LAKE GASTON CREEL SURVEY 2019–2020

Federal Aid in Sport Fish Restoration
Project F-108
Report Type: Summary Report

Kirk R. Rundle
Lawrence G. Dorsey

North Carolina Wildlife Resources Commission
Inland Fisheries Division
Raleigh

2021

Keywords: Creel survey, angler effort, angler catch, angler harvest.

This project was funded under the Federal Aid in Sport Fish Restoration Program utilizing state fishing license money and federal grant funds derived from federal excise taxes on fishing tackle and other fishing related expenditures. Funds from the Sport Fish Restoration Program are used for fisheries management and research, aquatic education, and boating access facilities. The program is administered cooperatively by the N.C. Wildlife Resources Commission and the U.S. Fish and Wildlife Service.

Abstract.– A creel survey was used to evaluate angler use patterns for all popular fish species at Lake Gaston. A roving creel clerk interviewed bank and boat anglers from December 2019 to November 2020. A total of 563 main lake interviews were conducted during the year-long survey period, whereas only 12 interviews were conducted in the upper lake, tailrace area due to COVID-19 restrictions soon after the creel survey began. The estimated total anglers for the main lake were 42,053 (RSE = 10.0) bank anglers and 175,911 (RSE = 5.4) boat anglers. Black bass (includes Largemouth Bass *Micropterus salmoides*, Spotted Bass *M. punctulatus*, and Alabama Bass *M. henshalli*) were targeted by the majority of anglers, with the majority of effort occurring during the summer months. For all species combined, anglers caught an estimated 158,107 fish (RSE = 13.3) and harvested an estimated 48,399 fish (RSE = 19.5) throughout this study. Estimated overall catch by species was greatest for Largemouth Bass, while overall harvest by species was greatest for crappie. Percent of catch harvested was greatest for Walleye *Sander vitreus*. Just over $1 million was spent during the creel survey, with gas accounting for the greatest expense category. Approximately 80% of anglers rated their fishing experience as good or excellent during the Lake Gaston creel survey.

Lake Gaston is a 8,215-ha reservoir on the Roanoke River, located upstream of Roanoke Rapids Lake and downstream of Kerr Reservoir on the Virginia-North Carolina border. Lake Gaston is owned and operated by Dominion Energy. It was completed in 1963 and is used for hydropower production, flood control, water supply, and recreation. The lake has a maximum depth of 29 m and a mean depth of 6 m. Lake Gaston and Roanoke Rapids Lake are subject to licensing by the Federal Energy Regulatory Commission (FERC). Both projects were re-licensed

under FERC license number P-2009. The life of the license is forty years and was issued on March 31, 2004 and re-issued as 'revised' on March 4, 2005. Lake Gaston has 350 miles of shoreline that is heavily developed with residential communities. Predominant shoreline habitats include piers, riprap, and bulkheads. However, there are remaining areas of natural aquatic structure such as woody debris and vegetation. Specific conservation easements are in effect and new development is monitored through a shoreline management plan. Lake Gaston is a popular destination seasonally for boating, swimming, and other water sports. In addition, recreational fishing is common throughout the year.

Lake Gaston supports a multi-species fishery consisting of Largemouth Bass *Micropterus salmoides*, Striped Bass *Morone saxatilis*, Black Crappie *Pomoxis nigromaculatus*, White Crappie *P*. *annularis*, sunfish *Lepomis* spp., Blue Catfish *Ictalurus furcatus*, Channel Catfish *I*. *punctatus*, White Perch *Morone americana*, Yellow Perch *Perca flavescens*, and Walleye *Sander vitreus*. Additionally, open water forage fish, species in the family Clupeidae, including Alewife *Alosa pseudoharengus*, Blueback Herring *A*. *aestivalis*, Gizzard Shad *Dorosoma cepedianum*, and Threadfin Shad *D*. *petenense*, play an important role in the food web at Lake Gaston. In recent years, a new Micropterus species has become established in Lake Gaston and until genetic testing is completed in 2021, it is unclear if these fish are Alabama Bass M. *henshalli* or Spotted Bass M. punctulatus or a hybrid of the two species. In the absence of genetic confirmation, all fish of these unconfirmed species are considered Spotted Bass.

Creel data are crucial to assessing patterns in angler use, to evaluating harvest regulations, and for addressing species-specific concerns. Additionally, as part of the FERC re-licensing agreement, the North Carolina Wildlife Resources Commission shall conduct a creel survey once every six years at Lake Gaston or Roanoke Rapids Lake. Based on this provision, a roving angler survey was conducted on Lake Gaston from 1 December 2019 through 30 November 2020 to determine angler effort, catch, and harvest. The following is a data summary of the 2019-2020 Lake Gaston creel survey.

