

JOB COMPLETION REPORT

STATE OF TEXAS

Project No. F5R3 Name Fisheries Investigations and Surveys of the Waters of Region 3-B.
Job No. B-5 Title Inventory of Species Present in Lake Brownwood, Brownwood, Texas.
Period Covered: June 22, 1953 - May 1, 1956

ABSTRACT

1. One hundred and eight-five gill net sets were made, sixty-eight seining collections taken, and water analysis was done periodically during the thirty-six month inventory period.
2. Significant fluctuations in the elevation and capacity of the reservoir, resulted in it losing and regaining about 41.18 percent of its most productive area during inventory.
3. Temperatures recorded were less extreme than records would indicate during an average thirty-six month period, and there was a gradual reduction in the total hardness of the lakes water.
4. Excepting bullrushes in the upper lake; there is no permanent aquatic vegetation in Lake Brownwood.
5. Thirty-six species representing eleven families were taken during inventory 3,487 individuals were captured in gill nets and 4,708 individuals were taken and released by seining.
6. White bass are the most important game species in Lake Brownwood, and are dependent upon spring run-off for successful spawning.
7. Largemouth bass are probably prevented from spawning effectively by seasonal fluctuations in the reservoir level.
8. White crappie are apparently semi-dependent upon fall insect production for rapid growth.
9. All available evidence indicates that sunfishes should be considered in a forage capacity rather than as game fish.
10. River carsuckers were the least affected of any species by reservoir conditions, were of no apparent utility as forage for game species. This species was observed spawning following every significant increase in the lake level from March to November.
11. Gizzard shad were the most important forage species, and as such are of basic importance in any proposed management procedures.

OBJECTIVES

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

PROCEDURE

One hundred and eighty-five nets were set at twenty-nine locations in Lake Brownwood. Experimental nylon gill nets, measuring 125 feet long by 8 feet in depth, and made up in five, 25 foot sections were used. Mesh size for these nets increased progressively in each following section at one-half inch intervals beginning with one-inch mesh and terminating with a three-inch mesh section.

Sixty-eight seining collections were made at sixteen seining stations in the reservoir. In nearly all collections both 26 feet $\frac{1}{4}$ inch mesh bag seines and 15 feet $\frac{1}{4}$ inch common seine were used. To estimate relative abundance a count was made of all individuals taken in two hauls with a 26 feet $\frac{1}{4}$ inch bag seine for each collection. In addition to that work other seining collections were made to determine seasonal distribution of species and to secure samples of fry after the spring spawning season for fishes. For this latter work 4 feet common seine with meshes of $\frac{1}{4}$ inch and $\frac{1}{16}$ inch were used.

Water analysis to determine dissolved carbon dioxide and oxygen content was taken periodically and surface temperature, pH and the climatic conditions were recorded for each netting and seining collection. Turbidity was taken on seven occasions.

In netting collections samples from each collection for each species were weighed, measured and sexed in the field. A scale sample was taken and stomachs containing food were preserved for laboratory study. Similar work for seining collections included identification and counting only and where identity of an individual was questioned the fish was preserved in 10% formalin.

FINDINGS

Lake Brownwood is located approximately 8.5 miles north of the City of Brownwood. The dam creating the reservoir is located about one-half mile below the confluence of Jim Ned Creek and Pecan Bayou, is earth fill construction and 1,580 feet long. The reservoir was constructed by Brown County Water Improvement District and the impounded water is primarily for the municipal and industrial consumption of Brownwood, Coleman and Bangs. However, about five-thousand acres are irrigated either directly or by sub-surface seepage from the reservoir. When at emergency spillway level, the lake has 8,000 surface acres and contains an estimated 137,300 acre feet of water. When filled the lake has about 95 miles of shoreline.

The contributing watershed of 1,535 square miles in Coleman, Breckenridge and Capps limestone formation and top soils are usually alluvial deposits near streamways and various clays, loams and sands on higher ground. There are fifty different soil types in the county. Vegetative cover for the watershed is predominantly oak-grassland association, and the area is currently employed for farming with a lesser acreage for ranching. Climate for the watershed is semi-arid. The average annual rainfall is 27.44 inches, and the average annual discharge for Pecan Bayou and Jim Ned Creek is 166 c. f. s. A maximum discharge of 52,700 c. f. s. was recorded in October 1930 and recent averages were 20.8 c. f. s. for 1953 and 4.96 c. f. s. for 1952. On May 2, 1956 26,500 c. f. s. discharge was recorded for a three hour peak, and this run-off decreased to an unrecordable quantity within fourteen days. Lake Brownwood may be considered to be about twenty-five years old, having filled as a result of floodwaters in July 1932. The reservoir can be drained by two twelve-foot (horseshoe-shaped) reinforced concrete conduits.

RESERVOIR CONDITIONS DURING INVENTORY PERIOD

Capacity and Fluctuation:

From August 1953 when the lake level was at mean elevation 1423 and the reservoir contained 133,000 acre feet storage until work was terminated in March 1956 when the lake level was at elevation 1425 and impounded about 138,000 acre feet of water; significant fluctuation in the lake was one of the most important influences on fish populations. The extent of this influence will be discussed later under, Fish Populations. However, the potential significance of such fluctuations may be here illustrated by the surface area of the reservoir at elevation 1425 (about 8,500 surface acres) as compared to its area of about 5,000 surface acres at elevation 1417.2. This last elevation was the minimum record during inventory, and occurred in July 1954. The lake capacity was about 80,000 acre feet at the minimum lake level. Other considerations not taken into account, Lake Brownwood lost and regained about 41.18 percent of its biologically most-productive area during the time this work was done. The following chart is more detailed data on capacity and fluctuation during the inventory period.

