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Evaluation of a 12 - 16 Inch Slot Limit on Largemouth Bass at Elmer Davis Lake

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ABSTRACT

A protective slot limit of 12.0-16.0 inches was imposed (1982-1988) at Elmer Davis Lake (148 aces) in 1982 to reduce the high density of ≤12-inch largemouth bass and increase the density of ≥12-inch bass to be caught and harvested. Density of 8.0-12.0 inch largemouth bass steadily declined each year from 1982, the first year of the slot limit, through 1984; however, their density increased in the next 2 years to a level comparable to the density in 1982. Densities of ≥12-inch largemouth bass, ≥6-inch bluegill, and young-of-year bluegill increased during the slot limit. Significant improvements in growth and survival of largemouth bass were also documented. Total yield of largemouth bass improved as well as the yield for bass >16-inches long. Catch rates by bass anglers of quality-size (≥12-inch) largemouth bass increased through 1985 and then declined. Mean length and weight of ≥12-inch largemouth bass creeled improved, as did the percent success by bass anglers. The panfish total harvest increased along with the average length and weight of the harvested fish. A majority of the objectives for the slot limit were achieved; therefore, this regulation will be continued.

INTRODUCTION

Elmer Davis Lake is a shallow, eutrophic lake that impounds 148.6 acres and is located in central Owen County (Figure 1). This lake is owned and maintained by the Kentucky Department of Fish and Wildlife Resources (KDFWR). Since impoundment in 1958, the fishery has been composed of largemouth bass, bluegill, white crappie, and channel catfish.

The largemouth bass population in Elmer Davis Lake prior to 1982 was dominated by slow-growing, sub-harvestable-size largemouth bass with poor body condition. The concentration of sub-legal largemouth bass was probably compounded in 1978 when the statewide size limit on largemouth bass was increased from 10.0-12.0 in. This allowed protection of the high density of stock-piled bass below the 10-in limit in Elmer Davis Lake for at least 2 more years or until they reached a length of 12.0 in. Largemouth bass, ≥12-in long, were found in few numbers. High recruitment and the size limit change perpetuated an unsatisfactory fish population. Bluegill numbers and recruitment were low, but the quality of fish present was good. In order to increase the condition and numbers of ≥12-in bass and increase numbers of young-of-the-year bluegill, the number of ≥12.0-in bass had to be reduced and a portion of the ≥12-in population of bass needed to be protected.

The concept of a slot limit (Johnson and Anderson 1974) provided the means to harvest smaller bass, protect that segment of the bass population between harvestable and quality sizes that were in low numbers, and allow harvest of the older, larger bass. The fact that Elmer Davis Lake was a productive, eutrophic lake made it suitable for a slot limit on the largemouth bass. Slot limits are considered to have the most application in meso- and eutrophic lakes dominated by largemouth bass and where there are sufficient numbers of intermediate-size largemouth bass for good recruitment into the slot range (Buynak 1986). For length limits to work, however, anglers must adhere to the prescribed limits. There is also a sociological factor involved in which anglers will not harvest bass under a certain size, or about 10.0 in for largemouth bass. A Missouri study found that anglers released about 45% of largemouth bass caught under 12 in long, and kept few bass under 9.0 in. They also found that anglers kept only 11.0-11.9 in bass more than 50% of the time. Their data also suggests that high recruitment of largemouth bass is important in causing and perpetuating surplus 8.0-11.9 in bass, and that predation by stock-size largemouth bass cannot be depended on to regulate recruitment (Novinger 1988). A slot limit on five lakes in Kansas did not produce the desired results, apparently because anglers did not harvest sufficient numbers of largemouth bass smaller than 12.0-in long (Gablehouse 1984).

