ROANOKE RAPIDS LAKE CREEL SURVEY, 2013–2014

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

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2015

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

Introduction

Roanoke Rapids Lake is a 1,860-ha reservoir on the Roanoke River, located immediately downstream of Lake Gaston (Figure 1). Roanoke Rapids Lake is owned and operated by Dominion North Carolina Power. It was completed in 1955 and is used for hydropower production, flood control, water supply, and recreation. Roanoke Rapids Lake and Lake Gaston are subject to licensing by the Federal Energy Regulatory Commission (FERC). Both projects were recently 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 'amended' on March 4, 2005. Roanoke Rapids Lake has approximately 50 miles of shoreline that is moderately developed with residential communities. Predominant shoreline habitats include woody debris and vegetation, along with piers, riprap, and bulkheads. Invasive aquatic vegetation such as hydrilla *Hydrilla verticillata* and Eurasion watermilfoil *Myriophyllum spicatum* are predominant in many areas of the lake. Roanoke Rapids Lake is a popular destination seasonally for boating, swimming, and other water sports. In addition, recreational fishing is common throughout the year. Roanoke Rapids Lake supports a multi-species fishery consisting of Largemouth Bass *Micropterus salmoides*, Striped Bass *Morone saxatilis*, Black Crappie *Pomoxis nigromaculatus*, White Crappie *Pomoxis annularis*, sunfish *Lepomis* spp., catfish *Amerius* spp. and *Ictalurus* spp., White Perch *Morone americana*, Yellow Perch *Perca flavescens*, Chain Pickerel *Esox niger* and Walleye *Sander vitreus*. Additionally, open water forage fish, species in the family Clupeidae,

including Alewife *Alosa pseudoharengus*, Blueback Herring *Alosa aestivalis*, Gizzard Shad *Dorosoma cepedianum*, and Threadfin Shad *Dorosoma petenense*, play an important role in the food web at Roanoke Rapids Lake. Although both Black and White crappie are found in Roanoke Rapids Lake, no attempt was made to distinguish between the two crappie species during the creel survey interviews, or when measuring crappie, and they will be referred to simply as crappie throughout this report. Additionally, anglers targeting catfish were most likely pursuing the larger Blue Catfish *Ictalurus furcatus*, or possibly Channel Catfish *Ictalurus punctatus*, yet this was not distinguished consistently during interviews, or when catfish were measured, and they will simply be referred to as catfish throughout this report.

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 (Commission) shall conduct a creel survey once every six years at Lake Gaston or Roanoke Rapids Lake. An access creel survey was conducted on Roanoke Rapids Lake from 1 December 2013 through 30 November 2014 to determine angler effort, catch, and harvest. The following is a data summary of the 2013-2014 Roanoke Rapids Lake creel survey.

Methods

Survey Design and Data Collection

Boat fishing at Roanoke Rapids Lake was assessed through a 12-month access creel survey (Pollack et al. 1994). One creel clerk was randomly assigned to one of two Commission access areas (Thelma and Fifth Street). Due to low water levels and no trailers observed during pre-creel surveys, the Commission's Vultare access area was not included as a sample site. Creel counts and interviews were conducted on pre-assigned sample days from 1 December 2013 through 30 November 2014. Sample days included two weekend days and three weekdays for a total of five sample days within each seven-day week. Holidays were treated as weekend days. Sample days were selected at random. Sample day length varied according to solar day length and was divided into two equal work periods, an "AM period" and a "PM period". Equal work period probabilities were used for the entire creel survey for Thelma and Fifth Street. Boat anglers were asked for the start time of their fishing trip, total time spent fishing, the species of fish targeted, the number and species of fish caught, and number and species of fish harvested. Additional information was gathered on the number of individuals in the fishing party, and angler residency, and for key species, harvested fish were measured to the nearest millimeter. To access the scope of night fishing activities, anglers were asked if they fish at night. If they did, additional data was collected on trips taken within the previous week.

Non-angling recreational boaters

As the angler survey was conducted, counts of pleasure boats, sail boats, and hunting boats that were observed utilizing the boat ramp were made, in an attempt to get an idea of non-angling effort at Roanoke Rapids Lake. Pleasure boats were considered to be all recreational boats that were not obvious fishing boats, such as ski boats, jet skis and non-fishing pontoon boats. Counts consisted of a simple tally of pleasure boats, sail boats, and hunting boats using

the boat ramp, with no attempt to determine the number of individuals on board or to conduct any interviews.

Estimates

Expanded estimates of angling effort (angler-h), catch, and harvest were calculated using an electronic spreadsheet. Estimates were stratified by day type (weekday or weekend/holiday) and month with associated standard errors computed. Daily angling effort in the survey area was determined by expanding the observed effort (from angler interviews) by the sample unit probability (product of access area probability and time of day probability). Catch (*C*) and harvest (*H*) was estimated from angling effort (*E*) and day-wise mean catch (harvest) rates as:

$$\hat{C} = \hat{E} \times \hat{R}$$

where

$$\hat{R} = \frac{\sum_{i=1}^{n} c_i / L_i}{n}$$

with *ci* = catch and *Li* = hours of fishing reported by each angling party (*i*) interviewed during the work period.

