

Possum Kingdom Lake

JOB PROCESS REPORT

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-4-R-19

REGION 2-A FISHERIES STUDIES

Job. B-37: Fishery Management Recommendations

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SUMMARY

During this segment, seven public lakes were surveyed, and the effects of silt pollution in a portion of the Brazos River were monitored.

Rough fish species, either gizzard shad or river carpsucker, were dominant in all lakes. In an effort to control the shad populations, striped bass were stocked in Lake Granbury and walleyes were stocked in Lake Diversion and Garza-Little Elm Reservoir.

Results obtained during 1972 indicate that gravel dredging and washing operations on the Brazos River has an adverse effect on the fishery in the dredged area and for two to four miles downstream.

Job Progress Report

State of Texas

Project No. F-4-R-19

Name: Region 2-A Fisheries Studies

Job No. B-37

Title: Fishery Management Recommendations

Period Covered: January 1, 1972 to December 31, 1972

Background:

From 1968 through 1971, 30 major public lakes in the region were surveyed on a quarterly basis, half were surveyed one year and the other half were surveyed the next year. Prior to the 19th Segment, the region was sub-divided into five areas and one or two lakes in each area was checked on a quarterly basis. Lake Granbury was surveyed on a monthly basis and Lake Diversion and Garza-Little Elm Reservoir were surveyed only twice, in August and in November. Walleyes were stocked in both Diversion and Garza-Little Elm during the year and the surveys were the first of quarterly surveys to evaluate the success of these introductions.

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 Warden-Biologist meeting prior to being presented at public hearings in each county under Regulatory Authority. The proposed 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.

Five major public lakes in this region were divided into three groups: less than 5,000 acres, 5,000 to 10,000 acres, and more than 10,000 acres. From 5 to 15 nets, based upon the size of the lake, were set overnight in each lake during each quarter except Lake Granbury where monthly surveys were made. Quarterly surveys were begun on Lake Diversion and Garza-Little Elm Reservoir in August. Thus, only two surveys were made on those lakes; in August and in November.

Experimental gill nets, 150 feet long with varying mesh sizes from 1 to 3½ inches, and a 20 foot common sense seine were used to make the fish collections. A representative sample of all fish taken in the nets was weighed and measured, and the remainder were counted and bulk weighed.

Seining collections were made in conjunction with the netting collections and the number of fish taken was recorded by species.

Monthly field trips were made to the Glen Rose area to determine the effects of siltation caused by gravel dredging and washing operations on the water chemistry, macroinvertebrates and fish populations in a portion of the Brazos River in Hood and Somervell Counties.

Water quality studies were made on five lakes; none were made on either Diversion or Garza-Little Elm.

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

When possible creel surveys were conducted of all but two lakes--Diversion and Garza Little-Elm.

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 this report.

Findings:

Lake Proctor
(Comanche County)

Gill Netting: Rough fish species, primarily gizzard shad, smallmouth buffalo, river carpsucker and freshwater drum, comprised 56.09% of the total number and 80.09% of the total weight of all fish taken in the netting collections (Table 2). Relative increases in the total number of smallmouth buffalo and freshwater drum, and decreases in the total number of gizzard shad, river carpsucker and carp were noted since the 1970 survey. Rough fish species decreased 8.22% by number, but increased 13.04% by weight since the 1970 survey. Most of the increase in weight can be attributed to the smallmouth buffalo and freshwater drum.

White crappie, the bread and butter fish in Lake Proctor, declined in total numbers taken, but increased in total weight since the 1970 survey. In 1970, the average weight of the crappie was four ounces; in 1972, their average weight was nearly seven ounces. The largest crappie taken in the 1972 survey weighed nearly one and one-half pounds.

Proctor also appears to have good populations of channel catfish and largemouth bass. Together they comprised 9.20% of the total number and 10.61% of the total weight of all fish taken in the 1972 netting collections.

Seining Collections: Red shiners were the most frequently taken fish in the seining collections. In all, 372 specimen were taken. The following fish were also taken during the year. The total number is given in parenthesis. Threadfin shad (61), mosquitofish (46), bluegill (29), largemouth bass (27), longear sunfish (7), logperch (3), bullhead minnow (3), gizzard shad (2), carp (1), and green sunfish (1). The bass, which ranges from $\frac{1}{2}$ to 5 inches (TL), indicated successful reproduction. In addition to the fish, 12 freshwater shrimp (Palaemonetes sp.) were taken in the seining collections.

Vegetation: Aquatic vegetation was not a problem in Lake Proctor. However, pondweeds (Potamogeton sp.) and cattails (Typha sp.) are becoming abundant in much of the lake, especially in the shallow areas.

Creel Survey: Several parties of anglers were interviewed during the year. Most of the anglers interviewed caught white crappie; a few of them had caught bluegills and longear sunfish. No one interviewed had caught any largemouth bass or catfish. The catch rate was 2.07 fish per hour of fishing.

Water Quality: Water samples were taken at two stations, from the surface and at 10-foot intervals. In addition to recording air and water temperatures, samples were analyzed for dissolved oxygen, alkalinity and pH.

