STATE Texas
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Job Completion Report

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TITLE

Basic Survey and Inventory of Fish Species Present, as well as Their Distribution in the Nueces River, its Tributaries and Watershed, Lying within Edwards, Real, Uvalde, and Kinney Counties, Texas.

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.

COOPERATING AGENCIES

Texas Board of Water Engineers
United States Geological Survey

METHODS

During the course of the survey, the 28 collections made consisted of 8 gill nets and 20 seining collections. Gill net collections were made with experimental nets 125 feet long, hanging eight feet in the water. The mesh ranged from one to three inches square, graduating $\frac{1}{2}$ inch each 25 feet. It was difficult in many instances to locate a section of the river to accommodate the net, but a fairly even coverage was obtained. The seining collections were made with 26 by 6 feet bag seines, $\frac{1}{4}$" mesh, and common sense seines having a 1/8" mesh, four feet deep with the length varying from four to ten feet.

A majority of the fish were preserved in 10% formalin solution and returned to the laboratory for identification and tabulation. In instances where large numbers of a single species were collected, they were counted, recorded, and returned to the river. The cooperation of Dr. Clark Hubbs, Department of Zoology, University of Texas, and W. H. Brown, Assistant Chief Aquatic Biologist, Texas Game and Fish Commission, in the verification and identification of many species was greatly appreciated. The game warden of each county of the watershed was especially helpful. They were very cooperative in assisting with the finding of suitable station locations, and getting permission from land owners to carry on survey work.

A water analysis, made in the field, included air temperature, water temperature, pH, dissolved oxygen, carbon dioxide and alkalinity. The analysis was made at 17 of the 25 stations.

Data pertaining to river flow was obtained from United States Geological Survey and The Texas Board of Water Engineers.

HISTORY

The watershed of the Nueces was the home of the Jumano Indians, a tribe of the Comanche Nation. The first white people to see the Nueces River were the members of Cabeza de Vaca's expedition. Moscoso's Spanish expedition crossed the river in 1542. The first semi-permanent white men in the area was Father Salas and a group of soldiers in 1629. This Christianizing of the Indians failed at that time. Spaniards then began to raid the Indians, hearing that gold and pearls were abundant in the area. The old name of the river was Rio de las Perlas. When the stream was first called the Nueces, is not known. The word Nueces is Spanish. The literal translation of the word is nut, but is generally used to refer to the pecan specifically. The settlement of San Antonio in 1718 was probably the opening of the country to settlers, however, as late as 1845 the area occupied by Uvalde county was very sparsely settled. It was still the hunting grounds of the Comanche.

In 1844, the town of Castroville, some 55 miles east of the present location of Uvalde, was settled by about 500 French and Alsatians under the lead of Count Henri de Castro. This group then spread west and the town of D'Hanis was established.

In 1849 two forts were established in the area. One, Fort Lincoln, near D'Hanis and the other, Fort Inge, two miles south of Uvalde near Inge mountain. After the establishment of the forts, the area was populated rather rapidly, largely by people of German descent. The primary occupation was ranching, as it is today. In 1856 the town of Uvalde was founded. Since that time the settlement has gradually increased, the larger ranches being broken up to make room for more families, in the way typical of the latter settling of most of western areas.

PHYSICAL CHARACTERISTICS

The upper part of the Nueces River is divided into two forks. The West Fork of the Nueces, flowing southeasterly, drains the south central portion of Edwards County, the northeast portion of Kinney County, and a small portion of western Uvalde County. Its length is approximately 100 river miles before its confluence with the East Fork 11 miles northwest of the city of Uvalde. The West Fork seldom flows, but a few permanent holes are along its course. The East Fork, being the main fork, has its beginning with a spring in northwestern Real County. Approximately nine miles east of Rocksprings, there is a spring on Hackberry Creek which gives the Nueces a major part of its water in the northernmost reaches. The river collects water from many small springs in the river bed over the entire Edwards Plateau section. Pulliam Creek, just north of Campwood, Real County, contributes an appreciable amount to the Nueces' flow. In many places the flow will enter a permeable material and re-emerge some miles downstream. This materially affects the flow in parts of the river.

The river, on its southerly course through the rather rugged hills of the Edwards Plateau, forms the southern half of the western county line of Real County, except for a short distance below Barksdale. It then enters the northwest corner of Uvalde County, and flows southeast through the western half of the county to the Uvalde-Zavala County line, which is the southern limit of Region 7-B, Texas. A survey is now being made from this point to its mouth by the Biologist of Region 8-B. A map is attached to facilitate locating areas discussed in this report.

In Region 7-B, except for a small portion of the river south of U. S. Highway 90, the entire river basin is within the Edwards Plateau. In the upper reaches of the Nueces, where canyons in many places are only 100 to 200 feet wide and the bottom is bed rock, there are many dams three to six feet in height. These dams have been constructed by land owners adjacent to the stream. Natural pools are rather frequent in the river. The bottoms of these pools are generally gravel but some are scoured to bed rock, to be filled with gravel on the next rise while others are scoured out. The riffle areas have gravel and in some instances bed rock bottoms. There are no falls which would be an obstruction to fish movement. Northwest of Uvalde, the Nueces emerges from the narrow canyons of the Edwards into its much wider bed of the coastal prairie. The flood plains in this area are often one-half mile wide.

There occurs between Laguna and the mouth of the West Nueces, the Balcones Fault, which is a large intake area for the Edwards limestone. This intake zone, some 14 miles long has generally accepted the entire normal flow of the river in the past years. A Geological Survey study on May 2, 1940 reported this intake zone was absorbing water at the rate of 76.4 second feet, the total flow. However some eight miles below this permeable area, on the McDaniel Ranch, a flow of 15.0 second feet had reemerged on the same date. Table 5 illustrates this condition. An exception occurred in 1949, due to a flood on the West Nueces only. This tributary enters the river between the gauging stations. This condition divides the river into two ecological habitats in this region, the northern portion, with its rather swift, clear, bluegreen waters, typical of all waters emerging from limestone, and the southern section, which is non-flowing the major part of the year, and generally dries to a few rather large holes. When a flow does occur in the southern part, it is usually a flood and many times of no small proportion. During the course of this survey a flood occurred which reached a height of 32.7 feet at Laguna. It is the highest on record. The flood was collected from a 13 inch, 6 hour, rain which fell on the upper 764 square miles of the 1,947 square mile watershed in this region. Unless conditions are changed with proper range management and water conservation practices the condition could become more acute.

It is regrettable that a large majority of the seining collections were made before, and all gill net collections were made after this most destructive of all floods, thereby missing an opportunity to check the influence of such vast amounts of silt laden and eroding waters on the fish population. It would be well if work could be done to determine the damage to fish populations by such large amounts of runoff water.

CHEMICAL CHARACTERISTICS

The upper Nueces is one of the few rivers in Texas in which little turbidity or pollution occurs in its normal flow. Its waters are a blue green and the bottom is plainly visible to a depth of eight or ten feet most of the year. The exceptions to these conditions are encountered during the floods which are a plague to the rivers in this area. During these floods, however, a large quantiy of manure is washed into the river whose fertilizing value may be of some benefit to the fish population. Some pollution is found from septic tanks emptying into the river, and an occasional dead animal in the stream. This form of pollution on such a small scale is of questionable detriment to the fish.

Water analyses were run at 17 of the 25 stations made. No abnormal or detrimental conditions were found. The oxygen content ranged from 2.4 ppm to 11.4 ppm

averaging 6.4 ppm. The carbon dioxide was found to be between 0.3 ppm and 14.0 ppm with a mean of 4.0 ppm. The total alkalinity range extended from 129 ppm to 256 ppm averaging 192.8 ppm. The pH averaging 8.3 varied from a low of 7.5 to 8.8. Although most water temperatures were taken in the flowing portion of the stream, the high of 92°F occurred in a shallow inlet. The average temperature was 80.4, however, all but two of the water temperatures were taken in July, which accounts for the high temperature. The average air temperature at the time of the water temperature check was 91.5°. The coldest water temperature recorded was 54°F in January. The water emerges from the springs in the low seventies.

