Report of Fisheries Investigations

Basic Survey and Inventory of Species Present in the Red River Drainage (other than Lake Texoma) in Region 2-B

by

E. W. Bonn
Project Leader

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H. D. Dodgen - Executive Secretary

Texas Game and Fish Commission
Austin, Texas

Marion Toole
Coordinator

William H. Brown
Asst. Coordinator

JOB COMPLETION REPORT

State of TEXAS

Project No. F8R4 Name: Fisheries Investigations and Surveys of the Waters of Region 2-B.

Job No. B-15 Title: Basic Survey and Inventory of Species Present in the Red River Drainage (other than Lake Texoma) in Region 2-B.

Period Covered: July 1, 1956 through December 31, 1957

ABSTRACT:

A basic survey and inventory of species was carried out on the Red River watershed of Region 2B. The area includes portions of Montague, Cooke, Grayson, Fannin, Lamar, Red River and Bowie Counties totaling approximately 3,160 square miles. The actual waters of Red River do not lie in Texas and Lake Texoma was studied under a previous survey. Gill nets, seines and rotenone were used to make the 609 collections at 84 locations in the area.

Three major plant life regions are included in this study. They include the West Cross Timbers in Montague County, the Post Oak Belt in Cooke, Grayson, Fannin and Lamar Counties and the Pine Belt in Eastern Red River and Bowie Counties.

The habitats for aquatic life are described as natural oxbow lakes, artificial impoundments, large permanent water tributary streams, small sometimes intermittent streams and acid swamps. The size, uses and aquatic vegetation of these areas is described.

A total of 32 water analyses was made at 20 sites during the study. Most of the waters were alkaline and moderately clear with satisfactory oxygen and carbon dioxide. A case of natural pollution from underground seepage was located in northern Fannin County. Evidence of oil field and domestic pollution was found on several of the streams empty into Red River.

The 223 seine, 383 gill net and three rotenone collections resulted in recording 84 species representing 18 families of fish. Nets produced 7,250 fish which weighed a total of 4,464 pounds. Gizzard shad, bluegill and white crappie made up 61 percent of this total number. Carpsucker, channel catfish, black bullhead, largemouth black bass and shortnose gar also accounted for a representative portion.

Gizzard shad (22.1), channel catfish (11.6), white crappie (9.5), river carpsucker (9.0) and largemouth black bass (8.9) made up a high percentage of the weight of the netted fish.

A collection is sited whereby a sample of 360 fish weighing 215 pounds was taken from Applewhite Lake, which had been dry for several months and then stocked by Red River floods.

The relative abundance and distribution is given for the 84 species of fish collected in this study. A hypothetical list of 20 additional species is also presented.

OBJECTIVES:

To determine the distribution of the species present and their relative abundance and the ecological factors influencing their distribution.

PROCEDURE:

The territory worked during this job as stated in the title concerns the waters of Region 2-B that drain into the Red River, but does not include Lake Texoma or the Red River itself. Lake Texoma was studied and reported on under Job B-1 (Inventory of Species Present in Lake Texoma) Project F-8-R-1. The boundary of Texas is described as "North to the Red River" therefore the actual water of Red River are in Oklahoma and Arkansas. Through the years, since the boundary was established, the bed of Red River has been changed and altered by many floods. As a result there are cases where Texas land is north of the river and also some where Oklahoma extends south of the Red. This is especially true in Lamar, Red River and Bowie Counties. However, waters south of the present flowing stream were included in this study area.

A total of 609 collections was made at 84 different locations in the lakes, sloughs, bayous and creeks in the Red River Drainage of Montague, Cooke, Grayson, Fannin, Lamar, Red River, and Bowie Counties of Texas. Three methods of collecting were employed in making this study. Each collection site was checked with either a one-fourth inch bag or a commonsense minnow seine, which resulted in a total of 223 seining collections. Gill nets of three-fourths to three inch bar mesh were used to make 383 collections in the lakes, sloughs and deeper pools of tributary streams. Rotenone collections were made in an attempt to determine the total population of fishes present in three representative waters on the drainage. The collection sites used in this study are shown in Figure 1.

The larger specimens collected were identified, counted and group weighed in the field. The smaller fishes taken with rotenone and seines were preserved in 10% formalin and brought to the laboratory for identification.

Temperature, pH and turbidity were determined and ecological factors were noted at most collections. Standard water analyses were made at 20 random sites on the drainage. Some of these tests were made where pollution conditions were suspected.

BASIC SURVEY:

The red River is formed by the confluence of intermittent streams near the Texas-New Mexico state line and flows generally eastward 496 miles across the Texas Panhandle and along the Texas-Oklahoma boundary to Denison Dam, thence 263 miles along that boundary and the Texas-Arkansas state line to Fulton, Arkansas, thence 455 miles south and southeast through southwest Arkansas and northwest Louisiana to a bifurcation at Barbe Landing. From there Old River extends about eight miles eastward to the Mississippi River and the Atchafalaya River extends 140 miles southward to the Gulf of Mexico. About 350 river miles of the Texas-Oklahoma and Texas-Arkansas boundary are included in Region 2-B.

The Red River Basin, excluding the watershed of the Quachita River, comprises about 69,200 square miles, of which approximately 3,160 (4.6%) lies in Region 2-B and was included in this study (Figure 1).

