STATE TEXAS

PROJECT NO. F-7-R-2, Job B-7

PERIOD June 1, 1954--May 31 1955

JOB COMPLETION REPORT

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TITLE

Inventory of species present in Lake Wichita, Texas.

OBJECTIVES

To determine the species present and their distribution, as well as the ecological factors that influence their distribution.

TECHNIQUES

At least once each month, and usually twice each month, four to six gill nets, each 125 feet long, with mesh sizes ranging in each net from 3/4 inch to 3 inches, were set overnight and run the following morning. Each time gill nets were set, seine samples were taken of the smaller fishes with 30-foot bag seines of 1/4 inch mesh. In addition, all possible observations were made of the fish populations when opportunity offered, including data made available by commercial fishermen, data obtained by the use of large seines, and hook-and-line fishing.

On each occasion when gill nets were set, the air temperature and temperatures of the surface water were recorded as was the light penetration as measured by a 200 mm. Seichi disk. Water samples were taken and analyzed by Dr. Carl Gray, Soils Scientist of Midwestern University, Wichita Falls, and the Wichita County Water Improvements Districts.

Smaller fishes were saved in a formalin solution and identified in the laboratory. Larger fishes were measured and weighed in the field. The stomachs, if they obviously contained food, were saved in formalin for laboratory analysis. The stages of reproduction development were recorded and, if females contained large eggs, the gonads were saved and the eggs counted in the laboratory. Pathological conditions were noted and tissues were dehydrated and sectioned with a microtome for microscopic examination when this seemed desirable.

At irregular intervals samples of plankton, bottom fauna, littoral fauna and vegetation were taken for laboratory analysis and identifications. Detailed notes on ecological conditions were taken.

Data pertaining to food habits, reproduction and comparative physical condition are reported elsewhere (Job Completion Report, F-7-R-2, Job B-4).

BACKGROUND

Lake Wichita is the oldest lake in the Wichita Falls area, having been constructed origainally as the water supply for the city of Wichita Falls in 1901. It is a lake of 2,500 surface acres, formed by an earthen dam several hundred feet in length. The dam crosses Holliday Creek, a tributary of the Wichita River. The lake lies in Wichita and Archer counties, about half in each county.

The reputed fishing history of Lake Wichita has varied tremendously from time to time. Since the lake is located only three miles from the city of Wichita Falls, it is subject to tremendous fishing pressure. In spite of this, fishing has gererally been excellent in the lake previous to 1953; the lake is extremely fertile and highly productive.

In 1952 the volume of Lake Wichita was greatly reduced by drought but game fishes were still abundant and were being caught in numbers. Drum were extremely abundant but in poor condition; channel catfish and large white bass were common and in good shape; crappie were common but rather small; black bass were not common. By the summer of 1953, however, the volume of the lake was so greatly reduced, from 13,964 acre-feet capacity to approximately 1,425 acre-feet, that the remaining fish were greatly crowded and fishing, except for drum and channel catfish, was poor. Gars were extremely abundant and one sweep with a gill net resulted in the capture of 142 gars. Netting showed rough fishes to be abundant but game fishes scarce. No white bass of small or medium size were taken, which indicates that the mud banks left by the retreating lake offered no suitable areas for the spawning of this species. At this time a selective kill of rough fishes resulted in the kill of approximately 73,000 pounds of drum and gizzard shad (see Job Completion Report, F-7-R-1, Job E-1, page 3).

Following the selective kill, the water in the lake continued to drop until areas in the center of the lake became islands and the water warmed greatly in July and August. Heavy rains in the fall of 1953 filled the lake to capacity but it is thought that few or no game fishes except catfishes, survived the summer. Several over-night gill nettings took only gizzard shad, carpsuckers, buffalos and gars.

Following the refilling of of the lake, white bass were stocked by Wildlife Conservation students from Midwestern University; crappies were stocked by some members of the North Texas Field and Stream Association; black bass were stocked on several occasions by the Dundee Hatchery of the Texas Game and Fish Commission. Reproduction of all of these species was noted in June 1954, and catchable fish of all three species were being taken in June 1955, in fair to large numbers.

FINDINGS

The rains of the fall of 1953 covered large areas of the old lake bed, much of which had been dry for years. Weeds and brush growing on the exposed flats were drowned and decayed. Emergent vegetation, once present around the borders of the lake had vanished without a trace two years before and auto races had been held on flats that were once extensive tule and cattail marshes. Other than the great rise in lake level, to spillway level, no other changes were readily apparent in the lake previous to the beginning of the present investigations.