For each stratum (weekday or weekend/holiday) in the creel survey, the mean of all daily estimates was multiplied by the number of available sample days to obtain monthly estimates of angling effort, catch, and harvest.

Approximate standard error (SE) of each estimate (e.g., effort or *E*) was computed as:

$$\hat{SE}\left(\hat{E}\right) \approx \sqrt{N^2\left(\frac{s^2}{n}\right)}$$

where s^2 = variance of sample observations, n = number of days sampled, and N = number of days available for sampling. Seasons were defined as: winter (December, January, February); spring (March, April, May); summer (June, July, August); and fall (September, October, November).

In addition to total angling effort, directed effort was estimated for Striped Bass, Largemouth Bass, crappie, catfish, sunfish (all centrarchids other than Largemouth Bass and crappie), White Perch, and “any species” (undirected effort). Size distributions (length frequencies) for harvested species were constructed and are presented in this report. Angler demographic, economic, and opinion data are also summarized.

Results and Discussion

Angling Effort

A total of 575 interviews were conducted during the survey period, with an average of 1.7 anglers in each angling party. Total angling effort on Roanoke Rapids Lake was estimated at 18,902 angler-h (SE = 5,536). This was considerably less than the overall effort by boat anglers of 296,850 angler-hours (SE = 15,920), during a recent Lake Gaston creel survey from September 2007 through August 2008 (Rundle et al. 2009). Weekday anglers fished an estimated 9,324 angler-h (SE = 2,804), while weekend anglers fished an estimated 9,578 angler-h (SE = 2,733). Seasonal differences in angling effort were observed. The majority of the total annual effort occurred during the summer and accounted for 39% of the overall effort, followed closely by effort during the spring at 34% (Figure 2).

Directed effort varied by species, with Striped Bass receiving 28.0% of the total annual fishing effort, followed closely by Largemouth Bass at 25.3%, and "any species" at 24.9%, with a considerable decline in effort for the next most popular species, White Perch at 7.9% (Figure 3). 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 (81%) by boat anglers during the Lake Gaston 2007-2008 creel survey, with the next most popular species, Striped Bass and catfish receiving much less effort at 6% and 5%, respectively (Rundle et al. 2009). Although Striped Bass did receive the most overall effort during this creel survey, Largemouth Bass received the greatest amount of effort for the spring season by a large margin (Table 1).

Catch and Harvest

Anglers caught an estimated 18,509 fish (SE = 6,565) and harvested an estimated 8,616 fish (SE = 4,054), with the majority of the overall catch and harvest occurring during the summer season, followed closely by the spring season (Figure 4). As with overall angling effort, these values were also considerably lower than values obtained of 258,939 fish (SE = 20,535) total catch by boat anglers and 61,151 fish (SE = 8,274) total harvest by boat anglers during the Lake Gaston 2007-2008 creel survey (Rundle et al. 2009).

Striped Bass at Roanoke Rapids Lake have a current minimum size limit of 508 mm with a 4 fish daily creel limit from October–May. There is no minimum size limit June–September. Length frequencies of fish harvested by interviewed anglers showed approximately 97% of Striped Bass measured were above the 508 mm minimum size limit (Figure 5). The Striped Bass harvested measuring less than 508 mm was during the no minimum size limit season between June–September.

Largemouth Bass at Roanoke Rapids Lake have a current minimum size limit of 356 mm with a 5 fish daily creel limit, with 2 fish allowed below the minimum size limit. Approximately 97% of the Largemouth Bass harvested were above the legal size limit of 356 mm (Figure 6).

Harvested catfish showed a variable length distribution with peaks occurring in the 325 and 650 mm size classes. Approximately 20% of catfish were greater than 700 mm (Figure 7). It is likely that these larger catfish were predominantly Blue Catfish. White Perch measured during the creel survey ranged from 100–340 mm, with most fish between 200–250 mm in length (Figure 8). Relatively few crappie were measured, yet all fish measured greater than 250 mm,

with many greater than 300 mm (Figure 9). Only ten sunfish species were measured during the creel survey, ranging between 110–220 mm.

Night Fishing

A total of 107 anglers (20%) indicated that they did fish at night while 437 (80%) did not. Night angling species included: catfish (60%), Largemouth Bass (25%), Striped Bass (9%), crappie (4%), White Perch (1%), and Longnose Gar *Lepisosteus osseus* (1%). Night fishing effort, catch, and harvest that was not captured during the day-time creel would increase the overall annual estimates, particularly for catfish, Largemouth Bass, and Striped Bass anglers.

Angler Characteristics

An estimated total of $122,296 (SE = $14,644) was spent overall by anglers during the Roanoke Rapids Lake creel survey, which 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. 2009). Observed values for the expense questions (gas, bait, food, and other expenses (i.e., something "other" than gas, bait, or food), showed that anglers spent the most money on gas (63%), followed by food and other expenses (both at 13%), and bait (11%). Approximately 40% of anglers fished with artificial bait only, with 33% using live bait only, while 27% preferred a combination of both live and artificial bait.