Capacity and Fluctuation in Lake Brownwood

Year		February	March	April	May	November
1953	El.	1418				1425
	SA.	5,800				7,584
	AF	95,000				138,000
1954	El.	1424		1422		
	SA.	7,500		6,800		
	AF	135,000		110,000		
1955	El.	1420			1417	
	SA.	6,130			5,500	
	AF	105,370			80,000	

Symbols:

- El. - mean elevation
- SA. - Surface acres
- AF. - Acre feet capacity

Note: In the fall of 1956 the reservoir was returned to spillway capacity and receded only 2 feet by March 1956.

Temperature, Turbidity and Water Quality:

The following data was taken during inventory, and is taken in part from records of Brown County Water Improvement District. These measurements were taken at Brownwood dam and were usually recorded between 6:00 A.M. and 7:30 A.M. All measurements recorded by personnel working on this project were usually taken between 6:00 A.M. and 8:00 A.M.; however, air temperature was recorded on at least two occasions as late as 12:00 noon. Measurements were taken at Gaines Boat Docks on the south shore of the lake near the dam.

Temperature:

Year	Month	Temperature of Surface Water (F)			Air Temperature (F)		
		Min.	Max.	Avg.	Min.	Max.	Avg.
1953	January	44	56	52	25	64	53
1953	February	36	56	50	28	68	52
1953	March	50	58	53	53	69	63
1953	April	50	58	54	56	70	65
1953	May	68	72	70	80	94	89
1953	June	74	84	78	82	108	98
1953	July	82	84	79	92	102	98
1953	August	78	80	79	88	94	90
1953	September	76	80	78	92	106	96
1953	October	70	76	72	74	94	82
1953	November	64	68	66	50	76	64
1953	December	50	76	64	64	68	66
1954	January	50	60	57	44	64	58
1954	February	46	51	50	34	70	60
1954	March	50	55	51	36	75	70
1954	April (No Data)	-	-	-	-	-	-
1954	May (No Data)	-	-	-	-	-	-
1954	June	80	86	83	-	-	90-95
1954	July	82	86	84	-	-	-
1954	August	84	88	86	-	-	-
1954	September	78	86	82	72	87	84
1954	October	74	80	76	59	78	64
1954	November	70	73	71	48	74	64
1954	December (No Data)	-	-	-	-	-	-
1955	January	44	58	54	28	70	50
1955	February	46	66	56	29	64	50
1955	March	54	66	60	54	78	64
1955	April	58	66	60	68	90	80
1955	May	66	72	68	98	98	98
1955	June (No Data)	-	-	-	-	-	-
1955	July	70	75	74	80	94	86
1955	August	72	76	73	86	100	94
1955	September	68	74	70	82	96	90
1955	October (No Data)	-	-	-	-	-	-
1955	November	56	66	59	54	94	72
1955	December	64	68	66	-	-	-
1956	March	60	62	61	62	70	63
1956	April	66	68	67	40	86	70
1956	May	65	69	68	65	92	84
1956	June	72	80	74	76	91	85
1956	July	82	86	84	80	89	85
1956	August (No Data)	-	-	-	-	-	-
1956	September	76	78	77	69	83	78
1956	October	70	76	77	69	83	78
1956	November	66	70	69	28	78	60
1956	December	46	66	50	26	76	59
1957	January	56	58	57	-	-	-

Note:

The temperatures recorded are less extreme than records would indicate for an average period.

Water Analysis:

Data for total hardness is from records by the Brown County Water Improvement District. Records for four analysis are not included as the results indicate faulty technique or improper standardization of reagents.

Water Analysis - Lake Brownwood

Year	Month	Air Temp. (F)	Water Temp. (F)	Turbidity Inches	pH	Diss O ₂	CO ₂
1953	October	80	71		8.4	7.5	8.0
1953	November	64	62		8.5	11.5	6.0
1954	January	54	57		8.2	14.5	0.0
1954	February	52	49		8.2	15.0	1.0
1954	June	87	82		8.4	11.0	4.0
1954	August	82	85		8.6	7.0	6.0
1954	October	74	74	18	8.4	10.0	3.0
1955	February	49	51	18	8.4	12.0	0.0
1955	April	80	64		8.6	11.5	3.0
1955	July	82	72	12	8.7	10.4	3.6
1955	November	78	60	12	8.4	11.5	2.0
1956	March	68	61	18	8.4	13.5	8.5
1956	March	66	61	18	8.6	4.0	8.0

Total Hardness of Water (Alkalinity):

Data in ppm.

Month	1953	1954	1955	1956
January	133	130	116	116
February	130	132	117	118
March	130	132	119	120
April	133	106	119	120
May	131	115	118	93
June	130	105	118	83
July	127	106	117	86
August	133	107	118	93
September	131	117	117	93
October	132	120	117	97
November	130	118	117	98
December	130	118	117	99

AQUATIC VEGETATION

Principal species of aquatic vegetation in the upper lake shallow flats are bullrushes (Scirpus sp.), and along the south shore and in coves arrowheads (Sagittaria latifolia and S. platyphylla) and pondweeds (Potamogeton natans and P. spirillus) are present in depths to eight feet. In several small protected areas, mainly boat docks artificially created, parrot feather (Myriophyllum sp.) and muskgrass (Chara sp.) occur. Because of semi-annual fluctuations in the lake level only bullrushes may be considered as semi-permanent; all others appeared to be seasonal in duration.