Table 1

Checklist of Fish Species

<u>Common Name</u>	<u>Scientific Name</u>
Spotted gar	<u>Lepisosteus oculatus</u>
Longnose gar	<u>L. osseus</u>
Shortnose gar	<u>L. platostomus</u>
Gizzard shad	<u>Dorosoma cepedianum</u>
Threadfin shad	<u>D. petenense</u>
Carp	<u>Cyprinus carpio</u>
Golden shiner	<u>Notemigonus crysoleucas</u>
Suckermouth minnow	<u>Phenacobius mirabilis</u>
Red shiner	<u>Notropis lutrensis</u>
Blacktail shiner	<u>N. venustus</u>
Plains minnow	<u>Hybognathus placita</u>
Bullhead minnow	<u>Pimephales vigilax</u>
River carpsucker	<u>Carpiodes carpio</u>
Smallmouth buffalo	<u>Ictiobus bubalus</u>
Spotted sucker	<u>Minytrema melanops</u>
Gray redhorse	<u>Moxostoma congestum</u>
Blue catfish	<u>Ictalurus furcatus</u>
Black bullhead	<u>I. melas</u>
Yellow bullhead	<u>I. natalis</u>
Channel catfish	<u>I. punctatus</u>
Flathead catfish	<u>Pylodictus olivaris</u>
Mosquitofish	<u>Gambusia affinis</u>
Brook silverside	<u>Labidesthes sicculus</u>
Mississippi silverside	<u>Menidia audens</u>
White bass	<u>Morone chrysops</u>
Redbreast sunfish	<u>Lepomis auritus</u>
Green sunfish	<u>L. cyanellus</u>
Warmouth	<u>L. gulosus</u>
Orangespotted sunfish	<u>L. humilis</u>
Bluegill	<u>L. macrochirus</u>
Longear sunfish	<u>L. megalotis</u>
Redear sunfish	<u>L. microlopus</u>
Spotted bass	<u>Micropterus punctulatus</u>
Largemouth bass	<u>M. salmoides</u>
White crappie	<u>Pomoxis annularis</u>
Black crappie	<u>P. nigromaculatus</u>
Logperch	<u>Percina caprodes</u>
Walleye	<u>Stizostedion vitreum vitreum</u>
Freshwater drum	<u>Aplodinotus grunniens</u>

Table 2
Lake Proctor Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Spotted gar *	6	0.78	16.99	1.72
Gizzard shad *	64	8.29	10.41	1.05
Smallmouth buffalo *	99	12.82	337.02	34.11
River carpsucker *	159	20.60	227.15	22.99
Carp *	32	4.15	26.94	2.73
Channel catfish	44	5.70	60.87	6.16
Black bullhead *	1	0.13	0.21	0.02
Flathead catfish	1	0.13	8.62	0.87
Largemouth bass	27	3.50	44.00	4.45
Warmouth	1	0.13	0.15	0.02
Bluegill	61	7.90	6.43	0.65
Longear sunfish	1	0.13	0.10	0.01
White crappie	204	26.42	76.60	7.75
Freshwater drum *	72	9.32	172.66	17.47
Totals	772	100.00	988.15	100.00
Rough Fish	433	56.09	791.38	80.09
Game Fish	339	43.91	196.77	19.91

* Indicates rough fish species

Dissolved oxygen values ranges from 1.0 mg/l at 17 feet at Station 1 in June to 11.2 mg/l at the surface at Station 1 in December.

Total alkalinity ranges from 50.0 mg/l to 150 mg/l and pH values ranged from 7.1 to 9.0. Turbidity ranged from 20- to 31- inches.

Discussion and Recommendations: Despite the sizeable rough fish population, this lake had good populations of white crappie, channel catfish and largemouth bass. Of the rough fish species, river carpsucker and smallmouth buffalo appeared to be most abundant. Some research is needed in order to develop a means of controlling the river carpsucker and the smallmouth buffalo.

Lake Nocona
(Montague County)

Gill Netting: In the 20 netting collections made in 1972, 500 fish of 13 species were taken (Table 3). Game fish species, primarily white bass, channel catfish, bluegill, white crappie and largemouth bass, comprised 47.20% of the total number of all fish taken, but only 20.32% of the total weight. Two significant changes occurred since the 1970 survey; first, an increase in the number of river carpsucker and, second, a decrease in the number of white crappie. The average weight of the carpsucker was more than four pounds and the average weight of the crappie was three and one-half ounces. Two years ago the average weight of the crappie was slightly more than eight ounces.

White bass were the most frequently taken game fish species in the netting collections. All told, they comprised 11.20% of the total number and 7.56% of the total weight of all fish taken in the netting collections. Channel catfish, the second most frequently taken game fish species, comprised 9.20% of the total number and 5.39% of the total weight of all fish taken during the year.

Seining Collections: Seining collections were made in conjunction with the netting collections. All together, 1,006 fish of 12 species were taken. Mississippi silversides, the most frequently taken fish, comprised 77.53% of the total number of all fish taken. The following fish were also taken during the year; the total number is given in parenthesis: bluegill (45), blacktail shiner (22), bullhead minnow (80), red shiner (46), largemouth bass (19), longear sunfish (8), gizzard shad (2), suckermouth minnow (1), orangespotted sunfish (1), redear sunfish (1) and golden shiner (1).

Vegetation: Generally, aquatic vegetation was not a problem in Lake Nocona, however, it was becoming a nuisance in the southwest end of the lake. Bulrushes, cattails, pondweeds (Potamogeton sp.) and American lotus were noted.

Creel Survey: Eleven anglers, who were interviewed during the year, caught 57 fish, mostly white crappie. The catch rate was 3.6 fish per hour.

Water Quality: Dissolved oxygen values ranged from 4.6 mg/l at 30 feet in August to 9.5 mg/l at the surface in November. Total alkalinity ranged from 122 mg/l in November to 148 mg/l in August, and pH ranged from 7.2 to 8.8. Secchi disc readings ranged from 21 inches in the upper end of the lake to 36 inches in the lower end of the lake, near the dam.