Somewhat different conditions exists south of U. S. Highway 90. From this point downstream the river consists of a few large pools. As these are sporadic springs and little flow, the water temperature are affected to a greater extent by the air temperature. The flow being little or none, these pools are prone to silt rather quickly after floods. Other than these variances the chemical conditions concur with those of the upper perennial section.

SOILS, VEGETATION, AND LAND USE.

The watershed of the Nueces is utilized primarily for the grazing of cattle, sheep and goats. Farming is done in the valleys and bottom lands where the soil is of a sufficient depth, and not too rolling. In all probability the amount of farm land does not comprise more than 1% of the area in the watershed. Crops primarily raised are oats, wheat, and some barley. A few row crops are planted during the spring, mostly hegari and milo. On many ranches along the creeks and river, irrigation from the stream supplements the 22 inch annual rainfall. Most of the irrigated plots are small and defer little of the flow when considered as a whole. However, if winter months are dry, an appreciable amount of water is, or could be, deferred to the irrigation of the winter grains.

The soil in the area is of a reddish brown color, derived mostly from the limestone of the area. The soil covering of the hillsides is very shallow or non-existent in many places. Overgrazing and recent years of drought have removed most of the grass cover, permitting the occasional, heavy local rains to severely erode the soil. Much of this silt is deposited below the Edwards Plateau on the coastal prairie, where the riverbed is wider and velocity decreases.

The cover that does occur over the watershed is composed primarily of short grasses such as buffalo, mesquite and grama grass. Some bluestems are present but overgrazing had done much to deplete these grasses. Trees of the area are mostly hardwoods, oaks being the most common. Junipers are present in goodly numbers, but are rapidly being cut by ranchers, as they are considered a detriment to the growth of grasses. Some elms occur and are utilized along with oaks for goat browse. After leaving the Edwards Plateau northwest of Uvalde, the river emerges on the coastal prairie. The soil in this area is rough, stoney land which has scattered brush and small tree, composed mostly of mesquite, small oaks, purple sage, and quahillo.

The grasses, principally curly mesquite, buffalo and three-awn, occur primarily in the valleys where soil is deeper, and moisture conditions are more suitable.

AQUATIC PLANTS

At the beginning of this survey, aquatic plants were abundant in the river. In some places they were becoming a nuisance to fishermen. In most areas however, they only occurred in profusion enough to offer a reasonable sancturary for forage fish, insect

larvae, etc. The most abundant aquatic plants were coontail (Ceratophyllum sp.), muskgrass (Chara vulgaris) and water milfoil (Myrophyllum heterophyllum). Along the banks an occasional growth of cattail (Typha latifolia) was found, and in the shallow still waters, yellow waterlily (Nuphar advena) grew in moderate numbers. In the cool spring areas, watercress (Nasturtium officinale) was abundant. Various other aquatics grew in lesser numbers intermingled with those already mentioned. Table 6 is a checklist of the aquatic plants found.

The flood of September 25, 1955 reduced the aquatic vegetation almost to the point of extinction, thus leaving the smaller fish to seek cover among rocks, holes washed out in the banks, or an occasional tree top bent into the river. In some areas which were protected from the flood waters by a ledge or some other obstruction, a few aquatic plants occur, mostly coontail, muskgrass and water milfoil. The seed and plants that remained, with time, will undoubtedly remedy this want for cover.

ACCESSIBILITY

Private lands ajoining the Nueces River, make gaining access to the stream rather difficult. The river is considered a public stream to the mouth of Hackberry Creek, some 7½ air miles north of Vance, Real County. Numerous highway and county road crossings are found along the river, where a person might fish. However if a person strays too far from these crossings, friction might be encountered from land-owners, even though he has the legal right to trespass on the river bed.

There are land owners who for a small charge allow fishermen access to the river, and some allow overnight camping. In many instances the fishing rights are included with Texas' system of purchased hunting leases. Many times a person may obtain permission to fish by asking the landowner, conducting himself in a sportsman-like manner and respecting the rancher's property. A fisherman, after establishing himself trustworthy, is usually permitted by the landowner to return with little interference.

In many parts of the river, and more especially in the upper regions, the land is owned by persons who have interests other than ranching. These individuals are for the most part very cooperative, and attempt to carry on programs conducive to good fish and game management. Possibilities to gain access to these waters, which are private, is practically nil. Heavy fishing pressure occurs here however, from the friends who are allowed access by invitation only.

However difficult it may seem to gain access to this stream, a good sportsman with perseverance can locate a place to fish.

Aside from natural reproduction, the stream is heavily stocked from the State Fish Hatchery at Ingram, and the Federal Fish Hatchery at Uvalde. The fish stocked are primarily: black bass, channel catfish, bluegill, and some redear sunfish.

Considering the river as a whole, moderate to heavy amounts of fishing pressure occurs, and fishing is considered to be from fair to good.

RESULTS OF FISH COLLECTIONS

During the survey 28 stations were made. Table 1 is the key to their location. Table 3 is a chart showing the species and number caught at each station. A total of 1,463 specimens were collected representing 26 species from 10 families.

Family Lepisosteidae

Gars

Lepisosteus productus: spotted gar. The two spotted gar were collected at different stations. This species alone has not reached numbers which could be considered detrimental, but in combination with the longnose gar, might reach numbers which could effect a fish population in a particular hole or short section of the river.

Lepisosteus osseus: longnose gar. This fish of prey occurs in all parts of the river but not in numbers that could be considered detrimental to the other fish populations, with local exceptions. They do congregate in some of the larger holes in the lower portions in perhaps excessive concentrations. Only four specimens were collected, all adults in gill nets set in the southern portion.

Family Clupeidae

Shad

Dorosoma cepedianum: gizzard shad. Shad are conspicuous by their absence in that portion of the Nueces River covered by this survey. Only one specimen was taken, a large adult, in the lower part of the river. This is the section where little or no flow occurs. Unless the lack of silt or mud in the flowing portion of the river accounts for their absence, no other explanation can be offered.

Family Characidae

Tetras

Astyanax fasciatus: Rio Grande tetra. A total of 191 were taken. They are found in all portions of the river, but generally more abundant in the upper portions, in the clear flowing waters. It is generally regarded as a good forage and bait fish.

Family Catostomidae

Suckers

Ictiobus bubalus: smallmouth buffalo. The smallmouth buffalo seems to enjoy the warmer, still waters of the lower part where the river is dry to holes much of the year. These holes contain more silt and detritus over which this buffalo prefers to feed, and is perhaps one reason for their halted immigration northward. All of the 22 buffalo collected were in these pools.

Moxostoma congestum: Texas gray redhorse sucker. This fish, which is very common in other rivers of the Edwards Plateau, has taken its place in the Nueces. It was not taken in any seining collections, with only adults taken in 6 of 8 gill net collections made. The fry and fingerlings of this species are good forage fish, and the adults are considered edible by many people, but are generally classified an undesirable rough fish.

Family Cyprinidae

Minnows

Notropis amabilis: Texas shiner. The 75 specimens taken, were collected over the entire length of the river. They are considered a good forage and bait minnow.

Notropis venustus: spottail shiner. This excellent bait and forage fish was among the most abundant minnow collected, and very evenly distributed. It is found in all portions of the river, and shows no preference for any particular location. A total of 115 spottails was collected.

Notropis lepidus: Edwards shiner. This species, typical of spring waters, was found to be very abundant in the perennial flowing portions of the river. None of the 102 specimens were found in the intermediate flowing lower portion.

Dionda episcopa: roundnose minnow. This species was the most abundant minnow found. Contrary to the general findings, this fish was found in all portions of the river, rather than in spring areas only. This distribution could be due to the spring-like conditions which prevail over the entire length of the perennial flowing portion, northwest of Uvalde. A total of 279 specimens was collected.

