

STATE Texas

PROJECT NO. F7R3, Job B-9

PERIOD June 1, 1955 - May 31, 1956

FILE

Segment Completion Report

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TITLE

An Inventory of the Species of Fishes Present in Buffalo Lake, Texas.

OBJECTIVES

To determine the species present and their relative abundance, as well as the ecological factors that govern their distribution.

TECHNIQUES

Each month, with the exceptions of October 1955 and March 1956, during the project year, collecting trips were made to Buffalo Lake. Several days were spent at the lake on each occasion. Ten to twelve experimental gill nets were set on each visit, and every fish taken in these nets was measured, weighed, and the stage of gonadal development recorded. In addition, filled stomachs of predacious species were saved in formalin, as well as ripe ovaries, pathological tissues, and parasites. Samples of the forage fishes were obtained with the use of small-mesh seines and the complete collections preserved in formalin. In the laboratory the formalin-preserved materials were identified and examined. A part of this data is reported elsewhere (Completion Report, Job B-4, Segment 3.)

Physical data, including air temperature, water-surface temperature and turbidity were recorded. Samples of lake water were saved and the pH and dissolved solids present were determined. Ecological data pertaining to the lake were obtained in the usual ways and detailed notes were taken.

Insofar as possible, all available information has been presented in the following pages in a somewhat standardized form, so that the data might be easily compared with completion reports dealing with other lakes and rivers of Region 1-B, Northcentral and Northwestern Texas.

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.

BACKGROUND

Buffalo Lake lies in Randall County, in the Texas Panhandle, about three miles south of the town of Umbarger and approximately 35 miles southwest of the city of Amarillo. It was constructed under the Federal Relief Program and was completed in 1939. The lake measures, at spillway level, 1,875 surface acres and contains approximately

18,300 acre-feet of water when filled. The lake is intended for fishing and recreation and is now under the control of the United States Forest Service. Annual patronage is from 250,000 to 300,000 persons per year. Most of these are fishermen and their families.

The lake is elongated and rather narrow, occupying the canyon of Tierra Blanca Creek. The dam is at the eastern end of the lake and the creek to the west of the lake is reduced to elongated holes except after rains. The creek below the lake is usually completely dry. The canyon of Tierra Blanca Creek is cut deeply into white Pliocene rock and in places the lake is bordered with white cliffs. The upland is the rolling grasslands of the High Plains, but the immediate environs of Buffalo Lake are more arid and desertlike, with prominent vegetation of yucca and various species of cacti. Close to the lake grow groves of elms, cottonwoods and other broad-leaved trees.

The lake occupies an unusually beautiful setting - almost oasis-like in a rugged land of white rock. Good roads surround the lake and the lake is accessible to fishermen almost everywhere. Rarely is it necessary to park one's car more than a few yards from a chosen fishing site, and usually the lake shore is of firm white sand and well shaded by trees. Overnight camping sites are numerous, and meals and cabins are available.

FINDINGS

Buffalo Lake is an extremely productive lake insofar as number of fishes is concerned. The fish fauna is rather small and unique in some ways. For example, there are no gars, buffalo-fishes or freshwater drum in the lake. White bass were absent until stocked by us (see Completion Report, Job F-1). The forage fish fauna is equally scanty. In total numbers of individuals, the lake is astonishingly rich. We would judge that Buffalo Lake contains more fishes per acre of water than any other lake in Region 1-B. Unfortunately, the lake resembles other lakes in Region 1-B in that the rough fish vastly outnumber the game species. Among lakes studied to date, Buffalo Lake seems to be most like Lake Kickapoo in fertility, water quality and turbidity.

The plankton fauna of Buffalo Lake is rich, and part of the turbidity of the water is due to plankton. The insect fauna seems limited; dragonflies, damselflies, midges, mosquitos, etc., were noted. Some crayfish, identified by Dr. Horton H. Hobbs of the University of Virginia as procambus simula, are present, and a species of "freshwater shrimp" was reported but not found by us. Freshwater mussels were found, however. Multicellular aquatic vegetation is absent, probably as a result of fluctuating lake level and the extreme turbidity. Vast numbers of waterfowl spend the winter months on the lake, which is a federal game refuge.

ANNOTATED CHECKLIST OF FISH SPECIES

Dorosoma cepedianum. Gizzard Shad. The shad is one of the commonest fishes of the lake and is the commonest of the larger fishes. It makes up about 40% of the population of the larger fishes. It is found almost throughout the lake, from shoreline to mid-lake, but is primarily an open-water, surface form. It is useless as a game fish and inedible for man. Young shad are much utilized by game fishes as food, but the harm done by shad in muddying the water and using space otherwise available to game fishes far offsets their value as forage. The large numbers of shad constitute one of the major problems in managing the fish resources of Buffalo Lake.

