

FINAL REPORT

FILE

As required by

FEDERAL AID IN FISHERIES RESTORATION ACT

TEXAS

Federal Aid Project No. F-3-R-15

Region 3-B Fisheries Studies

Job No. 10 Survey of State Park Lakes

Project Leader: Joe E. Toole

J. R. Singleton
Executive Director
Texas Parks and Wildlife Department
Austin, Texas

Marion Toole
D-J Coordinator

Eugene A. Walker
Director, Wildlife Services

February 15, 1968

ABSTRACT

State park lakes in Fisheries Region 3-B were investigated in order to determine specific needs and known management tools required for intensive management.

Standard fisheries surveys, consisting of netting, seining, water analysis and vegetation check, were conducted at Tyler State Park Lake in Smith County and at Mission Tejas State Park Lake in Houston County. Observations were made at Martin Dies, Jr., and Caddo State Parks to identify and estimate relative abundance of existing aquatic vegetation.

Discussions were held with personnel at each of the four parks to obtain additional information regarding the lakes.

Vegetation control, fertilizing, stocking with bass and forage species, and construction of fish pier are management suggestions for Tyler State Park Lake.

Results from the Mission Tejas State Park Lake survey indicate the need for population renovation, water quality improvement, and installation of a fishing pier.

Aquatic vegetation control is needed at Martin Dies, Jr., and Caddo State Parks.

FINAL REPORT

State of Texas

Project No. F-3-R-15

Name: Region 3-B Fisheries Studies

Job No. 10

Title: Survey of State Park Waters

Period Covered: February 1, 1967 - January 31, 1968

OBJECTIVES:

To determine specific needs and known management tools required to intensively manage the State Park Lakes in Fisheries Region 3-B.

1. To determine fishing pressure and angler success.
2. To determine the species composition, relative abundance and condition of the fish population in Mission Tejas and Tyler State Park Lakes.
3. To determine the need for water quality improvement in Mission Tejas and Tyler State Park Lakes.
4. To determine the need for aquatic vegetation control in Mission Tejas and Tyler State Park Lakes and on the shoreline of Martin Dies, Jr., and Caddo State Parks.
5. To recommend development work on the lakes.

PROCEDURES:

Tyler State Park Lake is located in Smith County, Texas, 10 miles north of Tyler on FM 14. At normal elevation, the lake covers approximately 63 acres and contains over 1,000 acre-feet of water. This lake and its watershed lie entirely within the boundaries of the 994 acre Tyler State Park.

Mission Tejas State Park Lake is a small lake of approximately 1 surface acre, having a maximum depth of 10 feet. The lake and surrounding park are located in Houston County, Texas, 5 miles southwest of Weches.

Martin Dies, Jr., State Park includes some 11 miles of shoreline on Dam "B" Reservoir, which is located in Tyler and Jasper Counties on the Neches and Angelina Rivers and covers some 13,700 acres at storage pool elevation.

Caddo State Park has approximately 1½ miles of shoreline along Big Cypress Bayou, flowing into Caddo Lake. The park is located in Harrison County, Texas, its entrance being about 1 mile northwest of Karnack.

Creek checking and censusing were included in the original job description procedures for Tyler State Park and Mission Tejas State Park Lakes. These techniques were discarded, as it was felt the value of such did not warrant expenditure of the needed man-days. Discussions were held with park personnel at these two lakes, in order to obtain information concerning fishing pressure and angler success.

Mission Tejas and Tyler State Park Lakes were sampled with experimental gill nets (150 foot nets having 1 to 3½ inch mesh) and a 26 foot bag seind having ¼ inch mesh, to attain random samples of the fish populations.

Fish captured by netting were sorted according to species, counted, and weighed. Samples of each species were then measured, weighed and sexed. Seining yields were identified and counted at the lakes.

Water analyses were run on samples taken from Mission Tejas and Tyler State Park Lakes using a portable Hach chemical kit. Turbidity, pH, temperature, dissolved oxygen, carbon dioxide, total alkalinity and hydrogen sulfide were factors checked during these analyses.

