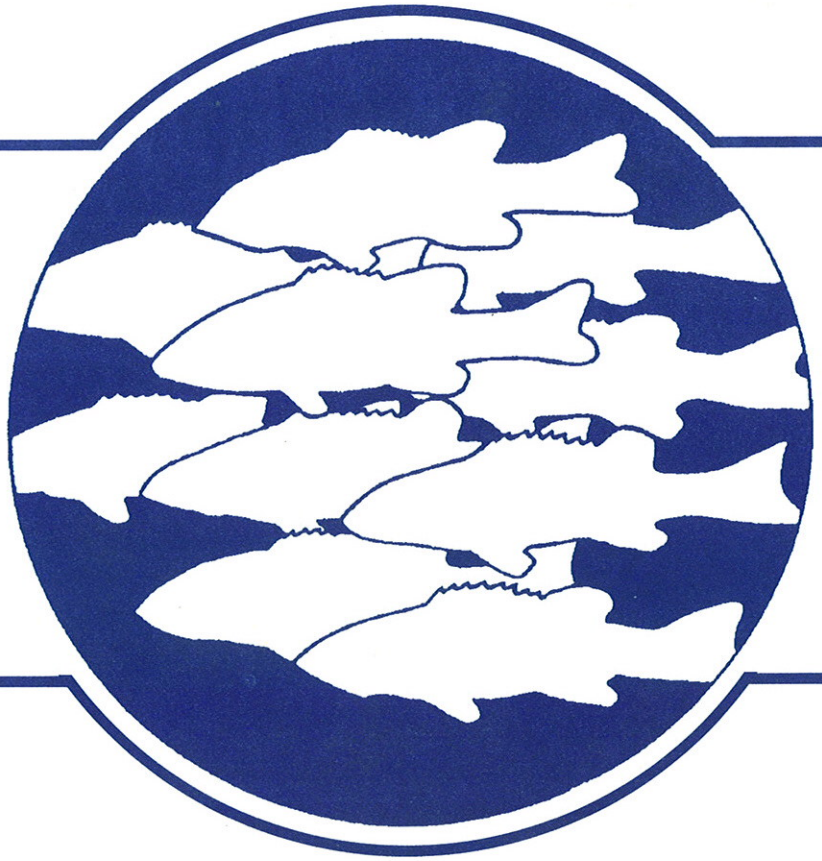

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Evaluation of a Smallmouth Bass Stocking Program at Cave Run and Cannon Creek Lakes

by

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ABSTRACT

Self-sustaining populations of smallmouth bass *Micropterus dolomieu* developed at both Cave Run and Cannon Creek lakes following a 3-year stocking program. Both these tributary reservoirs contained lake-habitat characteristics necessary for viable smallmouth bass populations. A total of 358,862 hatchery fingerlings (1.1-1.7 in) and 1,535 hatchery fish (5.9-14.4 in) were stocked in Cave Run Lake from 1985-1987, while 26,233 fingerlings (1.5-2.5 in) were stocked at Cannon Creek Lake from 1982-1984. Natural reproduction was documented at each lake, in each year sampled, since stocking was completed. In 1992 and 1993, smallmouth bass accounted for 20.0 and 37.4% of the black bass observed by divers at Cannon Creek Lake. At Cave Run Lake, from 1992-1994, smallmouth bass accounted for 7.4-13.2% of the total number and 6.7-14.5% of the total weight of the black bass collected in cove-rotenone studies. The highest standing stock estimate of 2.0 lb/acre was taken in 1994. Electrofishing catch rates of smallmouth bass since 1990 have ranged from 7.8-13.9 fish/hour for all samples taken at the lake with higher densities collected in the lower and mid-lake sections. Smallmouth bass accounted for 17.7% of the total number and 18.7% of the weight of black bass harvested at Cave Run Lake in 1994. The establishment of these self-sustaining smallmouth bass populations represents a fishery management option designed to utilize suitable reservoir habitat and provide the angler with a more diversified fishing opportunity.

