

Report of Fisheries Investigations
Inventory of Species Present in Lake Kirby near Abilene, Texas

by

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Dingell-Johnson Project F-5-R-7, Job B-26
April 16, 1959 - March 31, 1960

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A B S T R A C T

Thirteen species representing five families of fish were collected from Lake Kirby. Gizzard shad (Dorosoma cepedianum), flathead catfish (Pylodictus olivaris), channel catfish (Ictalurus punctatus), and white crappie (Pomoxis annularis), are all very abundant. The principal fisheries problems appear to be gizzard shad and an overpopulation of small crappie. Channel catfish and flathead catfish provide very good fishing for the local anglers. The carp (Cyprinus carpio) and river carpsuckers (Carpionodes carpio) found in Lake Kirby are all very small for some unexplained reason.

Evidence obtained by netting and seining collections indicated that largemouth bass (Micropterus salmoides) do not spawn in the lake probably because of its extremely turbid waters. Some very large bass were collected and observed, however. These were probably the result of hatchery stocking. It was recommended that largemouth bass be stocked more frequently in this lake.

Job Completion Report

State of TEXAS

Project No. F-5-R-7

Name: Fisheries Investigations and Surveys
of the Waters of Region 3-B

Job No. B-26

Title: Inventory of Species Present in Lake
Kirby near Abilene, Texas

Period Covered:

April 16, 1959 - March 31, 1960

OBJECTIVES

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

PROCEDURE

A total of 16 netting collections was obtained from Lake Kirby during the survey period. All nets used were experimental type nylon gill nets, measuring 125 feet in length and eight feet in depth. They were made up in five, 25 foot long sections with mesh sizes varying from one-inch square mesh to three-inch square mesh, increasing in one-half-inch intervals in each succeeding section. Six stations were employed in the setting of these 16 nets. In addition to the information obtained from these nets, data was collected from a commercial fisherman who set 7,000 feet of 3½ and 4 inch mesh in the lake for a one night period.

All fish taken from the nets set by the Texas Game and Fish Commission were weighed, measured, and their sex and condition determined. Individuals of some species were examined for stomach contents and for parasites.

Hoop and/or fyke nets were not employed for collection purposes as there were no channels in the lake or other locations that would have been particularly good for sampling with them. Also, insufficient time was available for their effective use.

Seining collections were obtained on three occasions from three locations in the lake. Each collection consisted of several seine drags at each beach with either a 12 foot commonsense seine or a 100 foot nylon seine with 1-inch mesh. The fish collected in seines were counted by species and a sample of each species was preserved for further study in the laboratory.

In addition to netting and seining, records were made at several times during the course of the survey of the surface water temperature, the pH, and the turbidity. Notations concerning the description and general ecological conditions of the lake and surrounding terrain were also recorded. Further hydrological and water analysis information was obtained from the City of Abilene and the Texas State Department of Health.

FINDINGS

Location and Physical Conditions

Lake Kirby is located on Cedar Creek, on the southern outskirts of Abilene, Texas, approximately 5 miles from the downtown area. Lake Litle and Fort Phantom Hill are also on Cedar Creek below the Lake Kirby Dam but there are no impoundments on the creek above Lake Kirby. Lake Kirby and Cedar Creek are on the Clear Fork of the Brazos River drainage system. The contributing watershed for Lake Kirby contains 44 square miles. At spillway level the lake covers 800 surface acres and contains 2,850,000,000 gallons of water.

The dam is 50 feet high, 2,000 feet long, of earth construction, and riprapped with large rocks approximately 1- to 2-feet in diameter. The lake bottom is silt, and red soils. A geological fault has created a steep bluff of crumbled bed-rock on the east shore of the lake while the other shore lines are gently sloping sand and silt beaches.

The lake always has a large amount of colloidal suspension. Turbidity values ranged between 2 and 4 inches as observed by means of a Secchi disk. The red, sandy loams above the lake, much of which is in cultivation, helps explain this condition. The recorded pH for the lake is 8.1 and during the project period water temperatures ranged between 38°F. and 83°F. The lake level was down approximately ten feet during the survey period and the lake covered only 350 surface acres. More complete hydrological information is given in Figures 9 and 10.

Vegetation

Button willows and desert willows along with native grasses are abundant along the lake's shores. Except for algae on the dam's riprap no aquatic vegetation is noticeable. This can probably be accounted for by the extreme turbidity of the water.

