

STATE Texas
PROJECT F2R3, Job B-13
PERIOD June 1955 through January 1956

Job Completion Report

John E. Tilton
Assistant Project Leader

FILE

TITLE

Inventory of Species Present in Buchanan Lake.

OBJECTIVES

To determine the species present and their relative abundance.

METHODS AND PROCEDURES

Three principal collecting methods were used in securing specimens from Buchanan Lake. Gill nets 8 by 100 feet of $1\frac{1}{2}$, 2, and 3 inch mesh were used to some extent although the experimental type was used most frequently because of the better sample obtained.

Seine collections were made with 36 by 6 feet bag seines and 30 by 6 feet straight seines, both types with $\frac{1}{4}$ inch mesh.

One rotenone collection was made. A small slough of approximately three acre feet was treated with rotenone during January.

Gill net collections were made at random over the entire lake, while seine collections were made at prescribed stations. Map No. 1 shows netting, seining, and rotenone collecting sites.

PHYSICAL CHARACTERISTICS

A complete physical description of the lake can be found in Segment Completion Report, Project F2R2, Job B-13, dated June 1955. During the present segment period the water level of Lake Buchanan fell from one foot below spillway level in July 1955 to 13 feet below spillway level in January 1956, or a maximum fluctuation of 12 feet.

AQUATIC VEGETATION AND COVER

With the exception of a few scattered areas, Lake Buchanan is relatively free of aquatic vegetation. In some shallow areas, musk grass, Chara sp.; filamentous algae, Spirogyra sp.; coontail, Ceratophyllum demersum; parrot feather, Myriophyllum sp.; and pond weed, Potamogeton sp., are found, particularly where heavy siltation has deposited a thick mud layer. Willows, Salix nigra, are found along most bank areas and on scattered islands throughout the lake.

Large areas of granite and gravel bottom as well as water level fluctuations probably account for the scarcity of typical aquatics in Buchanan Lake.

Stumps, rock outcroppings, rubble, and willow roots provide good cover in all areas of the lake.

CHEMICAL CHARACTERISTICS

Two water sample stations were selected and water samples were taken and analyzed each month. Samples were taken at ten foot intervals from the surface to a maximum depth of 50 feet. Water and air temperatures were recorded in degrees Fahrenheit, dissolved oxygen and dissolved carbon dioxide were recorded in parts per million. Data by months is presented in Table I.

Dissolved oxygen at the surface varied from a high of 12 ppm to a low of nine ppm. At a depth of 30 feet the high was eight ppm, the low three ppm. The average dissolved oxygen was found to be seven ppm.

Dissolved carbon dioxide varied from 0 ppm to 16 ppm with an average of slightly more than three ppm.

Water temperature ranged from a high of 91° F. in August to a low of 50° F. in January. During July and August a moderate temperature variance was found between the surface and 50 feet, but the months of September through January show little temperature differences.

The pH of Buchanan Lake varied from 7.6 to 8.6 with an average pH of slightly less than 8.1.

The lake was quite turbid throughout the segment period probably due to heavy fall and winter rains on the tributaries.

No chemical or thermal conditions were found in Lake Buchanan that could be construed as detrimental to any species of fish now known to occur in the lake.

FISH COLLECTIONS

A total of 30 species were taken during the segment period, June 1, 1955 through January 31, 1956, bringing the total number of species known to occur in Lake Buchanan to 37. A checklist of species is presented in Table II.

As shown in Table III seining provided the largest number of individuals for study with a total of 4,602 specimens, representing 24 species.

Of the seined specimens the gizzard shad, *Dorosoma cepedianum*, accounted for 3,349 specimens or 72.77 per cent of the total number. Second in number was the bluegill, *Lepomis macrochirus*, with 319 specimens or 6.93 per cent of the total. Surprisingly, largemouth black bass, *Micropterus salmoides*, made up 5.39 per cent of the total with 248 individuals and ranked fourth in total number. Since most largemouth black bass taken in seines during July, August, and September, ranged in size from three to five inches it is presumed that they were spawned during the spring of 1955. If this is the case, it indicates a relatively high spawning success for the year 1955. During the months of October and November the number of individuals taken in seines dropped sharply. This decline is probably due to the sharp decline in water temperature and the resulting regression of shallow water aquatic vegetation which provided some cover.