Observations were made at each of the four state park waters to identify the species of aquatic vegetation present and establish relative abundance. Control measures are recommended where conditions warranted such measures.

FINDINGS:

Tyler State Park Lake

This lake experienced a dam breakage in September of 1963, at which time all impounded water was lost. Repairs were made and the lake bed fertilized. Restocking commenced in 1964 when the lake began rising. At the time of this writing the lake elevation was 4 feet below normal pool level.

Personnel at the park related that approximately 30,000 overnight campers and sportsmen visited the park this past year. The number of fishermen frequenting the lake was below normal, apparently as a result of the poor fishing success reported. Bass fishing was considered very poor by park personnel, while catfish and sunfish angling was fair. Apparently the 22,750 largemouth bass (Micropterus salmoides) stocked in 1964 experienced poor survival. Channel catfish (Ictalurus punctatus) stocking was done in 1964, 1965 and 1967 and this game fish is presently the most fished for species.

Overnight netting with four gill nets was conducted on two occasions at Tyler State Park Lake. The results of these settings are given in Table 1 and 2. Three yellow bullheads (Ictalurus natalis) were the only rough fish captured by netting. The small sample of game fish, excluding bluegill (Lepomis macrochirus), exhibited rather poor size and physical condition. Only a single channel catfish (I. punctatus) was taken during the two netting nights, which does not reflect the amount of stocking done (about 7,000) with this species since 1965.

Table 1

Netting Results From Tyler State Park Lake, April 18, 1967

Species	Number	%Number	Weight	%Weight	Avg. Wt.	Avg. "K"
Yellow bullhead	3	4.00	0.88	8.13	0.29	-
Largemouth bass	1	1.33	0.25	2.31	0.25	2.20
Warmouth	2	2.67	0.37	3.42	0.19	3.05
Green sunfish	1	1.33	0.13	1.20	0.13	2.64
Spotted sunfish	2	2.67	0.19	1.76	0.10	-
Bluegill sunfish	66	88.00	9.00	83.18	0.14	3.67
Totals	75	100.00	10.82	100.00		

Table 2
 Netting Results From Tyler State Park Lake October 10, 1967

Species	Number	%Number	Weight	%Weight	Avg. Wt.	Avg. "K"
Channel catfish	1	4.35	1.00	28.02	1.00	1.82
Largemouth bass	1	4.35	0.25	7.00	0.25	2.04
Warmouth	1	4.35	0.19	5.32	0.19	3.60
Bluegill	5	86.95	2.13	59.66	0.43	3.91
Totals	8	100.00	3.57	100.00		

Shoreline seining yielded: Blackstripe topminnow, (Fundulus notatus), mosquitofish (Gambusia affinis), warmouth (Chaenobryttus gulosus), spotted sunfish (Lepomis punctatus), and bluegill (L. machochirus). Bluegill was the most numerous species collected by this method.

No outstanding qualities were revealed from water analysis. Results of these water tests are provided in Table 3. The application of fertilizer would no doubt aid fish growth and would perhaps help control the growth of submerged vegetation, however, a plankton bloom induced by this action may be offensive to swimmers.

Table 3
 Tyler State Park Water Analysis, April 18, 1967

Analysis	10 ft. depth	Surface
Temperature	67°F	76°F
pH	7.6	8.2
Turbidity	-	37 inches secchi
Dissolved oxygen	5.0 p.p.m.	9.0 p.p.m.
Carbon dioxide	8.0 p.p.m.	4.0 p.p.m.
Total alkalinity	35.0 p.p.m.	35.0 p.p.m.
Chlorides	15.0 p.p.m.	12.5 p.p.m.
Hydrogen sulfide	0	0

Aquatic vegetation was a hindrance to bank fishing this past growing season. Square-stem spikerush (Eleocharis gundrangulata) and soft-rush (Juncus effusus) were emergent marginal plants hindering accessibility, encompassing nearly the entire lake. Bushy pondweed (Najas sp.) and muskgrass (Chara sp.) were the principle submerged aquatics, while yellow water lily (Nuphar odvena) presented a potential navigation problem. A species list of plants observed is given in Table 4.

