W. KERR SCOTT RESERVOIR BLACK BASS – ASSESSMENT OF HYBRIDIZATION USING MORPHOLOGICAL TRAITS, 2011

Federal Aid in Sport Fish Restoration
Project F-108
District File

Kinnon B. Hodges

North Carolina Wildlife Resources Commission
Division of Inland Fisheries
Raleigh

2014

Keywords: black bass, Largemouth Bass, Spotted Bass, W. Kerr Scott Reservoir, hybridization, morphometric traits

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.

A recent spate of Spotted Bass *Micropterus punctulatus* introductions has occurred in reservoirs within the region in which Largemouth Bass *Micropterus salmoides* were previously the only black bass species present, and initial data from these systems suggests a high initial degree of hybridization between the two species. Spotted Bass have been a major component of the black bass fishery in W. Kerr Scott Reservoir since they were introduced in the 1970's. To provide insight into the extent to which hybridization might have occurred in systems where the black bass community has reached equilibrium in terms of species ratios and hybridization rates following the introduction of Spotted Bass, and to assess which morphological features are most easily and accurately assessed in the field, key morphological features of adult black bass collected from W. Kerr Scott Reservoir were assessed during spring 2011 electrofishing surveys.

Boat-mounted electrofishing gear was used to collect black bass from 20 fixed transects throughout W. Kerr Scott Reservoir during daylight hours on April 28 – May 4, 2011. All black bass collected were identified to species (including hybrids) and measured for total length (mm) and weight (g). Morphological traits involving jaw length, the length of the shortest dorsal

spine, the presence of a tooth patch on the tongue, the depth of the notch between the spinous and soft dorsal fins, and the shape of the spinous dorsal fin were assessed on adult fish as described in Godbout et al. (2009). While other traits are also used to differentiate between Largemouth and Spotted Bass, these traits were selected for this study based on the ability of field staff to reliably and consistently describe them in the field using live fish. Additionally, a measure of scale roughness was made on fish collected in the current study. Field staff have previously noted that Spotted Bass scales feel rougher than Largemouth Bass scales. In particular, scales on the sides of Spotted Bass often feel jagged and rough when rubbed from tail to head, while Largemouth Bass scales feel smooth whether rubbed from head to tail or tail to head.

As a rudimentary measure of how much hybridization might have occurred between Spotted and Largemouth Bass, data was summarized in two ways. First, the percentage of fish possessing varying levels of the expected morphological traits for a particular species was determined (i.e. a bass having 3 of the expected 5 traits expected for that species was given a score of 60%). Second, the percentage of fish where an individual morphometric trait matched what was expected for a particular species was determined (e.g. the percentage of fish identified as Largemouth Bass whose jaw length was consistent with what would normally be seen on a Largemouth Bass). Scale roughness was not included in these analyses since it has not been validated previously.

Overall, little evidence of large-scale hybridization between Largemouth and Spotted Bass was noted in this assessment. While three fish were determined to be Spotted Bass x Smallmouth Bass hybrids, no obvious hybrids of Largemouth and Spotted Bass were collected. Initial analyses included only fish ≥300 mm in this study since previous studies have established 300 mm as the size at which black bass display adult characteristics (Ramsey and Smitherman 1972; Ludsin and DeVries 1997). However, using 300 mm as the threshold for adulthood resulted in decreased sample sizes, particularly for Spotted Bass which have reduced growth potential relative to Largemouth Bass. Godbout et al. (2009) noted that most fish ≥225 mm in their analyses also displayed adult characteristics. To increase sample sizes in the current study, separate analyses were also conducted for fish ≥225 mm.

Regardless of the size criteria used to determine adult fish, a high percentage of both species was found to possess 100% of their expected morphometric traits (Figure 1). When examining individual morphometric traits, all traits were >90% accurate except for the depth of the notch between the spinous and soft dorsal fins (Figure 2). This trait was deemed difficult to assess on live fish in the field since the fish often raise their fins during examination, making it difficult to determine the degree to which the soft dorsal fin was raised when the spinous dorsal fin was lifted.

Additionally, the measure of scale roughness was highly accurate in identifying Spotted Bass of all sizes, with only 1 of the 130 Spotted Bass examined not having scales classified as being

rough. While scales on that fish were considered rougher than those of a Largemouth Bass, they were less rough than a typical Spotted Bass. For Largemouth Bass, the accuracy of the scale roughness assessment was size related and most effective for fish >400 mm, with 98% of fish >400 mm having smooth scales.

It should be noted that assessing many of these traits involves a certain degree of subjectivity. As such, a certain portion of the traits that were determined to be incongruous with the expected traits of a certain species were likely the result of errors made by field staff in assessing them. Furthermore, some of the traits used are not 100% exclusive to either Largemouth or Spotted Bass (e.g. a small percentage of Largemouth Bass are known to have tooth patches). As such, the finding of an incongruous trait in a specific fish by itself is not conclusive evidence of hybridization.