The western portion of this study area begins in the rolling prairies of the West

Cross Timbers of Montague County. Soils here are of the Windthorst-Nimrod group and include sandy loam uplands with red clay valleys. Native vegetation includes coarse grasses with mesquite, post oak, blackjack, pecan and elm. The elevation is about 940 feet MSL and average rainfall is slightly less than 30 inches annually.

The Red River Watershed of Cooke, Grayson, Fannin and Lamar Counties lies in the Post Oak Belt and soils are mainly of the Kirvin-Norfolk group which are reddish, light brown and gray loams and sands with red alluvial bottom lands. The most notable exceptions are the Wilson-Crockett black clays of Central Grayson and Fannin Counties. Post oak, blackjack, pecan, hickory, hackberry, cottonwood, and bois d'Arc are the principal native trees.

The eastern half of Red River County and all of Bowie County on the drainage are in the Pine Belt of East Texas. Soils are of the Kirvin-Norfolk-Bowie groups including light colored, acid sandy loams and alluvial sands. Here the principal vegetation is made up of pine, bottomland oaks, gum and ash. Near the Texas-Arkansas line the elevation has decreased to less than 300 feet MSL and the average annual rainfall increased to more than 45 inches.

Along the entire seven county area range and pasture are the principal land uses. Several tracts, especially from Denison Dam eastward, have become important farming areas for truck crops, hay and cotton. Timber is one of the major crops in Lamar, Red River and Bowie Counties.

Habitats encountered in the survey of this watershed include: (1) Natural oxbow and slough type lakes, (2) Small to moderate artificial impoundments for municipal or private use, (3) Large permanent waters of major tributary streams, (4) Small, sometimes intermittent, streams and (5) acid swampy waters.

The oxbows are found in the lower drainage of Lamar, Red River and Bowie Counties and were formed by the Red River changing its course during floods. Some of these are of recent origin while others were made years before the area was settled. Prior to the construction of Denison Dam (1944) these lakes were flooded almost every spring and even since then some have been inundated several times. These lakes are fairly uniform in shape, size and depth. All were former sharp bends in the Red River and as a result are more or less crescent shaped and average about 250 acres with an average depth of about eight feet. Aquatic vegetation consists mainly of willow (Salix nigra) and button brush (Cephalanthus occidentalis) with some smartweeds (Polygonum sps.) and various sedges. Usually the turbidity prevents submerged plants and in a few American lotus (Nelumbo lutea) has been introduced and become established.

For the most part these lakes are considered private and access is controlled by adjoining landowners. Anglers find these lakes very productive for crappie and catfish, while netters, when permitted, take good numbers of buffalo, suckers, drum and catfish. In a few cases water from the lakes is used to irrigate field crops of cotton, corn and hay.

Artificial impoundments on the Red River Watershed are located in every county except Cooke. These range in size from the 1,200 acre Lake Crook to small private club lakes and ponds. They were constructed for city water supply, recreation, irrigation, conservation and flood control. A list of the natural and artificial lakes worked during this study is given in Table 1. Included in this list is the location, type, use and approximate size of each body of water.

For the most part, lakes built for recreation, especially by an individual or an organized club, show some type of management and usually result in good fishing. Stocking of hatchery fish, vegetation control and rough fish contril are the most common practices attempted. Lakes of this type, along with the municipal reservoirs, provide approximately 80 percent of the fishing in this watershed. Natural vegetation includes willow, cattails (Typha latifolia and angustifolia), bulrush (Scirpus validus), water primrose (Jussiaea diffusa), pondweeds (Potamogeton sps.), duckweed (Lemna minor), muskgrass (Chara) and brushy pondweed (Najas guadalupensis). American lotus and coontail (Ceratophyllum demersum) have been introduced in several club lakes, while water willow (Dianthera americana) was brought into Denison Rod and Gun Lake and the Honey Grove Club Lake. An unusual dense stand of waterweed (Anacharis canadensis) was found at Loy Lake in Grayson County. The aquatic vegetation at the city lakes of Denison (Randell), Paris (Crook) and Texarkana (Bringle) is kept under control because of water treating problems.

Table 1. Impoundments on Red River Drainage in Region 2B Worked This Job.

NAME	COUNTY	TYPE	USE	APPROXIMATE ACRES
Applewhite	Bowie	Oxbow Private	N	116
Big	Red River	Oxbow Private	N	100
Billy Haw	Bowie	Oxbow Private	NI	200
Blackmon's Old	Bowie	Artificial Private	I	396
Blackmon's New	Bowie	Artificial Private	I	250
Bonham State Park	Fannin	Artificial Public	CR	65
Bowie City	Montague	Artificial Public	M	325
Bringle	Bowie	Artificial Public	M	240
Coffee Mill	Fannin	Artificial Public	CR	715
Crockett	Fannin	Artificial Public	CR	450
Crook	Lamar	Artificial Public	M	1,200
DeKalb	Bowie	Artificial Private	I	300
Denison Rod & Gun	Grayson	Artificial Private	R	32
Fannin	Fannin	Artificial Public	CR	35
Gibbons	Lamar	Artificial Public	R	130
Honey Grove Club	Fannin	Artificial Private	R	40
Jordon	Lamar	Artificial Private	R	12
Katy Club	Montague	Artificial Private	R	15
Loy	Grayson	Artificial Public	CR	42
Maxey	Lamar	Artificial Private	R	45
New	Bowie	Oxbow Private	NI	300
North	Red River	Artificial Private	R	65
Pecan Bayou	Red River	Artificial Private	R	16
Randell	Grayson	Artificial Public	M	220
Red Bayou	Bowie	Artificial Private	F	65
Sharp's Oxbow	Lamar	Oxbow Private	N	100
Sherman Club	Grayson	Artificial Private	R	44
Texoma Spillway	Grayson	Artificial Public	F	71
Waterloo	Grayson	Artificial Public	R	29
Whaley	Bowie	Oxbow Private	N	95
Womack	Lamar	Oxbow Private	N	200
		Total Acres		5,913

