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JOB PROGRESS REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-4-R-17

REGION 2-A FISHERIES STUDIES

Job No. B-37: Fishery Management Recommendations

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SUMMARY

During this segment, 14 major public lakes in North Central Texas were checked. From 5 to 15 netting collections were made on each lake.

Rough fish species, in the 14 lakes averaged 55.64% of the number and 73.50% of the weight. They ranged from 55% in Lake Mineral Wells to 94% in Lake Benbrook, by weight.

This job should be continued in order to keep abreast of changes in the fish populations. This information will be valuable in managing the fishery resources of this area.

Job Progress Report

State of Texas

Project No. F-4-R-17 Name: Region 2-A Fisheries Studies

Job No. B-37 Title: Fishery Management Recommendations

Period Covered: January 1, 1970 to December 31, 1970

Background:

Twelve of the 14 lakes checked during this segment were first checked in 1968. Lake Mineral Wells was not checked in 1968, and Lake Granbury, built in 1969, was checked three times in 1969.

Even though these data are limited, they were very useful in making stocking recommendations, population control recommendations, and recommendations pertaining to the need for a contract fisherman.

Objectives:

To determine the need for changes in fish harvest regulations, stocking, population control, vegetation control, and contract fishing in Region 2-A waters.

Procedures:

Proposed fishing regulations for the Possum Kingdom Regulatory Area were discussed at a Game Management Officer-Biologist meeting prior to being presented at public hearings in each county under Regulatory authority. The fishing laws were then presented to the Commissioners of the Texas Parks and Wildlife Commission. The regulations which set seasons, bag and possession limits, and means and methods of harvest, were based upon results and findings of surveys and work done in this region.

Fourteen major public lakes in the region were divided into 3 groups: less than 5,000 acres, 5,000 to 10,000 acres, and more than 10,000 acres. From 5 to 15 nets, based on the size of the lake, were set overnight in each lake during each quarter, except for Lakes Granbury and Mineral Wells. Monthly collections were made on Lake Granbury, and only three collections were made on Lake Mineral Wells.

Experimental gill nets, 150 feet long with varying mesh sizes from 1 to 3½ inches, and a 20-foot seine were used to make the fish collections. The game fish species were weighed and measured individually. A representative sample of rough fish species were weighed and measured, and the remainder of them were counted and bulk weighed.

Seining collections were made and the number of game fish and rough fish species taken was recorded.

Stocking recommendations were based on seining collection data.

Gill Netting data were used in considering whether or not a contract fisherman might be beneficial to a lake.

Notes were made on the types of aquatic vegetation present, and whether or not it interferred with access or fishability of an area.

Water quality studies were made at two stations on Lake Granbury. Insufficient quantities of chemicals or strong winds prevented us from making monthly analyses as planned.

Table 1 is a checklist of all fish taken in the netting and seining collections during this segment. Common and scientific names used in A List of Common and Scientific Names of Fishes from the United States and Canada (Third Edition), American Fisheries Society, Special Publication No. 6 are used in this checklist. Only common names are used in the report.

Findings:

Lake Benbrook

(Tarrant County)

Gill Netting: Spotted suckers ranked first in total number and third in total weight of all fish taken in the netting collections. They comprised 35.53% of the total number and 24.47% of the total weight of all fish taken in the netting collections. River carpsuckers, carp, and gizzard shad, in that order, were the next most abundant species taken. These four species accounted for 76.54% of the total number and 92.92% of the total weight of all fish taken at Benbrook during this segment.

Channel catfish showed a slight increase in percent of total number but a slight decrease in percent of total weight. White bass, largemouth bass, and white crappie all showed decreases in percent of total number taken since 1968. None of these changes, however, is considered significant. Table 2 shows the netting results.

Seining Collections: Five seining stations were set up on Benbrook. Usually two hauls, from 20 to 40 feet in length, were made at each station in conjunction with the quarterly netting checks. Threadfin and gizzard shad were taken in both April and July collections. In April, 33 threadfins were taken, and 320 gizzard shad were taken in the July collections. The following fish, along with the approximate number, were taken during the year. Brook silverside, 150; golden shiner, 200; blacktail shiner, 110; red shiner, 90; and bullhead minnow, 90. Five largemouth bass, from 2 to 5 inches (T.L.), were also taken in the April and July collections.

Vegetation: Pondweeds (Potamogeton sp.) are becoming a problem around the clear, shallow shoreline. Also, American lotus (Nelumbo sp.) were noted in two creeks on the south side of the lake, but it is not a problem at this time.

Discussion and Recommendations: Despite the apparent large number of rough fish in this lake, Benbrook continues to be a popular fishing lake. According to the U. S. Army Corps of Engineers, more than 2 million people visited the lake in 1970, and more than half of them fished. No creel census data are available but some fishermen report good strings of crappie at various times of the year. Channel catfish and largemouth bass fishing, reportedly good years ago, is only fair.

Table 1

Checklist of Fish Species

Common Name	Scientific Name
Spotted gar	*Lepisosteus oculatus*
Longnose gar	*L. osseus*
Shortnose gar	*L. platostomus*
Gizzard shad	*Dorosoma cepedianum*
Threadfin shad	*D. petenense*
Carp	*Cyprinus carpio*
Golden shiner	*Notemigonus crysoleucas*
Red shiner	*Notropis lutrensis*
Blacktail shiner	*N. venustus*
Fathead minnow	*Pimephales promelas*
Bullhead minnow	*P. vigilax*
River carpsucker	*Carpiodes carpio*
Smallmouth buffalo	*Ictiobus bubalus*
Spotted sucker	*Minytrema melanops*
Gray redhorse	*Moxostoma congestum*
Blue catfish	*Ictalurus furcatus*
Black bullhead	*I. melas*
Channel catfish	*I. punctatus*
Flathead catfish	*Pylodictis olivaris*
Blackstripe topminnow	*Fundulus notatus*
Starhead topminnow	*F. notti*
Blackspotted topminnow	*F. olivaceus*
Mosquitofish	*Gambusia affinis*
Brook silverside	*Labidesthes sicculus*
White bass	*Morone chrysops*
Green sunfish	*Lepomis cyanellus*
Warmouth	*L. gulosus*
Orangespotted sunfish	*L. humilis*
Bluegill	*L. macrochirus*
Longear sunfish	*L. megalotis*
Redear sunfish	*L. microlophus*
Spotted bass	*Micropterus punctulatus*
Largemouth	*M. salmoides*
White crappie	*Pomoxis annularis*
Black crappie	*P. nigromaculatus*
Logperch	*Percina caprodes*
Freshwater drum	*Aplodinotus grunniens*

