Report of Fisheries Investigations

# Basic Survey and Inventory of Fish Species Present in Mission River

by

Alvin Flury
Project Leader

Dingell-Johnson Project F-6-R-5, Job B-10
July 1, 1957 - June 30, 1958

H. D. Dodgen - Executive Secretary

Texas Game and Fish Commission
Austin, Texas

Marion Toole
Coordinator

Kenneth C. Jurgens & William H. Brown
Assistant Coordinators

Job Completion Report

State of TEXAS

Project No. F-6-R-5 Name: Fisheries Investigation and Surveys of the Waters of Region 8-B.

Job No. B-10 Title: Basic Survey and Inventory of Fish Species Present in Mission River.

Period Covered: July 1, 1957 to June 30, 1958

Abstract:

The Mission River and its two tributaries, Medio and Blanco Creeks, were investigated from July 1957, through June 1958. The watershed, about 1,000 square miles, is located in south Texas between the San Antonio River to the north and the Aransas and Nueces Rivers to the south. The main river is tidal and is fed by the creeks in flash floods during heavy rains. At other times, only small pools of water remain in the creeks.

Gill net collections from the river contained predominantly salt water species. Seining collections from the two creeks contained small numbers of fresh water fish with only black bass and sunfish as game species.

Aquatic vegetation is scarce and serious pollution by oil field brines is ruining the river even for salt water fish. Smaller fields on the two creeks ruin parts of them for fresh water species. Dams on the creeks could possibly furnish considerable quantities of fresh water and are the only possibility for the development of a fresh water fishery.

Objectives:

To determine the chemical and physical characteristics of the river, the fish species present, and their relative numbers.

Procedure:

The investigations job was conducted under three parts:

a. Physical factors and general ecological conditions were observed and recorded. Maps of the watershed were made from tracings of Texas Highway Department County maps.

Water samples were taken from several stations along the river and from intermittent streams in the watershed, and tested for principle chemical factors.

b. Additional water samples were taken for determination of different kinds and amounts of pollution. Pollution tests were run by the Marine Laboratory at Rockport. The sources of the pollutants were partly determined.

c. Seining and experimental gill netting collections were made at several stations along the river and the intermittent streams. Data recorded were number of each species taken and, except for small forage fish, the length, weight, sex, breeding condition, food in stomach, and other pertinent information. Special notes were made to the relation of numbers and kinds of fish present at the various stations to the pollution found.

Findings:

## Physical Description

The attached map shows the watershed of the Mission River. Blanco Creek, to the north, and Medio Creek, to the south, join just west of Refugio to form the river itself. The river flows into Mission Bay, a tertiary bay, on the west side of Copano Bay, which in turns enters Aransas Bay. The latter bay is separated from the Gulf of Mexico by St. Joseph Island. The Mission River, from its mouth in Mission Bay to the junction of the two creeks west of Refugio, winds through 26 miles by stream, in an airline distance of 14 miles.

The watershed, covering about 1,000 square miles in Karnes, Bee, Goliad, and Refugio Counties; extends 68 airline miles west-northwest from its mouth. It is about 28 miles wide at the western boundary of Refugio County. Upstream, near Beeville, the watershed narrows to about 16 miles. Bounded to the north by the San Antonio River, to the south by the Aransas River, and to the west by the Atascosa (Nueces) River; the area is in the junction of the Post Oak Belt, from the northeast; the Coastal Prairie, to the east and southeast; and the Rio Grande Plain, to the southwest. From the coast to Refugio the topography is flat to rolling with low, but sharply cut, banks. Upstream from Refugio the banks are bluffs from 20 to 30 feet high. Elevations along the river are as follows: Refugio, 43 feet; Goliad, 187 feet; Beeville, 214 feet; and Karnes City, 5 miles northwest of Kenedy, 404 feet.

The area east of Refugio and Woodsboro is of very low relief and is composed of mixed soils. It is near the dividing line between Tamaulipan and Texan Biotic provinces of Dice. Larger terrestrial plants include hackberry, elm, and mesquite, with a heavy ground cover of forbs and grasses. The lower two miles of the river flow through bear grass, salt flats.

West of Refugio the southern part of the drainage, Medio Creek, is mostly made up of caliche outcrops and the caliche derived soils of the Rio Grande Plain. It is in the Tamaulipan Province of Dice. Besides the trees mentioned above, huisache, granjeno, and other thorny shrubs are typical. Willows are common along the stream banks.

