) was one of the more common minnows in the collections from the Navidad but was completely absent from those of the Lavaca itself.

Family CATOSTOMIDAE

Two species, the river carpsucker (Carpiodes carpio) and the smallmouth buffalo (Ictiobus bubalus), occur in the drainage and it is probable that both of these fish are present in both the Navidad and Lavaca Rivers. In the June collections on the Navidad only young of the smallmouth buffalo were taken and in July the Lavaca collections produced only river carpsuckers. Difference in spawning season may well account for the abundance of young-of-the-year of one or the other at the different collection periods and it is assumed that both occur throughout the drainage.

Family AMEIURIDAE

The channel catfish (Ictalurus punctatus) was one of the three most generally distributed fishes in the drainage. It was taken in 85 percent of the collections from the Lavaca and in 63 percent of those from the Navidad. Two bullheads, Ictalurus natalis and I. melas were taken in headwaters collections but were present in only 20 percent of the total collections. One other catfish, Pylodictus olivaris, was taken at one station on the Lavaca. The presence of this fish, which is rarely taken in seining collections, at even one station suggests that the flathead catfish may be a relatively abundant member of the stream's catfish population.

Catfish, at least potentially, provide a fishery of significant proportions. Although often dry throughout most of its length during years of drought, there is sufficient water dispersed through the drainage to maintain a spawning population of considerable magnitude as witnessed by the large population of young-of-the-year taken at all points in the collections.

Family MUGILIDAE

The striped mullet (Mugil cephalus) was not taken in the Lavaca collections but did appear in two of the Navidad River collections. This fish is a difficult species to take by seining and is probably much more generally distributed than the collections indicate.

Family POECILIIDAE

The common mosquitofish (Gambusia affinis) is the most generally distributed and most abundant fish in the drainage. This species was taken at every collection station and was often the most abundant fish in individual collections.

Family CENTRARCHIDAE

Six species of centrarchid fishes occurred in the collections. The distribution of only one of these appears markedly limited. The longear sunfish (Lepomis megalotis) was taken in 85 percent of the collections on the Lavaca River but did not appear in any of the Navidad River collections. This paradoxical situation has no logical solution other than that the Lavaca River has a small amount of gravel bottom which may result in more satisfactory spawning areas. Although seining collections on

the Navidad may conceivably have been consistently less effective than those on the Lavaca, any existing population of that species in the Navidad must be assumed to be small.

The green sunfish (Lepomis megalotis) and the bluegill (L. macrochirus) were generally distributed throughout the drainage and were in some instances rather abundant. Both species may contribute to the catch of the pole and line fisherman. White crappie (Pomoxis annularis) were taken at two stations on the lower Navidad and warmouth (Chaenobryttus gulosus) occurred in two collections on the Lavaca. Neither of these species was abundant in any of the collections.

The largemouth black bass (Micropterus salmoides) occurred in approximately 50 percent of the collections made. It undoubtedly contributes to the fishery but to a lesser degree than the catfishes.

Family PERCIDAE

One darter (Etheostoma gracile) was collected at Station 4 on the Lavaca River.

Family CLUPEIDAE

The gizzard shad (Dorosoma cepedianum) was taken at two of the lower stations on the Navidad (Stations 18 and 19). The deep pools where shad would be expected to concentrate were usually not possible to seine with the equipment at hand and may have supported a shad population at points much farther upstream than these collections indicate.

Family LEPISOSTEIDAE

Although not represented in the seining collections three species of gar can be expected to occur in the rivers: the alligator gar (Lepisosteus spatula) spotted gar (L. productus), and longnose gar (L. osseus).

In addition to the families and species listed above a number of marine fishes are known to occur in the lower, brackish waters of the rivers. The gafftopsail catfish (Bagre marina) and the sea catfish (Galeichthys felis) both undoubtedly enter the river at times as does the tarpon (Megalops atlanticus). The red drum (Scianenops ocellata), Atlantic croaker (Micropogon undulatus), sand trout (Cynoscion arenarius), speckled trout (C. nebulosus) and southern flounder (Paralichthys lethostigma) also are expected residents of the lower river.

