JOB COMPLETION REPORT

State of TEXAS

Project No. F-7-R-4 Name: Fisheries Investigations and Surveys of the Waters of of Region 1-B.

Job No. B-12 Title: Basic Survey and Inventory of Species Present, as well as Their Distribution in the Salt Fork of the Red River, its Tributaries and Watershed, Lying within Collingsworth, Donley and Armstrong Counties, Texas.

Period Covered: June 1, 1956 through May 31, 1957.

ABSTRACT

Twenty-eight seine collections produced a total of 9,997 specimens for study. Eighteen species, representing 5 families of freshwater fish were found to occur. The Salt Fork of the Red River in Texas is valueless for game fish at the present time. It is often dry and always too shallow to maintain a game fish population. The water quality is good. If plans to construct a dam on the river near Whitefish Creek materialize, the new lake should be very productive and the fishing excellent.

OBJECTIVES

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

ACKNOWLEDGMENTS

Dr. Walter Dalquest, whose employment with the Texas Game and Fish Commission terminated in October, 1956, set up the original stations, conducted all of the laboratory work and most of the field work on this job for the first 5 months. Since that time, Dr. Dalquest has helped with some phases of work conducted in Region 1-B, and has checked the manuscript of this report. Grateful acknowledgment is also expressed to Dr. Carl Gray, Soils Scientist of Midwestern University and Wichita County Water Improvement Districts, for making the numerous water analyses during this study. Data on water volume were obtained from Mr. John Joerns, United States Geological Survey, Water Resources Branch, Wichita Falls.

TECHNIQUES

Sample stations were established at three points along the length of the Salt Fork of the Red River. Ten collections were made at each sample station during the study. At each station, chemical and physical data concerning the water were taken, and seine samples of the fishes present were preserved in formalin for laboratory examination and identifications. Since an adequate picture of the fish population at all points along the river could be determined by seining, no gill nets or fish toxicants were used.

There are no important permanent-flowing tributaries of the Salt Fork; however, basic survey collections were taken from two of its tributaries, at a time when water was present. On several occasions, data could not be obtained from some stations because freezing conditions prevented seining or because the river was dry.

PHYSICAL CHARACTERISTICS

The Salt Fork of the Red River is a small stream, both in volume of flow and in length. Its total length in Texas is less than 100 miles. After leaving Texas, it flows approximately 70 miles across the southwestern corner of Oklahoma before emptying into the Red River at a point west of Highway 283 in Jackson County, Oklahoma. It originates in the approximate center of Armstrong County and flows eastwardly across Donley and Collingsworth Counties before entering the State of Oklahoma at a point approximately 15 miles west of Wellington, Texas.

The Salt Fork has cut through the Early Pliocene rocks (the type locality and most typical exposures of the classic "Clarendon Formation" and its mammalian faunas, are located here) to expose early Permian sediments of the Double Mountain group. The Permian silts, sandstones and mineral deposits make up the bed of the river while the Pliocene clays and sandstones are found back from the river bed. Drift sands, largely reworked from Pliocene deposits of the High Plains, conceal much of the river valley in some places.

The bed of the Salt Fork is braided sand, but quite firm, in marked contrast to the quick sands of the Canadian River, to the north. (F-7-R-2, Jobs A-1 and B-5). Although the drainage area is considerable (1,222 square miles at the Wellington station), stream flow is highly irregular. At times during the past project year, there was no surface flow of water in most of the river. During heavy rains, the stream became a raging torrent, washing out bridges and carrying away heavy concrete pilings. Normally the Salt Fork is shallow (less than 1 foot) with only an occasional, washed-out pool deeper than 3 feet. On occasions, when the river was dry, collections were confined to pools that were isolated by the shifting channel and fed by subsurface flow.

The U. S. Geological Survey discontinued its station on the Salt Fork in October, 1956. Therefore, stream flow and run-off data are not available for the period of this survey. Data is available for the monthly and annual mean discharge and the monthly and annual run-off at Wellington Station from 1952 to October, 1956. (See Tables 1 and 2).