Netting collections provided information on 991 specimens during the segment

period. Table IV shows the number of individuals and per cent of total number for each species taken in gill nets. As in the seining collections, the gizzard shad, D. cepedianum, appears to be the most abundant, accounting for 37.34 per cent of the total number with 370 individuals. The second most abundant species taken was the river carpsucker, Carpionodes carpio, with 19.07 per cent of the total and 189 individuals.

The white bass, Morone chrysops, and channel catfish, Ictalurus punctatus, were the most frequently taken game fish. M. chrysops made up 13.72 per cent of the total number with 137 individuals and I. punctatus accounted for 13.92 per cent with 138.

The number of pounds of fish netted per month, total weight, and per cent of weight are presented in Table V.

The river carpsucker, Carpionodes carpio, contributed the highest percentage of total weight with 34.48 per cent and 309.58 pounds. The smallmouth buffalo, Ictiobus bubalus, was second in total weight with 135.82 pounds or 15.13 per cent of the total.

All game fish accounted for 33.73 percent or 302.73 pounds. I. punctatus and M. chrysops provided the largest per cent of total weight with 13.70 per cent and 12.69 per cent respectively.

Table VI shows netting success in terms of number and pounds of fish by months and net set. A higher return per net in both numbers and pounds of fish was obtained during the fall and winter months.

Table VII gives information on gonadal development in the more important species of game fish. The information presented is based on records from only 329 individuals and is too small a sample for any significant conclusions. However, one interesting fact in the collected information is the presence of fish in the No. 3 or developing stage throughout the segment period. Although no ripe game fish were encountered after August 1, 1955, many species showed individuals in an advanced stage of sexual development throughout the fall and winter months.

One rotenone collection was made on a small slough in Buchanan Lake on January 25, 1956. The area treated comprised $\frac{1}{2}$ surface acre with an average depth of six feet, making a total volume of three acre feet. It is believed that a complete kill was achieved, but few fish were taken. Four species were collected in the sample and as in the seining and netting collections the gizzard shad, D. cepedianum, accounted for the highest per cent of total numbers. Of 346 fish killed and collected, 310 individuals were gizzard shad. In addition, eight carp, Cyprinus carpio, two channel catfish, I. punctatus, and 26 spottail shiners, Notropis venustus, were collected.

The treated area was evidently too shallow and provided insufficient cover to support a larger fish population.

STOMACH ANALYSIS

Although an effort was made to preserve stomachs of game fish for laboratory analysis, few stomachs were found to contain food. Either regurgitation or complete digestion left most stomachs completely empty or filled with water only. A total of 73 stomachs was examined for content but no volumes were taken. A frequency chart is presented in Table VIII, listing the contents of stomachs from 30 channel catfish, 33 white bass, and 10 Centrarchid bass, representing eight largemouth and two spotted bass.

All catfish stomachs found with vegetation, both algae and maize, were taken from juveniles under nine inches in length. The sixteen stomachs containing maize were taken from the same net, which was undoubtedly set over or near a "baited" area.

Of the 33 white bass stomachs examined, 26 were taken from individuals caught on silver spoons by sport fishermen. Many of these stomachs were found to contain more than one shad, while several were so glutted, shad tails protruded from the mouth of the individual.

DISCUSSION

Sport fishing on Buchanan Lake is consistently good and the lake is fished extensively throughout the year. White bass, channel catfish, black bass, white crappie, and three species of sunfish provide fishing for all tastes. Large catches of white bass are made from November until April as the fish move to the head of the lake or its tributaries in their spawning migration. Minnows, spoons, and spinners are all effective baits with trolling, casting, or still fishing producing excellent catches.

Catfish, particularly I. punctatus, are taken the year around from all sections of the lake, but the most productive area would appear to be the upper end where the Colorado River empties into the lake. Excellent strings of largemouth black bass are taken from the lake, particularly in the spring. White crappie provide fishing the entire year with the best catches in the spring.

