⊜ North Carolina Wildlife Resources Commission ⊜

Gordon Myers, Executive Director

March 13, 2019

MEMORANDUM

TO: District-9 Files

FROM: Amanda M. Bushon, Fisheries Biologist I
           Inland Fisheries Division

SUBJECT: Cheoah River Smallmouth Bass Survey

District 9 fisheries staff surveyed the Smallmouth Bass *Micropterus dolomieu* population in the Cheoah River, Graham County, NC on July 2 and August 23–24, 2012 and May 31, 2017. More specifically, we surveyed the 14.7 km stretch of the Cheoah River from Santeetlah Dam to Calderwood Reservoir (Figure 1). Staff were distributed throughout the reach and Smallmouth Bass were collected using angling gear.

All collected Smallmouth Bass were transported to the Balsam Depot where they were measured for TL, weighed, sexed, and aged using sagittal otoliths. Sagittal otoliths were fractured perpendicular to the transverse axis, polished with 400 and 600 grit wet-dry sandpaper and read under a 10X dissecting microscope using transmitted fiber optic light. Smallmouth Bass collected in 2012 were assigned an age equal to the annuli count; while, fish from 2017 were assigned an age equal to the annuli count plus one because the annulus for 2017 had not yet formed in May. All Smallmouth Bass collected in during three sample dates in 2012 were pooled for analysis. Relative weight (W_r) was calculated for all Smallmouth Bass > 150 mm TL (Kolander et al. 1993) to assess condition. We used Fisheries Analysis and Modeling Simulator (FAMS) version 1.64.4 (Slipke and Maceina 2014) to estimate Smallmouth Bass growth via the von Bertalanffy growth model (von Bertalanffy 1938).

We collected 158 Smallmouth Bass during the 2012 surveys and 85 during the 2017 survey. In 2012, Smallmouth Bass ranged from 136–337 mm TL with a mean of 215.4 mm (SD = 39.2; Table 1; Figure 2). In 2017, Smallmouth bass ranged from 162–382 mm TL with a mean of 228.4 (SD = 46.0). Relative weights were generally low with a mean of 82.1 in 2012 and 83.3 in 2017 (Table 1). We assigned ages to 154 Smallmouth Bass from 2012 and 82 from 2017. Smallmouth Bass ages ranged from 1–10 years in 2012 and 2–8 years in 2017 (Figure 2).

The 2012 Smallmouth Bass collections were fitted using the von Bertalanffy growth model; whereas, the 2017 collection did not fit the model (R^2=-0.08). Based on the 2012 collections, the Cheoah River Smallmouth Bass growth was slow when compared to the growth rates of other western

North Carolina systems (Figure 4; Goodfred et al. 2010). During a comprehensive riverine Smallmouth Bass survey in western North Carolina from 2007–2009, Goodfred et al. (2010) found that Smallmouth Bass growth rates varied among streams but on average, von Bertalanffy growth models predicted 5.5 years for Smallmouth Bass to reach 305 mm TL. According to the 2012 Cheoah River Smallmouth Bass collections, it takes approximately 8.5 years to reach 305 mm TL. Furthermore, the asymptotic length predicted by the von Bertalanffy growth model for the 2012 Cheoah River Smallmouth Bass was 351 mm TL. This TL is very close to the current minimum length limit of 356 mm TL (2 fish may be less than 356 mm TL). However, Smallmouth Bass up to 382 mm TL were collected during the 2017 sample suggesting that the asymptotic length has increased between samples or larger fish were undetected in the 2012 sample.

The Cheoah River supports a strong Smallmouth Bass population. While there is a high density of Smallmouth Bass in the Cheoah River, growth is slow and a very high percentage of Smallmouth Bass (97–100%) are below the current minimum length limit; therefore, the number of Smallmouth Bass anglers can legally harvest from the Cheoah River represents an extremely small proportion of the population. This sport fishery, characterized as having a high density slow growing population, may benefit from increased harvest encouraged through lowering the minimum size limit.

