W. KERR SCOTT RESERVOIR BLACK BASS SURVEY — 2016

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Abstract.—Boat-mounted electrofishing gear was used to collect Largemouth Bass (LMB) *Micropterus salmoides* , Spotted Bass (SPB) *M. punctulatus*, and Smallmouth Bass *M. dolomieu* in W. Kerr Scott Reservoir in April 2016. We collected 270 LMB, 222 SPB, and 1 bass identified as a SPB x SMB hybrid in 5.0 hours of electrofishing effort for an aggregate black bass CPUE of 99 fish/h. This was the highest catch rate ever recorded at W. Kerr Scott Reservoir and it may be related to recent changes in water level management or to ongoing eutrophication of the reservoir. Largemouth and Spotted bass ranged in length from 85 to 580 mm TL and 90 to 417 mm TL, respectively, with the proportion of LMB ≥ 500 mm TL and SPB ≥ harvestable size (356 mm TL) both being lower than during the previous survey in 2011. Relative weights for LMB and SPB averaged 88 and 83, respectively, and were less than values obtained during previous surveys conducted between 1997 and 2011. Ages of LMB ranged from 1 to 15, with 87% of fish being < 7 years old, while ages of SPB ranged from one to six, with 80% of fish being < 3 years old. Year-class formation varied considerably between years for both species. Growth rates of LMB were slightly slower than in 2011, although LMB in 2016 still reached harvestable size (354 mm) by age four, as they did in 2011. Spotted Bass growth rates were slower than LMB at all ages and comparable to growth rates obtained during the 2011 survey.

W. Kerr Scott Reservoir (WKS) was impounded in 1962 when the U.S. Army Corps of Engineers built W. Kerr Scott Dam on the Yadkin River west of Wilkesboro and North Wilkesboro, North Carolina. The primary purpose of the dam is flood control and it was built in response to major floods in 1886, 1916, and 1940 that caused significant damage in Wilkesboro and downstream communities. Other uses include low-flow augmentation and recreation.

Covering 597 hectares, the impoundment has an average depth of 11.7 meters and its trophic state has generally been rated as mesotrophic (NCDEM 1992). The primary black bass species in WKS are Largemouth Bass (LMB) *Micropterus salmoides* and Spotted Bass (SPB) *M. punctulatus.* Smallmouth Bass (SMB) *M. dolomieu* are also present, but not in sufficient numbers to support a targeted fishery. Additional sport fisheries include those for Striped Bass *Morone saxatilis* and Hybrid Striped Bass *M. chrysops x M. saxatilis*, crappie *Pomoxis spp*., sunfish *Lepomis spp*., Channel Catfish *Ictalurus punctatus,* and Flathead Catfish *Pylodictis olivaris*.

Largemouth Bass were initially the primary black bass species present in the reservoir. Between 1976 and 1979, over 14,000 SPB fingerlings were stocked into WKS by the North Carolina Wildlife Resources Commission (NCWRC) in hopes of providing an additional sport fishery. Little targeted effort was directed at assessing the reservoir's LMB population prior to the introduction of SPB, due largely to the lack of electrofishing equipment in the region. Shortly after stocking SPB in the reservoir, survey effort on the black bass populations of WKS increased. In 1980, SPB reproduction was documented in the reservoir (Mickey 1980), and soon after, interest arose in stocking them into other mountain reservoirs. Beginning in the late-1980's, further studies were conducted to evaluate the contribution of SPB to the fishery and to determine what impacts they might be having on the LMB population, with the minimum length limit for SPB subsequently being removed as a result (Simpson et al. 1988). In the early-to-mid 1990's, a series of surveys was conducted to evaluate the effects of the minimum length limit removal on SPB and to compare the accuracy of scales and otoliths in LMB and SPB age determination (Buckmeier 1997). Subsequent surveys to monitor the status of the black bass fishery were conducted in 2000 and 2001 (Hodges 2002) and 2011 (Hodges 2014).

Since a comprehensive assessment of the WKS black bass fishery had not been conducted since 2011, an electrofishing survey was conducted in 2016 to gather updated information on the relative abundance, size structure, body condition, age structure, and growth rates of the WKS black bass community. This report summarizes the results of the 2016 survey.

Methods

Field collections.—Boat-mounted electrofishing gear (Smith-Root 7.5 GPP) was used to collect black bass from 19 sites throughout WKS on April 25–29, 2016 (Figure 1). Twenty sites have been used since current transect locations were established in 1997, but one site was inadvertently skipped during the 2016 survey. All transects were 300 m in length and were evenly distributed throughout the lake. Fish were collected by a single netter and electrofishing settings of 500–1000 V, 4 A, and 120 pulses per second were used for all sites. All fish collected were measured for total length (TL; mm) and weight (g). Finally, sagittal otoliths were removed from a randomly selected sample of LMB and SPB for age determination and placed in labeled vials.

Abundance.—Relative abundance was indexed by catch per unit effort (CPUE), which was calculated as the number of fish collected per hour of electrofishing time.

Size structure.—The size structure of the LMB and SPB populations was graphically assessed by constructing length-frequency distributions and numerically assessed by calculating size-structure indices (proportional size distributions [PSDs]; Guy et al. 2007). The lengths for stock-, quality-, preferred-, and memorable-size fish were those proposed by Gabelhouse (1984).

Condition.—Body condition of LMB and SPB ≥ 150 mm TL was indexed by calculating relative weights using the equations from Henson (1991) and Wiens et al. (1996), respectively. While the minimum TL in the SPB relative weight equation is 100 mm, weights were only measured for SPB ≥ 150 mm TL by mistake.