FISH POPULATIONSSpecies Distribution:

As shown in the following charts 4,708 individuals of thirty-seven species and representing eleven families were captured by seining during the thirty-six month period. Species and families recorded are:

Checklist of Species

Common Name	Family Name	Scientific Name
Longnose gar	<u>Lepisosteidae</u>	<u>Lepisosteus osseus</u>
Gizzard shad	<u>Clupeidae</u>	<u>Dorosoma cepedianum</u>
Black buffalo	<u>Catastomidae</u>	<u>Ictiobus niger</u>
Smallmouth buffalo	<u>Catastomidae</u>	<u>Ictiobus bubalus</u>
Over carpsucker	<u>Catastomidae</u>	<u>Carpiodes carpio</u>
Gray redhorse sucker	<u>Catastomidae</u>	<u>Moxostoma congestum</u>
Carp	<u>Cyprinidae</u>	<u>Cyprinus carpio</u>
Golden shiner	<u>Cyprinidae</u>	<u>Notemigonus crysoleucas</u>
Plains shiner	<u>Cyprinidae</u>	<u>Notropis percobromus</u>
Texas shiner	<u>Cyprinidae</u>	<u>Notropis amabilis</u>
Pallid shiner	<u>Cyprinidae</u>	<u>Notropis amnis</u>
Spottail shiner	<u>Cyprinidae</u>	<u>Notropis venustus</u>
Redhorse shiner	<u>Cyprinidae</u>	<u>Notropis lutrensis</u>
Proserpine shiner	<u>Cyprinidae</u>	<u>Notropis proserpinus</u>
Mimic shiner	<u>Cyprinidae</u>	<u>Notropis volucellus</u>
Plains minnow	<u>Cyprinidae</u>	<u>Hybognathus placita</u>
Parrot minnow	<u>Cyprinidae</u>	<u>Pimephales vigilax</u>
Channel catfish	<u>Ameiuridae</u>	<u>Ictalurus punctatus</u>
Yellow bullhead	<u>Ameiuridae</u>	<u>Ictalurus natalis</u>
Flathead catfish	<u>Ameiuridae</u>	<u>Pylodictus olivaris</u>
Blackstripe topminnow	<u>Cyprinodontidae</u>	<u>Fundulus notatus</u>
Common mosquitofish	<u>Poeciliidae</u>	<u>Gambusia affinis</u>
White bass	<u>Serranidae</u>	<u>Roccus chrysops</u>
Spotted bass	<u>Centrarchidae</u>	<u>Micropterus treculi</u>
Largemouth bass	<u>Centrarchidae</u>	<u>Micropterus salmoides</u>
Warmouth bass	<u>Centrarchidae</u>	<u>Chaenobryttus gulosus</u>
Green sunfish	<u>Centrarchidae</u>	<u>Lepomis cyanellus</u>
Spotted sunfish	<u>Centrarchidae</u>	<u>Lepomis punctatus</u>
Redear sunfish	<u>Centrarchidae</u>	<u>Lepomis microlophus</u>
Longear sunfish	<u>Centrarchidae</u>	<u>Lepomis megalotis</u>
Bluegill	<u>Centrarchidae</u>	<u>Lepomis macrochirus</u>
Yellowbelly sunfish	<u>Centrarchidae</u>	<u>Lepomis auritus</u>

Common Name	Family Name	Scientific Name
Orangespotted sunfish	<u>Centrarchidae</u>	<u>Lepomis humilis</u>
White crappie	<u>Centrarchidae</u>	<u>Pomoxis annularis</u>
Black crappie	<u>Centrarchidae</u>	<u>Pomoxis nigromaculatus</u>
Logperch	<u>Percidae</u>	<u>Percina caprodes</u>
Freshwater drum	<u>Sciaenidae</u>	<u>Aplodinotus grunniens</u>