Discussion and Recommendations: Rough fish species, river carpsucker, carp and gizzard shad, comprised more than 50% of the total number and nearly 80% of the

Table 3

Lake Nocona Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Gizzard shad *	52	10.40	13.46	1.48
River carpsucker *	157	31.40	645.89	71.20
Carp *	55	11.00	63.47	7.00
Blue catfish	4	0.80	10.05	1.11
Channel catfish	46	9.20	48.92	5.39
Flathead catfish	1	0.20	4.81	0.53
White bass	56	11.20	68.59	7.56
Green sunfish	1	0.20	0.14	0.02
Warmouth	2	0.40	0.26	0.03
Bluegill	40	8.00	3.45	0.38
Longear sunfish	12	2.40	0.94	0.10
Largemouth bass	35	7.00	36.24	4.00
White crappie	39	7.80	10.91	1.20
Totals	500	100.00	907.13	100.00
Rough Fish	264	52.80	722.82	79.68
Game Fish	236	47.20	184.31	20.32

* Indicates rough fish species

total weight of all fish taken in the netting collections. White crappie declined appreciably since the 1970 survey. In 1970, they comprised more than 20% of the total number of all fish taken in the netting collections; in 1972, they comprised less than 10% of the total number of fish taken in the netting collections.

The river carpsucker should be controlled by some suitable predator fish.

Possum Kingdom Lake
(Palo Pinto-Young Counties)

Gill Netting: Rough fish species dominated in the 1972 netting collections, both in percent of total number and total weight (Table 4). Gizzard shad, longnose gar, river carpsucker, and smallmouth buffalo, in that order, were the most frequently taken rough fish species.

Bluegill, largemouth bass, spotted bass, channel catfish and white bass, in that order, were the most frequently taken game fish species. Collectively, these five species comprised more than 38% of the total number of all fish taken in the netting collections.

Seining Collections: Mississippi silversides dominated the seining collections. In all, 1,115 specimens were taken during the year. Bluegills, blacktail shiners and red shiners, in that order, were the next more frequently taken fish.

Vegetation: Aquatic vegetation was not a problem in Possum Kingdom.

Water Quality: Water samples were taken at two stations; one was near the dam and the other one was near Rock Hollow, the mid-part of the lake. Dissolved oxygen values ranged from 1.1 mg/l at 48 ft. in May to 12.3 mg/l at 10 ft. in August. Total alkalinity ranged from 46 mg/l to 126 mg/l, and pH ranged from 7.1 to 7.8. Secchi disc readings ranged from 6 ft. to 14 ft. 11 in.

Discussion and Recommendations: Due to lack of time, no creel survey was taken.

The number of white bass taken in the netting collections declined since the 1970 survey. The reason for this can probably be attributed to insufficient run-off in the spring of 1971.

The gizzard shad should be controlled with either striped bass or walleyes.

Lake Waco
(McLennan County)

Gill Netting: White crappie were the dominant game fish species in the 1972 netting collections. All told, 162 crappie were taken. Game fish species declined slightly since the 1970 survey. The netting results are shown in Table 5.

Gizzard shad, river carpsucker, smallmouth buffalo and freshwater drum, in that order, comprised 58.08% of the total number and 69.54% of the total weight of all fish taken in the netting collections.

Seining Collections: Red shiners, gizzard shad, bullhead minnows and blacktail shiners, in that order, were the most frequently taken fish in the seining collections. Additionally, 88 largemouth bass, one spotted bass, and 32 white crappie were taken in the seining collections.

Table 4

Possum Kingdom Lake Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Spotted gar *	2	0.25	3.50	0.27
Longnose gar *	70	8.63	249.55	19.66
Threadfin shad *	6	0.74	0.55	0.04
Gizzard shad *	198	24.41	123.26	9.71
Smallmouth buffalo *	33	4.07	292.03	23.01
River carpsucker *	43	5.30	111.55	8.79
Carp *	50	6.16	168.30	13.26
Channel catfish	45	5.55	75.33	5.93
Yellow bullhead *	6	0.74	2.00	0.16
Flathead catfish	7	0.86	38.91	3.06
White bass	37	4.56	34.84	2.74
Spotted bass	49	6.04	39.65	3.12
Largemouth bass	54	6.66	69.03	5.44
Warmouth	6	0.74	0.99	0.08
Green sunfish	27	3.33	3.29	0.26
Redear sunfish	17	2.10	2.78	0.22
Bluegill	130	16.03	28.84	2.27
Orangespotted sunfish	2	0.25	0.08	0.01
Redbreast sunfish	2	0.25	0.58	0.05
Longear sunfish	7	0.86	1.19	0.09
White crappie	15	1.85	7.33	0.58
Black crappie	2	0.25	1.51	0.12
Freshwater drum *	3	0.37	14.32	1.13
Totals	811	100.00	1,269.41	100.00
Rough Fish	411	50.67	965.06	76.03
Game Fish	400	49.33	304.35	23.97

* Indicates rough fish species

Table 5

Lake Waco Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Shortnose gar *	1	0.10	1.50	0.11
Spotted gar *	9	0.93	24.60	1.79
Longnose gar *	4	0.42	20.98	1.53
Gizzard shad *	177	18.32	91.66	6.68
Smallmouth buffalo *	110	11.39	475.58	34.68
River carpsucker *	167	17.29	338.53	24.69
Gray redbhorse *	6	0.62	6.77	0.49
Carp *	31	3.21	128.81	9.39
Golden shiner *	1	0.10	0.19	0.01
Channel catfish	53	5.49	70.71	5.16
Flathead catfish	12	1.24	30.60	2.23
White bass	33	3.42	24.85	1.81
Spotted bass	3	0.31	1.88	0.14
Largemouth bass	35	3.62	21.92	1.60
Warmouth	3	0.31	0.42	0.03
Green sunfish	1	0.10	0.11	0.01
Redear sunfish	4	0.42	0.63	0.05
Bluegill	39	4.04	4.58	0.33
Longear sunfish	8	0.82	0.66	0.05
White crappie	162	16.77	78.55	5.73
Freshwater drum *	107	11.08	47.80	3.49
Totals	966	100.00	1,371.33	100.00
Rough Fish	613	63.46	1,136.42	82.86
Game Fish	353	36.54	234.91	17.14

* Indicates rough fish species

Vegetation: Aquatic vegetation was not a problem in Lake Waco.