History and Administration

Lake Kirby was constructed in 1928 for a water supply for the City of Abilene. Much water is still drawn from the lake for municipal consumption even though Abilene has two other water supply lakes which contain more water. The water from Lake Kirby reportedly has a more desirable flavor than water from the other two lakes. This can probably be accounted for by the high turbidity and lack of aquatic vegetation that are characteristic of the lake. Since the lake was built, a great amount of siltation has taken place. At the time of construction the maximum depth of the lake was reportedly 31 feet. At the present time no water over 20 to 22 feet deep would exist if the lake were at spillway level. The lake's level has fluctuated considerably from year to year. In 1953, the lake was down to a maximum depth of 10 inches in it's deepest area but has never gone completely dry.

Lake Kirby has a local reputation of having been a good fishing lake. Some large crappie have been caught year in and year out. Channel catfish have also been heavily fished for with a good degree of success. Shortly after the lake caught water in 1953, yellow catfish were introduced into the lake in large numbers for the first time. These fish were obtained from a small lake below Lake Kirby. This species has flourished in Lake Kirby and today yellow catfish are caught on poles and lines,

or rod and reels quite frequently. Trotlines, throwlines or any similar apparatus, are not allowed in the lake and the lake is closed to night fishing, speed boating, water skiing, swimming, and wading. A 25 cent daily recreational charge is levied by the City of Abilene. This money is used to help pay the lake patrolman's salary and for maintenance of roads and facilities.

Netting

Figures 2, 3, and 4 present the data obtained by the use of gill nets and Figure 11 shows the locations of the netting stations. A total of 329 specimens representing nine species, were collected by netting. Of this number 67.48 percent were game species. However, many of the game species collected by netting were small crappie therefore this percentage is misleading. In evaluating the relative condition of the lake, Figure 7 gives the results of a commercial fisherman's gill netting catch from the lake.

Description of Netting Stations

Station 1 - One end of the nets used at this station were tied to the water gauge, which was standing alone, approximately 50 feet from the dam. (See Figure 12). The other ends of the nets were anchored away from the gauge (and the dam) in open water. The average depth of the water was approximately 12 feet. The bottom was composed of sand and silt. This station was used during all three netting trips.

Station 2 - This station was located near the west end of the dam. One end of the nets was tied to the dam's riprap while the other end was anchored away from the dam in open water. The average depth of the water was approximately 12 feet. The bottom was composed of the dam's coarse rock riprap at one end of the net, and sand and silt at the other end. There was some filamentous algae apparent on the riprap at the water's edge. This station was used during the July and October netting trips.

Station 3 - This station was on the edge of the northernmost of two small islands. One end of the nets used was set in about three feet of water while the other end was stretched out into water approximately nine feet deep. The bottom was sand and silt. There were scattered patches of native grasses emerging from the water at the edges of the island which had most likely grown during periods of low water. This station was used every time the lake was netted. (See Figure 13).

Station 4 - This station was located at the southern island and had practically the same physical characteristics as station number three except that the water at this station was slightly shallower. Nets were set here during the July and October trips.

Station 5 - This station was close to the east shoreline about mid-way down the lake. The shoreline in this area is covered by large rocks and small boulders. The nets used were in about 2 feet of water at the shoreline end and in about 7 feet of water at the end stretched away from the shore. The bottom was composed of sand and silt. This station was utilized during all three netting trips. (See Figure 14).

Station 6 - This was a flat in the upper end of the lake adjacent to the creek channel. The water was approximately 4 feet deep. The bottom was composed of sand and silt. This station was employed every time the lake was netted.

Seining

Although there were not but three areas where seining could be effectively conducted it is felt that these areas produced a satisfactory sample. The use of other areas was prohibited by excessive obstructions, primarily stumps and large rocks. Figures 5 and 6 present the statistical data obtained from the seining collections and Figure 11 shows the locations of the seining stations. A total of 800 specimens representing 10 different species were collected by use of seines.

Descriptions of Seining Stations

Station 1 - This was the boat launching area at the northeast corner of the dam. The shore had a gentle gradient and was covered with rubble. This location was free of obstructions but became too deep for seining approximately 20 feet from the bank. (See Figure 15).

Station 2 - This seining station was a flat area between the southernmost island and the west shoreline. The water was between 1 foot and 18 inches deep. The bottom was clay, sand and silt, and was interspersed with stumps which prohibited the use of long seines but did not seriously deter the use of 12 foot seines.

