

Job Completion Report

State of TEXAS

Project No. F-4-R-6

Name: Fisheries Investigations and Surveys
of the Waters of Region 4-B.

Job No. B-24

Title: Inventory of Species in Possum Kingdom
Lake.

Period Covered:

November 1, 1958 - October 31, 1959

Abstract:

Following an attempt to selectively control gizzard shad in Possum Kingdom Lake through the use of rotenone, a series of monthly net sets were made to determine the effectiveness of the shad control work. On the basis of these netting collections it was concluded that the shad population had been only partially reduced and that it had rapidly recovered from the effects of the chemical treatment. This recovery was due in part to a spawn of this species which occurred in October 1958, two months after the chemical had been applied. Because the rotenone application had failed to drastically reduce the numbers of gizzard shad, it was not necessary or possible to learn the time required by the surviving shad to re-establish a large population.

Objectives:

To determine the effectiveness of the selective kill of shad and the time required for re-establishment of the shad population.

Procedure:

Following the selective kill of shad on August 6, 1958, a series of net checks were made to determine the extent of the kill. These nets were set in all parts of the lake. The data collected was to be used in evaluating the effectiveness of the chemical treatment.

Monthly net checks were continued throughout the segment and the netting stations established during the previous segment were used in order that comparative data might be obtained.

Data concerning length, weight, sex, and stage of sexual development were taken for each fish caught in the gill nets. Stomach analyses of food remains in the netted specimens were made to determine the food habits of the various species collected.

Seining stations, used during preceding segments, were rendered useless by changes in the water level. This, combined with submerged tree stumps and brush in shallow water, caused the abandonment of seine collections because comparative data could not be obtained.

Results:

The results of net checks made two weeks before the selective kill and again two weeks after the selective kill were included in the report for Job 16a-10, Project F-14-D-3. These indicated little difference in the relative abundance of gizzard shad before and after the attempt to selectively control them.

Netting collections obtained between December 1958 and October 1959 indicated that the gizzard shad continues to be the most numerous species in the catch. This species provided 47.85 percent of the total catch of the gill nets (Table 1).

Gizzard shad taken were of such size as to allow this species to account for 28.49 percent of the total weight of all fish taken. This was exceeded only by the longnose gar with 33.85 percent (Table 2).

During the period from December 1958 through October 1959 a total of 1,124 gizzard shad, weighing 559.43 pounds were taken in the netting collections. These averaged 230 millimeters in total length and 243 grams in weight. Their length ranged from 150 to 330 millimeters and their weight varied from 70 to 510 grams. On the average 11.02 shad, weighing 5.84 pounds, were taken per 100 feet of gill net, set overnight (Table 3).

A comparison of the data obtained during the 1955-1956 survey with that from the present segment shows that the gizzard shad population was somewhat reduced, probably by the selective kill attempted in August of 1958. Shad made up 78.91 percent of the total number and 61.97 of the weight in the 1955-1956 net catch (Table 4). The 1958-1959 net catch was also dominated by gizzard shad but not to such a great extent as previously observed. Only 47.85 percent of the total number and 28.49 percent of the total weight were shad (Tables 1 & 2).

The rate of catch of shad per 100 feet of gill net also indicates that the shad population was reduced by the chemical treatment in 1958. Each 100 feet of net set in 1955-1956 took 18.81 shad, compared with the 11.02 shad per 100 feet of net set in the 1958-1959 netting collections (Tables 3 & 4).

Game fish showed an increase in the percentage of the fish taken in nets, both in numbers and in weight. They comprised 15.80 percent of the total number and 15.56 percent of the weight in the 1955-56 figures and they increased to 34.48 percent of the number and 24.95 percent of the weight in the 1958-59 netting figures.