DESCRIPTION OF SAMPLE STATIONS

CLARENDON STATION. Located approximately 5 miles north of Clarendon at the Highway 70 crossing, this is the uppermost of our collecting stations. Although, at times, there was no visable stream flow, water was present during each visit, either as a swift flowing, shallow stream, or in an isolated pool fed by subsurface flow. The valley is broad (approximately 3/4 mile), and cut well down into Permian rocks. The predominant sediments are red silts and sandstones, with gypsum stringers protruding from cliffs along the banks.

WELLINGTON STATION. Located 8 miles north of Wellington on Highway 83, this is an intermediate, permanent station. The valley here is relatively broad, with low cliffs of hard shale and considerable exposed gypsum. The water is shallow and swift over a clear, clean gravel-and-sand bottom. Unlike the other two permanent stations, this

intermediate station had a continuous stream flow during each visit. Also, unlike the other two stations, there were deeper pools along the running stream caused by solution cavities in the rock of the stream bed and the fall of water over concrete pilings that had washed downstream in previous floods. These pools provided our largest and most varied fish collections.

OKLAHOMA LINE STATION. This station is located 12 miles west of Wellington and about 2 miles east of the Oklahoma line. The valley here is broad, and the river has cut a channel between gypsum and shale banks to a depth of about 50 feet. The river varies from a width of 10 feet and a depth of 2 feet to 100 feet wide and 4 inches deep. The stream bed is braided and much of its discharge is apparently carried in underground flow. On two occasions during the survey, the river was completely dry here, and not even an isolated pool could be found from which to collect a water sample.

DESCRIPTION OF BASIC SURVEY SAMPLE STATIONS

HEDLEY STATION. This was not a regular sampling station because of its inaccessibility. In order to sample the river here, it was necessary to walk and carry survey equipment at least 3/4 mile. Consideration was given to this station because it is located at the confluence of the river and Whitefish Creek, and is the proposed site of the Whitefish Creek Dam. The intermediate location of this station, between Clarendon and Wellington stations, would have made it very desirable as a monthly sampling station had it been more accessible. The river here is a braided stream with a broad, sandy flood plain, about 1 mile wide. Flood debris clinging to salt cedars in the wide, flat valley is indicative of the size of the river and the heavy loads carried during periods of heavy rainfall. The river was sampled approximately 12 miles north of Hedley between its confluence with Whitefish Creek and the old McLean "river crossing".

WHITEFISH CREEK STATION. According to local residents, this creek is not a permanently flowing stream. When sampled after recent heavy rains, however, it had considerable stream flow and contained a fish population similar to that of the river. In appearance, it was similar to the river, but much smaller. Apparently, this creek will contribute much water to the proposed lake and its valley will constitute a large component of the lake.

EAST LELIA LAKE CREEK. This creek emerges from a canyon to the south and flows northward to the Salt Fork. It was sampled at the Highway 287 crossing, approximately 10 miles from its confluence with the river. It was turbid (80mm.) but deep and cool. The bottom was sand and mud, and native vegetation was abundant along the banks. At the time of sampling, there was very little stream flow with only a trickle 6 inches wide and 1 inch deep connecting deep pools. Sunfishes, bullhead catfish and minnows were abundant.

CHEMICAL CHARACTERISTICS OF WATER

The chemical nature of water at the sample stations is given in Table 3. According to the analyses, the water quality of the Salt Fork and its tributaries is good and the river should support all species of the native fresh water fish species. No industrial or municipal waste was found to enter the stream.