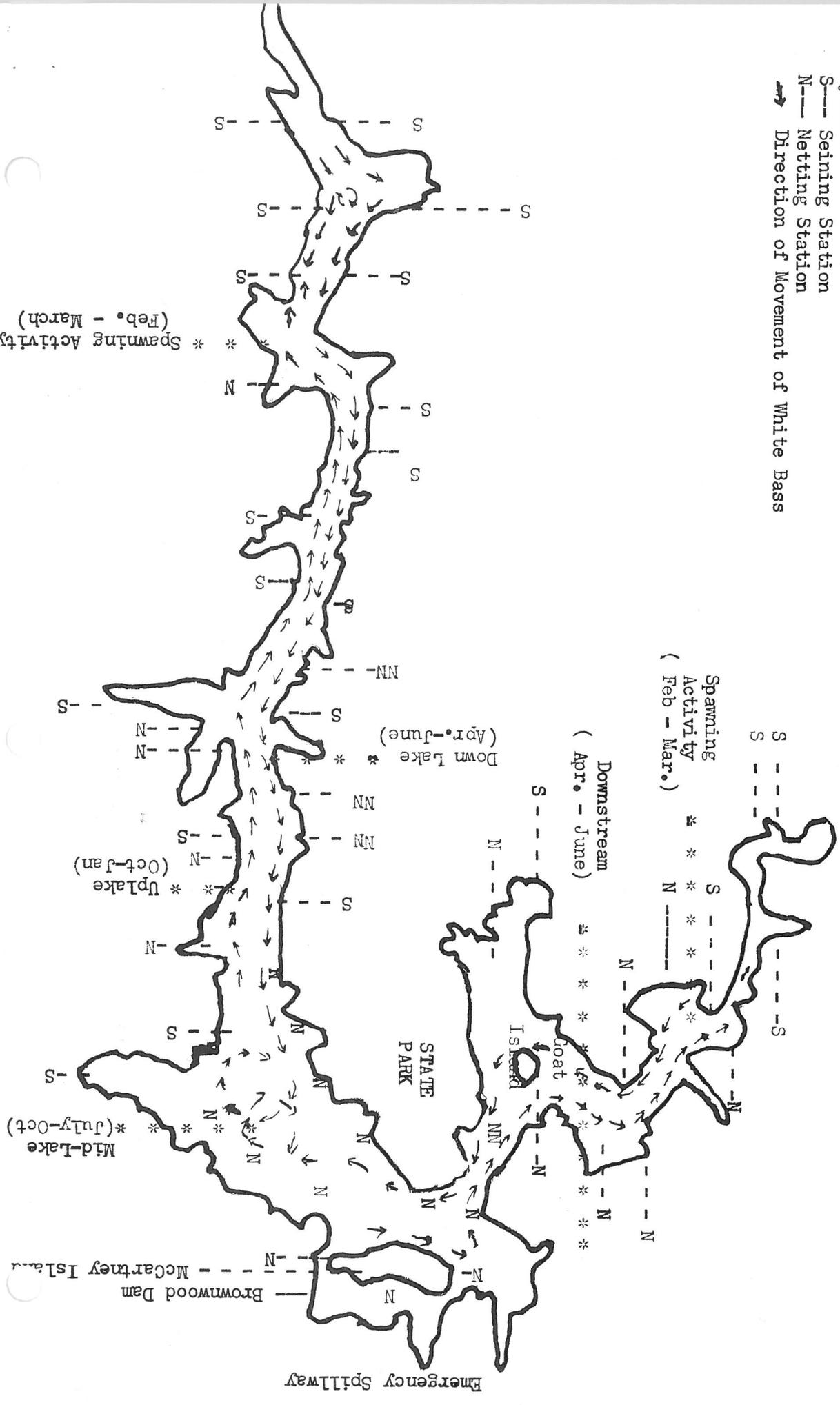
Logperch, Palid shiners, and Proserpine shiners were taken only from the extreme upper lake where the impounded water was retained in the original stream beds. The apparent migration of white bass is indicated on the included map, and it is believed that this pattern of movement may possibly also be partially duplicated by schools of gizzard shad. As discussed later there may be a somewhat different pattern of movement by Flathead catfish; however, there is insufficient evidence for any assertion. Other species listed were found through out the reservoir.

Seining Collections:

It was impossible to maintain exact seining stations because of reservoir fluctuations; however an attempt was made to repeat sampling as near to a designated locality as was possible. Technique was modified somewhat by improved nylon seines and in the included data unsuccessful seining attempts are not taken into account. The approximate location of seining stations are shown on the following map.

LAKE BROWNWOOD

Symbols
 S— Seining Station
 N— Netting Station
 → Direction of Movement of White Bass



* Spawning Activity (Feb. - March)

Mid-Lake *(July-Oct)

* Up-Lake (Oct-Jan)

Down-Lake *(Apr.-June)

Downstream (Apr. - June)

Spawning Activity (Feb - Mar.)

Emergency Spillway

Brownwood Dam

McCartney Island

STATE PARK

Island

Boat

Mid-Lake *(July-Oct)

* Up-Lake (Oct-Jan)

Down-Lake *(Apr.-June)

Downstream (Apr. - June)

Spawning Activity (Feb - Mar.)

* Spawning Activity (Feb. - March)

Seining Collections from Lake Brownwood August 21, 1953 through June 30, 1954.

Species	August	September	October	January	February	March	April	June	Total	Percent
Mosquitofish	21	50	0	11	0	17	23	31	153	10.40
Redhorse shiners	11	0	12	0	110	3	9	0	145	9.80
Spottail shiners	0	12	0	0	0	2	11	12	37	2.50
Texas shiners	0	0	11	0	18	9	0	0	38	2.60
Golden shiners	0	0	0	4	0	0	0	0	4	.20
Parrot minnows	0	0	21	0	11	18	17	0	67	4.50
Blackstripe topminnow	31	14	3	0	0	8	0	2	58	3.90
Plains minnow	0	0	0	62	18	0	0	11	91	6.20
Largemouth bass	4	0	0	0	3	0	4	6	17	1.10
White bass	4	18	9	28	2	32	20	11	124	8.50
Gizzard shad	38	37	10	0	128	154	12	0	379	25.80
Green sunfish	1	0	11	14	9	3	0	22	60	4.10
Longear sunfish	0	4	17	5	14	8	0	4	52	3.50
Bluegill	12	8	0	28	31	4	14	31	128	8.70
Redear sunfish	2	0	0	9	2	6	0	4	23	1.50
Yellowbelly sunfish	0	0	0	2	2	0	0	3	7	.40
Spotted sunfish	0	0	0	2	0	0	0	7	9	.60
Warmouth bass	2	2	1	6	4	1	1	4	21	1.40
White crappie	7	2	5	11	0	4	9	10	48	3.30
Total	133	147	100	182	352	269	120	158	1461	99.66

Seining Collections from Lake Brownwood July 1, 1954 through April 31, 1955.

