Fisheries Bulletin #19
Division of Fisheries
Minor E. Clark, Director

May 1956

INVESTIGATIONS AND MANAGEMENT OF THE DEWEY LAKE FISHERY

By

Ellis R. Carter

Commissioner - Earl Wallace
Department of Fish and Wildlife Resources
Frankfort, Kentucky

Federal Aid to Fisheries, Project F-8-R

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Introduction

Dewey Lake is an 1100 acre impoundment formed by a Corps of Engineers' dam across Johns Creek in Floyd County, Kentucky. It contains 17,200 acre-feet of water at an average depth of 15.6 feet. During the period November 1 to April 1, each year, the lake is lowered five feet and covers 880 acres. During this time the lake contains 12,300 acre-feet at an average depth of 14.0 feet. The lake is 16.8 miles long, and averages approximately 1000 feet in width, with nine major embayments. Normally, it is relatively clear.

The lake was impounded in the spring of 1950, and checks have been made on the fishery by means of rotenone sampling and a general creel census each year since 1951. Rotenone samples have indicated that game fishes have declined both in numbers and weight. The creel census has shown a steady falling off of fishing success to the point where fishing is below a reasonable norm.

In order to determine what factors were causing these conditions, a more intensive study was begun in April, 1954. This study was to include a general creel census, rotenone sampling, and netting and tagging in an effort to estimate the actual numbers of each species present in the lake.

At the end of the first year of study, a part of the problem was believed to be the presence of an overabundance of shad in sizes too large for forage. At that time a program of management was initiated whereby as many as possible of the shad were to be removed selectively by use of rotenone. This was done in March, 1955, and changes brought about as a result of the shad kill were observed by continuation of the same studies that were made in 1954, except that the creel census was more extensive.

1 Ky. Federal Aid Project F-8-R

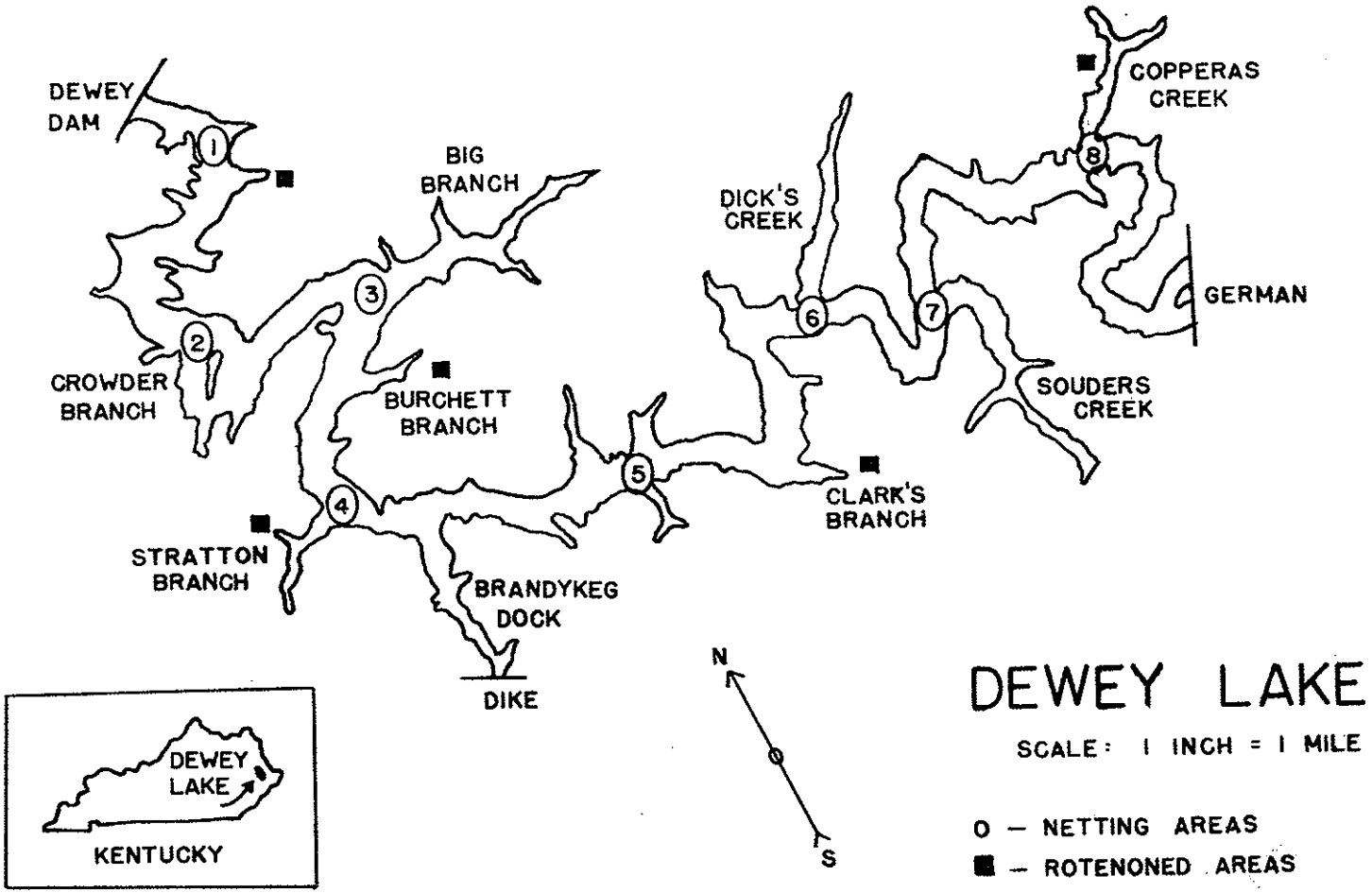


FIGURE 1. MAP SHOWING NETTING STATIONS AND ROTENONE SAMPLING AREAS IN DEWEY LAKE

MATERIALS AND METHODS

Hoop nets, wing nets, and lead nets were used to trap fish for tagging. Eight nets were used in 1954 - four hoop nets, three wing nets, and one lead net. In 1955, five hoop nets and five wing nets were used. Nets were fished in eight stations, each station averaging approximately two miles in length. Nets were operated for three one-week periods in each station, and nets were rotated so that netting operations would be carried on in opposite halves of the lake from week to week.

Netted fishes were tagged with monel metal strap tags and were returned to the lake at a central release point within each station. In larger fishes tags were placed over the left supermaxilla, while smaller ones were tagged in the operculum. Two tags sizes were used. Fishes recaptured in nets were recorded and released at the same central release point each time the station was netted.

Signs were placed at all access points on the lake, notifying the fishermen that the lake contained tagged fishes and requested notification by the fishermen in the event of capture of a tagged fish.

Thompson's modification of Schnabel's (1938) method of estimating fish populations was used and estimations were made following each day's netting, Lagler (1949).