Station 3 - This station was in a small slough near the southwest corner of the dam. A silt bar partially obstructed the mouth of the slough. There is an interchange of water between the lake and the slough when the lake is not low. The bottom was sand and silt with some rubble along the shoreline. The use of 100 foot seines was not prohibited by obstructions in this area.

Annotated Species List

Clupeidae (herrings)

Dorosoma cepedianum (gizzard shad) - Over 53 percent of the total fish collected by seining were gizzard shad and over 24 percent of the fish collected by use of nets were this species. The tremendous numbers of shad have apparently kept individuals of the species small since no large shad were captured. The average weight of the shad taken in the netting collections was only 1.9 ounces. Most game fish stomachs examined contained shad remains.

Catostomidae (suckers and buffalofishes)

Ictiobus bubalus (smallmouth buffalo) - One 6-pound buffalo was captured by a commercial fisherman from a total of 7,000 feet of net. This species was not represented in the regular netting and seining collections.

Carpionodes carpio (river carpsuckers) - This species was collected both by netting and seining but did not appear to be as numerous or as serious a fishery problem as it often is in other West Texas lakes. All the carpsuckers captured were extremely small. The sample of this species taken from nets averaged only 5.3 ounces.

Cyprinidae (shiners and minnows)

Cyprinus carpio (carp) - Carp were collected both by seining and netting and appeared to be present in about the same numbers as were the river carpsuckers. The carp collected were somewhat larger than the river carpsuckers but even so they averaged only 1 pound and 5 ounces. The reason for the small size of these two species, when there does not appear to be a large overabundance of either species, has not been determined.

Notropis lutrensis (redhorse shiner) - This appears to be the dominant minnow in Lake Kirby. The species seems to do especially well in tanks and lakes in the area which have large suspensions of colloidal material.

Notropis volucellus (mimic shiner) - A small sample of this species was obtained from Lake Kirby. This species appears to be sub-dominant to other species of minnows practically everywhere it occurs in West Texas.

Pimephales vigilax (parrot minnow) - This was the second most common minnow collected in Lake Kirby. Most of these were fairly large size specimens.

Ameiuridae (freshwater catfishes)

Ictalurus punctatus (channel catfish) - These fish are abundant in Lake Kirby and are frequently taken by anglers on rods and reels and cane poles. The average weight of the channel catfish taken in the regular netting collections was 1 pound and 5 ounces although the 12 channel catfish caught in the 3½- and 4-inch mesh of a commercial fisherman's nets averaged approximately eight pounds.

Pylodictus olivaris (flathead catfish) - Only three fish of this species were obtained by netting but this is considered to be an error created by the use of small mesh nets. Flatheads are caught very frequently by anglers on cane poles and rods and reels. Trotlines and throwlines are prohibited. The commercial fisherman, who set 7,000 feet of net in one night took over 500 specimens that averaged over 12 pounds each. According to local sources around Abilene this species was introduced into Lake Kirby for the first time about eight or ten years ago. These fish have added tremendously to the fishery of the lake. They have apparently spawned every year as there are various sizes in the lake.

Centrarchidae (black basses and sunfishes)

Micropterus salmoides (largemouth bass) - Only one individual of this species was collected from Lake Kirby. This was a 3 pound 2 ounce fish collected by netting. Several large specimens were taken by the commercial fisherman that averaged 7 pounds each. It is believed, by the observer, that largemouth bass do not spawn in this lake. The extremely turbid conditions of the water which always prevails is believed a major factor in the failure of bass to spawn. The lake was stocked with this species about five years ago from state fish hatcheries. Every bass seen or reported to be caught by anglers was of a large size, yet no small bass were captured by seining.

Lepomis macrochirus (bluegill) - This is the most common sunfish in the lake. Not a single individual collected was large enough to be of any value to a fisherman. These fish have probably overpopulated this lake in the same as they have in most other waters of the region.

Lepomis humilis (orangespotted sunfish) - These small relatively unimportant fish are common in Lake Kirby.

Pomoxis annularis (white crappie) - Lake Kirby contains two sizes of this species. One is the very large, very desirable size that is probably a remnant of the year class produced a year or two after the lake filled up after nearly going dry in 1953. The other size is very small. Small crappie averaged only $2\frac{1}{2}$ ounces, yet they were fully mature, sexually ripe specimens. This small sized crappie, which composes a very large group, is probably the result of an overpopulation of this species which has become evident during the last three or four years.