C-Conservation
F-Flood Control
I-Irrigation
M-Municipal Water Supply
N-Natural
R-Recreation

The major permanent tributaries of Red River in Region 2-B are listed in Table 2 along with their location and the amount of water suitable for fishing. Only water at least four feet deep was considered fishable and this type of water was found to extend only a few miles from Red River. Bank fishing and netting are the two main methods of angling in these streams due to the turbidity of the water, although reports have been made that Mud Creek in Bowie County provides plug fishing for spotted bass.

These major tributaries are subject to heavy run off and scouring action of the flood waters prevents most aquatic vegetation from becoming established. Only the woody emergents such as willow, button brush and river birch (Betula nigra) and some thickets of switch cane (Arundinaria tecta) are found along the stream beds. Salt cedar (Tamarix gallica), an abundant aquatic of the Upper Red River Basin, has spread down stream, through Lake Texoma and into the river below as far East as Lamar County. From Fannin County Westward, dense stands of this hardy plant have become established on the sand bars and shoals at the mouth of most tributary streams.

The small intermittent streams on the Red River Drainage are unimportant as far as fishing waters, but did produce notable collections of minnows and smaller miscellaneous fishes. Only two acid swampy areas were found during the survey and the most representative was McKinney Bayou near the Arkansas boundary. Here such unsual plants as blue beech (Carpinus caroliniana) and sawgrass (Zizaniopsis milacea) were recorded. Several uncommon species of fish were also collected from this site.

Mention should be made of the impoundments under consideration in this area by various municipal, state and governmental agencies. Heavy rainfall in 1957 has increased local interest over the 1,000 acre lake proposed by the city of Bonham on Timber Creek, as well as some 40 private impoundments on Bois d'Arc and eight on Caney Creek in Fannin County by the State Soil Conservation Board. The U. S. Corps of Engineers has been asked to investigate the feasibility of major impoundments on Sanders Creek in Lamar County and both Big Pine and Collier Creeks in Red River County.

Table 2. Major Tributary Streams of Red River in Region 2-B.

Name	County	Miles Fishable Water
Belknap	Montague	2.5
Choctaw	Grayson	2.0
Bois d'Arc	Fannin	5.0
Sanders	Lamar	3.0
Pine	Lamar	6.0
Big Pine	Red River	3.0
Pecan Bayou	Red River	11.0
Mud Creek	Bowie	5.0
Barkman	Bowie	4.0
	Total Miles	41.5

A brief statement should also be made concerning the weather and rainfall during this eighteen month study period. For the first nine months, from July 1956 through March 1957 this area was greatly influenced by the severe drought which had been in progress for the past four years. Many streams had not run for months, several oxbow lakes were completely dry and all impoundments were at a record low. In April this condition made a complete reverse and by June more rain had fallen in six months of 1957 than was recorded for all of 1956. The most severe flooding on record occurred in 1957 and set an all time high for rainfall in the entire region. This was the major reason this job was amended to extend for an additional six month period.

Water Quality

Routine water analyses were made at random of the larger waters in the study area in order to determine the quality. Additional tests were made in areas where pollution was suspected. In all, 32 analyses were made at 20 sites during this study. The results of these tests are compiled in Table 3.

For the most part the waters tested were alkaline with Pecan Bayou and Lake Fannin being the exceptions. A seep pool below Lake Fannin in Northern Fannin County was checked and found to be quite unusual. A report from a sample sent to the State Department of Health Laboratory showed the pH to be 2.6 with a total acidity of 1260 ppm. Other conditions reported in ppm were: total solids 4770, calcium 656, magnesium 226, iron 110, sulphates 3904, chlorides 40 and total hardness 2580. The entire watershed of this lake is rough broken land with little or no topsoil. The lake is controlled by the U. S. Forest Service and supports a very poor fish population. This is a case of natural pollution and is the only one on record in all of Region 2-B.

The direct influence of Red River water was evident in samples from several of the lakes and oxbows. Prior to the heavy rains, which began in April 1957, Red River water was pumped into Randell and Bringle to supplement the city water supply for Denison and Texarkana respectively. The chloride content of both lakes, as well as the pH of the normally acid Bringle waters, were notably higher. After the spring floods, tests made on Whaley, Billy Haw, Applewhite and New Lakes showed corresponding increases.

While no active human pollution was encountered on the watershed during this period, evidence of saltwater and oil was found on several streams draining from the oil fields in Montague, Cooke and Grayson Counties. Indications of domestic sewage were recorded on Paw Paw Creek from Denison and Choctaw Creek from Sherman in Grayson County, Bois d'Arc Creek from Bonham in Fannin County and Pine Creek from Paris in Lamar County. Of these four effluents, the discharge from Sherman is believed to be the most serious.