In 1954, the creel census was taken by the Conservation Officer on Dewey Lake. Fishermen were contacted as random license checks were made. The creel census in 1955 was taken by the writer and his assistant. Checks were made on three half-days each week, one day of which was Saturday or Sunday, and four checking routes were followed from three starting points. Any fishermen not actually contacted were counted and included in the census. Actual time required to complete checks was recorded.

All data were recorded on a 3" X 5" card, a sample of which is included in Section Iv. These data were later transferred to International Business Machine cards and the results tabulated by this system.

Five cove areas, totaling 6.6 acres, were sampled by use of rotenone. A 300' X 20' X 1" gill net was used as a stop net to prevent fishes from moving in or out of the cove being sampled.

Rotenone used in the selective poisoning of shad was applied from a plane. The aircraft was equipped with spray booms and a fan-operated pump to apply pressure to the booms. The plane was loaded from a larger mixing tank where emulsifiable rotenone and water were mixed to the proper concentrations to be applied to predetermined areas of the lake.

I NETTING AND TAGGING

In 1954, eight nets were used to trap fish for tagging, all of which were made of wooden hoops and twine. Four hoop nets, three wing nets and one lead net were used. In 1955, five hoop nets and five wing nets were used. Species taken during these studies are listed in Table I.

Netting stations were numbered consecutively from the dam, and stations were netted in the following order: 1, 5, 2, 6, 3, 7, 4, 8. This was done so that netting would be done in opposite halves of the lake in consecutive weeks in an attempt to insure a more or less random distribution of tagged fishes throughout the lake. Each station was netted three times each season or a total of 709 net days in 1954 and 960 net days in 1955. Nets were raised each morning in 1954, and each morning or afternoon in 1955, depending on creel census schedules.

Tables II and III show results of netting in 1954 and in 1955. Data concerning catch per net type is not shown; however, in 1954, 61.0 percent of the fish were taken in hoop nets, 30.5 percent were taken in wing nets and 8.5 percent were taken in the lead net. In 1955, 57.9 percent were taken in hoops and 42.1 percent were taken in wings. Wing nets caught the greater poundage during both seasons. Greater catch in 1955 is due primarily to use of additional nets.

Table I. A List of Species Taken During Experimental Netting and Rotenone Sampling in Dewey Lake.

Longnose Gar	Lepisosteus osseus (Linnaeus)
Gizzard Shad	Dorosoma cepedianum (LeSueur)
White Sucker	Catostomus commersonnii Lacepede
Hogsucker	Hypentelium nigricans (LeSueur)
Redhorse	Moxostoma spp.
Carp	Cyprinus carpio Linnaeus
River Chub	Nocomis micropogon (Cope)
Steelcolored Minnow	Notropis whipplii (Girard)
Common Shiner	Notropis cornutus (Mitchill)
Silverjaw Minnow	Ericymba buccata (Cope)
Bluntnose Minnow	Pimephales notatus (Rafinesque)
Stoneroller	Campostoma anomalum (Rafinesque)
Channel Catfish	Ictalurus punctatus (Rafinesque)
Flathead Catfish	Pilodictus olivaris (Rafinesque)
Black Bullhead	Ameiurus melas (Rafinesque)
Yellow Bullhead	Ameiurus natalis (LeSueur)
Brindled Madtom	Schilbeodes miurus (Jordan)
Northern Pike	Esox lucius Linnaeus
White Bass	Lepibema chrysops (Rafinesque)
Logperch	Percina caprodes (Rafinesque)
Johnny Darter	Etheostoma nigrum (Rafinesque)
Largemouth Bass	Micropterus salmoides (Lacepede)
Kentucky Bass	Micropterus punctulatus (Rafinesque)
White Crappie	Pomoxis annularis Rafinesque
Black Crappie	Pomoxis nigro-maculatus (LeSueur)
Rock Bass	Ambloplites rupestris (Rafinesque)
Bluegill	Lepomis macrochirus Rafinesque
Green Sunfish	Lepomis cyanellus Rafinesque
Longear Sunfish	Lepomis megalotis (Rafinesque)
Brook Silversides	Labidesthes sicculus (Cope)

Of the 1824 fish netted in 1954, 73.7 percent were game fish, and these made up 41.2 percent of the weight. In 1955, game fish represented 69.6 percent of the catch, but poundage rose to 48.0 percent and the average weight per fish was 0.04 pound more than in 1954. Average weights of each of the game fishes, except northern pike, increased, although the comparison for largemouth bass is probably not valid, because of the small sample in 1954.

Pan fish in the 1955 catch also increased in number, weight, and weight per fish. Average weight of food fishes decreased in 1955 as did the percentage representation, although the catch was greater. The group classified here as food fishes may also be termed commercial types, but use of commercial gear is illegal in this lake. The catch of gizzard shad in 1955 was less and the average weight decreased from 0.24 pound to 0.18 pound per fish.

Some of these differences in net catch composition are believed to be directly related to the selective poisoning of Dewey Lake gizzard shad in March, 1955.

Estimations of the numbers of five species of fishes in Dewey Lake were made and the results are shown in Table IV. Carp were not taken in sufficient numbers either year to provide an estimation. Final estimations for 1954 were made on October 8, except flathead catfish, which reached a final estimate on September 24. No tagged bluegills were recaptured in 1954 and no estimation could be obtained.

Note that final estimations for each of the species are lower in 1955 than in 1954. Estimations for 1955 are more consistent and are based on a larger catch.

Of the 220 Kentucky bass tagged in 1954, 5.9 percent were recaptured by fishermen. In 1955, 8.9 percent of the 282 Kentucky bass tagged were taken by fishermen. Only 0.4 percent of the 731 white crappie tagged were recaptured in 1954, and 0.3 percent of the 790 white crappie tagged in 1955 were recaptured by fishermen. In 1954, 0.7 percent of the tagged bluegill were taken by anglers. In 1955, 1.0 percent were caught. In 1954, 1.2 percent of the total number of tagged fish of all species were

Table II. Results of Netting and Tagging in Dewey Lake in 1954

Species	Tagged	Number		Weight		* Avg. Wt.
		No.	%	Wt	%	
Game Fish						
Northern Pike	2	2	0.11	7.86	1.07	3.84
Largemouth Bass		1	0.05	0.02		0.02
Kentucky Bass	220	233	12.77	153.57	20.86	0.66
White Crappie	731	808	44.30	98.61	13.40	0.12
Black Crappie	267	301	16.50	43.32	5.88	0.14
Total	1220	1345	73.74	303.38	41.21	0.23
Pan Fish						
Bluegill	269	294	16.12	25.59	3.48	0.09
Longear Sunfish	6	6	0.33	0.48	0.07	0.08
Total	275	300	16.45	26.07	3.54	0.09
Food Fish						
Channel Catfish		5	0.27	2.30	0.31	0.05
Flathead Catfish	24	27	1.48	297.08	40.35	11.00
Black Bullhead		5	0.27	2.36	0.32	0.47
Redhorse		42	2.30	32.20	4.37	0.77
Carp	52	54	2.96	59.43	8.07	1.10
Total	76	133	7.28	393.37	53.43	2.96
Forage-Trash Fish						
Longnose Gar		1	0.05	2.46	0.33	2.46
Gizzard Shad		45	2.47	10.89	1.48	0.24
Total		46	2.52	13.35	1.81	0.29
	1571	1824	99.98	736.17	99.99	0.40

* All weights are in pounds and decimal fractions of pounds.