Creel Survey: During the year, 40 parties of anglers were interviewed. In all, they caught 246 fish in 185 hours of fishing; a catch rate of 1.3 fish per hour. Most of the fish caught were white bass and white crappie.

Water Quality: Dissolved oxygen values ranged from 0.0 mg/l at 50 feet in June to 12.6 mg/l at the surface in December. Total alkalinity ranged from 112 mg/l to 168 mg/l, and pH ranged from 7.3 to 8.3. Secchi disc readings ranged from 14 inches to 30 inches.

Discussion and Recommendations: Lake Waco, like many other lakes in this area, has an abundance of gizzard shad, river carpsucker and smallmouth buffalo. Collectively, those three species comprised 46% of all fish taken in the netting collections.

White crappie, the most frequently taken game fish species, appears to be the bread and butter fish in Lake Waco.

Some suitable predator fish, such as striped bass or walleyes, should be stocked to control the gizzard shad and to provide an additional sport fish.

Lake Granbury (Hood and Parker Counties)

Gill Netting: Monthly netting collections were made on this lake during 1972. In all, 3,423 fish of 25 species were taken. Rough fish species, primarily gizzard shad, smallmouth buffalo, carp and grey redhorse, comprised 66.22% of the total number and 72.77% of the total weight of all fish taken in the netting collections (Table 6).

White crappie, bluegill, white bass and channel catfish, in that order, were the most frequently taken game fish species. They comprised 29.74% of the total number and 18.18% of the total weight of all fish taken in the netting collections. Of the four species, white crappie showed the largest increase in total number; in 1971, 292 were taken as compared to 476 in 1972.

Seining Collections: In the seining collections, 9,692 fish of 26 species were taken during the year. Nearly two-thirds of the fish were Mississippi silversides. In all, 6,126 silversides were taken. Blacktail shiners, red shiners, mosquito-fish, and threadfin shad, in that order, were the next most frequently taken fish. The following game fish, along with the total number, were taken during the year. Bluegill, 158; largemouth bass, 83; longear sunfish, 40; redear sunfish, 36; spotted bass, 4; green sunfish, 3; white crappie, 3; flathead catfish, 3; white bass, 1; and channel catfish, 1.

Vegetation: Aquatic vegetation was not a problem in Lake Granbury.

Creel Survey: During the year, 34 parties were interviewed. The catch rate was 0.72 fish per hour of effort. Many anglers caught carp and bluegills in addition to white bass, largemouth bass and white crappie.

Water Quality: Water samples were taken monthly at two stations. Station 1 was approximately 11 miles from the dam and Station 2 was approximately 21 miles from the dam. At both stations, samples were taken at the surface and at 10-ft. intervals to the bottom. Tables 7 and 8 show the results of the water analysis made in January, May, July and October.

Table 6

Lake Granbury Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Spotted gar *	9	0.26	18.64	0.78
Longnose gar *	52	1.52	139.43	5.83
Threadfin shad *	53	1.54	6.02	0.25
Cizzard shad *	989	28.89	149.25	6.24
Smallmouth buffalo *	467	13.64	690.22	28.85
River carpsucker *	151	4.41	230.97	9.65
Gray redbhorse *	198	5.78	271.93	11.36
Carp *	281	8.21	213.19	8.91
Golden shiner *	4	0.12	0.51	0.02
Channel catfish	113	3.30	115.56	4.83
Black bullhead *	5	0.15	0.90	0.04
Yellow bullhead *	3	0.09	0.56	0.02
Flathead catfish	23	0.67	141.11	5.90
White bass	137	4.00	107.54	4.49
Spotted bass	20	0.58	16.26	0.68
Largemouth bass	55	1.61	52.91	2.21
Warmouth	4	0.12	0.45	0.02
Green sunfish	8	0.23	1.07	0.04
Redear sunfish	4	0.12	0.65	0.03
Bluegill	292	8.53	26.44	1.10
Redbreast sunfish	1	0.03	0.09	0.01
Longear sunfish	18	0.53	1.78	0.07
White crappie	476	13.91	185.80	7.76
Black crappie	5	0.15	2.25	0.09
Freshwater drum *	55	1.61	19.74	0.82
Totals	3,423	100.00	2,393.27	100.00
Rough Fish	2,267	66.22	1,741.36	72.77
Game Fish	1,156	33.78	651.91	27.23

* Indicates rough fish species

Table 7

Station 1 - Lake Granbury Water Analyses - 1972

January

Depth-Temp (°C)	DO*	Alkalinity		pH
		ph-th	M.O.*	
Surface 9.3	11.0	0	106	7.6
10 ft. 9.4	10.8	0	112	7.4
20 ft. 9.5	10.9	0	108	7.4
30 ft. 9.4	10.6	0	108	7.4
40 ft. 8.3	7.2	0	110	7.2

May

Surface 23.0	9.4	22	46	7.2
10 ft. 22.0	8.2	0	40	7.2
20 ft. 21.5	8.0	0	24	7.2
30 ft. 21.0	6.0	0	60	7.2
40 ft. 18.5	1.5	0	40	7.1

July

Surface 28.5	8.4	0	104	7.4
10 ft. 28.0	7.7	0	106	7.4
20 ft. 27.5	6.4	0	106	7.4
30 ft. 26.5	2.0	0	112	7.2