The northern part of the drainage, Blanco Creek, is mostly sandy, Post Oak belt soils, but contains some caliche soils. The primary land use of the whole area is cattle ranching. Farming and oil production are also important. Human populations average 21.6 persons per square mile in Bee County, 7.1 in Goliad County, 22.6 in Karnes County, and 13.1 in Refugio County.

Permanent water is found only in the river itself. Blanco and Medio Creeks usually consist of widely spaced, mostly temporary, pools. Both creeks carry considerable run off during and after heavy rains. Normally only small pools are left to hold any fresh water fish present. Some of these pools retain water throughout normal years but almost all are subject to drying out in severe drought periods. The average annual rainfall is

33.84 inches in Refugio County, 30.65 inches in Bee County, 29.84 inches in Karnes County, and 31.94 inches in Goliad County. The Mission River is partially tidal and its lower portion contains permanent salt water.

## Chemical Characteristics

Table 1. presents the results of the chemical analyses of 19 water samples. The attached map shows the locations of station numbers referred to. Additional salinity samples were taken in the river before and after the study period by Marine Biologists from Rockport Marine Laboratory for a study of salinity increases caused by excessive dumping of oil well brines from adjacent oil fields. Bay water usually contains from 30 to 35 parts per thousand but the brine raises the river's salinity much higher. This seriously affects the salt water species but, since the river is largely tidal, bay water encroachment upstream would practically eliminate freshwater fish from it except temporarily, during heavy rain runoff. Salt water pollution from gas production was found at Station 24 on San Domingo Creek and at Station 20 from the oil refinery at Pettus. Because of the intermittent nature of the creeks, damages from small scale pollution are localized and are mostly washed out during flood periods.

## Aquatic Vegetation

The highly saline Mission River contained only small clusters of decomposing algae. Heavy surface mats of this material were found in several down wind pockets near the upper end of the river. Apparently originating in Blanco and Medio Creeks, it is washed down to the river on floods and killed by the salt water.

Small amounts of Ceratophylum sp. and Potamogeton sp. were found in some of the semi-permanent pools of both creeks. The "flash-flood" nature of the creeks, and the lack of any very large permanent pools, seems to prevent the development of many aquatic weeds.

## Fish Collections

Fish collections made were four experimental gill net collections and one seining collection in the Mission River, eight seine collections at three stations on Blanco Creek, nine seine collections from Medio Creek, and one seine collection from San Domingo Creek. Station numbers and locations are shown on the attached map. A checklist of species collected in the Mission River is given in Table 2. The kinds and numbers of fish taken are shown in Tables 3, 4, 5, and 6.

All the fish taken by experimental gill nets from stations in the Mission River were salt water species with the exception of alligator gar and gizzard shad. Both of these species are salt tolerant and are often found in the brackish lower portions of rivers and even in tidal bays. Similarly, in three seine collections from the Mission River below the confluence of Blanco and Medio Creeks, only saltwater species were taken. This is true except for Menidia beryllina, which is common in fresh waters of the area. Cyprinodon variegatus and Mugil cephalus commonly enter fresh water streams in south Texas but are apparently confined to saline areas caused by brine pollution from oil fields.

Station 6a was a fresh water pool in small creek about 200 yards off of the main river. The river here was flowing brine which apparently eliminated fresh water species except the specimen of gambusia taken. Station 7, at the junction of the two creeks and

the head of the river, was fresh flowing water. Seven fresh water fish species were taken there and, in addition, several blue crabs were seen.

Seining collections at the other stations in Medio and Blanco Creeks contained nothing unusual or unexpected. The numbers of individuals of all species, except Gambusia affinis, were smaller than would be expected. This may be due to the small bodies of permanent water in the creeks and frequent washout floods which give the various species little time to spawn and develop into what elsewhere could be considered normal populations. Black bass and five species of sunfish were the only game fish taken. They were small in size and were not present in large enough numbers to be considered of any importance as a fishery. Flathead, blue and channel catfish are probably present in the creeks, as they are in other streams of the area, but were not taken in the collections. Ranchers and hunters along the creeks use the pools for fishing only on rare occasions.