Species	July	August	September	October	November	December	January	April	Total	Percent
Mosquitofish	145	200	75	31	12	0	120	28	611	23.41
Redhorse shiner	21	180	21	18	64	28	16	24	372	14.25
Spottail shiner	0	64	10	38	21	30	8	0	171	6.60
Texas shiner	0	28	18	0	0	21	30	0	97	3.77
Golden shiner	0	24	20	0	0	10	0	18	72	2.75
Parrot minnow	24	50	12	24	0	12	14	0	136	5.21
Blackstripe topminnow	38	21	38	24	12	21	60	0	214	8.20
Plains minnow	14	8	12	0	0	25	12	0	71	2.72
Logperch	0	10	0	0	0	0	18	0	28	1.07
Channel catfish	2	0	0	1	0	2	0	0	5	.19
River carpsucker	0	2	4	0	4	7	0	0	17	.65
Gizzard shad	0	14	41	6	14	2	17	0	102	3.90
Longnose gar	0	4	2	0	0	0	0	0	6	.23
Largemouth bass	6	2	8	4	6	6	4	0	36	1.38
Spotted bass	0	4	4	2	2	8	5	0	25	.95
White crappie	10	20	4	2	8	2	4	6	56	2.14
White bass	4	6	0	0	0	1	2	19	32	1.23
Bluegill	20	25	18	24	61	40	31	47	266	10.19
Redear sunfish	18	6	0	2	2	2	8	12	50	1.91
Green sunfish	20	18	13	21	18	20	2	0	112	4.29
Yellowbelly sunfish	0	4	2	22	31	2	22	12	95	3.64
Warmouth bass	0	8	6	9	2	4	4	2	35	1.34
	316	704	304	240	257	218	390	180	2609	100.00

Seining Collections from Lake Brownwood.

Species	May	June	August	October	March	Total	Total	Total	Percent	
	1953-54	1954-55	1955-56	1953-54	1954-55	1955-56	1953-56	1953-56		
Mosquitofish	18	4	16	0	0	153	611	38	802	17.03
Redhorse shiner	6	6	12	12	14	145	372	50	567	12.04
Spottail shiner	0	0	0	0	0	37	171	0	208	4.43
Texas shiner	0	0	0	0	0	38	97	0	135	2.87
Golden shiner	0	0	0	0	0	4	72	0	76	1.62
Parrot minnow	21	18	15	15	9	67	136	8	281	5.97
Blackstripe topminnow	0	0	0	0	0	58	214	0	272	5.77
Flains minnow	18	18	21	24	48	91	71	129	291	6.18
Logperch	2	1	1	6	0	0	28	10	38	.81
Smallmouth buffalo	0	0	0	0	0	0	5	0	5	.10
River carpsucker	2	2	0	4	1	0	17	9	26	.55
Longnose gar	1	0	0	1	0	0	6	2	8	.17
Largemouth bass	2	6	6	4	5	17	61	23	101	2.15
White crappie	6	4	7	7	8	48	56	32	136	2.89
White bass	10	4	13	16	18	124	32	61	217	4.61
Bluegill	20	25	18	24	6	128	266	93	487	10.34
Redear sunfish	2	6	0	2	2	23	50	12	85	1.80
Green sunfish	8	8	4	3	3	60	112	26	198	4.23
Spotted sunfish	0	0	0	0	0	9	0	0	9	.19
Longear sunfish	0	0	0	0	0	52	0	0	52	1.10
Yellowbelly sunfish	0	0	0	0	0	7	95	0	102	2.16
Warmouth bass	2	2	1	4	1	21	35	10	66	1.40
Gizzard shad	0	21	10	14	20	379	102	65	546	11.59
	118	125	124	136	135	1461	2609	638	4708	100.00

The above data by month is for the final year of inventory. Actual catches by month for the preceeding twenty-four months is included in the completion reports for F5R1 and F5R2.

Netting Collections:

As in seining work exact duplication of netting was impossible except in a few instances. Only the netting stations pertinent in other discussion are shown on the map. As the included charts are regarded as the best available expression of a total interrelationship; populations for the most important species and the apparent ecological influences upon each species are discussed separately; where evidence of such influence was obtained.

Netting Collections from Lake Brownwood August 22, 1953 through June 22, 1954.

Species	August		September		November		December		January		February		March		April		May		June		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Gizzard shad	0	0	0	0	0	0	12	13.7	3	12	21	1	18	8	75	0	0	0	0	0	75
River carpsucker	4	50.00	2	50.00	1	9.1	19	21.60	11	4	5	4	0	12	5	4	18.20	0	0	12	62
Carp	0	0	0	0	0	0	1	1.1	0	0	0	0	0	0	0	0	0	0	0	0	1
Longnose gar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Drum	0	0	0	0	0	0	4	4.60	0	0	0	0	0	0	0	0	0	0	0	0	4
Yellow bullhead	0	0	0	0	4	36.3	24	27.3	3	7	8	3	0	7	13.7	0	0	0	0	7	56
Channel catfish	0	0	0	0	1	9.1	1	1.1	0	3	3	7.2	9	41.0	0	0	2	5.6	2	19	6.40
Largemouth bass	4	50.0	1	25.0	5	45.4	17	19.4	4	5	3	7.2	4	18.2	2	8.0	1	2.7	1	46	15.30
White crappie	0	0	0	0	0	0	4	4.60	0	2	0	0	0	0	0	0	0	0	5	11	3.60
Sunfish	0	0	1	25.0	0	0	6	6.8	4	6	2	4.8	1	4.6	5	20.0	0	0	0	25	8.40
Total	8		4		11		88		25	39	42	22	25	36	300						

Netting Collections from Lake Brownwood May 1, 1954 through May 31, 1955.