Table III. Results of Netting and Tagging in Dewey Lake in 1955

Species	Tagged	Number		Weight		Avg. Wt. *
		No.	%	Wt.	%	
Game Fish						
Northern Pike	3	3	0.13	5.76	0.66	1.92
Largemouth Bass	9	9	0.40	15.88	1.81	1.76
Kentucky Bass	282	332	14.88	221.48	25.24	0.67
White Crappie	790	914	40.97	127.53	14.54	0.14
Black Crappie	264	295	13.22	50.64	5.77	0.17
Total	1348	1553	69.61	421.29	48.02	0.27
Pan Fish						
Bluegill	393	511	22.90	50.79	5.79	0.10
Longear Sunfish		2	0.08	0.14	0.02	0.07
Total	393	513	22.99	50.93	5.80	0.10
Food Fish						
Channel Catfish	1	4	0.18	3.59	0.41	0.90
Flathead Catfish	32	33	1.48	280.11	31.93	8.49
Black Bullhead		9	0.40	3.74	0.43	0.42
Redhorse		66	2.96	67.71	7.72	1.03
Carp	35	37	1.66	47.11	5.37	1.27
Total	68	149	6.68	402.26	45.85	2.70
Forage-Trash Fish						
Shad		16	0.72	2.88	0.33	0.18
Total	1809	2231	99.98	877.36	100.02	0.39

* All weights are in pounds and decimal fractions of pounds.

recaptured by fishermen, while 1.8 percent were recaptured in 1955. Only fishes of harvestable sizes were tagged and considered in the tagging data.

Table IV. Population Estimations for Dewey Lake Fishes in 1954 and 1955

1954	April	May	June	July	August	September	October
Kentucky Bass				2,513	2,473	3,345	3,465
White Crappie		67,807	47,854	64,565	76,862	90,978	96,937
Black Crappie	709	6,307	12,930	23,288	28,728	19,240	20,159
Flathead Catfish					236	303	
1955							
Kentucky Bass		9,659	3,909	2,869	2,158	1,962	
White Crappie	5,258	29,018	57,121	153,447	79,391	52,396	
Black Crappie		4,602	6,517	4,524	4,258	4,820	
Bluegill		20,779	31,433	55,033	66,838	103,087	
Flathead Catfish				323	425	271	

II ROTENONE STUDIES

Five population studies were conducted on Dewey Lake during both 1954 and 1955 in five coves totaling 6.6 acres. The standing crops of 181.2 pounds per acre in 1954, and 72.6 pounds per acre in 1955, as shown in Tables V and VI, are based on this acreage.

One study was made each month, May through September, both years. The same cove was sampled during the same month each year. Since the lake is long and narrow, coves were selected at the extremes of the lake and at selected points between, in an effort to get a representative sample.

A 300' X 20' X 1" gill net was set at the outermost extreme of each cove area so as to effectively block off the cove from the rest of the lake. The cove was then treated with one part per million of powdered derris (5% rotenone). Each species of fish recovered was separated into one-inch size groups and the weight of each fish determined to the nearest 0.01 pound. All findings are based on 100 percent recovery, although total recovery probably was less than 100 percent.

Twenty-six species were present in these studies in 1954, and 25 species in 1955. The white sucker and silverjaw minnow were present in 1955 only. Five species of game fishes were found. One northern pike was taken in 1954 and one white bass, stocked in 1954, was taken in 1955. Four species of pan fish and seven species of food fish were taken; however, the hogsucker and the white sucker were not taken both years. Ten species of forage and trash fishes were identified from the samples in 1954, only nine in 1955.

Average weight of the game fishes decreased from 0.08 pound in 1954 to 0.03 pound in 1955, but percentage representation increased by both number and weight. Average weight of pan fish did not change but here again the percentage representation increased. The decrease in average weight of game fish may be due in part to a greater

Table V. Summary of Five Population Samplings - Dewey Lake - 1954

Species	Number		Weight		Avg. Wt.*	Pounds Per Acre
	No.	%	Wt.*	%		
Game Fish						
Largemouth Bass	454	1.98	32.68	2.73	0.07	4.95
Kentucky Bass	241	1.05	14.06	1.18	0.06	2.13
Northern Pike	1	-	0.50	0.04	0.50	0.08
White Crappie	735	3.21	60.44	5.05	0.08	9.16
Black Crappie	44	0.19	4.84	0.40	0.11	0.73
Rock Bass	2	0.01	0.26	0.02	0.13	0.04
Total	1477	6.45	112.78	9.43	0.08	17.09
Pan Fish						
Bluegill	11,704	51.11	225.23	18.83	0.02	34.13
Longear Sunfish	253	1.10	6.24	0.52	0.02	0.95
Green Sunfish	21	0.09	0.35	0.03	0.02	0.05
Total	11,978	52.30	231.82	19.39	0.02	35.12
Food Fish						
Channel Catfish	13	0.06	3.47	0.29	0.27	0.53
Flathead Catfish	12	0.05	17.30	1.45	1.44	2.62
Yellow Bullhead	10	0.04	0.96	0.08	0.10	0.15
Black Bullhead	575	2.51	2.22	0.19	-	0.34
Redhorse	70	0.31	51.10	4.27	0.73	7.74
Carp	151	0.66	102.06	8.53	0.68	15.46
Hogsucker	1	-	0.01	-	0.01	-
Total	832	3.63	177.12	14.81	0.21	26.84
Forage - Trash						
Brindled Madtom	65	0.28	0.34	0.03	0.01	0.05
Brook Silversides	64	0.28	0.14	0.01	-	0.02
Common Shiner	2	0.01	-	-	-	-
Logperch	8	0.03	0.13	0.01	0.02	0.02
Bluntnose Minnow	14	0.06	0.02	-	-	-
Steelcolored Minnow	16	0.07	0.20	0.02	0.01	0.03
River Chub	3	0.01	0.04	-	-	0.01
Stoneroller	2	0.01	0.01	-	-	-
Johnny Darter	1	-	-	-	-	-
Misc. Minnows	12	0.05	0.03	-	-	-
Gizzard Shad	8427	36.80	673.20	56.30	0.08	102.00
Total	8614	37.60	674.11	56.37	0.08	102.14
Grand Total	22,901	99.97	1195.83	99.98	0.05	181.19

* All weights are in pounds and decimal fractions of pounds.

