

STATE Texas  
PROJECT NO. F-7-R-1, Job B-1  
PERIOD June 15, 1953 -  
May 31, 1954

## Job Completion Report

by

Leo D. Lewis and Walter Dalquest

### TITLE

Inventory of the species of fishes present in Lake Kemp, Texas.

### OBJECTIVES

To determine the species present and their relative abundance as well as to determine the ecological factors influencing their distribution.

### TECHNIQUES USED

Seven collection stations were established on the eastern half of the lake on August 24, 1953 at sites designed to sample the varied ecological niches present. Two 100 - ft. gill nets were set at each station, in an effort to sample the populations of larger fishes in the lake. It was intended that the stations should be sampled at least once each month; preferably every three weeks, for periods of two days (and two nights) at a time. These stations were sampled on the following dates: August 24-25, September 30-October 1, October 21-23 and November 10-12.

Following the last date weather conditions became so dangerous at the exposed stations, and lack of cover for the crews working in the field presented such problems that these stations were abandoned and six new stations were established at the western end of the lake. This part of the lake is more distant from laboratory in Wichita Falls than are the stations at the eastern end of the lake, but the new stations are better protected from the violent winter storms, typical of the area, and overnight accommodations were available for the collection crew. The new stations were operated on the following dates: December 1-3, 1953; December 29, 1953; January 19-22, 1954; February 24-26, 1954; March 14-16, 1954.

All fishes taken in gill nets were removed and, as soon as was practicable, the specimens were identified, measured, weighed and their sex and stages of gonadal development were recorded. All ripe ovaries and the filled stomachs of predatory species were preserved for laboratory analysis. All abnormalities and diseases were noted and, if pathologic conditions were apparent, tissues were saved and sectioned in the laboratory for histological examination. Detailed notes were taken, with especial attention to ecological and environmental data.

The smaller fishes were taken at irregular intervals, with  $\frac{1}{4}$  inch meshed seines, as weather conditions and equipment permitted. Specimens taken were preserved in formalin for laboratory examination. Extreme variations in water level of the lake and abundance of drowned timber and stumps, made it impossible to establish permanent stations for comparative sampling of small fish population.

## FINDINGS

Lake Kemp, located in Baylor County, Texas, is a moderately large and relatively old impoundment. The dam was constructed in 1923 and, at spillway level, the lake holds 560,000 acre feet of water with a surface area of 22,800 acres. Its greatest length is approximately 20 miles and its greatest width is about eight miles. The shoreline, at spillway level, is approximately 125 miles.

The sources of Lake Kemp are the headwaters of the Big Wichita River, notably the North and South forks of this river. During most of the period of this study the headwaters were intermittent, almost dry at times, and greatly polluted with natural salts (see Completion Report, Job C-1). The watershed draining to the lake is considerable and after rains the lake is subject to rapid rise. Throughout the year, but especially during the late spring and summer, water is withdrawn (to Lake Diversinn) for irrigation. During most of the period of study the lake was 30 feet or more below spillway level and at one time approached a minimum of 50,000 acre feet in volume.

Lake Kemp is devoid of rooted aquatic vegetation. There is an abundance of brush, weeds, etc. that grows on areas temporarily above water level and which are partially or completely submerged when the lake rises. These, in many cases, seem to serve as emergent vegetation for fish species. There is little fixed algae along the shores due to the violence of wave action and fluctuations in water level. The lake is rich in plankton as a result of water clarity and abundance of sunlight. The lake is situated in semi-desert country, where cloudy days are unusual. Water clarity is a direct result of flocculation of suspended particles by dissolved salts (See Completion Report Job C-1). Turbidity (Seichi disk) reached extremes of 735 mm. during the period of study, following periods of calm weather. Following storms turbidity was reduced to less than 300 mm. The temperature of the surface water, away from shore, varied from 25°C in summer to 4°C in winter (all temperature readings taken at 7:30 A. M.) Skim ice formed over shallow water in protected coves in early January 1954..

A total of 26 species of fish was detected in the lake. These fall into three general groups: species of relatively large size and which are present in numbers great enough to cause them to be important, either as game species or as rough fish, in fisheries management: forage fishes, of the "minnow" and "sunfish" type (sunfishes in Lake Kemp rarely reach 100 grams in weight and are almost never taken by fishermen); casual species, too scarce to be of economic importance. Each of these groups is considered separately.

## Large and Important Fishes

Nine species are considered to belong to this group. One is a predator (the gar); three are rough fishes (gizzard shad, carpsucker and carp); five are game species (channel catfish, white bass, black bass, white crappie and drum). The position of the drum on this list may be open to question; nevertheless many persons do fish for drum, and many others that take drum while fishing for other species, save and eat them.