Methods

Survey Design and Data Collection

Boat and bank fishing at Lake Gaston was assessed through a 12-month roving creel survey (Pollock et al 1994). The survey period was stratified according to the twelve calendar months. Each month was stratified by lake area and day type with North Carolina state holidays, Fridays, Saturdays, and Sundays treated as weekend days and all other days treated as weekdays. The lake area was defined by partitioning Lake Gaston into eight zones, with the Kerr Dam Tailrace area as the ninth zone (Figure 1). Each sample day was stratified by work period (am or pm) and zone. Work period strata were of equal duration (4.75–7 h depending on solar day length). The eight main lake zones were all given equal probability of being sampled during a particular sample day, whereas zone nine had a much lower probability of being selected, with the exception of the spring months (March, April, and May), in which zone nine probabilities were similar to the other zones (Appendix 1).

To incorporate the Kerr Dam Tailrace bank fishing area that is inaccessible by boat, the total number of unique anglers were counted for a work period and anglers were interviewed as they left the access area. If a work period was nearing completion and anglers were still fishing, all anglers were interviewed just prior to the end of a work shift. Interview questions were as specified below. However, due to COVID-19 restrictions interviews were only conducted through March at the Kerr Dam Tailrace, with the remainder surveys in this zone being angler counts only.

For each sample day on any of the eight main lake zones, one creel clerk traveled along a circuit to count and interview boat and bank anglers in the process of fishing (Pollock et al. 1994). Additionally, due to the ability to social distance while doing interviews from the creel boat, the main lake component of the creel survey was uninterrupted due to the pandemic. Creel counts and interviews were conducted on pre-assigned sample days which included eight weekend days and twelve weekdays each month. Within each zone, the direction of travel (clockwise or counterclockwise) was selected at random for each day. Angling effort was estimated using progressive counts of boat and bank anglers along the roving circuit (Pollock et al. 1994). In segments with heavy angling effort, both boat and bank anglers were systematically sub-sampled for interviews; for example, every other or every third angler was interviewed. Boat and bank anglers were asked for the start time of their fishing trip, the species of fish targeted, the number and species of fish caught, the number and species of fish harvested, the anglers' county of residence, estimated trip expenditures, number of individuals in the fishing party, type of bait used, along with opinions on Blue Catfish regulations, Spotted Bass introductions, and trip satisfaction (Appendix 2). For boat anglers, additional information was gathered on the origination of the fishing trip (public access, private access, or live on the lake). No fish were measured or weighed during the survey. Anglers that were not targeting one specific species of fish were classified as fishing for "anything" or anything that bites; "general bass" or any of the black bass species at Lake Gaston; or "general catfish" or any of the catfish species at Lake Gaston. The vast majority of crappie at Lake Gaston are Black Crappie and although crappie were not specifically identified to species during the creel survey, it is assumed that all crappie caught and/or harvested were Black Crappie. To assess the scope of night fishing activities, boat and bank anglers were asked if they fish at night and if so, what species do they fish for.

Non-angling recreational boaters

As the angling survey was conducted, counts of pleasure boats, sail boats, jet skis, and paddle boats (e.g., non-fishing canoes and kayaks) were made to estimate non-angling boating pressure at Lake Gaston. Pleasure boats were considered to be all recreational boats that were not obvious fishing boats, such as ski boats and non-fishing pontoon boats. Counts consisted of a simple tally of pleasure boats, sail boats, jet skis, and paddle boats with no attempt to determine the number of individuals on board or to conduct any interviews.

Data Analysis

All analyses were conducted by Survey Solutions, LLC. All estimates were calculated using standard methods for creel surveys outlined in Pollock et al. (1994). Estimates of effort, catch,

and harvest were broken down into monthly strata, while overall effort and directed effort was estimated for each species and was also broken down by monthly strata and by angler type. Relative standard errors were estimated as a measure of precision for creel estimates (Malvestuto et al. 1978).

Results

Tailrace Angling Results

A total of 12 tailrace angler interviews were conducted. Tailrace anglers fished an estimated 5,358 angler-hours (RSE = 6.1) during the year. This effort varied by month, with the majority of effort occurring during the spring (Table 1).