Sunfish are plentiful and easily caught from the bank, boat docks, or piers. Bluegill, Lepomis macrochirus, is the most abundant but nearly all taken by anglers are of only moderate size.

No blue catfish, Ictalurus furcatus, were taken during this or the previous segment period indicating that this species may be absent from the lake. However, I. furcatus is known from Lake Travis and the Colorado River below the dams, making the complete absence in Lake Buchanan somewhat doubtful.

Large shoal areas of granite, sand, and gravel bottom provide excellent spawning grounds for the centrarchid fishes. In addition large amounts of organic matter are carried into the lake from its tributaries making the lake highly fertile. This fertility probably accounts for the abundant shad population and the high percentage of other forage fishes.

Because of the exceptional spawning areas, plentiful food supplies and suitable cover, Lake Buchanan is capable of, and does support, a large population of desirable game fish.

Rough and forage species are also very abundant in Lake Buchanan. D. cepedianum and Carpoides carpio together accounted for 69.9 per cent of the total fish taken from the lake. Although not directly important commercially, gizzard shad are indirectly valuable as forage fishes and are probably in large part responsible for the huge white bass population present in Lake Buchanan.

The smallmouth buffalo and European carp are quite abundant and are of some importance commercially. During the segment period, over 80,000 pounds of carp and buffalo were taken by contract netters and sold to both Texas and out of state markets.

MANAGEMENT RECOMMENDATIONS

As in other lakes on the Colorado River chain, rough fish make up an extremely

high percentage of the total population. In Lake Buchanan rough fish, including shortnose gar, gizzard shad, smallmouth buffalo, river carpsucker, carp, freshwater drum, and Rio Grande perch accounted for 71.9 per cent of the total individuals taken in both nets and seines and 66.3 per cent of the total weight of netted specimens. It is doubtful whether contract netters appreciably reduce the over population of rough fish in the lake. Although a high percentage of the productivity of the lake is utilized in the production of undesirable fish species, no means of eradication or control seem feasible at this time.

SUMMARY

Lake Buchanan, an impoundment of approximately one million acre feet, located in the hill country near Burnet, Texas, was inventoried for species present and approximate relative abundance of these species. Seines, gill nets, and rotenone were used in collecting specimens and rough fish were found to dominate the total collections, both in weight and numbers in all three sampling techniques. Game fish were plentiful and in excellent condition, probably due to the abundance of forage fishes present in the lake.

No adverse thermal or chemical conditions were found in the water samples analyzed and no evidence of pollution was found. Lake Buchanan is an excellent lake for sports fisherman, with good catches of game fish taken the year around, but from evidence gathered, a high percentage of lake fertility is spent on rough fish which have little or no commercial or sport value.

Table 1. Buchanan Lake Water Analysis, July 1955 through January 1956.

Date	Depth in Feet	Air Temp. °F	Water Temp. °F	pH	O ₂ ppm	CO ₂ ppm	
July 12, 1955	1	90	90	8.6	12	trace	
	10	90	87	8.2	9	trace	
	20	90	85	8.2	4	6	
	30	90	80	8.1	3	12	
	40	90	80	8.0	2	10	
	50	90	77	7.9	2	14	
August 3, 1955	1	94	91	8.4	10	trace	
	10	94	86	8.2	8	trace	
	20	94	85	8.1	4	5	
	30	94	81	8.1	3	9	
	40	94	80	8.1	2	11	
	50	94	78	7.8	2	16	
September 6, 1955	1	94	82	8.3	9	0	
	10	94	81	8.2	7	0	
	20	94	81	8.4	6	0	
	30	94	81	8.5	6	0	
	40	94	81	8.5	6	0	
	50	94	81	8.0	6	2	
October 25, 1955	1	80	75	8.1	10	trace	
	10	80	74	8.1	10	trace	
	20	80	72	7.8	9	1	
	30	80	72	8.0	8	3	
	40	80	70	7.9	7	4	
	November 9, 1955	1	69	64	7.8	10	trace
10		69	63	7.8	8	3	
20		69	63	7.7	7	4	
30		69	62	7.9	8	8	
December 14, 1955		1	56	54	7.9	12	trace
		20	56	55	7.9	12	trace
	30	56	56	8.0	2	2	
	40	56	55	8.0	5	3	
	January 25, 1956	1	56	50	8.1	9	trace
		10	56	50	8.0	8	1
20		56	50	8.0	6	2	
30		56	50	7.9	8	2	

Table 2. Checklist of Species Found to Occur in Buchanan Lake.