INTRODUCTION

The smallmouth bass *Micropterous dolomieu* is a highly regarded sport fish by many anglers. In Kentucky, prior to 1985, naturally reproducing smallmouth bass populations occurred in 6 of 19 major reservoirs, where they developed from stock present in the drainage before impoundment. From 1976-1981, over 561,000 smallmouth bass fry and fingerlings were stocked into Herrington Lake, Kentucky, in an unsuccessful attempt to reestablish this species (Buynak 1986a). The reservoir had a self-sustaining population before 1955, but eutrophication resulted in the elimination of suitable cool-water habitat. After the failure to reestablish the smallmouth bass in Herrington Lake, Buynak (1986b) analyzed habitat characteristics of tributary reservoirs in Kentucky with reproducing populations of smallmouth bass. Cave Run Lake met these criteria and was used to test the predictive value of the habitat-smallmouth bass relationship proposed by Buynak (1986b). Stocking at Cannon Creek Lake began prior to the development of the predictive model. The specific objective of this study was to determine if viable smallmouth bass populations would develop at Cannon Creek and Cave Run lakes following a three year smallmouth bass stocking program. A secondary objective was to determine the contribution of the smallmouth bass to the black bass population and fishery at each lake.

STUDY LAKES

Cave Run Lake, located in northeastern Kentucky, is an 8,270-acre multipurpose impoundment completed in 1974 on the Licking River. The lake stratifies during the summer with the thermocline usually deeper than 15 ft (Table 1). The average reservoir depth is 27 ft and the maximum depth is 89 ft. Watershed land use consists primarily of silviculture (73%). The reservoir has a retention time of 0.29 year and a morphoedaphic index (Ryder 1965) of 20. A nutrient gradient has been found to exist in the lake progressing from eutrophic in the headwaters to oligotrophic at the dam. This nutrient gradient had a definite effect on the distribution of black bass (*Micropterus* spp.) with approximately 5,000 acres of potential smallmouth bass habitat available in the lower lake (Buynak et al. 1989). Beginning in 1985, a 15.0-in minimum-size limit was imposed on harvest of largemouth bass *M. salmoides* and smallmouth bass and size limits were removed for spotted bass (*Micropterus punctulatus*) (Buynak et al. 1991).

Cannon Creek Lake is a 243-acre impoundment located on Cannon Creek in southeastern Kentucky. The lake has a mean depth of 47 ft and a maximum depth of 95 ft. The lake stratifies during the summer, with the thermocline ≥15.0 ft deep (Table 1). Watershed land use consists primarily of silviculture (95%). Black bass populations are managed with a 12.0-in minimum-size limit; size limits were removed from spotted bass in 1988.

METHODS

Dale Hollow Lake strain smallmouth bass were produced at Minor Clark Fish Hatchery and stocked over a three year period at both Cave Run and Cannon Creek lakes in an attempt to establishing self-sustaining populations of smallmouth bass. At Cave Run Lake, from 1985-1987, a total of 358,862 fingerling (1.1-1.7 in long) and 1,535 larger (5.9-14.4 in long) hatchery-produced fish were stocked. A total of 26,233 smallmouth bass (averaging about 1.5-2.5 in long) were stocked at Cannon Creek Lake from 1982-1984. Annual stocking rates averaged 24 fish/acre of available habitat at Cave Run Lake and 36 fish/acre at Cannon Creek Lake.

Spring electrofishing techniques were used to sample black bass at Cave Run Lake. Spring electrofishing procedures were conducted at night (Reynolds 1983) in each year from 1985-1994 in the upper, mid-, and lower lake with two or three boats equipped with Smith-Root electrofishing units. An attempt was made to collect all black bass seen. All black bass captured were identified, measured to nearest 0.1 in, and released near the area of capture. Population size structure of each species of black bass was assessed using spring electrofishing catch per unit effort data. Electrofishing catch rates were examined for each black bass species and for the <8.0, 8.0-11.9, 12.0-14.9, and ≥15.0 inch size classes of each species. Mean catch rates and standard errors were calculated for each size group of bass in each year sampled. Survival was estimated, when possible, by the Robson-Chapman method (Ricker 1975) from spring electrofishing data.