Discussion:

The Mission River drainage is similar in size and character to the Aransas River immediately to the south. Both are composed of a lower, tidal main stream fed by small intermittent creeks. Both are plagued by oil field pollution. Neither are of more than very little importance as fresh water fisheries except that by damming, considerable freshwater could be made available in small lakes. Although the oil and brine pollution being drained off to the Mission River in large quantities do little or no damage to any fresh water fish, it should be brought under control because of the damage it does to marine life in Mission Bay. Such small bays are becoming increasingly important as breeding grounds for the major salt water game fish and pollution will certainly destroy them for this use.

Prepared by Alvin Flury
Project Leader

Approved by Marion Toole
Director Inland Fisheries Division

Date November 17, 1959

Table 1. Water Analysis of Mission River.

| Station Number | Ph-th | M.O. Alk. | Ph | Salinity (ppt) |
|---|---|---|---|---|
| MR # 1 | 24.0 | 158.0 | 8.4 | 13.5 |
| MR # 3 | .0 | 138.0 | 7.9 | 20.0 |
| MR # 5 | - | - | - | 44.6 |
| MR # 6 | - | - | - | 22.4 |
| MR # 7 | .0 | 270.0 | 8.1 | 30.0 |
| BC # 8 | .0 | 182.0 | 8.1 | .4 |
| BC # 9 | .0 | 128.0 | 8.2 | .2 |
| BC # 10 | .0 | 182.0 | 7.2 | 1.9 |
| BC # 11 | .0 | 156.0 | 7.8 | .2 |
| MC # 14 | .0 | 136.0 | 7.8 | .2 |
| MC # 15 | .0 | 114.0 | 8.1 | .3 |
| MC # 16 | .0 | 118.0 | 7.9 | .4 |
| MC # 17 | .0 | 280.0 | 7.8 | .4 |
| MC # 18 | .0 | 386.0 | 7.8 | .4 |
| MC # 19 | .0 | 488.0 | 7.4 | .3 |
| MC # 20 | 100.0 | 308.0 | 8.6 | 2.0 |
| MC # 22 | .0 | 274.0 | 7.8 | .6 |
| MC # 23 | .0 | 240.0 | 7.8 | .3 |
| SD # 24 | 60.0 | 274.0 | 8.4 | 2.4 |

Table 2. A List of Fish Recorded from the Mission River.

| Scientific Name | Common Name |
|---|---|
| Carcharhinus limbatus | Spot fin shark |
| Dasyatis sabina | Tidewater stingray |
| Lepisosteus spatula | Alligator gar |
| Elops saurus | Skipjack |
| Brevoortia gunteri | Bay menhaden |
| Dorosoma cepedianum | Gizzard shad |
| Anchoa mitchilli | Bay anchovy |
| Ictiobus bubalus | Smallmouth buffalo |
| Notropis lutrensis | Red shiner |
| Pimephales vigilax | Parrot minnow |
| Bagre marina | Gafftop sail catfish |
| Galeichthys felis | Sea catfish |
| Ictalurus melas | Black bullhead |
| Cyprinodon variegatus | Sea pupfish |
| Gambusia affinis | Mosquitofish |
| Mollienisia latipinna | Sailfin molly |
| Mugil cephalus | Striped mullet |
| Menidia beryllina | Tidewater silverside |
| Micropterus salmoides | Largemouth black bass |
| Chaenobryttus gulosus | Warmouth bass |
| Lepomis cyanellus | Green sunfish |
| Lepomis microlophus | Redear sunfish |
| Lepomis macrochirus | Bluegill sunfish |
| Lepomis megalotis | Longear sunfish |
| Hadropterus maculatus | Blackside darter |
| Etheostoma chlorosomum | Bluntnose darter |
| Cynoscion nebulosus | Speckled trout |
| Diapterus olisthostomus | Irish pompano |
| Trinectes maculatus | Hogchoker |

Table 3. Number of Fish Taken in Experimental Gill Nets from the Mission River.