The spotted gar is not abundant in the lake. The status of this species remains in doubt. Pending a thoroughgoing investigation of its food habits, we consider it beneficial in lakes where rough fish make up the greatest part of the population. Certainly the gars feed on sunfishes and gizzard shad (see Completion Report, Job B-4) and this we consider beneficial.

Rough fishes dominate the fish population of Lake Kemp. Two species, the gizzard shad and river carpsucker, together, make up 65 percent of the population. The European carp makes up an additional 6 percent. This abundance of rough fish, and relatively scarcity of game fish, is considered typical of an "old" impoundment. Admittedly Lake Kemp is a "carpsucker hole" at present, with a disproportionately high ratio of rough to game fish as compared with nearby lakes (see Completion Reports, Jobs B-2 and Jobs B-3). Nevertheless it is encouraging that only three species make up the rough fish population. Thus the lake is well adapted to experimental control of rough fish species. One of the three species of rough fishes in Lake Kemp can now be controlled selectively, by use of chemicals (gizzard shad; see Progress Report, Job E-1, Segment 1.)

Five species of fishes constitute the game fish population of Lake Kemp. These forms are here considered game in that virtually all angling efforts by sports fishermen are devoted to their capture. Some of these species are not game fishes in the classical sense.

The channel catfish is the third most common of the game fishes, and it is also one of the most sought-after species. It is especially easy to take on trotlines, is an excellent food fish, and reaches large size (our largest specimen weighed 14 pounds.)

The white bass (Morone chrysops) is the second most abundant fish in Lake Kemp. Locally called "sand bass", this species is appreciated by most anglers and taken whenever possible. For the most part, however, the white bass is taken incidental to black bass or crappie fishing.

The black bass (Micropterus salmoides) was once abundant in the lake but is now far less common. Gill nets probably do not give a true picture of the relative numbers of black bass. The given figure (2% of the large-fish population) may be too low. As compared with other lakes in the general area (see Completion Reports, Jobs B-2 and B-3), the black bass population of Lake Kemp is low. Observations of fishing success also verify this. Black bass in Lake Kemp do, however, reach large size and fish in excess of six pounds weight are not uncommon. The species is intensively sought by fishermen using artificial lures and is one of the most important sports fishes of the lake.

The white crappie (Pomoxis annularis) is the most abundant and possibly the most important game fish of the lake. Few crappie are taken in the late summer (even in nets) but the crappie is the winter and early spring fish in Lake Kemp. Large catches are often made at baited holes and some specimens reach large size (up to four pounds, in some instances).

The drum (Aplodinotus grunniens) is rarely sought by fishermen. It is, however, often taken especially by persons seeking the channel catfish. Those drum taken are rarely discarded; although considered as slightly inferior as both a game and fish food, it is suitable for the table. Some specimens of large size, in excess of 20 pounds, have been taken in Lake Kemp. The young of the drum are important as food for the other game fish species (see Completion Report, Job B-4).

#### Forage Fishes

Included here are those fishes which, from their small size, are presumed to serve as food for the predatory species. We have no evidence that

many of them do so (see Completion Report, Job B-4). None of these forms constitute game fishes in Lake Kemp, though some sunfishes might grow large enough to be called panfish. We have taken no sunfishes in the lake that weighed more than 100 grams. We have never seen a fisherman at Lake Kemp with a sunfish in his bag.

One of the four species of minnow (Notropis) in Lake Kemp, two (N. lutrensis and N. buchanani) are the usual common minnows of the Wichita River drainage. Other minnows of the Wichita drainage are missing from Lake Kemp and two forms (N. bairdii and N. oxyrhynchus), more typical of the Brazos River drainage are present. N. bairdii is present, though rare, throughout the Wichita River but we have no records of N. oxyrhynchus occurring below Lake Kemp. The Parrot Minnow (Pimephales vigilax) is relatively scarce in Lake Kemp and the plains minnow (Hybognathus placita) extremely common. This latter is usually considered a river minnow but breeds in Lake Kemp. The plains killifish (Fundulus kansae) and, to a lesser extent, the Red River pupfish (Cyprinodon rubrofluviatilis) are forms typical of the saline waters of the upper Wichita River and are not common in Lake Kemp except near its head. The mosquito fish (Gambusia affinis) is found in virtually all natural waters of this area. It was relatively scarce in Lake Kemp.

Of the sunfish group, the two common local species (Lepomis megalotis and L. macrochirus) are present, and the latter outnumbers the former. Two species present in nearby lakes (L. cyanellus and L. microlophus) were not detected. The orange-spotted sunfish (L. humilis) is usually a pond fish in north central Texas, and was not detected in nearby lakes. Four specimens were taken in Lake Kemp on April 27, 1954. It may be more widespread than our records indicate.

