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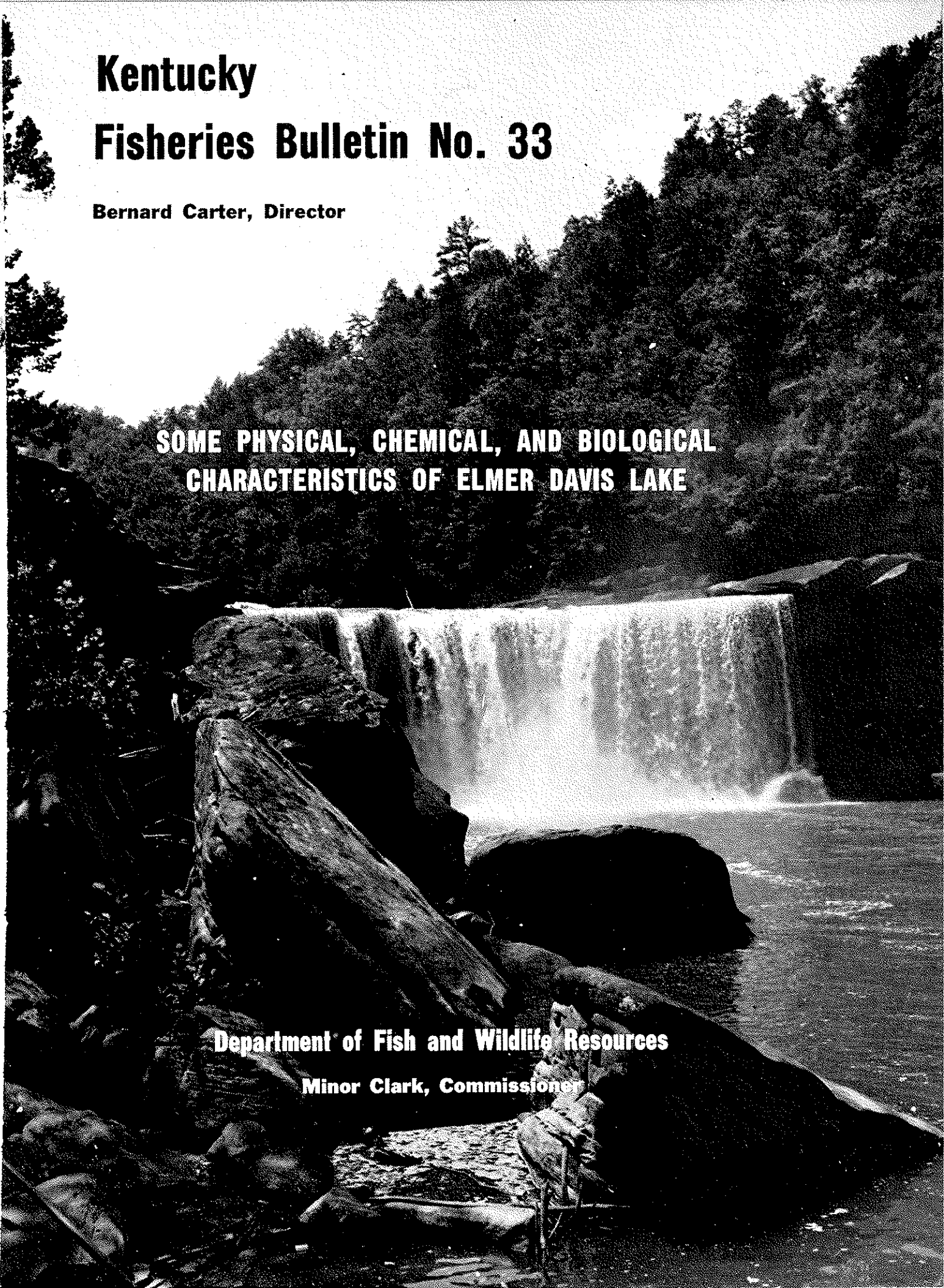

SOME PHYSICAL, CHEMICAL, AND BIOLOGICAL CHARACTERISTICS OF ELMER DAVIS LAKE

Department of Fish and Wildlife Resources

Minor Clark, Commissioner

SOME PHYSICAL, CHEMICAL, AND BIOLOGICAL

CHARACTERISTICS OF ELMER DAVIS LAKE

By

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ABSTRACT

Physical, chemical, and biological studies were conducted at Elmer Davis Lake from 1958 through 1964.

A bathymetric map of the lake is presented. Other physical data are given which include surface area, shoreline mileage, volume, and mean and maximum depth. Mean monthly temperature profiles are presented. Stratification was usually evident by mid-May when the thermocline extended from 7 to 15 feet. Fall overturn was complete by early December.

Mean monthly dissolved oxygen profiles show this characteristic to be present in amounts above 4 ppm to a depth of 10 feet during all sampling periods. Less than 2 ppm were found in the lower depths during June, July, August, and September. Annual maximum, mean, and minimum values are given for total alkalinity, total phosphates, pH, and free carbon dioxide.

Population studies indicated an improving fish population from 1960 to 1964. The average standing crop increased from 36 pounds per acre in 1960 to 131 pounds per acre in 1964. There were approximately 40 pounds per acre more fish of a size desirable to the angler in 1964 than there were in 1960.

Creel survey studies indicated an increasing harvest from 1960 to 1964. There were approximately 35 pounds per acre more fish harvested in 1964 than were creeled in 1960.

The fertilization studies indicated a substantial increase in the quality and quantity of the fishery during the years when an inorganic fertilizer (20-20-5) was applied at the rate of 40 pounds per acre per application.