CONCLUSIONS:

A total of at least 75 miles of the Lavaca and Navidad Rivers may be considered a potential fishery of varying importance. Although dry throughout much of its length during periods of drought, an adequate stock of game fish remains to repopulate the streams in times of satisfactory water conditions.

The most important game fish is the channel catfish which is fished for primarily with trotlines. Pole and line fishing undoubtedly also takes some of this species as well as largemouth bass and the various species of sunfish and bullheads.

Water quality is satisfactory throughout for diversified aquatic life and no significant pollution exists.

In the headwaters aquatic vegetation ranged from sparse to abundant but was totally absent in the lower reaches of the rivers.

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Project Leader

Approved by Marion Toole
Chief Aquatic Biologist

Date August 30, 1957

Table 1. Checklist of Fishes of the Lavaca River Drainage.

Scientific Name	Common Name	Stream of Collection	
		Lavaca	Navidad
Family CYPRINIDAE			
Notropis lutrensis	redhorse shiner	x	x
N. volucellus	mimic shiner	x	x
N. roseus	weed shiner	x	x
N. venustus	spottail shiner		x
N. atherinoides	emerald shiner		x
Pimephales promelas	fathead minnow	x	x
Opsopoeodus emiliae	pugnose minnow	x	
Notemigonus crysoleucas	golden shiner		x
Family CATOSTOMIDAE			
Carpiodes carpio	river carpsucker	x	
Ictiobus bubalus	smallmouth buffalo		x
Family AMEIURIDAE			
Ictalurus punctatus	channel catfish	x	x
I. natalis	yellow bullhead	x	x
I. melas	black bullhead	x	
Pylodictus olivaris	flathead catfish	x	
Family MUGILIDAE			
Mugil cephalus	striped mullet		x
Family POECILIIDAE			
Gambusia affinis	common mosquitofish	x	x
Family CENTRARCHIDAE			
Micropterus salmoides	largemouth black bass	x	x
Chaenobryttus gulosus	warmouth	x	
Lepomis megalotis	longear sunfish	x	
Lepomis cyanellus	green sunfish	x	x
Lepomis macrochirus	bluegill sunfish	x	x
Pomoxis annularis	white crappie		x
Family PERCIDAE			
Etheostoma gracile	slough darter	x	
Family CLUPEIDAE			
Dorosoma cepedianum	gizzard shad		x

Table 1. (Continued).

Scientific Name	Common Name	Stream of Collection: Lavaca	Stream of Collection: Navidad
Species believed to occur but not collected.			
Family LEPISOSTEIDAE			
Lepisosteus spatula	alligator gar	x	x
Lepisosteus productus	spotted gar	x	x
Lepisosteus osseus	longnose gar	x	x
Family ARIIDAE			
Bagre marina	gafftopsail catfish	x	x
Galeichthys felis	sea catfish	x	x
Family ELOPIDAE			
Megalops athlanticus	tarpon	x	x
Family SCIAENIDAE			
Scianenops ocellata	red drum	x	x
Micropogon undulatus	Atlantic croaker	x	x
Cynoscion arenarius	sand trout	x	x
Cynoscion nebulosus	speckled trout	x	x
Family PLEURONECTIDAE			
Paralichthys lethostigma	southern flounder	x	x