In a 1982 Kentucky angler survey, about 54% of the anglers were unfamiliar with a slot-limit but 53% favored enactment of a slot limit in certain lakes (Kinman and Hoyt 1984). Therefore in 1982, a 12-16 in slot limit was implemented to improve both bluegill and largemouth bass populations and fisheries. The following objectives were established to be evaluated: (1) (1) a biomass of 60 lb of largemouth bass per acre, (2) 20 lb/acre of ≥12.0-in largemouth bass (quality-size), (3) 25 ≥12.0-in largemouth bass/acre, (4) a PSD value for largemouth bass of 40-60%, (5) an RSD_{15} value for largemouth bass of 10-25%, (6) increase the growth rate of largemouth bass to reach a length of 12.0 in by age 4, (6) increase annual survival rate to 50%, (8) increase abundance of 1-5 in bluegill as additional forage for largemouth bass, (9) a yield for bass of at least 10 lb/acre, (10) improve the angler's catch rate of ≥12.0-in largemouth bass to at least 0.25 bass/hour, (11) improve the mean size of quality size (≥12-in) bass caught by anglers, and (12) improve the percent of successful bass fishing trips at catching ≥12.0-in bass to 25%.

Study Area

Elmer Davis Lake was constructed on North Severn Creek, in 1958 for the purpose of recreation and water supply. The lake was opened to public fishing in 1960 (Laflin and Pfeiffer 1989) and has a drainage area of 4,222 acres. At the time of impoundment, land usage was 55% agriculture, 40% silviculture, and 5% urban (Division of Water 1984). These percentages appear to have changed little since the lake was built. Elevation at normal pool is 720.8 ft msl at which lake capacity is 3143.7 acre-ft. There are 5.6 mi of shoreline and the lake has a shoreline development index of 3.27. The soil association of the area is described as Eden-Brashear-Heitt and the general topography is described as narrow ridges and valleys. Elmer Davis Lake has a mean depth of 21 ft and a maximum depth of 59 ft. The lake had a mean Carlson TSI (chlorophyll-a) value of 60 in 1982 (Division of Water 1984), which classified the lake as eutrophic. Thermocline depth in August and September is from 6-9 ft.

METHODS

Field sampling consisted of standard cove-rotenone studies (1982-1987) to estimate fish standing crop and shoreline electrofishing to collect largemouth bass and bluegill. Length frequency data and catch-per-unit-effort (CPUE) were collected on largemouth bass and bluegill by electrofishing in each spring (1982-1989). Proportional stock density (PSD) and relative stock density (RSD) were calculated (Anderson 1976). Each fall, the relative weight (Wr) was calculated from largemouth bass captured by electrofishing (Wege and Anderson 1978).

Age and growth calculations were accomplished by collecting 5-10 scales from fish captured by electrofishing during spring or early summer. Growth rates and lengths were determined using the Dahl-Lea direct proportional method (Lagler 1956).

Largemouth bass from 8.0-11.9 in were tagged with a Floy spaghetti tag to estimate exploitation rate by anglers in 1982 and 1983. Monetary rewards ranging from 5-100 dollars were offered for return of the tags.

Largemouth bass population estimates were made in 1982 using tagged and fin-clipped fish. Largemouth bass, ≤8.0-in or 12.0-16.0 in long were collected while electrofishing and marked by removing one pectoral fin and the remaining legal size fish received the previously mentioned Floy tag. After 1 week, electrofishing studies were again conducted in an attempt to recapture marked largemouth bass. The number of marked and unmarked fish was then used to make the population estimate using the Chapman method (Ricker 1975). In 1988, a multiple mark-recapture technique modified Schnabel population estimate, was utilized on fin-clipped bass used to estimate the population of the three different size categories of largemouth bass (8.0-11.9 in, 12.0-15.9 in, and ≥16.0 in).

Survival rates of largemouth bass were calculated from mark-recapture data collected in 1982, 1983, and 1988 (Ricker 1975). Survival and mortality rates were calculated by both the catch curve and Robson and Chapman methods (Ricker 1975) utilizing spring electrofishing data.

Roving creel surveys were employed to obtain catch and release and harvest data at Elmer Davis Lake from April through October during 1983-1987. Surveys were conducted by the Owen County Conservation Officer during the first 4 years of the study; Fisheries Division personnel were employed during the last year of the study. The creel survey was conducted one day per week during the first 4 years and 3 days per week during the final year. The survey was divided into 3-hour periods between 0700 and 1900 hours in a 7-day week. Either the first or last hour of the survey was randomly chosen for the purpose of making angler counts. The other two hours were used for angler interviews. Data included species harvested, their length and weight, man-hours expended, fishing intent, angler count, fishing method, mode, and other miscellaneous characteristics.

