

FILE

Job Completion Report

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TITLE

A Basic Survey of and Inventory of Species in the Little Wichita River in North-central Texas, lying in the Counties of Baylor, Archer, and Clay.

OBJECTIVES

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

SCOPE

The entire length of the Little Wichita River is included in this report, from headwaters to its confluence with the Red River of Oklahoma. Excluded is Lake Kickapoo, the only major impoundment of the Little Wichita River at this time. The fisheries biology of this reservoir has been previously reported (Completion Report F7R1, Job B-3, 1954.)

TECHNIQUES

Sample stations were established at six points along the length of the Little Wichita River, at carefully selected localities between the headwaters of the stream and its mouth. At these sample stations, chemical and physical data concerning the water were taken monthly. Seine samples of the fishes present were preserved in formalin for laboratory examination and identifications. At the two stations where the water was deep enough for the use of gill nets, and where seining could not give an adequate picture of the fish populations, overnight net sets were maintained. The fishes taken in gill nets were weighed and measured in the field. Ripe ovaries and filled stomachs of game fishes were saved for laboratory examination. Pathological conditions were noted or, when necessary, preserved in formalin for histological examination. On a few occasions fish collections were made with the use of rotenone. Ecological data were obtained by "walking-out" selected sections of the river. There are no important permanent-flowing tributaries of the Little Wichita River.

ACKNOWLEDGMENTS

We wish to express here our appreciation to Dr. Carl Gray, Soils Scientist of Midwestern University and the Wichita County Water Improvement Districts, for making the numerous water analyses so important to this study.

INTRODUCTION

An accident of geology and the erosional history of Northcentral Texas has forced

upon the Little Wichita River a role far more important than its size would seem to justify. Throughout most of its length the Little Wichita River is a narrow, muddy intermittent stream, scarcely worthy of the designation "river." However, this stream is virtually the only adequate supply of fresh water in an area of saline streams and rivers so arid that water is at a premium. One large reservoir, Lake Kickapoo, exists on the Little Wichita River at the present time, and another is to be constructed in the very near future. Still others will doubtless be made later. The growing population of the region and heavy fishing pressure demands a careful study of the river so that the sports fisheries of the new lakes can be better managed for the public good.

#### BASIC SURVEY OF THE LITTLE WICHITA RIVER

The Little Wichita River is apparently of relatively recent origin. To the north the Big Wichita River is entrenched nearly 135 feet deeper, on a course almost parallel to that of the Little Wichita, while to the south the Brazos River also parallels the Little Wichita and is cut some 50 feet deeper. In central Baylor County the Brazos bends northward and the Big Wichita bends southward until these two rivers come to lie quite close together. Between them they drain the land west of the sources of the Little Wichita and limit the westward extent of this stream.

This capture of the land west of the present Little Wichita River has two important results. The Little Wichita is an intermittent stream, because the only permanently flowing springs in the area lie to the westward, beyond the drainage of the Little Wichita River. The Little Wichita River is confined to a shallow valley cut only into the Admiralty Formation of the Permian Wichita Group, and possibly near its mouth into Cretaceous sediments. The entire valley of the Little Wichita is thus on non-marine sediments, and the salt and gypsum beds of the younger, marine Permian rocks are to the westward and are drained by the Big Wichita and the Brazos. For this reason the waters of the Little Wichita are "sweet" and suitable for human consumption and most fish life.

The Little Wichita River is a small stream, its straight-line length being only about 75 miles. Its origin is a series of arroyos and a shallow but broad valley south of the railroad station of Fulda, in eastern Baylor County. It follows a rather sinuous course to the east-northeast to its confluence with the Red River of Oklahoma, in extreme eastern Clay County. The total drainage area is approximately 1,000 square miles. A major reservoir, Lake Kickapoo, is located near the headwaters of the Little Wichita, in Archer County, and is the water supply of the city of Wichita Falls. Another and larger reservoir is soon to be constructed on the lower part of the river, in Clay County.

Ecologically the drainage system of the Little Wichita River lies in the Mesquite Plains Biotic Province, although some of the drainage area near the mouth of the river is within the outlying groves of the post-oaks of the West Cross Timbers. The shores and immediate environs of the river itself, however, are remarkably uniform and unlike the arid mesquite-desert. The soil is usually a deep, rich humus or silt and supports a rather dense vegetative cover of trees, especially elms and cotton woods with an undergrowth of wild-plum, briars and other woody shrubs and vines. Only for a few miles downstream from Lake Kickapoo Dam, where there is ordinarily no water flow, is the broadleaf vegetation absent. There the dry river-channel is of sand and boulders and adjacent vegetation consists of mesquite, palo-verde, cacti and other desert plants.

The Little Wichita River is but shallowly entrenched. The headwaters, west of Lake Kickapoo, are cut through 12 to 15 feet of brownish gravel and soil and form a channel rarely more than 25 feet wide and with vertical banks. Bones of Bison found

in these gravels indicate a late Pleistocene or more probably Recent age, and prove the relative youth of the Little Wichita River. The slot-like river channel is cut into a road, grassy valley, perhaps two miles wide at most, lying between exposed outcrops of Permian sandstones. No terraces are apparent here and the valley seems to have been formed by aluvium washed from the surrounding hills. The river bed is composed of sand and small areas of gravel. Ordinarily the river is intermittent here, composed of a series of larger or smaller pools separated by sandy reaches. During the study year the headwaters were never completely dry, but this year was not especially arid for the region. We suppose that in the past fifteen years, the headwaters have been dry for years at a time except after rains. In times of heavy rain the river floods swiftly and becomes a raging torrent. The river drains rapidly and within hours the flood recedes, usually leaving only a series of disconnected pools in a matter of a few days after the rains cease. Only where the river enters Lake Kickapoo is it permanent, deep and sluggish as it flows between low, muddy banks.