Species	July	August	September	October	November	December	January	March	April	May	Total	%
Gizzard shad	No. 40 % 31.25	No. 38 % 44.19	No. 13 % 17.33	No. 23 % 50.00	No. 2 % 8.33	No. 41 % 38.68	No. 51 % 68.91	No. 31 % 59.61	No. 61 % 46.92	No. 21 % 42.85	No. 321	41.69
River carpsucker	No. 23 % 17.96	No. 11 % 12.79	No. 0 % 2.17	No. 1 % 8.33	No. 2 % 29.24	No. 31 % 18.91	No. 14 % 1.92	No. 1 % 21.53	No. 28 % 18.36	No. 9	No. 120	15.58
Smallmouth buffalo	No. 0 % 0.00	No. 3 % 3.48	No. 6 % 18.00	No. 5 % 10.87	No. 4 % 16.85	No. 4 % 3.27	No. 0 % 0.0	No. 1 % 1.92	No. 17 % 13.17	No. 4 % 8.16	No. 44	5.72
Carp	No. 0 % 0	No. 2 % 2.32	No. 1 % 1.33	No. 2 % 4.34	No. 2 % 8.33	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 2 % 4.08	No. 9	1.17
Longnose gar	No. 0 % 0	No. 0 % 0	No. 2 % 2.66	No. 3 % 6.54	No. 8 % 33.34	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 4 % 3.08	No. 0	No. 17	2.21
Drum	No. 9 % 7.13	No. 0 % 0	No. 41 % 54.67	No. 1 % 2.19	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 1 % 1.80	No. 2 % 4.08	No. 54	7.01
Flathead	No. 0 % 0	No. 1 % 1.16	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 1 % 2.04	No. 2	.26
White bass	No. 41 % 32.00	No. 11 % 12.79	No. 4 % 5.34	No. 10 % 21.70	No. 0 % 0	No. 22 % 20.75	No. 5 % 6.75	No. 6 % 16.74	No. 2 % 1.53	No. 0	No. 101	13.12
Largemouth bass	No. 7 % 5.49	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 1 % 4.27	No. 4 % 3.27	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 1 % 2.04	No. 13	1.68
Channel Catfish	No. 0 % 0	No. 9 % 10.46	No. 3 % 4.00	No. 1 % 2.19	No. 5 % 2.04	No. 4 % 3.77	No. 2 % 2.70	No. 9 % 17.30	No. 6 % 4.51	No. 5 % 10.20	No. 44	5.72
White crappie	No. 8 % 6.10	No. 11 % 12.79	No. 5 % 6.67	No. 0 % 0	No. 0 % 0	No. 0 % 0	No. 2 % 2.70	No. 4 % 7.20	No. 11 % 8.46	No. 4 % 8.16	No. 45	5.84
Total	No. 128	No. 86	No. 75	No. 46	No. 24	No. 106	No. 74	No. 52	No. 130	No. 49	No. 770	100.0

Netting Collections from Lake Brownwood

Species	June		August		September		November		March		March		April		Total	Total	Total	Total	Percent
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	1953-54	1954-55	1955-56	1953-56	
Gizzard shad	40	33.05	51	51.00	21	25.92	23	29.48	8	9.87	50	23.04	15	22.05	855	321	208	1384	39.68
River carpsucker	23	19.00	14	14.0	19	23.45	9	11.53	3	3.70	5	2.31	9	13.23	184	120	82	386	11.03
Longnose gar	0	0.0	0	0	19	23.45	4	5.12	2	2.46	22	10.13	2	2.95	27	17	49	93	2.65
Smallmouth buffalo	0	0	0	0	4	4.93	0	0	9	11.11	24	11.05	6	8.82	79	44	43	166	4.73
Carp	0	0	0	0	0	0	0	0	4	4.93	4	1.84	4	5.89	25	9	12	46	1.31
Freshwater drum	9	7.43	0	0	0	0	4	5.12	0	0	1	.46	1	1.47	0	54	15	69	1.95
Flathead catfish	0	0	0	0	0	0	1	1.23	2	2.46	1	.46	2	2.95	10	2	6	18	.50
Channel Catfish	0	0	2	2.00	5	6.17	8	10.25	15	18.51	9	4.14	5	7.35	168	44	44	256	7.32
Largemouth bass	2	1.65	7	7.0	0	0	2	2.56	2	2.46	11	5.97	0	0	11	13	24	48	1.34
White bass	41	33.88	16	16.0	11	13.59	21	26.92	24	29.62	54	24.88	13	19.11	506	101	180	787	22.82
White crappie	6	4.95	10	10.0	2	2.46	2	2.56	12	1.48	26	11.98	11	10.17	86	45	69	200	5.71
Sunfishes (Combined)*	0	0	0	0	0	0	0	0	0	0	1	.46	0	0	20	0	1	21	.60
Bluegill	0	0	0	0	0	0	2	2.56	0	0	6	2.76	0	0	0	0	8	8	.22

Netting Collections from Lake Brownwood (Continued).

Species		June	August	September	November	March	March	April	Total 1953-54	Total 1954-55	Total 1955-56	Total 1953-56	Perce
Redear sunfish	No.	0	0	0	2	0	3	0	0	0	5	5	.14
	%	0	0	0	2.56	0	1.38	0					
Total		121	100	81	78	81	2.17	68	1971	770	746	3487	100.00

* The remaining sunfishes listed in the checklist and hybrids.
 The above data by month is for the final year of inventory. Actual catches by month for the preceding twenty-four months is included in the completion reports for F5R1 and F5R2.

Netting Collections from Lake Brownwood.
Comparative Data on Fish Populations for Principal Species.