Table 2

Lake Benbrook Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Gizzard shad*	111	15.22	45.99	4.13
River carpsucker*	104	14.27	427.95	38.45
Spotted sucker*	259	35.53	272.41	24.47
Carp*	84	11.52	287.79	25.87
Golden shiner*	13	1.78	3.02	0.27
Channel catfish	10	1.37	14.12	1.27
White bass	33	4.53	19.82	1.78
Largemouth bass	6	0.82	3.14	0.28
Green sunfish	3	0.41	0.38	0.03
Redear sunfish	5	0.69	1.54	0.14
Bluegill	59	8.09	8.68	0.78
Longear sunfish	3	0.41	0.27	0.02
White crappie	33	4.53	14.25	1.28
Black crappie	1	0.14	0.37	0.03
Freshwater drum*	5	0.69	13.33	1.20
Totals	729	100.00	1,113.06	100.00
Rough Fish	576	79.01	1,050.49	94.39
Game Fish	153	20.99	62.57	5.61

* Indicates rough fish species

In view of the large number of rough fish species taken in the netting collections, Benbrook is a candidate lake for some fisheries management work. Gizzard shad, river carpsucker, spotted sucker and carp comprised more than 75% of the total number and more than 90% of the total weight of all fish taken in the netting collections.

Either a partial rotenone treatment or the stocking of some suitable predator species is recommended.

Lake Cisco

(Eastland County)

Gill Netting: Nearly half (41.46%) of the fish taken in the netting collections in Lake Cisco were gizzard shad. Rough fish species, gizzard shad, river carpsucker, carp and golden shiners, comprised nearly 58% of the total number and nearly 60% of the total weight of all fish taken (Table 3).

Bluegill, white crappie, channel catfish and largemouth bass were the most frequently taken game species. Together, they comprised 39% of the total number of all fish taken in the netting collections. Other species of game fish taken included flathead catfish, green and redear sunfish, and one black crappie.

Seining Collections: Collections were made at five stations on this lake. Largemouth bass and bluegill dominated the August and November collections. The bass, which ranged from 1 to 3 inches (T.L.), indicated successful reproduction.

Golden shiners, blacktail shiners, and red shiners were taken during the year. Also, bullhead minnows, blackstripe topminnows, green, redear and longear sunfish, logperch, and white crappie were taken in the seining collections.

Vegetation: Aquatic vegetation is not a problem in this relatively clear water lake. The fluctuating water level probably prevents the development of a serious vegetation problem.

Discussion and Recommendations: For some unknown reason this is not a very productive lake. For example, only 0.06 pounds of fish per foot of net was taken in Lake Cisco, and 0.28 pounds of fish per foot of net was taken in nearby Lake Leon. Still, the game fish-rough fish ratio is comparatively good.

A recommendation was made to stock channel catfish; 60,000 were stocked in the fall of 1970.

Lake Leon

(Eastland County)

Gill Netting: In 1970, 332 fish of 13 speices were taken in the netting collections (Table 4). Since the 1968 survey, game fish species declined both in percent of total number and total weight. The reason for this is due to the decline in the number of white crappie. In 1968, 119 (36.95%) white crappie were taken; in 1970, only 49 (14.76%) were taken. Despite this apparent decline, the average weight of the crappie has increased from 152 grams in 1968 to 215 grams in 1970. Also, the average "K" factor has increased from 1.79 to 2.68. No other significant changes were noted among the game fish.

Table 3

Lake Cisco Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Gizzard shad*	102	41.46	44.23	24.23
River carpsucker*	4	1.63	14.79	8.10
Carp*	12	4.88	45.26	24.79
Golden shiner*	24	9.76	4.34	2.38
Channel catfish	17	6.91	16.56	9.07
Flathead catfish	4	1.63	21.79	11.94
Largemouth bass	14	5.69	13.09	7.17
Green sunfish	1	0.40	0.11	0.06
Redear sunfish	2	0.81	0.40	0.22
Bluegill	43	17.48	7.96	4.36
White crappie	22	8.94	13.65	7.48
Black crappie	1	0.41	0.37	0.20
Totals	246	100.00	182.55	100.00
Rough Fish	142	57.73	108.62	59.50
Game Fish	104	42.27	73.93	40.50

* Indicates rough fish species

Table 4

Lake Leon Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Spotted gar*	2	0.60	14.14	1.65
Longnose gar*	2	0.60	13.23	1.55
Gizzard shad*	44	13.26	8.38	0.98
Smallmouth buffalo*	111	33.43	507.12	59.18
River carpsucker*	33	9.94	116.92	13.64
Carp*	11	3.31	51.12	5.97
Channel catfish	42	12.65	60.27	7.03
Flathead catfish	1	0.30	9.67	1.13
Yellow bullhead*	3	0.90	0.75	0.09
Largemouth bass	20	6.03	53.03	6.19
Bluegill	13	3.92	1.07	0.12
White crappie	49	14.76	19.04	2.22
Freshwater drum*	1	0.30	2.18	0.25
Totals	332	100.00	856.92	100.00
Rough Fish	207	62.34	713.84	83.31
Game Fish	125	37.66	143.08	16.69

* Indicates rough fish species

Smallmouth buffalo continued to rank first by number as well as by weight. A slight increase in the river carpsucker population was noted since the 1968 survey. This change could be attributed to a netting error.

Seining Collections: White crappie, from 4 to 6 inches T.L., dominated the seining collections. In all, 174 crappie were taken during the year, most of them in the May collections. It is interesting to note this sizable number of crappie since the number taken in the netting collection declined. Also, none was taken in the 1968 seining collections. In addition to the crappie, 50 largemouth bass were taken in the seining collections. They ranged from 1 to 6 inches in total length. Most of the bass were taken in the August collections.