| Species | Station #1 | Station #2 | Station #3 | Station #4 | Total | Percent |
|---|---|---|---|---|---|---|
| Spot fin shark | 1 | - | - | - | 1 | 1.35 |
| Tidewater stingray | 1 | - | - | - | 1 | 1.35 |
| Alligator Gar | 1 | - | 2 | - | 3 | 4.05 |
| Skipjack | 3 | 3 | 3 | 1 | 10 | 13.52 |
| Bay menhaden | - | 1 | - | - | 1 | 1.35 |
| Gizzard shad | - | 3 | 18 | - | 21 | 28.39 |
| Gafftop sail catfish | - | 1 | - | - | 1 | 1.35 |
| Sea catfish | 2 | 4 | - | - | 6 | 8.10 |
| Striped mullet | 3 | 1 | 10 | 15 | 29 | 39.19 |
| Speckled trout | - | 1 | - | - | 1 | 1.35 |
| Total | 11 | 14 | 33 | 16 | 74 | 100.00 |
| Percent | 14.86 | 18.92 | 44.60 | 21.62 | | |

Table 4. Success of Experimental Gill Netting in the Mission River in Terms of Numbers and and Pounds of Fish Caught.

| Station | Number of Nets Set | Number of Feet of Net Set | Number of Fish Caught | Average Number of Fish/Net | Average Number of Fish/Foot of Net | Pounds of Fish Caught | Average Pounds of Fish/Net | Average Pounds of Fish/Foot of Net |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 125 | 11 | 11 | .088 | 19.52 | 19.52 | .16 |
| 2 | 1 | 125 | 14 | 14 | .112 | 4.45 | 4.45 | .04 |
| 3 | 1 | 125 | 33 | 33 | .264 | 12.88 | 12.88 | .10 |
| 4 | 1 | 125 | 16 | 16 | .128 | 12.68 | 12.68 | .10 |
| Total | 4 | 500 | 74 | 74 | | 49.53 | | |
| Average | 1 | 125 | | 18 | 0.144 | | 12.38 | .10 |

Table 5. Minimum, Maximum and Average Standard Length, Weights and "K" Factors of Fish Taken in Experimental Nets from the Mission River.