PHYSICAL CHARACTERISTICS OF WATER

Physical conditions at sample stations are shown in Table 4. Water temperatures during the survey period varied from freezing to 93 degrees F. In January, the river was frozen over solid, even in its swiftest parts. The clarity and shallowness of the water accounts for high summer temperatures. Except in periods of rainfall, the water in the Salt Fork of the Red River is clear. For the purpose of this survey, turbidity was measured with a sichi disk. Measurements were made in deepest water found at the station. Normally, the disk was clearly visible on the bottom, in which case the turbidity was recorded as the depth of the water "plus".

AQUATIC VEGETATION

Except for the occurrence of green algae along the banks, there is no aquatic vegetation in the Salt Fork. Chara and algae were found in a few isolated pools near Clarendon Station.

FISH COLLECTIONS

A total of 18 species, representing 5 families of fresh-water fish, was taken from the Salt Fork of the Red River during the segment period. Monthly variations in species and numbers of fishes taken at each of the sample stations are given in Tables 5, 6, and 7. The total numbers of fishes taken at all of the permanent sample stations along the river is given in Table 8. Stations on two tributaries of the Salt Fork and one additional station on the river were worked during the segment. Table 9 shows fishes taken at these extra, basic survey stations.

There were 9,811 specimens collected from the three permanent sampling stations, and each station contributed approximately equal numbers of fish during the one year segment period. Two species were taken at the extra survey stations that did not occur at the permanent stations. A single Notemigonus crysoleucas was taken at Whitefish Creek Station and an Ictalurus punctatus was taken at Hedley Station. Since both of these stations were worked on the same day, and just after locally heavy rains, it is assumed that these species were migrants from over-flowing watershed lakes and were not included in the checklist of fishes naturally occurring in the Salt Fork.

Family Catostomidae

Suckers

Carpiodes carpio: river carpsucker. This is the only member of the sucker family collected during the survey. The species was taken at Wellington Station in April, 1957.

Family Cyprinidae

Minnows

Cyprinus carpio: carp. Only one carp was collected. It was taken at Oklahoma Line Station in June, 1956.

Notemigonus crysoleucas: golden shiner. A single specimen was taken in Whitefish Creek following locally heavy rains. It may have washed out of a watershed pond.

Hybopsis aestivalis: speckled chub. A total of 12 specimens was taken from two stations. The species was not found at Clarendon Station. It seems to prefer swiftly running water and probably did not occur at this station because the surface flow is not continuous.

Notropis potteri: chub shiner. Although 58 specimens were taken, this species is of erratic occurrence in the Salt Fork. It was absent from Wellington Station, taken only in June at Clarendon Station, and in June, 1956 and May, 1956 at the Oklahoma Line Station.

Notropis bairdi: Red River shiner. This is one of the most abundant species in the Salt Fork. It was represented at all 3 stations, as well as the Hendley and Whitefish Creek stations and comprised 18.46% of total collections.

Notropis lutrensis: redhorse shiner. This is one of the most numerous and widely distributed species in the Salt Fork system. It was present at all stations and in every collection except the February, 1956, collection from Clarendon.

Hybognathus placita: plains minnow. This species is very abundant. It was found at all but the Lelia Lake Creek Station, and comprises 17.39% of the total collections.

Pimephales promelas: fathead minnow. A total of 42 specimens was taken from the three permanent stations together and 42 others were found in the Lelia Lake Creek collection.

Family Ameiuridae

Freshwater catfishes

Ictalurus punctatus: channel catfish. One specimen was taken at Hedley Station after locally heavy rains, and may have washed out of a watershed lake.

Ictalurus melas: black bullhead. Although not numerous (.42% of the total), this species is widely distributed. It was found at all stations, including the extra survey stations, with the exception of Oklahoma Line Station.

Family Cyprinodontidae

Killifishes and topminnows

Fundulus kansae: plains killifish. Comprising 43.59% of the total collections, this species is the most abundant and widely distributed of all fish in the Salt Fork system. It was represented at every collection at all stations during the segment.

Cyprinodon rubrofluviatilis: Red River pupfish. Although not abundant, this species is well distributed. It comprises only 1.8% of the total, but it was represented at all of the permanent stations.