Age and growth.—Because annuli can be obscured in whole view as early as age 2 (Hoyer et al. 1985), otoliths with fewer than two annuli were immersed in water in a black dish and read in whole view using a dissecting microscope, while otoliths with two or more annuli were sectioned before being read. Sectioned otoliths were prepared for reading by breaking them in half perpendicular to their longest axis and polishing the broken end using 320–400 grit sandpaper (Besler 1999). The otolith section was then submerged in a shallow dish of water, with the unbroken end embedded in a layer of clay lining the bottom of the dish. The otolith section was illuminated from the side with a fiber optic light and read under a dissecting microscope. Otoliths were read independently by two readers, and discrepancies in annuli counts between readers were rectified at a joint reading.

The reported age of fish in this survey is not equal to the number of annuli that were present. Previous work in Illinois has shown that annulus formation in LMB occurs between April and June (Taubert and Tranquilli 1982). For fish collected in this survey, the annulus for the year in which they were collected had not yet begun to form and there was significant growth between the last annulus and the otolith margin. As such, fish were assigned an age equal to the number of annuli plus one because additional annulus formation was imminent. Age-frequency distributions were constructed and mean length at age at time of capture was determined for all year-classes represented by at least two fish.

Results and Discussion

Abundance.—We collected 270 LMB, 222 SPB, and 1 bass identified as a SPB x SMB hybrid in 5.0 hours of electrofishing effort for an aggregate black bass catch per unit effort (CPUE) of 99 fish/h; mean CPUE among sites for all black bass species was also 99 fish/h (SE = 6.0). Mean CPUE among sites for LMB, SPB, and SMB x SPB hybrids was 53.3 fish/h (SE = 5.8), 45.8 fish/h (SE = 7.2), and 0.1 fish/h (SE = 0.1), in that order. These catch rates represent a substantial increase over catch rates from previous WKS electrofishing surveys conducted between 1989 and 2011 when aggregate black bass catch rates averaged 54 fish/h (SE = 3.2) and ranged from 42 to 69 fish/h (Hodges 2002; Hodges 2014). However, it can be difficult to make meaningful comparisons of recent catch rates with those from historical surveys given that there was no standardization of methods, sample sites, or sampling seasons used prior to 1997 (Hodges 2014). Even when limiting comparisons of catch rates from this survey to surveys conducted since 1997, which have all been conducted during the spring using the same sample sites, making accurate comparisons of fish abundance using the number of fish collected per hour is difficult given that electrofishing time used to collect fish from identical lengths of shoreline during these surveys has varied from a low of 3.8 hours in 1997 to a high of 5.1 hours in 2011.

Consequently, direct comparisons of the raw numbers of fish collected during each survey between 1997 and 2016 were made to provide additional insight into trends in black bass abundance, and these comparisons confirm that considerably more black bass were collected in 2016 than during any previous survey. Total black bass numbers collected during each survey averaged 303 (SE = 50.7) and ranged from 210 in 1997 to 493 in 2016 (Table 1). It should be noted that only 19 sites were sampled in 2016 instead of the usual 20, so the number of black bass collected in 2016 would likely have been even higher if all sites had been sampled. Prior to 2016, the next highest totals were collected in 2011 and 2000, when 305 and 280 black bass were collected, respectively. Although numbers collected in 2011 were only marginally higher than in 2000, the higher numbers collected in 2011 suggest that bass abundance was already increasing prior to the current survey.

In addition to changes in total black bass densities, recent changes in black bass community composition have been observed. Historically, more SPB than LMB have been collected from WKS, with the ratio of SPB to LMB ranging from 1.1 to 1.7 between 1989 and 2001 (Hodges 2002). But in 2011, more LMB than SPB were collected for the first time ever (Table 1), with a similar result being obtained in 2016. The fact that more LMB than SPB were collected for two consecutive surveys suggests that the proportion of each species in our catches is representative of an actual shift in species composition and is not just the result of random variation in the capture efficiency of the two species. Although this survey was conducted five years after the 2011 survey when LMB first became more abundant than SPB, the ratio of LMB to SPB did not increase further between 2011 (1.3) and 2016 (1.2). Additionally, despite becoming less abundant than LMB, the number of SPB collected in 2016 was the highest on record by a large margin (Table 1). So rather than the WKS SPB population declining, it just appears to have increased at a slower rate than the LMB population.

One possible explanation for the changes seen in the abundance and species composition of black bass in WKS could be related to recent changes in water level management. While lake elevation has been maintained at 313.94 m above mean sea level historically, in recent years, it has been maintained at 314.07–314.13 m above mean sea level (Kevin Heape, U.S. Army Corps of Engineers, personal communication). Numerous studies (Aggus and Elliott 1975; Miranda et al. 1984; Sammons et al. 1999) have documented increased survival of young LMB in response to higher summer water levels, and it is possible that the increased water levels in WKS have increased LMB recruitment by providing juveniles access to more shallow-water habitat that could increase foraging success and offer more refuge from predators. While higher summer water levels have been shown to benefit survival of juvenile LMB, they do not appear to provide similar benefits to SPB (Sammons et al. 1999), which could explain why SPB have become less abundant than LMB. However, while changes in lake elevation might explain some of the increase in black bass numbers and the change in the ratio of LMB to SPB observed in 2016, these changes in the black bass community were already occurring at the time of the 2011 survey, before any changes in lake level management were initiated. Additionally, the magnitude of the changes in lake elevation at WKS are relatively small in comparison to the reservoirs where positive relationships have been observed between LMB recruitment and water levels and the changes at WKS may not be large enough to affect black bass recruitment.