The important forage species included gizzard shad, blacktail and red shiners. Fifty-three blacktail and 43 red shiners were taken during the year.

Sunfish, such as bluegill, longear and redear, were taken less frequently. Also, a few fathead and bullhead minnows were taken as well as a few mosquitofish, and black spotted, black striped and starhead topminnows.

Vegetation: Aquatic vegetation was not a problem in Lake Leon. Cattails and pondweeds were noted in several still, backwater areas, but it was not a problem.

Discussion and Recommendations: Despite the large number of smallmouth buffalo, Lake Leon is still considered by many fishermen to be one of the better lakes. The largest largemouth bass taken in the netting collections weighed more than 7 pounds and the largest white crappie weighed more than 2 pounds. Ample evidence of reproduction of both largemouth bass and white crappie was found.

No specific recommendation is made at this time; however, some consideration for a commercial fisherman might be given at a later date.

Lake Grapevine

(Denton-Tarrant Counties)

Gill Netting: Rough fish species (shortnose, spotted and longnose gar, threadfin and gizzard shad, smallmouth buffalo, river carpsucker, carp, and freshwater drum) declined both in percent of total number and total weight. Decreases were noted among smallmouth buffalo, carp, freshwater drum, and river carpsucker. The latter decreased from 127 (1968) to 68 (1970), a 46% decrease. However, gizzard shad increased from 85 to 151, a 44% increase. Table 5 shows the 1970 netting results.

Overall, game fish species increased both in percent of total number and total weight. In 1968, they comprised 42.16% by number and 12.23% by weight as compared with 46.22% by number and 21.31% by weight in 1970. Channel catfish, white bass, largemouth bass, and bluegill all showed increases. White bass increased approximately 33% since 1968. A slight decrease in white crappie was noted; 119 in 1968, and 104 in 1970. However, the average weight of the crappie increased from 229 grams to 285 grams; the average "K" factor increased from 2.68 to 2.92. No other changes were noted.

Table 5

Lake Grapevine Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Shortnose gar*	14	1.79	19.19	1.78
Spotted gar*	4	0.51	6.76	0.63
Longnose gar*	15	1.92	40.98	3.81
Threadfin shad*	19	2.43	0.79	0.07
Gizzard shad*	151	19.28	73.70	6.85
Smallmouth buffalo*	81	10.35	368.96	34.30
River carpsucker*	68	8.69	208.48	19.38
Carp*	62	7.92	121.87	11.33
Channel catfish	18	2.30	27.24	2.53
Flathead catfish	3	0.38	19.97	1.86
White bass	124	15.84	89.14	8.28
Largemouth bass	35	4.47	20.30	1.89
Bluegill	73	9.32	8.28	0.77
Longear sunfish	4	0.51	0.41	0.04
White crappie	104	13.28	62.92	5.85
Black crappie	1	0.12	1.00	0.09
Freshwater drum*	7	0.89	5.83	0.54
Totals	783	100.00	1,075.82	100.00
Rough Fish	421	53.78	846.56	78.69
Game Fish	362	46.22	229.26	21.31

* Indicates rough fish species

Seining Collections: Blacktail and red shiners, brook silversides, and gizzard shad, in that order, were the most frequently taken species in the May seining collections. Threadfin shad, carp, largemouth bass, longear sunfish, and logperch were taken in lesser numbers.

Threadfin shad dominated the August collections. In all, 1,215 threadfins were taken in 9 of the 10 collections. Red and blacktail shiners, brook silversides, and bullhead minnows were also taken in the August collections. Six largemouth bass, from 2 to 4 inches total length, were also taken. Red shiners, gizzard shad, bullhead minnows, blacktail shiners, and brook silversides, in that order, were the most frequently taken species in the November collections.

Vegetation: In general, aquatic vegetation is not a problem in this lake. Pondweeds were found in several backwater areas, but it is not a problem at this time.

Discussion and Recommendations: Gizzard shad, smallmouth buffalo, river carpsucker, and carp were the principal rough fish species in Lake Grapevine. This was the case two years ago despite the efforts of a commercial fisherman.

White bass and white crappie were the most abundant game fish species taken in Grapevine. Occasionally some fishermen would take some nice channel catfish and largemouth bass.

It is recommended that channel catfish and largemouth bass be stocked in 1971, if they are available. Little or no evidence of reproduction was found and these would supplement the existing population.

Proctor Lake

(Comanche County)

Gill Netting: In general, game fish species increased both in percent of total number and total weight of all fish taken in the netting collections. In 1968, game fish species comprised 30.22% (by number) and 25.78% (by weight) as compared to 42.69% (by number) and 32.95% (by weight) in 1970. Increases were noted in channel and flathead catfish, and white crappie. The crappie increased more than 10% by number.

River carpsucker were the most frequently taken rough fish species. Gizzard shad, carp, and smallmouth buffalo, in that order, were the next most frequently taken rough fish (Table 6).

The most noticeable declines in rough fish were freshwater drum and gizzard shad. They declined 78% and 58% respectively.

Seining Collections: Red shiners were the most frequently taken fish in the seining collections. In all, 257 specimens were taken. Gizzard shad, bullhead minnow, fathead minnow, logperch, and bluegill, in that order, were taken in lesser numbers. No small catfish, bass or crappie were taken in the collections.

Vegetation: Aquatic vegetation was not a problem in this lake. Apparently the water level fluctuates enough to control the vegetation.