Main Lake Angling Effort

A total of 563 interviews were conducted during the survey, with 145 of those being bank or pier interviews and 418 being boat interviews, including 11 kayak anglers. There was an estimated total of 217,964 (RSE = 4.7) angler hours of effort during the survey, including 175,911 (RSE = 5.4) angler hours of boat effort and 42,053 (RSE = 10.0) angler hours of bank effort. Seasonal differences in angling effort were observed, with the majority of overall effort (41%) occurring during the summer months (June, July, and August) for boat and bank anglers, with 42% of all boat effort during the summer and 34% of all bank effort during the summer (Table 2). Specifically, July had the greatest amount of boat angling effort, while August had the greatest amount of bank angling effort, with December having the least amount of angling effort for boat and bank anglers (Table 2).

Directed effort varied by species. General bass received 39% of the total annual fishing effort, while anything (non-specific generalists) and Largemouth Bass received 28% and 14%, respectively (Table 3). Black bass (including general bass, Largemouth Bass, and Spotted Bass) received a total of 54% of overall fishing effort. General catfish anglers contributed 7% of overall effort, while Blue Catfish specific anglers contributed 2% of the overall annual effort. Black Crappie anglers contributed 6% of the overall effort, whereas Striped Bass anglers only contributed 1% of the annual angler effort.

Catch and Harvest

Anglers caught an estimated 158,107 fish (RSE = 13.3) and harvested an estimated 48,399 fish (RSE = 19.5), with the majority of the overall catch occurring during April and the majority of the harvest occurring during May (Table 4). The lowest overall catch occurred during February, while the lowest overall harvest occurred during August. Estimated overall catch by species was greatest for Largemouth Bass (45,922 fish; RSE = 17.8) and Spotted Bass (38,380 fish; RSE = 18.9), followed by Black Crappie (21,557 fish; RSE = 33.1), whereas the overall estimated harvest by species was greatest for Black Crappie (18,031; RSE = 31.6), followed by White Perch (7,769; RSE = 41.0) (Table 5). The percentage of catch harvested by species was greatest for Walleye (100%), followed by Black Crappie (84%) and was lowest for Largemouth Bass (13%) and Spotted Bass (9%) (Table 5).

Night Fishing

A total of 78 anglers (14%) indicated that they did fish at night while 478 anglers (86%) did not. Night angling species by order of preference included: catfish (55%); Black Crappie (19%); Largemouth Bass and Spotted Bass (18%); any species (4%); and Striped Bass (3%).

Angler Characteristics

An estimated total of $1,003,095 (RSE = 46.7) was spent overall by anglers during the Lake Gaston creel survey. Gasoline accounted for the majority of expense at $459,968 (RSE = 27.1), followed by lodging at $302,148 (RSE = 143.3), and food at $90,249 (RSE = 28.8) (Table 6). The majority of angling parties (97%) indicated a trip origin from either North Carolina or Virginia, followed by a small percentage from Maryland and nine other states (Table 7). Furthermore, the majority (60%) of North Carolina and Virginia anglers were from the five counties surrounding the lake. A total of 552 angling parties rated their overall fishing experience, with 22% indicating excellent, 56% indicating good, 12% indicating fair, and 9% indicating a poor experience. Artificial bait was used by 67% of anglers, natural or live bait was used by 24% of anglers, while a combination of both types was used by 9% of all anglers interviewed. The majority of anglers (54%) supported or strongly supported trophy Blue Catfish regulations at Lake Gaston, with 9% opposed or strongly opposed, 7% not sure or unaware, and 31% neutral. Unlike Blue Catfish, opinions on Spotted Bass were more balanced with 31% opposed or strongly opposed to Spotted Bass in Lake Gaston, 27% supporting or strongly supporting, 12% not sure or unaware, and 30% were neutral.

Boating Trips

An overall total of 87,496 recreational, non-fishing boats were estimated during the creel survey, with 52,548 pleasure boats, 27,423 jet skis, 7,085 paddle boats (non-fishing canoes and kayaks), and 440 sail boats (Table 8). The majority of these boating trips occurred during the summer months, while the fewest trips occurred during the winter months.

Discussion

Only 12 interviews were conducted in the tailrace section (Zone 9) during January and March prior to cessation of in person interviews due to COVID-19 restrictions. However, counts were still made to estimate effort in the tailrace fishing area during the remainder of the creel survey with the total amount of angling effort comparable to the tailrace angling effort of 7,253 (SE = 792) in the most recent Lake Gaston creel survey conducted from September 2007 through August 2008 (Rundle et al. 2015).