Scientific Name	Common Name
<u>Lepisosteus platostomus</u>	shortnose gar
<u>Dorosoma cepedianum</u>	gizzard shad
<u>Astyanax fasciatus</u>	tetra
<u>Ictiobus bubalus</u>	smallmouth buffalo
<u>Carpionodes carpio</u>	river carpsucker
<u>Noxostoma congestum</u>	gray redhorse sucker
<u>Cyprinus carpio</u>	carp
<u>Opsopoeodus emiliae*</u>	pugnose minnow
<u>Notropis oxyrhynchus*</u>	sharpnose shiner
<u>Notropis brazosensis*</u>	Brazos River shiner
<u>Notropis venustus</u>	spottail
<u>Notropis lutrensis</u>	redhorse shiner
<u>Notropis deliciosus*</u>	sand shiner
<u>Notropis volucellus</u>	mimic shiner
<u>Hybognathus nuchalis*</u>	silvery minnow
<u>Pimephales vigilax</u>	parrot minnow
<u>Campostoma anomalum*</u>	stoneroller
<u>Ictalurus punctatus</u>	channel catfish
<u>Pilodictus olivaris</u>	yellow catfish
<u>Fundulus notatus</u>	blackstripe topminnow
<u>Gambusia affinis</u>	common mosquitofish
<u>Mugil cephalus*</u>	striped mullet
<u>Morone chrysops</u>	white bass
<u>Micropterus punctulatus</u>	Kentucky spotted bass
<u>Micropterus treculi</u>	Texas spotted bass
<u>Micropterus salmoides</u>	largemouth black bass
<u>Chaenobryttus coronarius</u>	warmouth
<u>Lepomis cyanellus</u>	green sunfish
<u>Lepomis microlophus</u>	redeer sunfish
<u>Lepomis macrochirus</u>	bluegill
<u>Lepomis humilis*</u>	orangespotted sunfish
<u>Lepomis auritus</u>	yellowbelly sunfish
<u>Lepomis megalotis</u>	longear sunfish
<u>Pomoxis annularis</u>	white crappie
<u>Percina caprodes</u>	logperch
<u>Aplodinotus grunniens</u>	freshwater drum
<u>Cichlasoma cyanoguttata</u>	Rio Grande perch

* Species taken in segment period December 1, 1954 through May 30, 1955, but not taken in this segment period.

Table 3.
Number of Species Taken in Seines From Buchanan Lake, June 1955 through November 1955.

Fish Species	June	July	August	September	October	November	Total	% of Number
<u>L. platostomus</u>	0	1	0	0	0	0	1	0.02
<u>D. Cepedianum</u>	2184	567	175	291	91	141	3349	72.77
<u>A. fasciatus</u>	0	0	0	1	0	0	1	0.02
<u>Carpilodes carpio</u>	1	4	0	0	0	0	5	0.11
<u>Cyprinus Carpio</u>	0	0	1	0	0	0	1	0.02
<u>N. venustus</u>	8	14	26	34	31	2	115	2.50
<u>N. lutrensis</u>	3	1	0	1	4	0	9	0.20
<u>N. volucellus</u>	0	0	0	1	0	0	1	0.02
<u>P. vigilax</u>	0	1	1	0	0	0	2	0.04
<u>I. punctatus</u>	0	0	0	1	0	0	1	0.02
<u>F. notatus</u>	0	0	0	1	0	0	1	0.02
<u>G. affinis</u>	2	5	2	11	3	0	23	0.50
<u>M. chrysops</u>	6	166	76	3	0	0	251	5.46
<u>M. punctulatus</u>	19	32	20	0	0	1	71	1.54
<u>M. treculi</u>	0	0	0	15	2	1	18	0.39
<u>M. salmoides</u>	15	108	35	54	35	1	248	5.39
<u>C. coronarius</u>	0	5	0	2	0	0	7	0.15
<u>L. cyanellus</u>	2	22	1	9	0	0	34	0.74
<u>L. microlophus</u>	0	0	2	18	0	0	20	0.44
<u>L. macrochirus</u>	21	90	65	127	33	4	319	6.93
<u>L. megalostis</u>	0	34	8	28	4	0	74	1.61
<u>P. annularis</u>	6	0	0	5	0	0	11	0.24
<u>P. caprodes</u>	2	6	7	15	0	6	36	0.78
<u>C. cyanoguttata</u>	0	3	0	0	1	0	4	0.09
Totals	2269	1059	419	617	204	156	4602	100.00