Table 6

Lake Proctor Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Spotted gar*	5	0.55	19.41	2.01
Gizzard shad*	89	9.84	12.54	1.29
Smallmouth buffalo*	64	7.08	200.43	20.70
River carpsucker*	236	26.12	314.13	32.45
Carp*	77	8.52	57.87	5.98
Channel catfish	63	6.97	118.68	12.26
Black bullhead*	1	0.11	0.45	0.05
Yellow bullhead*	1	0.11	0.60	0.06
Flathead catfish	18	1.99	106.45	11.00
Largemouth bass	20	2.21	32.82	3.39
Warmouth	1	0.11	0.12	0.01
Green sunfish	1	0.11	0.11	0.01
Bluegill	33	3.65	3.29	0.34
Longear sunfish	1	0.11	0.07	0.01
White crappie	249	27.54	57.44	5.93
Freshwater drum*	45	4.98	43.62	4.51
Totals	904	100.00	968.03	100.00
Rough Fish	518	57.31	649.05	67.05
Game Fish	386	42.69	318.98	32.95

* Indicates rough fish species

Discussion and Recommendations: Rough fish species (river carpsucker, gizzard shad, carp, and smallmouth buffalo) were dominant in Lake Proctor. This was essentially the case two years ago. In order to control them, a predator-sport fish such as striped bass should be stocked. The use of rotenone would not be practical since Proctor is a municipal water supply for Comanche and surrounding towns.

Lake Pat Cleburne

(Johnson County)

Gill Netting: A total of 422 fish of 14 species was taken in the 20 netting collections made during 1970. The results are shown in Table 7. Game fish species (channel catfish, flathead catfish, white bass, largemouth bass, green sunfish, bluegill and white crappie) comprised 48.58% of the number and 39.45% of the weight of all fish taken. Overall the game fish declined both in percent of number and weight since the 1968 survey.

Both river carpsucker and smallmouth buffalo increased substantially since 1968.

Seining Collections: Twenty seining collections were made on this lake. Brook silversides were dominant in the April collections and gizzard shad were in the July collections. Red shiners, fathead and bullhead minnows, and bluegills were taken during the year. Only 3 largemouth bass (2 to 3 inches T.L.) were taken in the July collections.

Vegetation: Aquatic vegetation was not a problem in this lake.

Discussion and Recommendations: Even though game fish species declined since 1968, this is still one of the better lakes in this area. Good populations of white bass, channel catfish, largemouth bass, and white crappie were found.

No blue catfish (Ictalurus furcatus) were taken during the year although one was taken in 1968. The final outcome of the ones stocked in 1964 is still unknown.

The smallmouth buffalo and river carpsucker should be controlled with some predator fish, and extensive netting and seining.

Lake Nocona

(Montague County)

Gill Netting: In the netting collections made during 1970, 343 fish of 12 species were taken (Table 8). Overall, game fish species comprised 63.85% of the total number and 36.71% of the total weight of all fish taken. White crappie, bluegill, white bass, largemouth bass, and channel catfish, in that order, were the most frequently taken game fish species.

Two years ago the average weight of the white crappie was slightly more than 2 ounces; in 1970, it was 8.01 ounces.

River carpsucker and carp remained the dominant rough fish species in Lake Nocona.

Table 7

Lake Pat Cleburne Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Longnose gar*	1	0.24	1.93	0.50
Gizzard shad*	55	13.03	8.98	2.33
Smallmouth buffalo*	62	14.69	102.40	26.60
River carpsucker*	66	15.65	86.46	22.45
Carp*	25	5.92	30.12	7.82
Channel catfish	47	11.14	50.91	13.22
Black bullhead*	2	0.47	1.96	0.51
Flathead catfish	1	0.24	4.62	1.20
White bass	11	2.61	5.44	1.41
Largemouth bass	29	6.87	50.09	13.01
Green sunfish	4	0.95	0.99	0.26
Bluegill	25	5.92	3.90	1.01
White crappie	88	20.85	35.95	9.34
Freshwater drum*	6	1.42	1.29	0.34
Totals	422	100.00	385.04	100.00
Rough Fish	215	51.42	233.14	60.55
Game Fish	207	48.58	151.90	39.45

* Indicates rough fish species

Table 8

Lake Nocona Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Gizzard shad*	22	6.41	6.71	1.22
Smallmouth buffalo*	1	0.29	8.61	1.57
River carpsucker*	64	18.67	274.71	50.01
Carp*	35	10.20	50.30	9.16
Channel Catfish	20	5.83	39.40	7.17
Blue catfish	1	0.29	7.21	1.31
White bass	47	13.70	69.91	12.73
Largemouth bass	25	7.29	42.29	7.70
Green sunfish	1	0.29	0.08	0.01
Bluegill	52	15.16	4.08	0.75
White crappie	73	21.29	38.64	7.04
Freshwater drum*	2	0.58	7.32	1.33
Totals	343	100.00	549.26	100.00
Rough Fish	124	36.15	347.65	63.29
Game Fish	219	63.85	201.61	36.71

* Indicates rough fish species

Seining Collections: Brook silversides dominated the seining collections. In all, 394 silversides were taken in 1970. Blacktail and red shiners, threadfin shad, and fathead minnows, in that order, were the most frequently taken fish in the seining collections. Five largemouth bass, from 1 to 4 inches total length, were taken in the April and July collections. The only other game fish taken were 13 bluegill and 8 longear sunfish. Only 3 gizzard shad, 8 golden shiners, and 1 freshwater drum were taken during the year.

Vegetation: Aquatic vegetation was not a problem. Several patches of cattails and pondweeds were noted, however.

Discussion and Recommendations: Game fish species increased both in percent of total number and total weight since 1968. Fewer white crappie were taken in 1970 than were taken in 1968. but the average weight increased nearly four times.

River carpsucker and carp were the main rough fish species in Lake Nocona.

Since no channel catfish were taken in the seining collections, they should be stocked at the rate of 25 per surface acre in order to supplement the existing population.

Lake Mineral Wells

(Parker County)

Gill Netting: Game fish species comprised 67.08% of the total number and 45.38% of the total weight of all fish taken in the netting collections (Table 9). White crappie, bluegills, channel catfish, and largemouth bass, in that order, were the most frequently taken game fish species. The crappie comprised nearly 30% of the total number and nearly 12% of the total weight of all fish taken.

River carpsucker, carp, and freshwater drum were the most frequently taken rough fish species. The carpsucker and carp comprised more than 50% of the total weight of all fish taken.

Seining Collections: Threadfin shad, white crappie, bluegills, and longear sunfish, in that order, were the most frequently taken fish. In addition to the crappie, largemouth bass, warmouth, redear sunfish, bluefill, and longear sunfish were also taken during the year. In March and June, 12 freshwater shrimp (Palaemonetes sp.) were also taken.