Another possible explanation for the higher black bass numbers and the shift in the ratio of LMB to SPB observed during the 2011 and 2016 surveys could involve recent increases in the productivity of WKS. According to the North Carolina Trophic State Index (NCTSI), an index based on total phosphorus, total inorganic nitrogen, Secchi depth, and chlorophyll-a levels that is used to assign trophic status to North Carolina reservoirs (NCDEQ 2018), WKS was originally considered mesotrophic throughout the 1980’s after monitoring began in 1981, with occasional oligotrophic ratings being observed (NCDEM 1992). Although WKS is still generally considered mesotrophic, it has become more productive in recent years, with eutrophic NCTSI ratings first occurring in 2009 (Debra Owen, North Carolina Division of Environmental Quality, personal communication) and subsequently reoccurring periodically between 2012 and 2016 (NCDWQ 2012; NCDEQ 2016).

Although it seems reasonable that black bass numbers in WKS would increase in response to increasing nutrient levels (Allen et al. 1999), it is not clear whether the increase in productivity observed in recent years is large enough to cause increases in black bass catch rates of the magnitude that have been observed. To better understand the relationship between reservoir trophic state and black bass catch rates, a cursory analysis of the relationship between productivity and black bass electrofishing catch rates from several nearby reservoirs (Salem and Lookout Shoals lakes, Lake Hickory), along with current and historic data from WKS (Hodges 2002), was conducted. Since actual numerical NCTSI scores were not available for all reservoirs, chlorophyll-a values were used as a surrogate, with catch rates from the most recent electrofishing survey of each reservoir (Hodges 2017; Johnson 2017; NCWRC unpublished data) being compared to chlorophyll-a levels from the most recent water quality survey conducted prior to each electrofishing survey (NCDEM 1992; NCDWQ 2013; NCDEQ 2016). Overall, black bass catch rates increased in relation to increasing chlorophyll-a values, and recent black bass catch rates in W. Kerr Scott were comparable to those in other reservoirs with similar productivity levels (Figure 2). While this comparison was qualitative in nature and its results do not demonstrate that changes in the trophic state of WKS are directly responsible for the increase in black bass catch rates, it at least suggests that the number of black bass now present in WKS is in line with what might be expected based on current productivity levels.

While changes in reservoir productivity may be related to the higher total numbers of black bass collected in 2016, the relationship between the increased productivity and the changes in the proportion of LMB and SPB in the reservoir is less clear. Spotted Bass are usually more abundant in less productive reservoirs (Buynak et al. 1989), and the proportion of the black bass community made up of SPB was shown to be negatively related to chlorophyll-a concentrations in Alabama reservoirs containing both SPB and LMB (Greene and Maceina 2000). Furthermore, the proportion of SPB in the black bass community increased as West Point Reservoir in Georgia became more oligotrophic following reductions of phosphorus inputs into the reservoir (Maceina and Bayne 2001). Collectively, the relative suitability of LMB and SPB to specific trophic conditions would seem to explain the shift in the proportion of LMB and SPB in WKS as it has become more productive. However, the driving mechanism behind the shift in the increased proportion of SPB at West Point Reservoir was increased SPB recruitment coupled with decreased LMB recruitment, as opposed to SPB abundance increasing while LMB abundance remained constant. Assuming that the recruitment patterns of SPB and LMB observed as West Point Reservoir became more oligotrophic would be reversed in reservoirs that became more eutrophic, then decreased SPB abundance and increased LMB abundance would be expected in WKS. However, despite SPB becoming less abundant than LMB in WKS, SPB numbers did not actually decline and instead were the highest on record in 2016. An additional observation confounding the role productivity changes might be having in increased black bass abundance involves the abundance of crappie in WKS. Crappie abundance generally increases with reservoir productivity as well (Allen et al. 1998; Dubuc and DeVries 2002; Bunnell et al. 2006), yet WKS crappie abundance remained low during a fall 2017 trap-net survey (NCWRC unpublished data) and was not appreciably higher than during previous surveys conducted when reservoir productivity was lower (Hining 2003). Given that all the changes occurring with the black bass community in WKS may not be fully explained by recent changes in lake elevations and are not totally consistent with what would be expected with increasing reservoir productivity, additional investigations into other causative mechanisms for changes in the black bass community are needed.

In addition to changes in the relative abundance of LMB and SPB in WKS, more SMB and apparent hybrids of SMB and SPB have been collected in recent years. Although SMB are known to be present in WKS, no SMB were collected during electrofishing surveys conducted between 1989 and 2001. But more recently, several SMB and SMB x SPB hybrids were caught during a qualitative electrofishing survey conducted in 2008 (NCWRC unpublished data), during the 2011 electrofishing survey (Table 1), and during gillnet surveys conducted between 2010 and 2013 (NCWRC unpublished data). Additionally, anglers are reporting increased catches of SMB as well (Garrita 2009).

It is not clear why SMB have begun appearing more frequently in our surveys or why they now appear to be crossing with SPB more frequently. Smallmouth Bass are generally more abundant in reservoirs with lower nutrient levels (Buynak et al. 1989), and they would not be expected to become more abundant in response to the increased nutrient levels being observed in WKS. One explanation might involve changes in abundance of SMB within the Yadkin River itself. Although historical NCWRC data on the Yadkin River black bass community is limited, long-time Yadkin River anglers have reported increases in the river's SMB fishery over time as water quality conditions within the river have improved. If SMB abundance in the Yadkin River upstream of WKS has increased in recent years, then more SMB might be migrating into the reservoir from the river, thereby increasing the number of SMB in the reservoir and also increasing the likelihood that SMB could encounter and breed with SPB.