Table 4. Number of Specimens Taken by Gill Nets from Buchanan Lake, June 1955 through December 1955.

Fish Species	June	July	August	September	October	November	December	Total	% of Number
<u>L. platostomus</u>	6	0	0	0	2	1	0	9	0.91
<u>D. cepedianum</u>	33	31	25	31	69	119	62	370	37.34
<u>I. bubalus</u>	3	4	3	5	5	8	10	38	3.84
<u>Carploides carpio</u>	10	6	17	18	40	43	55	189	19.04
<u>M. congestum</u>	0	2	0	0	0	0	1	3	0.30
<u>Cyprinus carpio</u>	2	1	0	1	3	0	2	9	0.91
<u>I. punctatus</u>	22	20	7	4	14	38	33	138	13.92
<u>P. olivaris</u>	1	1	1	0	0	1	0	4	0.40
<u>M. chrysops</u>	0	4	10	23	37	48	15	137	13.72
<u>M. punctulatus</u>	0	0	0	0	0	3	0	3	0.31
<u>M. treculi</u>	0	0	9	0	2	2	0	13	1.31
<u>M. salmoides</u>	0	0	0	2	1	2	1	6	0.61
<u>L. cyanellus</u>	0	2	0	0	0	0	0	2	0.20
<u>L. macrochirus</u>	3	3	11	5	6	3	0	31	3.12
<u>L. auritus</u>	0	0	1	0	0	0	0	1	0.10
<u>P. annularis</u>	6	8	3	0	7	6	2	32	3.23
<u>A. grummiens</u>	1	4	0	0	0	1	0	6	0.61
Totals	87	86	87	89	186	275	181	991	100.00

Table 5. Pounds of Each Fish Species Taken by Gill Nets From Buchanan Lake, June 1955 through December 1955.

Fish Species	June	July	August	September	October	November	December	Total	% of Weight
<u>L. platostomus</u>	25.94	0.00	0.00	0.00	14.00	7.00	0.00	46.94	5.23
<u>D. cepedianum</u>	7.69	8.88	4.25	6.88	16.38	21.81	12.63	78.52	8.74
<u>I. bubalus</u>	15.63	11.81	7.25	15.56	14.75	27.69	43.13	135.82	15.13
<u>Carpiodes carpio</u>	15.88	13.19	31.44	37.25	63.63	71.25	76.94	309.58	34.48
<u>M. congestum</u>	0.00	0.25	0.00	0.00	0.00	0.00	1.88	2.13	0.23
<u>Cyprinus carpio</u>	4.63	1.38	0.00	4.69	6.94	0.00	2.88	20.52	2.28
<u>I. punctatus</u>	15.06	21.25	9.63	5.75	15.69	31.81	23.81	123.00	13.70
<u>P. olivaris</u>	5.25	0.69	0.69	0.00	0.00	4.94	0.00	11.57	1.28
<u>M. chrysops</u>	0.00	3.13	6.19	16.31	14.63	60.81	12.81	113.88	12.69
<u>M. punctulatus</u>	0.00	0.00	0.00	0.00	0.00	6.19	0.00	6.19	0.69
<u>M. treculi</u>	0.00	0.00	16.31	0.00	5.44	3.69	0.00	25.44	2.84
<u>M. salmoides</u>	0.00	0.00	0.00	1.69	0.25	2.19	3.56	7.69	0.85
<u>L. cyanellus</u>	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.25	0.03
<u>L. macrochirus</u>	0.50	0.38	1.25	0.50	1.19	0.31	0.00	4.13	0.46
<u>L. auritus</u>	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.13	0.02
<u>P. annularis</u>	0.75	2.44	1.19	0.00	3.00	1.94	1.13	10.45	1.17
<u>A. grunniens</u>	0.50	0.88	0.00	0.00	0.00	0.25	0.00	1.63	0.18
Totals	91.83	64.53	78.33	88.63	155.90	239.88	178.77	897.87	100.00