A comparison of the catch of game fish per 100 feet of gill net shows that 3.66 were taken in 1955-56, while 7.94 were caught during 1958-59. The pounds of game fish caught per 100 feet of net since the attempted selective kill is also higher with 2.32 pounds in 1955-56 and 5.02 pounds in 1958-59. The "K" factors of the fish taken during the two periods show little difference (Table 4).

Conclusions:

The results of gill netting before and after the application of rotenone to Possum Kingdom Lake, during August of 1958, indicate that the attempted selective kill of shad was only partially successful. There was a definite reduction of the shad population but a successful spawn of the surviving, large shad during October 1958

replaced many of the shad which had been killed. The decrease in average weight of shad caught after the rotenone treatment may be due in part to the fact that many of these were young-of-the-year shad which had been spawned in October 1958.

Following the chemical treatment of Possum Kingdom Lake, fishing success improved but was of short duration. Game fish, however, showed a definite increase in the percentages of both numbers and weights of fish taken in nets.

It appears evident that the selective kill of shad had a desirable effect on the fish population of Possum Kingdom Lake. The overall value of the treatment, unfortunately, was reduced by the fact that the shad were not destroyed in sufficient numbers to prevent their continued dominance of the fish population.

Because gizzard shad remained well established throughout the attempt to selectively control them, there could be no determination of the time required for the shad population to re-establish itself.

The need for selective control of shad in Possum Kingdom Lake is still present and further experimental work is needed to determine an effective means of reducing this population.

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Date January 21, 1960

Table 1. Number and Percentage of Each Species Taken by Gill Nets from Possum Kingdom Lake Between December 1958 and October 1959.

Number 100' Nets Month Species	4		11		8		6		10		4	
	December No.	December Percent	February No.	February Percent	March No.	March Percent	April No.	April Percent	May No.	May Percent	June No.	June Percent
Spotted gar	1	2.33			2	0.61			4	0.61	5	3.67
Longnose gar					1	0.31			149	23.04	4	2.95
Gizzard shad	27	62.78	130	55.31	119	36.61	51	48.11	295	45.60	69	50.74
Smallmouth buffalo	2	4.65							2	0.31	9	6.62
River carpsucker	1	2.33	14	5.96	67	20.62	6	5.66	11	1.70	21	15.44
Carp					1	0.31					2	1.47
Channel catfish	3	6.97	3	1.28	1	0.31			12	1.85	6	4.41
White bass	7	16.28	65	27.66	93	28.62	9	8.49	7	1.08	5	3.68
Largemouth bass	1	2.33	13	5.53	17	5.23	5	4.72	6	0.93	1	0.73
Spotted bass												
Warmouth												
Redgear sunfish					2	0.61	11	10.37	53	8.20		
Bluegill sunfish			3	1.28	13	4.00	9	8.49	95	14.69	11	8.09
Yellowbelly sunfish	1	2.33										
Longear sunfish			7	2.98	7	2.16	3	2.84	1	0.15	2	1.47
White crappie					2	0.61			10	1.54		
Black crappie									2	0.30	1	0.73
Drum												
Totals	43	100.00	235	100.00	325	100.00	106	100.00	647	100.00	136	100.00

Table 1. (Continued) Number and Percentage of Each Species Taken by Gill Nets From Possum Kingdom Lake Between December 1958 and October 1959.

Number 100' Nets Month Species	6 July		3 August		40 September		10 October		102 Totals	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Spotted gar	2	1.90	2	14.28	5	0.99	2	0.86	20	0.85
Longnose gar	2	1.90	2	14.28	45	8.90	13	5.60	229	9.75
Gizzard shad	63	59.05	3	21.44	235	46.53	132	56.91	1,124	47.85
Smallmouth buffalo	1	0.95	1	7.14	5	0.99	1	0.43	21	0.89
River carpsucker			1	7.14	12	2.38	1	0.43	134	5.70
Carp					2	0.40			5	0.22
Channel catfish	22	20.96	1	7.14	66	13.07	15	6.46	129	5.49
White bass	6	5.72			17	3.37	27	11.64	236	10.05
Largemouth bass					14	2.77	2	0.86	59	2.51
Spotted bass					2	0.40			2	0.09
Warmouth					3	0.59			3	0.13
Redear sunfish			1	7.14					3	0.13
Bluegill sunfish	6	5.72	2	14.28	22	4.36	7	3.02	67	2.85
Yellowbelly sunfish									168	7.15
Longear sunfish									1	0.04
White crappie	4	3.80	3	21.44	75	14.85	31	13.36	142	6.04
Black crappie					2	0.40	1	0.43	2	0.09
Drum									6	0.26
Totals	106	100.00	14	100.00	505	100.00	232	100.00	2,349	100.00