Table 3. Red River Drainage Water Analyses

Station	Depth Feet	Date	Degrees F. Air	Degrees F. H_2O	Turb. Inches	pH	O_2 ppm	CO_2 ppm	Cl ppm	Tot. Alk.
Loy Lake	0	7/11/56	85	82	23	7.8	12.8	3.5	17.7	80.0
Loy Lake	11	7/11/56	85	79	-	7.6	8.4	6.5	--	--
Katy Club Lake	0	8/22/56	90	86	36	8.8	--	0.0	24.8	59.0
Honey Grove Club Lake	0	8/28/56	95	79	11½	8.8	15.0	0.0	17.7	105.0
Lake Crook	0	9/11/56	96	86	4	8.2	--	1.5	14.6	50.0
Coffee Mill Lake	0	10/17/56	84	74	15½	8.0	9.0	1.0	22.7	80.0
Lake Fannin	0	10/23/56	79	72	24	8.1	9.0	1.0	14.2	45.0
Lake Fannin Seep Pool	0	10/23/56	74	75	--	2.6	10.0	--	212.8	40.0
Crockett Lake	0	12/20/56	48	46	25	8.6	--	2.0	3.5	90.0
Coffee Mill Lake	0	1/9/57	38	45	5	8.0	11.6	2.5	21.4	70.0
Bringle Lake	0	1/22/57	41	48	36	8.0	13.0	3.7	163.1	110.0
North Club Lake	0	2/19/57	47	54	16½	7.8	5.8	4.0	10.6	84.0
Pecan Bayou Lake	0	2/20/57	44	45.5	40	6.7	3.4	5.0	10.6	18.0
Randell Lake	0	3/20/57	53	54	25½	8.1	12.8	4.5	418.4	108.0
Waterloo Lake	0	3/20/57	53	56	25½	8.2	10.8	5.0	27.7	110.0
Sherman Club Lake	0	6/7/57	85	93	20	8.1	9.0	2.2	10.6	63.0
North Club Lake	0	6/25/57	80.5	84	33½	8.4	3.4	0.0	14.2	--
North Club Lake	11	6/25/57	80.5	79.5	--	7.6	2.2	7.5	17.7	--
Pecan Bayou Lake	0	6/27/57	90	92	36	6.5	8.0	5.5	7.1	25.0
Denison Rod & Gun	0	7/2/57	95	91	32	8.4	9.4	0.2	10.6	108.0
Crockett Lake	0	8/19/57	85	82	23½	8.1	11.2	3.0	21.3	--
Crockett Lake	18	8/19/57	85	83	--	7.8	8.6	1.0	21.3	79.0
Coffee Mill Lake	0	8/20/57	92	88	4½	7.8	10.7	2.5	24.8	--
Coffee Mill Lake	17	8/20/57	92	82	--	7.2	7.0	8.0	28.4	--
Lake Fannin	0	8/21/57	92	85	40	7.9	12.0	1.5	2.9	50.0
Lake Fannin	20	8/21/57	92	68	--	6.8	3.1	21.0	16.0	70.0
Lake Fannin Seep Pool	0	8/21/57	92	90	36	2.7	9.6	72.0	40.0	--
Whaley Lake	0	9/23/57	80	76	9½	8.3	9.6	10.0	86.5	154.0
Red Bayou	0	9/23/57	78	78	23½	7.1	8.4	4.0	21.3	72.0
Billy Haw Lake	0	9/23/57	76	76	5½	8.5	12.8	0.0	17.7	106.0
New Lake	0	9/23/57	76	83	30	9.1	6.0	0.0	61.0	91.0
Applewhite Lake	0	9/23/57	80	76	8½	8.3	8.6	1.9	127.6	150.0

INVENTORY OF SPECIES:

In making the inventory of species portion of this study, a total of 609 collections were made with seines, gill nets and rotenone. This resulted in approximately 6,000 acres of lakes, 40 miles of major streams and 500 miles of secondary tributaries being worked. From these combined methods, a total of 84 species representing 18 families of fish was collected. A list of these families and the number of species of each is given in Table 4.

Table 4. Families and Number of Species of Each Found in the Region 2B Portion of the Red River Drainage

Family	Common Name	Number of Species
Polyodontidae	Paddlefish	1
Lepisosteidae	Gars	4
Amiidae	Bowfins	1
Clupeidae	Herrings	3
Hiodontidae	Mooneyes	1
Esocidae	Pickerels	2
Characidae	Tetras	1
Catostomidae	Suckers	9
Cyprinidae	Minnows	25
Ameiuridae	Freshwater catfishes	7
Cyprinodontidae	Killifishes	4
Poeciliidae	Mosquitofishes	1
Aphredoderidae	Pirate perch	1
Atherinidae	Silversides	2
Serranidae	Basses	2
Centrarchidae	Sunfishes	15
Percidae	Perches	4
Sciaenidae	Croakers	1
18 Families	Totals	84

Due to the rather large size of the drainage and the irregularity of the waters, monthly collecting sites were impossible to maintain. However, an attempt was made to check seine the important lakes and streams at least twice during the time allowed. In so doing, more species were added to the checklist by seining than any other collecting method. No precise count was made of specimens from the 223 seining collections since it was felt that this method of collecting was valuable in determining what species were present and their relative abundance, but would not be used for total population estimates.

Three rotenone collections were attempted during the Red River study, but none were outstanding. A portion of Denison Rod and Gun CLub Lake was blocked off with nets and treated with rotenone in an effort to determine the population of an artificial impoundment. Unfavorable wind conditions dispursed the chemical and only a partial kill of no consequence was made.