Pimephales vigilax vigilax: parrot minnow. The six specimens of this species were collected at the most southern station, a rather large standing hole of water. The waters of these holes are usually turbid, more to the liking of this fish, and probably the reason the fish has not invaded the clear-watered northern portion.

Campostoma anomalum: stoneroller. Although the 25 specimens were collected at only three stations, in all likelihood, the distribution is rather uniform. One specimen was collected near the headwaters, the others at Pulliam Creek near the middle of the river and at the holes of the lower portion.

Family Ameiuridae

Freshwater catfishes

Ictalurus punctatus: southern channel catfish. The 9 specimens collected were found in all parts of the river, but not in large numbers. A factor influencing the condition could be the competition of the large population of yellow bullheads. The State Fish Hatchery at Ingram and the Federal Fish Hatchery at Uvalde add the channel catfish to the stream in large numbers. Apparently, this assistance to natural reproduction has not been the answer to establishing good numbers of this species under the condition prevailing in this stream.

Ameirus natalis: yellow bullhead. This widely distributed species was found in all portions of the Nueces River, in both the upper spring regions and the lower portion. Of the 40 taken 34 were taken in gill nets, the rest in seines. They are considered of no value in this region for game or forage purposes.

Family Poeciliidae

Mosquitofishes

Gambusia affinis: common mosquite fish. This top water minnow, was found to have the most homogeneous distribution of any fish in the seining collections. The 94 specimens were taken in 14 of the 20 seining collections made. Other than mosquite control they have little value.

Mollienisia latipinna: sailfin molly. This small fish, common in the coastal area of the river, has immigrated into these upper portions. It was taken at only one collection but in all probability is more widely distributed than these collections indicate.

Family Centrarchidae

Black basses and sunfishes

Micropterus salmoides: largemouth black bass. This most sought after game fish was found throughout the watershed. In addition to natural reproduction, the fish hatcheries at Uvalde and Ingram add this fish to the waters of the Nueces in large numbers. All size ranges were found, including one five pound individual taken with a gill net at Station 14 above Laguna. These fish were in excellent condition, and occur in numbers greater than local fishermen suspect.

Chaenobryttus coronarius: warmouth bass. This desirable small sunfish has a rather uniform distribution in the upper section of the Nueces, but for reasons, yet their own, they refuse to populate the stream with any great numbers in this area. Three of the four specimens were taken with gill nets, and were in good physical condition.

Lepomis cyanellus: green sunfish. This sunfish was found over the entire river course, but surprisingly, not in large numbers. Most of the 21 specimens caught were small, however, a few large individuals were taken. It inhabited the intermediate pools of the stream.

Lepomis punctatus: spotted sunfish. The small sunfish was found at only one collection station, that near the center of the perennial section of the river. There is no apparent reason for this restricted distribution, and is presumed that they were merely missed by the collection techniques used. They are of little value as a game fish, and only two were taken.

Lepomis microlophus: redear sunfish. The 2 individuals taken were found in a pool below a spring along the northern part of the West Nueces. This flow occurred for about 2 miles below the spring. As this was the only redear taken, they were, in all probability stocked by a hatchery.

Lepomis macrochirus: bluegill sunfish. The bluegill, usually very abundant in the streams east of the Nueces, did not occur in too great numbers in this section of the river. They are also stocked from the local hatcheries. The longear sunfish, which are more suited to this type of habitat, have apparently held the over populating tendency of the bluegill in check. A majority of the 11 specimens taken were from the West Nueces and below it's mouth in the main river.

Lepomis auritus: yellowbelly sunfish. This species was found over all of the perennial portion of the Nueces River, but did not habit the lower section of the stream, where the river dries to holes. This fish is a very desirable pan fish, and will constitute a large part of the fishermen's "perch string". A total of 15 specimens were taken.

Lepomis megalotis: longear sunfish. This species was found to be the most prevalent of the sunfish. It was found in 16 of the 28 collections in both gill nets and seines. It is an excellent game fish, and usually responsive to the offerings of the fishermen with the appropriate bait.

Family Percidae

Darters

Etheostoma lepidum: greenthroat darter. The 16 specimens were found in all

clearer parts of the river. The dispersion of this species, generally endemic to spring areas, is probably due to the same reasons as Dionda episcopa, spring like conditions over the entire course of that portion of the Nueces, Northwest of Uvalde.

Family Cichlidae

Cichlids

Cichlasoma cynoguttata: Rio Grande perch. This pugnacious fish has populated the entire river. It is suspected that the Rio Grande perch was introduced about 1929 when they were widely distributed by the U. S. Fish Cultural Station at San Marcos, Texas. This fish offers good sporting possibilities and very edible flesh when correctly prepared. Their tendency to over populate a stream often causes them to be a detriment to other fish. A total of 261 specimens were taken, but the 218 specimens collected at Station 2 was a portion of a spawn and does not indicate the relative abundance in that area of the stream.

The following list of fish species were not collected but the fish are of probable occurrence in the River:

Carpiodes carpio	River Carpsucker
Cyprinus carpio	Carp
Opsopoeodus emilie	Pugnose Minnow
Notropis roseus	Central Weed Shiner
Notropis deliciosus	San Shiner
Pilodictus olivaris	Flathead Catfish
Anguilla rostrata	American Eel

These fish could possibly occur:

Dorosoma petenesis	Threadfin Shad
Ictalurus lupus	Headwater Channel Catfish
Ictalurus furcatus	Blue Catfish
Schilbeodes mollis	Tadpole Madtom
Pomoxis nigromaculatus	Black Crappie
Hadropterus scierus	Dusky Darter
Aplodinotus grunniens	Freshwater Drum

SUMMARY

1. Father Salas, the first semi-permenant white man in the area, came in an attempt to Christianize the Jumano Indians. This failed, and the area remained the hunting grounds of the Indians, with little interference until the settlement of San Antonio in 1718. From this time on, the westward expansion, with the aid of several forts, was constant. The city of Uvalde near the Nueces River, was settled in 1856.

2. The Nueces is in two biotic provinces in this region; the Balcones, where the river is typical of spring and clear, swift water, and the Tamaulipan where the river dries to holes, caused by the porousness of the Edwards limestone outcropping just north of the highway 90 crossing, over which the river crosses. The West Nueces, the major tributary, offers little or no water except runoff from rains.

3. Water Analysis were run at 17 of the 25 stations. No abnormal or detrimental conditions were found. Little polution of consequence occurs on the Nueces River.

4. The principal use of the land is grazing, which in the recent drought years, has been severely overdone. In many instances the bare rocky soil has no cover whatsoever, thereby, aggravating the severity of the floods which are not unusual to the area. A small amount of land is cultivated near the river where the 22 inch annual rainfall is supplemented by irrigation from the river. The irrigation, at this time, is not of a sufficient magnitude to be detrimental to aquatic life.

5. At the beginning of the survey the aquatic plants were numerous, mainly coontail (Ceratophyllum demersum), muskgrass (Chara vulgaris) and water milfoil (Myriophyllum heterophyllum). During the survey a flood occurred which temporarily removed a large majority of the aquatic plants of the river.

6. The river is accesible in most areas if permission from the land owner is obtained and his property respected. In some cases the fishing priviledges are included with the hunting lease.