A total of 474 angling parties responded to the county of origin question with all indicating a trip origin from either North Carolina or Virginia, with the exception of one angling party originating from Maryland (Table 2). Most (81%) of the trips originated from the two counties (Halifax and Northampton) surrounding the lake. This is in contrast to the 2007–2008 Lake Gaston creel survey in which most of the angling trips originated from locations other than the counties surrounding the lake (Rundle et al. 2009). A total of 551 angling parties rated their overall fishing experience, with 13% indicating excellent, 47% indicating good, 23% indicating fair, and 17% indicating a poor experience. The most common responses for good and excellent fishing trips were related to beautiful weather, getting outside, success, catching fish, catching a limit of fish, and the fish were biting good. The most common responses for fair and poor fishing trips were related to poor weather, few or no fish, fish not biting, and broken equipment.

Boating Trips

An overall total of 1,195 boats were observed using the Thelma and Fifth Street boat ramps during the creel survey (Table 3). The majority of these were fishing boats, with an overall ratio of 4.3 fishing boats observed for each pleasure boat observed, 6.5 fishing boats observed for each hunting boat observed, and 143 fishing boats observed for each sail boat observed. More pleasure boats were recorded using the Fifth Street boat ramp, while more hunting boats were recorded using the Thelma boat ramp. Fishing boats were the highest observed number of boats using both boat ramps during all seasons, with the exception of more hunting boats were observed during the winter at the Thelma boat ramp (Table 3). The overwhelming majority of hunting boats observed were occupied by hunters targeting waterfowl.

Acknowledgments

The Roanoke Rapids Lake creel survey was funded through Federal Aid in Fish Restoration and Dominion Power.

References

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., William J. Collart, and B. J. McRae. 2009. Lake Gaston Creel Survey, 2007–2008. North Carolina Wildlife Resources Commission, Federal Aid in Sport Fish Restoration, Project F-23, Summary Report, Raleigh.

Table 1.—Directed angling effort (angler-h) with standard errors (in parenthesis) by season at Roanoke Rapids Lake, December 2013–November 2014. SE is not available for “any species”.

	Winter	Spring	Summer	Fall	Total
Striped Bass	579 (346)	1236 (479)	1890 (651)	1579 (750)	5,284 (2,226)
Largemouth Bass	353 (n/a)	2,289 (1,243)	1,886 (608)	253 (174)	4,781 (2,378)
Any Species	…….	…….	……	……	4,699 (n/a)
Catfish	68 (n/a)	568 (453)	1023 (489)	351 (284)	2,010 (1,294)
White Perch	338 (265)	266 (175)	239 (184)	650 (405)	1,493 (1,029)
Crappie	0	399 (334)	88 (76)	11 (n/a)	498 (421)
Sunfish	0	72 (n/a)	37 (n/a)	0	109 (n/a)
Chain Pickerel	0	29 (n/a)	0	0	29 (n/a)

Table 2.—Angler origin by county during the Roanoke Rapids Lake creel survey, December 2013–November 2014.

County	No. of Angling Parties	Percent
Halifax, NC	327	69.0
Northampton, NC	55	11.6
Nash, NC	30	6.3
Franklin, NC	18	3.8
Edgecombe, NC	10	2.1
Warren, NC	8	1.7
Vance, NC	5	1.1
Greensville, VA	5	1.1
Wake, NC	3	0.6
Augusta, VA	2	0.4
Bertie, NC	1	0.2
Chesterfield, VA	1	0.2
Forsyth, NC	1	0.2
Frederick, MD	1	0.2
Hertford, NC	1	0.2
Martin, NC	1	0.2
Mecklenburg, VA	1	0.2
Pamlico, NC	1	0.2
Pitt, NC	1	0.2
Wayne, NC	1	0.2
Wilson, NC	1	0.2

Table 3.—Number of boats observed at the Thelma and Fifth Street boat ramps by season during the Roanoke Rapids Lake creel survey, December 2013–November 2014.

	Winter	Spring	Summer	Fall	Total
Thelma					
Fishing Boats	38	146	136	88	408
Hunting Boats	111	0	0	12	123
Pleasure Boats	0	17	39	1	57
Sail Boats	0	1	0	0	1
Fifth Street					
Fishing Boats	37	182	170	63	452
Hunting Boats	10	0	0	0	10
Pleasure Boats	1	27	99	12	139
Sail Boats	0	2	2	1	5
Total	197	375	446	177	1,195