The original nature of the river where now flooded by Lake Kickapoo is obscured. The land surrounding the lake is high, composed of hills and areas of barren land. Almost all exposed land is Permian in age, with but thin and scattered areas of Recent soils in level areas.

Below the Lake Kickapoo dam, the river is ordinarily a dry arroyo. Only twice since Lake Kickapoo was constructed has the lake overflowed its spillway. On those occasions it ripped out a gash through the surface soils, exposing fifteen feet or more of Recent soils and Pleistocene gravels. The age of the prairie soil is revealed by numerous remains of Bison and human artifacts. The age of the gravels is established by the remains of mammoth and camel. The bed of the river channel is Permian sandstone and shale, covered with a thin layer of reworked sand and gravel. Some of the sand and gravel of the lower reaches of the river may have originated here. Within four miles, seepage and drainage form pools in the river bed that remain for long periods after rains, and some of these support fishes.

East of the Mankins-Archer City Road (State Highway 25,) the river assumes the nature it maintains for most of the remainder of its length. The course is sinuous, between broad, low hills. Trend is northeastward parallel to the Big Wichita River, farther north. The river channel is a steep-banked, deep-sunken, "V-shaped" canyon, usually about 40 feet deep and less than 100 feet across. The canyon is cut into deep alluvium, washed from the surrounding hills. There is no evidence of terracing or meandering. The course of the river valley is marked by a thin line of elms and other broad-leafed trees, but the sudden drop into the canyon is not seen until one is on the brink of the valley. The river remains a running stream through much of the year, though only after rains is there any considerable volume of water. Usually the water consists of a mere trickle connecting pools in the canyon floor. After a few months without rains, even the trickles cease. Some of the deeper pools seems to contain some water at all times. At least there are some pools that remained four to five feet deep through the past project year. In times of heavy rains the valley becomes a torrent. The water may rise 30 feet in a few hours. No arroyos containing water, except immediately after rains, enter the river except near the town of Henrietta where a creek, which also serves as the effluent of the city sewage-treatment plant, enter the river.

Between the town of Henrietta and the mouth of the river, the river changes. It becomes broader and slower, sometimes with scarcely perceptible current. The valley is broader and banks low and muddy. The river bed is of soft silt and mud. At the mouth of the river, the currents of the Red River have built a bar of relatively firm sand in marked contrast to the muddy bottom of the Little Wichita. In these last few miles of

the river's length, water is permanent although, when flowage ceases upstream, there is no current and water analyses indicate that waters of the Red River may actually back into the lower part of the Little Wichita River. The fish population of this part of the Little Wichita River is also derived directly from the Red River.

#### DESCRIPTION OF SAMPLE STATIONS

**FULDA STATION.** - This station is located on the headwaters of the Little Wichita River, directly south of the Railroad Station of Fulda in Baylor County. The river is intermittent. In times of high water, but not flood, a moderate current is present in water four to five feet deep in a narrow and vertical-banked channel. Usually the river consists only of a series of unconnected pools from four to five feet deep, at deepest, separated by a few to a hundred yards of firm sand and gravel. When several weeks have passed without rains, the smaller pools dry up, but even at extreme drought during the project period, some water was found in the largest and deepest pools. The river banks are packed gravel overlaid by floodplain silt. Broad-leafed trees, briars and rather dense vegetation form a narrow belt along the river. Water quality is good. Turbidity is quite high, even in the still pools in the river bed. Fish, almost all of small size, are numerous in the pools in the river bed where concentrated by receding water. Fish collections were obtained by seining.

**KICKAPOO STATION.** - Of the stations on the upper parts of the river, Kickapoo Station alone supports large fishes. The station is located where the river enters Lake Kickapoo, and during the course of the project year, Lake Kickapoo was at a relatively high to very high level. The station is located in front of a rocky bluff which turns the river and forms a constriction that may be considered the point where the river ends and lake begins. The land on the side of the river opposite the bluff is low, flat and muddy, overgrown with drowned salt-cedar brush. Ordinarily the river is placid here, with scarcely perceptible current. After rains the current is strong and large trees and stumps are carried downstream, to remain along the shore as driftwood or to sink in the calmer waters of the lake and form deadheads. The water is customarily quite turbid and brownish with suspended silt. Fish collections were obtained with gill nets and by seining.

**ARCHER STATION.** - On the map a considerable distance separates Archer Station from Kickapoo Station, but it must be remembered that much of this distance is covered by Lake Kickapoo (already reported, F7R1, Job B-3) and part of the remainder, below the Lake Kickapoo dam, is almost always dry. The Station is situated where the bridge on State Highway 79 crosses the river just north of Archer City. The river is intermittent at this station but never in our experience is it dry. Usually there are pools connected with narrow trickles of running water, and some of the pools are six feet or more in depth. The river flows in a deep, muddy, "V-shaped" canyon. The stream bed is gravel and, in deeper places, silt. Vegetation is rather dense and a broad band of wooded land fringes the river. Water is usually turbid but sometimes rather clear, especially in winter. Fishes are small. Collections were made with seines or, when conditions were optimal, rotenone.