Additional studies collecting genetics information and comparing genotypes to phenotypes are needed to more accurately describe the proportion of hybridization occurring in W. Kerr Scott Reservoir black bass.

Literature Cited

Godbout, J. D., D. D. Aday, J. A. Ric, M. R. Bangs, and J. M. Quattro. 2009. Morphological models for identifying Largemouth Bass, Spotted Bass, and Largemouth Bass x Spotted Bass hybrids. North American Journal of Fisheries Management, 29:1425–1437.

Ludsin. S. A., and Dr. R. DeVries. 1997. First-year recruitment of Largemouth Bass: the interdependency of early life stages. Ecological Applications 7:1024–1038.

Ramsey, J. S., and R. O. Smitherman. 1972. Development of color pattern in pond-reared young of five Micropterus species of southeastern U.S. Proceedings of the Annual Conference Southeastern Association of Game and Fish Commissioners 25(1971):348–356.

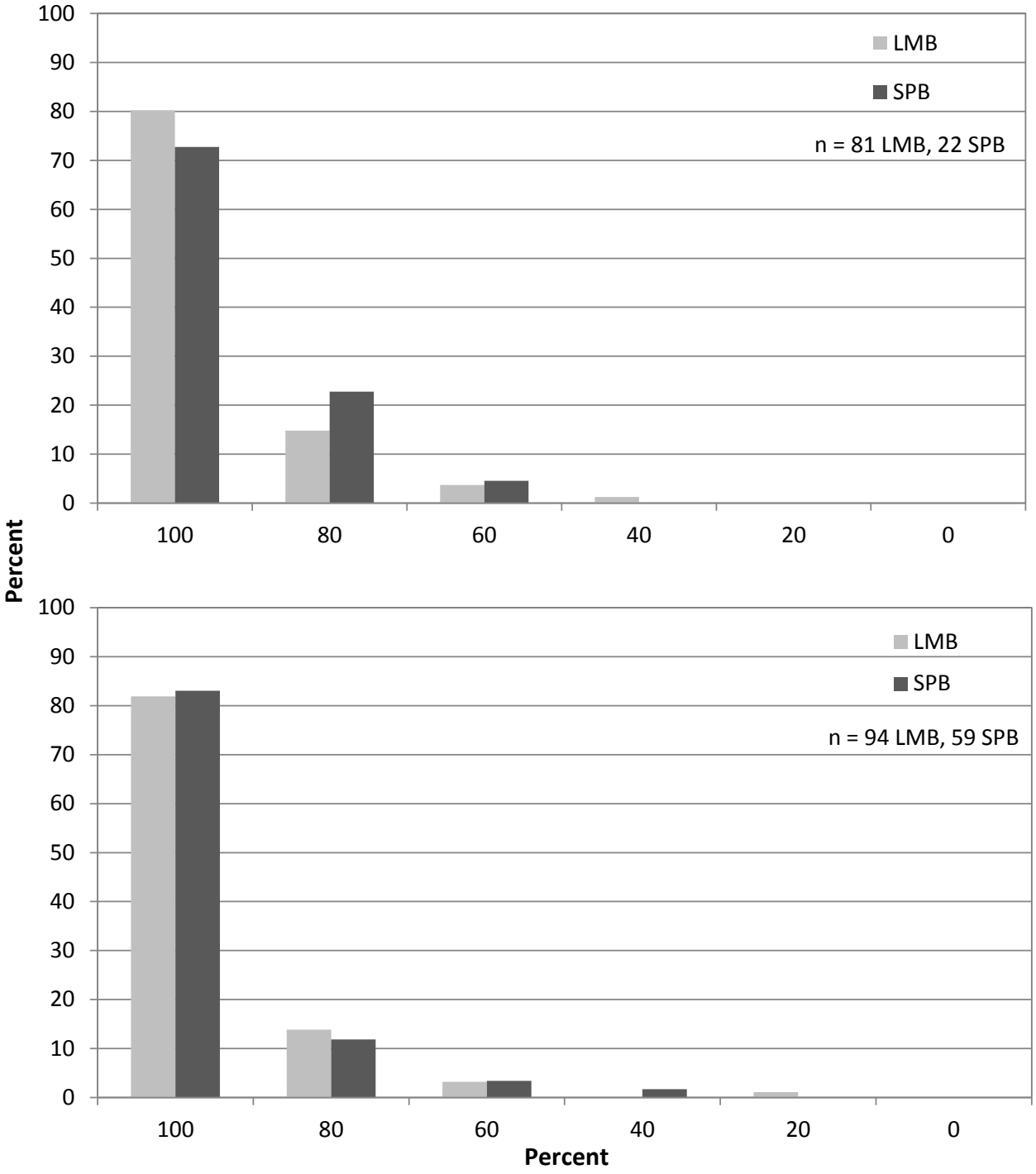

FIGURE 1.— Percentage of Largemouth and Spotted Bass in W. Kerr Scott Reservoir possessing varying levels of the expected morphological traits for each species. The upper graph shows results from analysis of fish ≥300 mm while the lower graph includes fish ≥225 mm.