Table VI. Summary of Five Population Samplings - Dewey Lake - 1955.

Species	Number		Weight		Avg. Wt. *	Pounds Per Acre
	No.	%	Wt*	%		
Game Fish						
Largemouth Bass	622	4.77	17.44	3.63	0.03	2.64
Kentucky Bass	411	3.14	3.84	0.80	0.01	0.58
White Bass	1	0.01	0.05	0.01	0.05	0.01
White Crappie	701	5.38	25.63	5.35	0.04	3.88
Black Crappie	20	0.15	1.46	0.30	0.07	0.22
Rock Bass	3	0.02	0.06	0.01	0.02	0.01
Total	1758	13.48	48.48	10.11	0.03	7.35
Pan Fish						
Bluegill	7201	55.22	142.40	29.71	0.02	21.58
Longear Sunfish	114	0.87	4.37	0.91	0.04	0.66
Green Sunfish	1	0.01	-	-	-	-
Total	7316	56.10	146.77	30.62	0.02	22.24
Food Fish						
Channel Catfish	6	0.04	3.51	0.52	0.42	0.38
Flathead Catfish	9	0.07	3.49	0.73	0.39	0.53
Yellow Bullhead	24	0.18	1.61	0.34	0.08	0.24
Black Bullhead	20	0.15	0.91	0.19	0.05	0.14
Redhorse	38	0.29	26.00	5.42	0.68	3.94
Carp	47	0.36	39.96	8.34	0.85	6.05
White Sucker	3	0.02	0.13	0.03	0.04	0.02
Total	147	1.13	74.61	15.57	0.51	11.30
Forage-Trash						
Brindled Madtom	114	0.87	0.72	0.15	0.01	0.11
Brook Silversides	48	0.37	0.15	0.03	-	0.02
Log Perch	42	0.32	0.36	0.08	0.01	0.05
Bluntnose Minnow	12	0.09	0.01	-	-	-
River Chub	2	0.02	0.01	-	0.01	-
Stoneroller	1	0.01	-	-	-	-
Johnny Darter	3	0.02	-	-	-	-
Silverjaw Minnow	1	0.01	-	-	-	-
Misc. Minnows	22	0.17	0.16	0.03	0.01	0.02
Gizzard Shad	3574	27.41	208.06	43.40	0.06	31.52
Total	3819	29.29	209.47	43.70	0.05	31.74
Grand Total	13,040	99.97	479.33	99.98	0.04	72.63

* All weights are in pounds and decimal fractions of pounds.

spawn of these species in 1955 than in 1954. Average weight of food fishes increased from 0.21 pound per fish in 1954 to 0.51 pound per fish in 1955.

The percentage representation for forage and trash fishes decreased from 56.4 percent, by weight, in 1954, to 43.7 percent in 1955. This last group was accounted for primarily by gizzard shad, which decreased from 56.3 percent by weight, in 1954, to 43.4 percent in 1955. Much of this decrease is attributable to the selective poisoning of shad described in Section V. Gizzard shad were killed in large numbers in March, 1955, but they spawned heavily later that spring, and grew rapidly. Shad were selectively poisoned again in September, 1955, because of the heavy spawn and rapid growth. Average weight of forage and trash fish decreased from 0.08 pound per fish in 1954 to 0.06 pound per fish in 1955.

The selective poisoning of shad was probably instrumental in causing a decrease from 102.0 pounds per acre of shad in 1954 to 31.5 pounds per acre in 1955. This is considered significant, even though a decrease in the standing crop of other species occurred.

Table VII. Difference in Percentage Representation and Average Weights of Four Classes of Fishes, as Shown by Population Samplings Taken in 1954 and in 1955.

Class	Game	Pan	Food	Forage Trash
Number				
Increase in 1955	7.1%	3.8%	-	-
Decrease in 1955	-	-	2.5%	8.3%
Weight				
Increase in 1955	0.7%	10.2%	0.8%	-
Decrease in 1955	-	-	-	12.7%
Average Weight				
Increase in 1955	-	-	0.30 lb.	-
Decrease in 1955	0.05 lb.	-	-	0.03 lb.

III SUCCESS OF REPRODUCTION

Young-of-the-year of bass (largemouth and Kentucky), white and black crappie, and bluegill were separated from data taken on population studies and are presented in graphic form on a per-acre basis in Figure II. Bass and crappie of three inches or less and bluegill of two inches or less were considered young-of-the-year.

Figure II shows that young-of-the-year of bass were more abundant in the August sample in 1954. They were more numerous in the June sample in 1955, and declined steadily thereafter. This decline is partly due to growth out of the size classification, and also due to utilization of young bass by larger predators. Much greater numbers of bass were present in the 1955 samples than in the 1954 samples.