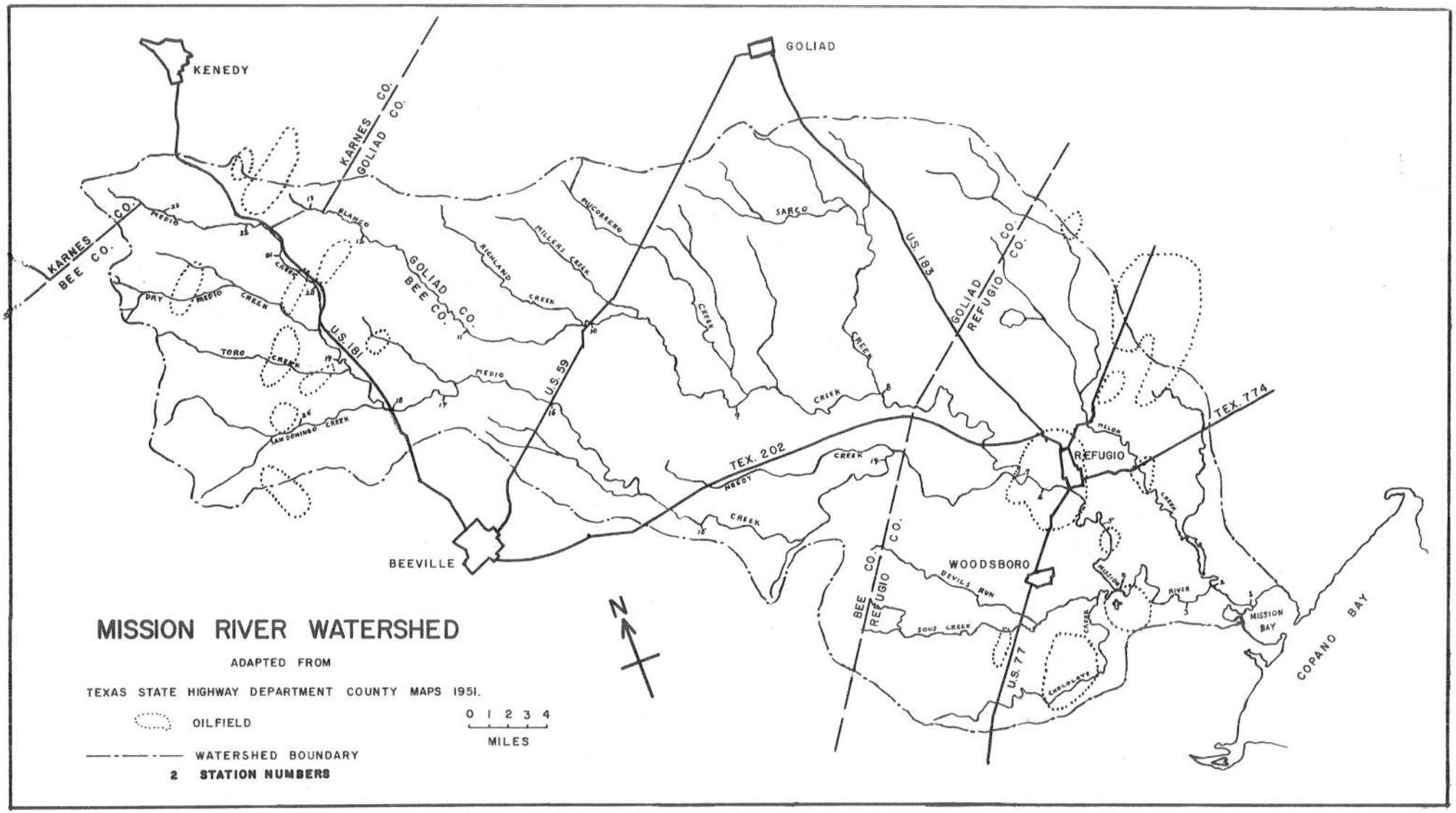
| Species | Number of Specimens | Standard Length | | | Weight in Grams | | | "K" Factor | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum | Maximum | Average | Minimum | Maximum | Average | Minimum | Maximum | Average |
| Spot fin shark | 1 | - | - | - | 5698 | - | - | - | - | - |
| Tidewater stingray | 1 | 300 | - | 300 | 879 | - | 879 | 3.26 | - | 3.26 |
| Alligator gar | 3 | 357 | 562 | 483 | 265 | 1247 | 854 | 0.58 | 0.70 | 0.66 |
| Skipjack | 10 | 225 | 292 | 249 | 112 | 280 | 175 | 0.91 | 1.50 | 1.09 |
| Bay menhaden | 1 | 61 | - | 61 | 4 | - | 4 | 1.76 | - | 1.76 |
| Gizzard shad | 21 | 120 | 206 | 134 | 33 | 123 | 46 | 1.41 | 2.08 | 1.87 |
| Gafftop sail catfish | 1 | 103 | - | 103 | 16 | - | 16 | 1.46 | - | 1.46 |
| Sea catfish | 6 | 113 | 233 | 177 | 18 | 217 | 100 | 1.25 | 1.72 | 1.57 |
| Stripped mullet | 29 | 165 | 276 | 238 | 95 | 482 | 322 | 1.81 | 2.56 | 2.22 |
| Speckled trout | 1 | 362 | - | 362 | 680 | - | 680 | 1.43 | - | 1.43 |
| Total | 74 | | | | | | | | | |

Table 6. Numbers of Fish Taken in Seining Collections from the Mission River.

| Species | Sta. #2 | Sta. #3 | Sta. #6 | Sta. #6A | Sta. #7 | Sta. #8 | Sta. #9 | Sta. #9A | Sta. #10 | Sta. #11 | Sta. #14 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bay menhaden | - | 2 | - | - | - | - | - | - | - | - | - |
| Gizzard shad | - | - | - | - | - | 1 | 9 | - | - | 157 | - |
| Bay anchovy | 45 | 33 | - | - | - | - | - | - | - | - | - |
| Smallmouth buffalo | - | - | - | - | 2 | - | 3 | 1 | - | - | - |
| Red shiner | - | - | - | - | 102 | 20 | 13 | 27 | 19 | - | 5 |
| Parrot minnow | - | - | - | - | - | 1 | - | - | - | - | - |
| Sea catfish | 1 | - | - | - | - | - | - | - | - | - | - |
| Black bullhead | - | - | - | - | - | - | - | - | 1 | - | 1 |
| Sea pupfish | 10 | - | 1 | - | - | - | - | - | - | - | - |
| Mosquitofish | - | - | 1 | 416 | 18 | 11 | 5 | 4 | 20 | 125 | - |
| Sailfin molly | - | - | - | 17 | - | - | - | - | - | - | - |
| Striped mullet | 8 | 3 | - | - | - | - | - | - | - | - | - |
| Tidewater silverside | 48 | - | - | - | - | - | - | - | - | - | - |
| Largemouth black bass | - | - | - | - | 4 | 2 | 2 | 4 | 19 | - | 4 |
| Warmouth bass | - | - | - | - | - | - | - | - | - | - | - |
| Green sunfish | - | - | - | 10 | 1 | 5 | 17 | 18 | 8 | 2 | 2 |
| Redear sunfish | - | - | - | - | - | - | - | - | 1 | 1 | 1 |
| Bluegill sunfish | - | - | - | - | 8 | 5 | 13 | 15 | 4 | 10 | - |
| Longear sunfish | - | - | - | - | - | - | - | - | 5 | - | - |
| Blackside darter | - | - | - | - | 1 | - | - | - | - | - | - |
| Bluntnose darter | - | - | - | - | - | - | - | - | - | - | - |
| Irish pompano | 1 | - | - | - | - | - | - | - | - | - | - |
| Hogchoker | 2 | - | - | - | - | - | - | - | - | - | - |
| Total | 115 | 38 | 2 | 443 | 136 | 45 | 62 | 69 | 77 | 295 | 13 |
| Percent | 7.25 | 2.40 | .13 | 27.93 | 8.57 | 2.84 | 3.90 | 4.35 | 4.86 | 18.60 | .82 |