INTRODUCTION

Elmer Davis Lake is a 140-acre impoundment located in Owen County in the Outer Bluegrass Physiographic Region of the state. It was built in 1958 and opened to public fishing in 1960. This report includes the results of the studies conducted on the lake from 1958 through 1964. The physical and chemical studies were conducted from 1958 through 1963, fish population studies from 1960 through 1964, creel survey studies from 1959 through 1964, and fertilization studies during 1963 and 1964. The stocking record was as follows:

DATE	SPECIES	SIZE	NUMBER
1/27/58	Bluegill	4 - 6"	3,750
5/4/58	Walleye	Fry	1,044,000
5/21/58	Largemouth bass	1"	20,000
10/21/59	Channel catfish	Fingerling	1,000
10/21/59	Channel catfish	3 - 5"	200
12/16/60	Channel catfish	3 - 4"	1,000
11/8/61	Channel catfish	3 - 4"	1,000
10/11/62	Channel catfish	4"	4,000
4/11/63	Channel catfish	4 - 5"	3,000
10/17/63	Channel catfish	Fingerling	6,000
8/28/64	Channel catfish	3"	6,900
3/8/65	Channel catfish	6 - 7"	500
11/66	Channel catfish	4 - 7"	2,000

METHODS

Physical

The basic outline of the bathymetric map, presented in Figure 1, was made from an aerial photograph. The depths and contour intervals were determined using a Raytheon echo sounder.

Temperature profiles were recorded monthly with a Whitney thermometer, near the dam, at the point of greatest depth. Temperatures were taken in one-foot decrements and recorded at every 0.5° F. change.

Chemical

Dissolved oxygen profiles were determined monthly using the modified Winkler method. Samples for this characteristic were collected every five feet to a depth of 20 feet, and then every 10 feet to the bottom.

Total alkalinity, pH, free carbon dioxide, and total phosphate determinations were made from monthly samples collected as described above. All sampling was done near the dam at the point of greatest depth. The amount of free CO_2 present was determined by nomograph using known quantities of pH and alkalinity. The values used in this report are an average of the results obtained from samples collected at the surface, middle and near-bottom.

Soil samples were taken from the watershed with a soil auger which sampled to a depth of six inches. These samples were taken in proportion to the amount of specific types of soils present in the watershed. Analyses of these samples were made by the University of Kentucky Soils Laboratory.

Biological

Population studies were conducted each year in pre-selected cove areas. These areas were measured to the nearest tenth of an acre by the plane table method. At approximately 7:00 a.m., a block net measuring 300' x 20' x 1" (bar measure) was placed across the mouth of the cove to be sampled. Emulsifiable rotenone (Chem-Fish Regular) was applied with a venturi-type bailer at the rate of 1 ppm (0.05 ppm actual rotenone). All fish that surfaced in the sample area within 60 hours were picked up, sorted to species, counted, measured to the nearest inch, and weighed.

A creel survey was conducted each year during a seven-month period from April through October with the exception of 1959, when a 10-day intensive survey was conducted from February 1 through 10. The survey was taken during pre-selected two-hour periods between 7:00 a.m. and 7:00 p.m. Each week, one weekday and one weekend day were sampled. The days and time periods sampled were rotated each week until the total time surveyed amounted to 58 days and included 2-hour periods for 6 Mondays, 6 Tuesdays, 6 Wednesdays, 6 Thursdays, 6 Fridays, 14 Saturdays, and 14 Sundays. A conservation officer conducted the survey. At the beginning of each survey period the officer boated completely around the lake and made a total count of all fishermen. After making the count he began interviewing fishing parties (a fishing party consists of one or more fishermen) trying first to contact two parties who had completed their trips for the day. After making or failing to make these contacts, the officer moved around the lake interviewing fishing parties until

he had boated completely around the lake, making sure that he stayed within the two-hour period. The survey was then complete for that day.

To insure that interviews were taken in all areas of the lake, the officer, after making the total count, began interviewing at the dam, moving one day to the left and the next to the right. The third and fourth days after making the count, he began interviewing at the farthermost point from the dam moving one day to the left and the next to the right. The fifth and sixth days he returned to the dam and repeated the procedure.

The interviewed-party data were projected to determine fishing pressure, catch, fishing methods, sex ratio, and numbers of resident and non-resident fishermen.

Elmer Davis was fertilized in 1963 and 1964 with an inorganic fertilizer (20-20-5) at the rate of 40 pounds per acre. Eight applications were made in the lake each year beginning in April and continuing through September. Double applications were made in April and May. The fertilizer was placed in the lake at six different sites in depths under three feet. Water temperatures and secchi disc readings were taken weekly by the conservation officer conducting the creel survey.

Work on the spillway and the necessity for an extremely low water level prevented fertilization in 1965.

Physical Characteristics

A bathymetric map of Elmer Davis Lake is presented in Figure 1. The lake has a maximum depth of 59.0 feet, a mean depth of 22.1 feet, 5.6 miles of shoreline, and a total volume of 3,088 acre feet. Table 1 gives the volume in gallons and cubic feet, and the percent volume for each five-foot contour.