Carpionodes carpio. River Carpsucker. In most North Texas Lakes, the carpsucker is a problem as serious as the gizzard shad. The carpsucker is usually extremely abundant and almost ineditable, occupying space that could be used by game fishes. Strangely enough, the carpsucker is not common in Buffalo Lake, where it constitutes less than two percent of the large-fish population. The carpsuckers of Buffalo Lake are, however, the largest specimens of the species we have ever seen.

Cyprinus carpio. European Carp. The carp is the third-most abundant of the larger fishes found in Buffalo Lake, taking the place occupied in most North Texas lakes by the carpsucker. In Buffalo Lake, the relative numbers of the two species seem to be almost the reverse of the usual condition. Although abundant, the carp from the lake rarely seem to grow to large size.

Carassius auratus. Goldfish. Goldfishes of large size are quite common in Buffalo Lake. They vary considerably in color but bright, orange-red individuals are most common. We suspect that the absence of gars in the lake has permitted the existence of the goldfishes.

Carp-goldfish Hybrids. Hybrids between the carp and goldfish are quite numerous in Buffalo Lake. Most individuals are small, less than a half-pound, but some individuals weighing up to five pounds are taken. They are almost perfectly intermediate in characters: face shorter than the carp but longer than the goldfish; color somewhat redder than the carp but far less so than the goldfish; one set of barbels rather than two, as the carp, or none as the goldfish; the "hump" on the back more pronounced than in the carp, but less so than in the goldfish; caudal peduncle deeper than in the carp but less so than in the goldfish. One distinctive feature of the hybrids is the distinctness of the lateral line. This is no stronger than in the two parent species, but in those forms it is obscured, in the carp by the scale markings and in the goldfish by the bright red colors.

The sexual development of the hybrids is varied. It appears that most males have well-developed gonads from which milt can be pressed in the breeding season of the carp and goldfish. Some hybrids had gonads so small they could not be identified in the field and were preserved in formalin. In the laboratory all were found to be females. A few hybrid females had large ovaries filled with well-developed eggs that appeared ready for fertilization.

Pimephales promelas. Fathead Minnow. This minnow is widespread but not abundant in the lake. It is primarily a fish of the pools of the rivers in the Panhandle, and the original stock may have been native to Tierra Blanca Creek before impoundment.

Notropis lutrensis. Red Shiner. Shiners of various species are common in most Texas waters, and Buffalo Lake is the only large body of water known to us where only a single species is found. It is not unexpected that the shiner present is the widespread and abundant red shiner. This species is the only common forage minnow in the lake.

Hybognathus nuchalis. Silvery Plains Minnow. This is the common bait minnow of Northern Texas. It is primarily a river species and those found in our seine drags were probably escaped or released bait. However, most of the lakes of Northern Texas now have populations of silvery minnows that apparently were established from released bait animals.

Phenacobius mirabilis. Suckermouthed Minnow. Our single record of the suckermouthed minnow may have been a released bait or have come from a small population developed from released baits. We doubt that it is endemic to Tierra Blanca Creek. Suckermouthed minnows are primarily stream minnows, but the species is common in Lake Diversion, at least. This is our first record of this fish from the Texas Panhandle.

Ictalurus punctatus. Spotted Channel Catfish. Large channel catfish are common in Buffalo Lake and much fishing effort is devoted to the taking of them. The largest specimens are taken by "drift-fishing" and trot lining.

Ameiurus melas. Black Bullhead. Bullheads are common in most waters of the Panhandle and at one time were said to be very abundant in Buffalo Lake. We found the species uncommon, possibly as a result of competition with larger catfishes.

Pilodictus olivaris. Flathead Catfish. Relatively few of these large catfishes are taken by fishermen at Buffalo Lake, but the species is moderately common there. Our nets did not take any individuals of large size, but doubtless many occur. (Commonly, flathead catfishes exceed 30 pounds in weight and anything over 25 pounds may be considered large).

Fundulus kansae. Plains Killifish. Killifishes are common in most Panhandle streams. The Buffalo Lake population may have been trapped by the construction of the dam or may have been introduced as bait, although the species is not greatly used as bait. Killifishes are not lake fishes, but we know of several established populations that have existed in lakes for years.