In June 1954, the emergent vegetation again grew, apparently from persistent underground roots. By July tules and cattails again covered the shallow flats about the lake and there were beds of water lilies (Neulembo) in deeper areas. Numerous ducks, geese, and marsh birds wintered at Lake Wichita. In the spring of 1955 the emergent vegetation spread deeper and denser than before.

Green algae of several species was abundant in the lake in 1954, especially filamentous types. In the winter and spring of 1954-55, an extremely heavy growth of Cladophora formed on almost all exposed hard objects such as pilings, rock, the face of the dam, and even on the bottom where it was shallow and firm. The Cladophora mat became so thick and dense that it formed a green carpet over a large area, making fishing difficult in many parts of the lake. By May 1955, much of the mat died away leaving only traces.

Plankton of Lake Wichita is extremely rich. The phytoplankton of several species of diatoms and desmids imparts a green color to the water at times and is responsible for much of the turbidity of the lake. Zooplankton is equally rich, far richer than that of other large lakes in our area. Most of the dominant forms are small, rotifers, small copepods and Bosmina. The aquatic insect fauna is rich and Chironemus larvae are especially abundant. Backswimmers, especially a small, black fish, nocturnal form which we were unable to identify, are present in the millions along the dam at night.

The nature of the lake bottom was determined with an Eckman dredge. We were surprised to find that those places that had been exposed by the drying up of the lake in 1952 and again immersed in 1953 were still firm. Even though the soil had been beneath the water for two years, it looked like it had been covered with water for only a few days. In contrast the bottom that had never been exposed to the air was a jellylike silt except at the heads of channels where the bottom was mixed sand and mud.

Turbidity varied greatly in the lake. In summer, when the lake is usually calm, turbidity is probably the result of plankton. Our greatest reading of an eight inch Seichi disk was 348 mm., on August 12, 1954. Over most of the summer, except after heavy winds or rains, readings average slightly more than 300 mm. In the fall and winter strong winds are the rule and often blow for several days and weeks at a time. Turbidity, probably due to suspended solids, averages less than 200 mm. at such times and sometimes fall to only slightly more than 100 mm.

Water quality of the lake is generally good. At the beginning of the present project year the quality was excellent. During the year, dissolved salts increased in dry periods, due to concentration through evaporation, and were diluted by each heavy rain. Salt concertration gradually crept up through the months until the heavy spring rains of 1955 restored the water quality to approximately what it was the year before. For details see Table 7.

The fish population of the lake during the project period was, qualitatively, about what it had always been in recent years but was quantitatively quite different. In general, gars were less abundant than previously, rough fishes of the sucker and carp type as abundant as usual, catfish scarcer than they have been, black bass, white bass and crappie present only because they were stocked, and sunfishes far more abundant than before. Details of the fish population are as follows:

Lepisosteus osseus (Longnosed Gar)--Still, as previously the dominant gar but now scarcer than in past years. Only 105 were taken over the year. In the past we have taken more in a single sweep of one gill net.

Lepisosteus platostomus (Shortnosed Gar)--This species was second in numbers to the Longnosed Gar. This is most unusual; usually it is a species rather scarce in lakes and less common than the other following species.

Lepisosteus productus (Spotted Gar)--This species was found to be rare in Lake Wichita. In the past in Lake Wichita, and at present in other nearby lakes, the spotted gar is more common than the shortnosed gar.

Dorosoma cepedianum (Gizzard Shad)--This species has always been very abundant in Lake Wichita, but during the past year, specimens have seemed to be smaller than in the past. In 1952 shad weighing more than four pounds were not uncommon. In the past year, few were taken that weighed more than three pounds.

Astyanax fasciatus (Rio Grande Tetra)--Two specimens were taken at different times of the year but were almost certainly released bait. The tetra is commonly released in local waters but does not survive ordinary winters.

Ictiobus cyprinellus (Bigmouth Buffalo)--This species is far less common than the smallmouth buffalo. A commercial fisherman that worked on the lake for three months estimated one bigmouth buffalo to 50 smallmouth buffalos The bigmouth buffalo seems to grow more rapidly than the smallmouth buffalo. In a seine haul in May 1955, 7 cyprinellus and about 100 bubalus were taken. All were less than a foot in standard length. The cyprinellus averaged more than an inch longer and half again as heavy as the bubalus.

Ictiobus bubalus (Smallmouth Buffalo)--The most abundant rough fish in the lake, both in numbers and by weight.

Carpiodes carpio (River Carpsucker)--The second most abundant rough fish in the lake, both in numbers and by weight. The carpsuckers of Lake Wichita average larger than those of any other local lake.