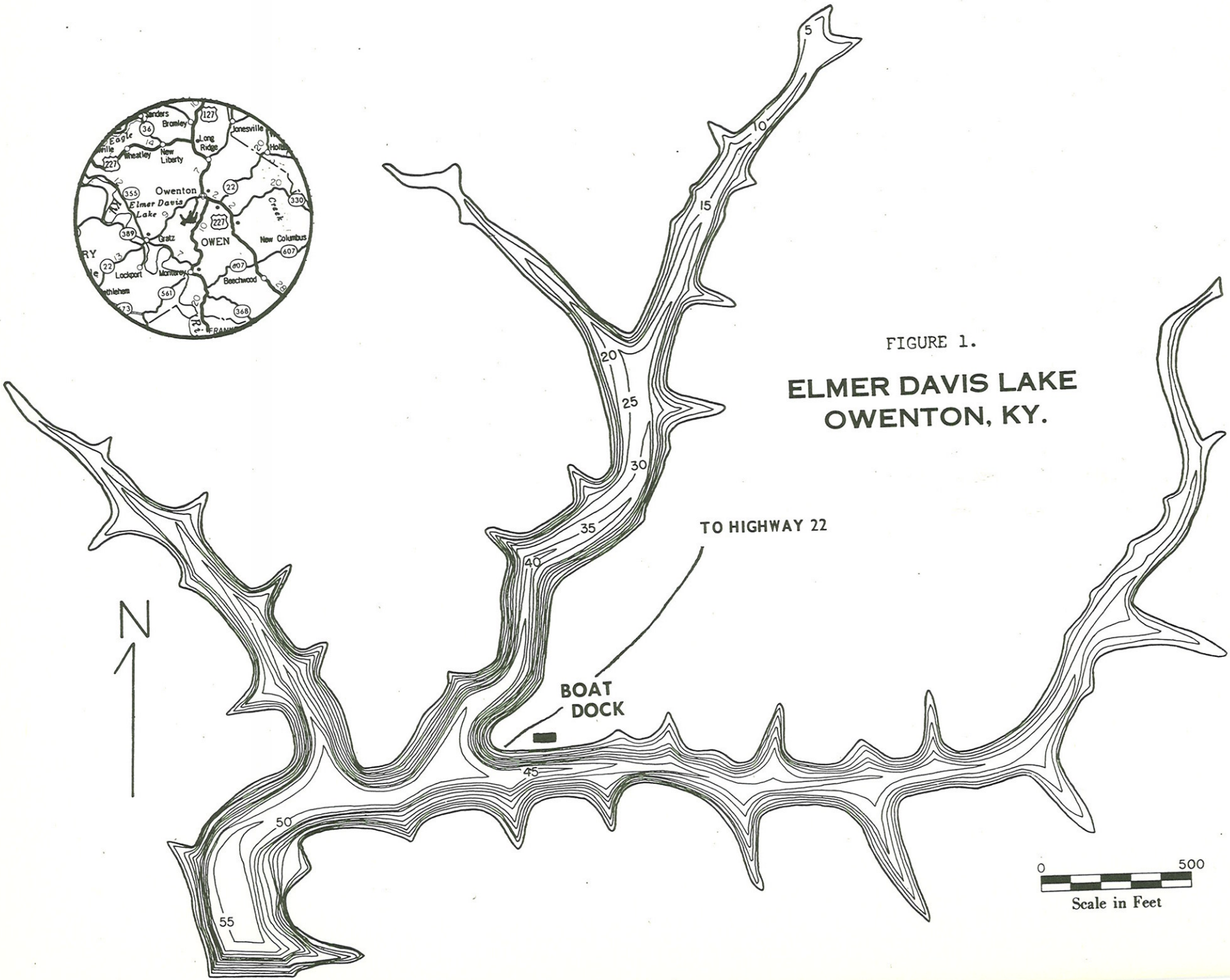


FIGURE 1.

ELMER DAVIS LAKE
OWENTON, KY.

Table 1. Percent volume of Elmer Davis Lake for each five-foot contour in gallons and cubic feet.

Depth	Volume		Percent volume
	Gallons	Cubic feet	
0 - 5'	222,847,847	29,792,493	22.2
5' - 10'	183,537,642	24,537,118	18.2
10' - 15'	148,502,990	19,853,341	14.8
15' - 20'	120,080,883	16,053,594	11.9
20' - 25'	94,473,514	12,630,149	9.4
25' - 30'	72,173,899	9,648,917	7.2
30' - 35'	54,320,231	7,262,063	5.4
35' - 40'	41,474,767	5,544,755	4.1
40' - 45'	32,589,297	4,356,858	3.2
45' - 50'	23,326,237	3,118,481	2.3
50' - 55'	10,872,284	1,453,514	1.1
55' - 59'	1,821,238	244,818	0.2

Temperature

The values given in Table 2 are a monthly average of temperatures taken once a month for six years (1958 - 1963). Stratification usually became evident during mid-May when the thermocline extended from 7 to 15 feet. It reached its maximum thickness in July when it extended from 8 to 21 feet. From this point it moved downward until mid-October and the advent of fall overturn. Mixing was complete by December when a near-homothermic condition was reached. Inverse stratification was recorded in January.

Chemical Characteristics

The watershed of Elmer Davis Lake is composed mainly of pastures and cultivated fields. An analysis of the soil from the watershed showed it to be slightly acetic (pH 6.1), and very high in available phosporous (215 pounds per acre) and potassium (300+ pounds per acre).

Oxygen

The mean monthly dissolved oxygen profiles are given in Table 2. Dissolved oxygen was present in amounts above 4 ppm to a depth of 10 feet during

Table 2. Mean temperatures and dissolved oxygen concentrations (ppm) for Elmer Davis Lake.