Family Poeciliidae

Gambusia affinis: common mosquitofish. A total of only 4 specimens was taken during the segment, at Clarendon and Wellington Stations.

Family Centrarchidae

Lepomis cyanellus: green sunfish. This species is not abundant, but was represented at 5 of the 6 stations. It was not found at Hedley Station.

Lepomis microlophus: redear sunfish. Only 3 specimens were taken, all at Wellington Station in December, 1956.

Lepomis humilis: orangespotted sunfish. A total of 11 specimens was taken at Clarendon and Wellington Stations.

Lepomis megalotis: longear sunfish. Only one specimen was taken during the segment. It was collected at Oklahoma Line Station in October, 1956.

CONCLUSIONS

The Salt Fork of the Red River, or at least that part of the Salt Fork that lies in Texas, is valueless for game fishes at the present time. Quite often the river bed is completely dry or with only small isolated pools to support fish life. Even when surface flow is present, it is too shallow to maintain a game fish population. At times, there are concentrations of bait minnows large enough for commercial bait seining, and tracks along the river indicate that the river is utilized for that purpose to some extent.

If plans to construct the Whitefish Creek Dam materialize, fishing in the new lake should be excellent. There were no rough fish species found above the proposed dam site, and only 2 specimens of rough fishes were found in the river below the dam site. All information that was obtained during this survey indicates that the new lake will be very productive.

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Date: July 26, 1957

Table 1. Monthly and Annual Mean Discharge at Wellington Station.
(Drainage area, 1,222 square miles of which 209 square miles is probably noncontributing)

Year	October	November	December	January	Feburary	March	April	May	June	July	August	September	Annual
1952										1.95	1.00	2.11	
1953	4.06	19.2	10.8	9.00	15.9	19.1	27.9	8.52	1.76	482	49.5	6.29	55.3
1954	72.5	17.5	20.9	24.5	13.6	8.04	39.2	542	642	6.60	45.6	4.53	120
1955	5.19	6.04	6.50	14.1	17.4	5.27	4.18	317	528	326	8.63	3.64	78.9
1956	102	7.28	18.8	19.3	19.8	5.86	4.24	347	4.91	11.6	1.34	1.48	45.9

Note: All discharge is measured in cubic feet per second.

Table 2. Monthly and Annual Run-off at Wellington Station.
(Drainage area, 1,222 square miles of which 209 square miles is probably noncontributing).

Year	October	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1952										120	62	126	
1953	250	1,140	666	553	883	1,180	1,660	524	105	29,660	3,040	374	40,040
1954	4,460	1,040	1,280	1,510	757	494	2,330	33,340	38,190	406	2,810	270	86,890
1955	333	359	399	867	966	324	249	19,500	31,400	2,000	531	217	57,140
1956	6,280	433	1,160	1,180	1,140	360	252	21,320	292	715	82	88	33,300

Note: All run-off is measured in acre feet.