October

Surface 20.5	7.7	0	94	7.9
10 ft. 21.0	7.6	0	106	7.9
20 ft. 21.0	7.5	0	104	7.8
30 ft. 21.0	7.0	0	102	7.8

Secchi disc: 34 to 39 inches

* mg/l

Table 8

Station 2 - Lake Granbury Water Analyses - 1972

January

Depth-Temp (°C)	DO*	ph-th	Alkalinity		pH
			M.O.		
Surface	9.5	10.4	0	116	7.4
10 ft.	9.5	10.4	0	116	7.4
20 ft.	10.0	9.4	0	122	7.4
30 ft.	9.5	9.0	0	124	7.4

May

Surface	27.0	10.6	0	126	7.2
10 ft.	23.0	9.7	0	130	7.2
20 ft.	21.5	5.0	0	130	7.2
30 ft.	21.0	4.0	0	132	7.2

July

Surface	29.0	9.9	0	108	7.4
10 ft.	28.0	7.5	0	104	7.2
20 ft.	28.0	7.5	0	98	7.4
30 ft.	27.5	7.3	0	98	7.4

October

Surface	21.5	9.2	0	104	8.1
10 ft.	20.0	7.0	0	106	8.1
20 ft.	19.5	7.3	0	98	7.9
30 ft.	19.5	8.0	0	104	7.9

Secchi disc: 24 to 38 inches

* mg/l

Discussion and Recommendations: Monthly fisheries surveys have been made on Lake Granbury for three consecutive years. Rough fish species, primarily gizzard shad and smallmouth buffalo, were dominant in the netting collections.

Sizable increases in the number of white crappie and white bass were noted.

In June and July, 27,250 striped bass were stocked in Lake Granbury in an effort to control the shad population. Additional stripers should be stocked.

Lake Diversion
(Archer and Taylor Counties)

Gill Netting: Only two quarterly walleye evaluations were made on this lake, one was made in August and one was made in November. No walleyes were taken in either survey.

Rough fish species, primarily smallmouth buffalo, river carpsucker and gizzard shad, comprised 63.88% of the total number and 81.90% of the total weight of all fish taken (Table 9). White crappie and white bass, in that order, were the most frequently taken game species.

Seining Collections: No walleyes were taken in the 20 seining collections made on Lake Diversion. In August, the collections were made at night. Daytime collections were made in November, but the lake level was approximately five feet above normal elevation. Thus, the normally difficult seining was almost impossible. Red shiners, bluegills and largemouth bass were the most frequently taken fish in the collections.

Discussion and Recommendations: In the spring of 1972, the Dundee State Fish Hatchery stocked 434,000 walleyes (approximately 1 3/4 in TL) in Lake Diversion. In order to evaluate the success of this effort, quarterly netting seining collections were initiated. Since no walleyes were taken, it is recommended that frame nets and a trawl be used instead of experimental gill nets and a 20 foot seine.

The quarterly surveys should be continued.

Garza-Little Elm Reservoir
(Denton County)

Gill Netting: In the quarterly surveys, two walleyes were taken in the netting collections. Both were taken in the November collections. The walleyes were nearly 12 inches (TL) in length and weighed more than one-half pound each. Both walleyes were taken in relatively shallow water, less than 10 feet deep, on the west side of the lake.

Rough fish species were dominant, both by number and by weight. Table 10 shows the netting results.

Seining Collections: Night seining collections were made in August. At that time one walleye (6 inches TL) was taken. Red shiners, Mississippi silversides and threadfin shad, in that order, were the most frequently taken fish in the seining collections.

Discussion and Recommendations: On May 10 and 11, 405,000 walleyes, approximately 2-inches TL, were stocked in Garza-Little Elm. The stocking rate was approximately 18 per acre.

Table 9

Lake Diversion Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Spotted gar *	1	0.38	1.25	0.30
Longnose gar *	4	1.52	8.49	2.01
Gizzard shad *	30	11.41	17.82	4.21
Smallmouth buffalo *	96	36.50	255.19	60.28
River carpsucker *	33	12.55	55.13	13.02
Carp *	2	0.76	8.55	2.02
Golden shiner *	1	0.38	0.18	0.04
Channel catfish	18	6.84	29.47	6.96
White bass	28	10.65	16.82	3.97
Largemouth bass	13	4.94	15.68	3.70
Green sunfish	1	0.38	0.18	0.04
Bluegill	6	2.28	1.08	0.26
White crappie	29	1.103	13.41	3.17
Freshwater drum *	1	0.38	0.10	0.02
Totals	263	100.00	423.35	100.00
Rough Fish	168	63.88	346.71	81.90
Came Fish	95	36.12	76.64	18.10

* Indicates rough fish species

Table 10
Garza-Little Elm Reservoir Netting Results - 1972

<u>Species</u>	<u>Total Number</u>	<u>Percent of Total Number</u>	<u>Total Weight (Pounds)</u>	<u>Percent of Weight</u>
Spotted gar *	10	1.99	20.23	2.08
Longnose gar *	23	4.57	211.24	21.70
Threadfin shad *	12	2.39	1.56	0.16
Gizzard shad *	22	4.37	17.67	1.82
Smallmouth buffalo *	85	16.90	286.93	29.47
River carpsucker *	98	19.48	199.39	20.48
Carp *	15	2.98	30.85	3.17
Channel catfish	17	3.38	31.85	3.27
White bass	151	30.02	126.20	12.96
Spotted bass	1	0.19	2.87	0.30
Largemouth bass	7	1.39	5.87	0.60
Bluegill	4	0.80	0.53	0.06
Longear sunfish	2	0.40	0.16	0.02
White crappie	50	9.94	34.50	3.54
Walleye	2	0.40	1.08	0.11
Freshwater drum *	4	0.80	2.56	0.26
Totals	503	100.00	973.49	100.00
Rough Fish	269	53.48	770.43	79.14
Game Fish	234	46.52	203.06	20.86

* Indicates rough fish species

Three walleyes were taken during the year; one was taken in the seining collections in August and two were taken in the netting collections in November. Their growth rate was approximately two inches per month. Additional walleyes should be stocked at the rate of 50 per acre (1.1 million fish) to supplement the relatively small number stocked in 1972. The quarterly evaluation should be continued.