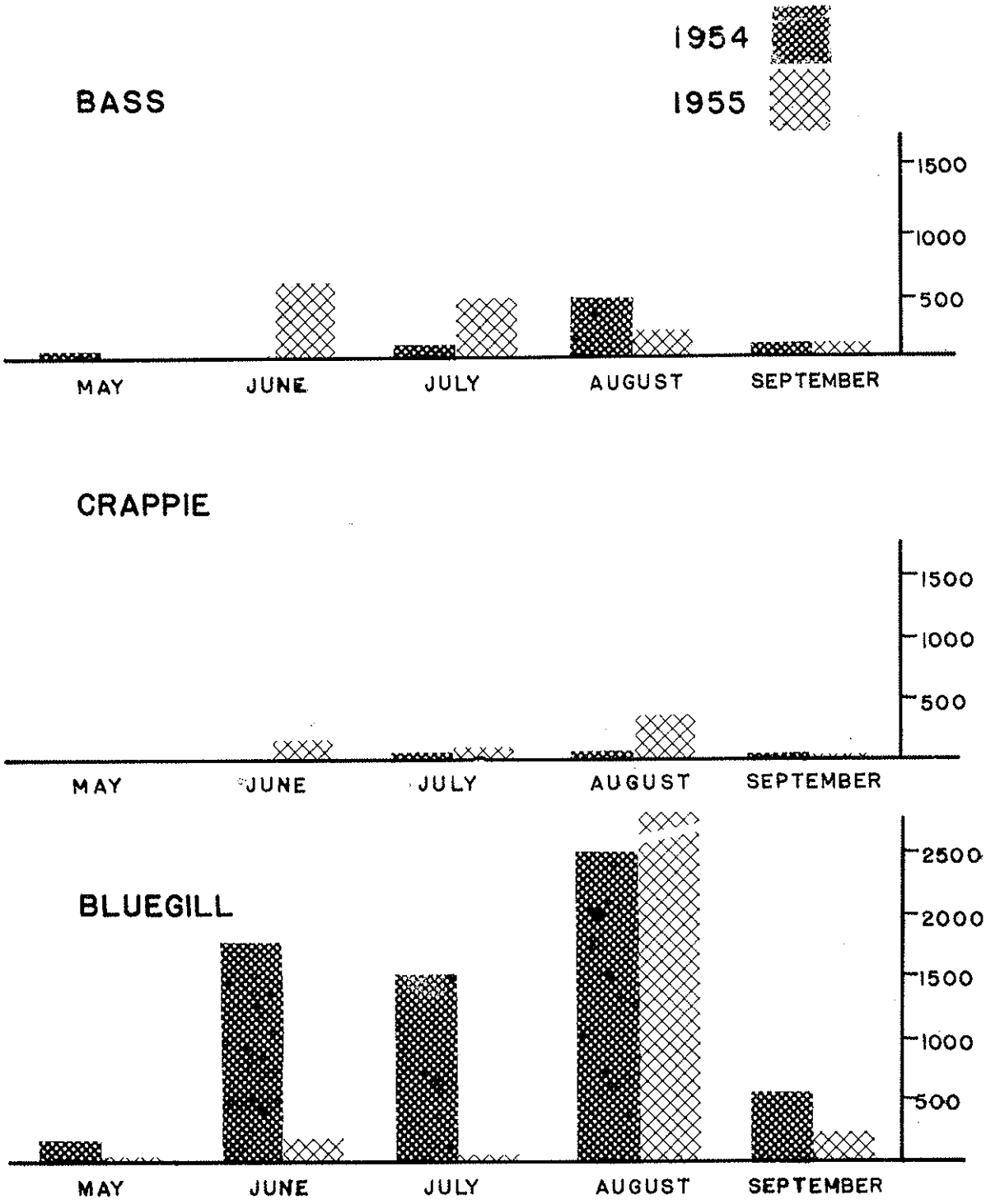
More young crappie were present in 1955 than in 1954. They were absent in the May samples both years, probably because spawning occurred after this time. Crappie were absent in the June sample in 1954, but 154 per acre were present in June 1955. Crappie in the August, 1955, study numbered 366 per acre, as compared to 28 in the sample in August, 1954.

Bluegill were more abundant in the 1954 samples, except in August. This is probably due to loss of bluegill in the selective poisoning operation, and might have brought about a heavy spawn, causing large numbers (4241) to show up in the August sample in 1955.

IV CREEL CENSUS

In 1954, the creel census was taken by the Conservation Officer on Dewey Lake as routine license checks were made. A total of 351 fishermen were checked. Of this number 279 were using live bait and 72 were using artificial bait. These fishermen fished 918.75 hours and expended $1054.05, an average cost of $3.00 per trip. Those checked anticipated making an average of 27.2 trips per year.

FIGURE 11. NUMBERS OF YOUNG-OF-THE-YEAR PER ACRE



Game fishes taken by the fishermen averaged 0.4 pound per fish, pan fish averaged 0.1 pound, and food fish averaged 0.7 pound. The average weight of all fishes taken in 1954 was 0.3 pound per fish.

Table VIII shows the catch of fishermen checked in fish per hour and fish per trip, by species. Also given is the percent of number and weight each species contributed to the catch in 1954. Bass made up almost 50 percent by weight of the total poundage of the creel. Crappie accounted for 33 percent of the fish taken. Fishermen averaged taking slightly over one-half pound of fish per trip, or 1.8 fish. Panfish were taken at the rate of only 0.03 pound per trip. Since catch-ability is usually high, lack of interest in these species is indicated, probably because of their small size in this impoundment in 1954.

The creel census in 1955 was taken by the writer and his assistant on a predetermined schedule. Fishermen were contacted from a boat as in the previous year. The lake is long and narrow and censusing was alternately begun at the dam, the headwaters, and the boat dock, located near the midpoint of the lake. Since the censusing route could lead up or down the lake from the midpoint, four routes were followed from the three starting points. This gave assurance that different starting points would be used on each of the three days in the week when the census was taken. Fishermen were contacted three half-days each week, one of which was Saturday and Sunday. The week-end day was alternated in successive weeks, and censusing was done in mornings one week, afternoons the next.

A total of 2094 fishermen, 1774 males and 320 females, were checked during 73 days, or 146.8 hours of actual census-taking. Also, 2160 fishermen were counted but not interviewed during this time. On the basis of a 12-hour fishing day during the 24 week study period, total fishing time is estimated to be 58,420.1 fisherman hours. Thus 32,715 fish, representing 29.7 fish per acre, or 4.8 pounds per acre, were estimated to have been taken by fishermen during the period 20 April to 28 September 1955. The 2094 fishermen spent $4742.09, an average cost of $2.26 per fisherman, or $1.17 per fish.

Table VIII. Average Catch of 351 Fishermen on Dewey Lake During 1954

Species	No. of Fish Per Hour	No. of Fish Per Man Per Trip	Total Number No.	Total Number %	Total Weight Wt.	Total Weight %	Average Weight *
Game Fish							
Bass			60	9.39	99.50	49.88	1.66
Northern Pike			1	0.16	2.27	1.14	2.27
Crappie			420	65.73	65.78	32.97	0.16
Total	0.48	1.37	481	75.28	167.55	83.99	0.35
Pan Fish							
Sunfish			129	20.19	10.52	5.27	0.08
Total	0.14	0.37	129	20.19	10.52	5.27	0.08
Food Fish							
Catfish			5	0.78	1.13	0.56	0.23
Suckers			4	0.63	3.36	1.68	0.84
Carp			20	3.13	16.93	8.49	0.85
Total	0.03	0.08	29	4.54	21.42	10.73	0.74
All Species	0.70	1.82	639	100.01	199.49	99.99	0.31

* All weights are in pounds and decimal fractions of pounds.

Table IX. Average Catch of 2094 Fishermen on Dewey Lake During 1955.

Species	No. of Fish		Total Number		Total Weight		Average Weight *
	Per Hour	Per Man Per Trip	Wt.	%	Wt.	%	
Game Fish							
Bass	0.04	0.14	296	7.38	124.32	19.65	0.42
Crappie	0.17	0.56	1178	29.36	153.14	24.21	0.13
Rock Bass	-	-	3	0.07	0.42	0.07	0.14
Total	0.21	0.71	1477	36.81	277.88	43.92	0.19
Pan Fish							
Bluegill	0.30	1.03	2149	53.56	214.90	33.97	0.10
Sunfish	0.02	0.06	127	3.17	10.16	1.61	0.08
Total	0.32	1.09	2276	56.73	225.06	35.57	0.10
Food Fish							
Channel Catfish	-	0.01	16	0.40	14.40	2.28	0.90
Flathead Catfish	-	0.01	19	0.47	24.70	3.90	1.30
Bullheads	0.02	0.05	115	2.87	11.50	1.82	0.10
Suckers	-	-	8	0.20	6.40	1.01	0.80
Carp	0.01	0.05	101	2.52	72.72	11.49	0.72
Total	0.04	0.12	259	6.46	129.72	20.50	0.50
All Species	0.56	1.92	4012	100.00	632.66	100.01	0.16

* All weights are in pounds and decimal fractions of pounds.