Size structure.—LMB ranged in length from 85 to 580 mm TL (Figure 3). The LMB length-frequency distribution was multi-modal, with fish being well represented throughout the range of sizes collected. While the percentage of LMB ≥ harvestable size (356 mm TL; 49%) in 2016 was identical to the previous survey conducted in 2011, fewer fish ≥ 500 mm TL were collected in 2016 ($n = 6$) than in 2011 ($n = 16$) despite the overall number of LMB collected being considerably higher in 2016. In addition to lower numbers of fish ≥ 500 mm TL, there were also fewer fish < 180 mm TL in 2016 than in 2011 (Hodges 2014). While this suggests that reproduction was less successful in the year before the 2016 survey than during the year preceding the 2011 survey, the number of fish < 180 mm TL in 2016 was within the range observed during previous surveys (Hodges 2002).

Values for PSD, PSD-P, and PSD-M of LMB were 79, 42, and 2, in that order. Proportional size distribution and PSD-P values were slightly higher than the desired ranges for balanced populations of 40–70 for PSD and 10–40 for PSD-P (Willis et al. 1993) and within the range of values observed during previous surveys conducted between 1997 and 2011 (Table 2). Conversely, the PSD-M value from the 2016 survey reflects the decreased abundance of fish ≥ 500 mm TL and was the lowest on record between 1997 and 2011 when values ranged from 4 to 13 (Table 2).

Spotted Bass ranged in length from 90 to 417 mm, with fish being well distributed throughout the range of sizes collected (Figure 3). While the overall size structure of SPB was comparable to those from previous surveys, the percentage of SPB ≥ harvestable size (356 mm TL) was lower in 2016 (4%) than in 2011 (11%). The lack of larger fish was reflected in the values for PSD, PSD-P, and PSD-M, which were 32, 8, and 0, in that order. These PSD and PSD-P values were the lowest on record since the current sampling regimen was initiated in 1997, and PSD-M was at bottom end of the range of values (0–1) observed during that time span (Table 2).

Condition.—Relative weights for LMB and SPB averaged 88 and 83, respectively, with body condition increasing slightly with increasing fish length for both species (Figure 4). These relative weights were below the recommended range for balanced fish populations (95–105; Anderson 1980) and were also generally less than values obtained during previous surveys of WKS conducted between 1997 and 2011, when LMB relative weights averaged 88–93 and SPB relative weights averaged 90–93 (Table 2). The reduced body condition observed during this survey might be related to the higher densities of black bass, since the amount of forage available to individual bass would be expected to decrease as total bass numbers increase.

Age and growth.—Ages of LMB ranged from 1 to 15, with 87% of fish being < 7 years old (Figure 5). Year-class formation varied considerably between years and appeared more erratic than in 2011 (Hodges 2014), with the 2012 year-class appearing to be stronger than average while an extremely weak year-class was formed in 2013. The 2013 year-class was likely weak due to hydrologic conditions within the reservoir during and after the spawn (Maceina and Bettoli 1998), as annual Yadkin River discharge in 2013 was the highest since record keeping began in 1963, with monthly flows during the late spring and summer months being especially high (USGS 2018).

Also, fewer age-1 LMB were collected than during the previous survey in 2011, when age-1 LMB were the most abundant age-class collected and made up nearly 25% of the entire sample (Hodges 2014). However, analysis of historic size- and age-structure data demonstrates that the number of age-1 LMB collected can vary considerably between years, and the abundance of yearling LMB in 2016 is within the range of what has been observed previously (Hodges 2014; NCWRC unpublished data). Additionally, it is interesting to note that despite the unusually high number of age-1 LMB collected in 2011, members of this age-class were less abundant than expected as 6-year-olds in 2016, suggesting either that long-term survival of this age-class was relatively poor or that fish of that size were just collected more efficiently than usual in 2011, making them appear more abundant than they really were.

Older LMB appeared to be less abundant in 2016 than in 2011, which may explain the reduced abundance of fish ≥ 500 mm TL in 2016. Largemouth Bass > age 5 made up 31% of the population in 2011, in comparison to only making up 23% of the population in 2016. If age-1 fish, which may not be equally susceptible to capture every year, are excluded, then LMB > age 5 made up 41% and 27% of the population in 2011 and 2016, respectively.

Ages of SPB ranged from one to six, with 80% of fish being < 3 years old (Figure 5). Spotted Bass year-class formation was also more erratic than during the 2011 survey and more dissimilar to the age structure of LMB than in 2011. The 2013 year-class was weak, presumably in response to the aforementioned hydrologic conditions during and after the 2013 spawning season. But while 2012 was the strongest year-class for LMB, it was the weakest year-class for SPB, with only a single individual being collected. Overall, older fish made up a lower proportion of the SPB population than in 2011, when ages of SPB ranged from one to nine and only 45% of SPB were < 3 years old (Hodges 2014), and the reduced proportion of older SPB in the population is likely related to the historically low size-structure index values in 2016.

Due to the lack of constant recruitment among year-classes, it was not possible to generate an accurate estimate of total annual mortality using catch-curve analysis for either LMB or SPB. However, the reduced abundance of older fish of both species in 2016 could indicate that mortality preceding the 2016 survey was higher than it was preceding the 2011 survey. However, the lower numbers of older fish in 2016 could also be the result of differences in initial year-class strength among the older cohorts collected during the two surveys. Unfortunately, the lack of age data from the years leading up to the 2011 survey makes it impossible to assess the initial year-class strength of the older LMB and SPB that were more abundant in 2011, and future surveys should be conducted more frequently to ensure that continuous data on recruitment and survival can be maintained.