Table 6. Success of Gill Netting in Terms of Number and Pounds of Fish, June 1955 through December 1955.

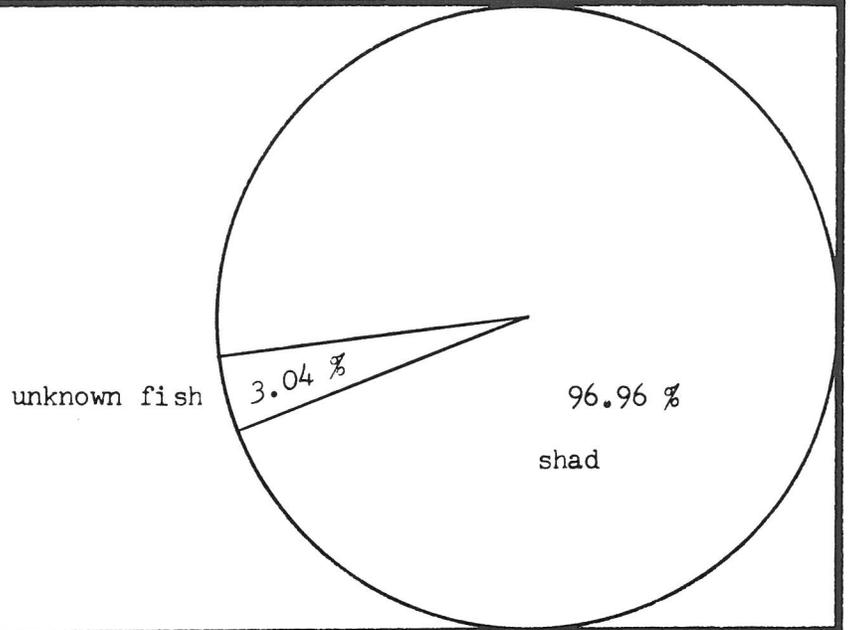
Month	Number of Nets Set	Number of Foot Net Set	Number of Fish Caught	Number lbs. Fish Caught	Average Number Fish/net	Average No. Fish Ft. of Net	Average No. lbs. Fish/Net	Average No. lbs. Fish per Ft. of Net
June	4	500	87	91.83	21.75	0.175	22.96	0.184
July	4	500	86	64.53	21.50	0.172	16.13	0.129
August	4	450	87	78.33	21.75	0.193	19.58	0.174
September	4	500	89	88.63	22.25	0.178	22.15	0.177
October	6	750	186	155.90	31.00	0.248	25.98	0.207
November	6	750	275	239.88	45.83	0.366	39.98	0.319
December	6	750	181	178.77	30.16	0.240	29.79	0.238
Total	34	4200	991	897.87	27.74	0.224	25.22	0.204

Table 7. Gonadal Development, by Month, for the More Important Species of Game Fish in Buchanan Lake (Based on 329 Individuals).