CONCLUSIONS AND RECOMMENDATIONS

The results of the inventory of fish made in Lake Kirby indicates that: 1. the crappie and sunfish are overabundant and, as a result, stunted; 2. the largemouth bass are not spawning; 3. gizzard shad are the principal rough fish problem, but their uniform small size makes them available to the other fish as a food supply; 4. the suckers and carp found in Lake Kirby are, for some unexplained reason, very small; and 5. flathead catfish and channel catfish are the primary fishery in the lake although many of the small crappie and sunfish are also utilized by local anglers.

The only recommendation that can be made at this time is that largemouth bass be stocked more frequently from the state fish hatcheries as no natural reproduction appears to occur. As long as flathead catfish are providing fishermen of the area with the "good fishing" they apparently have, even though trotlines and throwlines are not allowed in the lake, it is felt that no management work is required. However, when selective eradication techniques are completely worked out for the waters of this region, and when long range results of such treatments are known or can be reasonably accurately predicted, a selective control of gizzard shad will be recommended.

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Approved by Marion Toole
Director Inland Fisheries Division

Date July 1, 1960

Figure 1. A checklist of fish species caught by netting and seining from Lake Kirby from April 16, 1959 through March 31, 1960

Scientific Name	Common Name
<u>Clupeidae</u> (herrings)	
<u>Dorosoma cepedianum</u>	gizzard shad
<u>Catostomidae</u> (suckers and buffalofishes)	
<u>Ictiobus bubalus</u>	smallmouth buffalo
<u>Carpionodes carpio</u>	river carpsucker
<u>Cyprinidae</u> (shiners and minnows)	
<u>Cyprinus carpio</u>	carp
<u>Notropis lutrensis</u>	redhorse shiner
<u>Notropis volucellus</u>	mimic shiner
<u>Pimephales vigilax</u>	parrot minnow
<u>Ameiuridae</u> (freshwater catfishes)	
<u>Ictalurus punctatus</u>	channel catfish
<u>Pylodictus olivaris</u>	flathead catfish
<u>Centrarchidae</u> (black basses and sunfishes)	
<u>Micropterus salmoides</u>	largemouth bass
<u>Lepomis macrochirus</u>	bluegill
<u>Lepomis humilis</u>	orangespotted sunfish
<u>Pomoxis annularis</u>	white crappie

Figure 2. Results of netting collections taken from Lake Kirby during the period from April 16, 1959 through March 31, 1960

Species	July (6 nets)		October (6 nets)		December (4 nets)	
	No.	Percent	No.	Percent	No.	Percent
Gizzard shad	58	28.43	21	25.92	3	6.81
Smallmouth buffalo			1	1.24		
River carpsucker	9	4.41	1	1.24	1	2.28
Carp	6	2.94	7	8.64		
Channel catfish	31	15.20	6	7.40	5	11.36
Flathead catfish	3	1.47				
Largemouth bass					1	2.27
Bluegill sunfish	1	0.49				
White crappie	96	47.06	45	55.56	34	77.28
Total	204	100.00	81	100.00	44	100.00

Figure 3. Results of all sixteen netting collections taken from Lake Kirby during the period from April 16, 1959 through March 31, 1960

Species	No.	Percent by No.	Total Wt. Lbs. Ozs.	Avg. Wt. Lbs. Ozs.	Percent by Wt.	Avg. "K"
Gizzard shad	82	24.92	9 12	1.90	7.49	1.49
Smallmouth buffalo	1	0.30	1 4	1 4	0.96	2.80
River carpsucker	11	3.35	3 10	5.3	2.79	2.18
Carp	13	3.95	17 4	1 5	13.27	2.61
Channel catfish	42	12.77	39	15	29.99	1.78
Flathead catfish	3	0.92	8 12	2 15	6.72	2.50
Largemouth bass	1	0.30	3 3	2 2	2.41	2.12
Bluegill	1	0.30	1 1	1	0.04	2.78
White crappie	175	53.19	47 4	4.32	36.33	3.32
Total	329	100.00	130 1		100.00	

Figure 4. A comparison of rough and/or forage species to game species obtained in sixteen netting collections from Lake Kirby during the period from April 16, 1959 through March 31, 1960