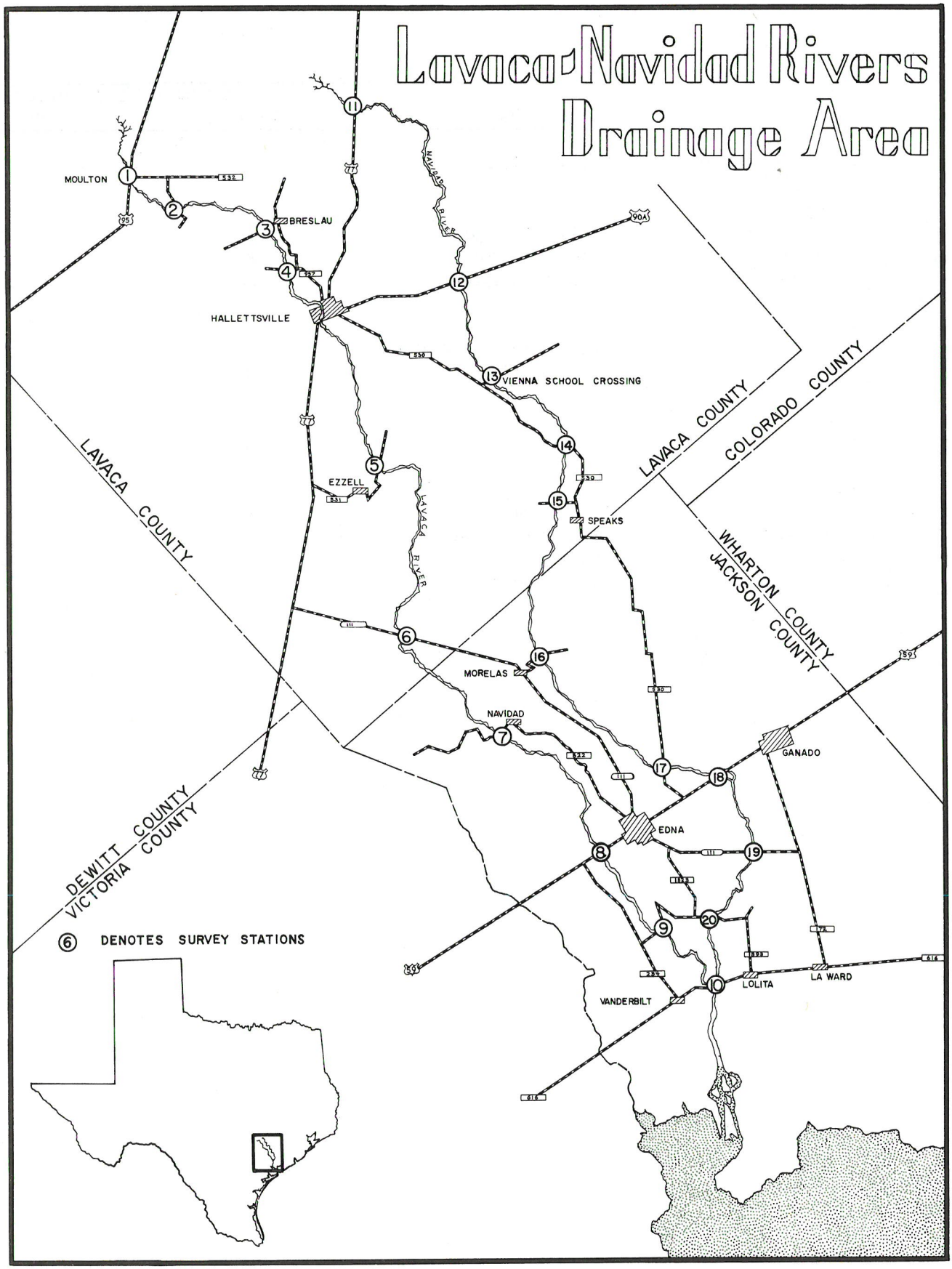