Depth in Feet	Jan. D.O.-°F	Feb. D.O.-°F	Mar. D.O.-°F	Apr. D.O.-°F	May D.O.-°F	June D.O.-°F	July D.O.-°F	Aug. D.O.-°F	Sept. D.O.-°F	Oct. D.O.-°F	Nov. D.O.-°F	Dec. D.O.-°F
0-	8.0-38°	10.4-42°	11.6-47°	8.4-59°	9.0-72°	9.7-79°	9.4-82°	9.9-81°	8.2-77°	6.3-62°	6.1-52°	9.0-41°
5-	8.1-38°	10.2-42°	11.7-46°	8.4-58°	8.4-70°	10.0-78°	7.6-81°	9.5-80°	8.0-75°	5.9-61°	5.4-52°	9.0-40°
10-	8.0-38°	10.2-40°	11.6-46°	7.8-57°	6.0-61°	4.7-69°	4.9-75°	8.6-77°	6.3-73°	5.8-61°	5.3-51°	9.2-40°
15-	8.1-38°	10.2-41°	10.0-45°	7.2-55°	4.1-53°	0.4-60°	1.6-64°	0.5-66°	2.0-67°	5.6-61°	5.5-51°	9.0-40°
20-	8.0-40°	10.2-41°	9.3-45°	6.9-50°	3.5-52°	0.2-52°	0.3-57°	0.1-57°	0.1-57°	3.6-58°	4.7-51°	8.8-40°
25-	- -40°	- -42°	- -44°	- -47°	- -50°	- -50°	- -50°	- -54°	- -51°	- -53°	- -51°	- -40°
30-	7.0-40°	10.2-42°	9.1-44°	5.4-47°	2.8-47°	1.3-48°	0.3-50°	0.0-52°	0.0-49°	0.0-50°	3.5-50°	8.4-40°
35-	- -40°	- -42°	- -44°	- -45°	- -47°	- -48°	- -48°	- -51°	- -49°	- -50°	- -50°	- -40°
40-	6.7-40°	9.8-42°	8.4-44°	5.1-45°	2.8-47°	0.7-48°	0.1-48°	0.0-50°	0.0-48°	0.0-49°	2.3-49°	8.0-40°
45-	- -40°	- -42°	- -44°	- -45°	- -47°	- -48°	- -48°	- -50°	- -48°	- -49°	- -49°	- -41°
50-	6.7-40°	9.4-42°	4.9-44°	3.9-44°	0.8-47°	0.1-48°	- -48°	0.0-50°	0.0-48°	0.0-49°	2.5-48°	- -41°
55-	- -40°	- -42°	- -45°	- -44°	- -47°	- -48°	0.1-48°	- -50°	- -48°	- -49°	- -48°	- - -
60-	- -40°	9.6-42°	- - -	1.9-43°	0.5- -	- - -	- - -	- - -	- - -	- -49°	- -48°	- - -

Thermocline ---------- Oxygen Depletion Zone ——————

all sampling periods. During June, July, August, and September it became inadequate (less than 2 ppm) below 10 feet for fish survival. Between November and May dissolved oxygen was present all the way to the bottom. Mean surface concentrations fluctuated from a high of 11.6 ppm in March to a low of 6.1 ppm in November.

Alkalinity

Total alkalinity, expressed as ppm $CaCO_3$, varied from month to month as high as 59 ppm, Table 3. Mean lake concentrations decreased steadily from 115 ppm in 1958 to 88 ppm in 1963.

Phosphates

The mean total phosphate concentrations ranged from a low of 0.00 ppm in 1959 to a high of 1.80 ppm in 1963, Table 3. Mean concentrations were considerably higher in 1963 (first year the lake was fertilized with an inorganic fertilizer analysis 20-20-5) than the mean concentrations found in 1958 and 1959.

pH

Mean pH values ranged from 6.8 to 7.2. Analysis of the watershed soil samples indicated a pH of 6.1.

Free Carbon Dioxide

Monthly free CO_2 concentrations varied from a high of 81.2 ppm in 1958 to a low of 6.9 ppm in 1959, Table 3. Mean lake concentrations showed the same decreasing trend as was recorded in other state-owned lakes.

Biological Characteristics

Fish Population Studies

In 1960, the cove population studies conducted in Elmer Davis Lake showed it to be in poor condition. A low average standing crop of 36 pounds

Table 3. The annual maximum, mean, and minimum values for alkalinity, total phosphates, pH, and free CO_2 in Elmer Davis Lake for 1958, 1959, and 1963. Values for alkalinity, total phosphates, and free CO_2 expressed as ppm.

	1958	1959	1963
Alkalinity	144	113	124
	115	105	88
	106	100	65
Total phosphates	0.14	0.19	1.80
	0.10	0.03	0.69
	0.08	0.00	0.36
pH	7.0	7.5	-
	-	-	-
	6.5	6.9	-
Free CO_2	81.2	32.7	-
	50.0	16.1	-
	25.5	6.9	-

per acre was recovered. This weight was composed of 44% game fish, 9% food fish, and 47% panfishes, Table 4. The population exhibited an F/C ratio of 2.2 and an A_t value of 36. Survival of the young-of-the-year of all species was very low.

In 1961, there was an increase in the average standing crop of 60 pounds per acre. This increase was accounted for by a substantial rise in the number and weight of the intermediate- and harvestable-sized crappie and bluegill, Table 5. This resulted in an increased F/C ratio (4.2) and A_t value (49). Survival of the young-of-the-year of all species was low again in 1961.

The cove studies conducted in 1962 yielded a further increased standing crop of 110 pounds per acre. This represents an increase of 14 pounds per acre over 1961. There was a good carryover of the intermediate-sized bluegill of 1961 to the harvestable-size group of 1962. This increased the weight of the latter by almost 100%, Table 6. Reproduction and survival of both the largemouth bass and the bulegill improved in 1962. An F/C ratio

of 3 and an A_t value of 57 were calculated. These statistics were approximately the same as recorded in 1961. There were a fewer number of channel catfish and crappie taken in the studies in 1962 as compared to 1961.