RESULTS AND DISCUSSION

Fish Population Indices

Standing stock figures indicate that the largemouth bass and bluegill populations were affected by the slot limit in 1983. The number of intermediate-size (5-11 in group) bass per acre decreased from 135 fish/acre in 1982 to 57 fish/acre in 1983 and remained low through 1985 (Table 1). In 1986, the number of intermediate-size bass (147 fish/acre) surpassed the 1982 level. This level was the product of recruitment of the excellent spawn in 1984 (518 fingerlings/acre). Numbers of harvestable-size bass per acre remained similar (10-14 fish/acre) through the study period. However, the weight of this size group nearly doubled due to the larger bass protected within the 12-16 in range. The major noticeable change in the bluegill population was a 4-fold increase in fingerling numbers (0-2 in group). Their density was previously suppressed by largemouth bass predation.

The total fish standing stock was lowest in 1985 (120 lb/acre) largely due to a very low standing stock of bluegill. The cove sample in 1985 was taken late in the season on October 2-3; whereas, other studies were conducted from late July through mid-September. Total fish standing stock in remaining years fluctuated between 259 and 364 lb/acre. Bluegill represented from 32 to 57% of the total standing stock in all years. Channel catfish and other panfish (excluding bluegill) comprised 23 to 50% of the remaining standing stock.

Length frequencies by inch class for largemouth bass collected by electrofishing in 1982-1989 are presented in Table 2. The majority of the bass were stockpiled just below 12 in due to the 12-in size limit that was in effect from 1978-1981. The modal length was 9 in in 1982 with few bass ≥12-in long. By 1987, there was a better length distribution as more fish grew through the protected slot. Also, the mean CPUE for largemouth bass in the 12-16 in and >16-in range was higher (11.3 bass/hour) in the latter years (1985-1989) than the beginning (3.7 bass/hour) of the study (1981-1984) (Table 3). Density of bass in the 8-11 in groups varied from 1981-1989, but showed the highest density in 1989. Overall, the protection of 12-16 in bass resulted in increasing the density of all ≥8-in bass. Both the PSD and RSD_{15} for largemouth bass improved from 1982-1985, but declined in succeeding years (Table 4). Declining PSD and RSD values were influenced by the increase in density of intermediate-size bass.

Spring electrofishing data for bluegill paralleled standing stock data. There was a higher mean density of >6-in group bluegill from 1985-1989 (22.2 bluegill/hour) than in 1983-1984 (4.5 bluegill/hour) (Table 3). Although aquatic vegetation interfered with electrofishing for young-of-year bluegill, there was an obvious improvement in bluegill reproduction in the latter years of the study. There was also a two-fold increase in the bluegill PSD from 1983 (20) to 1989 (40).

Relative weights for 8.0-11.9 and 12.0-14.9 in bass improved one year after the slot limit began in 1982 (Table 5). The high density of 8.0-11.9 in bass in 1982 was reflected in the low Wr values (76). Similarly, in 1985 when the density again increased for this size bass, a complimentary decline in Wr (85) was seen. In the final year of the study, bass Wr values returned to acceptable levels (96-102). As these numbers of smaller bass decreased, forage became more available to the 12.0-14.9 in bass and their Wr value increased to 94 by 1983. The Wr for this size group varied from 86-92 thereafter, still much higher than 1982 values. The Wr for ≥15-in bass remained fairly stable (91-96) during the study.

Largemouth bass growth rates steadily improved from 1982-1988 (Table 5). Largemouth bass achieved a length of 12 in at age 6+ in 1982 and attained the same length at age 4+ in 1985. In 1988, largemouth bass grew to 12 in at age 3+. This improved growth rate was influenced by the increased numbers of 1-2 in-group bluegill.

A total of 921 and 346 largemouth bass were tagged in 1982 and 1983 to obtain fish population estimates and angler exploitation; a population estimate was obtained in 1988 with fin-clipped bass only. The angler exploitation rate was 16.2% in 1982 and 21.4% in 1983 for a mean exploitation rate of 17.6%. Recapture of tagged fish in 1982 translated to 3,933 ≥8-in bass, based on the Chapman index (Table 7). The population was primarily composed of intermediate-size (96%) bass and few bass within the slot (1.6%) or above the slot (0.8%). A total of 2,596 bass was estimated to be present in 1983 (Table 8). The total numbers of 8.0-11.9 in bass had been reduced by about 35%. Both population estimates in 1988 indicated 8.0-11.9 in bass were 25-34% less numerous than in 1982 (Table 9). These estimates also indicated that numbers and percentages ≥12.0-in bass were more numerous.