Table 6. Numbers of Fish Taken in Seining Collections from the Mission River. (Continued)

| Species | Sta. #15 | Sta. #16 | Sta. #17 | Sta. #18 | Sta. #19 | Sta. #20 | Sta. #22 | Sta. #23 | Total | Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| Bay menhaden | - | - | - | - | - | - | - | - | 2 | 0.12 |
| Gizzard shad | - | 1 | - | - | - | - | - | - | 168 | 10.60 |
| Bay anchovy | - | - | - | - | - | - | - | - | 78 | 4.92 |
| Smallmouth buffalo | 1 | - | - | - | - | - | - | - | 7 | 0.44 |
| Red shiner | 6 | 37 | - | - | - | - | - | - | 229 | 14.45 |
| Parrot minnow | - | - | - | - | - | - | - | - | 1 | .06 |
| Sea catfish | - | - | - | - | - | - | - | - | 1 | .06 |
| Black bullhead | - | - | - | - | 2 | - | - | - | 4 | .25 |
| Sea pupfish | - | - | - | - | - | - | - | - | 11 | .69 |
| Mosquitofish | 4 | 17 | - | - | 27 | 12 | 1 | 69 | 730 | 46.04 |
| Sailfin molly | - | - | - | - | - | - | - | - | 17 | 1.07 |
| Striped mullet | - | - | - | - | - | - | - | - | 11 | .69 |
| Tidewater silverside | - | - | - | - | - | - | - | - | 48 | 3.03 |
| Largemouth black bass | 3 | 18 | - | 4 | 17 | - | 12 | - | 89 | 5.61 |
| Warmouth bass | - | - | 1 | - | - | - | - | - | 1 | .06 |
| Green sunfish | 3 | 7 | 1 | - | 6 | 6 | 7 | 14 | 107 | 6.75 |
| Redear sunfish | - | 1 | - | 1 | - | - | - | - | 5 | .32 |
| Bluegill sunfish | 3 | 1 | 2 | 2 | - | - | 1 | 2 | 66 | 4.16 |
| Longear sunfish | - | - | 1 | - | - | - | - | - | 6 | .38 |
| Blackside darter | - | - | - | - | - | - | - | - | 1 | .06 |
| Bluntnose darter | - | - | - | 1 | - | - | - | - | 1 | .06 |
| Irish pompano | - | - | - | - | - | - | - | - | 1 | .06 |
| Hogchoker | - | - | - | - | - | - | - | - | 2 | .12 |
| Total | 20 | 82 | 5 | 8 | 52 | 18 | 21 | 85 | 1586 | 100.00 % |
| Percent | 1.26 | 5.17 | .32 | .50 | 3.28 | 1.14 | 1.32 | 5.36 | 100.00 % | |


KENEDY
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MILLERS CREEK
HIGHLAND
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PRY
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TORO
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SAN DOMINGO CREEK
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TEX. 774
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WOODSBORO
MELON
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TEXAS STATE HIGHWAY DEPARTMENT COUNTY MAPS 1951.
OILFIELD
WATERSHED BOUNDARY
2 STATION NUMBERS
0 1 2 3 4
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