Species	No. Captured	Weight Comparison (% by Weight)				Numerical Comparison (% by Number)			
		1953-54	1954-55	1955-56	Average	1953-54	1954-55	1955-56	Average
<u>Dorosoma cepedianum</u>	1384	9.70	18.64	16.49	14.94	43.40	41.69	27.98	37.69
<u>Carpiondes carpio</u>	386	15.70	18.95	14.60	16.41	9.30	15.58	10.91	11.93
<u>Ictiobus bubalus</u>	166	14.50	12.65	9.27	12.14	4.00	5.72	5.72	5.14
<u>Ictalurus punctatus</u>	256	1.90	4.23	8.31	4.81	8.50	5.72	5.89	6.70
<u>Morone chrysops</u>	787	36.50	15.95	28.40	26.95	25.70	13.12	24.12	20.98
<u>Micropterus salmoides</u>	48	1.80	5.04	3.38	3.40	.60	1.68	3.21	1.83
<u>Pomoxis annularis</u>	200	4.30	5.15	7.38	5.61	4.30	5.84	9.11	6.41

Netting Collection from Lake Brownwood.
Comparative Physical Condition of Principal Species.

Species	1953-1954			1954-1955			1955-1956			Total No.	Perce Catch
	No.	K. Range	Avg. K.	No.	K. Range	Avg. K.	No.	K. Range	Avg. K.		
<u>Dorosoma cepedianum</u>	132	1.31-2.08	1.57	58	1.60-2.00	1.82	40	1.84-2.08	1.89	1384	16.6
<u>Carpiondes carpio</u>	60	2.20-2.69	2.38	40	1.52-2.50	2.38	40	2.40-2.69	2.46	386	36.2
<u>Cyprinus carpio</u>	25	2.60-3.10	2.54	8	2.32-2.59	2.40	6	2.64-2.90	2.60	46	84.0
<u>Ictiobus bubalus</u>	28	2.58-3.66	3.01	13	3.66-2.99	3.48	7	3.66-3.66	3.66	.166	28.9
<u>Lepisosteus osseus</u>	27	1.40-4.57	3.73	4	.264-.42	.290	0	0	0	.93	33.3
<u>Morone chrysops</u>	228	1.65-3.46	2.47	61	2.18-2.72	2.20	60	2.47-2.92	2.68	787	44.3
<u>Pilodictus olivaris</u>	10	2.80-3.25	3.18	1	2.94	2.94	7	2.42-2.64	2.52	18	100.0
<u>Ictalurus punctatus</u>	168	1.68-1.98	1.82	18	1.86-2.42	1.93	28	1.82-1.86	1.84	256	83.5
<u>Micropterus salmoides</u>	11	2.25-2.73	2.61	6	2.33-3.25	2.59	18	2.33-2.94	2.72	48	72.9
<u>Pomoxis annularis</u>	53	2.89-4.94	3.23	24	2.33-3.40	3.29	20	2.86-3.25	3.12	200	48.5
Sunfishes	30	4.42-6.65	4.80	20	4.42-6.40	5.24	20	4.80-6.08	5.12	21	33.3

LOCALITIES HAVING HIGH PERCENTAGES OF GAME FISH IN LAKE BROWNWOOD



Largemouth Bass

Most Largemouth Bass were taken off McCartney Island and in the Weatherby Bay area.



White Crappie

White Crappie were taken near Evans and Gaines Boat Docks and off Rocky cove.



Southern Channel Catfish

Most Southern Channel Catfish were taken from Doctors Draw and off Big Rocky point.



Flathead Catfish

Flathead Catfish were taken only off Rocky Point and in Saunders Bay

21.
LOCALITIES HAVING HIGH PERCENTAGES OF GAME
FISH IN LAKE BROWNWOOD



White Bass (Late Spring to Fall)

From March to October greatest concentrations of White Bass were in Sewell Draw and in the Rocky Cove area



White Bass (Late Fall to Spring)

From October to March White Bass were concentrated in and around McInnis point and in the mouth areas of Recan Bayou and Jim Ned Creek

Stomach Analysis:

The following data is included as resulting from the analysis of stomach's containing food; however its reliability may be questioned because of the obvious tendency of several species notably longnose gar, flathead catfish and largemouth bass to regurgitate their stomach contents when captured in gill nets, or when held in live boxes. It is also considered probable that for some species the small number of stomachs's containing food are inadequate to express the importance of the various types of food. The following data is on a volumetric displacement basis.

Stomach Contents for Principal Game Species

White Bass

No. stomachs	Fish examined	Shad %	Fish Remains %	Insects %	Crustaceans %	Others %
146	305	78	18	1	1	Sticks 1

Largemouth Black Bass (Micropterus salmoides)

No. stomachs	Fish examined	Shad %	Notropis %	Fish Remains %	Insects %	Others %
12	42	40	17	32	4	Sunfish 3 Twigs 3

White Crappie

No. stomachs	Fish Examined	Shad %	Notropis %	Fish Remains %	Insects %	Others %
82	114	36	11	17	22	corn & other grain 7%. Silt & organic matter 7%

Southern Channel Catfish

No. stomachs	Fish examined	Shad %	Fish Remains %	Insects %	Sunfish %	Algae %	Others %
49	138	22	15	17	11	14	Corn and other grain 12%, other catfish 8%, carrion 4%.

Flathead Catfish

No. stomachs	Fish Examined	Shad %	Fish Remains %	Insects %	Channel Catfish %
6	13	68	19	2	11

As shown in the preceding data 612 individual fish were opened for examination of stomach content, gonadal development, and for the existence of internal parasites. Of this number 295 stomach's (48.20%) contained food. The rather large percentage of corn and other gains found in Channel Catfish is undoubtedly a result of setting nets in areas baited by fishermen. Carrion was probably from picnickers and campers and included beans, weiners, chicken entrails and meat scraps.