The total amount of angling effort for the main lake was somewhat lower than the Lake Gaston 2007-2008 creel survey of 328,309 (SE = 19,170) angler hours, which excludes the tailrace area also, yet was much greater than a recent Roanoke Rapids Lake creel survey conducted from December 2013 through November 2014 of 18,902 (SE = 5,536) angler hours (Rundle et al. 2015). Seasonal effort differed between the current creel survey and the 2007-2008 Lake Gaston creel survey with the majority of effort (42%) occurring during the spring in the 2007-2008 Lake Gaston creel survey (Rundle et al. 2015). However, the seasonal effort was

very similar to the 2013-2014 Roanoke Rapids Lake creel survey, which had approximately 40% of the effort during the summer months. Black bass (i.e., Largemouth Bass and Spotted Bass) was the most popular species targeted during the current creel survey. Largemouth Bass are typically the most sought after species in reservoir fisheries. For example, Largemouth Bass anglers accounted for the majority of the directed effort (42%) during a recent Lake Norman creel survey (NCWRC; unpublished data), and during the 2007-2008 Lake Gaston creel survey directed effort for this. Additionally, during the previous Lake Gaston creel survey, the only option for black bass was Largemouth Bass and if you combine the black bass categories during the current creel survey, Largemouth Bass effort could be as high as 54% and is comparable to the 2007-2008 black bass level of angling effort.

As mentioned, total angling effort declined since the previous Lake Gaston creel survey. Causes for the decline in fishing effort are unknown, yet may result from reduced interest in fishing, displacement of day anglers by other water users, or variations in weather patterns. The overall amount of recreational boaters during the current creel survey was almost twice the level during the 2007-2008 Lake Gaston creel survey. This may have displaced some portion of the fishing effort to night angling in which, if accounted for, would increase the total angling effort. Finally, COVID-19 may have caused a shift in angling patterns, yet most anecdotal observations show that angling effort in North Carolina increased during the pandemic and did not decrease. In-spite of a decline from the previous survey, angling effort at Lake Gaston remains high, particularly in comparison to similar Piedmont reservoirs. Boat angling effort for Lake Gaston was 21 h/ha on average for the study, while the creel survey at Lake Norman found boat angling effort to be similar at 24 h/ha (NCWRC; unpublished data). Such estimates exhibit the value of Lake Gaston to recreational anglers.

As with overall angling effort, overall catch and harvest values followed a similar pattern and were lower than values obtained during the 2007-2008 Lake Gaston creel survey of 283,879 fish (SE = 21,291) total catch and 76,560 fish (SE = 9,365) total harvest (Rundle et al. 2015). The species with the highest level of directed effort (Largemouth Bass) also had the highest level of catch (162,665; SE = 13,783) during the 2007-2008 Lake Gaston creel survey, which equated to 57% of the total catch and was comparable to the current creel survey with black bass also having the highest estimated number of fish caught at 53% of the total estimated catch. The species with the greatest number of fish harvested during the 2007-2008 Lake Gaston creel survey was Black Crappie (19,463; SE = 4,188), which equated to 25% of the total estimated number of fish harvested and was comparable to the current creel survey in which Black Crappie also accounted for the greatest number of fish harvested at 38% of the total estimated harvest. Harvest rates varied by species, with the majority of Largemouth Bass anglers practicing catch and release fishing. Harvest rates for black bass during the current creel survey were comparable to the 2007-2008 Lake Gaston creel survey in which only 10% of all Largemouth Bass caught were harvested. Additionally, the species with highest rates of harvest for the current creel survey and the 2007-2008 Lake Gaston creel survey were Black Crappie and Walleye, with Walleye having a 100% harvest rate during both creel surveys. Both Blue Catfish and Spotted Bass are invasive species at Lake Gaston. Opinions on Blue Catfish were related to trophy regulations, whereas opinions on Spotted Bass were related to their presence

in the lake. It is not surprising that a majority of anglers are in favor of trophy regulations for Blue Catfish that would in theory translate into larger fish caught. It appears that a good portion of anglers realize the negative consequences of a newly introduced species such as Spotted Bass with about one-third of those surveyed being opposed to Spotted Bass being in the lake, albeit an almost equal percent of anglers, unfortunately favored their introduction. Regardless, both species are in the lake to stay and management must deal with them and hopefully educate anglers against the further spread of invasive species.