In 1963, the standing crop continued to increase (1963 was the first year the lake was fertilized with an inorganic fertilizer) and was recorded at 142 pounds per acre. This represents an increase of 32 pounds per acre over 1962. This increased weight was accounted for by increases in the warmouth and channel catfish populations, Table 7. The F/C and A_t value remained essentially the same as recorded in 1962. Reproduction of the piscovorous species was lower and the non-piscivorous higher than in 1962.

In 1964, the standing crop was estimated at 131 pounds per acre. This is a slight decrease of 11 pounds per acre under 1963. Intermediate- and harvestable-sized fishes shared equally for approximately 90% of the weight, Table 8. Both the largemouth bass and the bluegill spawned very successfully. There was an increase of approximately 10 pounds per acre of intermediate bass over 1963 indicating a good survival and carryover of the 1963 fingerling group, Table 8. Again, as in 1961, 1962, and 1963, there was very little change in the F/C ratio or the A_t value. However, there was an increase in the harvest indicating a better cropping of the harvestable weight in 1964.

Creel Survey Studies

Very few fish were caught from Elmer Davis Lake during the ten-day (February 1 - 10) survey in 1959. Less than 1 pound of fish per surface acre was harvested from the 150 acre lake. Two species, white crappie and largemouth bass, appeared in the creel. The low catch was primarily due to the severe weather. Most of the time the air temperature was below freezing, or it was raining. Few people fished after the first day.

During the first 7-month study (1960) a low harvest of 21.3 pounds (31 fish) per acre was cropped from Elmer Davis Lake, Table 9. Fishermen were

Table 4. Average weight and number of fish per acre taken from Elmer Davis Lake during 1960 (2 studies).

SPECIES	FINGERLING SIZE			INTERMEDIATE SIZE			HARVESTABLE SIZE			TOTAL		% OF TOTAL	
	Range	No.	Wt.	Range	No.	Wt.	Min. in.	No.	Wt.	No.	Wt.	No.	Wt.
GAME FISH													
Largemouth bass	0-4	47	0.71	5-9	31	4.43	10	5	5.70	83	10.84	7.50	29.80
White crappie	0-4	134	3.11	5-7	33	1.49	8	2	0.69	169	5.29	15.28	14.54
TOTAL		181	3.82		64	5.92		7	6.39	252	16.13	22.78	44.34
FOOD FISH													
Channel catfish	0-4	-	-	5-9	5	0.89	10	6	2.19	11	3.08	0.99	8.47
TOTAL		-	-		5	0.89		6	2.19	11	3.08	0.99	8.47
PANFISHES													
Bluegill	0-2	507	0.85	3-5	144	5.62	6	34	5.43	685	11.90	61.93	32.71
Green sunfish	0-2	28	0.16	3-5	102	3.33	6	1	0.14	131	3.63	11.84	9.98
Warmouth	0-2	3	0.03	3-5	16	0.66	6	5	0.94	24	1.63	2.18	4.48
TOTAL		538	1.04		262	9.61		40	6.51	840	17.16	75.95	47.17
							ABOVE FORAGE SIZE						
FORAGE FISH													
Misc. cyprinids	0-3	3	0.01	4-7	-	-	8	-	-	3	0.01	0.28	0.02
TOTAL		3	0.01		-	-		-	-	3	0.01	0.28	0.02
GRAND TOTAL		722	4.87		331	16.42		53	15.09	1106	36.38	100.00	100.00
% OF TOTAL		65.28	13.39		29.93	45.13		4.79	41.48	100.00	100.00		

Table 5. Average weight and number of fish per acre taken from Elmer Davis Lake during 1961 (2 studies).

SPECIES	FINGERLING SIZE			INTERMEDIATE SIZE			HARVESTABLE SIZE			TOTAL		% OF TOTAL	
	Range	No.	Wt.	Range	No.	Wt.	Min. in.	No.	Wt.	No.	Wt.	No.	Wt.
GAME FISH													
Largemouth bass	0-4	31	0.47	5-9	48	9.26	10	14	11.20	93	20.93	4.23	21.67
White crappie	0-4	186	0.36	5-7	106	14.50	8	68	13.31	360	28.17	16.36	29.16
TOTAL		217	0.83		154	23.76		82	24.51	453	49.10	20.59	50.83
FOOD FISH													
Channel catfish	0-4	-	-	5-9	-	-	10	5	6.41	5	6.41	0.23	6.64
TOTAL		-	-		-	-		5	6.41	5	6.41	0.23	6.64
PANFISHES													
Bluegill	0-2	1243	2.21	3-5	149	7.05	6	146	22.66	1538	31.92	69.91	33.04
Green sunfish	0-2	7	0.04	3-5	18	0.60	6	1	0.18	26	0.82	1.18	0.85
Longear sunfish	0-2	-	-	3-5	2	0.17	6	-	-	2	0.17	0.09	0.18
Warmouth	0-2	44	0.25	3-5	105	3.25	6	18	3.73	167	7.23	7.59	7.48
TOTAL		1294	2.50		274	11.07		165	26.57	1733	40.14	78.77	41.55
COMMERCIAL FISH													
Bullhead	0-4	6	0.03	5-8	1	0.10	9	1	0.80	8	0.93	0.36	0.96
TOTAL		6	0.03		1	0.10		1	0.80	8	0.93	0.36	0.96
							ABOVE FORAGE SIZE						
FORAGE FISH													
Misc. cyprinids	0-3	1	0.02	4-7	-	-	8	-	-	1	0.02	0.05	0.02
TOTAL		1	0.02		-	-		-	-	1	0.02	0.05	0.02
GRAND TOTAL		1518	3.38		429	34.93		253	58.29	2200	96.60	100.00	100.00
% OF TOTAL		69.00	3.50		19.50	36.16		11.50	60.34	100.00	100.00		

Table 6. Average weight and number of fish per acre taken from Elmer Davis Lake during 1962 (2 studies).