Survival rates significantly improved between 1983 (18%) and 1988 (52-58%) (Table 10). Low survival in 1983 could not be attributed to high exploitation (19%), but was related to higher natural mortality. This high natural mortality of largemouth bass was a product of their high density and slow growth. Lower densities and better growth of bass in 1988 was probably reflected in the higher annual survival.

Harvest (numbers and pounds) of largemouth bass was dominated by <12-in bass (Table 11). Total harvest (all sizes) peaked in 1987 at 5,393 bass, which also corresponded to the peak harvest of <12-in bass (5,223 fish). Numbers of bass in the protected slot of 12.0-16.0 in that were caught and released peaked at 3,093 bass in 1985, and remained relative stable (608-813) in the other creel survey years. This peak of catch and release in the protected slot in 1985 failed to translate to better harvest of >16-in bass in 1986-1987. This phenomenon cannot be explained, although the catch and release for >16-in bass was not recorded on these surveys. However, the harvest of ≥16-in largemouth bass increased from no fish in 1983 to a range of 94-241 fish in the following years, indicating an improvement in the size structure of the population. Catch rates for >12-in bass also improved from 0.05 bass/hour in 1983 to 0.09-0.43 in the following years. Other improvements in the bass fishery were mean length and weight of bass caught over 12.0-in long, total numbers and pounds of bass creeled while fishing for bass only, and the success rate of catching ≥12.0-in bass.

Panfish comprised 60-77% of the total number of fish harvested from 1983-1987. Harvest numbers for panfish remained fairly constant through the 5-year period, but the average length and weight of panfish steadily increased during the study. In 1987, panfish were almost 2 in longer and more than twice the weight of panfish creeled in 1983.

The goal of the slot limit was to improve the largemouth bass fishery by providing greater numbers of quality-size (≥12-in) largemouth bass. Twelve objectives were established for the 12-16 in slot limit on largemouth bass to accomplish. The success of achieving those objectives are discussed below.

1) <u>A biomass of 60 lb/acre of largemouth bass</u>

A reduction of intermediate-size bass by angler harvest, was projected to increase the numbers of 12-16 in bass and increase growth rates for remaining bass to produce a bass biomass of this level. This objective was never achieved during the 6-year study, although the biomass was as high as 56 lb/acre in 1986. The biomass decreased after 1982 for 3 consecutive years (Table 1). The biomass increased from 26 lb/acre in 1985 to 56 lb/acre in 1986, primarily due to another increase in intermediate-size bass.

2) <u>20 lb/acre of ≥12.0-in largemouth bass (quality size)</u>

There was also a definite increase in biomass of quality-size largemouth bass as a result of the slot limit. Although this objective was not achieved on an annual basis, it was achieved in 1984 and 1987.

3) 25 ≥12.0-in largemouth bass/acre

This objective was not achieved since the number of ≥12-in bass/acre remained stable (10-12 fish/acre) throughout the study. However, the average-size bass increased, thus improving the total biomass per acre of >12-in bass.

4) A PSD value for largemouth bass of 40-60%

This objective was only achieved in 1985 (Table 4), but there was an overall improvement above the 1982 PSD level. The PSD of 14 in 1989 was again due to a buildup of 8.0-11.9 in bass that was previously present in 1982.

5) An RSD_{15} value for largemouth bass of 10-25%

The RSD_{15} value peaked in 1985 at 17, but declined below the objective in 1989 (4). The RSD_{15} was influenced by the same factors influencing the PSD.

6) Increase the growth rate of largemouth bass to reach a length of 12.0 in by age 4

Growth rates of largemouth bass steadily increased and the objective was achieved by 1988.

7) Increase annual survival rate to 50%

This objective was obtained since annual survival improved from 18.0% in 1983 to 52-58% in 1988.