The total amount of money spent during the current creel survey was considerably less than the estimated total of $2,282,145 (SE = 261,183) spent overall by anglers during the 2007–2008 Lake Gaston creel survey (Rundle et al. 2015), yet considerably more than the estimated total of $122,296 (SE = 14,644) spent overall by anglers during the 2013-2014 Roanoke Rapids Lake creel survey (Rundle et al. 2015). As with the current creel survey, gas was the highest expense category during the 2013-2014 Roanoke Rapids Lake creel survey, whereas lodging was the greatest expense category during the 2007-2008 Lake Gaston creel survey. However, relatively few anglers reported staying overnight during the 2007-2008 Lake Gaston creel survey, whereas the majority of anglers did report spending money on gas. It is surmised that a few expensive lodging trips can inflate the lodging category, which was slightly less than gas expenses during the current creel survey. Angler origin in this survey was very similar to the 2007-2008 Lake Gaston creel survey, with 93% indicating a trip origin from North Carolina or Virginia and approximately half of those considered “local” anglers originating from the five counties surrounding the lake. The percentage of anglers that indicated fishing at night was about half of the level from the 2007-2008 Lake Gaston creel survey, but catfish was still the most popular fish targeted by far after dark during both creel surveys. Night fishing effort, catch, and harvest that was not captured during the daytime creel survey would likely increase the annual overall estimates, particularly for catfish. The percentage of anglers indicating either a good or excellent fishing trip doubled to approximately 80% compared to the 2007-2008 Lake Gaston creel survey, whereas the bait choice by anglers was nearly identical (Rundle et al. 2015).

The estimated total expenditures of Lake Gaston anglers during the creel survey period were just over $1 million, which does not include the cost of boats, motors, vehicles, and other major accessories. With the majority of anglers surveyed originating from the five counties surrounding the lake, the recreational fishery at Lake Gaston generated significant revenue for the local economy from local anglers. These numbers illustrate the importance of the Lake Gaston fishery among anglers, suggest the presence of a high quality fishery, and should be considered as a motive for further enhancement of habitat and water quality for the benefit of fish and anglers. A cumulative reduction in habitat and water quality resulting from increased development in the Lake Gaston watershed has the potential to lessen the revenues of local businesses that depend on angler expenditures. Conversely, improvements in habitat quality, and careful consideration of development projects, have the potential to increase revenues to these local businesses.

Acknowledgments

The Lake Gaston creel survey was funded through Federal Aid in Fish Restoration and Dominion Energy.

References

Malvestuto, S. P., W. D. Davies and W. L. Shelton. 1978. An evaluation of the roving creel survey with nonuniform probability sampling. Transactions of the American Fisheries Society. 107(2):255-262.

Pollock, K. H., C. M. Jones, and T. L. Brown. 1994. Angler survey methods and their applications in fisheries management. American Fisheries Society, Special Publication 25, Bethesda, Maryland.

Rundle, K. R., W. J. Collart, and B. J. McRae. 2015. Lake Gaston Creel Survey, 2007–2008. North Carolina Wildlife Resources Commission, Federal Aid in Sport Fish Restoration, Project F-23, Final Report, Raleigh.

Rundle, K. R., W. J. Collart, B. J. McRae, and N. C. Oakley. 2015. Roanoke Rapids Lake Creel Survey, 2013–2014. North Carolina Wildlife Resources Commission, Federal Aid in Sport Fish Restoration, Project F-23, Summary Report, Raleigh.

Table 1.—Total angling effort (angler-h) with relative standard errors (RSE) in parentheses by months surveyed at the Lake Gaston Tailrace (Zone 9), during the Lake Gaston 2019-2020 creel survey.

Month	Total Angler Hours	RSE
Dec	—	—
Jan	268	(n/a)
Feb	—	—
Mar	296	(n/a)
Apr	1,320	(n/a)
May	1,137	(n/a)
Jun	—	—
Jul	605	(n/a)
Aug	545	55.7
Sep	547	21.6
Oct	640	(n/a)
Nov	—	—
Total	5,358	6.1

Table 2.—Estimated monthly angling effort (angler-h) with relative standard errors in parentheses during the Lake Gaston 2019-2020 creel survey.

	Bank		Boat		Total	
	Angler Hours		Angler Hours		Angler Hours	
Dec	359	(55.9)	3,267	(27.5)	3,625	(27.1)
Jan	1,655	(35.3)	4,450	(31.9)	6,105	(26.7)
Feb	1,801	(35.8)	4,444	(29.9)	6,246	(27.3)
Mar	4,956	(31.2)	10,328	(16.9)	15,284	(18.7)
Apr	2,644	(27.7)	11,166	(23.6)	13,810	(21.9)
May	5,807	(25.9)	18,586	(16.9)	24,394	(15.8)
Jun	2,666	(37.5)	22,804	(14.9)	25,470	(13.6)
Jul	5,204	(25.7)	27,276	(13.5)	32,480	(12.1)
Aug	6,603	(29.4)	24,423	(14.0)	31,026	(9.8)
Sep	4,809	(42.0)	18,289	(20.2)	23,099	(16.4)
Oct	3,766	(21.7)	21,358	(15.8)	25,124	(13.8)
Nov	1,781	(38.3)	9,521	(20.1)	11,302	(18.9)
Total	42,053	(10.0)	175,911	(5.4)	217,964	(4.7)

Table 3.—Estimated directed annual angling effort (angler-h) with relative standard errors in parentheses by species during the Lake Gaston 2019-2020 creel survey.