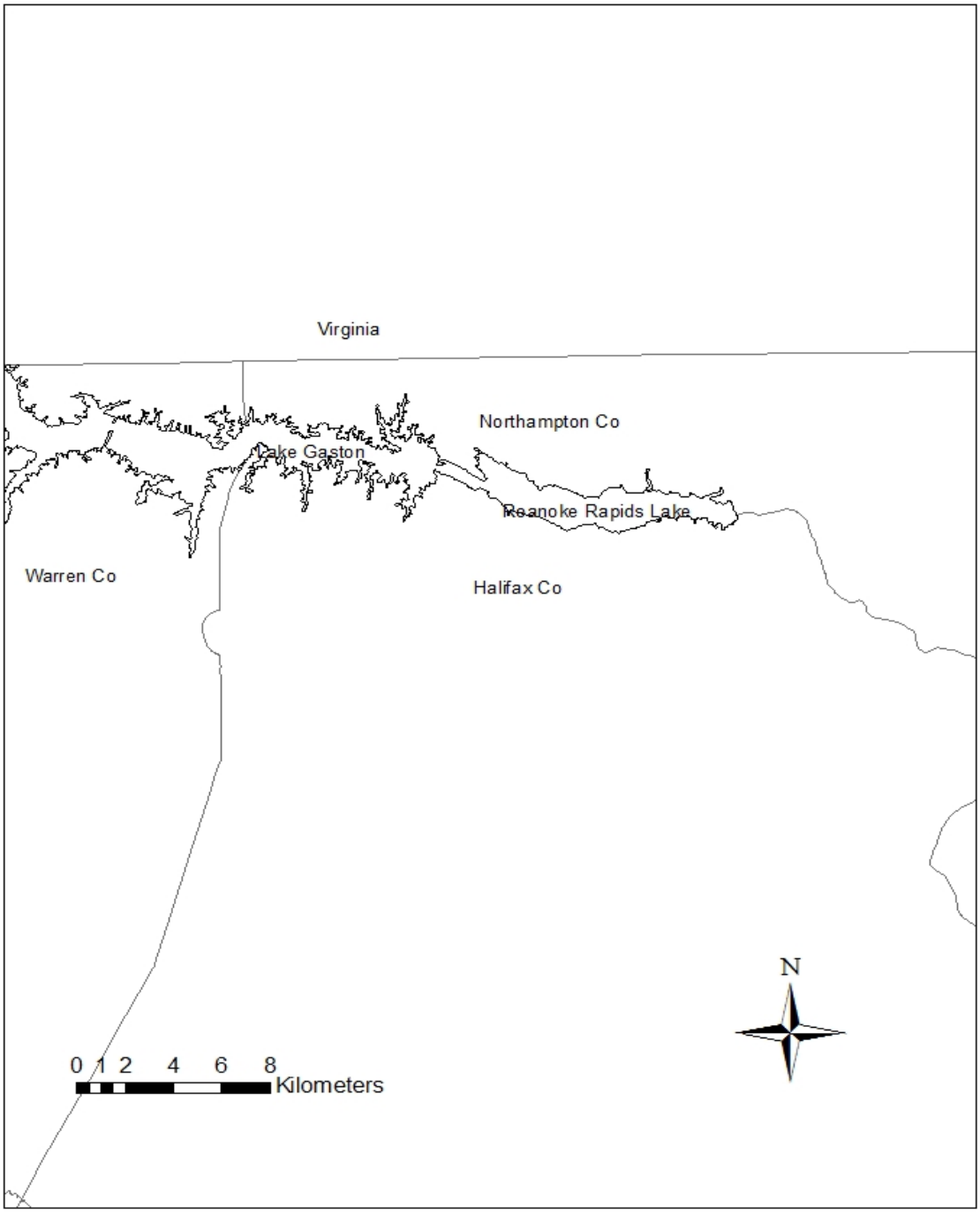


Figure 1.—Map showing Roanoke Rapids Lake on the Virginia-North Carolina border.