8) Increase abundance of 1-5 in bluegill as additional forage for largemouth bass

This objective was achieved since numbers of fingerling- and intermediate-size bluegill increased from approximately 4,000 fish/per acre in 1982 to almost 24,000 in 1986 and exceeded 13,000 fish/acre in 1987. A low number of 1-5 in bluegill in 1985 was probably a result of poor sampling efficiency due to the density of aquatic vegetation in the study cove.

9) A yield for bass of at least 10 lb/acre

This objective was exceeded in 1983, 1985, and 1987 when anglers creeled 12.5, 10.7, and 19.4 lb/acre, respectively.

10) Improve the anglers' catch rate of ≥12-in largemouth bass to at least 0.25 bass/hour

This objective was met only in 1985 when the catch rate for ≥12.0-in bass was 0.43 bass/hour, compared to only 0.05 bass/hour in 1983. The catch rate declined to 0.09 bass/hour in both 1986 and 1987. The reason for such a high catch rate in 1985 was due to a large number of 12-16 in bass caught, almost four times the numbers caught during any other creel survey year.

11) Improve the mean size of quality-size (≥12-in) bass caught by anglers

This objective was achieved, as the mean length of quality-size bass increased by >2 in in 1984, 1986, and 1987 compared to 1983. The mean weight of bass creeled was almost 50% higher in 1987 versus 1983.

(12) Improve the percent of successful bass fishing trips at catching >12-in bass to 25%

This objective was only achieved in 1985 (28%), but an overall improvement was observed in other years above the 1983 level of 4%.

CONCLUSIONS

The 12.0-16.0 in slot limit on largemouth bass at Elmer Davis Lake was effective in reducing the large surplus of 8.0-11.9 in bass for at least the first 3 years of the study. After the third year, numbers of these bass increased due to an increase in recruitment, growth, and survival of the bass population. These improvements in the bass population were undoubtedly related to the improved forage or panfish populations. Similar improvements were also documented in both the bass and panfish fisheries. Overall, a total of 6 of the 12 pre-study objectives were achieved to make the slot limit a successful fish management strategy for Elmer Davis Lake.

RECOMMENDATIONS

The experimental 12-16 in slot limit at Elmer Davis Lake should be made part of the fishing regulation on seasons and limits for anglers (KAR 1:200) to improve enforcement of bass harvest regulations due to the protected slot. The bass population, age and growth, and condition should continue to be monitored to determine if the population density, size structure, growth, and condition are within desired levels.

Elmer Davis Lake should be managed to maintain a good fishery for quality-size (≥6-in) panfish. High recruitment of largemouth bass are now contributing to a good population of quality-size bluegill and redear sunfish. The density of quality-size panfish in the population should be determined periodically to assess the panfish population. A creel survey should be conducted every 5 years to monitor the bass and bluegill fisheries.