	Bank			Boat			Total		
	Angler Hours		%	Angler Hours		%	Angler Hours		%
Anything	30,905	(33.7)	74	30,992	(15.3)	18	61,897	(18.5)	28
General Bass	1,700	(238.2)	4	83,366	(8.9)	47	85,066	(10.0)	39
Largemouth Bass	2,719	(121.9)	7	28,145	(15.1)	16	30,864	(17.4)	14
Spotted Bass	-	-	-	1,105	(84.7)	1	1,105	(84.7)	1
General Catfish	3,789	(119.4)	9	10,963	(24.7)	6	14,752	(35.7)	7
Blue Catfish	-	-	-	3,323	(50.7)	2	3,323	(50.7)	2
Striped Bass	53	(1,474)	< 1	2,527	(51.8)	1	2,580	(59.1)	1
Crappie	2,310	(131.0)	6	11,027	(25.6)	6	13,337	(31.0)	6
Sunfish	-	-	-	1,007	(88.6)	1	1,007	(88.6)	1
White Perch	573	(367.3)	1	2,983	(39.9)	2	3,556	(68.0)	2
Walleye	-	-	-	475	(98.8)	< 1	475	(98.8)	< 1

Table 4.—Estimated monthly catch and harvest with relative standard errors in parentheses for all species combined during the Lake Gaston 2019-2020 creel survey.

	Catch		Harvest	
Dec	9,384	(57.3)	3,643	(72.1)
Jan	2,258	(51.8)	1,099	(84.9)
Feb	1,677	(40.6)	764	(48.7)
Mar	7,098	(51.8)	1,833	(71.9)
Apr	25,473	(59.8)	11,814	(49.9)
May	23,774	(31.2)	12,269	(42.3)
Jun	17,014	(23.9)	4,713	(50.2)
Jul	16,238	(30.4)	3,315	(76.9)
Aug	19,519	(25.8)	713	(66.4)
Sep	9,503	(39.9)	1,752	(47.8)
Oct	20,692	(24.9)	5,014	(43.5)
Nov	5,479	(33.1)	1,471	(45.9)
Total	158,107	(13.3)	48,399	(19.5)

Table 5.—Estimated catch and harvest by species with relative standard errors in parentheses and percent harvested during the Lake Gaston 2019-2020 creel survey.

	Catch		Harvest		Percent Harvested
Largemouth Bass	45,922	(17.8)	5,866	(32.5)	13
Spotted Bass	38,380	(18.9)	3,599	(43.3)	9
General Catfish	2,141	(180.2)	1,207	(251.2)	56
Blue Catfish	9,548	(47.9)	3,124	(77.4)	33
Channel Catfish	2,067	(155.4)	857	(201.9)	42
Flathead Catfish	657	(207.2)	508	(141.5)	77
Striped Bass	4,897	(121.6)	1,027	(285.3)	21
Crappie	21,557	(33.1)	18,031	(31.6)	84
Sunfish	19,598	(34.4)	6,268	(63.2)	32
White Perch	13,200	(36.0)	7,769	(41.0)	59
Walleye	143	(163.3)	143	(163.3)	100

Table 6.—Estimated money spent by month with relative standard errors in parentheses during the Lake Gaston 2019-2020 creel survey.