**SCOTLAND STATION.** - Scotland Station is located in Archer County just north of the town of Scotland, where the river is crossed by the bridge on Highway U. S. 281. Conditions are in most respects very similar to those at Archer Station, principal difference being the deeper valley and presence of salt water pollution sites in the vicinity. Fish collections were usually taken by seining but on a few occasions by the use of rotenone.

HENRIETTA. - Conditions at Henrietta Station are distinctly more humid than farther upstream. The station is located just west of the town of Henrietta, in Clay County, where the river is crossed by the bridge on Highway U. S. 82-287. The valley is "V-shaped" but not as deep as at Scotland Station, nor is it as broad. Usually there is a current here, but on several occasions the river consisted of only a series of disconnected pools in the river bed. The bottom was uniformly muddy, gravel occurring only in riffles, and the water turbid and brownish with silt. Most fish collections were taken with seines but some rather complete collections were obtained with the use of rotenone.

Henrietta Creek, the sewage effluent of the town of Henrietta, enters the river a few miles downstream from Henrietta Station. The creek was checked. The sewage is treated and the water quality of the effluent is good. The creek is broad and sluggish. European carp and gizzard shad were noted in the creek but a complete collection was not made.

RIVERMOUTH STATION. - This station is located just above the point where the Little Wichita River enters the Red River. Gill nets were set in the stiller waters upstream from the sand bar that marks junction of the two rivers but seining was confined to the bar itself. The river is broad and still here, with a bottom of mud so soft and deep that we found it impossible to seine. Streamside vegetation includes dense growths of willows and salt cedars. The more swiftly flowing Red River has built a sandbar at the mouth of the Little Wichita, and waters of the Red River swirl into and contaminate the non-saline waters of the Texas stream. The high quantity of dissolved solids of the Red River change the water quality of the mouth of the Little Wichita enormously, decrease its turbidity, and the fishes present are typical of the Red River rather than the Little Wichita River.

Table 1. Volume of Water in the Little Wichita River at Archer Station.

Period	Mean Discharge (cubic ft./sec.)	Total Runoff (acre feet)
Average annual, 1932-55	82.6	59800
for year 1955	88.4	63980
January, 1955	7.13	438
February, 1955	17.0	943
March, 1955	9.85	606
April, 1955	24.1	1430
May, 1955	83.5	5130
June, 1955	110.0	6570
July, 1955	2.54	156
August, 1955	.26	16
September, 1955	512.0	30460
October, 1955	297.0	18230
November, 1955	dry	--
December, 1955	dry	--

Table 2. Physical Conditions at the Sample Stations.

Date	Air Temp.	Water Temp.	Turbidity (mm.)	pH
<u>FULDA STATION</u>				
7/12/55	-	-	-	7.85
8/22/55	-	-	-	7.73
9/9/55	39	29	190	-
10/23/55	33	28	165	7.6
11/8/55	21	10	145	7.3
12/13/55	9	8	300 plus	8.25
1/10/56	6	5	275	7.65
2/16/56	9	8	180	7.35
3/1/56	21	16	260	7.85
4/6/56	25	21	75	-
5/6/56	36	27	30	-
<u>KICKAPOO STATION</u>				
7/26/55	33	29	100	7.70
8/23/55	30	29	105	7.94
9/15/55	26	27	140	-
10/9/55	23	22	160	7.4
10/16/55	19	20	90	7.8
11/12/55	14	12	245	7.6
12/5/55	2	9	290	8.18
2/21/56	17	11	100	8.03
4/5/56	22	20	155	8.0
5/15/56	23	22	80	-
<u>ARCHER STATION</u>				
7/11/55	-	-	-	7.70
7/28/55	-	-	-	7.65
8/23/55	-	-	-	7.55
9/8/55	39	27	110	-
10/13/55	28	21	70	7.7
11/9/55	18	10	90	7.6
12/23/55	6	7	230	7.60
1/20/56	0	4	120	7.75
2/5/56	8	5	150	8.15
3/8/56	27	16	340	7.65
4/15/56	19	17	185	-
5/8/56	37	30	40	-
<u>SCOTLAND STATION</u>				
7/11/55	-	-	-	7.95
7/28/55	-	-	-	7.60
8/23/55	-	-	-	7.50
9/8/55	33	24	195	-
10/13/55	29	22	85	7.5
11/7/55	18	12	750	7.6
12/24/55	16	4	775	7.84
1/22/56	1	4	100	7.72
2/9/56	8	6	110	8.0
3/5/56	26	16	350	7.70
4/12/56	24	20	210	-
5/9/56	38	29	65	-

Table 2. (Continued)

Date	Air Temp.	Water Temp.	Turbidity (mm.)	pH
<u>HENRIETTA STATION</u>				
7/11/55	-	-	-	8.35
7/28/55	-	-	-	7.75
8/23/55	-	-	-	7.66
9/9/55	31	28	75	-
10/13/55	24	22	65	7.7
11/24/55	16	13	70	7.3
12/26/55	6	4	725	7.45
1/12/56	5	4	70	-
2/4/56	15	9	220	7.75
3/4/56	18	12	280	7.78
4/11/56	21	19	160	-
5/12/56	36	29	65	-
<u>RIVERMOUTH STATION</u>				
7/12/55	-	-	-	7.50
7/27/55	25	28	145	7.45
8/23/55	27	29	260	7.28
9/7/55	28	28	260	7.55
10/19/55	31	18	105	7.4
11/23/55	6	13	400	7.5
12/9/55	10	6	600	7.82
1/13/56	11	5	195	7.70
2/16/56	11	9	405	7.20
3/30/56	24	20	250	-
4/18/56	15	16	200	-
5/13/56	28	24	35	-
5/17/56	32	23	75	-

All temperatures are Centigrade. Turbidity is Seichi disk readings in millimeters. pH was determined with a Beckman pH meter.