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

Date	Calcium	Sodium	Chloride	Sulfate	Carbonates	Bicarbonates	Total Salts	pH
				CLARENDON STATION				
6/15/56	122	160	114	332	18	146	892	
8/17/56	144	115	160	192	0	225	836	7.70
9/24/56	176	132	284	88	0	282	962	7.90
10/21/56	132	78	134	206	30	178	758	7.95
1/7/57	108	59	66	125	0	210	568	8.10
3/12/57	84	57	75	144	0	102	462	8.08
4/9/57	76	51	54	84	9	90	364	8.20
5/22/57	104	43	33	173	18	122	493	8.20
				WELLINGTON STATION				
6/15/56	816	150	195	1875	0	165	3201	
8/17/56	588	174	213	1358	0	160	2493	7.60
9/24/56	788	165	284	1732	0	148	3117	7.90
10/21/56	800	165	400	1565	0	198	3128	7.70
1/7/57	748	150	213	1666	0	192	2969	8.10
2/18/57	624	153	231	1440	6	60	2514	7.69
2/57	680	159	249	1570	6	68	2732	7.69
4/9/57	698	163	195	1690	0	84	2830	7.80
5/22/57	350	143	227	670	0	200	1592	7.68
				OKLAHOMA LINE STATION				
6/15/56	808	176	223	1920	0	116	3243	
8/17/56	Dry							
9/24/56	Dry							
10/21/56	742	187	351	1555	18	138	2991	7.90
1/7/57	804	171	231	1857	0	144	3207	8.70
1/17/57	1124	237	347	2592	12	140	4452	8.00
2/18/57	666	171	266	1570	0	36	2709	7.65
3/12/57	696	194	291	1618	0	64	2863	7.80
4/9/57	702	193	249	1618	9	150	2921	7.97
5/22/57	350	130	164	758	12	138	1552	8.05
				HEDLEY STATION				
5/22/57	396	154	295	768	12	116	1320	7.97
				WHITEFISH CREEK STATION				
5/22/57	400	143	227	835	12	122	1739	8.05
				EAST LELIA LAKE CREEK				
6/15/56	118	53	39	155	12	213	590	

Table 4. Physical Conditions at the Sample Stations.

Date	Air Temp.	Water Temp.	Turbidity (mm.)
		OKLAHOMA STATION	
6/15/56	86	86	100
8/17/56	Dry		
9/24/56	Dry		
10/21-56	70	68	310 plus
12/6/56	64	52	300 plus
1/17/57	33	32	Frozen over solid
2/18/57	48	45	500 plus
3/12/57	72	61	385 plus
4/9/57	55	61	350 plus
5/22/57	80	78	50
		WELLINGTON STATION	
6/15/56	86	86	130
8/17/56	100	93	450
9/24/56	99	89	400 plus
10/21/56	75	73	260 plus
12/6/56	62	53	1000 plus
1/17/57	34	33	300 plus
2/18/57	49	47	1000 plus
3/12/57	79	68	650 plus
4/9/57	57	65	550 plus
5/22/57	82	79	50
		CLARENDON STATION	
6/15/56	80	75	200 plus
8/17/56	100	82	225
9/24/56	84	80	300 plus
10/21/56	75	75	120 plus
12/6/56	62	53	250 plus
1/17/57	37	33	Frozen over solid
2/18/57	44	45	95
3/12/57	76	62	40 plus - clear
4/9/57	65	64	750 plus
5/22/57	78	76	200
		HEDLEY STATION	
5/22/57	71	82	70
		WHITEFISH CREEK STATION	
5/22/57	88	85	80
		EAST LELIA LAKE CREEK	
6/15/56	88	79	80

ble 5. Monthly Variation in Species and Numbers of Fishes at Clarendon Station, Salt Fork.

Species	6/15	8/17	9/24	10/21	12/6	1/17*	2/18	3/12	4/9	5/22	Total	Percent of Total
N. potteri	26	-	-	-	-	-	-	-	-	-	26	.88
N. bairidi	3	-	-	-	29	-	-	2	1	4	39	1.31
N. lutrensis	41	21	4	3	5	-	-	4	22	29	129	4.34
Hybognathus	106	96	11	-	4	-	1	-	-	40	258	8.69
P. promelas	16	-	5	9	-	-	1	-	7	-	38	1.28
I. melas	2	1	1	-	-	-	-	-	-	35	39	1.31
F. kansae	13	10	63	25	1530	-	83	256	342	15	2,337	78.67
Cyprinodon	-	-	11	11	32	-	-	22	10	86	86	2.90
Gambusia	-	-	-	1	-	-	-	-	-	-	1	.03
L. cyanellus	1	1	1	-	1	-	-	-	-	5	9	.30
L. humilis	1	2	-	-	-	-	-	-	-	5	8	.27
Total	209	131	96	49	1601	-	85	284	382	133	2,970	99.98
% of Total	7.0	4.4	3.2	1.6	53.9	-	2.9	9.6	12.9	4.5		100.00

* Frozen over - impossible to seine.