Vegetation: Aquatic vegetation was not a problem in this lake.

Discussion and Recommendations: This comparatively small lake, 646 acres, had a good population of game fish; mainly white crappie, channel catfish, largemouth bass, and flathead catfish.

Due to a damaged spillway, the city of Mineral Wells decided to drain the lake and have the repair work done. On October 5, 1970 the gates were opened; the lake was empty about two weeks later. An effort was made by F-4-R personnel to salvage as many flathead catfish as possible in order to restock them when the lake refills. Approximately 50 flatheads were taken with 3 inch mesh gill nets. The fish were taken to the Possum Kingdom State Fish Hatchery.

When the lake refills, in about a year, channel and flathead catfish should be stocked, followed by largemouth bass.

Table 9

Lake Mineral Wells Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Gizzard shad*	7	4.35	0.85	0.37
River carpsucker*	23	14.29	66.30	28.64
Carp*	11	6.83	54.25	23.43
Golden shiner*	1	0.62	0.16	0.07
Channel catfish	18	11.19	20.51	8.86
Flathead catfish	2	1.24	44.27	19.13
Largemouth bass	12	7.45	10.16	4.39
Green sunfish	5	3.11	0.74	0.32
Bluegill	22	13.66	2.57	1.11
Longear sunfish	2	1.24	0.16	0.07
White crappie	47	29.19	26.62	11.50
Freshwater drum *	11	6.83	4.88	2.11
Totals	161	100.00	231.47	100.00
Rough Fish	53	32.92	126.44	54.62
Game Fish	108	67.08	105.03	45.38

* Indicates rough fish species

Possum Kingdom Lake

(Palo Pinto-Young Counties)

Gill Netting: Rough fish species dominated the 1970 netting collections both in percent of total number and total weight (Table 10). Gizzard shad ranked first in percent of total number and second in percent of total weight. Smallmouth buffalo ranked first in percent of total weight.

White bass, bluegill, largemouth bass, and channel catfish, in that order, were the most frequently taken game fish species. White bass comprised 13.54% of the fish taken and 8.12% of the total weight. White crappie comparised only 2.28% of the total number and 1.11% of the total weight of all fish taken.

The average weight of the crappie was more than a half pound, and the average "K" factor was 2.73.

Seining Collections: Brook silversides were dominant in the collections. In all, 542 specimens were taken during the year. Bluegills, largemouth bass, and blacktail shiners, in that order, were the next most frequently taken fish. The largemouth bass ranged from 1 to 3 inches (T.L.). Longnose gar, gizzard shad, red shiners, bullhead minnows, longear sunfish, and logperch were also taken in the seining collections.

Vegetation: Aquatic vegetation was not a problem in Possum Kingdom. The water level dropped more than 20 feet during the year, exposing large mats of pondweeds which had become a problem. Insufficient rain on the watershed was responsible for the low water level.

Discussion and Recommendation: Possum Kingdom has a good population of white bass, as indicated by the netting collections. They comprised more than 13% of the total number and 8% of the total weight of all fish taken in the netting collections.

The only explanation for the relatively few number of crappie was the location of the nets. They were set in open water in order to avoid the sunken dead trees. The crappie were probably near the trees and avoiding the nets. Many anglers reported good strings of crappie, especially in the spring and fall months.

The gizzard shad should be controlled with either walleyes or striped bass, if they are available. Also, 2 million largemouth bass should be stocked in the spring of 1971.

Lake Graham

(Young County)

Gill Netting: Game fish species increased both in percent of total number and total weight since 1968. White crappie, channel catfish, and bluegills showed the largest increases. Overall, game fish species comprised 61.90% of the total number and 33.32% of the total weight of all fish taken in the 1970 netting collections (Table 11).

Table 10

Possum Kingdom Lake Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Longnose gar*	23	2.49	101.65	8.40
Threadfin shad*	37	4.01	4.59	0.38
Gizzard shad*	332	35.98	247.41	20.44
Smallmouth buffalo*	48	5.20	306.33	25.31
River carpsucker*	44	4.77	129.81	10.73
Carp*	9	0.98	41.50	3.43
Channel catfish	74	8.02	119.12	9.85
Flathead catfish	3	0.32	21.60	1.78
White bass	125	13.54	98.29	8.12
Warmouth	7	0.76	3.91	0.32
Largemouth bass	77	8.34	92.64	7.66
Green sunfish	3	0.32	0.30	0.02
Redear sunfish	4	0.43	0.74	0.06
Bluegill	112	12.13	23.41	1.93
Longear sunfish	1	0.11	0.30	0.02
White crappie	21	2.28	13.39	1.11
Freshwater drum*	3	0.32	5.29	0.44
Totals	923	100.00	1,210.28	100.00
Rough fish	496	53.75	836.58	69.13
Game fish	427	46.25	373.70	30.87

* Indicates rough fish species

Table 11

Lake Graham Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Spotted gar*	1	0.21	4.05	0.71
Longnose gar*	3	0.62	7.68	1.35
Gizzard shad*	85	17.60	25.69	4.53
Smallmouth buffalo*	29	6.00	166.14	29.27
River carpsucker*	22	4.56	76.67	13.51
Carp*	13	2.69	78.91	13.91
Golden shiner*	16	3.31	3.35	0.59
Channel catfish	60	12.42	38.31	6.75
Flathead catfish	9	1.86	63.30	11.15
White bass	2	0.41	3.80	0.67
Largemouth bass	21	4.35	16.64	2.93
Warmouth	2	0.41	0.44	0.08
Green sunfish	5	1.04	0.54	0.10
Redear sunfish	3	0.62	0.85	0.15
Bluegill	86	17.81	10.01	1.76
Longear sunfish	10	2.07	5.65	1.00
White crappie	101	20.91	49.53	8.73
Freshwater drum*	15	3.11	15.92	2.81
Totals	483	100.00	567.48	100.00
Rough Fish	184	38.10	378.41	66.68
Game Fish	299	61.90	189.07	33.32

* Indicates rough fish species

Gizzard shad and river carpsucker decreased and smallmouth buffalo increased since the 1968 survey. In 1968, 220 gizzard shad were taken; two years later only 85 were taken. River carpsucker decreased from 44 in 1968 to 22 in 1970; smallmouth buffalo increased from 15 to 29 in the same period.