Table 3. Chemical Nature of the Water at the Sample Stations.

Date	Calcium	Sodium	Chloride	Sulfate	Carbonates	Total Salts
<u>FULDA STATION</u>						
7/12/55	36	14	22	-	134	206
8/22/55	36	2	4	-	128	170
9/9/55	38	22	33	-	145	238
10/22/55	34	6	9	31	64	144
11/10/55	48	7	11	20	122	208
12/10/55	56	6	9	6	165	241
1/10/56	48	40	34	0	165	287
2/16/56	86	118	195	0	213	612
3/1/56	64	10	8	204	177	469
4/29/56	116	18	17	30	336	517
5/6/56	44	9	12	20	113	198
<u>KICKAPOO STATION</u>						
7/26/55	44	21	12	-	162	239
8/22/55	56	12	18	-	168	254
9/24/55	44	11	17	-	162	234
10/9/55	38	18	29	-	125	210
10/16/55	28	16	9	-	110	153
11/12/55	38	8	12	-	137	195
12/4/55	56	9	14	24	137	240
12/29/55	66	12	18	63	135	293
2/20/56	40	21	14	0	149	224
3/24/56	44	21	10	12	148	235
4/4/56	50	23	20	17	149	259
5/14/56	46	13	12	35	127	238
<u>ARCHER STATION</u>						
7/11/55	54	84	131	-	202	471
7/28/55	52	122	188	22	119	503
8/23/55	48	19	31	-	181	279
9/8/55	44	26	40	-	216	326
10/13/55	38	12	18	-	128	196
11/9/55	42	12	18	-	246	318
12/22/55	100	66	101	58	232	557
1/20/56	58	42	33	0	170	303
2/9/56	72	62	85	31	198	448
3/4/56	190	319	763	-	110	1382
4/21/56	332	483	1159	110	162	2246
5/8/56	54	42	67	40	109	312
<u>SCOTLAND STATION</u>						
7/11/55	50	44	67	-	170	331
7/28/55	56	149	231	39	116	591
8/23/55	42	76	119	-	149	386
9/8/55	132	456	700	192	156	1637

Table 3. (Continued).

Date	Calcium	Sodium	Chloride	Sulfate	Carbonates	Total Salts
10/13/55	38	16	25	-	131	210
11/9/55	86	168	259	74	167	754
12/24/55	116	222	343	121	198	1000
1/22/56	40	36	36	0	146	258
2/5/56	46	39	46	0	180	311
3/5/56	234	504	1118	-	122	1978
4/11/56	370	714	1488	244	153	2969
5/9/56	52	47	80	35	104	318
<u>HENRIETTA STATION</u>						
7/11/55	46	25	39	40	86	236
7/28/55	48	117	181	24	104	474
8/23/55	68	152	238	38	139	635
9/9/55	30	3	4	24	61	122
10/13/55	38	15	24	-	128	205
11/24/55	78	43	67	40	184	412
12/26/55	82	43	66	38	201	430
1/12/56	52	36	29	38	154	309
2/16/59	74	46	78	23	186	407
3/3/56	58	48	59	3	189	357
4/10/56	90	64	74	61	232	521
1/12/56	44	38	61	21	104	368
<u>RIVERMOUTH STATION</u>						
7/12/55	252	510	793	492	132	2179
7/28/55	58	85	131	60	92	426
8/23/55	162	396	612	303	97	1570
9/7/55	244	586	905	475	122	2332
10/19/55	64	7	11	101	68	251
11/23/55	360	777	1199	686	226	3248
12/8/55	424	771	1190	830	238	3453
1/12/56	342	230	543	296	345	2056
2/15/56	392	1050	1566	902	143	4053
3/30/56	294	1173	1690	705	198	4160
4/18/56	530	910	1591	876	183	4090
5/13/56	46	38	57	27	110	278
5/17/56	36	28	41	24	83	212

Dashes indicate insignificant amounts, not checked to exact amounts but less than 5 ppm. Carbonates are almost entirely bicarbonates at prevailing pH, and include carbon dioxide also. Total salts are totals of those listed.

## QUALITY OF WATER OF THE LITTLE WICHITA RIVER

Before the water analyses listed in Tables II and III can be interpreted, certain considerations must be taken into account. Water samples were taken in pools in the intermittent parts of the river. In dry periods the water in the pools evaporated, concentrating the solids. In these same parts of the river a rain, even a local thundershower, is sufficient to dilute these solids greatly. The wide fluctuations in the readings at Fulda Station in Table III are the result of such concentration and dilution. On the other hand, the river is constant and deep at Kickapoo Station, and the variation there is slight.

There are oil wells with surface salt pits in the vicinity of Archer and Scotland Stations. Here, in periods of dry weather, sodium chloride escapes to the river in underground flow and, when concentrated by evaporation in pools in the river bed, gives extremely high readings for sodium and especially for chloride. Here, too, dilution by rainwater is swift and enough precipitation to wash the salts as far as Henrietta Station also dilutes them. Because there is more water in the river at Henrietta Station, under ordinary conditions, the variations in the chemical nature of the water is less there.

At Rivermouth Station, water from the Red River backs into the Little Wichita River in times when the Little Wichita is low. Thus the mouth of the Little Wichita River often contains water adulterated with Red River water, and this accounts for the high salinities sometimes encountered there. However, in times of rain the Little Wichita River rises rapidly, flushing out the Red River water and often flowing remarkably pure.

