Report of Fisheries Investigations

Fisheries Survey of Buffalo Lakes, Lubbock, Texas

by

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Supplemental Report

State of TEXAS

Name: Fisheries Investigations and Surveys of the Waters of Region 1-B.

Title: Fisheries Survey of Buffalo Lakes, Lubbock, Texas.

Abstract:

A total of 13 species, representing five families of freshwater fish, was collected from Buffalo Lakes for study. Data concerning relative abundance, food habits, sexual development, coefficient of condition and pathological conditions were recorded, and, as far as possible, reduced to tabular form.

Though all species present were found to be in good condition, Buffalo Lakes contain an excessive population of carpsucker and black bullhead catfish.

Remedial recommendations included complete eradication of the existing fish population in all three lakes as well as their headwater stream and impoundments, and restocking with a balanced ratio of game and forage fishes. It was also recommended to drop water levels as low as possible prior to treatment to permit reduction in cost of treatments, conditioning of the lake bottoms, and construction of fishing piers, boat docks, fish shelters, spawning beds for bottom-nesting game fishes, and seining beaches for future surveys and rough fish controls.

Fishing should be prohibited for at least one year after restocking. Another fisheries survey will be conducted prior to continuation of fishing to determine growth and condition of the stocked fish, and to determine future requirements to maintain good fishing in Buffalo Lakes.

Objectives:

To conduct a fisheries investigation in an effort to determine species present, their relative abundance, condition, stage of gonadal development, and other data upon which to base recommendations for improving the fishery of the lake.

Techniques:

Field work on this job was done on April 21 and 22, 1958. Approximately 2400 feet of gill nets were set ranging in size from one inch to three inch square mesh for a single night set. Each fish taken in these nets was measured, weighed, and the stage of gonadal development recorded. Filled stomachs of predacious species were saved in formalin and their contents later identified in the laboratory. Check seining was done with a 20 foot minnow seine (1/8 inch mesh), and a 100 foot nylon drag seine (1/2 inch mesh).

Physical data, including air temperature, water temperature and turbidity were recorded at the lake. Water samples were saved for a chemical analysis in the laboratory.

Findings:

The waters under study consist of three lakes in a series, situated on the Double Mountain Fork of the Brazos River, approximately twelve miles southeast of Lubbock, Lubbock County, Texas. Buffalo Lakes are under operating control of the Lubbock County Water Control and Improvement District Number 1. The three lakes and the surrounding land comprise a recreation area for fishing, boating, swimming and camping. Fees charged for use of this recreational area are as follows:

General admission	$ .25 per person
Daily fishing permit	1.00 per day
Boat admission	1.00 per day
Annual fishing permit	20.00 per person

Physical Characteristics

The upper lake, No. 1, is the larger with an estimated volume of 630 acre feet. It has an uncontrolled spillway 63 feet long at the right end of the dam and a 6-inch pipe with valve at the left end. The middle lake, No. 2, contains an estimated 140 acre feet of water. It has an uncontrolled spillway 25 feet long at the right end of the dam, an 18-inch corrugated iron culvert pipe with valve at the right end, and a 10-inch cast-iron pipe and valve at the left end of the dam. The third lake, No. 3, is the smaller with an estimated volume of 133 acre feet. Controlled releases are permitted through the dam by a $2\frac{1}{2}$ inch cast-iron pipe and valve and a 12-inch corrugated iron pipe with valve. An uncontrolled service spillway 50 feet long has been excavated in rock on the right bank, and an uncontrolled emergency spillway, 60 feet long, has been excavated in earth on the left bank.

Figure 1. (aerial photograph) shows the lakes as they now exist. Dotted lines indicate a proposed new development which will incorporate the three lakes into one large lake. The main purpose of this survey is to determine the status of the fishery of the three lakes so that remedial recommendations can be carried out before impounding the larger lake.