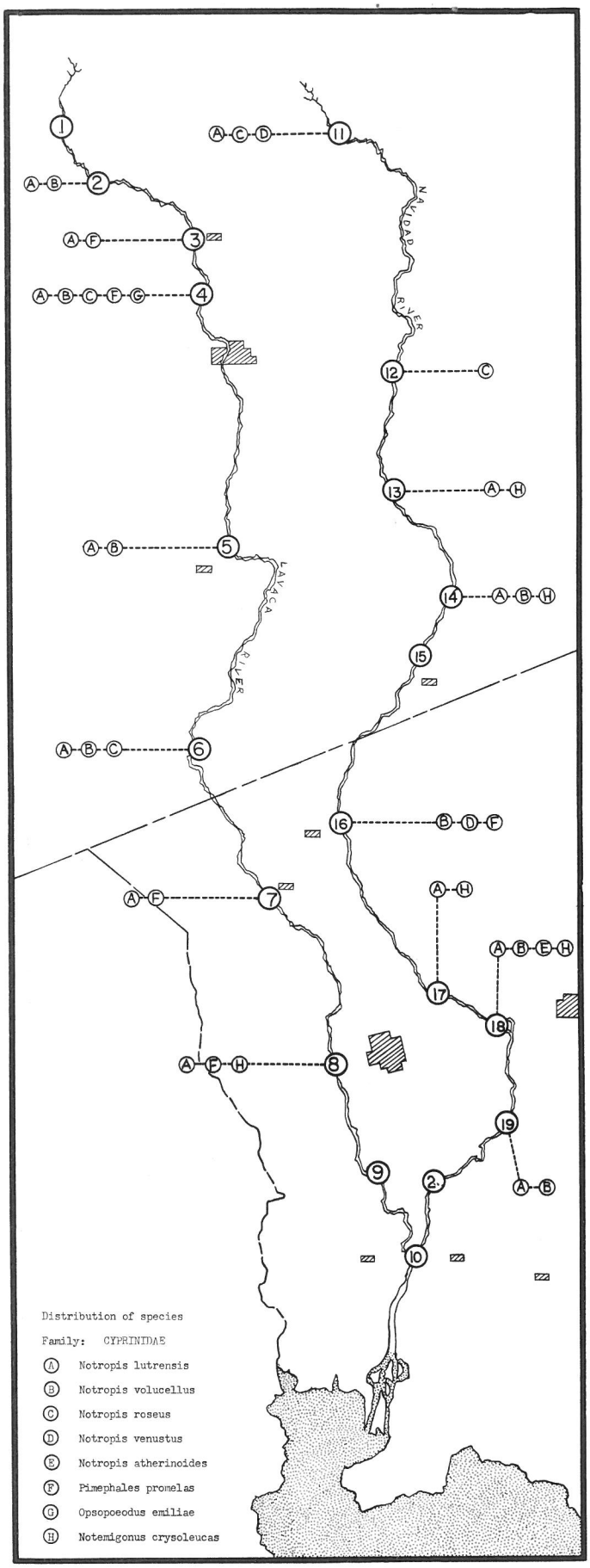