These fishermen estimated making an average of 10.6 trips during the year.

Table IX shows the average rate at which anglers caught fish in Dewey Lake in 1955. The average rate of catch for all species in 1955 is slightly lower than the catch rate for 1954. This may be due to the more thorough and exact censusing methods used in 1955. The lower rate is most evident in catch of game fish, since other fishes were taken at a greater rate in 1955.

The average weights of fishes in the creel in 1955 may also be noted in Table IX, and these show a lower average for game fishes and food fishes than that for 1954, shown in Table VIII. Pan fish averaged slightly higher in average weight. Shown also in these tables is the percentage each species contributed to the total catch. Bass made up 19.7 percent of the weight of the catch and crappie accounted for 24.2 percent. Thus game fish made up only 43.9 percent of the total catch in 1955 as compared with 84.0 percent in 1954. The percent of pan fish in the catch is greater in 1954, while the catch of food fish is about the same for both years.

Table X gives the rate of catch and total catch for each month of the 1955 season. This table illustrates a greater rate of catch in the early spring months. A catch of 0.1 pound per hour is based on an overall average of 0.2 pound per fish.

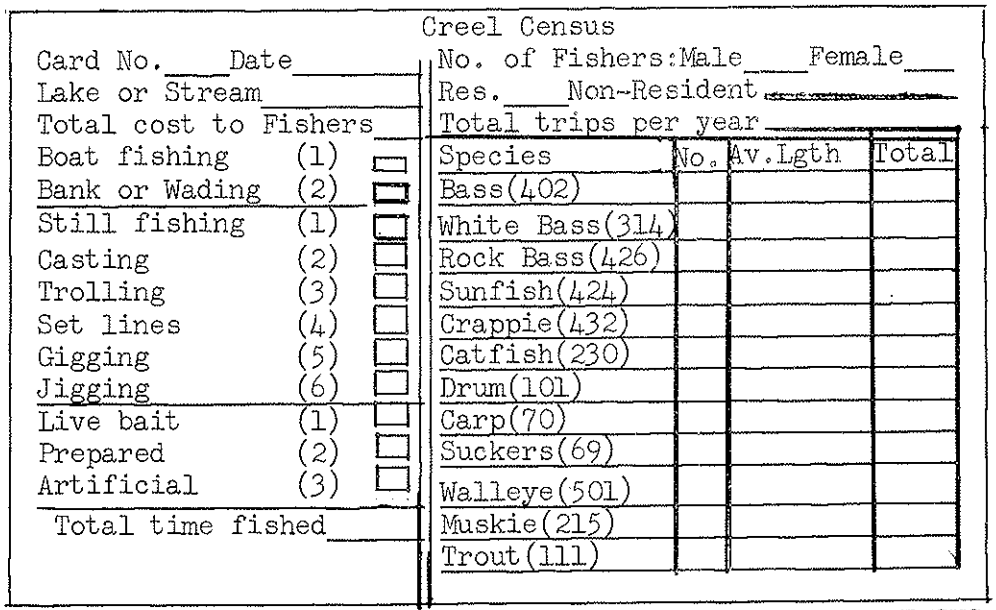
In Table XI the results of the various methods of fishing are compared, and this table shows greater success by still-fishing from a boat with live bait. The major portion of the catch by this method is represented in bluegill and crappie, although more bass were caught by this method than casting with artificial bait. Note also that more crappie were caught from a boat than from the bank.

Of the types of bait used, live bait was responsible for a greater catch, with 2.1 fish per fisherman, while users of artificial bait caught 0.4 fish per fisherman, and those using prepared bait were less successful. Persons fishing from a boat caught 2.0 fish per fisherman, while those fishing from the bank caught 1.8 fish per fisherman. Still-fishing resulted in a catch of 2.0 fish per angler, casting yielded 0.5 fish per angler, and other methods were less successful.

Table X. Total Catch of 2094 Fishermen on Dewey Lake for the Months April Through September - 1955.

Month	Total Catch	Total Time (Hrs.)	Fish Per Hour	Wt. * Per Hour	Number Fishers	Fish Per Man Per Trip	Weight Per Man Per Trip
April	951	908.9	1.05	0.17	258	3.69	0.59
May	1096	2337.5	0.47	0.08	725	1.51	0.24
June	551	1246.5	0.44	0.07	390	1.41	0.23
July	542	813.8	0.67	0.11	245	2.21	0.35
August	298	586.2	0.51	0.08	150	1.99	0.32
September	574	1223.9	0.47	0.08	326	1.76	0.28
Total	4012	7116.8	0.56	0.09	2094	1.92	0.31

* All weights are in pounds and decimal fractions of pounds.


Creel Census

Card No.___ Date_____
Lake or Stream_____
Total cost to Fishers_____
Boat fishing (1) ☐
Bank or Wading (2) ☐
Still fishing (1) ☐
Casting (2) ☐
Trolling (3) ☐
Set lines (4) ☐
Gigging (5) ☐
Jigging (6) ☐
Live bait (1) ☐
Prepared (2) ☐
Artificial (3) ☐
Total time fished_____

No. of Fishers: Male___ Female___
Res.___ Non-Resident___
Total trips per year_____

Species	No.	Av. Lgth	Total
Bass(402)			
White Bass(314)			
Rock Bass(426)			
Sunfish(424)			
Crappie(432)			
Catfish(230)			
Drum(101)			
Carp(70)			
Suckers(69)			
Walleye(501)			
Muskie(215)			
Trout(111)			

FIGURE III. SAMPLE OF CARD USED FOR COLLECTING CREEL CENSUS DATA ON DEWEY LAKE IN 1955.