#### Casual Forms

Four species of fishes, all of large size, are too scarce in Lake Kemp to be of importance from the standpoint of fisheries management. Several specimens of the shortnosed gar (Lepisosteus platostomus) were taken in gill nets. This form is not typical of large lakes and probably specimens trapped by the construction of the Lake Kemp Dam have managed to breed and persist in the lake, greatly outnumbered by the very similar spotted gar (Lepisosteus productus). The latter seems to be the more successful lake fish.

The blue catfish (Ictalurus furcatus) is present in the lake in small numbers. Individuals of large size are occasionally reported by fishermen but some, perhaps most, of these are probably large channel catfish (Ictalurus punctatus.) We took but a single blue catfish in the period of this study.

The flathead catfish (Pilodictus olivaris) is present in Lake Kemp in small numbers. Small specimens were reported taken occasionally by fishermen on tridlines, and we studied one specimen taken in the nets of a commercial fisherman.

The Kentucky Jumper (Micropterus punctulatus) has been introduced into Lake Kemp. Specimens are often reported as taken by fishermen but at least some of these are unusually brightly colored black bass. We took no specimens in gill nets but obtained one small individual from a fisherman. The true status of this species remains in doubt; we suspect it is now scarce.

## Species Absent from Lake Kemp

Two species of large size are abundant in Lake Diversion, a few miles downstream from Lake Kemp, and are in the Wichita River just below the Lake Kemp Dam, but have never, to our knowledge, been taken in Lake Kemp. These are the longnosed gar (Lepisosteus osseus) and the smallmouth buffalo (Ictiobus bubalus). Two species that are rare in Lake Diversion, just below Lake Kemp, were not found at all in Lake Kemp (Hiodon alosoides and Ictiobus bubalus.) Two species of minnows and two species of sunfishes, found in Lake Diversion, were not detected in Lake Kemp. It is assumed that either these forms were not in the river above the Lake Kemp Dam when the dam was constructed (probable in most cases), were once present in Lake Kemp but have since become exterminated, or have been introduced into Lake Diversion but not Lake Kemp.

It is noteworthy that a minnow (Notropis percobromus) was found in the river between Lake Kemp and Lake Diversion and in the river below Lake Diversion but has not been taken in either lake. Apparently this is a river form that does not survive in lakes.

## SUMMARY

Lake Kemp is located in Baylor County, north central Texas. It is an impoundment (dam constructed in 1923) of 560,000 acre feet at spillway level. During the course of this investigation (August 24, 1953 to April 22, 1954) the lake was 30 feet or more beneath spillway level and at one time approached 50,000 acre feet in volume.

The lake waters are heavily polluted with natural salts (1050 to 2100 ppm. total solids), relatively clear (turbidity 300-735 mm.) due to flocculation of suspended matter, and rich in plankton as a result of water clarity and intense sunlight of the semi-desert surroundings. No multicellular aquatic vegetation occurs in the lake.

Twenty-six species of fishes were found in Lake Kemp. Of these, 9 are of large size and numerous enough to be important as game species of rough fish species; 13 are forage forms (minnow and sunfish types); four are of rare or casual occurrence. Of the important forms, one is a predator (spotted gar); three are rough fish (gizzard shad, river carpsucker and European carp) and five are game or food species (channel catfish, white bass, black bass, white crappie, drum). Of 1003 fish of the large and important group, weighing 933.34 pounds, of certainly-known sex and taken in gill nets only, 40 (4%) weighing 99.74 pounds (10.7%) were gars, 711 (71%) weighing 648.18 pounds (69.5%) were rough fish; and 252 (25%) weighing 177.28 pounds (19%) were game fish. Four species of minnows (Notropis lutrensis, N. buechanani, N. oxyrhynchus and Hybognathus placita) made up 92.34% of the 2,412 forage fishes taken in seines. Four species of fishes (short-nosed gar, blue catfish, flathead catfish and spotted bass or Kentucky jumper) are too scarce in the lake to be important from the standpoint of fisheries management.

Lake Kemp is, biologically, an old impoundment, with the rough fishes greatly outnumbering the game fishes in both numbers and weight. From the standpoint of fishermen, it is now in poor condition. It is encouraging however that the rough fish population includes only three species.