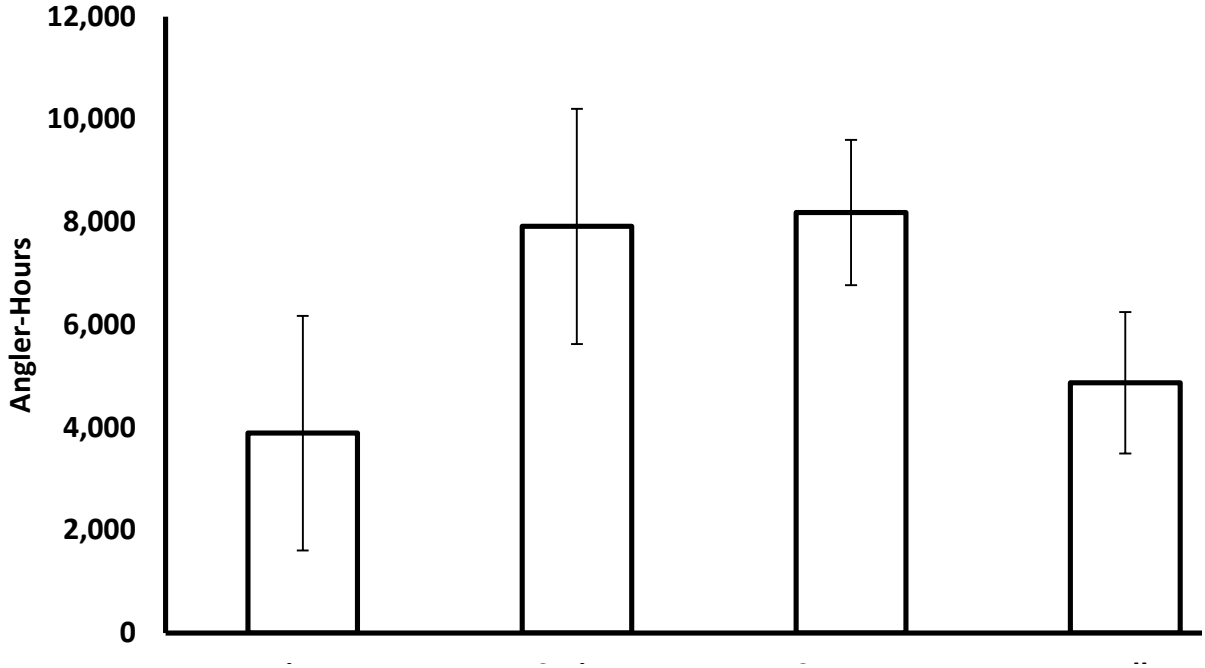


Figure 2.–Estimated total angling effort (angler-hours) with standard errors (SE) by season at Roanoke Rapids Lake, December 2013–November 2014.

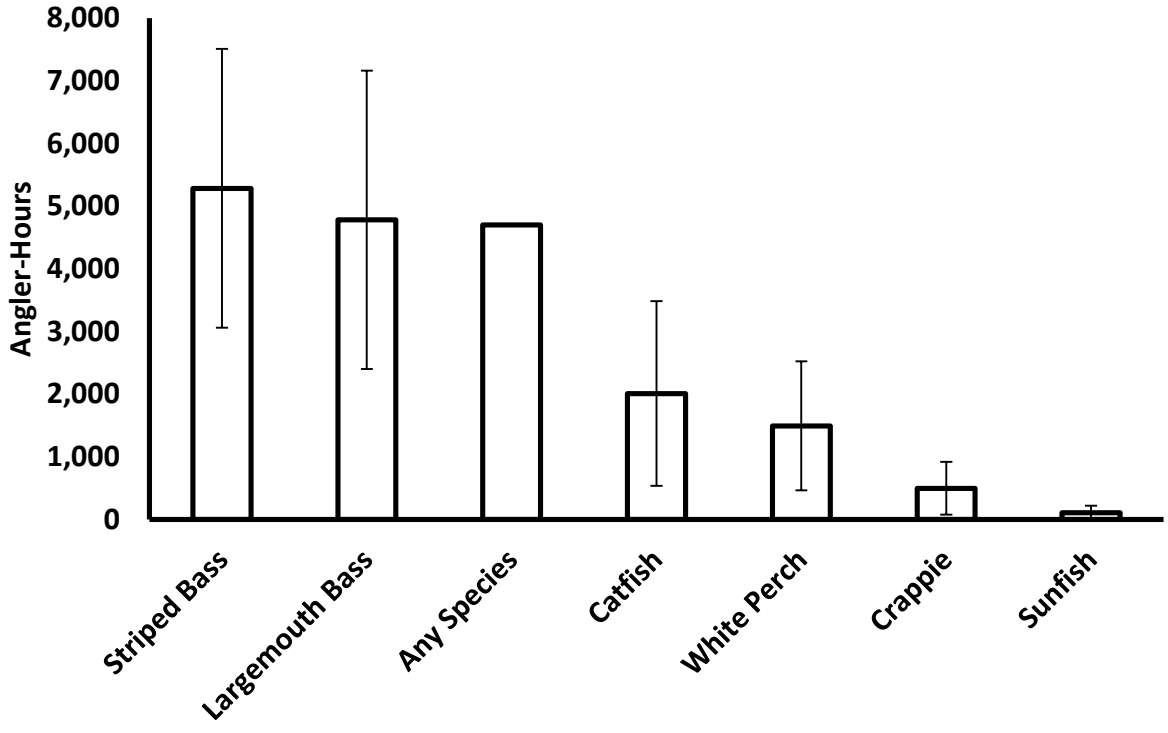


Figure 3.–Estimated angling effort (angler-hours) by species with standard errors (SE) at Roanoke Rapids Lake, December 2013–November 2014. SE is not available for “any species”.