Table XI. Total Catch of 2094 Fishermen on Dewey Lake by Type of Fishing - 1955

Species	Bait			Kind		Method			
	Live Bait	Arti-ficial	Pre-pared	Boat	Bank or Wading	Still Fishing	Cast-ing	Trol-ing	Set Lines
Bass	211	84	1	210	86	212	82	2	
Rock Bass	3			1	2	3			
Crappie	1155	23		922	256	1151	26	1	
Game Fish	1369	107	1	1133	344	1366	108	3	
Bluegill	1965	172	12	916	1224	1872	277		
Sunfish	116	5	6	46	81	116	11		
Pan Fish	2081	177	18	962	1305	1988	288		
Channel Catfish	15		1	15	1	14			2
Flathead Catfish	19			11	8	16			3
Bullheads	114	1		27	88	114	1		
Suckers	7		1	1	7	8			
Carp	86	1	14	31	70	90	4		7
Food Fish	241	2	16	85	174	242	5		12
All Species	3691	286	35	2180	1823	3596	401	3	12

V SELECTIVE POISONING OF SHAD

Preliminary to the selective rotenoning of gizzard shad, a test section of Dewey Lake was poisoned with 0.10 part per million of 5 percent emulsifiable rotenone in November, 1954. This concentration was used successfully by Bowers (1955) on a 70 acre lake in Daviess County, Kentucky, during 1954. The test cove contained four surface acres at an average depth of 8.4 feet, or 33.3 acre feet. Rotenone was applied over the surface at the rate of 0.3 pound per acre foot, or a total of 8.7 pounds in the test area.

The test application was begun at noon and completed in one hour. Surface temperature was 53°F. Shad began to surface within one hour and the area remained toxic for 24 hours. The only other species affected were small bluegill and brook silversides. The concentration of 0.10 ppm was believed adequate and no other concentrations were tested.

During the winter of 1954-55, the lake was ostensibly divided into 17 sections of approximately one mile each, and five series of depth soundings were made across the lake within each section. Later some sections were combined, resulting in eight areas.

Acreage of each area was computed by use of a Planimeter and the volume of water in acre feet computed.

The aerial spraying was done by a commercial crop duster. The plane was a Piper Super Cub with a copper spray boom mounted under the wing on each side. Each boom had twelve nozzles, to which pressure was applied by a fan-operated pump activated by air flow and propwash. The rotenone solution was held in an 80 gallon tank mounted inside the plane just behind the pilot. The plane was loaded from a large mixing tank by use of a centrifugal pump.

The spray boom on the plane was adjusted to discharge 0.5 gallon of chemical per acre. Enough chemical was put into the plane's tank to cover a given area. Boats clearly marked in white were used to delineate between areas. Some areas required that

water be added to the chemical in order to treat the area properly.

Jet nigrosine was added to the rotenone solution in order to aid the pilot in discerning treated and untreated sections within an area. Insufficient time was allowed for this material, which had been pulverized with a mortar and pestle, to go into solution, with the result that the boom nozzles on the plane became clogged. Use of nigrosine was discontinued after the first run; however, the milky color produced by rotenone mixing with water was sufficient for the pilot to detect sprayed areas.

Three coves were set up as sample areas with two men assigned to pick up and weigh the shad killed in each area, for use as an index to the total kill. This endeavor was unsuccessful, because only an insignificant number of poisoned fish surfaced immediately. Also, the low temperature of the water and the resulting slow rate of decomposition retarded bloating and subsequent surfacing.

Three hundred fifty gallons of emulsifiable rotenone (Chem Fish) were sprayed from the plane in a two-day period starting March 29, 1955. One drum of rotenone was damaged in shipment and failed to arrive, and attempts to use powdered rotenone resulted in clogged spray nozzles so that use of the plane had to be discontinued. Treatment of the remaining areas was completed on March 31, 1955. Four hundred pounds of powdered rotenone mixed with water were put out from three boats equipped with centrifugal pumps and garden hoses.

The lake was moderately turbid during the entire period of spraying. Surface water temperature was 47°F. to 49°F., the first day, 52°F., the second and third days. On April 1, 1955, water hardness was 39 ppm, alkalinity was 31 ppm and turbidity was 90 ppm. The pH was 7.38. Turbidity had increased to 130 ppm on April 5, other characteristics having remained relatively constant.

One 12" Kentucky bass, one 6" largemouth bass and two yellow bullheads were observed to have been killed by the poison. Bluegill were killed at the rate of approximately one bluegill to 15 shad in all sections. Several hundred carp were killed in shallow areas. No spectacular numbers of shad were seen, but they were

observed to struggle and disappear beneath the surface continually. Shad were observed to be dying as late as April 22, 1955. Hundreds of minnows were killed.

Fishing was successful in some quarters over the week-end of April 2 and 3, 1955. During the next month fishing was reported to have been better than it had been since impoundment.

Shad spawned heavily in May and large numbers of forage-size shad were available to the predators as forage. Fishing success decreased from 1.05 fish per hour in April to 0.47 fish per hour in May. These young shad grew rapidly, however, and by September the greater portion of young-of-the-year shad were five inches in length.

Since they were useless as forage, shad were killed by strip poisoning in September, 1955, without harm to game fishes. This method involves a solution of two gallons of emulsifiable rotenone mixed with 20 gallons of water, put out from a boat in strips 30 to 50 feet apart. The solution is dispensed from containers in the boat by means of a venturi tube attached to the anti-cavitation fin of an outboard motor and adjusted so that the venturi is just behind the propeller. This attachment is manufactured for use as an automatic boat bailer, and is available commercially.

SUMMARY

Thirty species of fishes were taken by netting and rotenone sampling on Dewey Lake in 1954 and 1955. Six were game species, four were pan species, eight were food species, and twelve were forage and trash species, the last category including ten species of minnows.

In 1954, 1824 fish were netted, and 1571 fish of eight species were tagged. These fishes weighed 736.2 pounds, an average weight of 0.4 pound per fish. Of this weight, game fish represented 41.2 percent; panfish 3.5 percent; food fish 53.4 percent; and forage and trash fish 1.8 percent.

In 1955, 2231 fish were netted and 1809 fish of nine species were tagged. These fishes weighed 877.4 pounds, an average weight of 0.4 pound per fish. Game fish

made up 48.0 percent of the weight; panfish 5.8 percent; food fish 45.9 percent; and forage and trash fish 0.3 percent of the total weight. A greater catch in 1955 is probably due to use of additional nets.

Population estimations for four species of fishes in 1954 and five species in 1955 were made by use of Thompson's modification of Schnabel's method, (Lagler, 1949). In 1954, final estimates showed Kentucky bass to number 3,465; white crappie 96,937; black crappie 20,159; and flathead catfish 303. In 1955, final estimates were: Kentucky bass 1,962; white crappie 52,396; black crappie 4,820; bluegill 103,087; and flathead catfish 271. These estimates were for harvestable size fishes only.

Tagged fishes recaptured by fishermen represented 1.2 percent of the number tagged in 1954, and 1.8 percent of those tagged in 1955.

Five coves, totaling 6.6 acres, were sampled in 1954 and in 1955 by use of rotenone. A total of 22,901 fish, weighing 1195.83 pounds, were taken during 1954. The average weight of all species was 0.05 pound per fish. The standing crop was 181.2 pounds per acre. Game fish made up 9.4 percent, panfish 19.4 percent, food fish 14.8 percent, and forage and trash fish 56.4 percent of the total weight of the combined samples.