According to a study made by the U. S. Geological Survey between March 4, 1952, and March 18, 1954, the lakes store enough flood water to remain practically full most of the time. Measurements of inflow to the upper Buffalo Lake indicate a fairly dependable supply of about 2 c.f.s. from headwater springs and seeps. According to the conclusions of their study, it appears that the inflow from springs and seeps is sufficient to offset evaporation and transpiration losses under conditions existing during the two year period of their investigation.

In addition to headwater seeps and springs, there are several springs and seep areas along the banks and in the beds of the lakes. Engineers have estimated the flow of springs at the rock house (Lake No. 2) at 350 gallons per minute. Estimates on flow of the other springs and seeps are not available, but they probably contribute greatly to the water supply of Buffalo Lakes.

Water Quality

The collecting bottle containing Buffalo Lake water was broken in transit, and the sample was lost before it could be analyzed. However, records of complete chemical analysis of Buffalo Lake water were maintained by the U. S. Geological Survey during their two year investigation. This information is given in Table 1.

Fish Collections

A total of 13 species, representing five families of fresh-water fish, was taken from Buffalo Lakes during the survey. Gill nets collected 567 fish, totaling 590.7 pounds, which included eight species. Seine drags with a 20-foot minnow seine and a 100-foot drag seine, produced five species that were not present in gill nets. Fishes taken by seining were too numerous to save and work into the data, however, field counts were made and relative abundance of species noted. Table 2 shows the percentage composition by numbers and weights of fish collected by gill nets. Table 3 shows the relative abundance of species collected by both netting and seining. Table 4 shows the number and percent of number of fish taken by gill nets in each of the three lakes, as well as the combined total. The check list of species present in Buffalo Lakes is as follows:

Catostomidae (suckers and buffalofishes)

Carpiodes carpio - river carpsucker. This species presents a serious problem to the fishery of Buffalo Lakes, and the reduction of its numbers would be highly beneficial. It made up 37.9 percent of the total number and 95.28 percent of the total weight of fishes taken in gill nets and processed for data.

Cyprinidae (shiners and minnows)

Notemigonus crysoleucas - golden shiner. This large minnow is common in the lakes. Not only was it taken in seine collections, but it comprised 6.1 percent of the total taken by gill nets.

Notropis lutrensis - redhorse shiner. This very common minnow of Texas waters is very abundant in Buffalo Lakes and was represented in every seine drag made during the survey.

Pimephales promelas - fathead minnow. This species was taken in seine collections, but is considered rare in Buffalo Lakes.

Ameiuridae (freshwater catfishes)

Ictalurus punctatus - channel catfish. This was the most abundant game fish found in the lakes. It constituted only 2.3 percent of the total collected by gill nets.

Ictalurus melas - black bullhead. Comprising 42.5 percent of the total, this is the most abundant species taken by gill nets. Control measures to reduce the bullhead population is needed to improve the fishery of Buffalo Lakes.

Poeciliidae (mosquitofish)

Gambusia affinis - common mosquitofish. Rare in Buffalo Lakes.

Centrarchidae (black basses and sunfishes)

Micropterus salmoides - largemouth black bass. Fingerlings of this very popular game fish were common in seine collections, however, only five were taken in gill nets, comprising 0.9 percent of the total.

Lepomis cyanellus - green sunfish. Considered as rare in Buffalo Lakes. Only one was taken in gill nets, very few in seine collections.

Lepomis microlophus - redear sunfish. Rare.

Lepomis macrochirus - bluegill sunfish. The most abundant sunfish present in seine collections and the third most abundant species taken in gill nets.

Lepomis humilis - orangespotted sunfish. Common.

Pomoxis annularis - white crappie. Rare. Only two were taken in gill nets and very few in seine collections.