7. A total of 26 species from 10 families were collected from 20 seining stations and 8 gill net sets.

Table 1. Key to Fish Collection Stations on Nueces River, Edwards, Real, Uvalde and Kinney Counties, Texas

Station No.	Collection No.	Location
1	S-5, Gn-7	Nueces River, Lat. 29°59'15", Long. 99°57'00" Real Co. Camp Eagle, fourth crossing on Nueces River Road, South from Highway 41.
2	S-3	Hackberry Creek, Lat. 30°1'20", Long. 100°3'37" Edwards Co. Gilmer Ranch, Hackberry Creek Road, 5 mi. S. Highway 41.
3	GN-6	Hackberry Creek, Lat. 30°00'00", Long. 100°2'50" Edwards Co. 1.5 mi. S. E. Station 2.
4	S-4	Hackberry Creek, Lat. 29°56'20", Long. 100°00'50" Edwards Co. Crossing on Hackberry Creek Road, 1.3 mi. N. W. of Nueces River Road junction.
5	S-16	Nueces River, Lat. 29°51'50", Long. 100°1'15" Edwards-Real Co. line. 3.2 air mi. N. of Vance, Real Co.
6	GN-8	Nueces River, Lat. 29°50'40", Long. 100°2'5" Edwards-Real Co. line. 2.2 air mi. N. W. of Vance, Real Co.
7	S-15	Nueces River, Lat. 29°48'40", Long. 100°1'5" Edwards-Real Co. line. Highway 335 crossing, 5 mi. S. of Vance.
8	S-14	Nueces River, Lat. 29°43'20", Long. 100°2'10" Edwards-Real Co. line. Highway 55 crossing, 5 mi. S. of Barksdale, Edwards Co.
9	S-19	Pulliam Creek, Lat. 29°45'50", Long. 100°5'15" Edwards Co. 4 air mi. N. W. of Barksdale.
10	S-20	Pulliam Creek, Lat. 29°43'35", Long. 100°4'50" Edwards Co. 2.5 air mi. West of Barksdale.
11	S-13, GN-5	Nueces River, Lat. 29°37'20", Long. 100°00'30" Uvalde Co. 4 mi. S. of Camp Wood, Real Co.
12	S-12	Nueces River, Lat. 29°32'40", Long. 100°00'00" Uvalde Co. .5 air mi. N. E. of Montell.
13	S-11	Nueces River, Lat. 29°28'45", Long. 100°1'30" Uvalde Co. 4.2 air mi. N. NE. of Laguna.
14	GN-4	Nueces River, Lat. 29°25'55", Long. 99°59'30" Uvalde Co. .5 air mi. N. E. of Laguna.

Table 1. (Continued).

Station No.	Collection	Location
15	S-10	Nueces River, Lat. 29°24'00", Long. 100°00'00" Uvalde Co., Highway 55 crossing, 1.6 mi. S. of Laguna. (19 mi. crossing).
16	S-9	Nueces River, Lat. 29°22'00", Long. 99°59'5" Uvalde Co.; Highway 55, 4 mi. S. SE of Laguna. (Camp Chalk Bluff).
17	S-2	West Nueces River, Lat. 29°45'20", Long.100°23'35" Edwards Co. 20.6 air mi., S. W. of Rocksprings on Highway 674, or 1.7 mi. downstream from mouth of Indian Creek.
18	S-18, GN-1	West Nueces River, Lat. 29°31'15", Long. 100°15'00" Kinney Co. End of Tularosa Lane off Highway 334, N. W. from Brackettville or 17 air mi. N. W. of Brackettville.
19	S-17	West Nueces River, Lat. 29°29'30", Long. 100°17'30" Kinney Co. Second crossing on Tularosa Lane off Highway 334, N. W. from Brackettville or 14.5 air mi. N. W. of Brackettville.
20	S-1	West Nueces River, Lat. 29°26'20", Long. 100°7'15" Kinney Co. Mouth of Liveoak Creek, 7.2 air mi. W. of Laguna.
21	S-8	West Nueces River, Lat. 29°18'40", Long. 100°3'30" Uvalde Co. 4.8 air mi. N. NW. of Cline. (Mustang water hole).
22	GN-3	Nueces River, Lat. 29°8'30", Long. 99°53'45" Uvalde Co., 1.6 air mi. N. of Highway 481, SW of Uvalde.
23	GN-2	Nueces River, Lat. 29°7'40", Long. 99°53'50" Uvalde Co., .5 mi. NW of Highway 481. SW of Uvalde.
24	S-7	Nueces River, Lat. 29°7'15", Long. 99°53'15" Uvalde Co., Crossing of Highway 481, 9 air mi. SW of Uvalde.
25	S-6	Nueces River, Lat. 29°3'30", Long. 99°51'40" Uvalde Co., Crossing of Highway 83, 11.5 air mi. S SW of Uvalde.

Table 2. Checklist of Fishes from Nueces River and its Tributaries within Edwards, Real, Uvalde, and Kinney Counties, Texas.

Scientific Name	Common Name
Lepisosteus productus	Spotted Gar
Lepisosteus osseus	Longnose Gar
Dorosoma cepedianum	Gizzard Shad
Astyanax fasciatus	Tetra, (Mexican jumper)
Ictiobus bubalus	Smallmouth Buffalo
Moxostoma congestum	Gray Redhorse
Notropis amabilis	Texas Shiner
Notropis venustus	Blacktail Shiner
Notropis lepidus	Edwards Shiner
Dionda episcopa	Roundnose Minnow
Pimephales vigilax	Parrot Minnow
Campostoma anomalum	Stoneroller, (Steelback)
Ictalurus punctatus	Southern Channel Catfish
Ameiurus natalis	Yellow Bullhead
Gambusia affinis	Gambusia (Common Mosquitofish)
Mollienisia latipinna	Sailfin Molly
Micropterus salmoides	Largemouth Black Bass
Chaenobryttus coronarius	Warmouth
Lepomis cyanellus	Green Sunfish
Lepomis punctatus	Spotted Sunfish
Lepomis microlophus	Redear Sunfish
Lepomis macrochirus	Bluegill
Lepomis auritus	Yellowbelly Sunfish
Lepomis megalotis	Longear Sunfish
Etheostoma lepidum	Greenthroat Darter
Cichlasoma cyanoguttata	Rio Grande Perch

Table 3. Species and Number of Fish Collected from Each Station on Nueces River.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Totals
Lepisosteus productus	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
Lepisosteus osseus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Dorosoma cepedianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Astyanax fasciatus	0	0	0	0	1	0	0	0	38	122	0	5	0	0	5	3	9	5	2	0	0	0	0	0	1	191
Ictiobus bubalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	12	0	0	22
Moxostoma congestum	0	0	13	0	0	5	0	0	0	0	10	0	0	2	0	0	0	0	0	0	0	4	3	0	0	37
Notropis amabilis	2	18	0	0	0	0	0	1	2	0	0	0	0	0	0	35	0	6	0	3	0	0	0	0	8	75
Notropis venustus	0	0	0	0	0	0	0	6	9	5	15	1	0	0	3	2	2	6	11	0	1	0	0	33	21	115
Notropis lepidus	9	38	0	2	2	0	0	0	0	38	0	12	0	0	0	0	1	0	0	0	1	0	0	0	0	102
Dionda episcopa	0	21	0	119	45	0	1	5	7	24	0	18	1	0	0	2	31	5	0	0	0	0	0	0	0	279
Pimephales vigilax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6
Campostoma anomalum	0	0	0	1	0	0	0	0	2	10	0	1	0	0	11	0	0	0	0	0	0	0	0	0	0	25
Ictalurus punctatus	0	0	4	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	1	0	0	9
Ameiurus natalis	0	1	8	0	0	12	0	0	1	0	2	0	4	3	0	0	0	8	0	0	0	1	0	0	0	40
Gambusia affinis	0	14	0	21	1	0	2	1	6	0	0	0	5	0	0	2	3	6	0	18	8	0	0	4	3	94
Mollienesia latipinna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Micropterus salmoides	1	4	3	2	0	2	1	0	0	0	0	0	0	2	1	0	3	3	0	4	1	0	1	0	2	30
Chaenobryttus coronarius	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	4
Lepomis cyanellus	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	4	1	0	0	6	0	0	0	7	21
Lepomis punctatus	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Lepomis microlophus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Lepomis macrochirus	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	5	11
Lepomis auritus	4	0	0	1	0	1	0	1	0	0	2	0	0	0	4	0	1	1	0	0	0	0	0	0	0	15
Lepomis megalotis	1	11	2	11	0	0	4	0	0	2	5	1	12	2	6	0	10	24	0	0	1	0	0	2	3	97
Etheostoma lepidum	0	1	0	2	0	0	0	0	4	1	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	16
Cichlasoma cyanoguttata	0	218	0	0	0	0	0	0	8	0	1	0	4	2	0	1	11	16	0	0	0	0	0	0	0	261
Totals	17	326	31	159	49	25	8	15	77	202	35	40	28	13	30	47	81	90	13	26	18	16	22	39	56	1,463

Table 4. Water Analysis of Nueces River.