Scale samples were taken from fish collected during spring electrofishing studies. All scales were taken from the left side of each fish near the tip of the extended pectoral fin. Most scale samples were read with a microfiche reader; larger scales were aged with an Eberbach scale viewer. Scale measurements were corrected for differences in magnification. Back-calculations were made using the Fraser-Lee method (Ricker 1971).

A nonuniform probability creel survey was conducted at Cave Run Lake from March through October 1985-1989 and in 1993 and 1994 to determine angler catch, harvest, and fishing pressure (Malvestuto 1983). In each year, a roving clerk surveyed the lake 4 d/week, 7.5 h/d. The clerk recorded the size and number of each black bass species harvested and those reportedly caught and released.

Cove rotenone-surveys (Davies and Shelton 1983) were conducted at Cave Run Lake each year to determine the total standing stock of fish. In 1985-1986, two coves totaling 4.9 acres were sampled. From 1987-1989, the area of the coves sampled was increased to a total of 7.8 acres by moving the block net to the mouth of each cove. Rotenone data from 1991-1994 were collected from only one of the original coves and totaled 3.9 acres; no samples were collected in 1990.

At Cannon Creek, one cove-rotenone sample (1.97 acres) was collected in each year from 1983-1986 while electrofishing techniques were used to sample black bass populations

from 1982-1988. Electrofishing and cove-rotenone procedures used at Cannon Creek Lake were similar to those used at Cave Run Lake. No age and growth or survival data are presented for smallmouth bass since too few fish were collected in any one year. Electrofishing was discontinued in 1989 due to low conductivity and poor electrofishing efficiency.

In 1989, a preliminary study determined that black bass abundance data could be collected with scuba gear. Length frequency and relative abundance of each black bass species was determined at Cannon Creek Lake in 1991 and 1992 using these underwater techniques. Observations were made using five people with snorkels or scuba gear; snorkels were used for near-shore observations. In both years, five measured shoreline sections were sampled. Sampling was preformed with all divers beginning at the same point and spaced equally from near shore to a depth of about 10 ft; diving below 10 ft was ineffective because of a loss of visibility. Divers maintained sight contact with each other to prevent duplication of fish counts. Lengths of bass were estimated to the nearest inch class by comparing underwater fish lengths to rulers carried by the divers and recorded on under water marking boards.

RESULTS

Cave Run Lake

Natural reproduction and recruitment of smallmouth bass were documented in each year from 1988-1994 at Cave Run Lake. Numbers of young of year (YOY) smallmouth bass collected in cove-rotenone studies ranged from <0.5 to 9 fish/acre (Table 2). Smallmouth bass standing stock (Table 3) increased from 0.1 lb/acre in 1985 to 1.5 lb/acre in 1988. Since 1988, standing stocks have fluctuated, but attained their highest level of 2.0 lb/acre in 1994. From 1992-1994, smallmouth bass accounted for 7.4 to 13.2% of total number and 6.7-14.5% of the total weight of all black bass taken in cove studies (Table 2).

Natural reproduction of smallmouth bass was also documented in spring electrofishing studies conducted at Cave Run Lake in each year since 1988 (Table 4). Spring electrofishing catch per unit effort data (CPUE) increased from 0.21 fish/hour in 1985 to 15.84 fish/hour in 1990. Since 1990, smallmouth bass catch rates, have stabilized and ranged from 7.84 to 13.92 fish/hour. Catch rates by size classes have fluctuated but have been relatively stable since 1990 (Table 5). Data collected in 1994 may be an underestimate, particularly for older fish, since sampling was delayed by 3 weeks due to high water levels.

Smallmouth bass numbers increased from 0.3 % of the total black bass population in 1985 to 10.2 % of the black bass taken in 1990 (Table 6); numbers then declined to 5.4% of the total number of black bass collected in 1994. Relative abundance of smallmouth bass generally was greatest at the lower lake sampling station and lowest at the upper lake station; only one smallmouth bass was taken at this station in 10 years of sampling.