When these factors are understood, the water of the Little Wichita River may be described as: "of good quality, mildly alkaline, quite turbid, and low in dissolved salts other than carbonates." If the oil-well brine pollution now existing is stopped, the waters of the proposed lake or lakes should be very similar to the water of Lake Kickapoo.

## ANNOTATED CHECKLIST OF SPECIES OF FISHES OF THE LITTLE WICHITA RIVER

Lepisosteus osseus. Longnosed Gar. This species is quite common near the mouth of the river, where the bulk of our specimens were taken, but we found it uncommon at Kickapoo Station. None was taken at any of the other stations. The longnosed gar does sometimes enter small streams and it is surprising that we found it only in deeper waters. Near the mouth of the river this fish is sometimes a pest, stealing bait from fishermen's lines and rarely becoming captured.

Lepisosteus platostomus. Shortnosed Gar. Strangely enough, we took no shortnosed gars at Rivermouth Station, where longnosed gars were common. The species was uncommon, although the most numerous gar, at Kickapoo Station. None was taken at the other stations.

Scaphirhynchus platyrhynchus. Shovel-nosed Sturgeon. We know of but a single sturgeon taken in the Little Wichita River. This was caught by a fisherman near the river mouth in 1953, and preserved for some time in the local high school.

Dorosoma cepedianum. Gizzard Shad. This fish was recorded at all stations but was taken regularly only at Kickapoo Station and Rivermouth Station, where the water was deep. Only small numbers of immature specimens were taken elsewhere. At the deeper-water stations, the shad is one of the most abundant fishes. Shad from the river average somewhat smaller than those from impoundments. The largest specimens caught weighed scarcely two pounds.

Hiodon alosoides. - Goldeye. The goldeye is a species that ranges from the Red River northward, entering only the northern fringe of the State of Texas. It is known to enter the Big Wichita River for many miles (Completion Report, F7R2, Jobs A-2 and 6-B,) but in the Little Wichita River it is rarely found more than a mile or so from the Red River. There the species is one of the most common fishes. Specimens taken are remarkably similar in size, averaging about one pound in weight.

Ictiobus bubalus. - Smallmouth Buffalo. This buffalo is a large fish and in the Little Wichita River we found it only in the deep-water stations, Kickapoo and Rivermouth. It is not very common in the river but is of regular occurrence where found. The largest specimens taken weighed between four and five pounds.

Ictiobus cyprinellus. Largemouth Buffalo. As elsewhere in Northern Texas, the largemouth buffalo is less successful than the smallmouth buffalo in the Little Wichita River. Our few specimens were taken at Rivermouth Station and Kickapoo Station.

Carpiodes carpio. - River Carpsucker. The carpsucker is one of the most successful species of large fishes to occur in Northcentral Texas. It is as widespread and abundant in the Little Wichita River as elsewhere. Specimens were taken at all stations, but most were young individuals, less than a foot in length, except at the deep-water stations, Kickapoo and Rivermouth. At these latter stations the carpsuckers averaged as large and plump as those in the impoundment lakes.

Cyprinus carpio. - European Carp. The distribution of the carp in the Little Wichita River is unlike the distribution of the buffalos and carpsuckers which superficially resemble it. We found no carp at Funda Station, though this may have been due to chance. Carp were also more common at the deepwater Stations, Kickapoo and Rivermouth, than elsewhere but were only moderately numerous there. However, mature carp are of regular occurrence along the entire river, and large individuals were taken at Archer Station, Scotland Station, and Henrietta Station. Enough carp of large size were seen elsewhere along the river to show that they are uniformly distributed. Mature carpsuckers and buffalos are rarely found away from the deep water stations. Small carp were taken at all stations except Fulda Station.

Hybopsis storeriana. - Silvery Dace. This form seems to be rare in the upper reaches of the Red River. We found but a single specimen in the Big Wichita River, and took two, both in the same seine drag, at the mouth of the Little Wichita River.

Hybopsis aestivalis. - Speckled Dace. Although common in the Big Wichita River, the speckled dace is rare in the Little Wichita River. We found it of regular occurrence at Rivermouth Station, but took it nowhere else in the river. In our experience this dace prefers saline waters, relatively clear water, and a sand or gravel bottom where the current is moderately swift. Such conditions are absent in the Little Wichita River except near the river's mouth.

Notemigoneus crysoleucas. - Golden Shiner. We would have guessed that the Little Wichita River, with its many deep, still pools, turbid, warm water, free of appreciable salts, would constitute ideal conditions for this species. Nevertheless, it is rare in the river. We took it twice at Fulda Station and once at Scotland Station, but nowhere else.

Pimephales promelas. - Fathead Minnow. The fathead minnow is a "pool" fish, preferring quiet backwaters. Conditions for it are optimal in the Little Wichita River.

As a result it is widespread in the river, being taken at every station except Rivermouth Station (where conditions are not optimal,) but it is not as abundant as we would have expected. It appears from our records that the fathead is relatively less common in winter than at other times of the year.

Pimephales vigilax. - Parrot Minnow. The parrot minnow prefers waters almost opposite from its relative, the fathead minnow. Clear, swift water with sand bottom and riffles are its habitat. The only part of the Little Wichita River suitable for the species is Rivermouth Station, where it was found on several occasions. Elsewhere in the river its occurrence is sporadic and unpredictable.