Station Number	Date	Air Temp F°	Water Temp F°	pH	Dissolved Oxygen ppm	Carbon Dioxide ppm	Total Alkalinity ppm
1	7-13-55	98	78	8.2	6.5	4.0	195
2	7-13-55	97	72	7.5	2.4	14.0	256
3	No Analysis						
4	7-13-55	97	75	7.9	6.8	8.0	232
5	7-28-55	97	83	8.2	6.0	5.0	216
6	No Analysis						
7	7-28-55	98	84	8.5	6.8	2.0	210
8	7-28-55	96	82	8.2	4.4	6.0	211
9	No Analysis						
10	No Analysis						
11	7-28-55	91	82	8.5	5.0	3.0	200
12	7-28-55	87	82	8.8	6.4	0.3	191
13	7-27-55	98	92	8.1	4.2	7.0	202
14	No Analysis						
15	7-27-55	93	84	8.1	2.8	4.0	203
16	7-27-55	94	82	8.0	7.6	7.0	192
17	7-12-55	97	83	8.4	11.4	4.0	166
18	10-12-55	74	73	8.6	10.6	2.0	177
19	No Analysis						
20	No Analysis						
21	7-27-55	89	82	8.5	7.0	2.0	132
22	No Analysis						
23	1-11-56	55	54	8.5	7.0	6.5	212
24	7-26-55	99	90	8.8	4.4	3.0	129
25	7-26-55	96	88	8.6	8.8	7.0	154
Average		91.5	80.4	8.3	6.4	4.0	192.8

Table 5. Flow of the Nueces River at Two U. S. Geological Stations from 1943 to 1953.

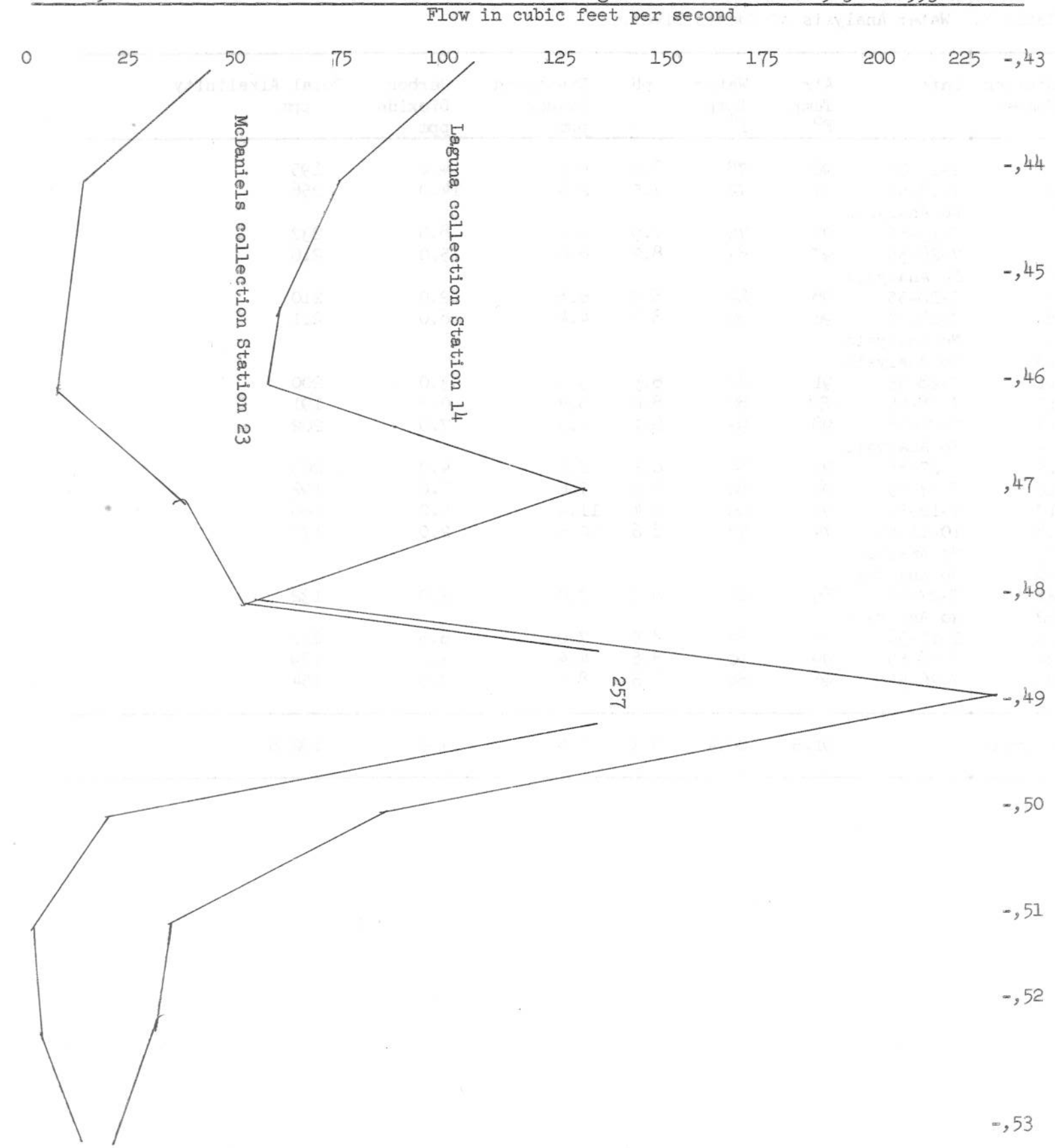
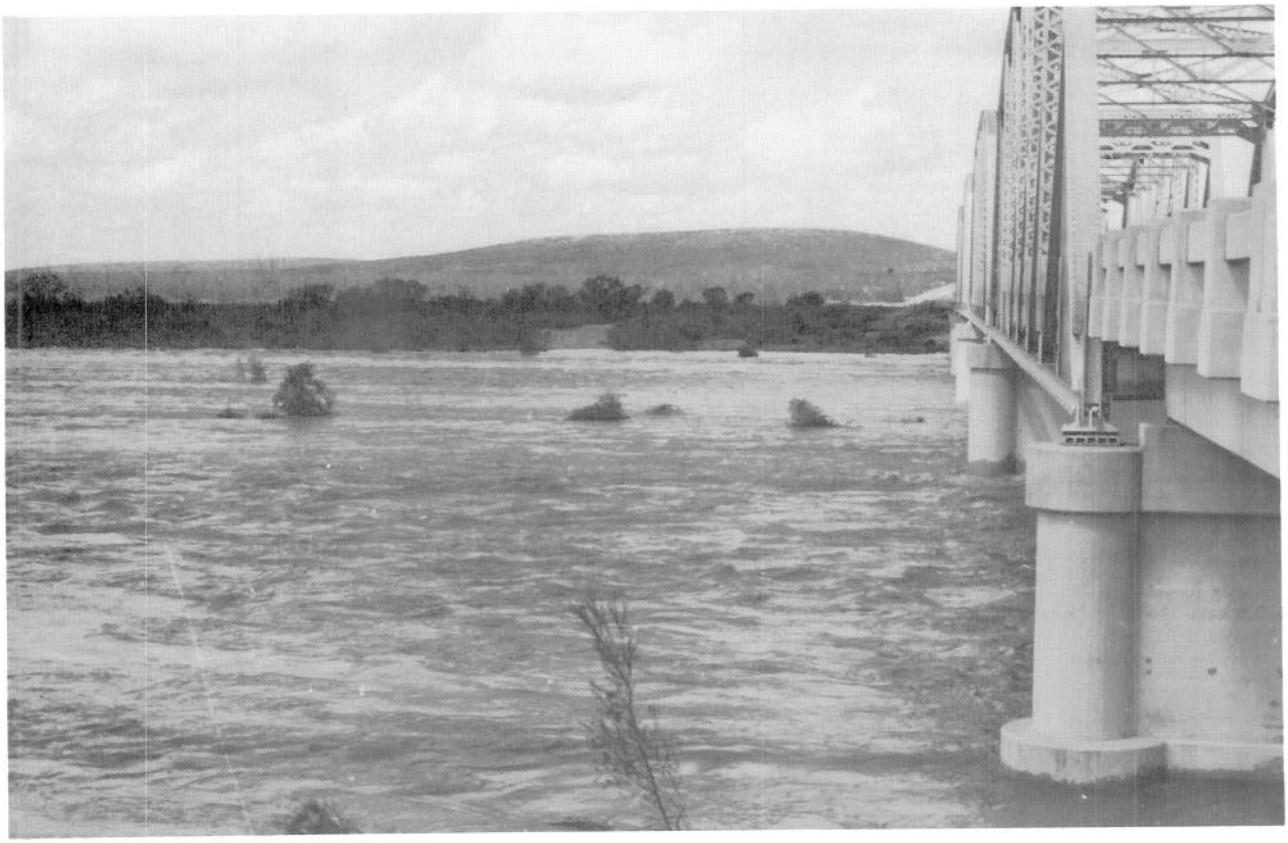