Table 2. Weight and Percentage of Each Species Taken by Gill Nets From Possum Kingdom Lake From December 1958 - October 1959.

Number 100' Nets Month Species	4 December		11 February		8 March		6 April	
	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
Spotted gar	3.00	8.08			4.75	2.14		
Longnose gar	14.70	39.62			1.31	0.59	63.20	57.77
Gizzard shad	11.50	31.00	79.33	57.15	72.50	32.67	26.20	23.95
Smallmouth buffalo								
River carpsucker	2.00	5.39	10.58	7.62			5.80	5.30
Carp					73.09	32.94		
Channel catfish	1.70	4.58	3.92	2.83	3.44	1.55		
White bass	3.40	9.17	32.75	23.59	0.70	0.31	4.50	4.11
Largemouth bass	0.60	1.62	9.12	6.57	48.51	21.86	3.50	3.20
Spotted bass			0.43	0.31	11.15	5.03		
Warmouth bass								
Redear sunfish					0.50	0.22	3.10	2.83
Bluegill sunfish			0.23	0.17	2.74	1.24	2.10	1.92
Yellowbelly sunfish	0.20	0.54						
Longear sunfish								
White crappie			2.44	1.76	2.65	1.19	1.00	0.92
Black crappie					0.56	0.26		
Drum								
Totals	37.10	100.00	138.80	100.00	221.90	100.00	109.40	100.00

Table 2. (Continued) Weight and Percentage of Each Species Taken by Gill Nets From Possum Kingdom Lake From December 1958 - October 1959.

Number 100' Nets Month Species	10 May		4 June		6 July		3 August	
	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
Spotted gar	9.94	1.59	8.12	6.25	3.19	3.96	8.80	57.70
Longnose gar	338.22	54.23	8.68	6.69	10.87	13.52	1.49	9.77
Gizzard shad	180.53	28.95	35.86	27.64	28.61	35.58	0.50	3.28
Smallmouth buffalo	9.98	1.60	36.51	28.14	0.97	1.21	0.50	3.28
River carpsucker	11.06	1.77	21.57	16.62			2.18	14.29
Carp			4.12	3.18				
Channeled catfish	20.00	3.21	7.89	6.08	30.66	38.13	0.32	2.10
White bass	3.58	0.57	2.32	1.79	3.26	4.05		
Largemouth bass	7.01	1.13	0.71	0.56				
Spotted bass								
Warmouth								
Redear sunfish	14.07	2.25					0.28	1.84
Bluegill sunfish	24.38	3.91	2.63	2.02	1.34	1.67	0.47	3.08
Yellowbelly sunfish								
Longear sunfish	0.35	0.06						
White crappie	3.47	0.56	0.80	0.61	1.51	1.88	1.21	7.94
Black crappie								
Drum	1.06	0.17	0.54	0.42				
Totals	623.65	100.00	129.75	100.00	80.41	100.00	15.25	100.00

Table 2. (Continued) Weight and Percentage of Each Species Taken by Gill Nets From Possum Kingdom Lake From December 1958 - October 1959.