Coefficient of Condition

"K" factors were determined for all carpsucker, channel catfish, black bass and crappie collected in gill nets. Each fish was measured, weighed, and the stage of gonadal development recorded, in an effort to determine condition of fishes present in Buffalo Lakes as compared to those in other lakes in the region. Table 5 shows the comparison of "K" factors for fishes collected from Buffalo Lakes with those collected from Lake Eddleman, Lake Diversion and Buffalo Lake (near Umbarger). All species collected from Buffalo Lakes were found to be in good condition.

Food Habits

Food remains were found in stomachs of six specimens; 2 black bass, 2 channel catfish and 2 black bullhead. Table 6 presents a complete analysis on food remains of all stomachs taken. Black bass and channel catfish fed exclusively on fish. Stomachs of black bullhead contained snails, freshwater shrimp, insect larva, fish eggs, algae, and plant fiber.

Sexual Development

Gonads of all channel catfish collected were immature. The only other immature individuals recorded were two carpsuckers. One female carpsucker was found to be half-spent, apparently being captured during the process of spawning. All other carpsuckers, as well as black bass and crappie were ripe and in spawning condition.

Pathological Conditions

No evidence of disease, parasites or other abnormalities was found on any of the fishes collected and examined during the survey. However, one crappie possessed rather

peculiar markings. A black band approximately 1/8 inch starting under its lower lip and continuing up over the head and back to the dorsal fin, terminating on the last of the spiny rays of that fin. It was taken from the lower lake.

Discussion and Recommendations:

The primary purpose of this survey was to determine condition of the fishery at Buffalo Lakes, and what, if anything, should be done before impounding the larger lake.

Results of the survey disclosed an overpopulation of rough fish (80.4 percent). Carpsucker and black bullhead represented 37.9 percent and 42.5 percent, respectively, of the total number taken in gill nets. Game fish, including channel catfish, black bass and crappie, comprised only 3.5 percent of the total. Forage species, including golden shiner and sunfishes, made up the remaining 16.1 percent.

The most outstanding problems at Buffalo Lakes are the over-abundant carpsucker and bullhead populations, which should definitely be eliminated before impounding the new lake. At the present time, there is no selective-control for these species. Therefore, it follows that the entire fish population must be removed and the lake restocked with a proper ratio of game and forage fishes.

In order to increase the possibility of eliminating the undesirable species in Buffalo Lakes, it will be necessary to treat the tributary stream and its impoundments on the V8 Ranch. The lake on the Johnson Ranch, located below the proposed new dam, should also be treated if permission can be obtained to do so.

Dropping the water levels of all three lakes as low as possible prior to treatment will be highly beneficial. Not only will it reduce cost of treatment, but exposing the lake bottom to sunlight and fresh air will condition and increase its fertility. Dropping the water level, especially in the upper lake, will also provide opportunities to construct fishing piers, boat docks, fish shelters, spawning beds for bottom-nesting game fishes, and to clean seining beaches for future surveys and rough fish controls.

If the lakes are treated and restocked, as recommended, fishing should be prohibited for one year. After the stocked fish have had an opportunity to spawn during the spring following stocking, another fisheries survey will be conducted to determine the most feasible time to resume fishing in Buffalo Lakes.

Prepared by Leo D. Lewis
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Approved by Marion Toole
Director Inland Fisheries Division

Date July 8, 1959

Table 1. Water Quality of Buffalo Lakes, Lubbock, Texas.