Table 6. Checklist of Aquatic Plants from Nueces River and its Tributaries lying within Edwards, Real, Uvalde, and Kinney Counties, Texas.

Cattail	*Typha latifolia*
Bulrush	*Scirpus etuberculatus*
Spikerush	*Eleocharis sp.*
Sedges	*Cyprus sps.* and *Eleocharis sps.*
Umbrella grass	*Fuirena simplex*
Yellow waterlily (spatterdock)	*Nuphar advena*
Pondweeds	*Potamogeton sp.*
Water pennywort	*Hydrocotyle umbellata*
Bushy pondweed	*Najas sp.*
Horned pondweed	*Zanichellia palustris*
Watercress	*Nasturtium officinale*
False loosestrife	*Ludwegia sp.*
Water milfoil	*Myriophyllum heterophyllum*
Coontail	*Ceratophyllum demersum*
Muskgrass	*Chara vulgaris*
Green alage	*Chlorophyceae*
Bluegreen algae	*Cyanophyceae*

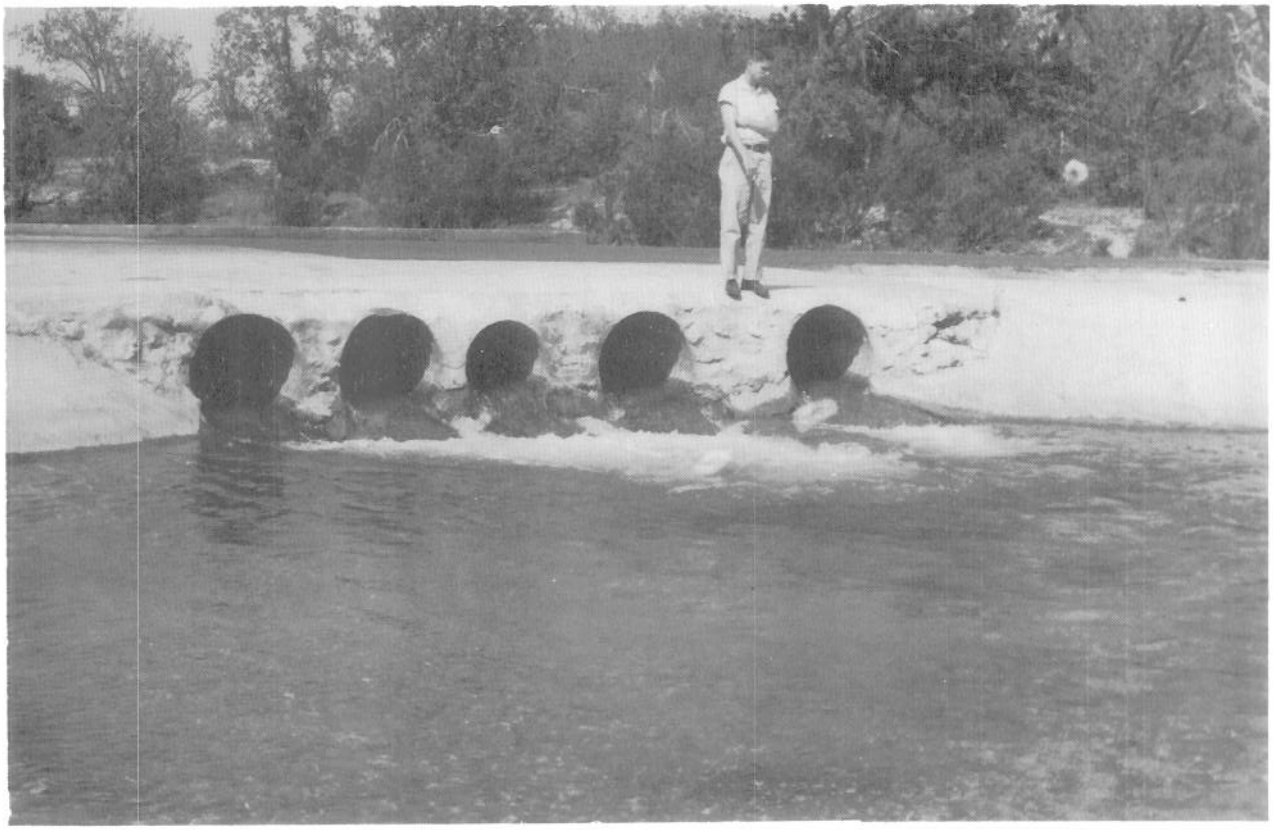
Gravel deposits in one of the wider places of the Nueces near station eight.

Gravel deposits left by the September 25, 1955 flood. This is station 11.



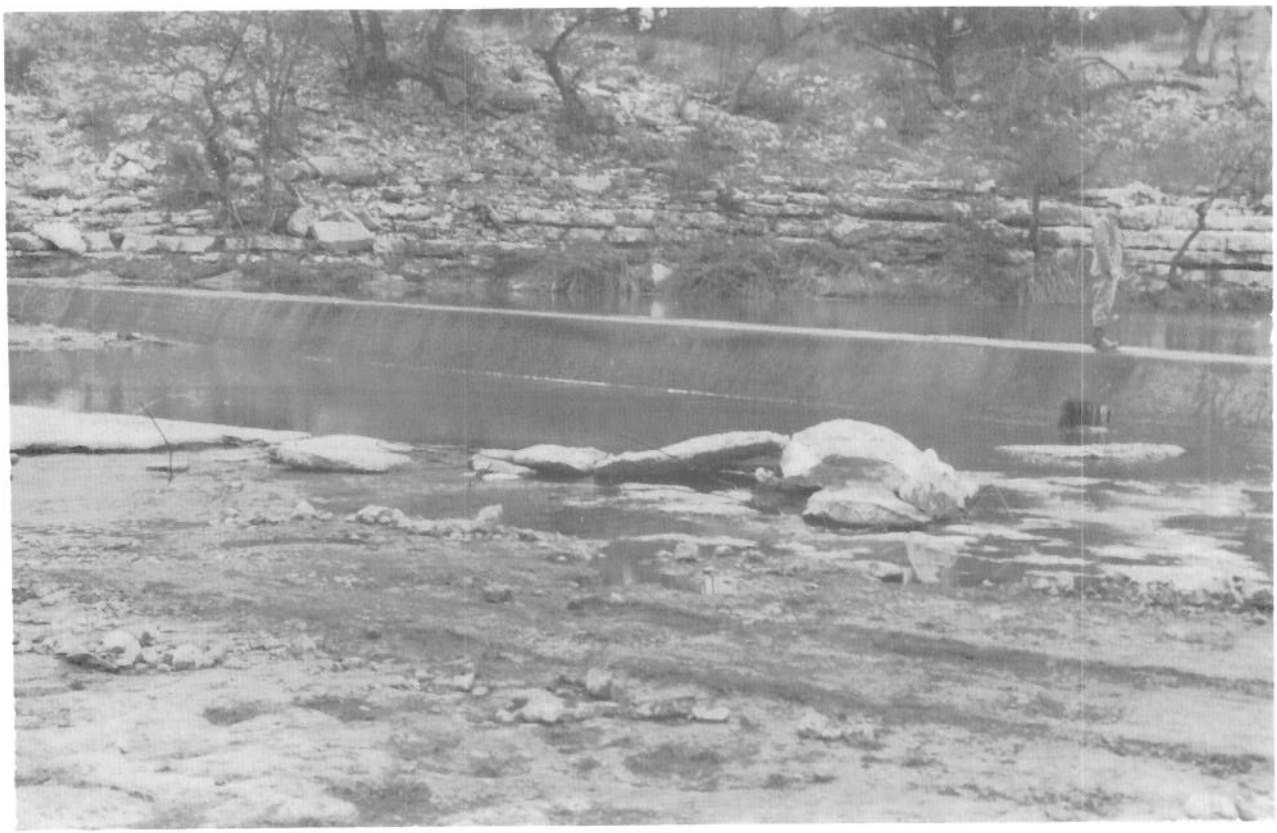
The Nueces River, Highway 90 crossing, west of Uvalde during the September 25, 1955 flood. At it's crest the water reached the bridge's steel substructure.