SPECIES	FINGERLING SIZE			INTERMEDIATE SIZE			HARVESTABLE SIZE			TOTAL		% OF TOTAL	
	Range	No.	Wt.	Range	No.	Wt.	Min. in.	No.	Wt.	No.	Wt.	No.	Wt.
GAME FISH													
Largemouth bass	0-4	325	2.62	5-9	51	6.58	10	19	10.87	395	20.07	12.51	18.22
White crappie	0-4	104	1.33	5-7	10	1.14	8	30	8.61	144	11.08	4.56	10.06
TOTAL		429	3.95		61	7.72		49	19.48	539	31.15	17.07	28.28
FOOD FISH													
Channel catfish	0-4	-	-	5-9	2	0.34	10	1	0.42	3	0.76	0.09	0.69
Flathead catfish	0-4	-	-	5-9	-	-	10	1	0.65	1	0.65	0.04	0.59
TOTAL		-	-		2	0.34		2	1.07	4	1.41	0.13	1.28
PANFISHES													
Bluegill	0-2	1476	7.82	3-5	754	18.35	6	172	40.66	2402	66.83	76.06	60.67
Green sunfish	0-2	1	0.01	3-5	1	0.01	6	-	-	2	0.02	0.06	0.02
Warmouth	0-2	17	0.08	3-5	168	6.10	6	25	4.07	210	10.25	6.65	9.30
TOTAL		1494	7.91		923	24.46		197	44.73	2614	77.10	82.77	69.99
COMMERCIAL FISH													
White sucker	0-4	-	-	5-11	-	-	12	1	0.50	1	0.50	0.03	0.45
TOTAL		-	-		-	-		1	0.50	1	0.50	0.03	0.45
GRAND TOTAL		1923	11.86		986	32.52		249	65.78	3158	110.16	100.00	100.00
% OF TOTAL		60.89	10.77		31.22	29.52		7.89	59.71	100.00	100.00		

Table 7. Average weight and number of fish per acre taken from Elmer Davis Lake during 1963 (2 studies).

SPECIES	FINGERLING SIZE			INTERMEDIATE SIZE			HARVESTABLE SIZE			TOTAL		% OF TOTAL	
	Range	No.	Wt.	Range	No.	Wt.	Min. in.	No.	Wt.	No.	Wt.	No.	Wt.
GAME FISH													
Largemouth bass	0-4	211	2.73	5-9	64	8.25	10	12	11.58	287	22.56	7.56	15.89
White crappie	0-4	11	0.10	5-7	63	6.25	8	19	4.96	93	11.31	2.45	7.97
TOTAL		222	2.83		127	14.50		31	16.54	380	33.87	10.01	23.86
FOOD FISH													
Channel catfish	0-4	1	0.02	5-9	12	2.04	10	3	9.02	16	11.08	0.42	7.81
TOTAL		1	0.02		12	2.04		3	9.02	16	11.08	0.42	7.81
PANFISHES													
Bluegill	0-2	1835	7.97	3-5	1060	34.33	6	180	31.55	3075	73.85	81.01	52.03
Green sunfish	0-2	1	0.01	3-5	2	0.06	6	1	0.10	4	0.17	0.11	0.11
Warmouth	0-2	86	0.52	3-5	165	9.62	6	65	12.31	316	22.45	8.32	15.82
TOTAL		1922	8.50		1227	44.01		246	43.96	3395	96.47	89.44	67.96
COMMERCIAL FISH													
White sucker	0-4	-	-	5-11	1	0.01	12	1	0.36	2	0.37	0.05	0.26
Bullhead	0-4	-	-	5-8	1	0.14	9	-	-	1	0.14	0.03	0.10
TOTAL		-	-		2	0.15		1	0.36	3	0.51	0.08	0.36
							ABOVE FORAGE SIZE						
FORAGE FISH													
Misc. cyprinids	0-3	1	0.01	4-7	1	0.01	8	-	-	2	0.02	0.05	0.01
TOTAL		1	0.01		1	0.01		-	-	2	0.02	0.05	0.01
GRAND TOTAL		2146	11.36		1369	60.71		281	69.88	3796	141.95	100.00	100.00
% OF TOTAL		56.53	8.00		36.07	42.77		7.40	49.23	100.00	100.00		

Table 8. Average weight and number of fish per acre taken from Elmer Davis Lake during 1964 (6 studies).

SPECIES	FINGERLING SIZE			INTERMEDIATE SIZE			HARVESTABLE SIZE				TOTAL		% OF TOTAL	
	Range	No.	Wt.	Range	No.	Wt.	Min. in.	No.	Wt.		No.	Wt.	No.	Wt.
GAME FISH														
Largemouth bass	0-4	1037	5.71	5-9	169	22.31	10	13	12.79		1220	40.81	17.20	31.20
Black crappie	0-4	6	0.90	5-7	-	-	8	2	1.05		8	1.94	0.10	0.90
White crappie	0-4	tr.	tr.	5-7	29	1.96	8	13	3.85		42	5.82	0.60	4.40
TOTAL		1043	6.61		198	24.27		28	17.69		1270	48.57	17.90	36.50
FOOD FISH														
Channel catfish	0-4	1	tr.	5-9	14	0.95	10	6	4.95		21	5.90	0.30	4.50
TOTAL		1	tr.		14	0.95		6	4.95		21	5.90	0.30	4.50
PANFISHES														
Bluegill	0-2	4927	7.00	3-5	420	21.29	6	164	31.70		5511	59.99	77.70	45.85
Longear sunfish	0-2	-	-	3-5	tr.	tr.	6	-	-		tr.	tr.	tr.	tr.
Warmouth	0-2	40	tr.	3-5	201	9.53	6	48	6.97		289	16.50	4.10	12.90
TOTAL		4967	7.00		621	30.82		212	38.67		5800	76.49	81.80	58.75
COMMERCIAL FISH														
Bullhead	0-4	-	-	5-8	1	tr.	9	tr.	tr.		1	tr.	tr.	tr.
TOTAL		-	-		1	tr.		tr.	tr.		1	tr.	tr.	tr.
							ABOVE FORAGE SIZE							
FORAGE FISH														
Topminnows	0-3	tr.	tr.	4-7	-	-	8	-	-		tr.	tr.	tr.	tr.
Darters	0-3	1	tr.	4-7	-	-	8	-	-		1	tr.	tr.	tr.
TOTAL		1	tr.		-	-		-	-		1	tr.	tr.	tr.
GRAND TOTAL		6012	13.61		834	56.04		247	61.31		7093	130.96	100.00	100.00
% OF TOTAL		84.80	10.10		11.70	43.00		3.50	46.90		100.00	100.00		