Age and growth data collected at Cave Run Lake in 1992 (Table 7) showed that smallmouth bass in the lake reach 12.0 in late in their fourth year of life (age 3+) and 15.0 in late in their sixth year (age 5+). Survival estimates (Table 8) ranged from 32 to 63% (mean=53 %).

Smallmouth bass harvest was first documented in 1986 and peaked at 443 fish in 1989 (Table 9). Numbers of sub-legal smallmouth bass in the creel steadily increased and peaked in 1994. By 1994, smallmouth bass accounted for 17.7% of the total number and 18.7 % of the weight of black bass harvested at Cave Run Lake. The catch and release component of legal-size smallmouth bass at Cave Run Lake has remained relatively low and was estimated at 19.2% and 12.7% in 1993 and 1994.

Cannon Creek Lake

The smallmouth bass population in Cannon Creek Lake expanded following introductory stockings (1982-1984) with natural reproduction documented in each year from 1985-1992 (Table 10-12). In cove-rotenone studies, smallmouth bass contributed between 5.1 to 21.5% of the number and 6.3-22.4% of the weight of black bass collected from 1983-1986 (Table 10), while electrofishing studies indicated this species accounted for 13.2-52.6% of the total number of black bass collected (Table 11). Smallmouth bass accounted for 20-37% of the total number of black bass observed during underwater surveys conducted in 1991 and 1992 (Table 12).

DISCUSSION

Smallmouth bass populations have been found to be more productive in clearer, less fertile reservoirs, with productivity being positively related to reservoir age and surface area but negatively related to total dissolved solids, length of the growing season, and relative shoreline length (Jenkins 1975). Haines (1973) also concluded that nutrient enrichment was detrimental to smallmouth bass populations. Requirements of this species also include an optimum pH level of 7.9-8.1 (Funk and Pflieger 1975) and oxygen requirements of 6.0 ppm for optimal growth; production was reduced by 20% when oxygen levels were lowered to 4.0 ppm at 68^0 F (Bulkley 1975). Smallmouth bass have been shown to tolerate high turbidity for short periods of time, although excessive turbidity and siltation will reduce population size (Coutant 1975). Substrate and cover in reservoirs also seems to be important, because these fish prefer broken-rock substrate with crevices and fissures (Edwards et al. 1983). Although all these factors are important, the single most important limiting factor for smallmouth bass may be temperature (Coutant 1975).

Buynak (1986b) reported that Kentucky reservoirs with self-sustaining smallmouth bass populations have deep, cool, oxygenated water during the critical time of July-September. The critical time was defined as the period of thermal stratification when oxygen levels decreased below 4.0 ppm within the 68.5-70.3^0 F preferred temperature range of smallmouth bass (Ferguson 1958). Reservoir characteristics were further

divided into those having preferred or acceptable smallmouth bass habitat. These requirements indicate that it is important that smallmouth bass populations do not undergo a summertime "squeeze" on desirable habitat. Similar thermal requirements have been documented in reservoirs for other species, such as striped bass *Morone saxatilis,* (Coutant 1985) and rainbow trout *Oncorhynchus mykiss* (Kirkland and Bowling 1966).

Self-sustaining smallmouth bass populations were successfully produced at both Cave Run and Cannon Creek lakes following the stocking program. Both lakes were found to have acceptable smallmouth bass habitat, although Cannon Creek Lake was assessed after the introductions began. Smallmouth bass populations did not develop in Cave Run Lake following impoundment even though they are native to the Licking River and still represent 32.8% of the black bass population in areas below the dam (Kornman 1989). The status of smallmouth bass in the Cannon Creek Lake drainage prior to impoundment is not known. Both lakes now support self-sustaining populations that were developed from Dale Hollow Lake genetic stocks with each population thought to be near carrying capacity. Smallmouth bass currently account for 17.7% of the total number and 18.7% of the weight of black bass harvested from Cave Run Lake. The contribution of smallmouth bass to the fishery at Cannon Creek Lake was not determined but was considered low due to the relatively low standing stocks (49-59 lb/acre) of all fish in this infertile lake. The most recent population data indicate that the smallmouth bass accounted for at least 20% of the total number of black bass in the lake.

