

Release of Largemouth Bass Under Differential Size Limits

Edward A. Bettross, *Georgia Department of Natural Resources, 142 Bob Kirk Road, Thomson, GA 30824*

Jeffrey F. Jones, *Georgia Department of Natural Resources, 142 Bob Kirk Road, Thomson, GA 30824*

Bruce M. Saul, *Augusta College, 2500 Walton Way, Augusta, GA 30904*

Abstract: Release of largemouth bass (*Micropterus salmoides*) by anglers licensed under 2 size limits were evaluated based on tag returns. Clarks Hill, Richard B. Russell, and Hartwell reservoirs, forming the boundary between Georgia and South Carolina, have different largemouth bass size restrictions on each side of the lake. Georgia imposes a 305-mm minimum length limit, whereas South Carolina imposes no size limit. Georgia anglers released a significantly greater ($P \leq 0.05$) proportion of stock size (200–299 mm) bass than did South Carolina anglers. Georgia anglers also appeared to release a greater percentage of quality (300–379 mm) and preferred and larger (≥ 380 mm) size bass; however, no significant differences ($P \leq 0.05$) were detected. These results suggest that even a relatively small minimum length limit (305 mm) has a positive effect on angler release rates despite the popularity of voluntary catch and release. Management of fisheries resources should emphasize education of the angling public, angler satisfaction, better fishing, and adherence to fishing regulations.

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Use of minimum and slot size limits as management tools for largemouth bass have increased substantially since the early 1970s. About 70% of the states in the Southeast either impose statewide minimum length limits on largemouth bass or implement size restrictions on a dozen or more large water bodies. Size limits on largemouth bass can be an effective management tool if based on sound biological data and done with public support (Anderson 1974). Noble and Jones (1993) reviewed the uses of length limits. Numerous successes and failures of regulations have been documented (Gabelhouse 1980, Mense 1981, Van Horn et al. 1981, Hamilton 1985, Novinger 1987, Hall 1989, Mitchell and Sellers 1989, Kornman 1990, Buynak et al. 1991).

The boundary between Georgia and South Carolina is formed by the Sa-

vannah River basin, and the 2 states share fisheries management responsibilities in the basin. Clarks Hill, Richard B. Russell, and Hartwell reservoirs are U.S. Army Corps of Engineers (COE) impoundments on the Savannah River that are very popular with fisherman. Georgia imposes a 305 mm (12-inch) minimum length limit on largemouth bass, but South Carolina has no size restriction on bass in these waters. In 1991 a reward tagging study was initiated on all 3 reservoirs to determine bass mortality rates and age and growth. Results were to be used to recommend consistent size limits on both sides of the river for each impoundment. Improved management, enforceability of regulations, and increased angler satisfaction were the targeted benefits.

Review of fishing regulations in the Southeast revealed 16 lakes and 9 rivers that are regulated by 2 or more state resource agencies implementing different largemouth bass length limits. The study provided a unique opportunity to look at catch and release practices of anglers operating under different size limits. Growth in popularity of catch and release has paralleled that of size limits and tournament fishing (Graff 1987). Does the popularity of catch and release negate the difference between a relatively short minimum length limit (305 mm) and no length limit? Are the different regulations more confusing to anglers than they are significant to fishery?

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Methods

This study was conducted on 3 mainstem reservoirs on the Savannah River, Georgia-South Carolina. In succession from down-to upstream they are Clarks Hill, Richard B. Russell, and Hartwell reservoirs, respectively. The U.S. Army Corps of Engineers built these impoundments for flood control and hydropower. Clarks Hill Reservoir, constructed in 1952, is a 28,972-ha impoundment with 1,920 km of shoreline. Richard B. Russell Reservoir was built in 1985 and impounds 10,793 ha with 885 km of shoreline. Hartwell Reservoir, constructed in 1962, is a 22,660-ha impoundment with 1,539 km of shoreline. PCB levels in Hartwell Reservoir exceed Food and Drug Administration (FDA) standards.

Each February and March from 1991 to 1993, from 978 to 2,107 largemouth bass were tagged in each reservoir with international orange-colored Floy (FM-89SL) internal anchor tags. Each tag was individually numbered and coded and read "REWARD GA G & F" and provided an address where the tag could be sent. The reward for all returned tags was \$5.00. A publicity campaign, consisting of news releases, reward posters, pre-printed postage paid envelopes, and presentations to local fishing clubs was initiated to inform the public about the tagging and reward program.