Fish Harvest Regulations

A meeting of all concerned personnel in the Possum Kingdom Regulatory Authority Area was held in Waco to discuss the proposed fishing regulations. Two changes were proposed:

1. To remove the minimum size limit of 11 inches on catfish.
2. To require that all trotlines placed in public waters be redated at the expiration of each ninety-day period.

Public hearings were attended in all counties in the Possum Kingdom Area in May.

The proposed regulations were adopted by the Parks and Wildlife Commission.

An Investigation of the Effects of a Gravel Dredging and Washing Operation on the Fisheries of the Brazos River

Findings:

The study consists of monthly samplings of the water quality, benthic organisms, fish populations and physical characteristics of the river at sample stations shown on Figure 1. Sampling procedures and methods employed are described in Job C-1, F-4-R-18, Pollution Studies.

Before evaluating the results of this study, it is necessary to understand the methods employed by the gravel dredgers.

The first phase consists of creating an island by stock piling sand and gravel which has been dredged from the river channel. After completion of the stock pile island, draglines load the desirable gravel into pit trucks, thus consuming the island. The gravel company under study created an island approximately 2.5 miles long, 100 to 120 feet wide, and 3 to 8 feet above the water level.

The second phase consists of hauling the sand and gravel from the island to the processing plant. At the plant it is unloaded, washed, sized and stacked. The water used for the washing is pumped from the river and, after being used, is cycled through a settling pit and returned to the river. A considerable volume of water by-passes the settling pit and enters the river directly.

Chemical Characteristics:

Average concentration of water quality components checked at the sample stations during 1972 are given in Table 11. As indicated, all chemical components checked except turbidity and settleable solids, did not vary significantly between stations.

Turbidities below the washing operation ranged from 68 to 2750 J.T.U.. Below dredging, it ranged from 65 to 400 J.T.U.. The degree of turbidity of downstream waters was dependent upon the volume of flow. Normally, turbidity was reduced by 80% in the first mile below dredging and decreased at a slower rate at the downstream stations. At high flow significant turbidity increases were recorded six miles below the gravel operation.

Figure 1. Location of sample stations, stock pile island and gravel washing plant.

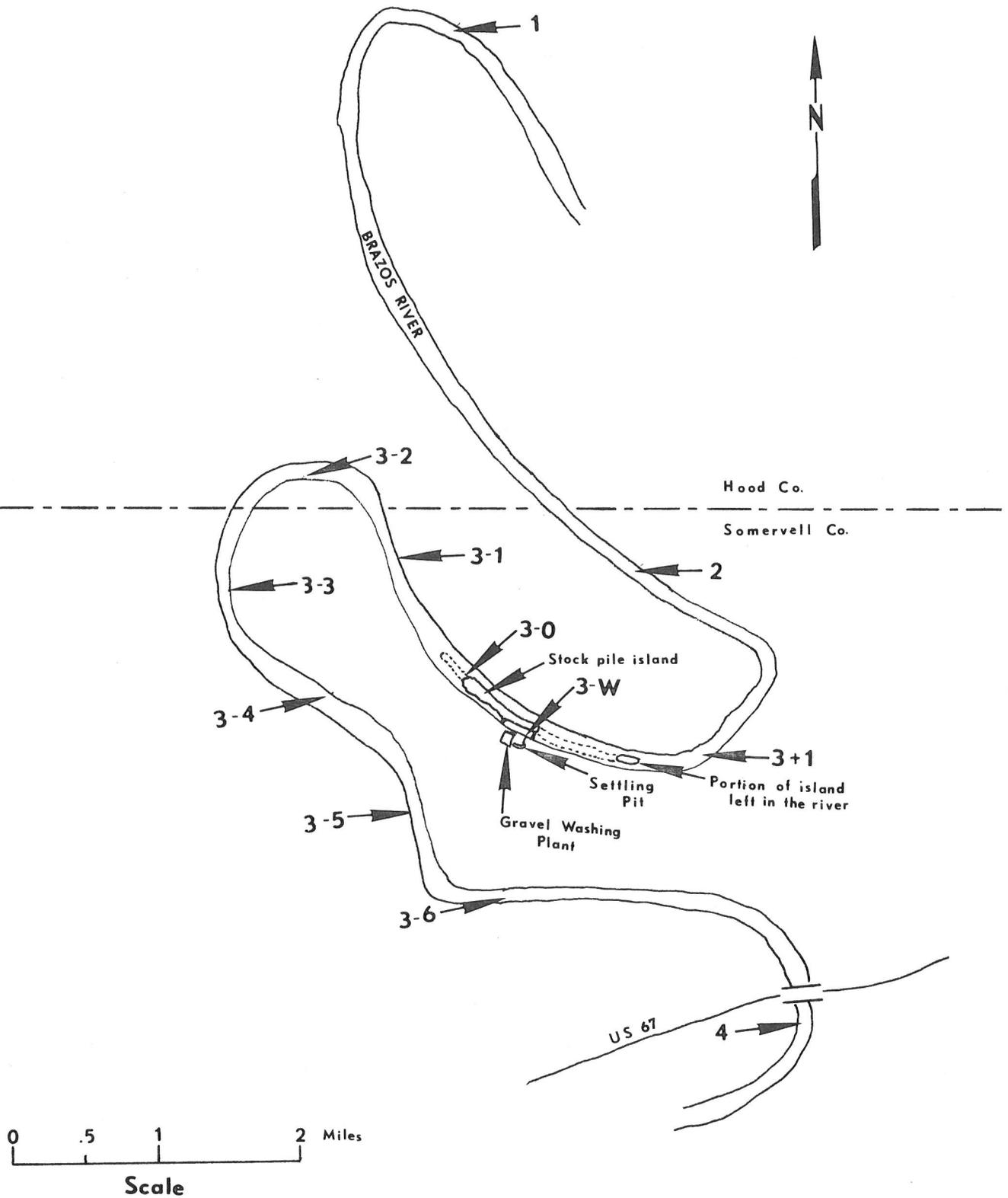


Table 11. Averages of the water quality survey for 1972.