Population Influences:

White Bass. White bass are the most important game species in Lake Brownwood; however reproduction of these fish was almost entirely dependent upon run-off entering the lake from February to April. Virtually no juvenile fish were taken in netting or seining collections during periods following the years in which no run-off occurred during these months, and no spawning activity was observed in the reservoir other than in the area around the mouth of the contributing tributaries. When run-off occurred in the spring and the water temperature was about 60 degrees F, spawning of this species was observed in dramatic manner. As expressed in the food analysis data; white bass fed almost entirely upon gizzard shad, and the fluctuation in the density and condition of these carnivorous species may be correlatable with the successful propagation of that forage type. Additional evidence; although not available in recordable data, of the dependence of white bass on shad for food was the observed favorable results of sportsmen who by following the flight of sea gulls trolled through schools of shad and obtained excellent catches of the bass feeding on these concentrations.

Largemouth Bass. It is believed that the annual fluctuation of the lake level during the regular spawning period of this species may be regarded as sufficient reason for the comparatively low percentage of largemouth bass in Lake Brownwood. Seining and netting indicated that only in the spring of 1955, when a mild winter permitted the water to reach spawning temperatures before the usual spring withdrawals for irrigation, did this species reproduce successfully. The sexual development and general condition of individuals indicated that only the apparently younger fish were active in spawning.

White Crappie. Although all data included in the charts is designated as white crappie, two black crappie were identified from netting collections. However, these were believed to be individuals released by hatcheries, and no other evidence was obtained to support the existence of a significant population. Other information pertaining to this species is best illustrated in the various charts. Spawning apparently occurred in March and April; however degenerate or spent individuals were occasionally captured as late as October. In addition to the data obtained by detailed stomach analysis of 82 individuals the food taken by a large number of crappie caught by fishermen were observed when these fish were dressed. It is considered likely that this species is more dependent upon fall insect life than the included data would indicate.

Sunfishes (All Lepomis). Of the six species of sunfish and one common hybrid taken during inventory, no species had established dominance. All data available also indicated that from a utilization standpoint sunfishes in the lake should be regarded in a forage capacity rather than as game fish. The largest sunfish taken during inventory (a bluegill-redear hybrid) weighed seven ounces, and there was a marked lack of interest in harvesting these fish by sportsmen. Spawning by this group was usually from late spring until frost; however fish were observed on or near nests throughout the year.

Southern Channel Catfish. Apparently because of the abundance of suitable spawning areas and devices, southern channel catfish were less affected by lake conditions during inventory than were the previously discussed species. These fish were apparently in poorer condition when the lake level was lowered in the summer of 1954, and a higher rate of internal parasites were found in specimens during that period. Spawning was indicated as early as the first week in July and there was no evidence of activity after the middle of August.

Flathead Catfish. The total number of fish taken during inventory is insufficient to justify any conclusions regarding the habits, requirements or influences for this species. All individuals were taken in two localities designated on the map, and were captured during the warmer months (May to September).

River Carpsuckers. These fish were probably the least affected of any species by reservoir conditions. Individuals in advanced stages of sexual development were taken in every netting collection, and spawning was observed immediately following every significant increase in the lake level from March to November. The utility of this species as forage is believed to be negligible since not one identifiable specimen was recovered from stomach analysis either from this lake or from any other body of water in Region 3-B. There is no known commercial market for these fish.

Smallmouth Buffalo. As indicated by the comparative charts for the principal species, smallmouth buffalo remained fairly constant numerically during the thirty six month study period. Average "K" for this population increased, and there was a loss in the percentage of the total weight of all fish captured by netting. These indicated changes in the population may have been the result of netting by a commercial fisherman who worked at the lake from January 1955 through March 1956. During that period about 25,000 pounds of these fish were removed according to the best available estimate. Six-inch mesh gill nets were employed and may have significantly reduced the number of individuals in the size category that would be captured by such nets. No spawning activity was observed, and individuals in an advanced stage of sexual development were taken throughout the year. Seining results indicated that spawning occurred in the late spring.

Gizzard Shad. Shad were the most important forage species for all the principal game species in the reservoir, and as such are of basic importance. There is not sufficient data present to attempt correlation between successful reproduction of this species and the anticipated resultant increase in white bass, nor is there sufficient data to establish a correlation between reservoir fluctuations and the successful reproduction of this species; however all data and evidence available indicates some such relationship. Gizzard shad apparently spawn, depending upon reservoir conditions between April and October.

Freshwater Drum. No data is available on the habits of this species, and drum were not utilized by sportsmen or by the commercial fisherman. Other importance is not indicated.

Longnose Gar. This population was apparently of lesser importance than those in the preceding discussion and no detailed information is available for their requirements or their behavior resulting from reservoir conditions.

Other Species. Of the remaining species taken during inventory only members of the Genus Notropis are of significance in the data obtained. Apparently these shiners are important in a forage capacity; however it is doubted that their importance is equal to that of insects and crustaceans, and there is virtually no doubt that they are secondary to gizzard shad in providing food for the principal game species.

RECOMMENDATIONS

1. No recommendations for constructive action are included at this time because fishing results are expected to improve as a result of the discussed improvement in the reservoir condition and the apparent increases in the game species present.

2. Encouragement should be extended in the completion of proposed developments on the Pecan Bayou and Jim Ned Creek tributaries of the reservoir. It is believed that these developments will aid in maintaining stream flow during the critical spawning period for white bass and may aid in maintaining the lake level during the spawning activity of largemouth bass.

3. Should an effective control be found for river carpsuckers, it is recommended that this device and/or procedure be employed to curb, control, or eradicate the population of that species.

4. Although data is inconclusive on the resulting benefits from commercial harvesting of smallmouth buffalo, it is recommended that consideration and co-operation be extended to authorized commercial fishermen in continuing work at the lake.

5. Should the situation warrant, it is recommended that the reservoir be re-surveyed in a period of three to five years.

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