Date of Collection	Temperature (°F)	Measured discharge (c.f.s.)	pH	Specific conductance (micromhos at 25° C)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium ($Na+K$)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCo_3$ Total	Hardness as $CaCo_3$ Noncarbonate	Percent sodium
Mar. 4, 1952	46	2.35	8.2	2,320	2.6	63	132	250	0	390	421	335	5.0	2.0	1,400	700	380	44
Apr. 3, 1952	58	1.88	8.5	2,940	10.0	84	142	321	14	363	503	458		1.0	1,710	794	472	47
Apr. 30, 1952	69	22.5	8.6	2,230	7.4	40	131	248	17	307	430	318		2.0	1,340	638	358	46
June 10, 1952	81	0.12																
July 2, 1952	73	0.22																
Aug. 5, 1952	83	0.18	8.5	2,200	43.0	40	124	247	17	324	371	328		4.8	1,330	610	316	47
Sept. 3, 1952	75	0.29	8.4	2,170	38.0	42	123	245	13	367	352	320		5.8	1,320	611	289	47
Oct. 6, 1952	64	0.50	8.4	2,240	29.0	62	127	248	14	423	375	320		5.6	1,390	676	306	44
Nov. 5, 1952	58	0.61	8.4	2,230	30.0	62	128	247	16	426	373	318		5.8	1,390	681	306	47
Dec. 2, 1952	47	3.20	8.5	2,400	12.0	42	144	282	18	344	475	355		4.8	1,500	697	385	47
Mar. 4, 1953	50	4.37	8.6	2,560	6.0	48	153	290	22	367	494	370		9.0	1,570	749	412	46
Apr. 14, 1953	60	2.02	8.5	2,620	7.7	50	158	296	22	375	516	375		11.0	1,620	774	430	45
June 10, 1953		0.25	8.4	2,570			129	266	17	473	430	372		4.5	1,590	812	396	42
Aug. 3, 1953	88	0.21	8.5	3,040	19.0	52	189	371	24	406	645	460	6.4	5.8	1,970	906	534	47
Sept. 10, 1953	64	0.13	8.4	2,490	36.0	58	147	287	18	471	371	388	5.2	12.0	1,550	749	333	45
Nov. 30, 1953	52	1.96		1,850	14.0						324	238		1.5				
Jan. 21, 1954	38	1.83	8.4	2,050	8.6	47	114	227	14	327	372	282		4.8	1,230	586	294	46
Mar. 18, 1954	47	1.88	8.5	2,350	6.8	49	138	279	17	371	483	325		3.5	1,480	690	358	47

Table 2. Percentage Composition by Numbers and Weights of Fish Collected by Gill Nets from Buffalo Lakes, Inc.

Species	Number	% of Number	Weight (lbs.)	% of Weight
Carpsucker	215	37.9	562.8	95.28
Golden shiner	35	6.1	Not worked up	-
Channel catfish	13	2.3	9.7	1.64
Black bullhead	241	42.5	Not worked up	-
Black bass	5	0.9	17.7	3.0
Green sunfish	1	0.2	Not worked up	-
Bluegill sunfish	55	9.7	Not worked up	-
White crappie	2	0.4	0.5	0.08
Totals	567	100.0	590.7	100.00

Table 3. Relative Abundance of Species Taken by Seines and Gill Nets in the Buffalo Lakes, Inc.

Common Name	Scientific Name	Relative Abundance
Carpsucker	Carpiodes carpio	abundant
Black bass	Micropterus salmoides	common
Black bullhead	Ameiurus melas	abundant
Bluegill sunfish	Lepomis macrochirus	abundant
Green sunfish	Lepomis cyanellus	rare
Orangespotted sunfish	Lepomis humilis	common
Redear sunfish	Lepomis microlophus	rare
Redhorse shiner	Notropis lutrensis	very abundant
Fathead minnow	Pimephales promelas	rare
Golden shiner	Notemigonus crysoleucas	common
Mosquitofish	Gambusia	rare
Channel catfish	Ictalurus punctatus	rare
Crappie	Pomoxis annularis	rare

Table 4. Buffalo Lakes, Inc. Gill Netting Results, April 22, 1958.