	No.	Percent by No.	Total Wt. Lbs. Ozs.	Percent by Wt.
Rough and/or forage species (Gizzard shad, smallmouth buffalo, carp, and river carpsuckers)	107	32.52	31 14	24.51
Game species (Channel catfish, flathead catfish, largemouth bass, bluegill sunfish and white crappie)	222	67.48	98 3	75.49
Total	329	100.00	130 1	100.00

Figure 5. Results of individual seining collections taken from Lake Kirby during the period from April 16, 1959 through March 31, 1960

Species	July 15, 1959		October 15, 1959		January 26, 1960	
	No.	Percent by No.	No.	Percent by No.	No.	Percent by No.
Gizzard shad	33	19.07	23	25.27	375	69.96
River carpsuckers	11	6.36	5	5.49	29	5.41
Carp	8	4.62	3	3.30	26	4.85
Redhorse shiners	63	36.42	37	40.66	0	--
Mimic shiners	3	1.73	2	2.20	0	--
Parrot minnows	17	9.83	4	4.39	0	--
Channel catfish	4	2.31	7	7.70	7	1.30
Bluegill	7	4.05	2	2.19	32	5.98
Orangespotted sunfish	4	2.31	0	--	19	3.54
White crappie	23	13.30	8	8.80	48	8.96
Totals	173	100.00	91	100.00	536	100.00

Figure 6. Results of all seining collections taken from Lake Kirby during the period from April 16, 1959 through March 31, 1960

Species	No.	Percent by No.
Gizzard shad	431	53.87
River carpsuckers	45	5.63
Carp	37	4.62
Redhorse shiners	100	12.50
Mimic shiners	5	0.63
Parrot minnows	21	2.62
Channel catfish	18	2.25
Bluegill	41	5.13
Orangespotted sunfish	23	2.87
White crappie	79	9.88
Totals	800	100.00

Figure 7. Results of 7,000 feet of $3\frac{1}{2}$ inch and 4 inch mesh gill net set in Lake Kirby by a commercial fisherman during the period from April 16, 1959 through March 31, 1960

Species	No.	Estimated Average Weight (lbs.)
Smallmouth buffalo	1	6
Carp	1	6
Channel catfish	12	8
Flathead catfish	500	12
Largemouth bass	10	7
White crappie	7	3
Total	531	

Figure 8. Results of water analysis made on Lake Kirby on November 2, 1959. (Analysis courtesy of Texas Health Department.)

	p.p.m.
Calcium (Ca)	34
Magnesium (Mg)	8
Iron (Fe)	0.9
Mangnaese (Mn)	0.05
Sodium (Na)	9
Carbonate (CO ₃)	0
Bicarbonate (HCO ₃)	134
Sulphate (SO ₄)	16
Chloride (Cl)	16
Flouride (F)	0.3
Nitrate (NO ₃)	0.9
Specific conductance micromhs/cm	300
Dissolved residue (T.S.) calculated	180
Phenolphthalein alkalinity as CaCO ₃	0
Total alkalinity as CaCO ₃	110
Total hardness as CaCO ₃	118
pH	8.1

Figure 9. Chart showing the relation of surface area covered to volume contained at each elevation in Lake Kirby.

Elevation	Surface Acres	Billion gallons	Elevation	Surface Acres	Billion gallons
1786.0 (spillway)	800	2.85	81.0	570	1.65
85.8	790	2.81	80.8	561	1.61
85.6	780	2.77	80.6	552	1.57
85.4	770	2.73	80.4	543	1.53
85.2	760	2.69	80.2	534	1.49
85.0	750	2.65	80.0	525	1.45
84.8	742	2.60	79.8	516	1.42
84.6	734	2.55	79.6	507	1.39
84.4	726	2.50	79.4	498	1.36
84.2	718	2.45	79.2	489	1.33
84.0	710	2.40	79.0	480	1.30
83.8	700	2.34	78.8	472	1.27
83.6	690	2.28	78.6	464	1.24
83.4	680	2.22	78.4	456	1.21
83.2	670	2.16	78.2	448	1.18
83.0	660	2.10	78.0	440	1.15
82.8	650	2.06	77.8	433	1.12
82.6	640	2.02	77.6	426	1.09
82.4	630	1.98	77.4	419	1.06
82.2	620	1.94	77.2	412	1.03
82.0	610	1.90	77.0	405	1.00
81.8	602	1.85	76.8	396	.98
81.6	594	1.80	76.6	387	.96
81.4	586	1.75	76.4	378	.93
81.2	578	1.70	76.2	369	.90