A second artificial impoundment sample was made in September 1957 at the Hagerman Wildlife Refuge in Grayson County. This one acre pond had been stocked with hatchery fish and also subject to inundation by Lake Texoma during the June flood. The following fish were recovered:

Spotted gar	Young	Frequent
Gizzard shad	Adult and Young	Very Abundant
Smallmouth buffalo	Young	Frequent
Bigmouth buffalo	Young	Frequent
Carp	Adult	Common
Golden shiner	Adult	Frequent
Black Bullhead	Adult and Young	Abundant
Largemouth black bass	Adult and Young	Common
Warmouth	Adult	Frequent
Bluegill	Adult and Young	Very Abundant
Redear sunfish	Adult	Rare
White crappie	Young	Abundant
Log perch	Adult	Rare
Drum	Young	Common

In September 1956 a 100 acre oxbow on the J. B. Sharp farm in Lamar County was reduced by the drought to less than one surface acre. It was treated with rotenone to determine species present but no population count was made of the concentrated fish. Species recovered included: spotted gar, gizzard shad, bigmouth buffalo, smallmouth buffalo, river carpsucker, carp, channel catfish, tadpole madtom, parrot minnow, mosquito fish, mississippi silverside, largemouth black bass, orangespotted sunfish, white crappie, slough darter, and freshwater drum.

The 383 gill net collections made in the deeper waters of the Red River Basin produced 7,250 fish of 35 species which weighed 4,464 pounds. A comparison of these numbers and weights by species is given in Table 5. Gizzard shad, bluegill and white crappie were by far the most abundant netted species, making up 61 percent of the total fish taken with gill nets. Carpsucker, channel catfish, black bullhead, largemouth black bass and shortnose gar made up 6.6, 6.4, 5.3, 2.9 and 2.4 percent respectively. The remaining 27 species made up only 15 percent of the total numbers. Only a single specimen of alligator gar, golden redhorse and spotted sucker was taken with gill nets.

A comparison of the weights of the netted fish shows that gizzard shad had the highest percent with 22.1. Other important species include channel catfish (11.6), white crappie (9.5), river carpsucker (9.0) and largemouth black bass (8.9). The other 30 species made up the balance of 38.9 percent of the netted fish weight.

For several months in late 1956 and early 1957 Applewhite Lake in Bowie County was completely dry due to the drought. It was flooded by Red River in April and no fish had been placed by man in this 116 acre oxbow. In September 800 feet of gill nets set for one night produced 360 fish that weighed 215 pounds. Table 6 gives a break down of the kinds and numbers of fish taken from this natural lake. In additional check seining revealed that substantial numbers of threadfin shad, yellow bullhead, bluegill, longear sunfish and five species of minnows were also present. This collection is mentioned in order to show the tremendous stocking job done by Red River under natural conditions.

Table 5. Results of Gill Net Collections in Red River Drainage

Species	Number	Percent Number	Pounds	Percent Weight
Longnose gar	94	1.30	200.5	4.49
Shortnose gar	175	2.41	121.3	2.72
Spotted gar	91	1.26	202.6	4.54
Alligator gar	1	0.01	3.7	0.08
Bowfin	3	0.04	1.5	0.03
Skipjack	16	0.22	17.0	0.38
Gizzard shad	2138	29.49	986.1	22.09
Threadfin shad	6	0.08	0.4	0.01
Goldeye	19	0.26	11.0	0.25
Bigmouth buffalo	4	0.06	10.3	0.23
Black buffalo	8	0.11	32.6	0.73
Smallmouth buffalo	64	0.88	56.6	1.27
River carpsucker	482	6.65	400.2	8.97
Golden redhorse	1	0.01	2.0	0.04
Spotted sucker	1	0.01	3.8	0.09
Lake chubsucker	8	0.11	4.3	0.10
Carp	134	1.85	273.7	6.13
Golden shiner	103	1.42	13.7	0.31
Channel catfish	465	6.41	516.5	11.57
Black bullhead	383	5.28	218.1	4.89
Yellow bullhead	68	0.94	40.6	0.91
Flathead catfish	3	0.04	9.2	0.21
White bass	59	0.81	45.1	1.01
Yellow bass	44	0.61	9.3	0.21
Spotted bass	10	0.14	12.3	0.28
Largemouth black bass	210	2.90	396.6	8.88
Warmouth	74	1.02	27.3	0.61
Green sunfish	3	0.04	0.9	0.02
Redear sunfish	115	1.59	37.6	0.84
Bluegill	1289	17.78	293.8	6.58
Longear sunfish	15	0.21	2.6	0.06
White crappie	983	13.56	426.4	9.55
Black crappie	51	0.70	22.4	0.50
Flier	11	0.15	1.2	0.03
Drum	119	1.64	62.7	1.40
Totals	7250	99.99	4463.9	100.01

Based on all methods of collections and from field observations, the following checklist of species and their relative abundance can be made:

1. Polyodon spathula, Paddlefish-Rare. Taken from gill net and seine collections immediately below Denison Dam, undoubtedly present upon occasion in major tributaries and some oxbows.
2. Lepisosteus spatula, Alligator gar-Frequent. Taken from larger streams below Denison Dam, probably in the larger oxbow lakes.
3. Lepisosteus platostomus, Shortnose gar-Common. Found in moderate numbers over the entire watershed.
4. Lepisosteus productus, Spotted gar-Abundant. Collected in good numbers along the entire drainage, probably the most abundant gar.
5. Lepisosteus osseus, Longnose gar-Abundant. Prefers the larger waters through out the area, especially those closely associated with the river.
6. Amia calva, Bowfin-Rare. Recorded only from the more acid quiet waters of the Eastern section.
7. Alosa chrysochloris, Skipjack herring-Frequent. Found in major tributaries below Lake Texoma, seasonally very abundant in Red River below Denison Dam. Unusually large specimens netted in the Texoma Spillway Pool.
8. Dorosoma petenense, Threadfin shad-Common. From Texoma Eastward. A very large population now exists in Texoma, probably the result of water overflowing the spillway.