Cyprinus carpio (European Carp)--As in other local lakes, the carp is not numerous enough to be a serious problem, probably because the species encounters such heavy competiton from the buffalos and the carpsucker. Some extremely large individuals were taken by the commercial fisherman in February, March and April 1955.

Notemigonus chrysoleucas (Golden Shiner)--This species is rarely a common lake fish in our area. We suspect that when the white bass grow larger, golden shiners will become scarce in Lake Wichita.

Pimephales vigilax (Parrot Minnow)--This is usually a moderately common minnow in local waters. The present population of Lake Wichita is about as large as we would have expected.

Hybognathus placita (Plains Minnow)--This species is primarily a river form but does breed in some saline lakes. We suspect that the few specimens taken in Lake Wichita were released bait minnows. This is the most popular bait minnow in our area.

Notropis buchanani (Ghost Shiner)--This species has always been a moderately common form in Lake Wichita and now seems to be about as common as usual.

Notropis deliciosus (Sand Shiner)--The small resident population of this shiner seemed to disappear from Lake Wichita in 1952. The single specimen taked in 1955 may have been a released bait minnow.

Notropis lutrensis (Red Shiner)--In Lake Wichita, as in all local waters, this is the most abundant forage species.

Pilodictus olivaris (Flathead Catfish)--Lake Wichita was once known for its large flathead catfish. We took no flatheads in our gill nets in the past year but did take two young fishes of this species in a seine drag.

Ictalurus punctatus (Channel Catfish)--Once abundant in the lake, this form now seems to be much less common. Although we took few specimens in our gill nets, fishermen regularly take them on trot lines.

Ameiurus melas (Black Bullhead)--This catfish was once rare in the lake but now seems to be quite common. Numerous individuals are taken on trot lines.

Gambusia affinis (Mosquito Fish)--Abundant in the shallows and heavy cover.

Fundulus kansae (Plains Killifish)--This form was once fairly common in the lake, but we took no specimens during the present investigations. Even if now absent from Lake Wichita the killifish will almost certainly be restocked as released bait minnows in the near future.

Morone chrysops (White Bass)--This game fish was once common in the lake and grew to large size. The resident population died out in 1953. The present large population is the result of stocking, by students of Midwestern University, of white bass from Lake Diversion.

Micropterus salmoides (Largemouth Black Bass)--Rare or absent from the lake in 1953, thousands of fry and fingerlings stocked by the Texas Game and Fish Commission's Dundee Hatchery in 1954 reached small but "catchable" size the next year. The black bass is now common in the lake.

Chaenobryttus coronarius (Warmouth)--Rare in Lake Wichita in the past, this fish now seems to be fairly common. We saw one specimen of almost a pound in weight.

Lepomis cyanellus (Green Sunfish)--Once rare except in heavy cover, the green sunfish now is rather common.

Lepomis humilis (Orange-spotted Sunfish)--We have no previous records of this sunfish from Lake Wichita. It is a widespread but rarely common fish in our area.

Lepomis macrochirus (Bluegill Sunfish)--Once rare in Lake Wichita, the bluegill is now abundant. We saw several specimens of approximately a pound in weight taken by fishermen. Sunfishes of this size are extremely unusual in our area.

Lepomis megalotis (Long-eared Sunfish)--Once uncommon in the lake, this species is now abundant. We have seen few specimens, however, that would have weighed more than 100 grams.

Pomoxis annularis (White Crappies)--Crappie were greatly reduced or even exterminated in the lake by 1953. The North Texas Field and Stream Association held a "Crappie Catch" at Lake Diversion in the winter of 1953. Biologists and hatchery personnel of the Game and Fish Commission transported the 400-odd fish individuals taken to Lake Wichita. Crappie are now common in the lake.

Percina caprodes (Logperch)--This small fish has always been rare and difficult to take in Lake Wichita.

Aplodinotus grunniens (Freshwater Drum)--This was once one of the most abundant fishes in Lake Wichita, but its numbers were greatly reduced. It seems to be on the increase at present. Specimens taken by fishermen were examined and seemed to be fat and healthy, in contrast to their condition in 1952 and 1953.