Figure 9. Chart showing the relation of surface area covered to volume contained at each elevation in Lake Kirby. (Continued)

Elevation	Surface Acres	Billion gallons	Elevation	Surface Acres	Billion gallons
76.0	360	.87	70.8	200	.47
75.8	352	.84	70.6	195	.45
75.6	344	.81	70.4	190	.44
75.4	336	.79	70.2	185	.43
75.2	328	.77	1770.0	180	.42
75.0	320	.75			
74.8	314	.74			
74.6	308	.73			
74.4	302	.72			
74.2	296	.70			
74.0	290	.68			
73.8	283	.67			
73.6	276	.66			
73.4	269	.64			
73.2	262	.62			
73.0	255	.60			
72.8	250	.59			
72.6	245	.58			
72.4	240	.57			
72.2	235	.56			
72.0	230	.55			
71.8	225	.53			
71.6	220	.52			
71.4	215	.51			
71.2	210	.50			
71.0	205	.49			

Figure 10. Chart showing the monthly water elevations in Lake Kirby from April 1954 through March of 1960.*

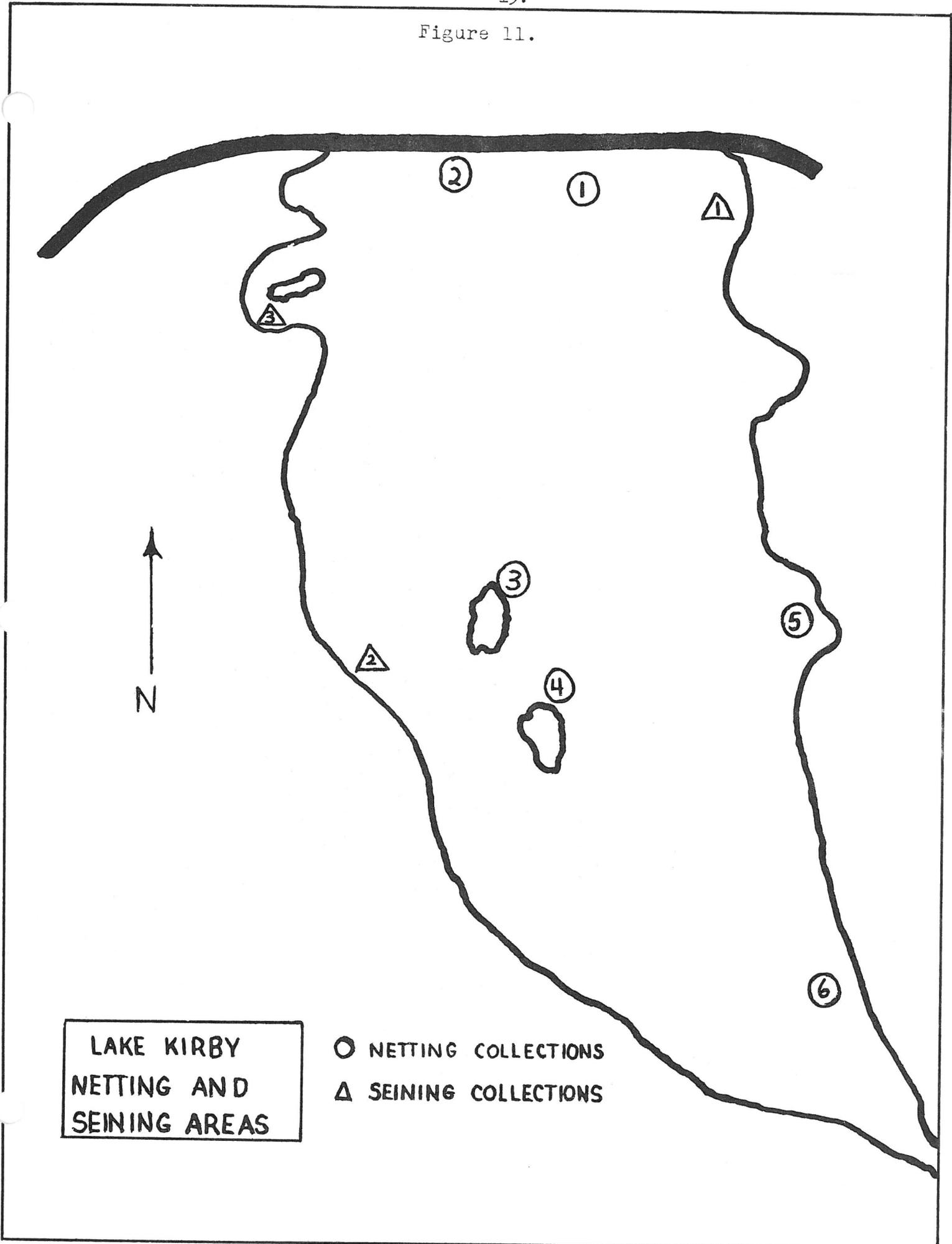
Month	Elevation on Gauge	Month	Elevation on Gauge
1954 April	1,775.7	May	79.2
May	79.8	June	77.2
June	78.6	July	75.8
July	77.2	August	84.9
August	75.6	September	75.8
September	74.0	October	74.9
October	72.6	November	73.7
November	73.0	December	72.7
December	72.6	1957 January	1,772.1
1955 January	1,772.3	February	72.6
February	72.4	March	72.4
March	72.9	April	78.5
April	71.6	May	86.0
May	74.9	June	85.5
June	80.9	July	84.9
July	80.5	August	83.6
August	80.6	September	82.5
September	85.5	October	85.8
October	85.0	November	85.1
November	84.0	December	84.5
December	83.1	1958 January	1,783.8
1956 January	1,782.7	February	83.5
February	82.6	March	83.1
March	82.4	April	82.5
April	82.1	May	82.1