successful in harvesting fish at the rate of 0.4 fish per hour or 1.1 fish per trip. Largemouth bass dominated the creel by accounting for 69% of the total weight and 42% of the total number harvested. Bluegill, crappie, white bass, and walleye made up the rest of the creel, Table 10.

There was a total of 4,101 fisherman trips made to the lake in 1960. Of that number 68% were still fishermen while 32% used the casting method. Ninety-three percent were residents and 81% males.

During the 7-month survey in 1961 a harvest of 37.3 pounds (107 fish) per acre was creeled at the rate of 0.6 fish per hour or 2.4 fish per trip, Table 9. This represents an increase of 16 pounds per acre over the harvest of 1960 and was accounted for by a substantially increased catch of bluegill, Table 10. The white bass and walleye taken in the 1960 harvest had just about disappeared from the creel.

There was a considerable drop in the fishing pressure on Elmer Davis in 1961. Fisherman trips were down 75% from 1960, Table 11. There were also decreases in the number of bait casters and males.

During the 1962 survey period anglers harvested 27.7 pounds (156 fish) per acre at the rate of 1.0 fish per hour or 4.0 fish per trip, Table 9. This represents a 26% drop in the weight harvest from 1961, Table 10. There was, however, an increase in the number of fish harvested indicating a decrease in the quality of the fishery in 1962. Bluegill dominated the creel and were one-half as big as those taken in 1961. The white bass and walleye completely disappeared from the harvest, while channel catfish significantly entered the creel for the first time.

The fishing pressure was almost five times as great in 1962 as the pressure recorded in 1961, Table 11. The other categories, with the exception of the sex ratio, did not significantly change. In 1962 male fishermen resumed the level recorded in 1960.

In 1963, the harvest increased 37% to 37.3 pounds per acre. Fishermen were successful in harvesting fish at the rate of 0.9 fish per hour or 4.1 fish per trip, Table 9. Bluegill (67 per acre) and crappie (69 per acre) shared equally in the harvest. There was also an improvement in the catch of largemouth bass and channel catfish, Table 10.

There was a total of 5,647 fisherman trips made to the lake in 1963. This was a slight increase over 1962, Table 11. The rest of the categories in Table 11 did not significantly change in 1963.

During the survey period in 1964 more fish were cropped from Elmer Davis than in any previous year. There was a total of 231 fish or 57.3 pounds per acre harvested at the rate of 1.2 fish per hour or 5.9 fish per trip, Tables 9 and 10. The increase (20 pounds per acre) was accounted for by a 70% increase in the catch of bluegill. There was also slight improvement in the quality of the crappie and channel catfish, Table 10.

The fishing pressure and the other categories recorded in Table 11 did not significantly change in 1964.

The results of the creel survey presented in Tables 9 - 11 for 1965 indicate a very poor harvest. However, in 1965 the lake level was drastically reduced in order to repair the dam and spillway. As a result fishermen were unable to launch their boats and those who preferred bank fishing were repelled by the mud, and the stench of dying vegetation.

Fertilization Studies

Figure 2 shows a comparison of the standing crop, weight of harvestable fish (A_t), and the fish harvest from 1960 through 1964. During the three years previous to fertilization (1960 - 1962) the standing crop averaged 81 pounds per acre, the At averaged 42 pounds per acre, and the harvest averaged 29 pounds per acre. After two years of fertilization these values increased to a mean standing crop of 137 pounds per acre, a mean At value of 65 pounds

Table 9. Catch statistics from Elmer Davis Lake for 1960-1965.

Year surveyed	Acres	Avg. no. fisherman hrs./acre	Avg. no. fisherman trips/acre	Avg. no. fish/hour	Avg. wt. fish/hour	Avg. no. fish/trip	Avg. wt. fish/trip
1960	150	108	27	0.4	0.26	1.1	0.72
1961	150	32	8	0.6	0.31	2.4	1.24
1962	150	140	35	1.0	0.19	4.0	0.76
1963	150	169	38	0.9	0.22	4.1	0.99
1964	150	196	39	1.2	0.29	5.9	1.50
1965	150	79	20	0.4	0.20	1.8	0.69