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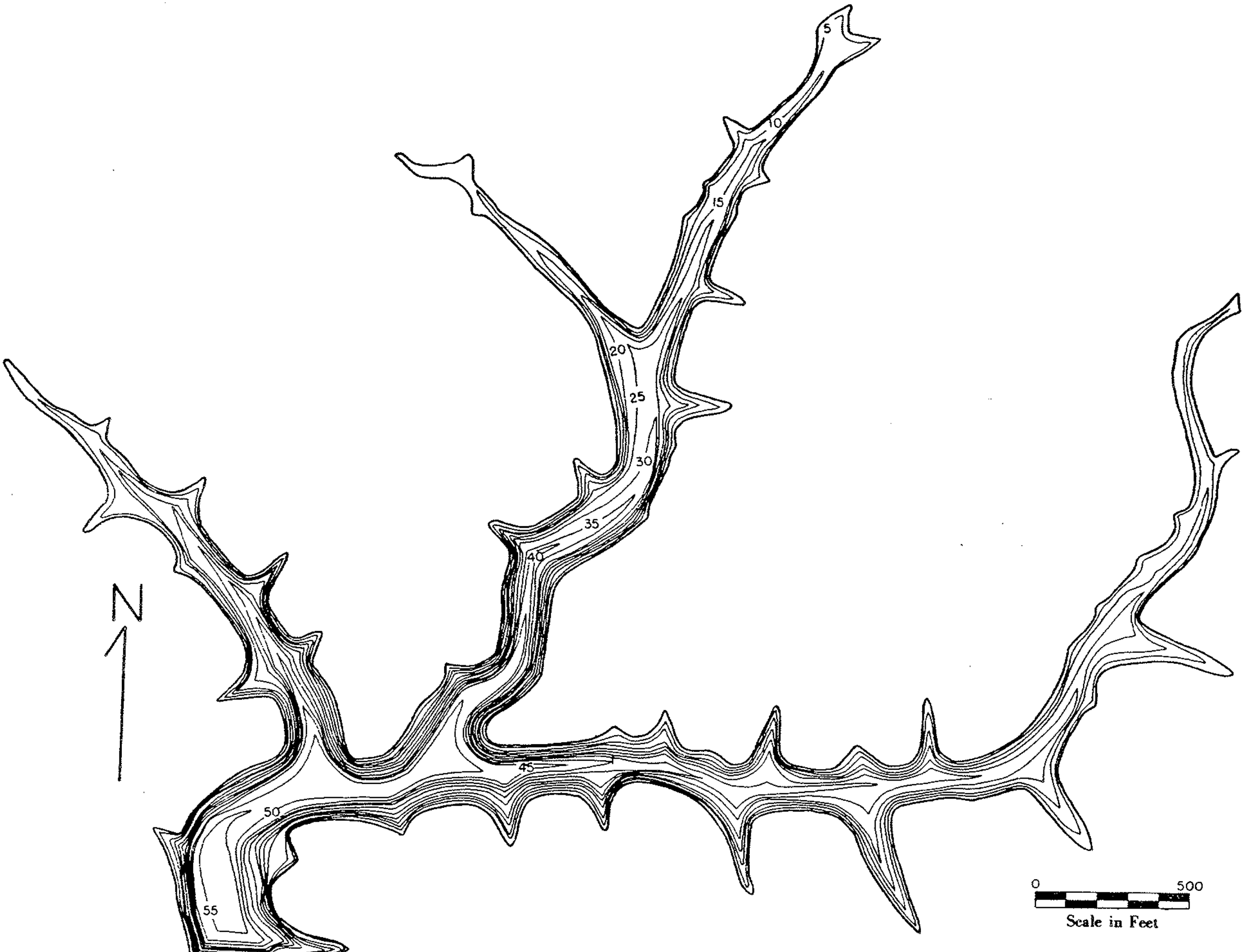

Figure 1. Contour map of Elmer Davis Lake.

Table 1. Standing stock per acre of largemouth bass and bluegill from cove-rotenone sampling at Elmer Davis Lake in 1982-1987. Size groups are in inch groups as shown in parentheses.

	1982	1983	1984	1985	1986	1987
Largemouth bass						
Fingerling (0-4 in)						
No.	20	20	518	159	506	170
Lb	0.17	0.26	1.96	2.39	6.66	3.05
Intermediate (5-11 in)						
No.	135	57	68	36	147	99
Lb	37.47	18.51	7.20	8.26	34.30	20.55
Harvestable (≥12 in)						
No.	12	10	12	12	14	12
Lb	10.80	10.97	19.78	15.76	15.40	23.35
Total no./acre	167	87	598	207	667	281
Total lb/acre	48.44	29.74	28.94	26.41	56.36	46.95
Bluegill						
Fingerling size (0-2 in)						
No.	2,871	5,155	3,537	1,874	19,109	12,182
Lb	6.58	18.62	34.15	4.78	35.21	18.73
Intermediate (3-5 in)						
No.	1,437	3,879	6,288	653	4,470	1,073
Lb	42.75	89.88	130.65	29.24	88.70	42.10
Harvestable (≥6 in)						
No.	261	192	149	55	272	167
Lb	79.86	32.32	24.63	4.42	51.26	27.69
Total no./acre	4,569	9,226	9,974	2,582	23,851	13,422
Total lb/acre	129.19	146.82	189.43	38.44	175.17	88.52
GRAND TOTAL						
No./acre	5,583	10,979	14,406	3,282	25,499	15,246
Lb/acre	364.11	315.46	332.27	120.07	332.93	258.93

Includes crappie, catfish, other panfish, and forage fish.