Table 6. Monthly Variation in Species and Numbers of Fishes at Wellington Station, Salt Fork.

Species	6/15	8/17	9/24	10/21	12/6	1/17 *	2/18	3/12	4/9	5/22	Total	Percent of Total
Carpiodes	-	-	-	-	-	-	-	-	1	-	1	.03
Hybopsis	-	-	-	1	-	-	-	2	1	1	5	.14
N. bairdi	31	7	-	6	323	-	151	171	153	-	742	21.70
N. lutrensis	20	45	5	3	84	-	306	369	257	12	1101	32.19
Hybognathus	123	150	37	31	132	-	1	242	267	4	987	28.86
P. promelas	-	-	-	-	1	-	-	1	-	-	2	.06
I. melas	-	-	1	-	-	-	-	-	-	1	2	.06
F. kansae	91	19	2	30	140	-	1	48	166	41	538	15.73
Cyprinodon	-	-	4	2	6	-	-	2	5	2	21	.61
Gambusia	-	-	-	-	-	-	-	-	2	1	3	.09
L. cyanellus	-	-	-	-	-	-	7	2	3	-	12	.35
L. microlophus	-	-	-	-	3	-	-	-	-	-	3	.09
L. humilis	-	-	-	-	-	-	2	-	1	-	3	.09
Total	265	221	49	73	589	-	468	837	856	62	3420	100.00
Percent of Total	7.8	6.5	1.4	2.1	17.2	-	13.7	23.5	25.0	1.8		100.00

* Frozen over - impossible

Table 7. Monthly Variation in Species and Numbers of Fishes at Oklahoma Station, Salt Fork.

Species	6/15	* 8/17	* 9/24	10/21	12/6	** 1/17	2/18	3/12	4/9	5/22	Total	% of Total
Cyprinus	1	-	-	-	-	-	-	-	-	-	1	.03
Hybopsis	3	-	-	-	1	-	-	2	1	-	7	.20
N. potteri	27	-	-	-	-	-	-	-	-	5	32	.94
N. bairdi	21	-	-	4	703	-	110	73	116	3	1030	30.11
N. lutrensis	7	-	-	10	103	-	197	32	9	56	414	12.10
Hybognathus	101	-	-	77	29	-	22	70	34	126	459	13.42
P. promelas	-	-	-	-	-	-	2	-	-	-	2	.06
F. kansae	9	-	-	12	184	-	1048	81	51	17	1402	40.98
Cyprinodon	-	-	-	2	-	-	62	5	1	1	71	2.07
L. cyanellus	-	-	-	-	-	-	2	-	-	-	2	.06
L. megalotis	-	-	-	1	-	-	-	-	-	-	1	.03
Total	169	-	-	106	1020	-	1443	263	212	208	3421	100.00
% of Total	4.9	-	-	3.1	29.8	-	42.2	7.7	6.2	6.1	-	100.00