Growth rates of WKS LMB were slightly slower than in 2011 (Table 3; Hodges 2014). Despite their reduced growth rates, LMB in 2016 still reached harvestable size (356 mm) by age four, as they did in 2011. Spotted Bass growth rates were slower than LMB at all ages (Table 3) and comparable to growth rates obtained during the 2011 survey (Hodges 2014). In 2011, SPB on average attained harvestable size (356 mm) by age six, while mean TL never reached 356 mm for any SPB age-classes in 2016. However, so few SPB ≥ age six were collected in 2016 (n = 2) that little confidence should be placed in the growth rates of older SPB collected during the 2016 survey.

Management Recommendations

1. Continue to monitor total black bass numbers, the relative proportion of LMB and SPB within the black bass community, and trends in the abundance of SMB.
2. Conduct genetic analysis of apparent SPB x SMB hybrids to confirm their identity.
3. Investigate other possible causative mechanisms for changes in the abundance and species composition of the WKS black bass community.
4. Monitor relative weights and growth rates of black bass to determine if they decline in response to increasing abundance.
5. Conduct surveys more frequently to maintain continuous data on the recruitment and survival of LMB and SPB.

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TABLE 1.—Number of Largemouth, Spotted, and Smallmouth bass collected from W. Kerr Scott Reservoir by electrofishing, 1997–2016. Smallmouth Bass include apparent hybrids of Smallmouth and Spotted bass.

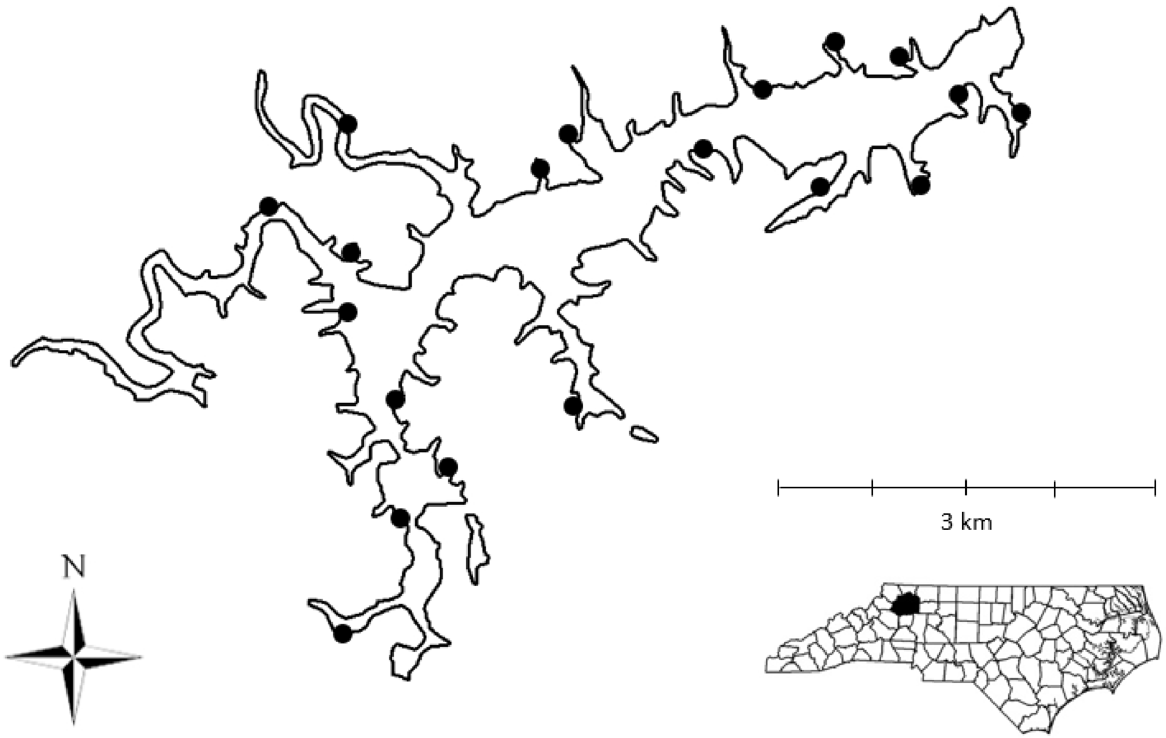
Year	Largemouth Bass	Spotted Bass	Smallmouth Bass
1997	99	111	0
2000	105	175	0
2001	90	135	0
2011	168	133	4
2016	270	222	1

TABLE 2.—Relative weight (Wr) and proportional size distribution values for quality (PSD)-, preferred (PSD-P)-, and memorable (PSD-M)-size Largemouth and Spotted bass collected from W. Kerr Scott Reservoir by electrofishing, 1997–2016.

	Largemouth Bass				Spotted Bass			
Year	Wr	PSD	PSD-P	PSD-M	Wr	PSD	PSD-P	PSD-M
1997	88	77	61	8	92	36	9	0
2000	92	68	37	4	93	44	15	0
2001	93	74	44	4	92	49	21	0
2011	91	82	54	13	90	36	16	1
2016	88	79	42	2	83	32	8	0

TABLE 3.—Mean total length at age (mm), with range, standard error (SE), and sample size (n) for Largemouth and Spotted bass collected from W. Kerr Scott Reservoir by electrofishing, 2016. Data are only shown for age-classes represented by >1 fish.