Table 2. Length-frequency distribution by inch class of largemouth bass collected during spring electrofishing at Elmer Davis Lake.

	Inch class																						
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total[a]	No./hour
1982		29	151	102	13	247	481	87	52	20	7	2			5	4	2	1	7	4	1	1,215	-
1983				1	5	166	148	62	68	25	15	6	7	3	1		2	1	2	3	1	516	-
1987	3	9	9	8	22	24	17	13	14	6	3	5	4	4	1		1					143	95
1988		22	168	75	33	121	222	195	159	71	35	36	23	20	19	14	13	16	13	2	1	1,258	78
1989	2	3	8	2	2	45	29	14	12	5	5			1			2	1	1			132	136

Time was not kept during 1982, and 1983 to estimate density by CPUE (no./hour).

Table 3. Catch per unit effort (no./hour) of largemouth bass and bluegill within inch group ranges from spring electrofishing in 1982-1989 at Elmer Davis Lake.

	Largemouth bass				Bluegill		
	0.0-7.4	7.5-11.4	11.5-16.4	≥16.5	0.0-2.4	2.5-6.4	≥6.5
1981	44.0	80.0	10.0	0.0	27.0	10.0	33.0
1982	98.5	71.6	1.5	3.0	0.0	91.0	26.9
1983	31.0	37.0	11.0	0.0	0.0	27.0	3.0
1984	7.0	11.0	4.0	0.0	4.0	37.0	6.0
1985	0.0	13.3	13.3	2.7	4.0	50.0	17.3
1986	68.0	67.0	20.0	6.0	7.0	33.0	10.0
1987	24.0	50.0	19.3	14.0	4.0	21.3	12.0
1988	18.6	43.5	11.5	4.9	1.6	22.1	29.5
1989	15.4	98.7	17.4	4.1	4.1	99.7	42.1

Table 4. Proportional stock density (PSD) and relative stock density (RSD) for largemouth bass and bluegill at Elmer Davis Lake in 1982-1989.

	Largemouth bass		Bluegill	
	PSD	RSD_{15}	PSD	RSD_8
1982	6	3		
1983	13	4	20	3
1984	27	7		
1985	48	17		
1987	26	11	48	2
1988	22	11	64	5
1989	14	5	40	5

Table 5. Relative weight (Wr) of largemouth bass at Elmer Davis Lake in 1982-1987.

	Length range (in)		
	8.0-11.9	12.0-14.9	≥15
1982	76	78	
1983	101	94	94
1985	104	86	92
1986	92	89	93
1987	85	89	91
1988	102	92	94
1989	96	90	96

Table 6. Mean length (in) at age for largemouth bass at Elmer Davis Lake in 1982, 1985, and 1988.

		Age										
Year	No.	1	2	3	4	5	6	7	8	9	10	11
1982	94	4.1	7.0	8.0	9.4	10.5	11.4	12.4				
1985	44	4.3	7.5	9.8	11.8	13.7	15.3	18.0				
1988	175	6.7	9.8	12.0	13.9	15.6	17.2	18.3	19.4	20.2	20.6	20.9

Table 7. Largemouth bass population estimates in June 1982 at Elmer Davis Lake.

Length (in)	Population estimate	%	No. per acre (149 a)
8.0-11.9	3,780	96.7	25.4
12.0-16.0	61	1.6	0.4
16.0+	30	0.8	0.2
Total (≥8.0)	3,933		26.4

Table 8. Largemouth bass population estimates in June 1983 at Elmer Davis Lake.

Length (in)	Population estimate	%	No. per acre (149 a)
8.0-11.9	2,513	96.8	16.8
12.0-16.0	10	0.4	0.1
16.0+	40	1.5	0.3
Total (≥8.0)	2,596		17.4

Table 9. Largemouth bass population estimates in spring 1988 at Elmer Davis Lake.

Length (in)	Population estimate	95% CI limits	No./acre (149a)
Schnabel Population Estimate			
8.0-11.9	2,853	(2,123 - 3,920)	19.1
12.0-15.9	478	(248 - 1,006)	3.2
16.0+	236	(123 - 497)	1.6
Total (≥8)	3,643	(2,817 - 4,706)	24.4
Modified Peterson estimate			
8.0-11.9	2,492		16.7
12.0-15.9	409		2.7
16.0+	205		1.4
Total (≥8)	3,187		21.4

Table 10. Mortality and survival rate estimates of largemouth bass in Elmer Davis Lake.