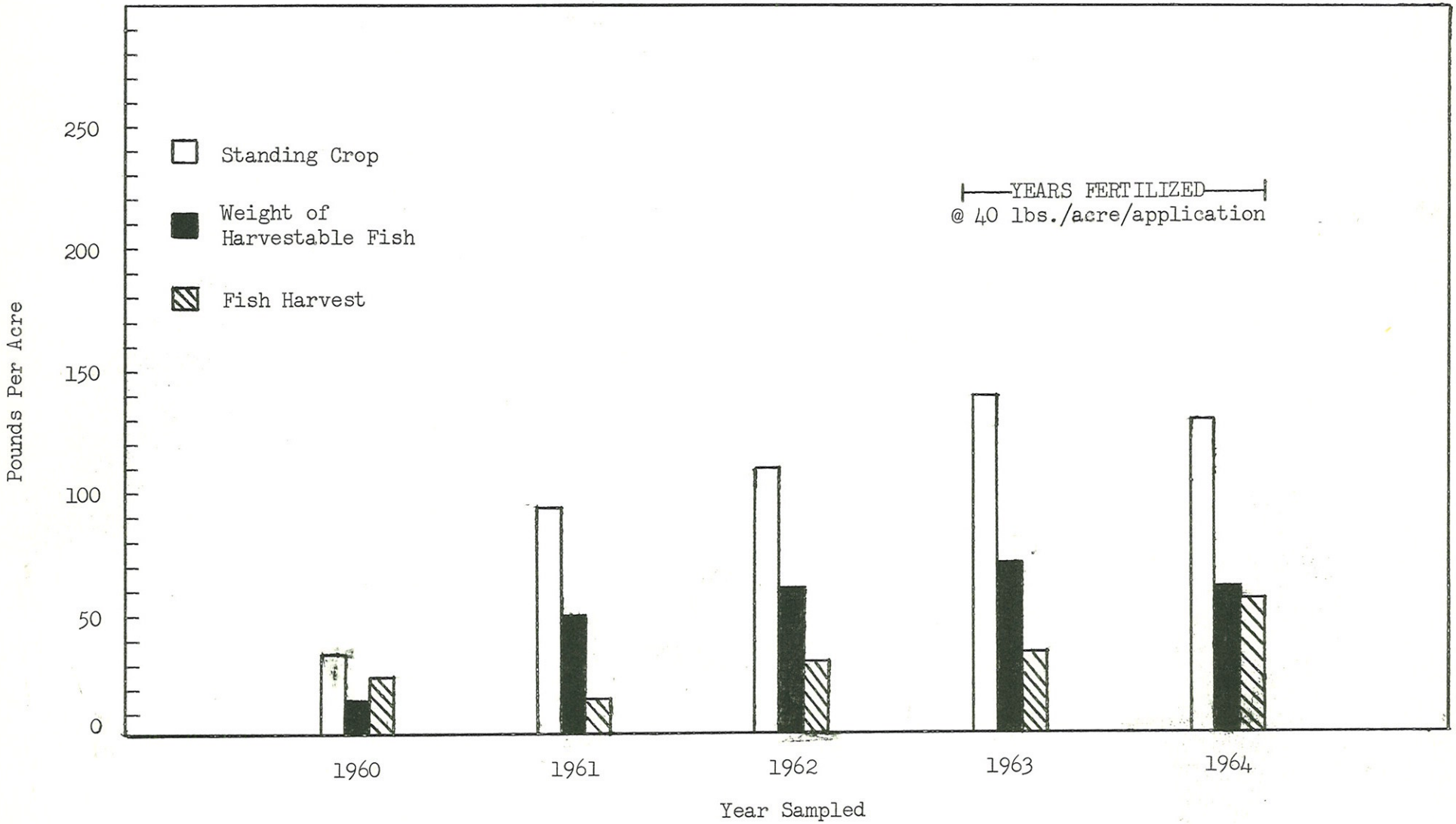
Table 10. Average catch per surface acre at Elmer Davis Lake from 1960-1965.

Year surveyed	Acres	Largemouth bass		Sunfish		Crappie		White bass		Channel catfish		Walleye		Totals	
		No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.	No.	Wt.
1960	150	13	14.6	11	2.6	5	2.2	1	1.3	tr.	tr.	1	0.6	31	21.3
1961	150	4	4.6	98	30.5	5	1.7	0	0.0	tr.	0.2	tr.	0.4	107	37.3
1962	150	4	4.6	122	16.0	29	6.9	0	0.0	1	0.1	0	0.0	156	27.7
1963	150	13	16.9	67	8.9	69	11.0	0	0.0	3	0.5	0	0.0	152	37.3
1964	150	9	15.5	176	29.1	42	10.2	0	0.0	4	2.5	0	0.0	231	57.3
1965	150	2	3.0	28	6.6	5	3.2	0	0.0	3	0.7	0	0.0	38	13.5

Table 11. Creel survey statistics, Elmer Davis Lake 1960 - 1965.

Year surveyed	Total no. fisherman trips	No. still fishing	% of total	No. casting	% of total	No. residents	% of total	No. non-residents	% of total	No. males	% of total	No. females	% of total
1960	4,101	2,769	68	1,332	32	3,820	93	281	7	3,316	81	785	19
1961	1,196	1,022	85	174	15	1,107	93	89	7	774	65	452	35
1962	5,239	4,256	81	983	19	4,951	95	288	5	4,414	84	825	16
1963	5,647	4,625	82	1,022	18	5,340	95	307	5	4,111	73	1,536	27
1964	5,887	4,982	85	905	15	5,361	91	526	9	4,598	78	1,286	22
1965	2,960	2,584	82	376	18	2,321	77	639	23	2,163	77	797	23

Figure 2. Standing Crop, Weight of Harvestable Fish, and Fish Harvest in Elmer Davis Lake From 1960-1964.



per acre and a mean harvest of 47 pounds per acre. This represents a significant increase in the quality and quantity of the fishery at Elmer Davis Lake during the years when an inorganic fertilizer was applied at the rate of 40 pounds per acre per application (8 applications).

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