	Largemouth Bass				Spotted Bass			
Age	Mean	Range	SE	n	Mean	Range	SE	n
1	156	98–197	8.2	15	125	90–157	2.9	38
2	247	178–293	4.8	25	202	94–278	4.2	51
3	324	306–354	6.3	7	291	265–317	6.4	9
4	357	292–448	6.7	29				
5	387	326–460	9.6	16	344	307–410	9.7	10
6	396	323–446	10.8	12	334	328–340	6.0	2
7	462	410–513	51.5	2				
8	422	360–505	43.1	3				
9	455	391–499	32.7	3				
10	450	432–483	16.4	3				
11	486	444–542	29.1	3				



Latitude	Longitude	Latitude	Longitude
36.13062	-81.25103	36.12895	-81.22772
36.12401	-81.26977	36.12927	-81.23221
36.12076	-81.29501	36.13173	-81.23713
36.11282	-81.28873	36.13332	-81.24435
36.12736	-81.28629	36.12609	-81.26669
36.09177	-81.28475	36.12515	-81.27684
36.10259	-81.27778	36.11783	-81.28651
36.10631	-81.26624	36.12363	-81.23609
36.12568	-81.25356	36.09730	-81.28096
36.12100	-81.24802		

FIGURE 1.—Map of W. Kerr Scott Reservoir in Wilkes County, North Carolina, showing black bass electrofishing sites (●) and site GPS coordinates, 2016. GPS coordinates depict the left-hand boundary of each site.

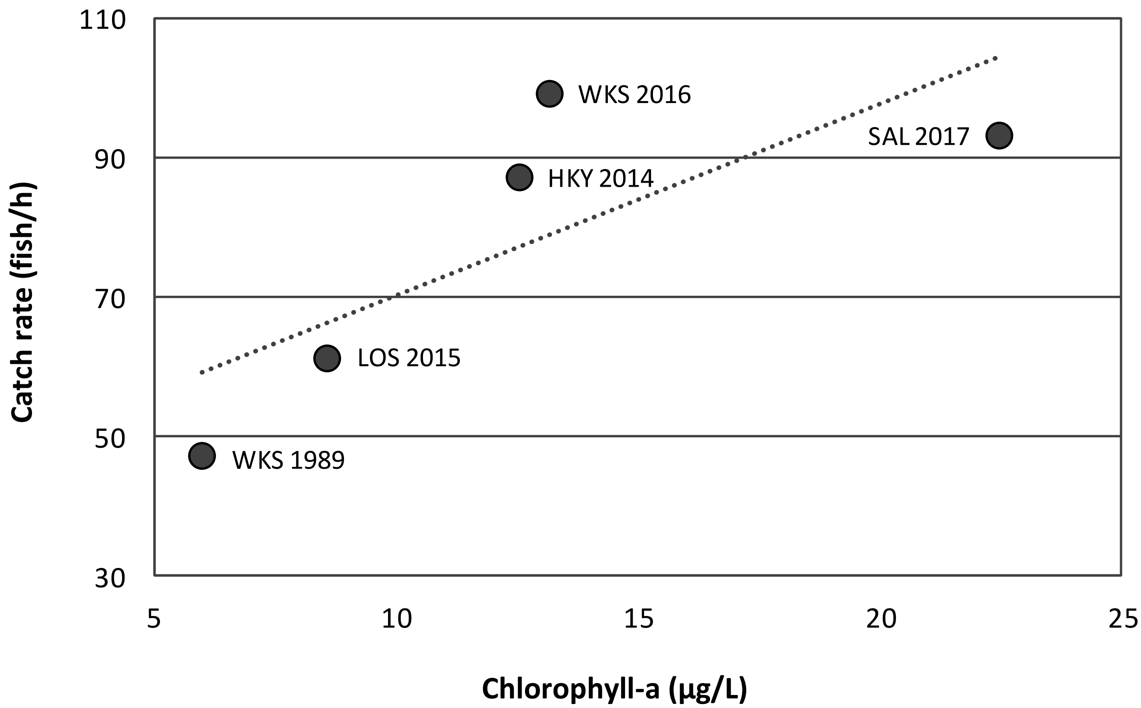


FIGURE 2.—Relationship between chlorophyll-a levels and black bass electrofishing catch rates, with trendline, for W. Kerr Scott Reservoir (WKS), Lake Hickory (HKY), Lookout Shoals Lake (LOS), and Salem Lake (SAL). Date beside each marker shows year electrofishing survey conducted.