This evaluation was instrumental in testing the smallmouth bass reservoir habitat criteria and developing two new smallmouth bass fisheries in Kentucky. In addition, the criteria successfully predict suitable smallmouth bass habitat at both Painstville and Laurel River lakes and following stocking programs self-sustaining populations have now developed at these two Kentucky reservoirs. Smallmouth bass populations in all these lakes should remain viable and continue to contribute to the bass fisheries as long as suitable habitat remains. Attempts should be made to protect these waters from nutrient enrichment since increases in nutrient levels can eliminate suitable habitat and reduce or eliminate the contribution of this species to each lake's fishery.

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Table 1. Comparison of Cave Run Lake and Cannon Creek Lake charcteristics with those reservoirs in Kentucky having self-sustaining smallmouth bass populations.

Characteristics	Reservoirs with reproducting smallmouth bass populations	Cave Run Lake	Cannon Creek Lake
Size (acres)	≥100	8,270	243
Trophic state	oligotrophic-mesotrophic	mesotrophic	oligotrophic
Silviculture (% of watershed)	≥55	73	95
Mean depth (ft)	≥26	27	47
Retention time (year)	≥0.28	0.29	
Morphoedaphic index[a]	≤20	20	
Thermocline depth (ft)[b]	≥15	usually ≥15	>15

[a]Total dissolved solids ÷ mean depth.
[b]Preferred smallmouth bass habitat: dissolved oxygen (DO), ≥4.0 ppm at 68.5-70.3°F, thermocline depth, ≥20 ft from July through September. Acceptable habitat, DO, ≥4.0 ppm only at 70.3=74.3°F; thermocline depth, ≥15 ft from July through September.

Table 2. Standing stock estimates for each size group of smallmouth bass obtained in cove-rotenone studies at Cave Run Lake from 1985-1994. No data were collected in 1990.

Year	Fingerling[a] (per acre)		Intermediate[b] (per acre)		Harvestable[c] (per acre)		% of total black bass population (per acre)	
	No.	Lb	No.	Lb	No.	Lb	No.	Lb
1985	5	0.06	t	0.01			4.7	2.6
1986	3	0.05	2	0.30			6.5	10.1
1987	1	0.01	2	0.28	1	0.62	5.0	14.7
1988	t[d]	0.01	1	0.43	1	1.07	1.9	21.7
1989	t	t	1	0.23	1	1.00	0.8	17.4
1991	1	0.03	1	0.28	t	0.24	2.2	5.1
1992	9	0.13	2	0.43	t	0.30	9.1	6.7
1993	6	0.13	3	0.80	t	0.59	7.4	7.4
1994	6	0.11	3	0.93	1	0.92	13.2	14.5

t = <0.5 fish/acre.
[a]Fingerlings = 0-4 in group
[b]Intermediates = 5-11 in group
[c]Harvestable ≥12 in group
[d]t = trace or <0.5

Table 3. Total and black bass standing stock estimates (lb/acre) obtained from cove-rotenone samples collected at Cave Run Lake from 1985-1994. No samples were collected in 1990.

Year	Total	Largemouth bass	Smallmouth bass	Spotted bass
1985	119.7	1.2	0.1	1.5
1986	77.5	1.7	0.4	1.4
1987	132.2	3.2	0.9	2.2
1988	102.7	3.0	1.5	2.5
1989	115.5	4.2	1.2	1.6
1991	106.2	7.8	0.6	2.8
1992	79.2	10.9	0.9	1.1
1993	104.1	14.4	1.5	1.6
1994	51.7	9.1	2.0	2.6

Table 4. Length frequency and catch-per-unit-effort (fish/hour) of smallmouth bass in all spring electrofishing samples at Cave Run Lake, 1985-1994. Smallmouth bass were stocked from 1985-1987. SE = standard error.