Table 4

Aquatic Vegetation Present At Tyler State Park Lake

Common Name	Scientific Name	Relative Abundance
Black willow	<u>Salix nigra</u>	Common
Buttonbush	<u>Cephalanthus occidentalis</u>	Occasional
Sedge	<u>Carex sp.</u>	Common
Cutgrass	<u>Zizaniopsis miliacea</u>	Occasional
Common cattail	<u>Typha latifolia</u>	Occasional
Square-stem spikerush	<u>Elecharis quadrangulata</u>	Very abundant
Soft-rush	<u>Juncus effusus</u>	Abundant
Water primrose	<u>Jussiaea diffusa</u>	Rare
Yellow water lily	<u>Nuphar advena</u>	Common
American lotus	<u>Nelumbo lutea</u>	Rare
Pondweed	<u>Potamogeton sp.</u>	Common
Bushy pondweed	<u>Najas sp.</u>	Abundant
Bladderwort	<u>Utricularia sp.</u>	Common
Muskgrass	<u>Chara sp.</u>	Abundant

Tyler State Park has excellent facilities, concessions, and roads for a lake of its size. Motor driven boats up to 12 horsepower are permitted and a boat ramp with adequate parking space is provided. The need for at least one additional fishing pier, an inadequate population of largemouth bass, and control of aquatic vegetation are primary management concerns at Tyler State Park Lake.

Mission Tejas State Park Lake

Angler visitation to this small lake was estimated to be about 150 per month by the park supervisor. Channel catfish (I. punctatus), largemouth bass (M. salmoides), and sunfish (Lepomis sp.) constitute the primary game species. Fishing success has been very good for these species in past years, but it is believed that heavy fishing pressure has greatly depleted the existing bass and catfish populations.

The experimental gill nets were set overnight and yielded only four fish. Although this was a relatively small catch, it is worthwhile to note that no rough species were included in the results (Table 5).

Table 5

Netting Results From Mission Tejas State Park Lake, September 19, 1967

Species	Number	%Number	Weight	%Weight	Avg. Wt.	Avg. "K"
Channel catfish	1	25.00	3.36	61.20	3.36	2.14
Largemouth bass	2	50.00	2.00	36.43	1.00	2.95
Bluegill	1	25.00	0.13	2.37	0.13	3.61
Totals	4	100.00	5.49	100.00		

Seining was done along the majority of the shoreline, but vegetation hampered efforts in the upper end where shallow water prevails. A few adult mosquitofish (*G. affinis*), blackstripe topminnows (*F. notatus*) and a moderate number of bluegill (*L. macrochirus*) fingerlings were taken.

A surface sample of water was tested which revealed a low alkaline reading, but no other adverse conditions. Table 6 gives results of this water analysis. The water in this lake usually remains clear, but due to its location between surrounding hills, periods of turbid water exist following rains. This condition is not considered detrimental from a water quality standpoint, but siltation is quite evident and can be expected to continue.

Table 6

Mission Tejas State Park Water Analysis, September 19, 1967

Analysis	Surface Sample
Temperature	78°F
pH	7.3
Turbidity	50 Jackson Turbidity Units
Dissolved oxygen	6.0 p.p.m.
Carbon dioxide	2.0 p.p.m.
Total Alkalinity	20.0 p.p.m.
Chlorides	5.0 p.p.m.
Hydrogen sulfide	0

The upper one-third of the lake is shallow and this area supports most of the aquatic plants found during the survey. The dam and steeply sloping banks around the remaining shoreline provide deep water near the margins, which accounts for limited vegetative growth in these areas. Aquatic plants encountered are listed in Table 7. Submerged plants were not evident at the time of this investigation, which was probably due to a period of turbid water preceding the survey. It is felt that the vegetation in the lake may help reduce turbidity during run-off by filtering suspended particles deposited by soil erosion. Plants may become more troublesome in the future and require control, but until such time no plant eradication is suggested.