Table 6. Netting Results of Applewhite Lake, Bowie County, September 26, 1957

Species	Number	Percent Number	Pounds	Percent Weight
Shortnose gar	82	22.8	24.1	11.2
Spotted gar	1	0.3	2.7	1.3
Longnose gar	19	5.3	15.1	7.0
Gizzard shad	48	13.3	25.2	11.8
Goldeye	1	0.3	1.3	0.6
Smallmouth buffalo	20	5.5	3.1	1.5
River carpsucker	56	15.5	34.3	16.0
Carp	1	0.3	0.6	0.3
Channel catfish	46	12.8	49.1	22.9
Black bullhead	13	3.6	10.7	5.0
White bass	1	0.3	0.3	0.1
Yellow bass	2	0.5	0.3	0.1
Largemouth black bass	4	1.1	0.5	0.2
White crappie	65	18.1	46.6	21.7
Black crappie	1	0.3	0.6	0.3
Totals	360	100.0	214.5	100.0

9. Dorosoma cepedianum, Gizzard shad- Very abundant. Widespread throughout the entire drainage.
10. Hiodon alosoides, Goldeye-Frequent. Most collections were made near Lake Texoma.
11. Esox americanus, Grass pickerel- Common. An East Texas species found mostly in bayous and borrow pits of Red River and Bowie Counties.
12. Esox niger, Chain pickerel -Frequent. Collected from smaller waters of the lower drainage.
13. Astyanax fasciatus, Banded tetra- Rare. Taken only from a tributary of Lake Texoma and undoubtedly a released bait species.
14. Ictiobus cyprinellus, Bigmouth buffalo - Common and widespread in the larger waters of the Region.
15. Ictiobus niger, Black buffalo- Frequent. Recorded from the larger waters throughout the area but not abundant in any collection. There is some question of the characteristics separating the black buffalo from the following species.
16. Ictiobus bubalus, Smallmouth buffalo -Abundant and widespread in most of the natural waters of the drainage.
17. Carpiodes carpio, River carpsucker -Very abundant and widespread in the entire area.
18. Moxostoma erythrurum, Golden redhorse -Rare. A single mature adult taken from Choctaw Creek in Grayson County and a few young from Red River County.
19. Minytrema melanops, Spotted sucker -Frequent. Recorded only from Red River County.
20. Erimyzon sucetta, Lake chubsucker -Frequent. Collected from the lower drainage in Red River and Bowie Counties.
21. Erimyzon oblongus, Creek chubsucker -Rare. Teken from a borrow pit in Red River County.
22. Cyprinus carpio, Carp - Abundant and widespread in the entire drainage.
23. Carassius auratus, goldfish - Rare. Collected only from two farm ponds in Grayson County where they had been introduced.
24. Notemigonus crysoleucas, golden shiner - Very abundant and widespread in the area. Surpassed only by the red shiner as the most abundant minnow.
25. Opsopoeodus emiliae, pugnose minnow - Rare. Taken in only one collection from the extreme Eastern portion of the study area.
26. Hybopsis storeriana, silver chub - Rare. Recorded from only tow collections, but is found in greater numbers in the river.
27. Notropis atherinoides, emerald shiner - Common. Locally abundant at mouths of the major tributary streams.
28. Notropis percobromus, plains shiner - Frequent. Widespread in the general area.
29. Notropis fumeus, ribbon shiner - Rare. Closely associated with the two previous species, but only one confirmed collection made in Lamar County.
30. Notromis umbratilis, redfin shiner - Frequent. Found in the streams and oxbows of the lower drainage.
31. Notropis brazosensis, Brazos River shiner - Frequent. Collected from the waters near the Red River.
32. Notropis maculatus, taillight shiner - Rare. Recorded from three collections made in Eastern Bowie County.
33. Notropis cornutus, common shiner - Rare. Two specimens collected from a stream in Red River County.
34. Notropis roseus, weed shiner - Rare. Found only in the smaller tributary streams of Red River and Bowie Counties.
35. Notropis potteri, chub shiner - Abundant and widespread over the entire study area.
36. Notropis venustus, spottail shiner - Abundant. Found most often in the streams and lakes of the central portion of the area worked.