Data for the study included angler name, address, and whether the fish was kept or released. For analysis tagged bass were divided into stock (200–299 mm), quality (300–379), and preferred and larger (≥ 380 mm) size groups. Length of tagged bass caught by anglers was estimated using length when tagged and age and growth data from 1993 (Bettross et al. 1994). Only tags with recapture dates within 1 year of release were considered. Seasonal estimates of largemouth bass growth were arbitrarily applied at 20% in the spring, 35% in the summer and fall, and 10% in the winter. The release of 3 sizes of largemouth bass by Georgia and South Carolina anglers was evaluated with Wilcoxon's Signed Rank Test.

Results and Discussion

Release of largemouth bass by Georgia and South Carolina anglers ranged from 30% to 91% (Table 1). Generally, release rates decreased as size of fish increased. Bass from Hartwell Reservoir were released at a higher rate than the other 2 reservoirs, probably because anglers were aware that fish PCB levels exceeded FDA standards. South Carolina anglers kept an equal or greater proportion of largemouth bass than Georgia anglers in 77% (20 of 26) of the comparisons. Release of stock size or sublegal (in Georgia) largemouth bass was significantly ($P < 0.05$) greater by Georgia anglers (Table 1).

Georgia angler compliance with the 305-mm length limit ranged from 67% to 91%. This data is comparable to what has been documented elsewhere for black bass with various minimum and slot length limits (Eder 1984, Glass and Maughan 1984, Paragamian 1984, Crawford et al. 1988, Mayers 1988, Kokel 1991). South Carolina anglers voluntarily released 53% to 77% of stock size bass.

Table 1. Angler release (%) and sample sizes (N) of stock (200–299 mm), quality (300–379 mm), and preferred and larger (≥ 380 mm) size largemouth bass by Georgia (GA) and South Carolina (SC) anglers in Clarks Hill, Richard B. Russell, and Hartwell reservoirs from 1991–1993.

Lake	Year	Stock				Quality				Preferred			
		GA		SC		GA		SC		GA		SC	
		N	%	N	%	N	%	N	%	N	%	N	%
Clarks Hill	1991	43	70	37	65	162	54	83	60	118	34	63	30
Clarks Hill	1992	30	90	13	77	156	60	73	51	92	50	42	38
Clarks Hill	1993	7	71	0		69	58	33	58	46	54	24	50
Russell	1991	8	88	25	76	51	57	77	58	19	55	38	37
Russell	1992	13	77	17	53	51	55	48	38	12	42	19	47
Russell	1993	3	67	9	67	25	64	49	49	23	43	24	54
Hartwell	1991	26	85	49	69	54	69	116	64	40	73	79	53
Hartwell	1992	22	91	20	70	115	77	111	66	43	63	76	66
Hartwell	1993	6	67	9	67	35	66	55	69	13	77	26	69

Above the range of the length limit, there appeared to be some carry-over of Georgia anglers releasing bass at a higher rate (11 of 18 comparisons) than South Carolina anglers. However, no significant differences in angler releases ($P < 0.05$) were detected for quality and preferred and larger size groups. Austen and Orth (1984) documented carry-over in Virginia anglers to non-target species after implementing a 305-mm minimum length limit on smallmouth bass (*Micropterus dolomieu*) in the New River. Public acceptance of a length limit regulation generally signifies concern for the resource and confidence in the management program (Anderson 1974). Carry-over could be a result of concern for the resource. Another reason could be sociological (Bryan 1977, Kokel 1991).

These results suggest that anglers can control the harvest of largemouth bass populations in large impoundments by harvesting substantially less than they catch. Voluntary release rates of quality and preferred and larger size bass averaged 61% and 50%, respectively. Weaver (1989) reported a 57% release rate for similar sized bass. Results also suggest that the popularity of catch and release can be strengthened by management regulations even on small (≤ 300 mm) bass. Harvest of larger bass or those in protective slot limits should be affected even more. Heavy fishing pressure on some reservoirs produce an estimated $\geq 50\%$ catch of tagged largemouth bass (Ager 1980, Keefer 1988, Evans 1989, Bettross et al. 1994). In these cases, minimum length limits or slot limits may be required to prevent overharvest.

The public is becoming more educated and involved in resource issues. If anglers are provided sound biological reasons for proposed management (i.e., regulation) changes and made part of the decision process, they have and will continue to voluntarily adhere to restrictive length limits. We as fisheries managers should take every opportunity to provide clear, concise management of fisheries resource to the public. Inconsistent fishing laws and regulations may actually do more to cause anglers to view resource agencies unfavorably than to protect the resource. States sharing management responsibilities for lakes and rivers should make every attempt to provide homogeneous fishing regulations based on sound biological data.

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