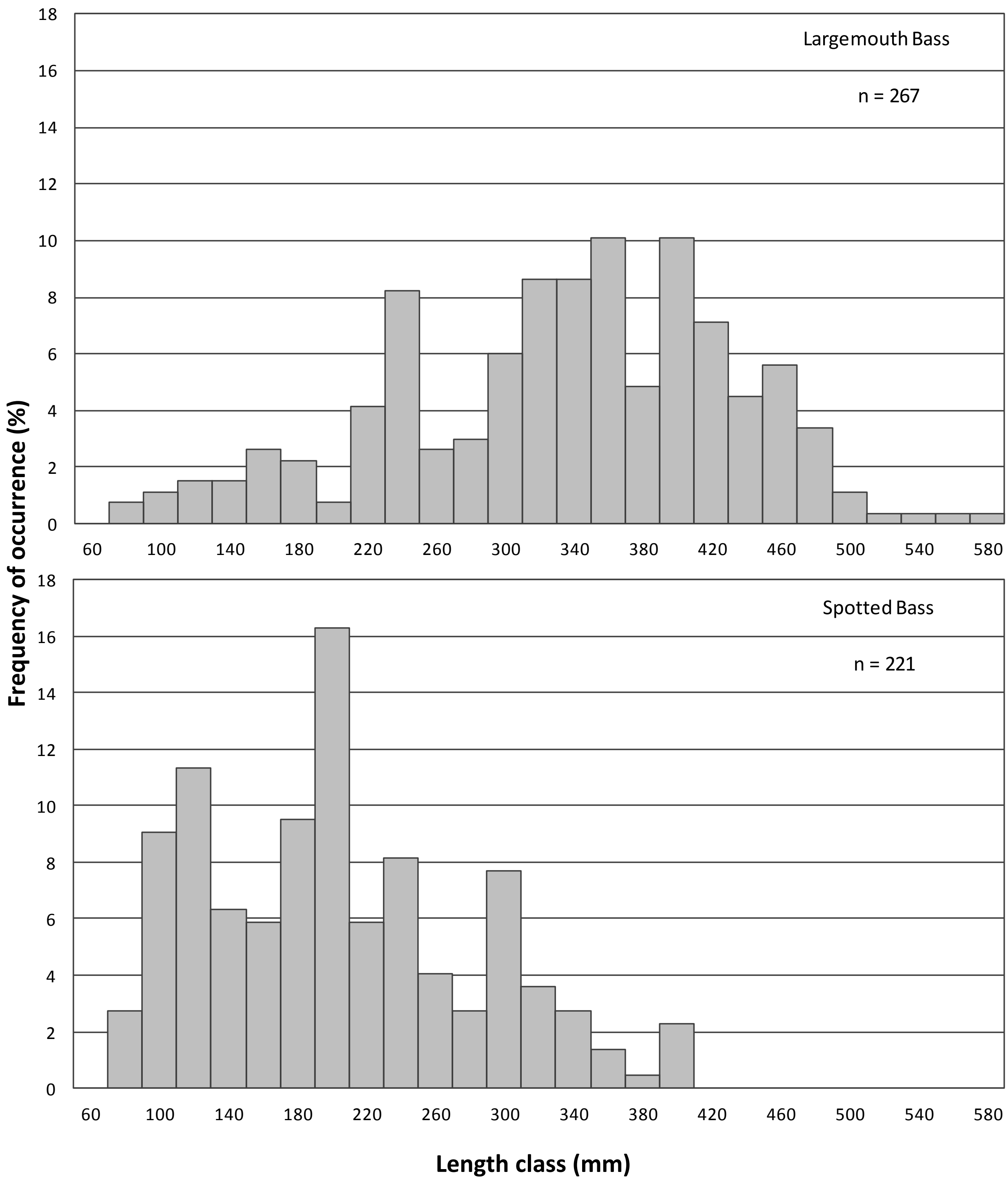


FIGURE 3.—Length-frequency distribution of W. Kerr Scott Reservoir Largemouth and Spotted bass collected by electrofishing, 2016.