37. Notropis lutrensis, redhorse shiner - Very abundant. This is the most abundant and widespread cyprinid in the entire area.
38. Notropis deliciosus, sand shiner - Frequent. Collected mostly in the central region.
39. Notropis atrocaudalis, black spot shiner - Frequent. Recorded from scattered collections below Denison Dam and Eastward.
40. Notropis volucellus, mimic shiner - Rare. Taken only from the lower portion of the drainage.
41. Notropis buchanani, ghost shiner - Common and widespread, but nowhere plentiful in this area.
42. Hybognathus nuchalis, silvery minnow - Common. Found in the larger streams below Texoma in Grayson County eastward to the Arkansas boundary.
43. Hybognathus placita, plains minnow - Frequent. Collected from Texoma to the west border of the region.
44. Hybognathus havi, cypress minnow - Rare. Recorded from James Creek and borrow pits in Eastern Red River County.
45. Pimephales vigilax, parot minnow - Abundant. Taken mostly from the central portion of the study area.
46. Pimephales promelas, fathead minnow - Common. Found in streams of the Western section of the watershed.
47. Campostoma anomalum, stoneroller - Rare. Recorded from only one site in Grayson County.
48. Ictalurus punctatus, channel catfish - Abundant and widespread in the entire area. Introduced in most recreation lakes and native in all natural waters.
49. Ictalurus furcatus, blue catfish - Rare. Collected only from a farm pond in Grayson County where introduced by owner. This species is abundant in Lake Texoma and the Red River and probably ascends the major tributaries on occastion.
50. Ictalurus melas, black bullhead - Very abundant and widespread in most waters of the entire drainage.
51. Ictalurus natalis, yellow bullhead - Common. Found in many of the same waters as the black bullhead, but not as abundant.
52. Pilodictus olivaris, flathead catfish - Frequent. Probably more plentiful than the collection records indicate. Should be in most of the larger native waters.
53. Schilbeodes gyrinus, tadpole madtom - Frequent. Taken from the East Central portion of the region studied.
54. Schilbeodes nocturnus, freckled madtom - Rare. Recorded from only one East Texas location.
55. Fundulus notti, starhead topminnow - Rare. Collected only from sites in Bowie County.
56. Fundulus notatus, blackstripe topminnow - Abundant and widespread in all types of waters of the area.
57. Fundulus kansae, plains killifish - Frequent. Mostly from the smaller tributaries streams in the Western portion where it is sometimes locally very abundant.
58. Cyprinodon rubrofluviatilis, Red River pupfish - Rare. Strictly a Western species in the alkaline springs and streams of Montague County.
59. Gambusia affinis, gambusia - Very abundant. Probably the most widespread and best adapted fish in all of Region 2-B.
60. Aphredoderus sayanus, pirate perch - Frequent in the small streams, sloughs and Bayous of the Eastern area.
61. Menidia audens, Mississippi silversides - Common from Lake Texoma eastward and recently found in large numbers in the lake.
62. Labidesthes sicculus, brook silversides - Frequent. Taken from Texoma eastward, but an established population is reported further West in the Wichita Falls area.

63. Roccus chrysops, white bass - Common. Collected from the larger natural waters throughout the drainage.
64. Roccus mississippensis, Yellow bass- Frequent. Locally abundant in the oxbows of Bowie County.
65. Micropterus punctulatus, spotted bass - Frequent. Mostly found in the waters of the Central portion.
66. Micropterus salmoides, largemouth bass - Very abundant and widespread with the help of stocking throughout the area.
67. Chaenobryttus gulosus, warmouth - Abundant and widespread over most of the watershed.
68. Lepomis cyanellus, green sunfish - Very abundant in the entire region, especially in the waters of the Central portion.
69. Lepomis symmetricus, small sunfish - Rare. Taken only from collections in Bowie County.
70. Lepomis punctatus, spotted sunfish - Rare. Recorded from scattered collections over the watershed.
71. Lepomis microlophus, redear sunfish - Abundant. Mostly found in the upland. impoundments where it has been introduced as a panfish.
72. Lepomis macrochirus, bluegill - Very abundant. Appears to be the best adapted Centrarchid in Region 2-B.
73. Lepomis humilis, orangespotted sunfish - Common but of little importance over the Red River Drainage.
74. Lepomis megalotis, longear sunfish - Very abundant and widespread over all the study area.
75. Lepomis marginatus, dollar sunfish - Rare. Only one verified collection made in Red River County.
76. Pomoxis annularis, white crappie - Very abundant from all permanent waters on the watershed.
77. Pomoxis nigromaculatus, black crappie - Common. This species is native in most of East Texas and has been stocked in recreation lakes over most of the area. No large populations were found anywhere.
78. Centrarchus macropterus, flier - Frequent. Taken only from the more Eastern collections.
79. Elassoma zonatum, banded pigmy sunfish - Frequent. Found in much the same areas and habitat as the previous species.
80. Percina caprodes, log perch - Frequent. Collected mostly in the central portion of the drainage.
81. Etheostoma chlorosomum, bluntnose darter - Rare. Recorded from a few sites in Red River and Bowie Counties.
82. Etheostoma gracile, slough darter - Common. Found in the Central and Eastern section of the watershed.
83. Etheostoma barratti, scalyhead darter - Rare. Scattered collections made in Fannin and Lamar Counties.
84. Aplodinotus grunniens, freshwater drum - Common and widespread, but nowhere abundant, over the entire area.

Species expected to be encountered, but not collected, are listed in the following hypothetical list. The basis for these fish being included is also given.

1. Ichthyomyzon castaneus, chestnut lamprey - Collected from the Sulphur and Cypress Drainages.
2. Scaphirhynchus platorynchus, shovelnose sturgeon - Frequent in the Red River and published record from Shawnee Creek, Grayson County, 1950.