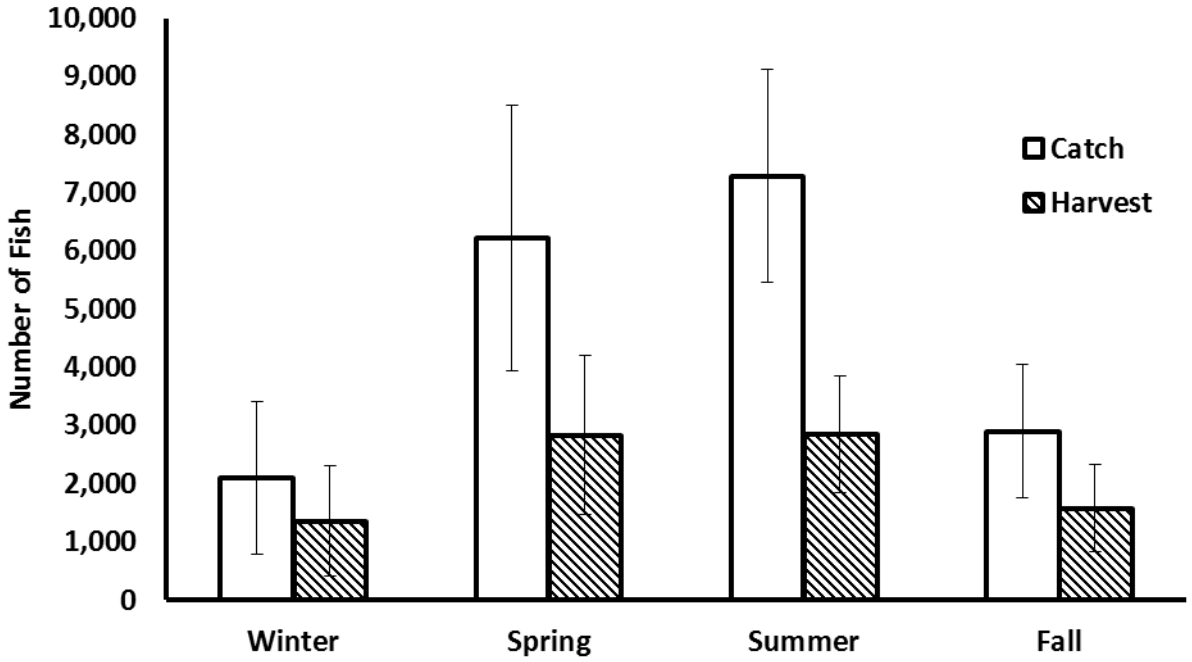


Figure 4.–Estimated total catch and harvest by season with standard errors (SE) during the Roanoke Rapids Lake creel survey, December 2013–November 2014.

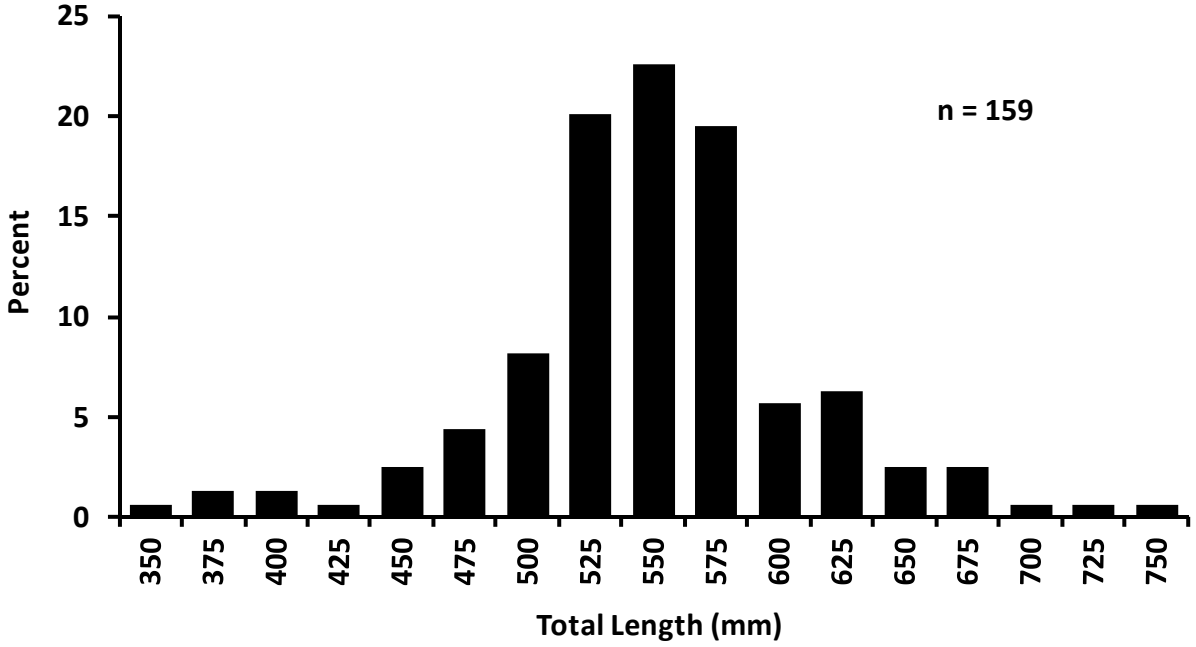


Figure 5.—Length frequency distribution of Striped Bass, by 25-mm size group, measured during the Roanoke Rapids Lake creel survey, December 2013–November 2014.