	Gas	Food	Bait	Lodging	Guide	Total
Dec	13,430 (74.0)	2,968 (76.4)	1,410 (151.8)	15,396 (148.4)	12,985 (161.6)	46,299 (87.6)
Jan	9,000 (119.7)	2,134 (130.2)	1,387 (206.2)	0	17,786 (234.3)	30,379 (157.4)
Feb	26,374 (109.2)	3,959 (61.9)	1,712 (154.5)	0	0	32,045 (94.3)
Mar	35,719 (102.1)	7,144 (176.7)	6,182 (120.3)	0	0	49,045 (94.7)
Apr	18,986 (92.2)	1,060 (206.6)	6,623 (197.0)	0	0	26,669 (98.8)
May	46,122 (103.8)	11,208 (61.5)	19,044 (169.4)	39,675 (90.5)	0	117,537 (62.9)
Jun	51,382 (131.7)	13,550 (108.7)	5,252 (90.6)	0	0	70,564 (100.9)
Jul	63,339 (70.5)	3,918 (119.5)	0	0	0	69,085 (70.2)
Aug	45,605 (73.5)	20,652 (52.5)	6,023 (80.3)	240,935 (178.8)	0	316,657 (135.7)
Sep	73,824 (53.3)	9,843 (62.4)	9,843 (82.8)	0	0	94,823 (48.7)
Oct	57,760 (61.1)	8,746 (66.6)	15,154 (114.9)	0	0	81,660 (54.8)
Nov	18,427 (55.3)	5,067 (79.6)	3,071 (221.0)	6,142 (221.3)	34,550 (221.3)	68,332 (144.0)
Total	459,968 (27.1)	90,249 (28.8)	75,701 (55.2)	302,148 (143.3)	65,321 (137.1)	1,003,095 (46.7)

Table 7.—Angler origin by state during the Lake Gaston 2019-2020 creel survey.

State	Frequency	Percentage
North Carolina	747	86.9
Virginia	84	9.8
Maryland	15	1.7
Pennsylvania	3	0.3
Georgia	2	0.2
Iowa	2	0.2
Kentucky	2	0.2
New Jersey	1	0.1
New York	1	0.1
South Carolina	1	0.1
Tennessee	1	0.1
Texas	1	0.1

Table 8.—Estimated overall monthly recreational boats by type during the Lake Gaston 2019-2020 creel survey.

	Pleasure Boats	Sail Boats	Jet Skis	Paddle Boats
Dec	258	0	42	42
Jan	527	0	0	88
Feb	328	0	0	23
Mar	1,556	0	390	425
Apr	1,163	12	133	325
May	3,889	37	1,352	734
Jun	8,023	108	3,937	1,418
Jul	13,845	67	9,534	1,599
Aug	12,363	68	8,651	1,610
Sep	6,050	148	2,621	342
Oct	3,264	0	615	414
Nov	1,282	0	148	65
Total	52,548	440	27,423	7,085