Seining Collections: Brook silversides were the most frequently taken fish in the seining collections. In all, 525 specimens were taken during the year. Bluegill, threadfin shad, blacktail and red shiners, golden shiners, bullhead minnows, longear sunfish, redear sunfish, and logperch were also taken during the year. In addition, 8 largemouth bass, from less than ½ to 6 inches (T.L.) were taken in the seining collections.

Vegetation: Cattails and lotus were still a problem, as they were in 1968. Several hundred acres of cattails were sprayed in August.

The water level dropped during the summer and fall of 1970 and exposed many lotus. Thus both plants were controlled to some extent.

Discussion and Recommendations: This lake has a good population of white crappie, channel catfish, and largemouth bass. Since 1968, a relative increase in white crappie and a decrease in gizzard shad occurred.

Smallmouth buffalo, carp, and river carpsucker comprised more than 50% of the total weight of all fish taken in the netting collections. These fish should be harvested either by commercial or sport fishermen.

Lake Bridgeport

(Wise and Jack Counties)

Gill Netting: Rough fish species, mostly gizzard shad, smallmouth buffalo, and river carpsucker, increased both in percent of total number and total weight since 1968. Overall rough fish comprised 58.80% of the total number and 81.40% of the total weight of all fish taken in the 1970 collections (Table 12).

White bass and white crappie declined both in percent of total number and total weight since 1968. White bass accounted for 16.17% (by number) and 9.65% (by weight) of the fish taken in 1968 as compared to 7.37% (by number) and 2.79% (by weight) in 1970. The white crappie declined similarly. But the average "K" factor for crappie increased from 2.67 in 1968 to 2.83 in 1970. The largest crappie taken weighed slightly more than 2 pounds; the average weight was 7½ ounces.

Seining Collections: Brook silversides, gizzard shad, threadfin shad, blacktail shiners, in that order, were the most frequently taken fish. Bullhead minnows and red shiners were taken commonly. One spotted gar, 1 smallmouth buffalo, 1 carp, 25 golden shiner, and 10 logperch were also taken during the year.

One white bass (2 inches T.L.), 29 largemouth bass (½ to 3 inches T.L.), 32 bluegill, 10 longear sunfish, and 11 white crappie were taken in the seining collections.

Table 12

Lake Bridgeport Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Shortnose gar*	2	0.21	3.37	0.25
Spotted gar*	2	0.21	3.05	0.23
Longnose gar*	5	0.52	28.16	2.12
Threadfin shad*	3	0.31	0.24	0.02
Gizzard shad*	137	14.23	91.21	6.86
Smallmouth buffalo*	219	22.74	587.63	44.18
River carpsucker*	187	19.42	314.57	23.65
Carp*	8	0.83	35.15	2.64
Channel catfish	25	2.60	38.70	2.91
Flathead catfish	4	0.42	14.59	1.10
White bass	71	7.37	37.05	2.79
Largemouth bass	55	5.71	39.09	2.93
Warmouth	2	0.21	0.36	0.03
Green sunfish	5	0.52	0.64	0.05
Redear sunfish	1	0.10	0.13	0.01
Bluegill	31	3.22	5.38	0.40
Longear sunfish	3	0.31	0.25	0.02
White crappie	199	20.66	111.25	8.36
Freshwater drum*	4	0.41	19.27	1.45
Totals	963	100.00	1,330.09	100.00
Rough Fish	567	58.88	1,082.65	81.40
Game Fish	396	41.12	247.44	18.60

* Indicates rough fish species

Vegetation: Several patches of pondweeds were found in the shallow water areas of the lake. Neither was considered a problem.

Discussion and Recommendation: Lake Bridgeport remains one of the better crappie lakes in this area. Despite the fewer number taken in the netting collections, the average "K" factor increased from 2.67 to 2.83. The decrease in the number of white bass could be attributed to insufficient rainfall in the springs of 1968 and 1969.

Channel catfish should be stocked, if they are available. Also some consideration should be given to stocking flathead catfish or some suitable predator fish.

Lake Waco

(McLennan County)

Gill Netting: White crappie were the dominant species in the 1970 netting collections. In all, 193 crappie were taken. Overall, however, game fish species declined slightly since the 1968 survey. The netting results are shown in Table 13.

Gizzard shad and smallmouth buffalo populations remained about the same during the two-year period, but river carpsucker increased. In 1968, they comprised 9.68% of the total number, but in 1970, they comprised 18.36%.

Seining Collections: Gizzard shad, brook silversides, and red shiners, in that order, were the most frequently taken fish in the seining collections. Blacktail shiners, fathead minnows, golden shiners, mosquitofish, bluegill, and orangespotted sunfish were taken less frequently. Also, four small largemouth bass were taken in the July collections.

Vegetation: Aquatic vegetation was not a problem in this lake.

Discussion and Recommendation: Lake Waco, like many others in this area, has an abundance of gizzard shad, smallmouth buffalo, and river carpsucker. These three species alone comprised more than 50% of the total number and more than 60% of the total weight of all fish taken during 1970.

If available, some suitable predator fish should be s tocked.

Lake Brownwood

(Brown County)

Gill Netting: Gizzard shad, river carpsucker, and smallmouth buffalo, in that order, were the most frequently taken rough fish species. All told, they comprised 59.85% of the total number and 72.45% of the total weight of all fish taken in the 1970 netting collections. Overall more rough fish were taken in 1970 than were taken in 1968. Table 14 shows the netting results.

White crappie comprised 19% of the total number of fish taken in 1968, but only 10% in 1970. Other than this, the game fish remained the same.