The Nueces at same crossing during a dust storm. The permeable Edwards limestone north of this point absorbs the normal flow leaving this point generally dry.



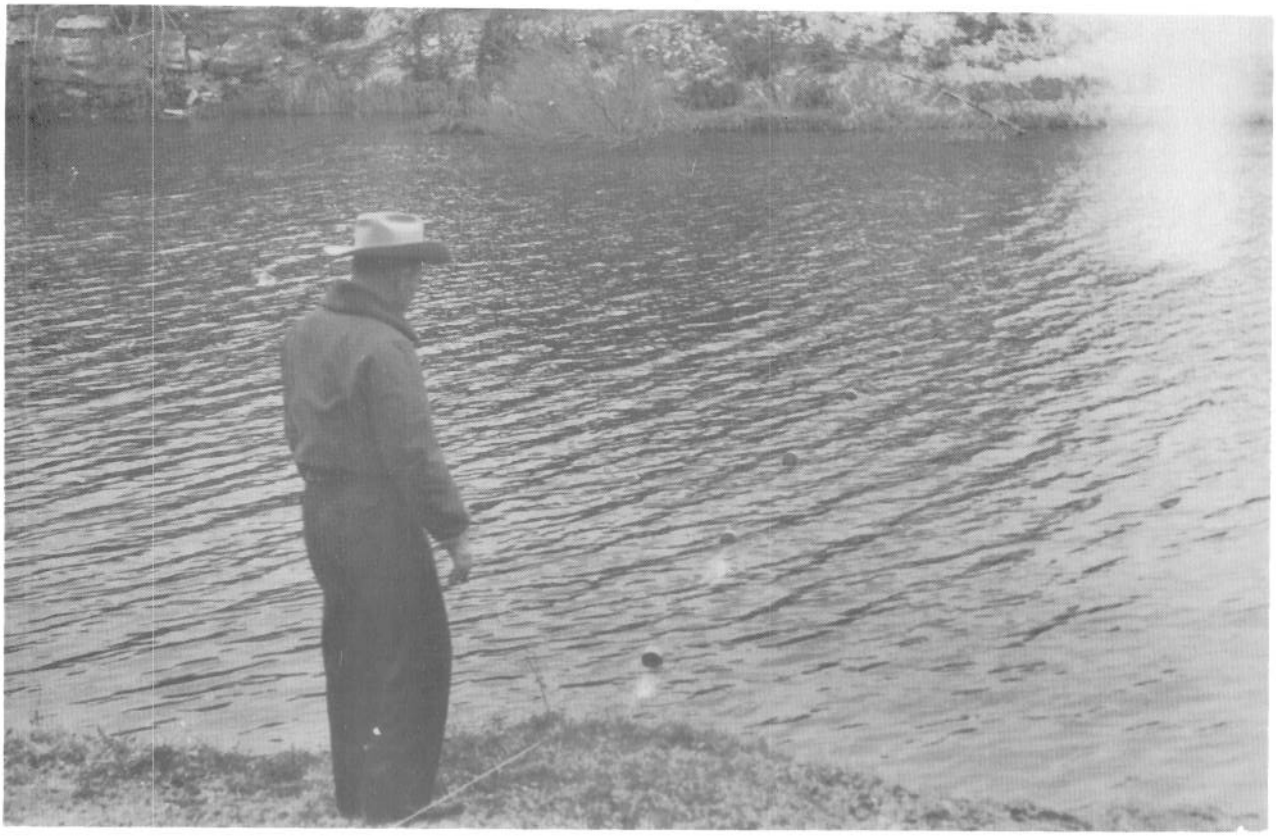
An indication of the Nueces' flow at station 15 on April 10, 1956.

The last pool into which water was flowing on April 10,1956. This point is some six miles below station 15.



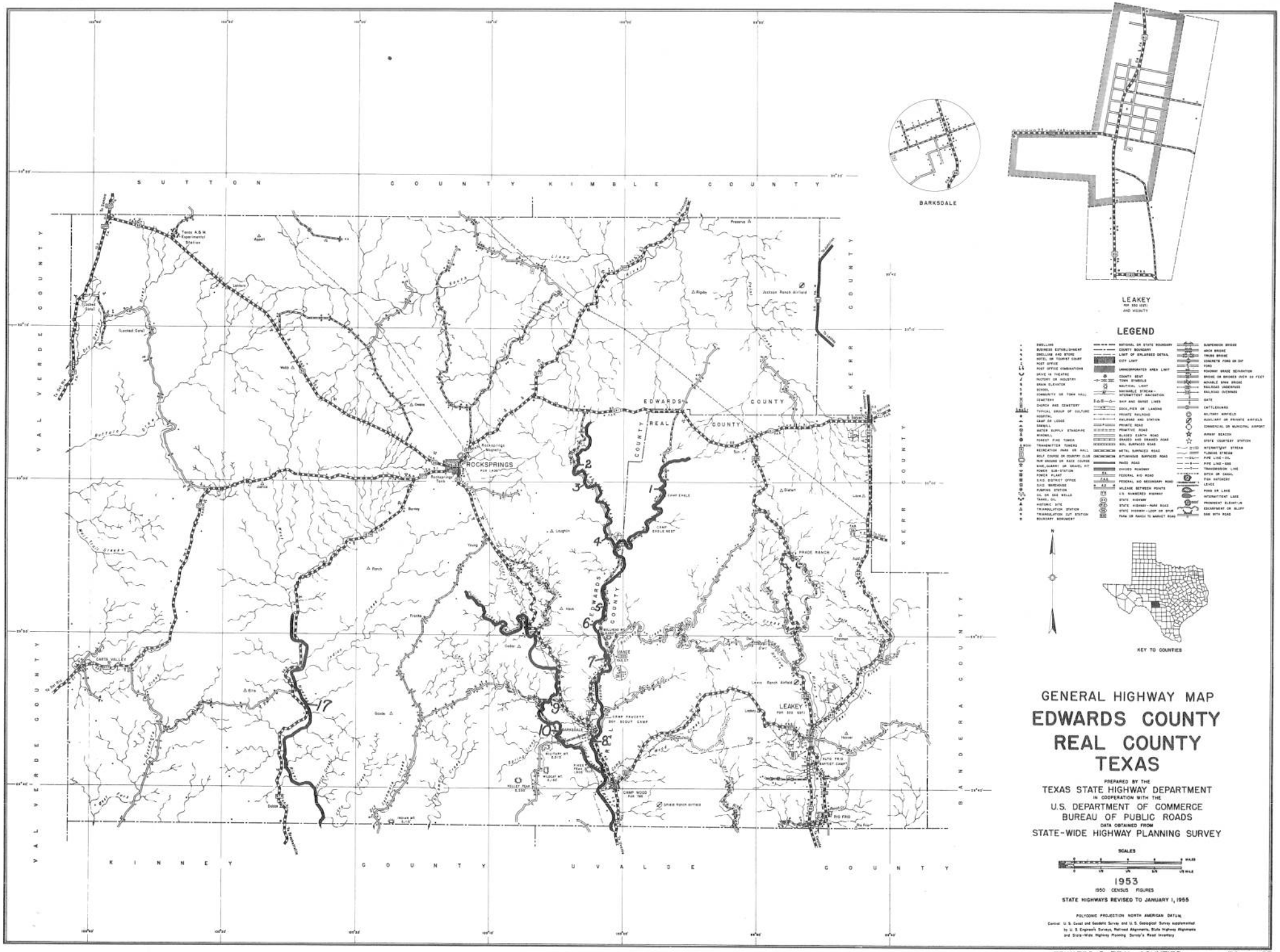
One of the many small privately owned dams on the Nueces. This is station two.