Station Number	Dissolved Oxygen ppm	Alkalinity ppm	pH	Carbon dioxide ppm	Specific conductance umho/cm	Turbidity J.T.U.	Chlorides ppm	Calcium hardness ppm	Silicon ppm	Settable Solids ml/l
1	8.8	125	8.0	1.7	1976	7	555	467	1.9	<0.1
2	8.7	121	7.9	1.9	1916	6	564	489	2.0	<0.1
3+1	8.3	118	8.0	1.9	1891	7	550	457	1.9	<0.1
3-W	7.8	163	7.8	2.6	1752	811	543	607	2.0	3.0
3-0	7.6	123	8.0	2.5	1954	120	590	497	1.7	0.4
3-1	8.1	119	8.0	2.4	2074	26	588	553	2.5	<0.1
3-2	7.9	114	7.9	2.4	2100	23	551	539		<0.1
3-3	7.7	117	8.0	2.2	1991	20	557	547		<0.1
3-4	7.9	116	8.0	2.0	1997	22	572	594		<0.1
3-5	7.6	118	8.0	2.1	2035	19	563	583		<0.1
3-6	8.1	118	8.0	2.1	2007	15	565	604		<0.1
4	8.9	116	8.1	2.1	1994	10	577	604	2.2	<0.1

Settable solids increased from 0.1 ml/l to 3.0 ml/l below washing and 0.4 ml/l below dredging. These solids tend to settle out in the first two miles below the operations.

Physical Characteristics:

In the process of stock piling, the river channel was changed. The main flow was diverted by the island from the west bank to the east bank. The average depth was changed from 1.2 feet to three feet.

In addition, a 1/8 mile portion of the stock pile island left in the river because of high sand content, has been washed down-stream by high volume of flow. It has formed a sheet of sand approximately 3 feet deep, 150 feet long and 100 feet wide.

A substance in the area dredged has been changed from sand, gravel, boulders and organic debris to silt and shifting sand.

Bedload was measured in the river using a modification of the pit sampler described by England and Cumming (1971). It is a measure of sediment transport carried by sliding or rolling along the riverbed.

Bedload was sampled during a three day period during high flow. The bedload was found to be approximately five times greater below the dredging operation than at stations above the operation.

The first two miles of river below dredging received a thin coat of fine silt covering the substrate.

Benthic Organisms:

The average density of benthic macroinvertebrates for stations one, two, three, and four is shown in Table 12. This data was collected with a Surber square foot bottom sampler during 1971 and 1972. The table indicates the average density of benthic organisms in the dredged area decreased by 98% and remained relatively constant at the other stations.

In an effort to determine the effect of dredging on downstream waters, Hester-Dendy samplers were placed above and at progressive points below dredging. Results obtained from the samplers indicate an average of 2454 organisms/sq. meter above dredging, 10 organisms/sq. meter directly below dredging, 264 organisms/sq. meter one mile below dredging, and 428 organisms/sq. meter two miles below dredging.

None of the data collected with Surber or Hester-Dendy samplers had obvious or consistent evidence that any one type of aquatic organisms was more tolerant or intolerant of siltation.

Fish Population:

The fish population of the Brazos River above and at the dredging operations was sampled with gill nets, electro-fishing gear and 20 foot common seines.

Pre-dredging studies conducted on the river during 1971 indicated the fish population was approximately the same in sections above, below, and within the area to be dredged.

Post-dredging studies indicate a significant alteration in the fish composition of the area dredged. Table 13 shows the results of four netting surveys above and at the dredging site. The percentage of rough fish to game fish by number and by

Table 12. Average density of benthic organisms per square meter collected during 1971 and 1972.

Station #	1971	1972
	Before Dredging Average Number/Square Meter	After Dredging Average Number/Square Meter
1	96	58
2	145	117
3-0	771	18
4	589	1381

Table 13. Netting results from the Brazos River above and at the dredging operation.

Species	Above Dredging				At Dredging			
	Total No.	% of No.	Total Lbs.Wt.	% of Wt.	Total No.	% of No.	Total Lbs.Wt.	% of Wt.
*Longnose gar	32	14.8	175.7	35.0	49	12.0	174.6	20.0
*Gizzard shad	50	23.2	39.1	7.8	98	24.0	58.5	6.7
*Carp	4	1.8	12.4	2.4	11	2.7	36.5	4.2
*River carpsucker	46	21.3	79.9	15.8	138	33.8	217.9	25.0
*Smallmouth buffalo	26	12.0	151.7	30.2	58	14.2	336.3	38.5
*Gray redhorse	6	2.8	7.4	1.4	5	1.2	6.5	0.7
Channel catfish	9	4.2	17.1	3.4	12	2.9	18.3	2.1
Flathead catfish	2	0.9	6.9	1.4	3	0.7	9.3	1.1
Green sunfish	3	1.4	0.3	0.1				
Warmouth					1	0.3	0.3	0.1
Bluegill	14	6.5	2.6	0.5	11	2.7	1.3	0.1
Longear sunfish	4	1.8	0.4	0.1	6	1.5	0.6	0.1
Spotted bass					3	0.7	1.3	0.1
Largemouth bass	16	7.4	7.4	1.5	2	0.5	3.3	0.4
White crappie	3	1.4	0.9	0.2	10	2.5	4.3	0.5
*Freshwater drum	1	0.5	0.2	0.1	1	0.3	3.6	0.4
Total	216	100.0	502.0	100.0	408	100.0	872.6	100.0
*Rough fish	165	76.4	466.4	92.9	360	88.2	833.9	95.6
Game fish	51	23.6	35.6	7.1	48	11.8	38.7	4.4