Statistic	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Hours of electrofishing	19.0	21.4	12.0	12.0	12.0	11.0	12.0	12.0	12.0	12.0
				No. of fish caught						
Inch class										
3		1	2			11	5	4	4	
4		5	16	2	3	14	10	17	11	8
5		6	17	7	6	32	16	11	9	34
6	1	12	10	11	17	34	24	9	6	4
7		11	10	20	26	26	32	13	14	17
8	2	18	13	22	18	14	20	19	21	34
9	1	12	7	15	18	16	9	11	2	12
10		3	9	11	11	9	9	9	10	9
11		3	3	2	6	8	19	12	3	13
12			2	3	6	5	5	5	5	4
13				9	3	2	11	5	2	1
14				2	2		4	2	3	2
15			2		2		3	3		
16				1		1			2	1
17				1	1	1		1	1	
18						2	1			
19					1					
20						1				
Total	4	71	91	106	120	176	167	122	94	139
CPUE	0.21	3.65	6.53	10.47	10.27	15.84	13.92	10.16	7.84	11.58
SE	0.15	0.98	3.08	3.28	3.91	4.42	4.64	3.38	2.08	3.38

Table 5. Spring electrofishing catch-per-unit-effort (fish/hour) for each size class of smallmouth bass collected at Cave Run Lake. Standard errors are in parentheses.

Year	Inch class				Total
	<8.0	8.0-11.9	12.0-14.9	≥15.0	
1994	5.26	5.66	0.58	0.08	11.58
	(1.76)	(1.76)	(0.18)	(0.08)	(3.38)
1993	2.76	3.00	0.84	0.34	7.84
	(1.12)	(0.80)	(0.32)	(0.20)	(2.08)
1992	4.50	4.25	1.00	0.42	10.16
	(2.02)	(1.24)	(0.40)	(0.20)	(3.38)
1991	6.72	4.76	1.66	0.26	13.92
	(2.70)	(1.62)	(0.50)	(1.38)	(4.64)
1990	10.08	4.50	0.76	0.42	15.84
	(3.72)	(1.12)	(0.26)	(0.20)	(4.42)
1989	5.64	3.91	0.36	0.36	10.27
	(2.28)	(1.47)	(0.29)	(0.20)	(3.91)
1988	5.20	3.53	1.47	0.27	10.47
	(1.57)	(1.50)	(0.64)	(0.21)	(3.28)
1987	4.53	1.87	0.00	0.13	6.53
	(2.20)	(0.88)	(0.00)	(0.13)	(3.08)
1986	2.12	1.53	0.00	0.00	3.65
	(0.44)	(0.69)	(0.00)	(0.00)	(0.98)
1985	0.07	0.14	0.00	0.00	0.21
	(0.07)	(0.14)	(0.00)	(0.00)	(0.15)

Table 6. Electrofishing catch-per-unit-effort data collected for smallmouth bass in each area of Cave Run Lake from 1985-1994.

	Lower		Mid		Upper		Total	
Year	CPUE	% total	CPUE	% total	CPUE	% total	CPUE	% total black bass
1985	0.33		0.22				0.21	
	(0.33)	0.5	(0.22)	0.4			(0.15)	0.3
1986	5.07		2.26				3.65	
	(1.50)	8.3	(0.83)	3.9			(0.98)	6.3
1987	23.31		1.01				6.53	
	(5.94)	15.9	(0.60)	0.9			(3.08)	6.5
1988	18.52		6.80				10.47	
	(5.62)	12.4	(1.25)	4.9			(3.28)	6.0
1989	24.75		4.67				10.27	
	(4.77)	10.6	(2.91)	4.8			(3.91)	5.9
1990	37.50		7.27				15.84	
	(8.89)	21.0	(2.15)	4.6			(4.42)	10.2
1991	37.00		4.75				13.92	
	(9.64)	18.3	(1.69)	2.8			(4.64)	7.9
1992	23.3		7.00		0.25		10.16	
	(8.09)	9.5	(2.70)	0.1	(0.25)		(3.38)	4.8
1993	9.5		14.0				7.84	
	(3.09)	5.1	(4.26)	3.4			(2.08)	3.1
1994	19.5		15.3				11.58	
	(4.98)	7.6	(7.59)	7.8			(3.38)	5.4

Table 7. Mean back calculated length (in) at each annulus for smallmouth bass collected from Cave Run Lake in 1992, including the 95% confidence interval (CI) for the mean length of each age group.