Gambusia affinis. Mosquitofish. The ubiquitous mosquitofish is not common in the lake. Most specimens were taken in shallows and heavy cover.

Morone chrysops. White Bass. We introduced a small number of white bass from Lake Diversion to Buffalo Lake two years ago, and a larger number this past spring (under Job F-1). The species is now well established in Buffalo Lake, and many small individuals were taken by fishermen. We took some large specimens in our gill nets. The species has not become common in the lake yet, and the introductions appear to be less successful than we would have hoped.

Micropterus salmoides. Largemouth Black Bass. Largemouth bass have been placed in Buffalo Lake by the Texas Game and Fish Commission on several occasions. Bass, some of large size, are quite common in the lake, and much fishing effort is devoted to their capture.

Lepomis humilis. Orangespotted Sunfish. This small, brightly-colored fish seems to be moderately common in Buffalo Lake. Over most of Northern Texas, it is widespread but rarely common.

Lepomis macrochirus. Bluegill Sunfish. Bluegills are common in the lake but rarely reach one-half pound in weight. Under present conditions, the species is not abundant enough to constitute a pest.

Lepomis megalotis. Longear Sunfish. Like the bluegill, the longear sunfish is common, rarely reaches a half-pound in weight, but is not yet a pest in Buffalo Lake.

Pomoxis annularis. White Crappie. The crappie is the second-most abundant large fish in the lake. Much angling effort is devoted to crappie, especially by inexperienced fishermen, for they are so abundant that they may be easily taken. Large numbers of crappie large enough to eat are taken, but there remains enormous numbers of tiny individuals that constitute a threat to the population of larger game fishes of the lake. The crappie is distinctly over-abundant in Buffalo Lake at this time.

Percina caprodes. Logperch. The logperch is moderately common in the lake and in Tierra Blanca Creek. The population is probably endemic. This is the only population of logperches in the Panhandle, to our knowledge. The species is of erratic distribution in Northern Texas and does not occur in saline waters.

Lepomis cyanellus. Green Sunfish. Although we took but one green sunfish in Buffalo Lake, we suppose the species is not uncommon there. In lakes, the green sunfish prefers heavy cover and is difficult to take by ordinary seining methods.

Table 1. Total Number of Fishes Taken From Buffalo Lake.

Species	Number Taken
<u>Dorosoma cepedianum</u>	1441
<u>Carpiodes carpio</u>	56
<u>Cyprinus carpio</u>	380
<u>Carassius auratus</u>	23
<u>Carassius x Cyprinus hybrids</u>	27
<u>Pimephales promelas</u>	342
<u>Notropis lutrensis</u>	2233
<u>Hybognathus nuchalis</u>	14
<u>Ictalurus punctatus</u>	142
<u>Phenacobius mirabilis</u>	1
<u>Ameiurus melas</u>	13
<u>Pilodictus olivaris</u>	10
<u>Fundulus kansae</u>	22
<u>Gambusia affinis</u>	35
<u>Morone chrysops</u>	16
<u>Micropterus salmoides</u>	78
<u>Lepomis cyanellus</u>	1
<u>Lepomis humilis</u>	8
<u>Lepomis macrochirus</u>	12
<u>Lepomis megalotis</u>	10
<u>Pomoxis annularis</u>	1260
<u>Percina caprodes</u>	9
	<u>6124</u>

Table 2. Percentage Composition of the Forage Fish Fauna of Buffalo Lake.

Species	Number Taken	% of Total
<u>Pimephales promelas</u>	342	12.7
<u>Notropis lutrensis</u>	2233	83.1
<u>Hybognathus nuchalis</u>	14	.5
<u>Phenacobius mirabilis</u>	1	.04
<u>Fundulus kansae</u>	22	.8
<u>Gambusia affinis</u>	35	1.3
<u>Lepomis cyanellus</u>	1	.04
<u>Lepomis humilis</u>	8	.3
<u>Lepomis macrochirus</u>	12	.5
<u>Lepomis megalotis</u>	10	.4
<u>Percina caprodes</u>	9	.3
	<u>2687</u>	<u>100.0</u>

Table 3. Percentage Composition and Sex Ratios of Larger Fishes from Buffalo Lake.