Number 100' Nets Month Species	40		10		102	
	September Pounds	September Percent	October Pounds	October Percent	Totals Pounds	Totals Percent
Spotted gar	16.80	3.11	2.74	1.40	45.54	2.17
Longnose gar	203.37	37.77	70.12	35.87	707.57	33.85
Gizzard shad	101.49	18.85	54.72	27.99	595.43	28.49
Smallmouth buffalo	5.27	0.98	6.18	3.16	70.91	3.39
River carpsucker	15.75	2.92	2.06	1.05	144.09	6.90
Carp	1.01	0.19			8.57	0.41
Channel catfish	139.42	25.89	27.58	14.11	232.19	11.10
White bass	10.14	1.88	15.98	8.17	124.44	5.96
Largemouth bass	12.13	2.25	2.06	1.05	46.28	2.21
Spotted bass	1.19	0.22			1.62	0.08
Warmouth bass	0.88	0.17			0.88	0.04
Redear sunfish			1.58	0.81	17.95	0.86
Bluegill sunfish	4.25	0.79			39.72	1.90
Yellowbelly sunfish					0.20	0.01
Longear sunfish					0.35	0.02
White crappie	23.60	4.38	12.11	6.20	48.79	2.33
Black crappie					0.56	0.03
Drum	3.21	0.60	0.37	0.19	5.18	0.25
Totals	538.51	100.00	195.50	100.00	2,090.27	100.00

Table 3. Possum Kingdom Lake Netting Data, December 1958 - October 1959.

Species	Total Number	% of Total	Total Lbs. Weight	% of Weight	Average Length MM	Average Weight Grams
Spotted gar	20	0.85	45.54	2.17	546	1,088.6
Longnose gar	229	9.75	707.57	33.85	690	1,399.3
Gizzard shad	1,124	47.85	595.43	28.49	230	243.0
Smallmouth buffalo	21	0.89	70.91	3.39	323	2,009.4
River carpsucker	134	5.70	144.09	6.90	263	498.7
Carp	5	0.22	8.57	0.41	282	777.8
Channel catfish	129	5.49	232.19	11.10	350	817.4
White bass	236	10.05	124.44	5.96	219	236.3
Largemouth bass	59	2.51	46.28	2.21	288	352.0
Spotted bass	2	0.09	1.62	0.08	240	270.0
Warmouth bass	3	0.13	0.88	0.04	150	130.0
Redear sunfish	67	2.85	17.95	0.86	156	121.0
Bluegill sunfish	168	7.15	39.72	1.90	131	111.3
Yellowbelly sunfish	1	0.04	0.20	0.01	130	85.0
Longear sunfish	1	0.04	0.35	0.02	160	123.0
White crappie	142	6.04	48.79	2.33	180	148.4
Black crappie	2	0.09	0.56	0.03	172	126.0
Drum	6	0.26	5.18	0.25	228	397.0
Totals	2,349	100.00	2,090.27	100.00		

Table 3. (Continued) Possum Kingdom Lake Netting Data, December 1958 - October 1959.

Species	Length Range MM	Weight Range Grams	No. Per 100 Ft. of Net	Lbs. Per 100 Ft. of Net	"K" Range	"K" Average
Spotted gar	430-1000	454-4678	0.20	0.45	---	--
Longnose gar	250-1150	140-8853	2.24	6.94	---	--
Gizzard shad	150-330	70-510	11.02	5.84	1.15-3.00	1.90
Smallmouth buffalo	170-510	230-4167	0.20	0.69	2.50-4.20	3.28
River carpsucker	145-380	190-1418	1.31	1.41	1.80-3.30	2.57
Carp	210-410	200-1559	0.05	0.08	2.20-2.40	2.93
Channel catfish	210-520	145-2892	1.26	2.28	1.10-2.40	1.72
White bass	170-280	90-567	2.31	1.22	1.45-3.20	2.43
Largemouth bass	160-430	80-1616	0.58	0.45	1.90-3.70	2.33
Spotted bass	230-250	260-280	0.02	0.01	1.80-2.10	1.95
Warmouth bass	110-170	100-145	0.03	0.01	3.00-3.00	3.00
Redear sunfish	140-180	95-155	0.66	0.18	1.30-4.00	3.20
Bluegill sunfish	100-150	35-135	1.65	0.39	3.10-5.00	4.07
Yellowbelly sunfish	130-130	85-85	0.01	---	3.80-3.80	3.80
Longear sunfish	160-160	123-123	0.01	---	2.90-2.90	2.90
White crappie	130-220	50-320	1.39	0.48	1.90-3.40	2.61
Black crappie	170-175	118-135	0.02	---	2.40-2.50	2.45
Drum	190-345	165-1247	0.06	0.05	2.10-3.00	2.47
Totals			23.02	20.48		