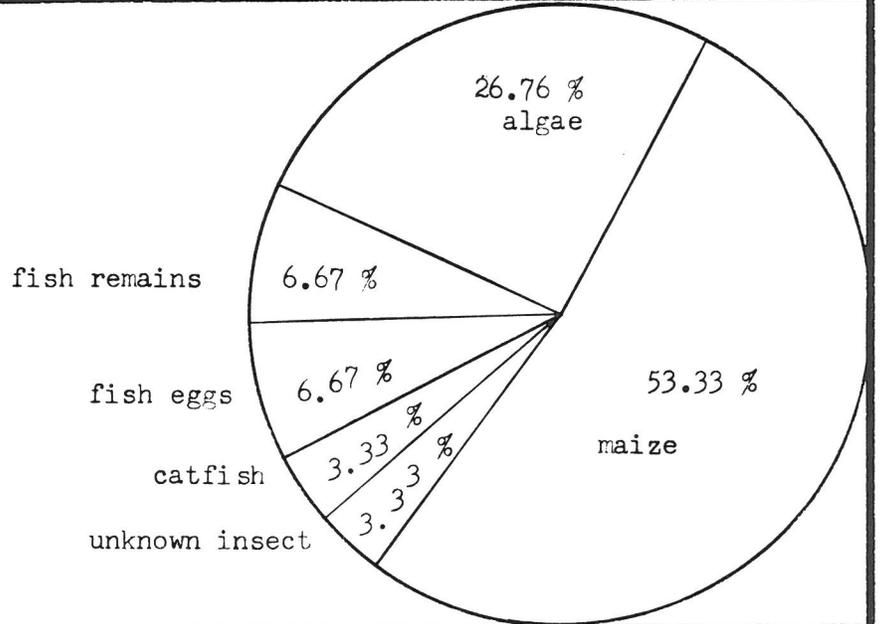
Species	June	July	August	September	October	November	December
<u>I. punctatus</u>	1,2,3,4	1,3,4,5	3,5	3,5	3,4	3,4	3,4
<u>P. olivaris</u>	3	3	3	*	*	4	*
<u>M. chrysops</u>	*	3,4,5	3,5	3,4,5	3	2,3,4	3,4
<u>M. salmoides</u>							
<u>M. punctulatus</u>	*	*	3,4,5	3	3,4	3	3
<u>M. treculi</u>							
<u>P. annularis</u>	4	3,4	3,4	*	3,4	3,4	3,4
Explanation of symbols:				No. 1 - Ripe, in spawning condition.			
				No. 2 - Nearly ripe.			
				No. 3 - Sexes distinguishable but gonads not well developed.			
				No. 4 - Gonads not developed, sexes not easily distinguishable.			
				No. 5 - Spent, fish gonads empty.			
* - No individuals taken or examined.							

Table VIII
Results of Stomach Analysis, Lake Buchanan, June, 1955 through January, 1956.

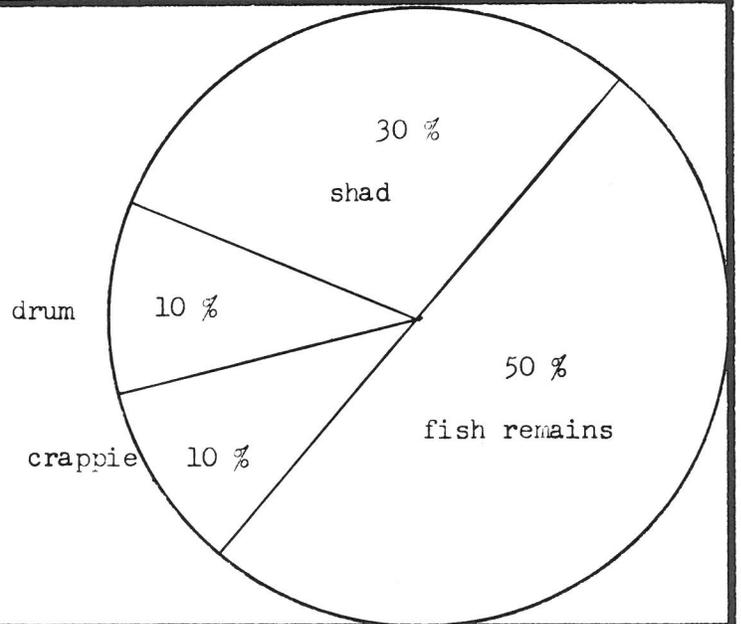
WHITE BASS
(33 stomachs)