Table 7

Aquatic Vegetation Present At Mission Tejas State Park Lake, September 19, 1967

Common Name	Scientific Name	Relative Abundance
Black willow	<u>Salix nigra</u>	Common
Buttonbush	<u>Cephalanthus occidentalis</u>	Common
Cutgrass	<u>Zizaniopsis miliacea</u>	Frequent
Square-stem spikerush	<u>Eleocharis quadrangulata</u>	Frequent
Water primrose	<u>Jussiaea diffusa</u>	Occasional

Mission Tejas State Park Lake is small enough to permit easy access to all portions, however, a small fishing pier placed at a point heavily fished would provide an additional area for fishermen. Small numbers of game fish, low water alkalinity and siltation are management problems presently confronting this lake.

Martin Dies, Jr., State Park

Observation of the entire shoreline in each of the three units comprising this park revealed several plant species of significant quantity. Alligatorweed (Alternanthera philoxeroides), which was abundant in other portions of the reservoir during the growing season, was also dense in several shoreline areas encompassing the park units. This matting plant was found around the majority of the Walnut Ridge Unit, except in the vicinity of the southwest point where wave action is heavy. The Beech Grove Unit exhibited a few scattered, small mats of alligatorweed along portions of the west shoreline and on either side of the slough bisecting the unit. Cherokee Unit was void of alligator weed at the time of investigation, but an existing stand nearby to the east seemed to be progressing in the direction of this area. In areas where this plant was in dense mats, fishing and boat navigation was nil.

Biological control of alligatorweed is presently being tested at Dam "B", using flea beetles (Agasicles sp.). These insects were released on two plots on May 2, 1967. No conclusive results are yet available.

Water hyacinth (Eichornia crassipes), which has become extremely detrimental in recent years, is found scattered in the park areas in small individual clumps. The U. S. Corp of Engineers is presently conducting a program of hyacinth control on the reservoir.

Submerged vegetation, primarily bushy pondweed (Najas sp.) and muskgrass (Chara sp.) has become established around much of the park due to shallow water.

Water primrose (Jussiaea diffusa) and arrowhead (Sagittaria sp.) were emergent plants noted as being potentially troublesome in accessible areas around the park. These marginal aquatics should be eradicated in areas where bank fishing is popular.

Whether or not the presence of Sam Rayburn Reservoir, directly above Dam "B" on the Angelina River, will have an elevation stabilization effect and possibly a resulting decrease in turbidity in Dam "B", remains to be seen. Should turbidity be reduced, an increase in aquatic vegetation may result. In the park areas where a great deal of the surrounding water is shallow, increased vegetation, particularly submerged types, would handicap bank fishermen.

This new park also has excellent facilities and nearby concessions. Boat launching ramps are present at each of the park units and fishing piers are being constructed on Walnut Ridge and Beech Grove Units.

Caddo State Park

The shoreline area of this park is comprised of the south bank of Big Cypress Bayou and the perimeter of Mill Pond, which lies adjacent to the bayou.

Other than bald cypress (Taxodium distichum) which lines the margin, aquatic vegetation was minimal along most of the bayou due to water depth. Coontail (Ceratophyllum demersum) and buttonbush (Cephalanthus occidentalis) were lightly scattered in the area of the boat ramp. These plants were not considered detrimental at the time of the investigation.

Mill Pond on the other hand, contains rather heavy stands of coontail (C. demersum) and white water lily (Nymphaea sp.). Buttonbush (C. occidentalis), false loosestrife (Ludwigia sp.), filamentous algae (Chlorophyceae), and smartweed (Polygonum sp.) were other aquatics noted in lesser degrees. This pond area is shallow and vegetation control will probably be a continual problem.

Timber covers most of the park, extending down to the water's edge except where clearing for roads, picnic areas, and boat ramp has been done. The presence of this timber makes accessibility to shorelines and bank fishing very difficult in all but a few areas.

Plans are presently being discussed to raise the dam and thus increase the water elevation of Caddo Lake. Fulfillment of these plans would bring about a rise of about 3 to 4 feet above the present water level. An increase of this much would greatly alter the appearance of the park area and would no doubt result in changes of management undertakings.