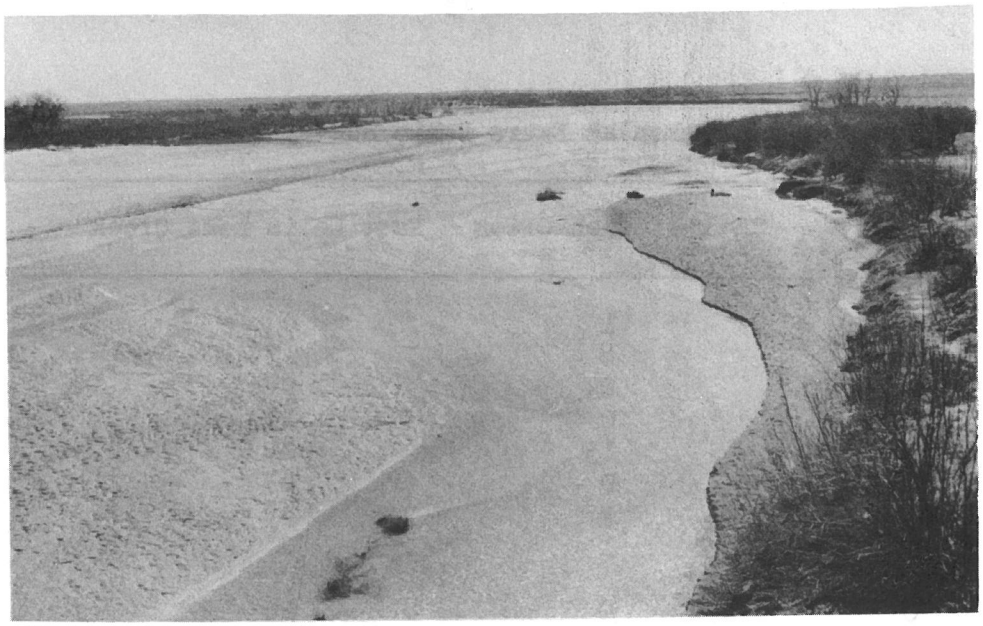
* - Dry
** - Frozen over - impossible to seine

Table 8. Total Numbers of Fishes Taken at Stations on Salt Fork of Red River.

Species	Oklahoma	Wellington	Clarendon	Total	Percent of Total
Carpiodes	-	1	-	1	.01
Cyprinus	1	-	-	1	.01
Hybopsis	7	5	-	12	.12
N. potteri	32	-	26	58	.59
N. bairdi	1030	742	39	1811	18.46
N. lutrensis	414	1101	129	1644	16.76
Hybognathus	459	987	258	1704	17.37
P. promelas	2	2	38	42	.43
I. melas	-	2	39	41	.42
F. kansae	1402	538	2337	4277	43.59
Cyprinodon	71	21	86	178	1.81
Gambusia	-	3	1	4	.04
L. cyanellus	2	12	9	23	.23
L. microlophus	-	3	-	3	.03
L. humilis	-	3	8	11	.11
L. megalotis	1	-	-	1	.01
Total	3421	3420	2970	9811	99.99
% of Total	34.9	34.8	30.3		100.00

Table 9. Total Numbers of Fishes Taken at Extra Basic Survey Stations.

Species	Hedley	Whitefish Creek	East Lelia Lake Creek	Total
N. bairdi	1	1	0	2
N. lutrensis	2	8	17	27
Hybognathus	28	24	0	52
P. promelas	0	0	17	17
I. melas	1	13	21	35
I. punctatus	1	0	0	1
F. kansae	5	7	4	16
Notemigonus crysoleucas	0	1	0	1
L. cyanellus	0	9	26	35
Total	38	63	85	186