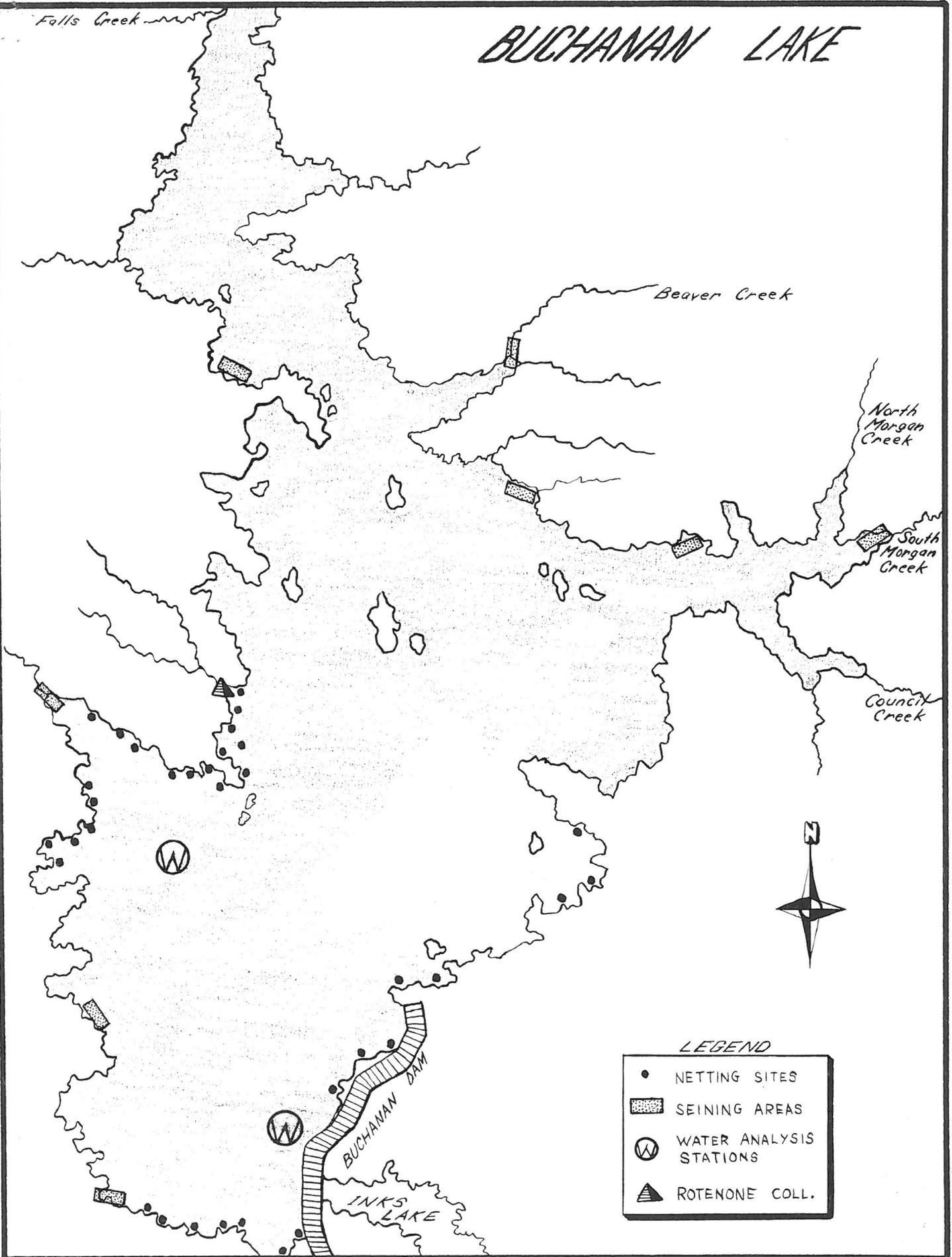
CHANNEL CATFISH
(30 stomachs)



BLACK BASS (salmoides & traculi)
(10 stomachs)



BUCHANAN LAKE



LEGEND

- NETTING SITES
- ▨ SEINING AREAS
- ⊙ W WATER ANALYSIS STATIONS
- ▲ ROTENONE COLL.