Hybognathus nuchalis. - Silvery Plains Minnow. This is a fish of clear, saline swift waters. Conditions in the Little Wichita River are not suitable for it, except at Rivermouth Station where it is abundant. The few scattered records from farther upstream are probably released fishermen's bait. The species is the preferred bait minnow of the region and countless thousands are sold yearly for bait.

In earlier reports this minnow was listed as Hybognathus placita. Proof that the Texas form of the plains minnow is conspecific with the northern H. nuchalis requires reduction of the name placita to subspecific rank under the species name nuchalis.

Phenacobius mirabilis - Suckermouth Minnow. We took but a single suckermouth minnow in the Little Wichita River, at Rivermouth Station. It was undoubtedly a stray from the Red River. Apparently the species does not like the turbid, non-saline waters of the Little Wichita River.

Notropis bairdi. - Baird Shiner. This saline-water shiner is found in the Little Wichita River only at the mouth of the Red River. There it is of regular occurrence except during the winter months.

Notropis buchanaui. - Ghost Shiner. Our records of this species are rather erratic. One month large numbers may be taken at a station, and the next month none are taken at the same station. We feel that this is the result of the schooling habits of this species. If the seine envelops a school of these small fishes, a large collection is obtained. On another occasion the seine may miss the schools, even though the species is abundant in a pool. We took the ghost shiner at every station and sometimes it was the most common shiner in a collection.

Notropis lutrensis. - Red Shiner. The red shiner is ubiquitous. We took it at every station on almost every occasion when a collection was made, and usually it was the commonest forage fish present.

Notropis percobromus. - Plains Shiner. Like the Baird shiner, this is a species of clear, saline, swift waters. It was of fairly regular occurrence in the saline waters at Rivermouth Station but was not found farther upstream. It may be considered a Red River form straying regularly into the mouth of the Little Wichita River.

Notropis potteri. - Broadhead Shiner. This is another saline-water species. Usually the broadhead shiner and the Baird shiner are found together in Northcentral Texas, with the broadhead shiner much less common than the Baird shiner. This same relationship is maintained at Rivermouth Station in the Little Wichita River. The species was not found elsewhere in the river.

Pilodictus olivaris. - Flathead Catfish. The flathead is said to be fairly common in deeper pools in the Little Wichita River, and many are caught by illegal "grappling." We found the species uncommon, taking one at Henrietta Station and three at Kickapoo Station. We took several fingerlings of this species at Henrietta Station, in addition to those listed above. The species spawns in the river.

Ictalurus punctatus. - Spotted Channel Catfish. A number of channel catfish of fair size were taken in the deep-water stations, Rivermouth and Kickapoo. Numerous specimens of small size were taken at the other stations. The species seems to be of general distribution in the river.

Ameiurus melas. Black Bullhead. The black bullhead is of general distribution in the Little Wichita River except in the lower reaches. We took none at Henrietta Station, but suspect that this was the result of chance. At least we see no reason why black bullheads should not occur there. None was taken at Rivermouth Station, but we would not expect them to occur in the saline water present there.

It has recently been proposed that the bullheads now placed in the genus Ameiurus be shifted to the genus Ictalurus. Pending further clarification and acceptance of this proposal, which we feel sure will be resisted, we prefer to retain the current generic usage.

Ameiurus natalis. - Yellow Bullhead. We were greatly surprised to find the yellow bullhead in the Little Wichita River, because it is absent from the Big Wichita River and, apparently, from other streams in Northcentral Texas. Apparently, the species is extremely susceptible to high salinity. We took many specimens at Fulda Station, above Lake Kickapoo, and three others at Scotland Station when rotenone was used to kill all the fishes in a deep pool.

Schilbeodes mollis. - Tadpole Madtom. This is another species we were surprised to find in the Little Wichita River, because we have found it nowhere else in Northcentral Texas. Apparently the species does not occur in saline waters. Madtoms were taken at Archer Station, Scotland Station, and Henrietta Station. We found none at Kickapoo Station but seining in the deep water there is so difficult that the species might have been overlooked. None were taken at Fulda Station, however, where seining was so thorough that, had madtoms been present, they would have most certainly been captured. The absence of the species in the saline waters at Rivermouth Station is to be expected.

Because the madtoms of the Little Wichita River seem to be isolated by saline waters, we wondered if they might not have evolved a distinct race there. We therefore sent specimens to Dr. Frank Cross, at the University of Kansas. Dr. Cross considered the specimens typical of S. mollis.

Gambusia affinis. - Mosquitofish. Mosquitofishes are almost as widespread and abundant as red shiners. Specimens were taken at every station and in most seine hauls. Because mosquitofishes are surface-shoreline haunters, it is difficult to obtain them in numbers comparably representative of the other fish species present in an area. Those taken were usually caught when the seine was brought in to the bank. Had special effort been made, thousands could have been captured in some seine drags. We feel that by counting only specimens taken in normal seining operations, without extending the seine-drag along the shoreline unduly, fairly representative samples were obtained.

Morone chrysops. - White Bass. Locally called "sand bass," the white bass is a favored game species. The muddy bottom and turbid waters of most parts of the Little Wichita River are unsuited to this species, and all of our records were obtained at the deep-water stations, Kickapoo Station and Rivermouth Station. It was of rather regular occurrence at both stations.

Micropterus salmoides. - Largemouth Black Bass. We took a small bass at Scotland Station, a large individual at Rivermouth Station, and six others at Kickapoo Station. Apparently the species is uncommon in the Little Wichita River, possibly because of the extreme turbidity of the water. Some of the fish taken, however, were of good size and the scattered records show that the river is capable of supporting bass for all of its length.