Species	First Lake		Second Lake		Third Lake		Total of all Three Lakes	
	Number	% of Number	Number	% of Number	Number	% of Number	Number	% of Number
Carpsucker	113	42.96	28	20.90	74	43.53	215	37.9
Golden shiner	32	12.17	0	-	3	1.77	35	6.1
Channel catfish	8	3.04	1	0.75	4	2.35	13	2.3
Black bullhead	79	30.04	101	75.37	61	35.88	241	42.5
Black bass	5	1.90	0	-	0	-	5	0.9
Green sunfish	0	-	1	0.75	0	-	1	0.2
Bluegill sunfish	26	9.89	3	2.23	26	15.29	55	9.7
White crappie	0	-	0	-	2	1.18	2	0.4
Totals	263	100.00	134	100.00	170	100.00	567	100.0

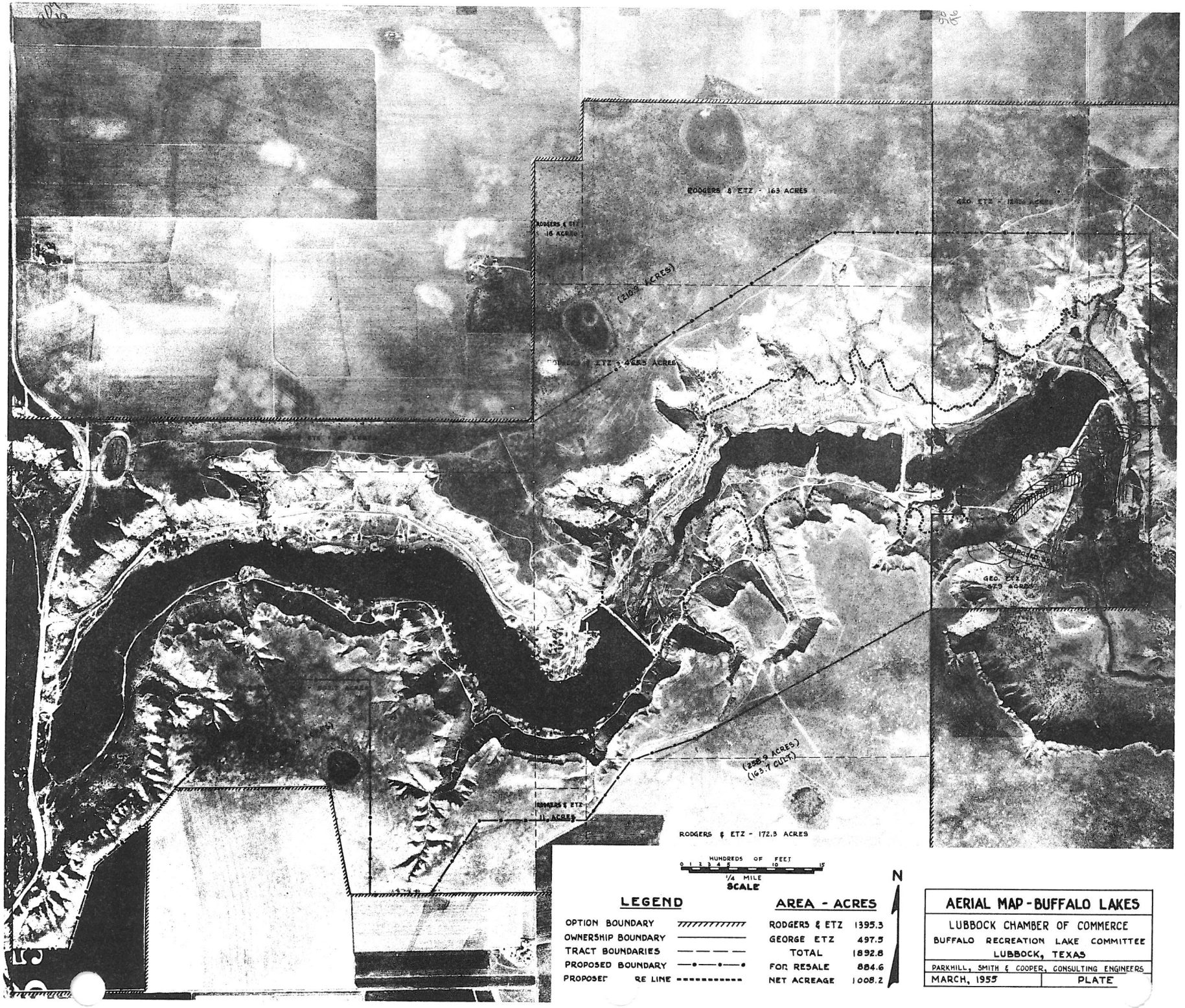
Rough fish	456	80.4%
Forage fish	91	16.1
Game fish	20	3.5
Totals	567	100.0%