References

Goodfred, D. W., K. J. Hining, A. M. Bushon, and D. L. Yow. 2010. Riverine Smallmouth Bass surveys. North Carolina Wildlife Resources Commission, Federal Aid in Sportfish Restoration, F-24-S, Final Report, Raleigh.

Kolander, T. D., D. W. Willis, and B. R. Murphy. 1993. Proposed revision of the standard weight (W_s) equation for Smallmouth Bass. North American Journal of Fisheries Management 13: 398–400.

Slipke, J. W., and M. J. Maceina. 2014. Fishery Analysis and Modeling Simulator (FAMS). Version 1.64. American Fisheries Society, Bethesda, Maryland.

von Bertalanffy, L. 1938. A quantitative theory of organic growth. Human Biology 10: 181-213.

TABLE 1.—Mean TL, weight, and relative weight (W_r) of Smallmouth Bass collected from the Cheoah River in July and August 2012 and May 2017. Standard deviations are reported parenthetically.

Year	N	TL (mm)	WT (g)	W_r
2012	158	215.4 (39.2)	123.9 (76.0)	82.1 (6.1)
2017	85	228.4 (46.0)	150.7 (101.3)	83.3 (10.7)
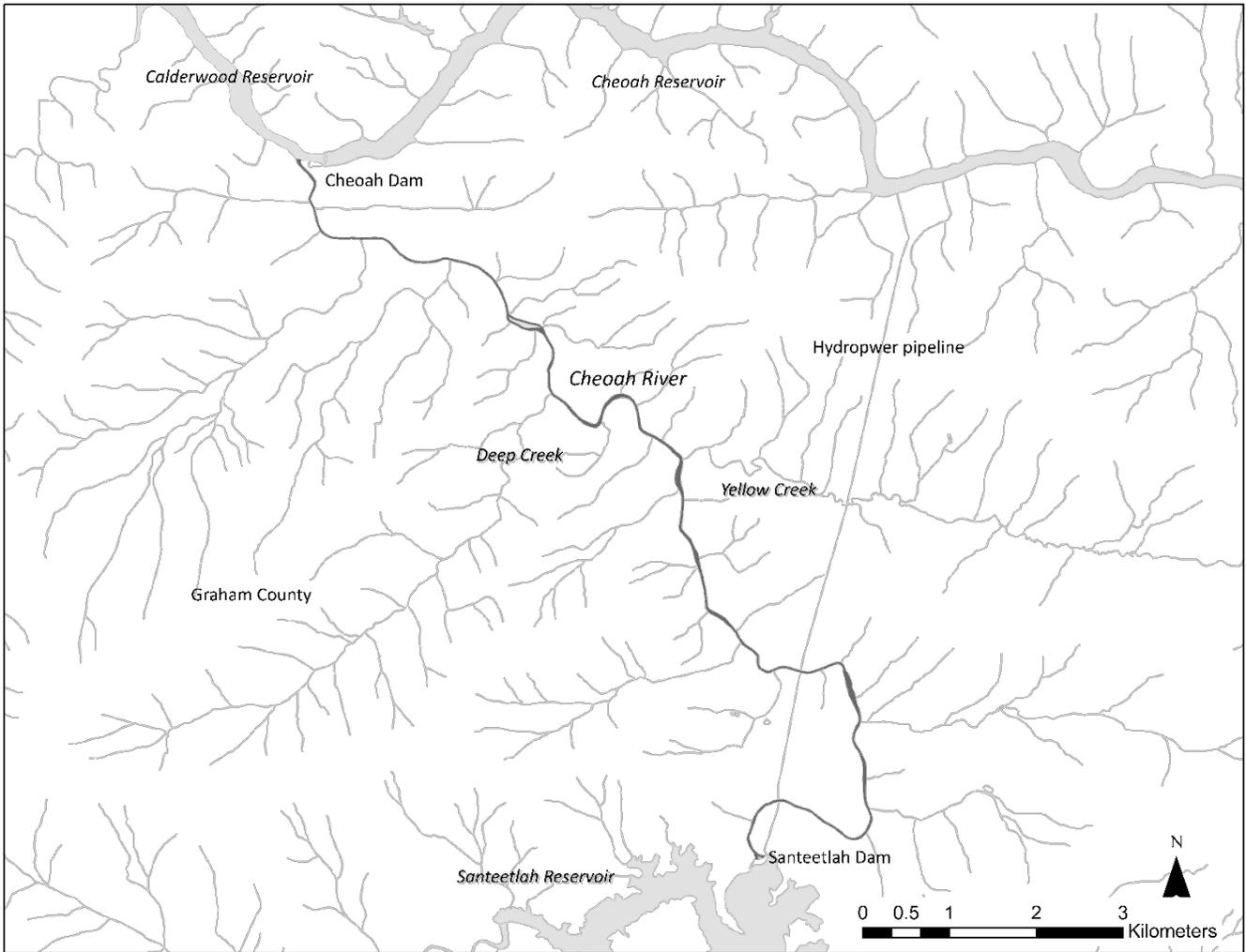
FIGURE 1.—Map of the Cheoah River, Graham County, NC surveyed during July and August 2012 and May 2017 using angling techniques.
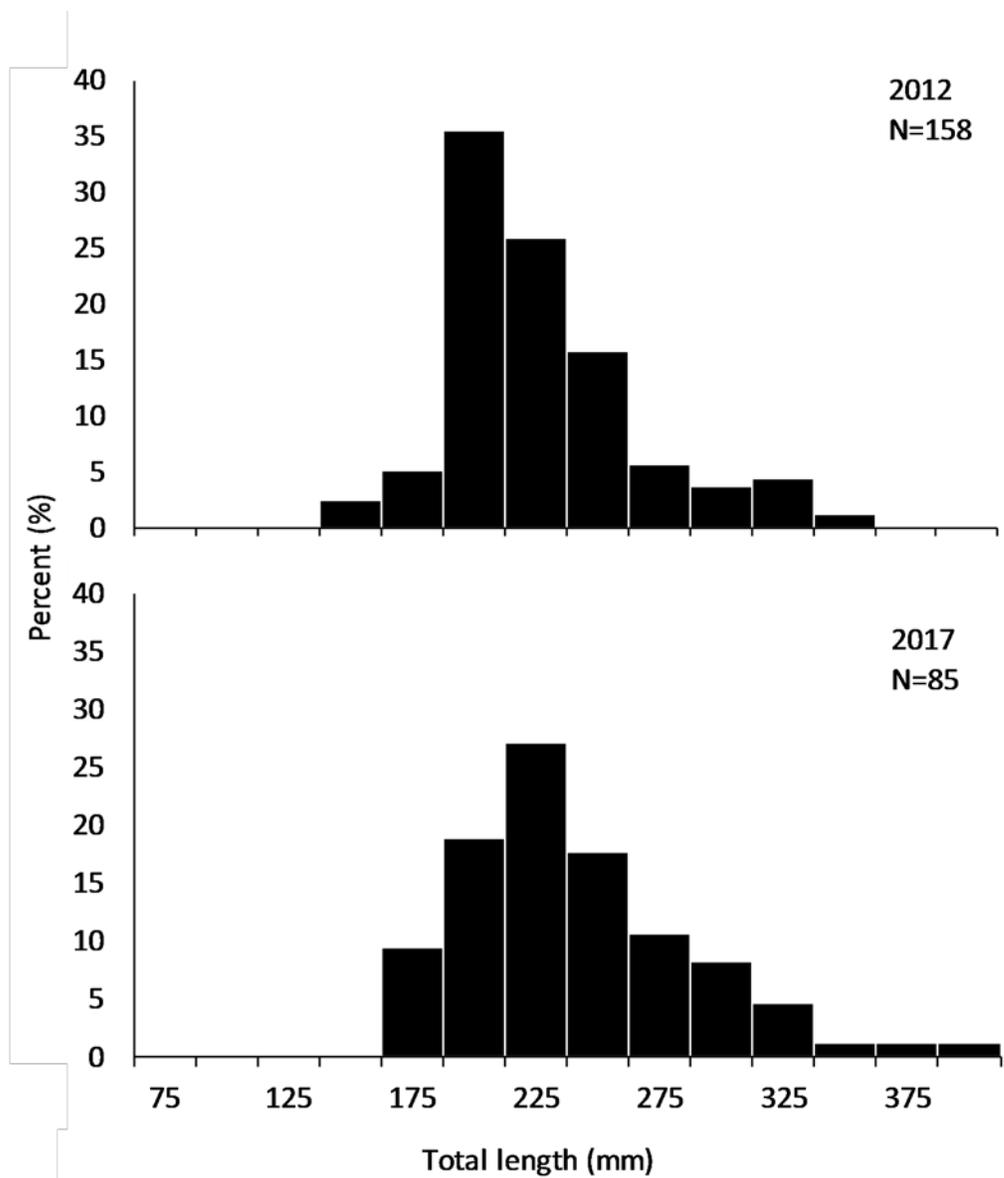