Figure 1. Map, Lavaca-Navidad River Drainage.



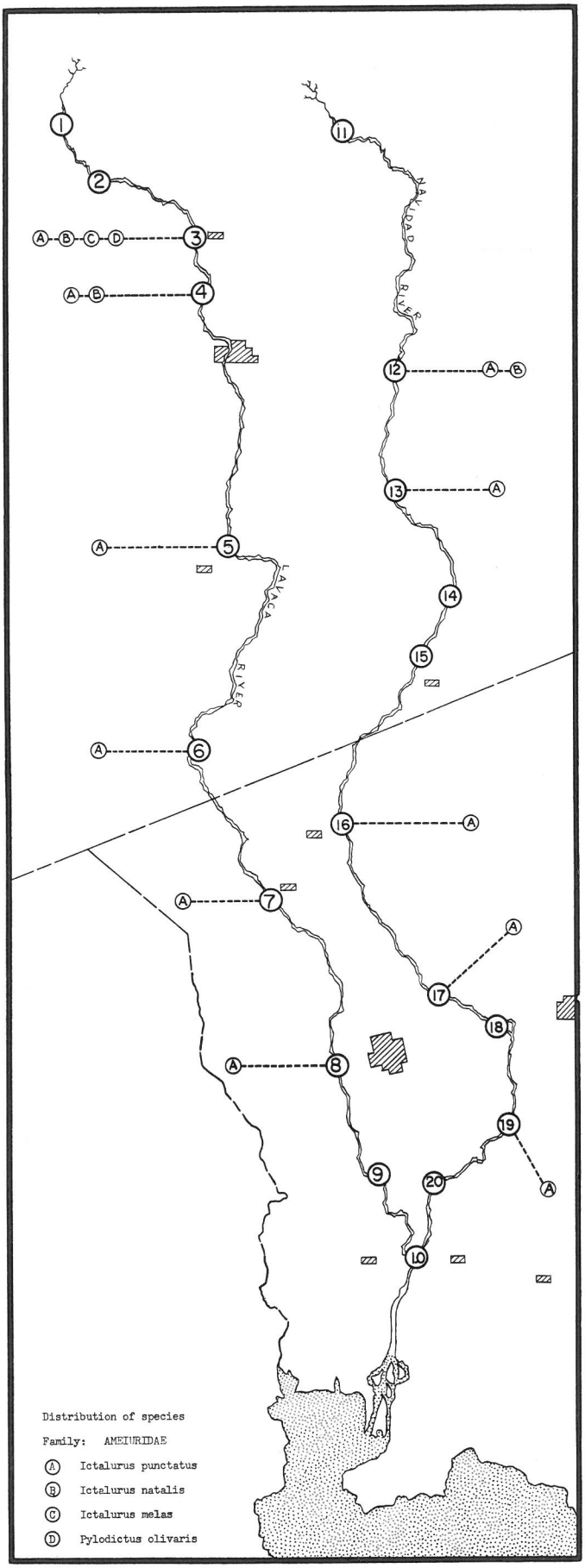
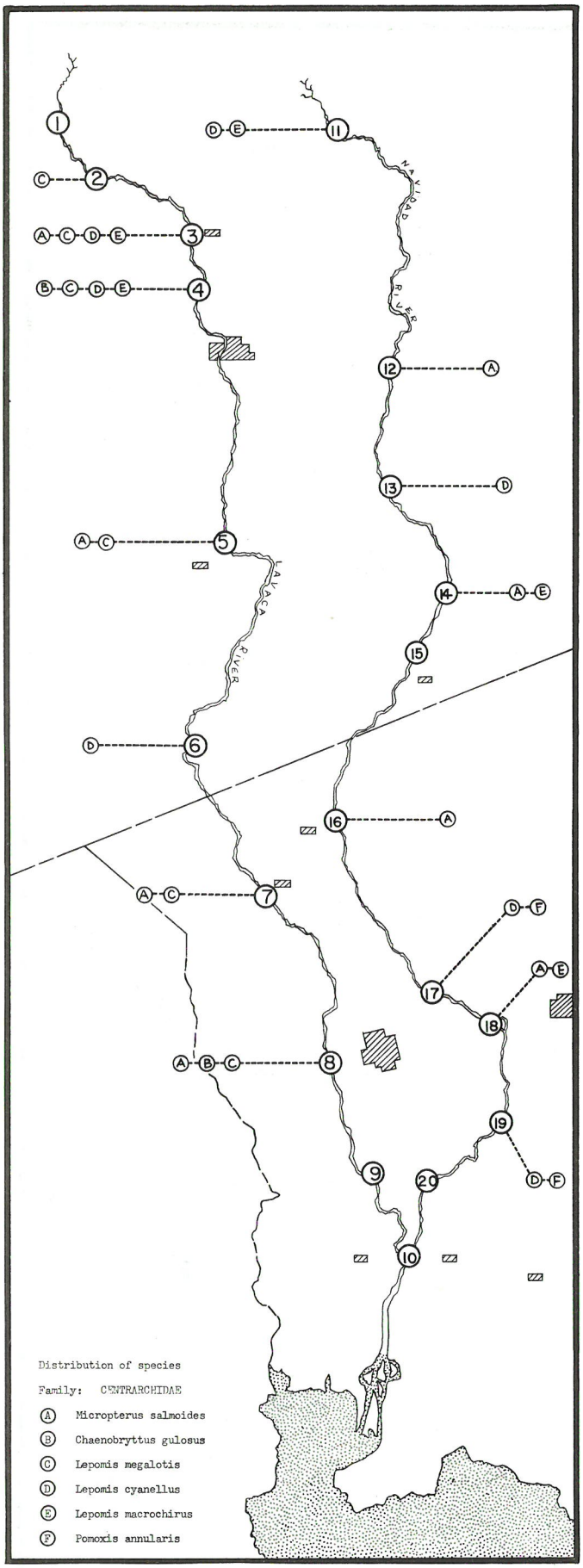