Table 5. Coefficient of Condition of Species Present in Buffalo Lakes, Inc., as Compared With Lake Eddleman, Lake Diversion and Buffalo Lake.

Species	No.	Buffalo Lakes, Inc. April 1958 Range	Ave.	Lake Eddleman April 1958 Range	Ave.	Lake Diversion June 1,'56-May 31,'57 Range	Ave.	Buffalo Lake (Umbarger) June 1,'56-May 31,'57 Range	Ave.
Carpsucker									
Males	86	2.10 - 3.00	2.49	2.30 - 3.30	2.64	2.00 - 3.30	2.64	2.60 - 4.20	3.19
Females	129	2.30 - 3.70	2.85	2.00 - 3.20	3.03	2.20 - 3.40	2.68	2.40 - 4.30	3.38
Channel catfish									
Males	4	1.50 - 2.00	1.72	1.50 - 1.90	1.65	1.50 - 2.10	1.67	1.30 - 2.40	1.80
Females	2	1.40 - 1.70	1.55	1.50 - 2.60	1.77	1.10 - 1.80	1.56	1.40 - 2.50	1.89
Black bass									
Males	1	2.80	2.80	2.80 - 3.00	2.90	2.20 - 2.50	2.35	2.60 - 3.30	2.97
Females	4	3.00 - 3.40	3.15	2.40 - 3.10	2.72	2.20 - 2.60	2.42	2.30 - 3.50	3.04
White crappie									
Males	0	-	-	2.90 - 3.60	3.25	2.10 - 3.20	2.52	2.10 - 4.50	2.90
Females	2	3.20 - 3.30	3.25	2.80 - 3.70	3.22	1.60 - 3.20	2.39	2.20 - 4.00	2.83

Table 6. Buffalo Lakes, Inc. - Stomach Analysis.

Food Item	No. Times of Occurrence	Total No. Identified
	Black Bass	
Golden shiner	1	1
Black bullhead	1	1
	Channel Cat	
Sunfish	1	2
Fish remains	2	3 /
	Black Bullhead	
Snails	2	7
Freshwater shrimp	2	2
Insect larva	2	9 /
Fish eggs	1	1 /
Algae and plant fiber	2	2 /


RODGERS & ETZ - 163 ACRES
GEO. ETZ - 133.6 ACRES
RODGERS & ETZ 16 ACRES
(210.8 ACRES)
GEO. ETZ - 46.5 ACRES
GEO. ETZ 57.9 ACRES
(258.9 ACRES)
(163.7 CULT.)
RODGERS & ETZ 11 ACRES
RODGERS & ETZ - 172.3 ACRES
HUNDREDS OF FEET
0 1 2 3 4 5 10 15
1/4 MILE
SCALE
N
LEGEND
OPTION BOUNDARY
OWNERSHIP BOUNDARY
TRACT BOUNDARIES
PROPOSED BOUNDARY
PROPOSED RE LINE
AREA - ACRES
RODGERS & ETZ 1395.3
GEORGE ETZ 497.5
TOTAL 1892.8
FOR RESALE 884.6
NET ACREAGE 1008.2
AERIAL MAP - BUFFALO LAKES
LUBBOCK CHAMBER OF COMMERCE
BUFFALO RECREATION LAKE COMMITTEE
LUBBOCK, TEXAS
PARKHILL, SMITH & COOPER, CONSULTING ENGINEERS
MARCH, 1955
PLATE