Table 1. Checklist of Fishes of Lake Kemp

Species	Large and Important	Forage Fishes	Casual Forms
<u>Lepisosteus platostomus</u>			X
<u>Lepisosteus productus</u>	X		
<u>Dorosoma cepedianum</u>	X		
<u>Carpionodes carpio</u>	X		
<u>Cyprinus carpio</u>	X		
<u>Hybopsis aestivalis</u>		X	
<u>Notropis bairdii</u>		X	
<u>Notropis buchmanii</u>		X	
<u>Notropis lutrensis</u>		X	
<u>Notropis oxyrinchus</u>		X	
<u>Hybognathus placita</u>		X	
<u>Pimephales vigilax</u>		X	
<u>Ictalurus punctatus</u>	X		
<u>Ictalurus furcatus</u>			X
<u>Pilodictus olivaris</u>			X
<u>Fundulus kansae</u>		X	
<u>Cyprinodon rubrofluviatilis</u>		X	
<u>Gambusia affinis</u>		X	
<u>Morone chrysops</u>	X		
<u>Micropterus salmoides</u>	X		
<u>Micropterus punctulatus</u>			X
<u>Lepomis humilis</u>		X	
<u>Lepomis macrochirus</u>		X	
<u>Lepomis megalotis</u>		X	
<u>Pomoxis annularis</u>	X		
<u>Aplodinotus grunniens</u>	X		

Table 11. Percentage Composition and Sex Ratios of Large and Important Species of Fishes From Lake Kemp, as Determined from Gill Nets Only.

Species	Total	% of Total	% Males	% Females
<u>Lepisosteus productus</u>	40	4	37	63
<u>Dorosoma cepedianum</u>	222	22	36	64
<u>Carpiodes carpio</u>	428	43	52	48
<u>Cyprinus carpio</u>	61	6	50	50
<u>Ictalurus punctatus</u>	39	4	44	56
<u>Morone chrysops</u>	79	8	47	53
<u>Micropterus salmoides</u>	15	2	37	63
<u>Pomoxis annularis</u>	111	10	43	57
<u>Aplodinotus grunniens</u>	8	1	87	13

Table 111. Weights, Percentage Composition by Weight, and Mean Weights of Large and Important Fishes from Lake Kemp, as Determined from Gill Nets.

Species	Weight	% of Total	Mean Weight
<u>Lepisosteus productus</u>	99.74 lbs.	10.7	2.49 lbs.
<u>Lepisosteus platostomus</u>	8.14	.8	2.71
<u>Dorosoma cepedianum</u>	56.60	6.1	.24
<u>Carpiodes carpio</u>	530.00	56.8	1.20
<u>Cyprinus carpio</u>	61.58	6.6	1.01
<u>Ictalurus punctatus</u>	33.30	3.6	.86
<u>Morone chrysops</u>	43.31	4.6	.54
<u>Micropterus salmoides</u>	41.08	4.4	2.74
<u>Pomoxis annularis</u>	33.44	3.6	.30
<u>Aplodinotus grunniens</u>	26.15	2.8	3.27*

\* - Includes one very large specimen; weight 25.5 lbs.

Table IV. Percentage Composition of Forage Fishes for Lake Kemp  
As Determined from Seine Samples Only.

Species	Total	Percent
<u>Notropis bairdii</u>	29	1.20
<u>Notropis buchanaani</u>	244	10.12
<u>Notropis lutrensis</u>	1178	48.84
<u>Notropis oxyrhynchus</u>	271	11.23
<u>Pimephales vigilax</u>	19	.79
<u>Hybopsis aestivalis</u>	10	.40
<u>Hybognathus placita</u>	534	22.15
<u>Fundulus kansae</u>	54	2.24
<u>Cyprinodon rubrofluviatilis</u>	7	.29
<u>Gambusia affinis</u>	11	.46
<u>Lepomis humilis</u>	4	.17
<u>Lepomis megalotis</u>	12	.50
<u>Lepomis macrochirus</u>	39	1.61

STATE Texas  
PROJECT NO. F-7-R-1, Job B-1  
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C O R R E C T I O N   S H E E T

Line 6, Page 5, Job B-1, Job F-7-R-1 should read Ictiobus  
cyprinellus instead of Ictiobus bubalus.

W. SCOTT SCHREINER  
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*Corrections  
being  
made  
next  
week*

AUSTIN, TEXAS

3300 Iowa Park Road  
Wichita Falls, Texas  
November 16, 1954

*Answered*

Mrs. Lorraine Friedrich  
Sec'y to M. Toole

Dear Jane:

We finally got around to proof reading the project reports. Mighty sorry to have delayed you in your efforts to get them submitted to the Fish and Wildlife Service.

The mistakes are few and unimportant. Reference to the errors are given on the first page of each report. All other reports except for the ones sent back are O.K.

The most important mistake was ours — not yours. We would like to have it corrected, and you can do as you please about the rest. I am referring to Job B-1 report, page 5. Please change the word bubalus to cyprinellus.

We will appreciate as many copies as you can afford to send us of all our reports, especially Job E-1.

Thanks for everything. My ~~apologies~~ apologies again for being so dilatory.

Sincerely yours,

Leo Lewis  
Aquatic Biologist

P. S. Please ask Will Watt what he has found out about the axle for our Tipps boat trailer. We need it *tw* quite often.

RECEIVED

NOV 17 1954

G. & F. COMM.