Figure 2a. Distribution of fishes in the Lavaca-Navidad River Drainage.



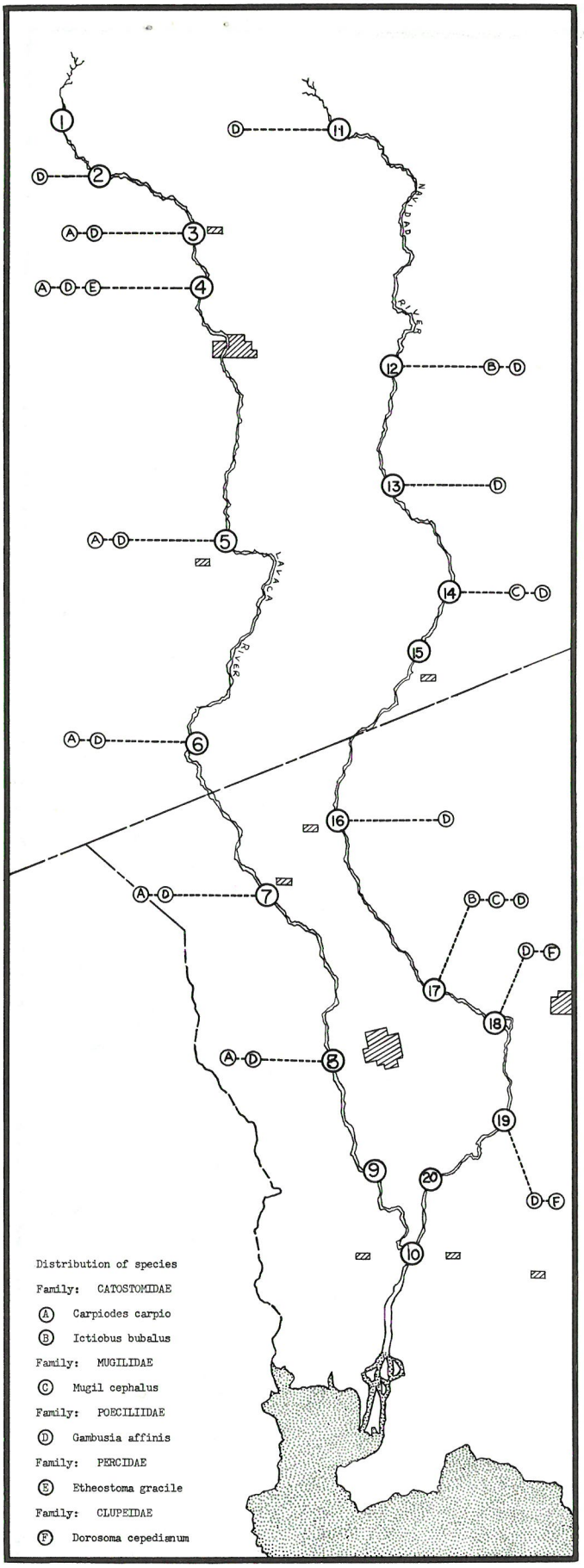


Figure 2b. Distribution of fishes in the Lavaca-Navidad River Drainage.