Lepomis cyanellus - Green Sunfish. An abundant species, taken at every station except Rivermouth Station, where only a single sunfish was taken in the course of the study. Seining conditions on the sandbar at this station are such that sunfishes usually escaped capture. Doubtless, green sunfishes were abundant at this station as elsewhere.

Lepomis humilis. - Orangespot Sunfish. Throughout most of the river, this sunfish was widespread but uncommon. None were taken at Rivermouth Station. Through the year, however, an increase in numbers of this species was noted at Fulda Station. In April and May the river receded to a series of pools in the river bed and some of these pools contained hundreds of orangespot sunfishes in breeding coloration - a most colorful sight.

Lepomis macrochirus. - Bluegill Sunfish. Bluegills were taken in small numbers at every station except Rivermouth Station. The species is not as common as some of the other kinds of sunfishes in the river. No large fishes of this species were found in the river.

Lepomis megalotis. - Longear Sunfish. The longear sunfish was almost as abundant as the green sunfish. Specimens were taken at every station and are represented in most collections. The only sunfish taken at Rivermouth Station was a longear.

Chaenobryttus coronarius. Warmouth. Warm water, muddy bottom, and turbid, still pools are typical habitat of this fish. We would have expected it to be common in the Little Wichita River but we found it only once, when two specimens were taken in a seine haul at Scotland Station.

Pomoxis annularis. - White Crappie. Crappie were taken at every station, always in the deeper pools. In the deeper water at Kickapoo Station and Rivermouth Station, the crappie is one of the most numerous of the larger fishes.

Percina caprodes. - Logperch. The logperch is present in Lake Kickapoo, but seem to be quite scarce in the Little Wichita River. Our only records are two specimens taken at Kickapoo Station.

It has recently been proposed that the genus Percina be placed in the synonymy of Hadropterus, on the grounds, in part, that the generic character, long snout, is missing in specimens from various localities. We are heartily in accord with this treatment, but prefer to wait for more general acceptance of the change before accepting it. Logperches from both the Big Wichita River drainage and the Little Wichita

ver drainage have short snouts, and form a local race, possibly worthy of taxonomic recognition at some future time.

Aplodinotus grunniens. - Freshwater Drum. The drum seems to be quite uncommon throughout the length of the Little Wichita River. We took several specimens when pools in the riverbed at Fulda Station were treated with rotenone, but elsewhere we took only one or a few individuals.

Table 4. Total Numbers of Fish taken at the Little Wichita River Stations.

Species	Fulda	Kickapoo	Archer	Scotland	Henrietta	Rivermouth
<u>L. osseus</u>	-	3	-	-	-	83
<u>L. platostomus</u>	-	17	-	-	-	2
<u>Scaphirhynchus</u>	-	-	-	-	-	-
<u>Dorosoma</u>	4	677	3	13	20	235
<u>Hiodon</u>	-	-	-	-	-	172
<u>I. bubalus</u>	-	24	-	-	-	24
<u>I. cyprinellus</u>	-	7	-	-	-	4
<u>Carpiodes</u>	1	90	4	19	2	253
<u>Cyprinus</u>	-	49	6	15	2	20
<u>H. storeriana</u>	-	-	-	-	-	2
<u>H. aestivalis</u>	-	-	-	-	-	10
<u>Notemigoneus</u>	3	-	-	1	-	-
<u>P. promelas</u>	12	72	31	168	45	-
<u>P. vigilax</u>	11	6	21	3	3	64
<u>Hybognathus</u>	-	2	-	3	-	7416
<u>Phenacobius</u>	-	-	-	-	-	1
<u>N. bairdi</u>	-	-	-	-	-	53
<u>N. buchanaani</u>	-	27	10	111	591	186
<u>N. lutrensis</u>	281	108	228	570	222	415
<u>N. percobromus</u>	-	-	-	-	-	160
<u>N. potteri</u>	-	-	-	-	-	16
<u>Pilodictus</u>	-	4	-	-	4	1
<u>Ictalurus</u>	26	26	14	23	5	11
<u>A. natalis</u>	34	-	-	3	-	-
<u>A. melas</u>	3	50	79	138	-	-
<u>Schilbeodes</u>	-	-	12	3	25	1
<u>Gambusia</u>	159	179	519	120	209	20
<u>Morone</u>	-	19	-	-	-	55
<u>Micropterus</u>	-	9	-	2	-	1
<u>L. cyanellus</u>	32	11	39	74	47	-
<u>L. humilis</u>	626	7	8	13	29	-
<u>L. macrochirus</u>	56	24	1	-	6	-
<u>L. megalotis</u>	126	57	37	43	62	1
<u>Chaenobryttus</u>	-	-	-	2	-	-
<u>Pomoxis</u>	3	157	8	9	13	27
<u>Percina</u>	-	2	-	-	-	-
<u>Aplodinotus</u>	12	2	1	1	5	7

Note: Included here are all fishes taken, including immature specimens of larger species, taken in seine drags.

Table 5. Monthly Variation in Species and Numbers of Forage Fishes.