Year	Annual survival (%)	Annual mortality (%)	Angler mortality (%)	Instantaneous mortality
1982			11.0	
1983 (over 1 year)	18.0	82.0	19.0	
1988				
(catch curve)	57.7	42.3		0.550
(Chapman-Robson)	52.7	47.3		0.641

Table 11. Creel statistics for largemouth bass fishery at Elmer Davis Lake (140 a) in 1983-1987.

	1983	1984	1985	1986	1987
No. fishing trips for largemouth bass only	2,764	5,073	3,341	3,110	3,179
Hours fished for	6,973	5,398	7,282	8,063	8,600
(per acre)	(50)	(46)	(52)	(58)	(61)
No. of <12 in bass harvested	4,841	1,529	4,056	1,990	5,223
(per acre)	(34.58)	(10.92)	(28.97)	(14.21)	(37.31)
No. of >16 in bass harvested	0	241	111	94	170
(per acre)		(1.72)	(0.79)	(0.67)	(1.21)
Total no. of bass harvested	4,481	1,770	4,167	2,084	5,393
(per acre)	(34.58)	(.2164)	(29.76)	(14.88)	(38.52)
Total no. of 12-16 in bass caught and released	608	800	3,090	813	790
(per acre)	(4.34)	(5.71)	(22.07)	(5.81)	(5.64)
Lb of <12 in bass harvested	1,745	657	1,141	722	2,052
(per acre)	(12.46)	(4.69)	(8.15)	(5.15)	(14.65)
Lb of >16 in bass harvested	0	570	353	198	518
(per acre)		(4.07)	(2.52)	(1.42)	(3.70)
Total lb of bass harvested	1,745	1,227	1,494	920	2,570
(per acre)	(12.46)	(8.76)	(10.67)	(6.57)	(19.35)
No. of <12 in bass creeled fishing for bass	1,691	802	2,379	1,347	3,669
No. of >16 in bass creeled fishing for bass	0	241	96	94	146
Total no. of bass creeled fishing for bass	1,691	1,043	2,475	1,441	3,815
Lb of <12 in bass creeled fishing for bass	718	354	835	460	1,452
Lb of >16 in bass creeled fishing for bass	0	570	240	198	452
Total lb of bass creeled fishing for bass	718	924	1,075	658	1,904
No. of 12-16 in bass caught and released by bass anglers	315	708	3,063	645	636
No./hour creeled fishing for bass	0.24	0.16	0.34	0.18	0.44
No./hour caught of ≥12 in bass fishing for bass	0.05	0.15	0.43	0.09	0.09
Mean length (in) of all ≥12 in bass caught	12.1	14.5	13.6	14.2	14.7
Mean weight (lb) of all ≥12 in bass caught	1.13	1.55	1.28	1.44	1.57
% success for <12 in bass	38	10	32	20	42
% success for ≥12 in bass	4	11	28	17	16
% success for ≥16 in bass	0	5	3	3	3

Table 12. Fishing statistics for panfish/bluegill, redear sunfish, and warmouth at Elmer Davis Lake in 1983-1987.

	1983	1984	1985	1986	1987
No. harvested	14,580	12,459	11,495	18,247	15,843
(per acre)	(104)	(89)	(82)	(130)	(113)
% of total no. harvested	60.1	74.9	57.1	76.6	65.5
Lb harvested	2,261	2,371	2,167	3,962	4,074
(per acre)	(16)	(17)	(16)	(28)	(29)
% of total lb harvested	45.6	46.3	27.6	55.7	45.9
Mean length (in)	5.5	6.3	6.3	7.1	7.4
Mean weight (lb)	0.11	0.19	0.19	0.22	0.26
No. fishing trips for panfish only	3,997	2,943	2,145	3,892	3,866
Hours fished for panfish	6,916	4,428	7,142	9,598	10,989
No. caught fishing for panfish only	9,335	9,506	7,409	13,413	12,674
No. panfish per hour fishing for panfish	1.35	2.51	1.04	1.40	1.15