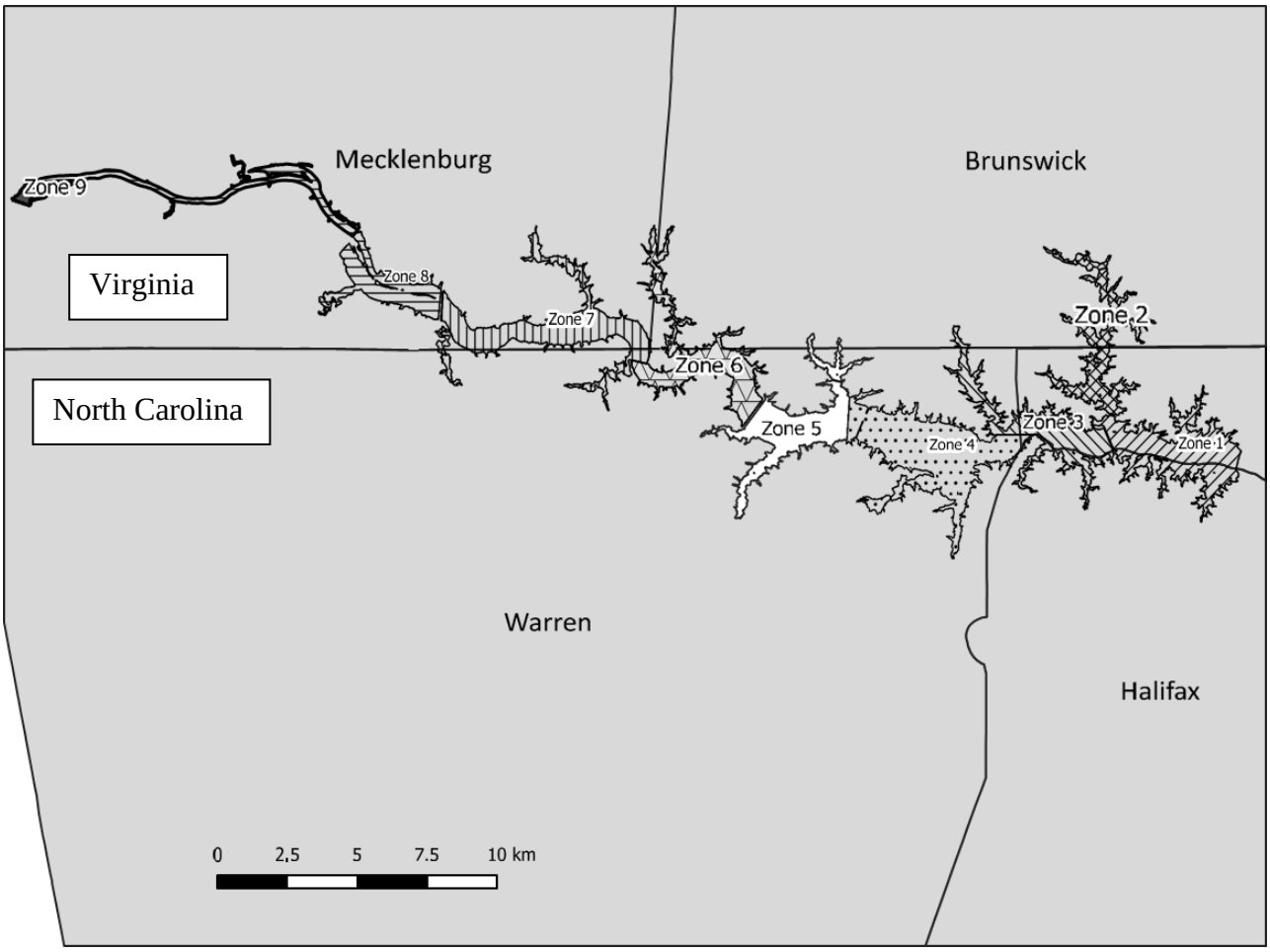

Figure 1.—Lake Gaston map showing the eight zones and the tailrace angling area (Zone 9) for the creel survey, December 2019–November 2020.

Appendix 1: Probabilities used for the Lake Gaston creel survey, Dec. 2019-Nov. 2020.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Tailrace	Total
Dec	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.0200	1.0000
Jan	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.0200	1.0000
Feb	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.0200	1.0000
Mar	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1000	1.0000
Apr	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1000	1.0000
May	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1125	0.1000	1.0000
Jun	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.0800	1.0000
Jul	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.0800	1.0000
Aug	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.0800	1.0000
Sep	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.0800	1.0000
Oct	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.1150	0.0800	1.0000
Nov	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.1225	0.0200	1.0000

Appendix 2: Interview sheet used for the Lake Gaston creel survey, Dec. 2019-Nov. 2020.

Interview Date: __ __ / __ __ / 2 0 __ __ **Zone:** _____ **Direction:**_____

Completed Trip / Incomplete / Refused / Other (*Circle one*)

Record Time of Interview:___:___ **Record Angler Time Started:** ___:___

Have we surveyed you at the lake before today? Yes/No (*If yes, ask for name*) Name: _____

How Many Anglers in your Party? _____

Fishing Method: ___Boat ___Bank ___Fishing Pier ___Guided ___Kayak ___Tournament ___Other_____

If fishing from a boat: **How did you access the lake today?**___Public Access___Live on Lake ___Private Access

What are you fishing for today? ___Largemouth Bass ___Striped Bass ___Crappie ___Sunfish/Bream ___Catfish *spp.*_____ ___Walleye ___Anything ___Other (*Specify*)_____

How many fish did you catch by species? Keep?

If you released fish today, why? (*circle all that apply*) undersize/oversize/over limit/other_____

What fishing method/bait are you using? ___Live ___Artificial ___Cut ___Fly Rod ___Other_____

Do you fish at night? (Yes / No) **If so, what do you fish for?**

_____

What county are you from? If not NC/VA, what state are you from? (*Enter # anglers from each, e.g. 2 Halifax*)
____Halifax NC ____Northampton NC ____Warren NC ____Brunswick VA ____Mecklenburg VA
____NC County_____ ____VA County_____ ____Out of State_____

For your fishing trip today, how much do you expect to spend on:
$_____Food/Beverage $____Ice $____Bait $____Boat Fuel/Oil $____Vehicle Fuel $____Guide Fees $_____Lodging
How much more would you be willing to pay overall for a similar trip? $_____

Trophy regulations protecting invasive Blue Catfish were recently implemented at Lake Gaston. Please indicate:
Do you: ___Strong Support ___Support ___Neutral ___Oppose ___Strong Oppose ___Not Sure ___Wasn't Aware

Invasive Spotted Bass have become established in Lake Gaston by accidental introduction and may compete with other predatory fish such as Largemouth Bass and Striped Bass. Please indicate your reaction to Spotted Bass.
Do you: ___Strong Support ___Support ___Neutral ___Oppose ___Strong Oppose ___Not Sure ___Wasn't Aware

Please rate your overall trip satisfaction: ___Poor ___Fair ___Good ___Excellent