weight did not vary significantly, but the total weight and numbers did. Rough fish, mainly river carpsucker and smallmouth buffalo, were taken more frequently at the dredging site. Approximately 195 more rough fish constituting 367.53 pounds were collected at the dredging site.

Electro fish sampling also indicated more rough fish by number and by weight in the area dredged.

Conclusion and Recommendations:

Results obtained during 1971 and 1972 indicate gravel dredging and washing on the Brazos River has an adverse affect on the fishery in the area dredged and two to four miles of the downstream river. Based on data collected the following recommendations are made:

1. No gravel dredging operations should be permitted in the river bed or in the streambed by any tributary of the Brazos River in the following counties:
 1. Baylor
 2. Throckmorton
 3. Young
 4. Palo Pinto
 5. Parker
 6. Hood
 7. Somervell
 8. Johnson
2. A closed system of waste water disposal for gravel washing operations should be required.

It is also recommended that this job be continued until sufficient data is collected concerning the long term effects of a gravel wash and dredging operation on the fishery of the Brazos River.

Prepared by Allen A. Forshage

Approved by: *Lenne Peters*

Date: February 20, 1973

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Regional Director for Inland Fisheries

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Presented at 1965 Staff Meeting

WALLEYE STOCKING IN POSSUM KINGDOM LAKE

Dwane Q. Smith

Due to certain hinderances neither redbfish (*Sciaenops ocellata*) nor striped bass (*Roccus saxatilis*) were obtainable for stocking in Possum Kingdom Lake; therefore, attention was turned to Walleye (*Stizostedion vitreum*) for a desirable exotic which would be both a predator and sport fish.

In 1962 the Possum Kingdom Lake Camp Operators Association, with the assistance of L. D. Lamb, Project Leader, Fort Worth, Texas, purchased 2,000 walleye fry from Ohio, Commercial Fish Hatchery, which were placed in State Fish Hatchery number 2. There was no evidence of survival. With this in mind a project was prepared with plans to obtain fingerlings. The fingerlings were obtained July 29, 1963 and were placed in the Possum Kingdom State Fish Hatchery also. In late summer the pond was drained to determine survival of walleye. This almost proved disasterous. Because of high air temperature and low pond water level - water temperature reached 97 degrees - only twelve live walleye were caught and placed into another pond which was readied beforehand, but two of these died along with others in the original pond. The ten walleye remained in the pond in which 55,000 redear fingerlings had been placed until cooler weather. Upon draining the redear pond, four walleye were found and only 5,000 redear. Three remain on the hatchery to date.

Until 1963, all fish were flown by commercial airline, but on May 7, 1964 the "flying fish" arrived at Possum Kingdom Lake by Parks and Wildlife airplane. All 160,000 of them were in excellent condition. Three releases were made. A total of 105,000 walleye fry were released into Possum Kingdom Lake, 30,000 released equally in each of two ponds on Possum Kingdom State Fish Hatchery and 25,000 traveled on to San Marcos State Fish Hatchery.

One pond on the Possum Kingdom Hatchery sustained walleye while all were lost in the other. Upon draining pond No. 26, a total of 160 - six month old walleye were recovered which averaged 10.2 inches in length.

One hundred and fifty of the yearling walleye were released into Possum Kingdom Lake near Costello Island, six were taken to the Parks and Wildlife Exhibit in Dallas, Texas, and four remained on the Possum Kingdom Hatchery.

To date there are four walleye on the Possum Kingdom Hatchery. At least three of the fingerling which were obtained in 1963, and possibly one from the 1964 shipment of fry.

Approximately six walleye have been reported being caught by fishermen from Possum Kingdom Lake, one caught by commercial contract netter, and one speciman given to Hatchery Superintendent.

On May 10, 1965, a total of 500,000 fry were flown to Graham Airport from Spirit Lake, Iowa. A total of 10 boxes of fish were unloaded. Each box contained a plastic bag with enough water to sustain 50,000 fry. Following arrival in Graham the fish were carried to Possum Kingdom Lake and released at pre-determined sites.

Summary of Walleye Releases

- I 1962 - 2,000 Fry
 - 1. Obtained by Possum Kingdom Camp Operators Association.
 - a. Fry placed into Possum Kingdom Hatchery ponds.
 - b. No survival.
- II 1963 - 300 Fingerlings
 - 1. Obtained by Possum Kingdom Camp Operators Association and were placed in Possum Kingdom Hatchery.
 - a. Ten survived and placed into Redear Sunfish pond.
- III 1964 - 160,000 Fry
 - 1. 105,000 released into Possum Kingdom Lake.
 - 2. 30,000 distributed equally between either of two ponds.
 - 3. 25,000 to San Marcos State Fish Hatchery.
 - a. Lake release (no evidence of survival)
 - b. Possum Kingdom Hatchery (160 recovered)
 - (1) 150 released in Possum Kingdom Lake
 - c. San Marcos (no evidence of survival)
- IV 1965 - 500,000
 - 1. Released into Possum Kingdom Lake.