3. Cycleptus elongatus, blue sucker - Frequently taken from the Red River and Lake Texoma, also reported from the Sulphur River.
4. Semotilus atromaculatus, creek chub - Collected from the Sulphur River watershed.
5. Hybopsis aestivalis, speckled chub - Taken from the Red River above Lake Texoma.
6. Phenacobus mirabilis, suckermouth minnow - Collected from Red River and the Sulphur Drainage.
7. Notropis blennius, river shiner - Recorded from Lake Texoma.
8. Notropis boops, bigeye shiner - Collected from the Oklahoma side of Lake Texoma.
9. Notropis bairdi, Red River shiner - Described from the Red River and taken in Lake Texoma.
10. Anguilla rostrata, American eel - Frequently taken by fishermen in Red River below Denison Dam and probably ascends the tributary streams.
11. Mugil cephalus, striped mullet - Several have been caught in Red River, especially below Denison Dam.
12. Lepomis auritus, yellow belly sunfish - Collected in the Bowie and Cass County portion of the Sulphur watershed.
13. Stizostedion canadense, sauger - Frequently caught by minnow fishermen in Red River below Denison Dam.
14. Hadropterus maculatus, blackside darter - Recorded from the Sulphur Drainage.
15. Etheostoma radiosum, orangebelly darter - Collected from the Oklahoma side of Lake Texoma.
16. Ethesostoma asprigene, mud darter - Recorded from the Sulphur River.
17. Etheostoma parvipinne, goldstripe darter - Taken from tributaries of the Sulphur River.
18. Etheostoma artesiae, eastern redfin darter - Collected from the Sulphur River watershed in Bowie County.
19. Etheostoma spectabile, orangethroat darter - Found in the Sulphur Drainage.
20. Etheostoma proeliare, cypress darter - Collected from both the Sulphur and Cypress watersheds.

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Prepared by: E. W. Bonn
Project Leader

Approved by: Marion Toole
Chief Aquatic Biologist

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Figure 1. RED RIVER DRAINAGE IN REGION 2B.

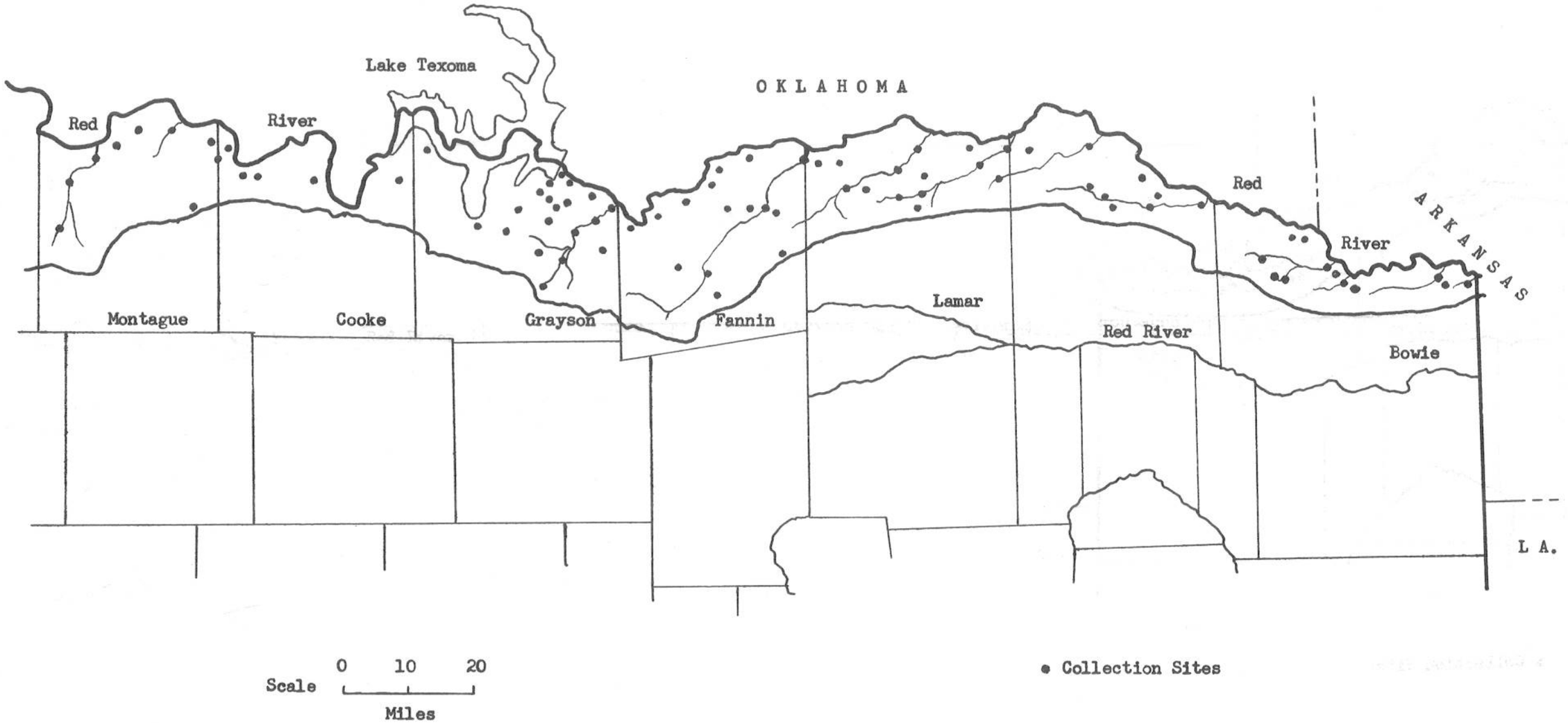

Plate 1. Red River Drainage in Region 8.