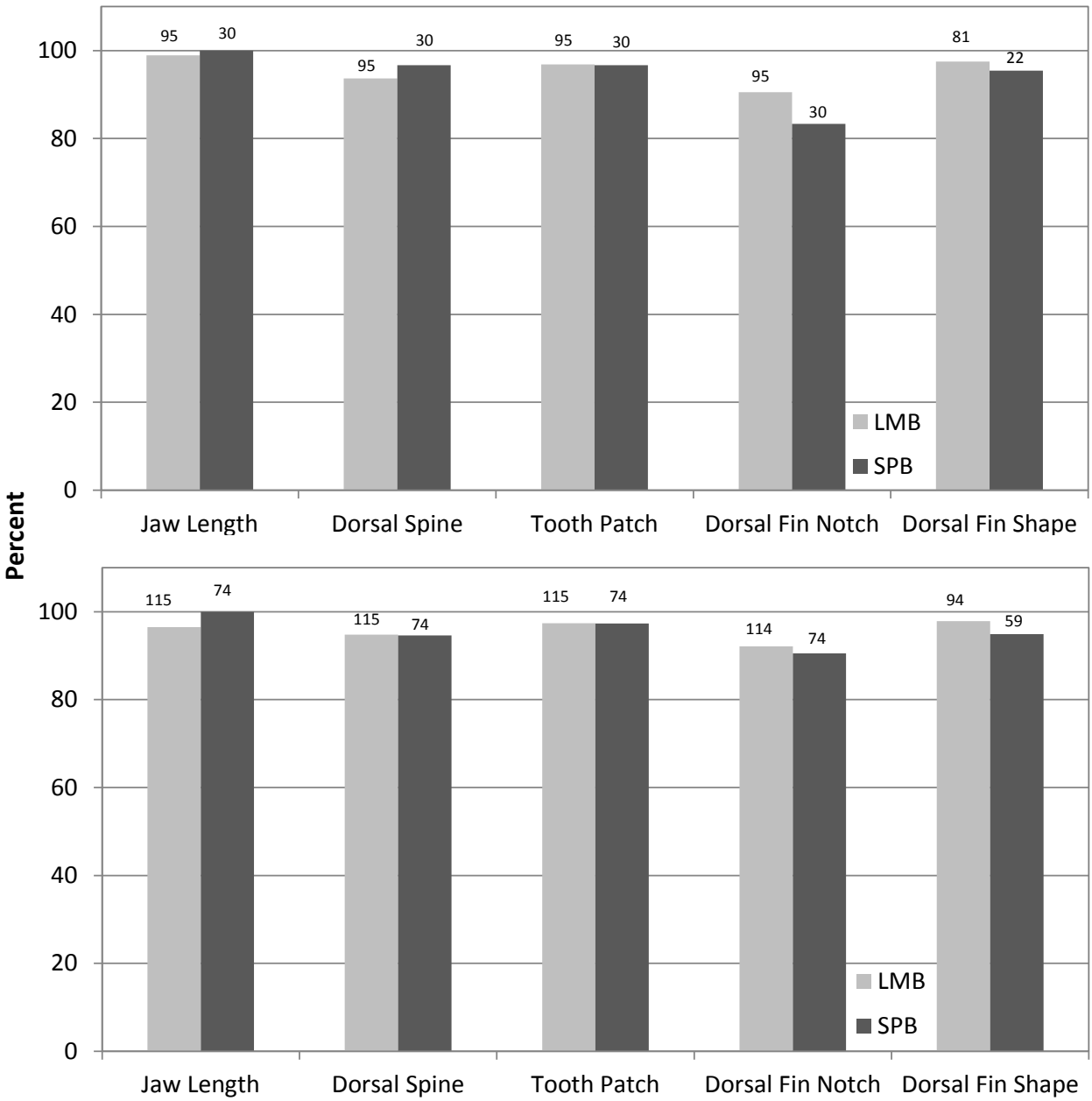

FIGURE 2.— Percentage of each morphometric trait that matched expected trait for Largemouth and Spotted Bass in W. Kerr Scott Reservoir. The upper graph shows results from analysis of fish ≥300 mm while the lower graph includes fish ≥225 mm. The number above each column indicates total sample size for each analysis.