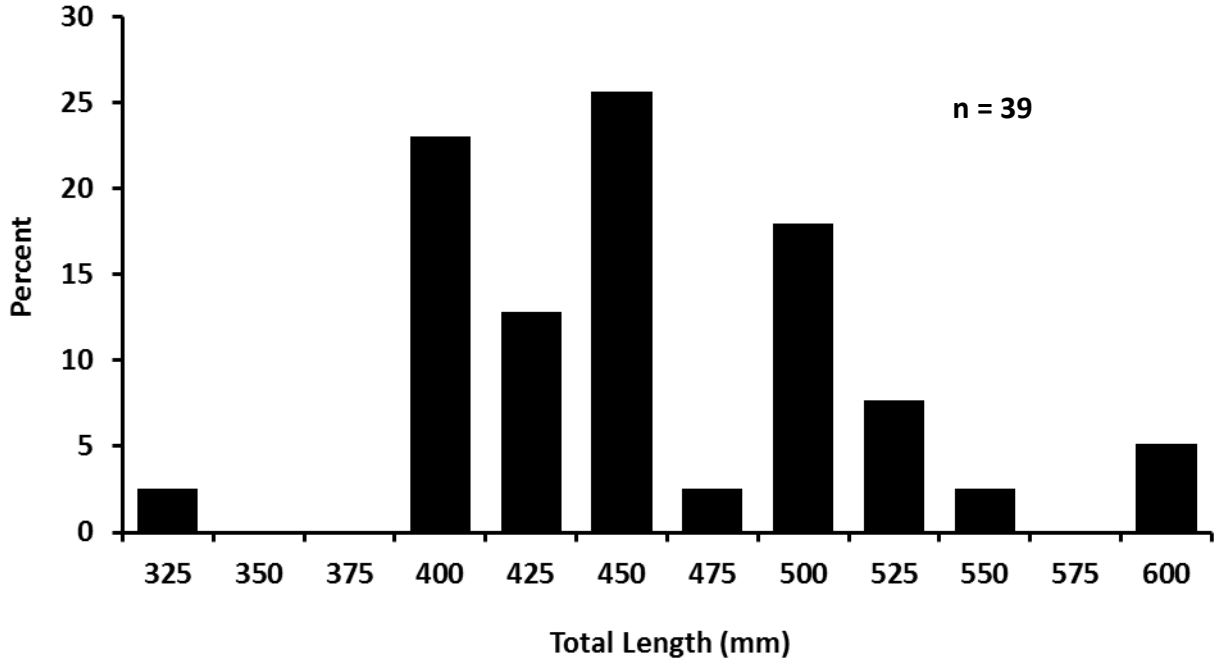


Figure 6.—Length frequency distribution of Largemouth Bass, by 25-mm size group, measured during the Roanoke Rapids Lake creel survey, December 2013–November 2014.

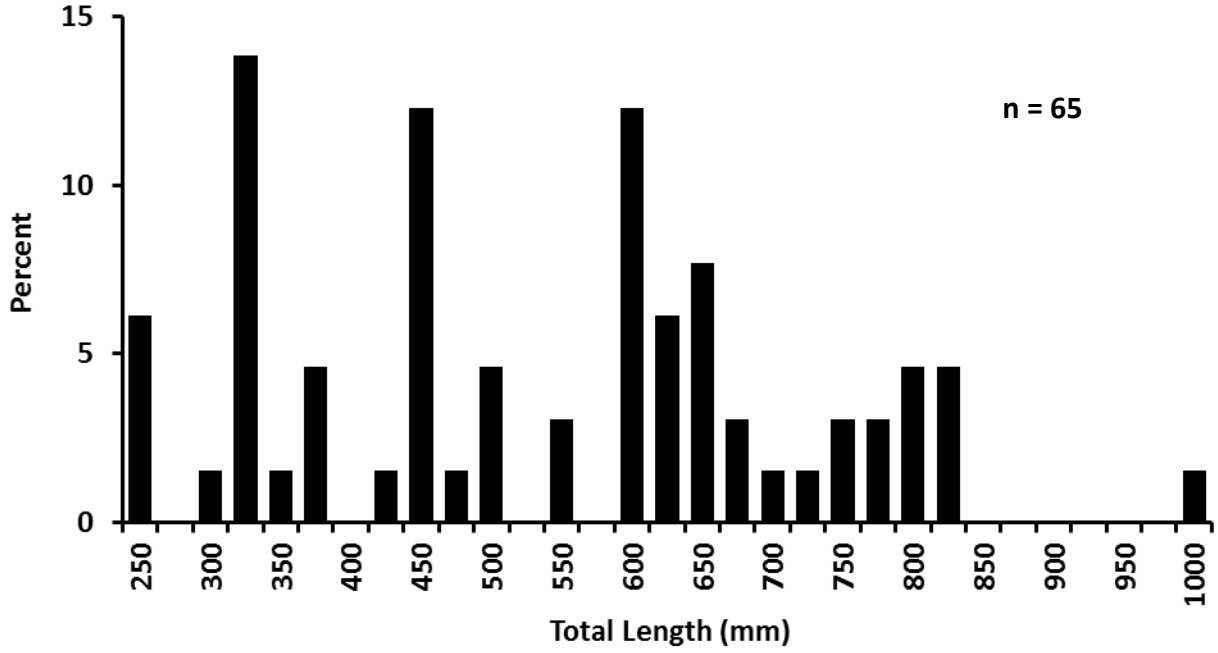


Figure 7.—Length frequency distribution of catfish, by 25-mm size group, measured during the Roanoke Rapids Lake creel survey, December 2013–November 2014.