<u>FULDA STATION</u>											
	7/10	8/23	9/9	10/23	11/8	12/13	1/10	2/16	3/1	4/6	5/6
<u>Notemigoneus</u>	-	-	-	-	-	-	-	-	1	2	-
<u>P. promelas</u>	4	-	3	1	-	-	-	-	3	1	-
<u>P. vigilax</u>	-	-	11	-	-	-	-	-	-	-	-
<u>N. lutrensis</u>	-	42	26	13	9	11	22	7	37	101	13
<u>Gambusia</u>	-	19	6	-	9	17	65	31	7	5	-
<u>L. cyanellus</u>	2	6	17	-	-	-	-	1	6	-	-
<u>L. humilis</u>	5	9	16	-	-	3	-	21	66	499	7
<u>L. macrochirus</u>	-	-	-	-	-	-	-	-	11	45	-
<u>L. megalotis</u>	-	17	-	2	-	-	1	-	5	100	1

<u>KICKAPOO STATION</u>									
	8/23	9/24	10/9	10/16	11/12	12/5	2/21	4/4	5/16
<u>P. promelas</u>	-	-	-	-	-	-	72	-	-
<u>P. vigilax</u>	-	-	-	-	-	-	6	-	-
<u>Hybognathus</u>	-	-	-	-	-	-	2	-	-
<u>N. buchannani</u>	-	-	-	-	-	-	18	9	-
<u>N. lutrensis</u>	-	16	3	11	19	-	21	28	10
<u>Gambusia</u>	26	28	31	12	41	35	-	1	5
<u>L. cyanellus</u>	3	5	-	-	1	-	1	1	-
<u>L. humilis</u>	-	3	-	-	1	1	2	-	-
<u>L. macrochirus</u>	4	7	-	-	7	-	3	2	1
<u>L. megalotis</u>	-	22	11	3	7	1	4	6	3
<u>Percina</u>	-	-	1	-	1	-	-	-	1

<u>ARCHER STATION</u>											
	7/28	8/23	9/8	10/13	11/9	12/23	1/20	2/5	3/8	4/15	5/8
<u>P. promelas</u>	1	7	6	9	7	-	-	-	-	-	1
<u>P. vigilax</u>	-	-	21	-	-	-	-	-	-	-	-
<u>N. buchannani</u>	1	-	9	-	-	-	-	-	-	-	-
<u>N. lutrensis</u>	61	42	7	19	11	22	16	9	29	7	5
<u>Schilbeodes</u>	-	-	11	-	-	1	-	-	-	-	-
<u>Gambusia</u>	24	27	11	-	-	82	55	120	-	200	-
<u>L. cyanellus</u>	5	3	16	2	-	-	-	1	11	-	1
<u>L. humilis</u>	-	-	6	-	1	-	-	-	1	-	-
<u>L. macrochirus</u>	1	-	-	-	-	-	-	-	-	-	-
<u>L. megalotis</u>	-	2	22	7	-	3	-	-	-	-	-



Table 6. Percentage Composition and Sex Ratios of Larger Fishes from the Little Wichita River.

Species	Number taken	% of total	% males	% females
<u>Lepisosteus osseus</u>	80	5.7	80	20
<u>Lepisosteus platostomus</u>	19	1.4	67	33
<u>Dorosoma cepedianum</u>	305	22.0	35	65
<u>Hiodon alosoides</u>	172	12.6	50	50
<u>Ictiobus bubalus</u>	48	3.5	75	25
<u>Ictiobus cyprinellus</u>	11	.0	73	28
<u>Carpionodes carpio</u>	353	25.3	55	45
<u>Cyprinus carpio</u>	73	5.3	50	50
<u>Ictalurus punctatus</u>	38	2.8	37	63
<u>Ameiurus melas</u>	38	2.8	70	30
<u>Pilodictus olivaris</u>	4	.3	-	100
<u>Morone chrysops</u>	74	5.3	64	36
<u>Micropterus salmoides</u>	11	.8	27	73
<u>Pomoxis annularis</u>	138	10.1	43	57
<u>Aplodinotus grunniens</u>	8	.6	25	75
	<u>1386</u>	<u>100.3</u>		

Note: Not included here or in the following table are the following young, small specimens taken in seine drags and counted by not weighed and measured: 6 Lepisosteus osseus, 647 Dorosoma cepedianum, 16 Carpionodes carpio, 17 Cyprinus carpio, 234 Ameiurus melas, 37 Ameiurus natalis, 5 Pilodictus Olivaris, 67 Ictalurus punctatus, 1 Micropterus salmoides, 79 Pomoxis annularis, 20 Aplodinotus grunniens.

Table 7. Percentage Composition by Weight and Mean Weights of Larger Fishes from the Little Wichita River.

Species	Weight Taken	% of Total Weight	Mean Weight
<u>Lepisosteus osseus</u>	122 lbs.	7.9	1.5 lb.
<u>Lepisosteus platostomus</u>	37.8	2.5	1.1
<u>Dorosoma cepedianum</u>	208.8	13.6	.7
<u>Hiodon alosoides</u>	112.2	7.3	.7
<u>Ictiobus bubalus</u>	142.2	9.3	3.0
<u>Ictiobus cyprinellus</u>	45.9	3.0	4.2
<u>Carpionodes carpio</u>	455.6	29.6	1.6
<u>Cyprinus carpio</u>	140.3	9.2	1.9
<u>Ictalurus punctatus</u>	50.2	3.3	1.3
<u>Ameiurus melas</u>	7.9	.5	.2
<u>Pilodictus olivaris</u>	18.1	1.2	4.5
<u>Morone chrysops</u>	67.2	4.4	.9
<u>Micropterus salmoides</u>	37.2	2.4	3.4
<u>Pomoxis annularis</u>	80.0	5.2	.6
<u>Aplodinotus grunniens</u>	6.0	.4	.8