TABLE I. CHECK LIST OF FISHES OF LAKE WICHITA

SPECIES	Large and Important	Forage Fishes	Casual Forms
Lepisosteus osseus Longnosed Gar	X		
Lepisosteus platostomus Shortnosed Gar	X		
Lepisosteus productus Spotted Gar			X
Dorosoma cepedianum Gizzard Shad	X		
Astyanax fasciatus Rio Grande Tetra			X
Ictiobus cyprinellus Bigmouth Buffalo	X		
Ictiobus bubalus Smallmouth Buffalo	X		
Carpiodes carpio River Carpsucker	X		
Cyprinus carpio European Carp	X		
Notemigonus chrysoleucas Golden Shiner		X	
Pimephales vigilax Parrot Minnow		X	
Hybognathus placita Plains Minnow			X
Notropis buchanani Ghost Shiner		X	
Notropis deliciosus Sand Shiner			X
Notropis lutrensis Red Shiner		X	
Pilodictus olivaris Flathead Catfish			X
Ictalurus punctatus Channel Catfish	X		
Ameiurus melas Black Bullhead	X		
Gambusia affinis Mosquito Fish		X	
Morone chrysops White Bass	X		
Micropterus salmoides Largemouth Black Bass	X		
Chaenobryttus coronarius Warmouth		X	
Lepomis cyanellus Green Sunfish		X	
Lepomis humilis Orange-spotted Sunfish			X
Lepomis macrochirus Bluegill Sunfish		X	
Lepomis magalotis Long-eared Sunfish		X	
Lepomoxis annularis White Crappie	X		
Percina caprodes Logperch			X
Aplodinotus grunniens Freshwater Drum	X		

TABLE II. PERCENTAGE COMPOSITION AND SEX RATIOS OF LARGE FISHES FROM LAKE WICHITA TAKEN IN GILL NETS

SPECIES	Number Taken	%of Total	% Males	% Females
Lepisosteus osseus	105	9.8	75	25
Lepisosteus platostomus	36	3.3	53	47
Lepisosteus productus	9	.8	44	56
Dorosoma cepedianum	178	16.5	33	67
Ictiobus cyprinellus	7	.7	100	--
Ictiobus bubalus	226	21.0	84	16
Carpiodes carpio	173	16.1	57	43
Cyprinus carpio	40	3.7	60	40
Ictalurus punctatus	4	.4	75	25
Ameiurus melas	14	1.3	50	50
Morone chrysops	121	12.2	46	54
Micropterus salmoides	32	3.0	34	66
Pomoxis annularis	86	8.0	42	58
Aplodinotus grunniens	45	4.2	33	67
TOTALS	1,076	101.0		

TABLE III. WEIGHTS, PERCENTAGE COMPOSITION BY WEIGHT AND MEAN WEIGHTS OF LARGER FISHES FROM LAKE WICHITA TAKEN IN GILL NETS

SPECIES	Weight Taken	% of Total Weight	Mean Weight
Lepisosteus osseus	356.5 lbs.	16.7	3.4 lbs.
Lepisosteus platostomus	63.1	2.9	1.6
Lepisosteus productus	12.3	.6	1.4
Dorosoma cepedianum	292.6	13.2	1.6
Ictiobus cyprinellus	26.5	1.2	3.8
Ictiobus bubalus	704.9	32.9	3.2
Carpiodes carpio	383.7	17.9	2.2
Cyprinus carpio	58.2	2.7	1.5
Ictalurus punctatus	9.4	.4	2.4
Ameiurus melas	20.4	.9	1.5
Morone chrysops	103.9	4.9	.9
Micropterus salmoides	26.1	1.2	.8
Pomoxis annularis	30.7	1.4	.4
Aplodinotus grunniens	49.8	2.3	1.1
TOTALS	2,138.1	99.2	

TABLE IV. ROUGH RISHES TAKEN IN OUR GILL NETS IN LAKE WICHITA BETWEEN JUNE 1, 1954 AND MAY 30, 1955

SPECIES	Number Taken	% of Total	Weight Taken	% of Total	Mean Weight
Gars (all species)	150	19.4	431.9 lbs.	22.8	2.2 lbs.
Gizzard Shad	178	23.0	292.6	15.4	1.6
Buffalos (2 species)	233	30.1	731.4	38.5	3.1
River Carpsucker	173	22.3	383.7	20.2	2.2
European Carp	40	5.2	58.2	3.1	1.5
TOTALS	774	100.0	1,897.8	100.0	

TABLE V. ROUGH FISHES TAKEN BY COMMERCIAL FISHERMAN C. E. WALSTON IN LAKE WICHITA BETWEEN FEBRUARY 1 AND APRIL 30, 1955

SPECIES	Number Taken	% of Total	Weight Taken	% of Total	Mean Weight
Gars (all species)	387	3.5	2,309 lbs.	6.6	6.0 lbs.
Gizzard Shad	3,649	33.4	7,936	22.7	2.2
Buffalos (2 species)	3,282	30.0	13,947	39.9	4.3
River Carpsucker	3,534	32.3	10,062	29.1	2.8
European Carp	75	.7	645	1.7	8.6
TOTALS	10,927	99.9	34,899	100.0	