RECOMMENDATIONS:

Management of Tyler State Park and Mission Tejas State Park Lakes is much different than at Caddo and Dam "B" (Martin Dies, Jr.) Parks. The former are completely incorporated within state park boundaries and are small enough to manage effectively, while the latter are large and many management techniques are not economically feasible.

Tyler State Park

Results from this job indicate a need for additional bass stocking at Tyler State Park. Evidently the fingerlings released in 1964 experienced heavy mortality and did not become soundly established. In addition to the release of bass fingerlings, it is recommended that a forage species such as threadfin shad (Dorosoma petenense) be stocked next fall, to supplement bass food items.

Successful catfish reproduction does not occur to any extent in this lake, but sufficient numbers are believed present to provide satisfactory yields for the coming year. Periodic catfish stocking will be required in the future to sustain this population at a desired level on a "put, grow, and take" basis.

Development of a good plankton bloom by fertilizing may be offensive to swimmers, but such an action would definitely aid fish growth and may help control submerged vegetation. Fertilizing should be done annually and the construction of several submerged platforms for application would allow best material utilization.

Marginal submerged and emergent vegetation should be eradicated in areas where bank fishing is popular. Spraying the yellow water lily (N. advena) is also recommended in an effort to check the spread of this plant.

It is felt construction of at least one additional fishing pier would help boost fishing popularity at the lake. The one existing pier reportedly receives heavy use, particularly by ladies and children.

Mission Tejas State Park

Since the present fish population is believed to contain poor ratios of bass, catfish and sunfish, renovation is recommended. This procedure will cancel fishing for at least one year, but provides the surest and most rapid means of restoring sport fishing to a desirable level. Bass, channel catfish and possibly a forage species should do well in a small lake such as this. Rapid growth could be obtained on the channel catfish by feeding with a commercial feed.

Water quality should be improved by limestoning followed by annual spring fertilizing. One or two submerged platforms, as mentioned above, would provide an efficient and easy means of application.

Installation of a small fishing pier, centrally located on the north side, is recommended to facilitate fish harvest.

The problem of siltation is difficult to remedy. Good stands of soil holding vegetation on land surrounding the lake provide the most feasible means of minimizing the effects of this action.

Martin Dies, Jr., State Park

Presently, an effective, feasible control of alligator weed (A. philoxeroides) is not known to the writer. Biological control using flea beetles (Agasicles sp.) may be the answer. Chemical treatment with 2,4-D invert may give some control since this material adheres to the plant for longer periods than ordinary 2,4-D, used on many emergent plants.

The U. S. Corps of Engineers is attempting to control water hyacinth (E. crassipes) with 2,4-D invert on Dam "B" and it is suggested that a small area of alligatorweed be treated experimentally with this chemical to determine its usefulness in controlling this noxious plant.

Chemical treatment of submerged vegetation is also recommended around the fishing piers, in the slough besecting the Beech Grove Unit and in the infested areas adjacent to camping facilities in the Walnut Ridge Unit. Cherokee Unit has a good deal of shallow water and consequently submerged vegetation is usually heavy. Treatment in those areas heavily fished may afford some relief, but treatment of the entire area would not be feasible.

Caddo State Park

The abundant timber found along the shoreline creates a drawback to bank fishing in the park. Plans are being processed to raise the dam, thereby changing the location of the waterline. For this reason extensive clearing is not recommended until such time that results of this alteration can be accurately predicted, in order to eliminate undue cost and labor.

Vegetation control in the Mill Pond area, which is now almost inaccessible due to a timber barrier, would not be practical until clearing is undertaken.

Until more concrete facts are known regarding the future plans for Caddo Lake, limited clearing around picnic and boat launching areas is the sole recommendation for improving fishing conditions at Caddo State Park.

It is recommended that this job be terminated with F-3-R-15 segment. This planned one year study has indicated needed management techniques to enhance sport fishing in Region 3-B state park waters.

Prepared by Roger L. McCabe
Assistant Leader

Approved Marion Toole
Coordinator

Date February 15, 1968

Charles E. Gray
Regional Supervisor