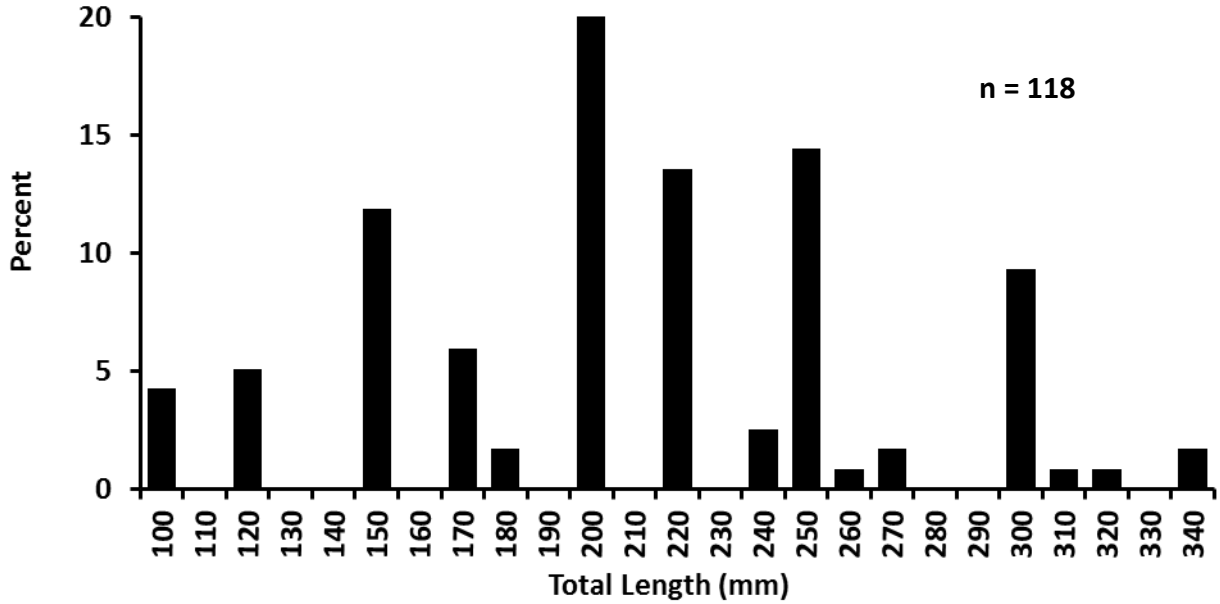
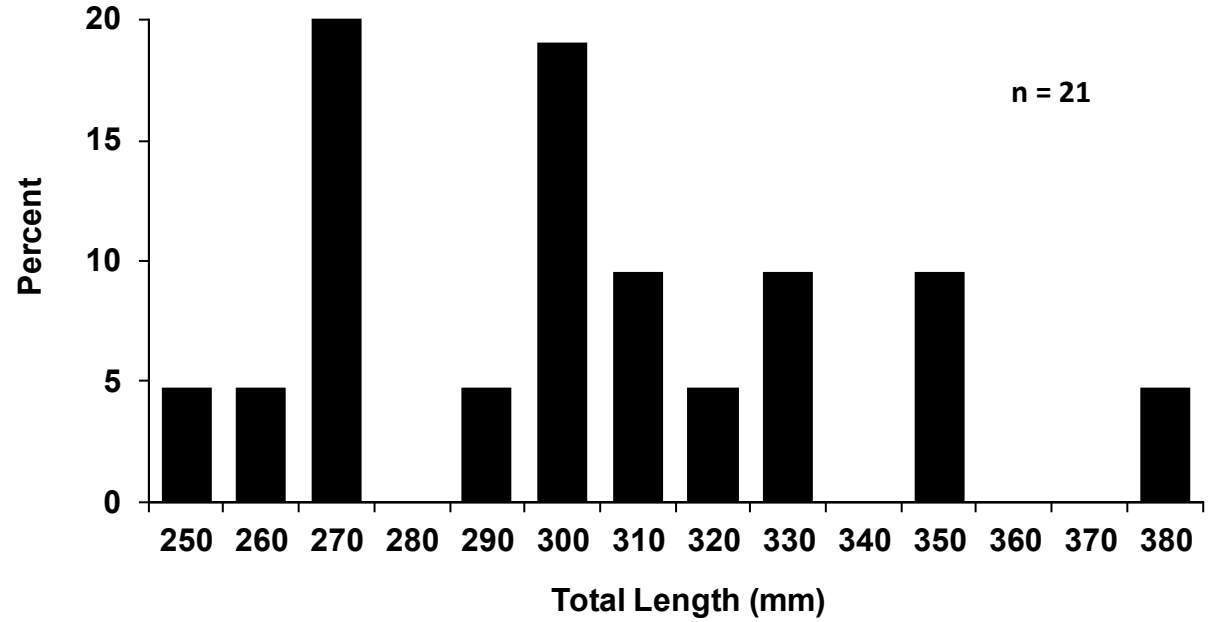


Figure 8.—Length frequency distribution of White Perch, by 10-mm size group, measured during the Roanoke Rapids Lake creel survey, December 2013–November 2014.



. Figure 9.—Length frequency distribution of crappie, by 10-mm size group, measured during the Roanoke Rapids Lake creel survey, December 2013–November 2014.