FIGURE 2.—Length frequencies of Smallmouth Bass collected in July and August 2012 and May 2017.
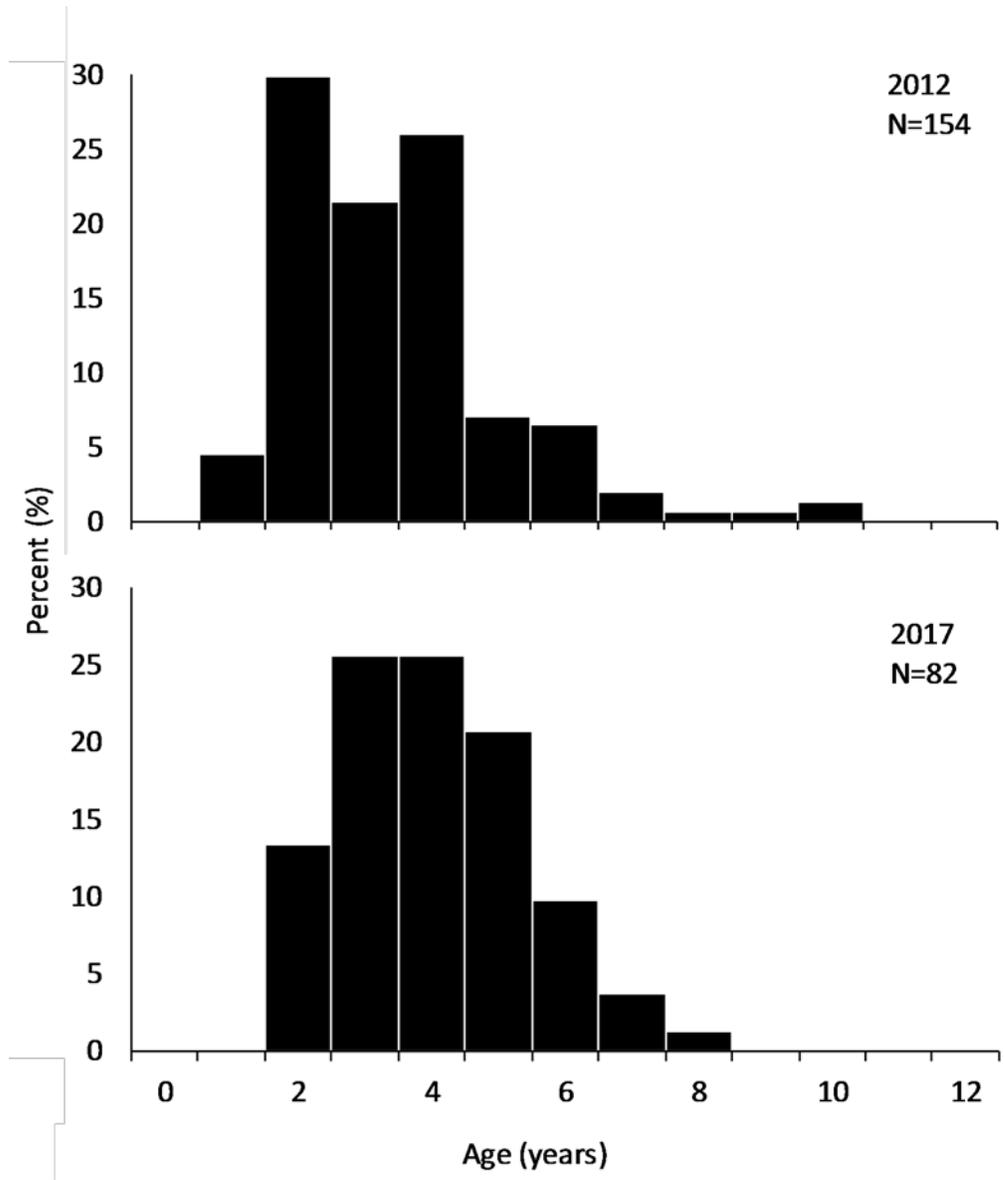
FIGURE 3.—Age frequencies of Smallmouth Bass collected in July and August 2012 and May 2017.
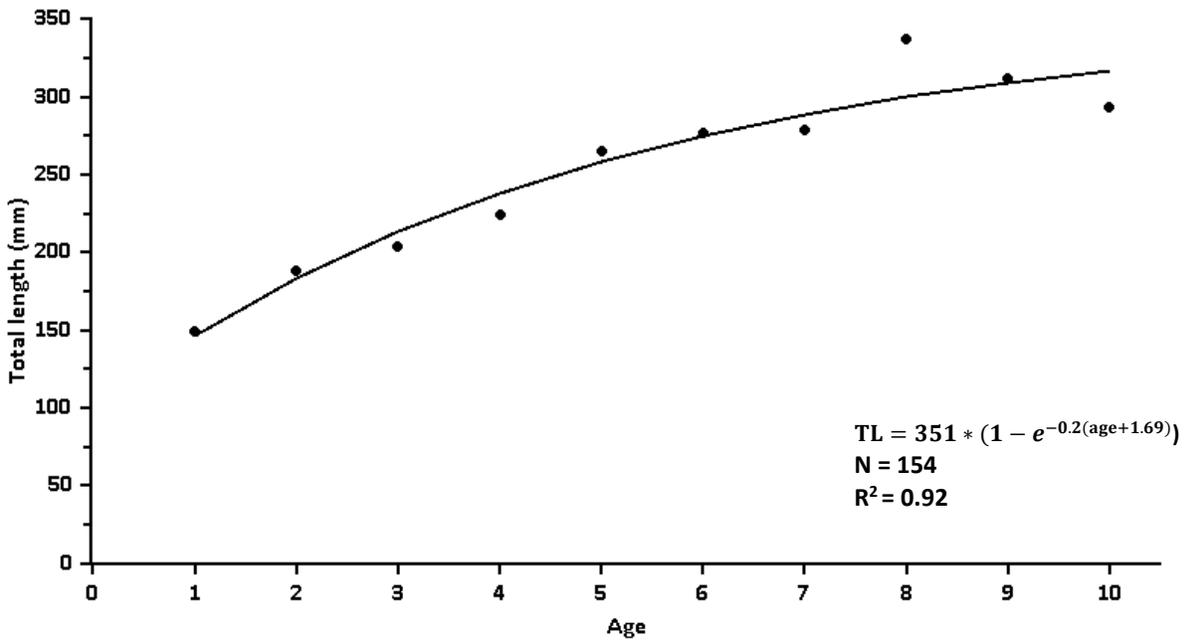
FIGURE 4.—Observed total length (TL; mm) at age (dots) and Von Bertalanffy growth curve (solid line) for Cheoah River Smallmouth Bass collected July and August 2012.