Species	Number Taken	% of Total	% of Males	% Females
<u>Dorosoma cepedianum</u>	1369	40.9	44.6	55.4
<u>Carpiodes carpio</u>	52	1.6	59.6	40.4
<u>Cyprinus carpio</u>	371	11.1	51.8	48.2
<u>Carassius auratus</u>	22	.7	50.0	50.0
<u>Hybrids</u>	26	.8	65.4	34.6
<u>Ictalurus punctatus</u>	140	4.2	48.6	51.4
<u>Ameiurus melas</u>	13	.4	38.5	61.5
<u>Pilodictus olivaris</u>	10	.3	20.0	80.0
<u>Morone chrysops</u>	16	.5	31.3	68.7
<u>Micropterus salmoides</u>	74	2.2	36.5	63.5
<u>Pomoxis annularis</u>	1252	37.4	49.8	50.2
	3345	100.1		

Table 4. Percentage Composition by Weight and Mean Weights of Larger Fishes from Buffalo Lake.

Species	Weight Taken	% of Total Weight	Mean Weight
<u>Dorosoma cepedianum</u>	829.7 lbs.	39.0%	.6 lbs.
<u>Carpiodes carpio</u>	146.0	6.9	2.8
<u>Cyprinus carpio</u>	474.3	22.3	1.3
<u>Carassius auratus</u>	19.7	.9	.9
<u>Hybrids</u>	14.3	.7	.6
<u>Ictalurus punctatus</u>	112.8	5.3	.8
<u>Ameiurus melas</u>	6.2	.3	.5
<u>Pilodictus olivaris</u>	62.8	2.9	6.3
<u>Morone chrysops</u>	15.3	.7	1.0
<u>Micropterus salmoides</u>	174.3	8.2	2.4
<u>Pomoxis annularis</u>	274.3	12.9	.2
	2129.7 LBS.	100.1%	

Note: Not included in the above two tables are the following fishes taken in seine hauls and counted but not measured or weighed: 72 Dorosoma, 4 Carpiodes, 9 Cyprinus, 1 hybrid, 2 Ictalurus, 4 Micropterus, 8 Pomoxis, 1 Carassius.

Table 5. Physical Conditions of Buffalo Lake Water when Fish Samples were Taken.

Date	Air Temperature	Water Temperature	Turbidity (mm.)	pH
6/23/55	18	18	350	8.30
7/20/55	20	23	205	8.05
8/9/55	24	25	220	7.73
9/15/55	26	22	170	
11/9/55	16	7	270	7.90
12/14/55	-1	1	210	8.32
1/18/56	-3	0	200	
4/27/56	15	15	110	
5/12/56	17	15	200	

Table 6. Chemical Conditions of Buffalo Lake Water when Fish Samples were Taken.

Date	Calcium	Sodium	Chloride	Sulfate	Carbonates	Total Salts
6/23/55	70	33	54	50	127	334
7/20/55	68	23	36	48	159	434
8/9/55	76	28	45		484	633
9/15/55	70	30	46		314	460
11/9/55	78	21	33		292	424
12/14/55	92	36	55		317	500
2/28/56	82	92	50	36	329	589
4/27/56	104	118	62	98	379	761
5/7/56	106	124	61	134	339	764
5/12/56	104	124	61	134	339	762

Note: The water sample taken January 18, 1956, froze and shattered in transit. Physical data for February 28, 1956, was lost. Turbidities were measured with an eight-inch Seichi disk. pH was determined with a Beckman pH meter. This machine was out of order on dates when pH is indicated by a dash. Sulfates indicated by dash were insignificant, less than 5 ppm., but were not measured exactly. Carbonates include carbon dioxide, carbonate and bicarbonate but, at the prevailing pH, were largely bicarbonate. Figures for calcium include magnesium as well.

RECOMMENDATIONS

Buffalo Lake can be made into a highly productive game fish lake, if the present overpopulation of gizzard shad, European carp and small crappie can be reduced. Once this is accomplished, the game fishes should keep the fry and young of the rough fish species under natural control for several years, at least. During this period fishing should be excellent. We therefore recommend a selective kill of gizzard shad followed by appropriate measures to reduce the carp and crappie populations.

SUMMARY

Buffalo Lake is located in the Texas Panhandle, approximately 35 miles southwest of Amarillo. It contains 18,300 acre-feet of water at spillway level, and is operated primarily for fishing and recreation, under control of the U. S. Forest Service. Accommodations for fishermen are excellent. At the present time, fish are abundant in the lake, but belong to relatively few species. Red shiners and fathead minnows make up the bulk of the forage fish population. Game fishes include black bass, white bass, crappie, channel catfish and flathead catfish. Rough fishes include gizzard shad, European carp, river carsuckers and goldfishes, with a large number of carp-goldfish hybrids. The lake is greatly overpopulated with gizzard shad, European carp and undersized crappie. Control measures for these species are suggested.