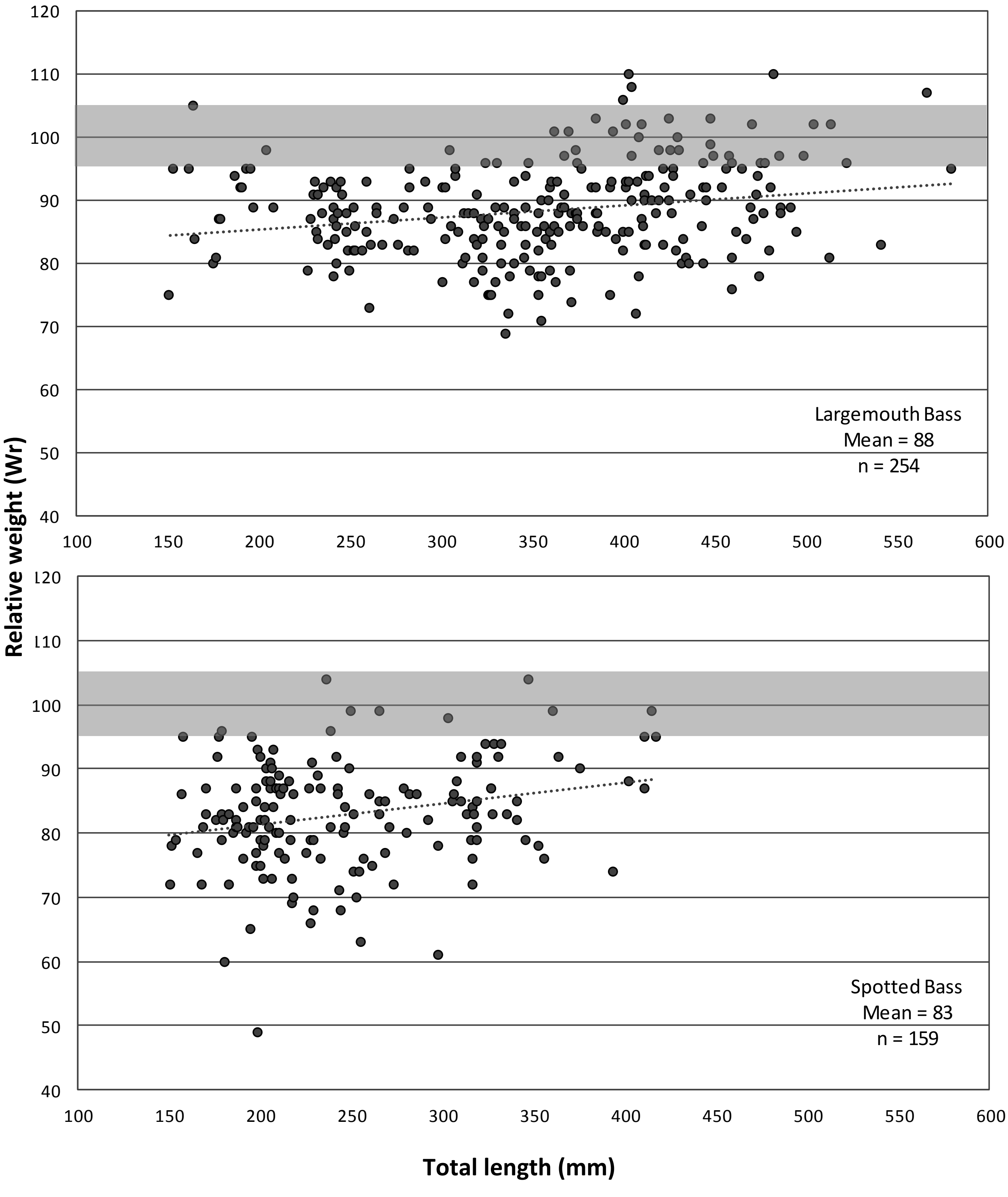


FIGURE 4.—Relative weights, with trendlines, of W. Kerr Scott Reservoir Largemouth and Spotted bass collected by electrofishing, 2016. The shaded area represents the desired range of relative weights (95–105).

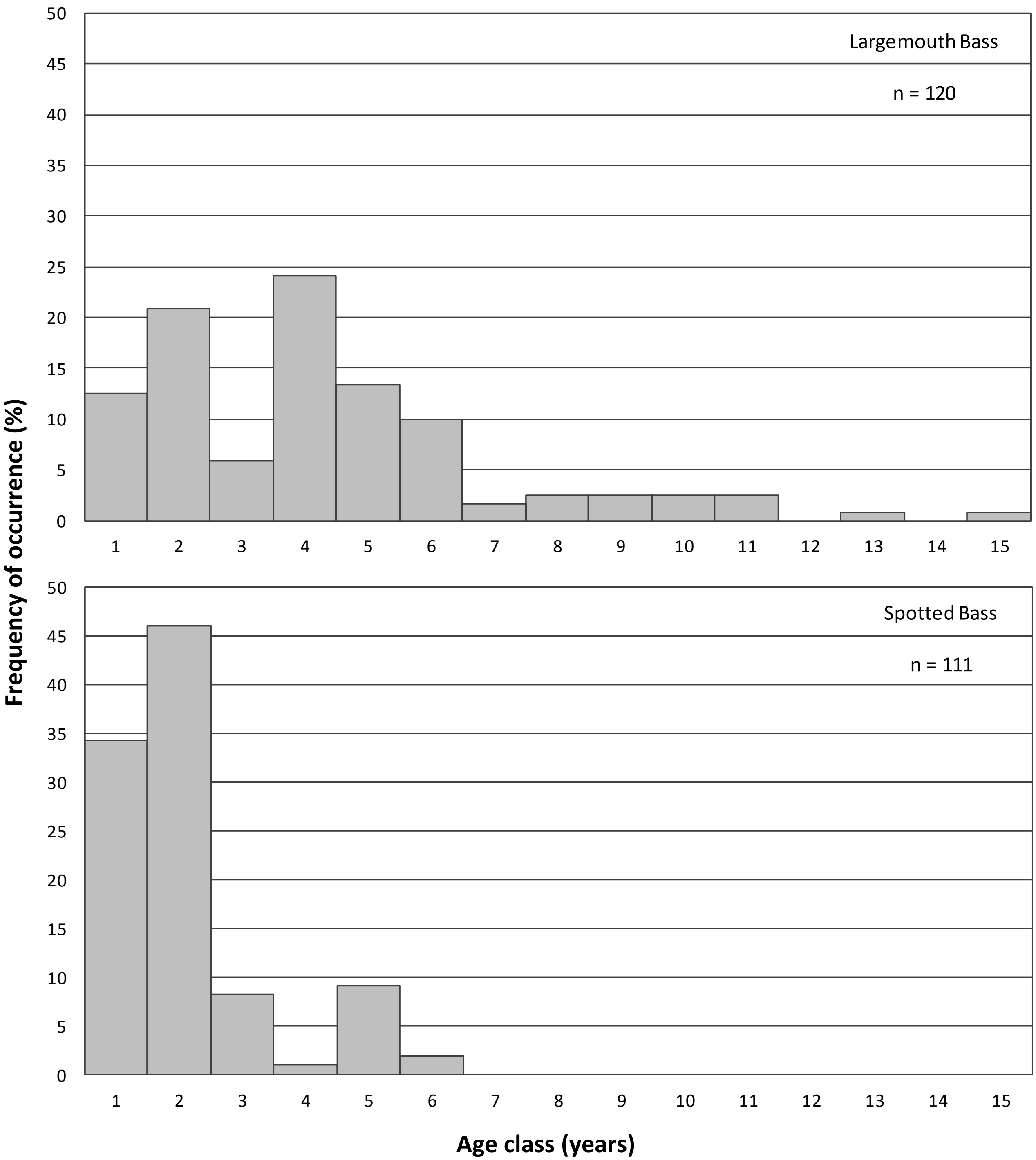


FIGURE 5.—Age-frequency distribution of a subsample of W. Kerr Scott Largemouth and Spotted bass collected by electrofishing, 2016.