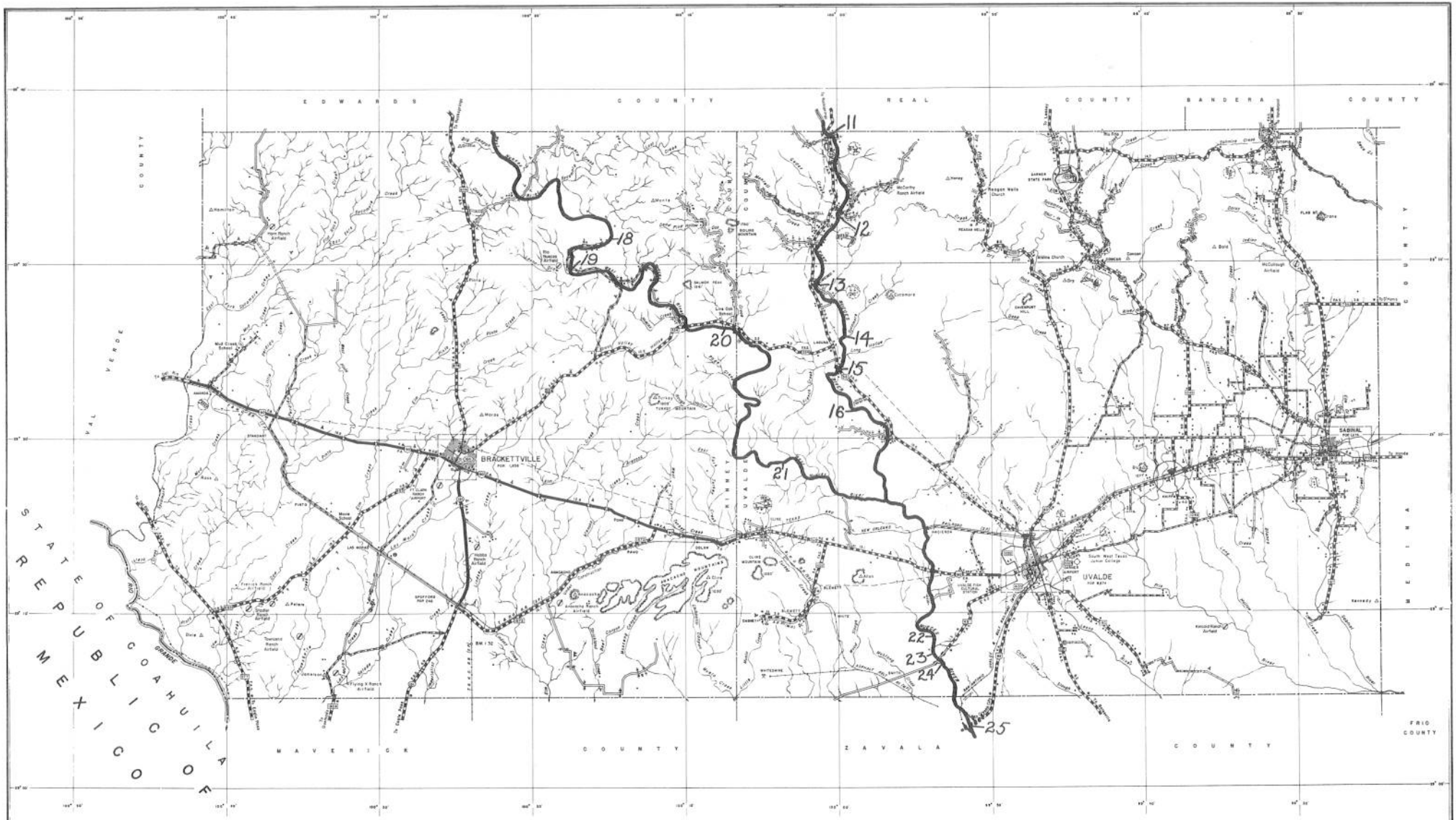
Water entering permeable gravel on Pullian Creek, one of the major tributaries.



One of the larger pools along the Nueces. This is station three.

A riffle area typical of the perieval flow section. This is station 15.


SUTTON COUNTY
KIMBLE COUNTY
VAL VERDE COUNTY
KERR COUNTY
EDWARDS COUNTY
REAL COUNTY
BANDERA COUNTY
KINNEY COUNTY
UVALDE COUNTY
ROCKSPRINGS
CAMP EAGLE
CAMP EAGLE REST
PRADE RANCH
LEAKEY
CAMP FAUCETT BOY SCOUT CAMP
CAMP WOOD
CAMP WOOD AIRFIELD
JACKSON RANCH AIRFIELD
LEWIS RANCH AIRFIELD
SPEAR RANCH AIRFIELD
CARTA VALLEY
BARKSDALE
LEAKEY
FOR SEC VISIT
AND VICINITY
LEGEND
KEY TO COUNTIES
GENERAL HIGHWAY MAP
EDWARDS COUNTY
REAL COUNTY
TEXAS
PREPARED BY THE
TEXAS STATE HIGHWAY DEPARTMENT
IN COOPERATION WITH THE
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
STATE-WIDE HIGHWAY PLANNING SURVEY
SCALES
1953
1950 CENSUS FIGURES
STATE HIGHWAYS REVISED TO JANUARY 1, 1955
POLYCONIC PROJECTION NORTH AMERICAN DATUM
Control: U. S. Coast and Geodetic Survey and U. S. Geological Survey supplemented by U. S. Engineer's Surveys, Railroad Alignments, State Highway Alignments and State-Wide Highway Planning Survey's Road Inventory



LEGEND

KEY TO COUNTIES

POLYCONIC PROJECTION NORTH AMERICAN DATUM

Control: U. S. Coast and Geodetic Survey and U. S. Geological Survey supplemented by U. S. Engineer's Surveys, Railroad Alignments, State Highway Alignments, and State-Wide Highway Planning Survey's Road Inventory.

STATE HIGHWAYS REVISED TO JANUARY 1, 1955

GENERAL HIGHWAY MAP
KINNEY COUNTY
UVALDE COUNTY
TEXAS

PREPARED BY THE
TEXAS STATE HIGHWAY DEPARTMENT
IN COOPERATION WITH THE
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
STATE-WIDE HIGHWAY PLANNING SURVEY

SCALE

1953
1950 CENSUS FIGURES

Sheet 1 of 1 map sheet and 1 supplementary sheet

KINNEY & UVALDE COUNTIES TEXAS 136 AND 232