In 1955, 13,040 fish were taken in rotenone samples, weighing 479.33 pounds — an average weight of 0.04 pound per fish. Game fish made up 10.1 percent of the total poundage, panfish 30.6 percent, food fish 15.6 percent, and forage and trash fish 43.7 percent. The standing crop was found to be 72.6 pounds per acre in 1955.

A study of young-of-the-year bass showed that these fish were more numerous in the August sample in 1954 and in the June sample in 1955. Crappie were more numerous in the 1955 samples, and bluegill were more numerous in the 1954 samples, except in August.

A creel census was taken by a Conservation Officer in 1954 and by the writer and his assistant in 1955. In 1954, 351 fishermen were contacted, who caught 639 fish weighing 199.5 pounds. The average weight was 0.3 pound per fish. Bass made up 49.9

percent of the catch and crappie 33.0 percent. The rate of catch was 0.7 fish per hour.

In 1955, 2094 fishermen were contacted. They caught 4012 fish, weighing 632.7 pounds. The average weight was 0.16 pound per fish. Fish were taken at an average rate of 0.6 fish per hour. Game fish made up 43.9 percent of the catch, pan fish 35.6 percent, and food fish 20.5 percent by weight.

In 1955 fish were taken at the highest rate in April - 1.1 fish per fisherman-hour. The lowest rate was 0.4 fish per hour in June. More fish were caught while still-fishing from a boat with live bait than by any of the other methods used. Fishermen removed 29.7 fish per acre from Dewey Lake, during the period 20 April to 28 September, 1955, according to census data.

Shad were selectively rotenoned in March, 1955, by aerial and boat spraying. The reduction of the standing crop of gizzard shad from 102.0 pounds per acre in 1954 to 31.5 pounds per acre in 1955 was probably brought about by this operation. Average weight of shad in population samplings decreased from 0.08 pound in 1954 to 0.06 pound per fish in 1955. The percent of the total weight made up in game fish increased in 1955 both in the netting and rotenone samples. The average catch of game fish decreased in 1955, while the catch rate for pan fish and food fish increased. Most of the young-of-the-year shad had reached a length of five inches by September, 1955, and were poisoned again at that time.

CONCLUSIONS

The number of fish in the netting sample was greater in 1955 than in 1954, but the catch per net day was less, so that use of two additional nets probably accounts for the greater catch in 1955.

The percentage reprsentation, by number, of game fish in the netting sample decreased in 1955, while the representation by weight increased. This would seem to

indicate a decline in numbers or movement of game species, or a greater harvest by fishermen, and an increase in average weight. There was an actual increase in average weight for each of the game species in 1955, except northern pike.

Representation of pan fish in the net catch increased in 1955 by both number and weight, and the average weight of this group was greater. The decrease in average weight of food fish is primarily attributable to a decrease in the average weight of flathead catfish.

According to the reports of fishes tagged in 1955 and recaptured by fishermen, the rate of catch of all species increased and the increase in catch rate was greater for Kentucky bass than for any other species.

Netting was a valuable part of the research on this lake, and served several purposes in an evaluation of the fishery. It was especially valuable in that it afforded a comparison of the fishery by a consistent method before and after the selective poisoning of shad. This consistency is illustrated by the almost identical list of species taken by nets during the two years. In addition to several relationships within the fishery shown in net catch tables, a great deal of additional information was made possible by netting, including population estimations, percentage of harvest data and age and growth studies.

Although the percentage representation of game fishes increased by both number and weight, the average weight of this group decreased in 1955, according to rotenone studies. This is probably due to a greater spawn of game fishes, noticeable in the data concerning success of reproduction. This is not shown in netting samples, since fingerling and fry escape through the meshes of the nets. The tendency of nets to catch larger fish would account for failure of netting data to show an increase in percentage representation of game fish by number in 1955, while rotenone studies do show an increase.

The percentage representation of pan fish increased by both number and weight in 1955 according to rotenone studies, in agreement with netting data.

Average weight of food fishes increased in 1955, according to population samples taken by use of rotenone.

The standing crop, average weight, and percentage representation by both number and weight of gizzard shad, and the entire trash fish group, decreased in 1955, according to rotenone studies. The success of the selective shad kill is reflected in the fact that gizzard shad represented 64.9 percent of the decrease in standing crop of forage and trash fishes. This decrease in standing crop is considered significant even though the standing crop of other species declined also.

Benefits of rotenone samples in the study of this fishery were many, especially for comparison of success of reproduction and standing crop before and after the selective poisoning of shad. Results of rotenone sampling are not directly comparable with netting results, although percentage representation and average weights did follow similar trends in the two study methods, as used here. Comparison of results from year to year affords the best use of rotenone study data. Shad are easily killed by rotenone, and this may account for large numbers of this species occurring in population samples, even though a stop net is used, as in these studies. Other benefits of rotenone studies include a source of fishes for age and growth study and a check on reproduction of stocked fishes. White bass, stocked in April, 1954, produced spawn in Dewey Lake which were taken in a rotenone study in August, 1955.

According to the results of the creel census on Dewey, average weights of game fish and food fish decreased in 1955, while average weight of pan fish did not change. Game fish made up a greater representation of the total catch in 1954 than in 1955. Still fishing from a boat with live bait was the most rewarding of the fishing methods used, in 1955. Fishermen caught fish at a greater rate in 1954 than in 1955.

It is believed that the creel census is one of the best methods of determining the status of a fishery, since it deals directly with the catch. However, different routines and different census takers were employed in taking creel census

during the years considered in this paper, and results might not be conclusive. For instance, gross observation and contact with fishermen seemed to indicate to the writer that the catch was greater in 1955, after the selective poisoning of shad, but creel census figures show the catch was greater in 1954.

Many of the changes in the Dewey Lake fishery shown by comparative studies in 1954 and 1955 are believed to be attributable to the selective poisoning of shad and each change has been pointed out in the section concerning that phase. One additional effect is the increased growth of young-of-the-year shad in 1955, necessitating their removal by strip poisoning in September of that year. This method is quite effective, and it is the belief of the writer that it might be effective in selective poisoning of shad without an initial aerial spraying being required.

Strip poisoning is less expensive than aerial spraying, since it requires fewer personnel, is less time consuming, and does not require a pilot or plane. Additional benefits might be obtained by strip poisoning two or more times during a given year.

ACKNOWLEDGEMENTS

The writer wishes to thank Bernard T. Carter for planning and supervising field work and for help in preparation of the manuscript. Mayo Martin and James R. Charles conducted the population samplings. Many thanks also to Douglas Boren for assistance in every phase of the work and to Luther Renaker and Lewis Gerow for their help in the field. Thanks to Mercer Peters for his help in planning the selective shad kill, and to all those who helped in carrying out this phase. The writer also acknowledges the fine work of Miss Lucille Stewart and Mrs. Elizabeth Sutherland in typing the manuscript.

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Reprinted May 1963