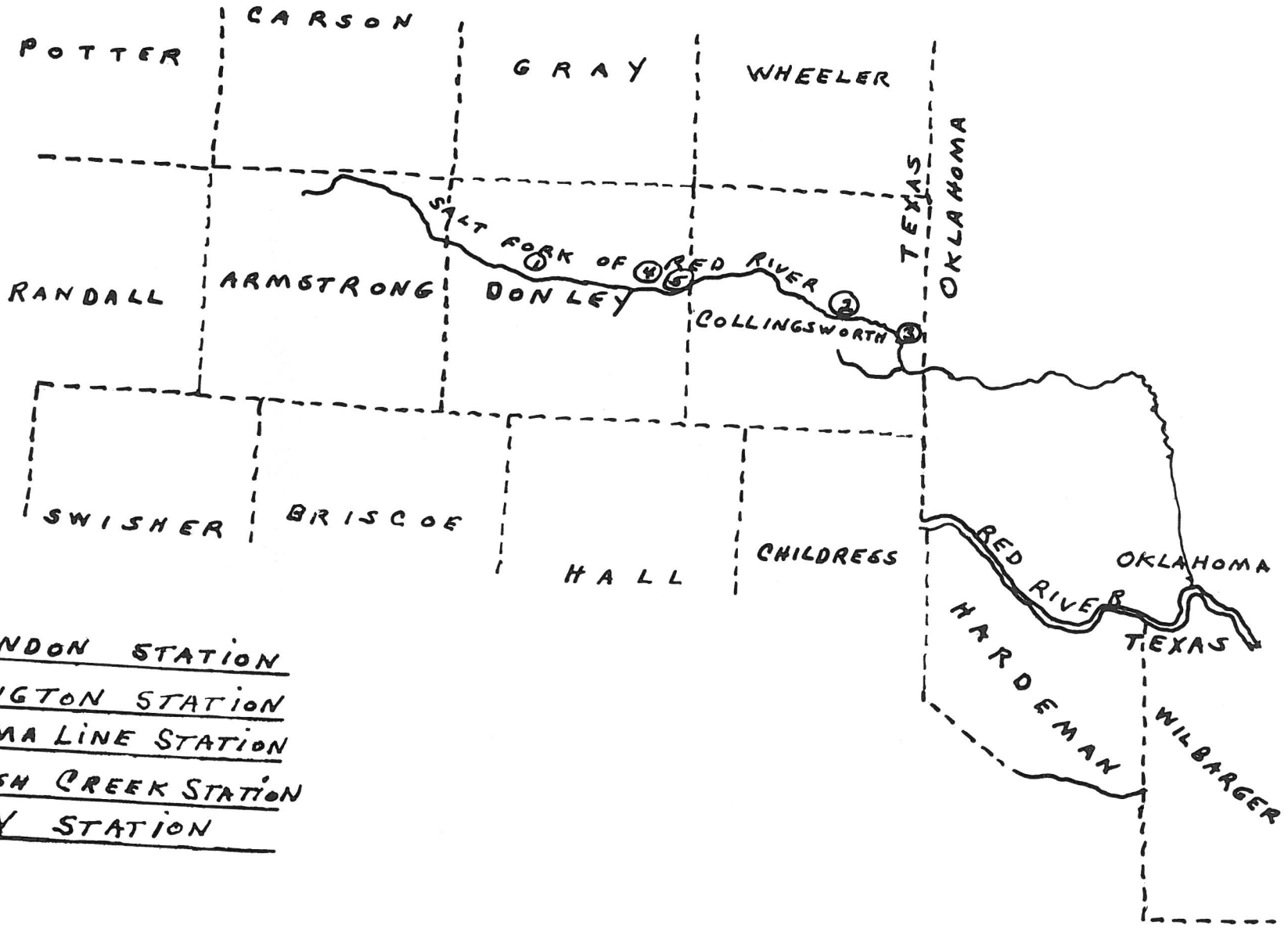
Oklahoma Line station down stream from Highway 203 bridge. Picture shows greater than normal stream flow. River is often dry here. (Photo by Ray Hess)

Oklahoma Line station following recent rainfall on the watershed.

Wellington station down stream from Highway 83 bridge. Note pools in main stream below remains of concrete bridge. Also isolated pools to right of stream. (Photo by Ray Hess)

Wellington station following recent rise showing shifting of main channel from left to right.

Clarendon station following recent rise. River here is often dry, and collections were taken from small, isolated pools which were fed by sub-surface flow.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CARSON
GRAY
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TEXAS
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DONLEY
SALT FORK OF RED RIVER
COLLINGSWORTH
SWISHER
BRISCOE
HALL
CHILDRESS
RED RIVER
OKLAHOMA
TEXAS
HARDEMAN
WILBARGER
① CLARENDON STATION
② WELLINGTON STATION
③ OKLAHOMA LINE STATION
④ WHITEFISH CREEK STATION
⑤ HEDLEY STATION