Table 4. Possum Kingdom Lake Netting Data, November 1, 1955 through October 31, 1956.

Species	Total Number	% of Total	Total Lbs. Weight	% of Weight	Average Length MM	Average Weight Grams
Spotted gar	19	0.91	36.12	2.76	518	680
Longnose gar	36	1.72	143.96	10.98	769	1,918
Gizzard shad	1,646	78.91	812.20	61.97	235	321
Smallmouth buffalo	6	0.29	16.06	1.22	300	1,030
River carpsucker	54	2.58	95.12	7.26	275	655
Carp	3	0.14	2.24	0.17	242	338
Channel catfish	76	3.64	75.48	5.76	293	443
Flathead catfish	1	0.05	1.13	0.08	320	510
White bass	30	1.44	23.02	1.76	240	451
Largemouth bass	38	1.82	53.97	4.11	284	678
Warmouth	3	0.14	1.13	0.08	173	171
Redear sunfish	14	0.68	3.83	0.30	152	118
Bluegill sunfish	96	4.61	23.46	1.79	130	80
Yellowbelly sunfish	12	0.57	2.57	0.20	139	101
White crappie	47	2.26	18.47	1.41	192	235
Black crappie	3	0.14	0.88	0.07	175	134
Drum	2	0.10	1.05	0.08	230	238
Totals	2,086	100.00	1,310.69	100.00		

Table 4. Possum Kingdom Lake Netting Data, November 1, 1955 through October 31, 1956.
(Continued)

Species	Length Range MM	Weight Range Grams	No. Per 100 Ft. of Net	Lbs. Per 100 Ft. of Net	"K" Range	"K" Average
Spotted gar	445-640	624-1531	0.22	0.41	---	--
Longnose gar	470-1100	652-6265	0.41	1.64	---	--
Gizzard shad	180-290	160-482	18.81	9.28	1.90-2.70	2.30
Smallmouth buffalo	220-402	280-2240	0.07	0.18	2.60-3.40	3.20
River carpsucker	200-350	205-1106	0.62	1.09	2.50-2.60	2.52
Carp	220-255	265-380	0.03	0.03	2.40-2.50	2.44
Channel catfish	225-460	115-1843	0.87	0.86	1.30-2.13	1.70
Flathead catfish	320-320	510-510	0.01	0.01	1.57-1.57	1.57
White bass	180-300	200-709	0.34	0.26	2.60-3.50	3.00
Largemouth bass	180-480	102-3289	0.44	0.62	1.55-3.40	2.37
Warmouth	170-175	159-177	0.03	0.01	3.23-3.40	3.29
Redear sunfish	125-180	65-180	0.16	0.04	2.90-3.90	3.30
Bluegill sunfish	100-160	20-140	1.10	0.27	3.00-3.45	3.23
Yellowbelly sunfish	130-156	82-126	0.14	0.03	3.23-4.60	3.92
White crappie	130-253	55-415	0.54	0.21	2.50-2.83	2.67
Black crappie	170-180	128-139	0.03	0.01	2.20-2.90	2.52
Drum	230-230	235-240	0.02	0.01	1.95-1.95	1.95
Totals			23.84	14.96		