Year class	No.	Age 1	2	3	4	5	6	7	8
1990	23	5.6	7.4						
1989	23	6.2	8.2	10.2					
1988	5	7.0	9.0	10.3	11.6				
1987	5	6.1	8.0	10.0	11.8	13.2			
1986	4	6.1	7.9	9.9	12.2	13.4	14.4		
1985	5	6.4	9.0	11.1	12.9	14.4	15.7	17.0	
1984	1	6.0	9.1	10.8	12.9	14.9	15.9	16.4	16.9
Mean		6.1	8.0	10.3	12.2	13.8	15.2	16.9	16.9
No.		66	66	43	20	15	10	6	1
Smallest		5.9	7.8	9.9	11.9	13.3	14.7	16.3	
Largest		6.2	8.3	10.6	12.5	14.2	15.7	17.5	
Std error		0.08	0.12	0.14	0.17	0.21	0.25	0.31	
95% CI (±)		0.16	0.24	0.27	0.33	0.41	0.49	0.61	

Intercept = 3.58, P^2= 0.92

Table 8. Survival estimates (%) for smallmouth bass collected at Cave Run Lake from 1985-1994.

Year	Survival estimate
1994	32
1993	63
1992	61
1991	57
1990	49
1989	56
1988	54

Table 9. Summary of smallmouth bass harvest and catch and release statistics obtained from creel surveys conducted at Cave Run Lake.

Year	No. harvested	Catch and release			% of black bass harvested	
		8.0-14.9 in	≥15.0 in	Total	No.	Lb
1985	0	0	0	0	0	0
1986	20	214	0	214	0.7	0.6
1987	110	808	65	873	2.2	3.1
1988	200	1,382	86	1,468	t	0.1
1989	443	2,060	56	2,116	7.9	9.3
1993	407	2,046	97	2,143	17.9	19.3
1994	384	2,395	56	2,451	17.7	18.7

t = <0.05%.

Table 10. Summary of smallmouth bass data collected in cove rotenone studies conducted at Cannon Creek Lake from 1983-1986.

Year	Fingerling[a] (per acre)		Intermediate[b] (per acre)		Harvestable[c] (per acre)		% of total black bass population (per acre)	
	No.	Lb	No.	Lb	No.	Lb	No.	Lb
1983	8	0.11	1	0.12			16.9	6.3
1984	9	0.10	6	1.13			19.2	22.4
1985	14	0.16	3	0.99			21.5	21.5
1986	3	0.07	2	0.47			5.1	16.5

[a]Fingerling = 0-4 in group
[b]Intermediate = 5-11 in group
[c]Harvestable = ≥12 in group

Table 11. Summary of electrofishing data for smallmouth bass collected at Cannon Creek Lake from 1982-1988.

Year	Inch class									CPUE (no./h)	% total black bass
	3	4	5	6	7	8	9	11	12		
1982		1	3							1.0	40.1
1983		2	5							4.7	17.9
1984		3	1		1	5				7.8	52.6
1986	2	3	2	1	1	1				7.1	31.3
1987		3	4	3	1	3	1			16.7	40.5
1988		2				1		1	1	2.8	13.2

Table 12. Summary of smallmouth bass data collected by divers at Cannon Creek Lake in 1991 and 1992.

Year	Inch class													No./100 ft of shoreline	% of total black bass
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1991	14	18	8	17	11	4	2	5	11	4	3		2		3.69	20.0
1992		8	10	7	17	11	15	10	12	2	1	1		1	2.47	37.4