Figure 10. Chart showing the monthly water elevations in Lake Kirby from April 1954 through March of 1960.* (Continued)

Month	Elevation on Gauge
June	81.1
July	80.3
August	79.6
September	80.8
October	79.8
November	78.9
December	78.1
1959 January	1,777.4
February	76.4
March	75.2
April	74.5
May	73.7
June	74.8
July	74.2
August	73.4
September	72.6
October	75.7
November	75.3
December	75.2
1960 January	1,775.5
February	75.5
March	75.2

* Spillway elevation of Lake Kirby is 1,786.0

Figure 11.



LAKE KIRBY
NETTING AND
SEINING AREAS

○ NETTING COLLECTIONS
△ SEINING COLLECTIONS



Figure 12. Netting station Number 1 at Lake Kirby

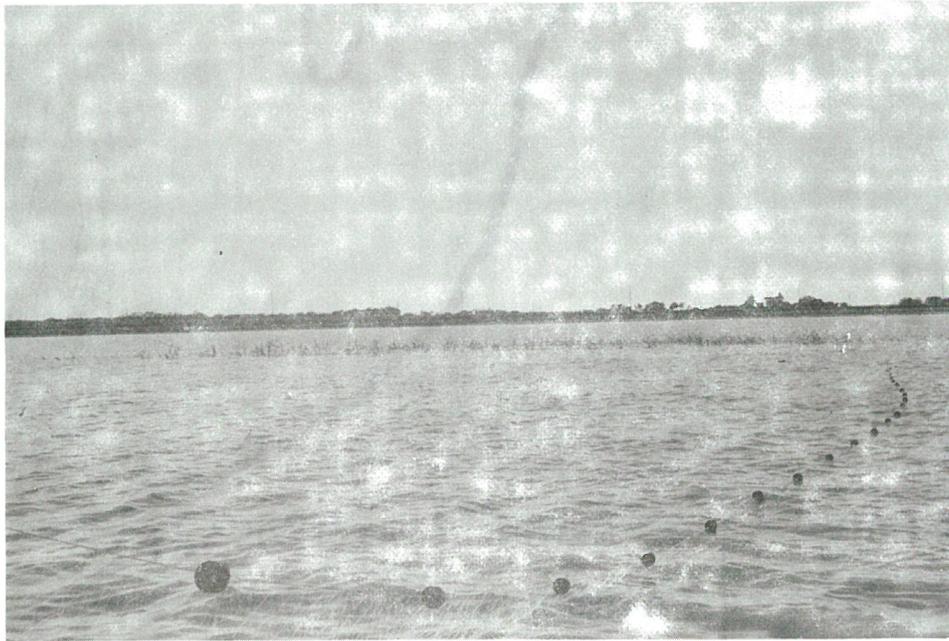


Figure 13. Netting station Number 3 at Lake Kirby

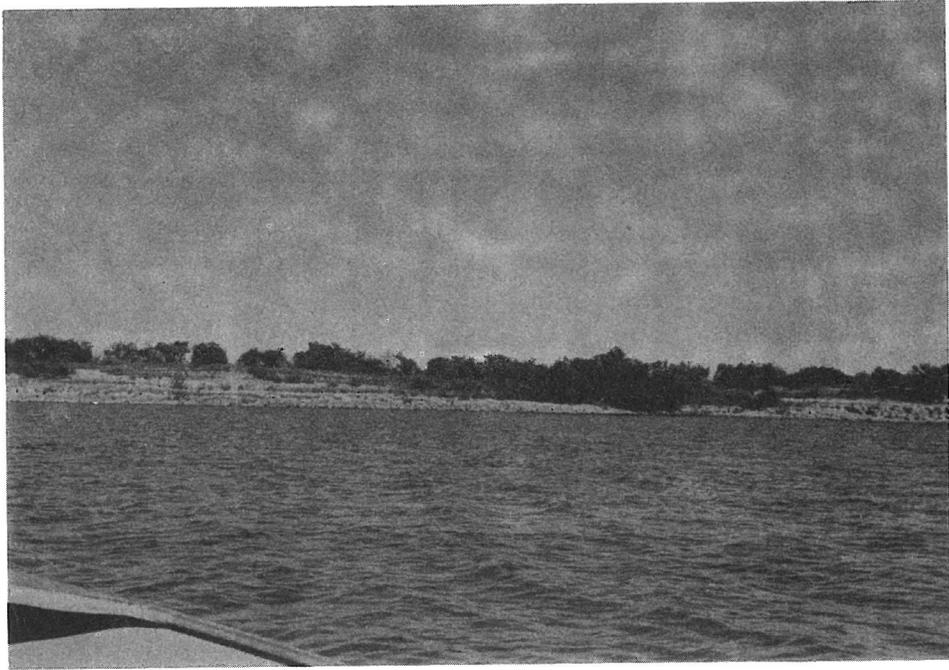


Figure 14. Netting station 5 at Lake Kirby

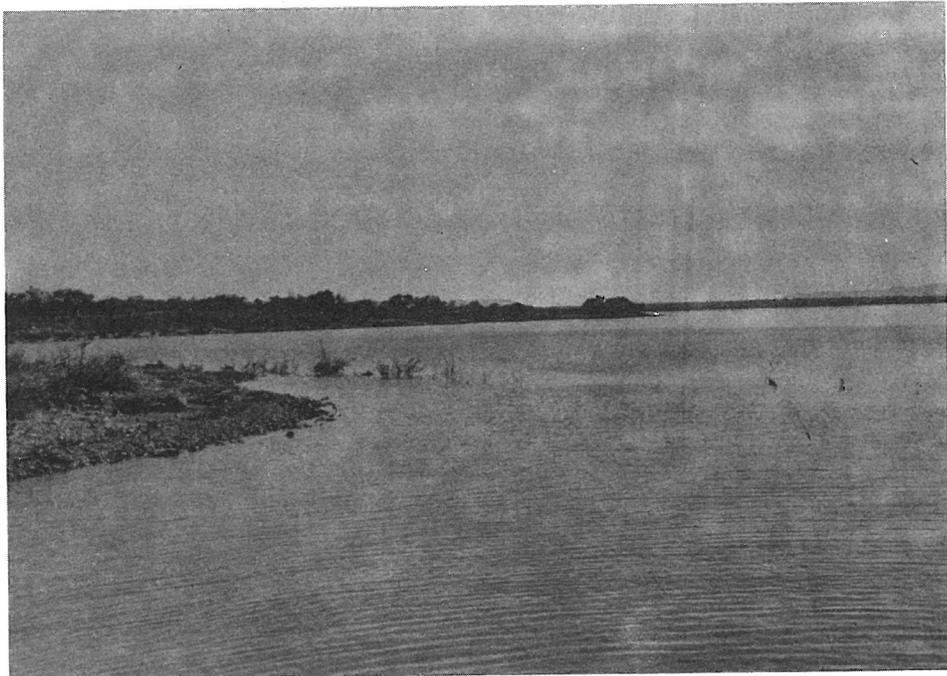


Figure 15. Seining station 1 at Lake Kirby