TABLE VI. COMPOSITION OF FORAGE FISH FAUNA OF LAKE WICHITA DETERMINED BY SEINING

SPECIES	Number Taken	Percent of Total
Astyanax fasciatus	2	.1
Notemigoneus crysoleucas	82	4.1
Pimephales vigilax	28	1.4
Hybognathus placita	6	.3
Notropis buchanani	101	5.0
Notropis deliciosus	1	.05
Notropis lutrensis	893	44.4
Gambusia affinis	216	10.8
Chaenobryttus coronarius	23	1.1
Lepomis cyanellus	110	5.5
Lepomis humilis	22	1.0
Lepomis macrochirus	324	16.1
Lepomis megalotis	199	9.9
Percina caprodes	1	.05

TABLE VII. SEASONAL VARIATION IN WATER QUALITY OF LAKE WICHITA

TE	Calcium	Sodium	Chloride	Sulfate	Carbonates	Total	pH
6/21/54	43	34	83	3	84	247	7.65
7/14/54	59	100	160	54	96	472	8.20
8/12/54	259	444	786	381	98	1,986	7.70
8/17/54	252	518	825	470	104	2,181	7.75
9/9/54	89	159	293	97	55	693	8.56
9/22/54	119	168	327	108	104	826	8.43
10/6/54	116	196	337	139	108	896	8.81
10/19/54	115	198	342	133	113	901	7.78
11/25/54	122	208	350	156	122	958	8.23
12/15/54	336	198	387	121	135	1,177	7.78
12/21/54	114	222	364	149	113	962	8.15
1/12/55	103	222	355	130	122	932	8.20
1/26/55	132	216	360	187	122	1,017	7.80
2/1/55	154	252	426	221	128	1,181	7.60
2/25/55	220	192	384	215	120	1,131	7.90
3/4/55	248	204	375	413	125	1,365	7.85
4/29/55	128	258	462	116	159	1,123	8.50
5/9/55	128	264	476	89	152	1,109	8.49
5/25/55	64	76	142	43	98	423	7.70

Lake Wichita is an artificial impoundment of 2,500 surface acres and 13,964 acre-feet capacity, located in Wichita and Archer counties in north-central Texas. The lake was constructed in 1901 and has had an extremely varied fishing history. Since it is located only three miles from the city of Wichita Falls fishing pressure has been unusually heavy. The lake is astonishingly fertile and productive and fishing has generally been excellent previous to 1952. In 1953 drought so reduced the lake volume that game fishes except for catfishes apparently died out. Heavy rains in the fall of 1953 again filled the lake to its spillway capacity.

In the spring of 1954, emergent vegetation again grew along the lake borders, apparently from persistent underground roots. Water lilies and green algae, especially Cladophora, were abundant. The plankton, and the insect faunas of the bottom and the littoral zones, are rich. Turbidity is great, and an eight-inch Seichi disk can rarely be seen at more than 300 mm. Water quality is generally good. Dissolved salts increase during dry months but are again diluted following rains. Chlorides ranged from 83 to 476 ppm. during the study period.

Twenty-nine species of fishes were found in Lake Wichita. Three of these are game species, reintroduced to the lake since 1953. These, the white bass, black bass and white crappie all reproduced in the summer of 1954, and large numbers of specimens in excess of one pound were taken by fishermen in 1955. The channel catfish is now uncommon and the flathead catfish rare, but the black bullhead, once rare in the lake, is now common. The freshwater drum is less common than in the past but now seems to be increasing in numbers. Three species of gars occur in the lake: longnosed, shortnosed and spotted. Only the former is common.

Rough fishes include the gizzard shad (abundant), bigmouth buffalo (rare), smallmouth buffalo (abundant), river carpsucker (abundant), and the European carp (moderately common).

Fourteen species are of small size. Of these, five are too uncommon to be important forage species. Three of these are probably released fishermen's bait (Rio Grande tetra, plains minnow, and sand shiner). The orange-spotted sunfish and logperch are native but rare. The nine more important forage species include: golden shiner, parrot minnow, ghost shiner, red shiner (most abundant species), mosquito fish, warmouth, green sunfish, bluegill sunfish and long-eared sunfish.

Tables include a checklist of species, percentage composition and sex ratios of larger fishes, weights, percentage composition by weight and mean weights of larger fishes, rough fishes taken by commercial fishermen, rough fishes taken in gill nets, composition of forage fish fauna, and the seasonal variation in water quality of the lake.