Table 14

Lake Brownwood Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Longnose gar*	42	3.75	59.30	3.83
Gizzard shad*	351	31.31	210.22	13.59
Smallmouth buffalo*	123	10.97	492.65	31.85
River carpsucker*	197	17.57	417.67	27.01
Carp*	28	2.50	99.11	6.41
Golden shiner*	1	0.09	0.20	0.02
Channel catfish	35	3.12	29.86	1.93
Flathead catfish	21	1.87	109.65	7.09
White bass	56	5.00	28.15	1.82
Largemouth bass	38	3.39	22.08	1.43
Warmouth	4	0.36	0.76	0.05
Green sunfish	5	0.45	1.14	0.07
Redear sunfish	8	0.71	2.01	0.13
Bluegill	49	4.37	7.17	0.46
Longear sunfish	13	1.16	1.10	0.07
White crappie	115	10.26	40.19	2.60
Freshwater drum*	35	3.12	25.31	1.64
Totals	1,121	100.00	1,546.57	100.00
Rough Fish	777	69.31	1,304.46	84.35
Game Fish	344	30.69	242.11	15.65

* Indicates rough fish species

Table 13

Lake Waco Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Spotted gar*	4	0.43	8.11	0.66
Longnose gar*	4	0.43	7.11	0.58
Gizzard shad*	187	19.96	82.23	6.72
Smallmouth buffalo*	118	12.59	385.97	31.57
River carpsucker*	172	18.36	319.94	26.17
Gray redhorse*	4	0.43	9.17	0.75
Carp*	36	3.84	175.95	14.39
Golden shiner*	2	0.21	0.61	0.05
Channel catfish	34	3.63	49.59	4.06
Flathead catfish	6	0.64	18.66	1.53
White bass	46	4.91	23.26	1.90
Largemouth bass	33	3.52	24.02	1.96
Warmouth	3	0.32	0.50	0.04
Green sunfish	7	0.75	1.26	0.10
Redear sunfish	3	0.32	0.22	0.02
Bluegill	54	5.76	7.73	0.63
Longear sunfish	14	1.49	1.41	0.12
White crappie	193	20.60	94.87	7.76
Freshwater drum	17	1.81	12.10	0.99
Totals	937	100.00	1,222.71	100.00
Rough Fish	544	58.06	1,001.19	81.88
Game Fish	393	41.94	221.52	18.12

* Indicates rough fish species

Seining Collections: During this study period, 4,096 fish of 18 species were taken in the seining collections. Brook silversides, gizzard shad, blacktail and red shiners, in that order, were the most frequently taken fish.

Game fish included largemouth bass, bluegill, green sunfish, redear sunfish, and longear sunfish. In all, 55 bass from 2 to 4 inches (T.L.) were taken.

Other species taken were threadfin shad, golden shiners, and fathead minnows. In addition, one tadpole and 2 freshwater shrimp were taken.

Vegetation: Aquatic vegetation was not a problem.

Discussion and Recommendations: The rough fish, mainly gizzard shad, river carpsucker, and smallmouth buffalo increased since 1968. Generally, the game fish remained the same; however, white crappie declined since 1968. Despite the sizable rough fish population, Lake Brownwood still produces some good bass.

Some consideration should be given to controlling the rough fish with a suitable predator fish.

Lake Granbury

(Hood County)

Gill Netting: Monthly netting collections were made in 1970 on this newly built lake. The flood gates were closed in September 1969 and the lake filled rapidly.

Rough fish species comprised 71.20% of the total number and 84.74% of the total weight of all fish taken in the netting collections (Table 15). Collectively, gizzard shad, smallmouth buffalo, and river carpsucker comprised 45.12% of the total number and 58.90% of the total weight of all fish taken in the nets. In addition to the shad, buffalo and carpsucker, longnose gar were frequently taken in the netting collections. In fact, they comprised more than 20% of the total number and 25% of the total weight of all fish taken in the 1969 collections.

Bluegill, channel catfish, and largemouth bass, in that order, were the most frequently taken game fish species. They comprised 21.29% of the total number and 11.75% of the total weight of all fish taken in the netting collections. Only 40 white bass and 34 white crappie were taken during 1970. Both species will probably increase their numbers in future years.

Seining Collections: Largemouth bass, brook silversides, blacktail shiners, carp, and red shiners, in that order were the most frequently taken fish in 1970. In all, 2,385 fish of 17 species were taken.

The largemouth bass, which ranged from less than 1 inch to 10 inches (T.L.), were taken at every seining station. Other game fish species taken included bluegill, redear sunfish, white bass, and white crappie.

Table 15

Lake Granbury Netting Results - 1970

Species	Total Number	Percent of Total Number	Total Weight (Pounds)	Percent of Weight
Spotted gar*	6	0.24	6.09	0.19
Longnose gar*	152	6.18	286.84	8.82
Gizzard shad*	450	18.29	213.33	6.56
Smallmouth buffalo*	402	16.35	1,316.86	40.49
River carpsucker*	258	10.48	386.82	11.89
Gray redhorse*	65	2.64	60.76	1.87
Carp*	318	12.92	426.48	13.11
Golden shiner*	6	0.24	1.37	0.04
Channel catfish	194	7.88	279.72	8.60
Black bullhead*	12	0.49	4.08	0.12
Flathead catfish	16	0.65	45.57	1.40
White bass	40	1.62	31.04	0.95
Largemouth bass	112	4.55	67.19	2.07
Spotted bass	6	0.24	4.19	0.13
Warmouth	1	0.04	0.32	0.01
Green sunfish	41	1.67	7.05	0.22
Redear sunfish	10	0.41	2.94	0.09
Bluegill	218	8.86	35.08	1.08
Orangespotted sunfish	1	0.04	0.28	0.01
Longear sunfish	36	1.46	5.22	0.16
White crappie	34	1.38	17.36	0.54
Freshwater drum*	83	3.37	53.70	1.65
Totals	2,461	100.00	3,252.29	100.00
Rough Fish	1,752	71.20	2,756.33	84.74
Game Fish	709	28.80	495.96	15.26

* Indicates rough fish species

Threadfin and gizzard shad, smallmouth buffalo, carp, golden shiners, fathead minnows, mosquitofish, longear sunfish, and logperch were taken less frequently during the year.