Figure 3. The Lavaca River at Station No. 1 in Moulton.

Figure 4. The Lavaca River at Station No. 2 near Oak Grove School in Lavaca County.

Figure 5. The Lavaca River at Station No. 5 east of Ezzell in Lavaca County.

Figure 6. The Lavaca River at Station No. 6 located at the State Rd. 111 bridge in Lavaca County.

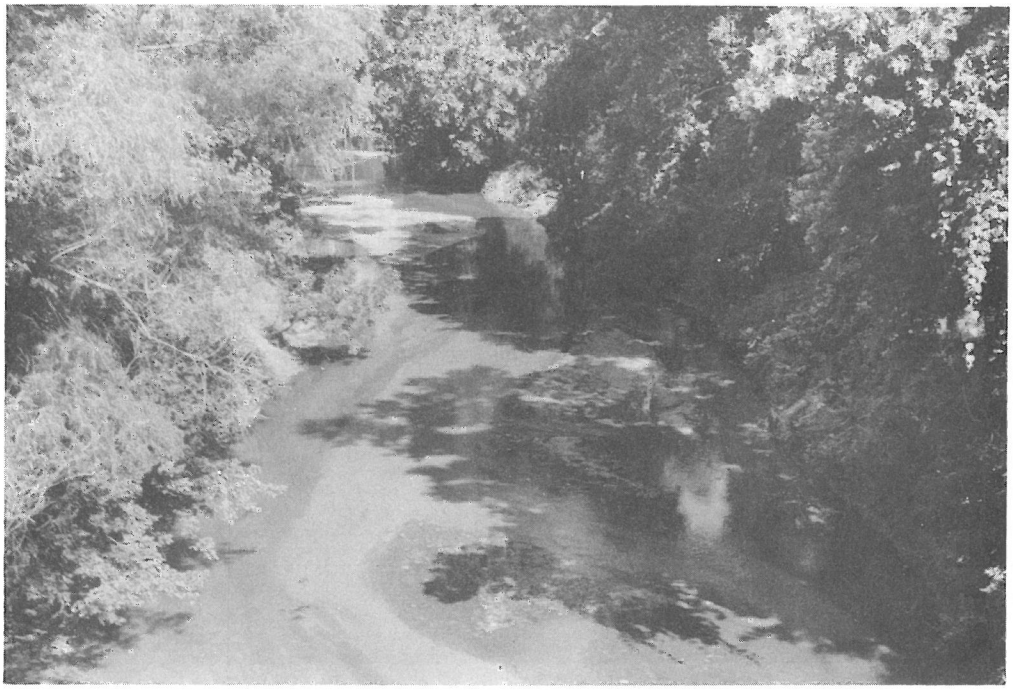


Figure 7. The Lavaca River. Station No. 8
at US 59 bridge near Edna in Jackson County.

Figure 8. The Lavaca River. Station No. 10
at the mouth of the Navidad River in Jackson County.

Figure 9. The Navidad River. Station No. 11 at US 77 bridge in Lavaca County.

Figure 10. The Navidad River. Station No. 14 at Farm Road 530 bridge in Lavaca County.

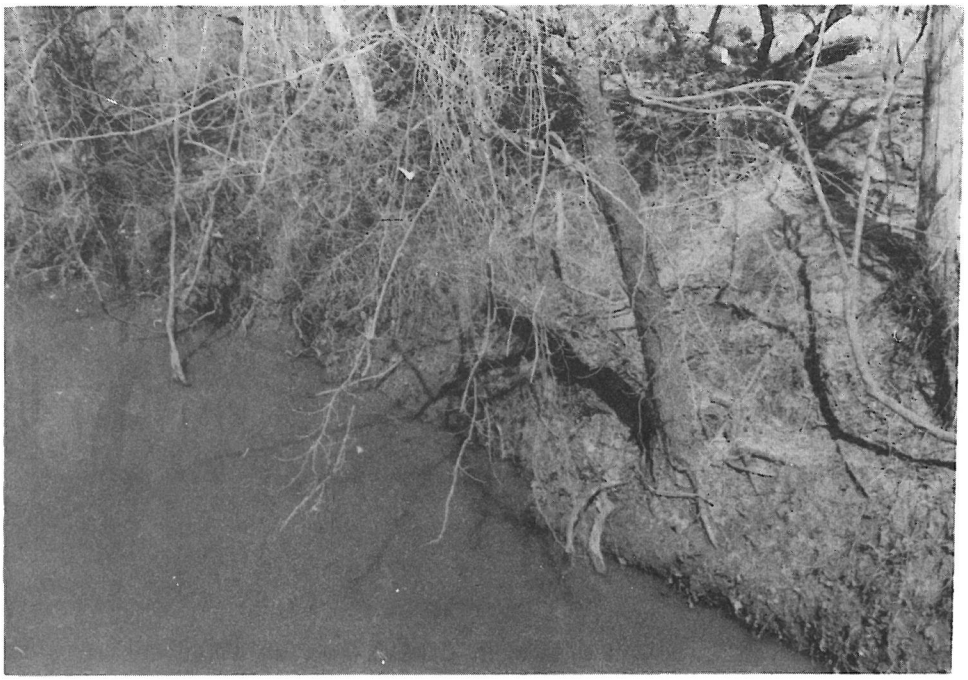


Figure 11. The Navidad River. Low, steep-cut banks at Station No. 14 which are typical of the middle and lower river sections.

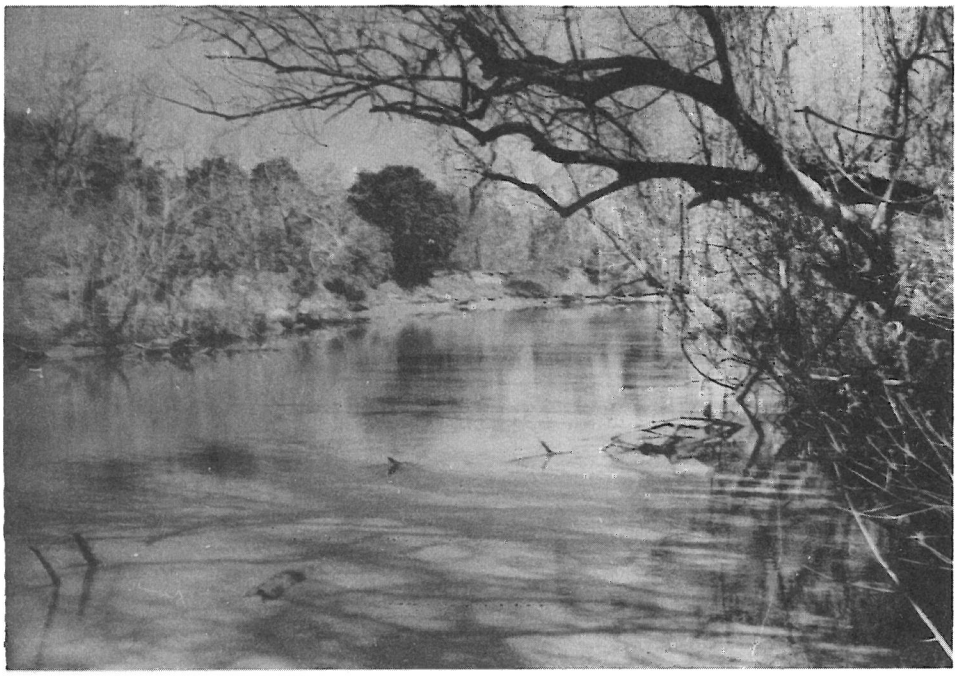


Figure 12. The Navidad River. Station No. 20 north of Lolita in Jackson County.