Vegetation: In general, aquatic vegetation was not a problem. Several sizable mats of pondweeds were noted in the shallow, backwater areas. Also, cattails, bushy pondweeds and algae were noted.

Discussion and Recommendations: Rough fish species, mainly gizzard shad, smallmouth buffalo, and river carpsucker, were dominant in this new lake. However, Granbury has a good population of largemouth bass and they appear to be well distributed. Also, evidence of reproduction of white bass and white crappie was found; these two species should help control the shad and provide a lot of sport for anglers.

Water quality studies were made at two stations; Station 1 was approximately 11 miles upsetream from the dam and Station 2 was approximately 21 miles from the dam. At Station 1, closer to the dam, water samples were taken at the surface and at 10 foot intervals to the bottom. At Station 2, samples were taken at the surface and at 10 foot intervals down to approximately 40 or 50 feet.

Samples were analyzed for dissolved oxygen, carbon dioxide, total (methyl orange) alkalinity, and pH. Water temperatures were also recorded.

At Station 1, dissolved oxygen values ranged from 10.0 ppm at 20 feet in January to 4.8 ppm at 30 feet in the same month. Carbon dioxide values were 0.5 ppm or less at both stations and at all depths. Total alkalinity ranged from 60 ppm to 128 ppm, and pH ranged from 7.2 to 8.6.

The results were similar at both stations. Tables 16 and 17 show the results of quarterly analyses.

In order to gather as much data as possible on the fishery complex, this job should be continued. Striped bass, if available, should be stocked in order to control the rough fish and to provide additional sport for the anglers.

Stocking Records

The following lakes were stocked with largemouth bass and channel catfish during 1970. Data gathered under this job helped considerably in making the stocking recommendations.

Lake	Number of Largemouth Bass	Number of Channel Catfish
Palo Pinto	100,000	50,000
Leon	50,000	10,000
Hubbard Creek	204,000	100,000
Graham	50,000	50,000
Possum Kingdom	360,000	- 0 -
Cisco	- 0 -	60,000
Granbury	1,700,000	45,600
Bridgeport	250,000	- 0 -

Table 16

Station 1 - Lake Granbury Water Analyses - 1970

Depth-Temp. (°F)		DO*	CO_2*	Alkalinity ph-th	M.O.*	pH
January						
Surface	44	9.0	0.5	0.0	128	8.6
10 ft.	44	9.1	0.5	0.0	120	8.8
20 ft.	44	10.0	0.4	0.0	103	8.6
30 ft.	44	4.8	0.4	0.0	128	8.6
April						
Surface	66	7.0	0.5	0.0	120	8.5
10 ft.	66	7.0	0.5	0.0	120	8.5
20 ft.	66	6.0	0.4	0.0	103	8.5
30 ft.	66	6.0	0.4	0.0	120	8.5
July						
Surface	86	8.0	0.5	0.0	120	8.5
10 ft.	84	8.0	0.5	0.0	128	8.5
20 ft.	82	3.0	0.4	0.0	128	8.0
30 ft.	81	2.0	0.4	0.0	123	7.5
40 ft.	80	3.0	0.4	0.0	123	7.5
November						
Surface	54	9.0	0.5	0.0	120	8.2
10 ft.	54	9.0	0.5	0.0	123	8.2
20 ft.	54	8.0	0.5	0.0	60	7.2
30 ft.	54	7.0	0.4	0.0	123	8.2
35 ft.	54	7.0	0.4	0.0	123	8.2

Secchi disc: 25 to 42 inches

* ppm

Table 17

Station 2 - Lake Granbury Water Analyses - 1970

Depth-Temp. (°F)		DO*	CO_2*	Alkalinity ph-th	Alkalinity M.O.*	pH
January						
Surface	46	9.2	0.3	0.0	128	8.6
10 ft.	46	9.4	0.6	0.0	120	8.8
20 ft.	46	9.2	0.5	0.0	103	8.6
30 ft.	46	9.2	0.5	0.0	128	8.6
40 ft.	46	8.4	0.6	0.0	120	8.6
April						
Surface	67	9.1	0.5	0.0	128	8.0
10 ft.	67	8.0	0.5	0.0	128	8.0
20 ft.	67	5.0	0.4	0.0	123	8.0
30 ft.	67	3.0	0.4	0.0	120	8.0
40 ft.	67	3.0	0.7	0.0	120	7.5
50 ft.	65	2.0	0.8	0.0	123	7.5
July						
Surface	85	9.0	0.3	0.0	126	8.5
10 ft.	84	7.0	0.3	0.0	123	8.5
20 ft.	83	4.0	0.5	0.0	123	8.0
30 ft.	83	6.0	0.6	0.0	123	7.5
November						
Surface	54	10.0	0.3	0.0	130	8.5
10 ft.	52	8.0	0.5	0.0	127	8.5
20 ft.	52	8.0	0.8	0.0	134	8.5
30 ft.	52	8.0	0.8	0.0	134	8.5

Secchi disc: 31 to 40 inches

* ppm

Moss	- 0 -	56,500
Garza-Little Elm	- 0 -	25,000
Grapevine	- 0 -	50,000
Arlington	- 0 -	13,450
Eagle Mountain	- 0 -	60,000
New Waco	- 0 -	25,000
Cleburne	- 0 -	50,000
Whitney	- 0 -	50,000
Weatherford	- 0 -	25,000
Benbrook	- 0 -	15,000
Kickapoo	100,000	- 0 -
Kemp	100,000	12,000
Arrowhead	50,000	121,600
Diversion	- 0 -	14,000
Totals	2,964,000	833,150

In September 1970, 11,000 blue catfish (3 to 4 inches T.L.) were stocked in Lake Whitney. Also approximately 1,000,000 walleyes were stocked in Lake Diversion in April.

Fish Harvest Regulations

A meeting of all concerned Game Management Officers and Biologists in the Possum Kingdom Regulatory Authority Area was held in Mineral Wells to discuss the proposed fishing regulations. Only one change was proposed: to remove the possession limit on largemouth bass.

Public hearings were attended in all counties in the Possum Kingdom Area in June 1970. The proposed regulations were adopted by the Parks and Wildlife Commission.

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