North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

6/14/19

MEMORANDUM

TO: District-9 Files

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

SUBJECT: Nantahala Reservoir Gill-Net Surveys, 2010 and 2017

District 9 Fisheries staff used gill-net surveys to sample the Walleye *Sander vitreus* population in Nantahala Reservoir, Macon County, NC on October 5–6, 2010 and September 19–22, 2017. The gill net dimensions were 2.4 x 76.3 m and consisted of consecutive, equal-length panels of 25-, 32-, 38-, 44-, and 51-mm bar mesh. Each year gill nets were placed perpendicular to the shore at eight sites, and the nearshore end (large or small mesh) of each net was randomly selected prior to being set (Table 1; Figure 1).

All gamefish species collected in gill nets 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. All fish were assigned an age equal to the annuli count. Relative abundance for the three most abundant species collected in gill nets was indexed by catch per unit effort (CPUE) and expressed as the number of fish per net-night (24 h) per year. Total length and age frequencies were constructed for the three most abundant species and mean relative weights (W_r) were calculated to assess condition (Murphy et al. 1990; Kolander et al. 1993; Bister et al. 2000). Mean length, weight, and W_r were calculated for each age class of the three most abundant species.

The three most abundant species collected in gill nets were Rock Bass *Ambloplites macrochirus*, Smallmouth Bass *Micropterus dolomieu,* and Walleye. Other species collected in small numbers each year included Bluegill *Lepomis macrochirus,* Channel Catfish *Ictalurus punctatus*, Kokanee Salmon *Oncorhynchus nerka*, Largemouth Bass *Micropterus salmoides*, Rainbow Trout *Oncorhynchus mykiss*, Redbreast Sunfish *Lepomis auritus,* and Yellow Perch *Perca flavescens*.

Mean CPUE decreased from 2010 to 2017 for Rock Bass and Smallmouth Bass (Table 2). Rock Bass and Smallmouth Bass were in generally good condition with mean W_r values ≥85 (Table 2). The size structure of Rock Bass collected from Nantahala Reservoir consisted of individuals ranging in length

from 121–226 mm TL (mean = 164 mm TL; SD = 23; Figure 2) and Smallmouth Bass ranged from 191–427 mm TL (mean = 321 mm TL; SD = 50; Figure 3). The size structure of Smallmouth Bass shifted slightly to larger fish from 2010 (mean = 299 mm TL; SD = 46) to 2017 (mean = 351 mm TL; SD = 40; Figure 3). Rock Bass (mean = 3; SD = 1; Figure 2) and Smallmouth Bass (mean = 3; SD = 1; Figure 3) were collected up to age 7. The age structure of Smallmouth Bass shifted to older fish from 2010 (mean = 2; SD = 1) to 2017 (mean = 3; SD = 1; Figure 3).

Walleye mean CPUE increased from 2010 (mean = 3; SD = 3) to 2017 (mean = 4; SD = 2; Table 2). Walleye were in good condition with mean W_r values ≥80 (Table 2). The size structure of Walleye consisted of individuals ranging in length from 272–495 mm TL (mean = 386 mm TL; SD = 58; Figure 4). Age structure ranged from 1 to 15 years (mean = 4; SD = 3; Figure 4). Age-1 Walleye recruit to our gill nets; therefore, total catch of age-1 fish can be used as an index of year-class strength. The number of age-1 Walleye collected in 2010 were low (N = 1), and no age-1 Walleye were collected in 2017, suggesting that growth in Nantahala Reservoir may be too slow for age-1 Walleye to reach sizes that recruit to our gill nets in Nantahala Reservoir.

References

Bister, T. J., D. W. Willis, M. L. Brown, S. M. Jordan, R. M. Neumann, M. C. Quist, and C. S. Guy. 2000. Proposed standard weight (W_s) equations and standard length categories for 18 warmwater nongame and riverine fish species. North American Journal of Fisheries Management 20:570–574.

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

Murphy, B. R., M. L. Brown, and T. A. Springer. 1990. Evaluation of the relative weight (W_r) index with new applications to Walleye. North American Journal of Fisheries Management 10:85–97.

TABLE 1.—Coordinates of Nantahala Reservoir gill-net sites.

Site	Latitude	Longitude
GN01	35.16126	-83.65420
GN02	35.18188	-83.67255
GN03	35.19295	-83.65443
GN04	35.16848	-83.66629
GN05	35.15635	-83.65469
GN06	35.17901	-83.67061
GN07	35.18798	-83.65769
GN08	35.19498	-83.64740

TABLE 2.—Mean CPUE with associated standard deviations for Rock Bass, Smallmouth Bass, and Walleye collected in gill nets in fall 2010 and 2017, Nantahala Reservoir.

Species	Mean CPUE (fish/net night)		Mean W_r	
	2010	2017	2010	2017
Rock Bass	6 (6)	1 (1)	88 (8)	87 (7)
Smallmouth Bass	12 (5)	9 (7)	94 (8)	91 (9)
Walleye	3 (3)	4 (2)	87 (6)	83 (7)

TABLE 3.—Mean TL, weight, and W_r of Rock Bass, Smallmouth Bass, and Walleye by age, collected by gill net, Nantahala Reservoir, 2010 and 2017. Standard deviations are reported parenthetically.

Age	Rock Bass				Smallmouth Bass				Walleye			
	N	TL (mm)	Weight (g)	W_r	*N*	TL (mm)	Weight (g)	W_r	*N*	TL (mm)	Weight (g)	W_r
1	0	–	–	–	17	228 (29)	156 (36)	102 (6)	1	276	170	83
2	14	156 (23)	80 (58)	89 (8)	62	303 (29)	404 (140)	95 (6)	14	376 (52)	504 (221)	86 (6)
3	20	180 (20)	121 (42)	92 (10)	64	346 (32)	578 (177)	91 (7)	21	377 (56)	490 (240)	83 (5)
4	10	209 (17)	202 (57)	97 (10)	15	359 (35)	641 (215)	88 (10)	4	374 (83)	497 (365)	84 (11)
5	4	219 (19)	243 (76)	100 (10)	3	388 (40)	763 (339)	80 (14)	3	456 (27)	815 (186)	80 (3)
6	3	226 (24)	263 (88)	98 (11)	2	384 (30)	731 (175)	83 (1)	5	431 (23)	721 (119)	85 (3)
7	1	234 (23)	286 (88)	97 (8)	2	404 (33)	820 (343)	78 (13)	2	445 (6)	837 (17)	90 (2)
8	0	–	–	–	0	–	–	–	1	370	307	59
9	0	–	–	–	0	–	–	–	1	306	266	94
14	0	–	–	–	0	–	–	–	1	431	677	81
15	0	–	–	–	0	–	–	–	1	363	466	96

FIGURE 1.—Map of gill-net sites on Nantahala Reservoir, Macon County, NC surveyed during fall 2010 and 2017.

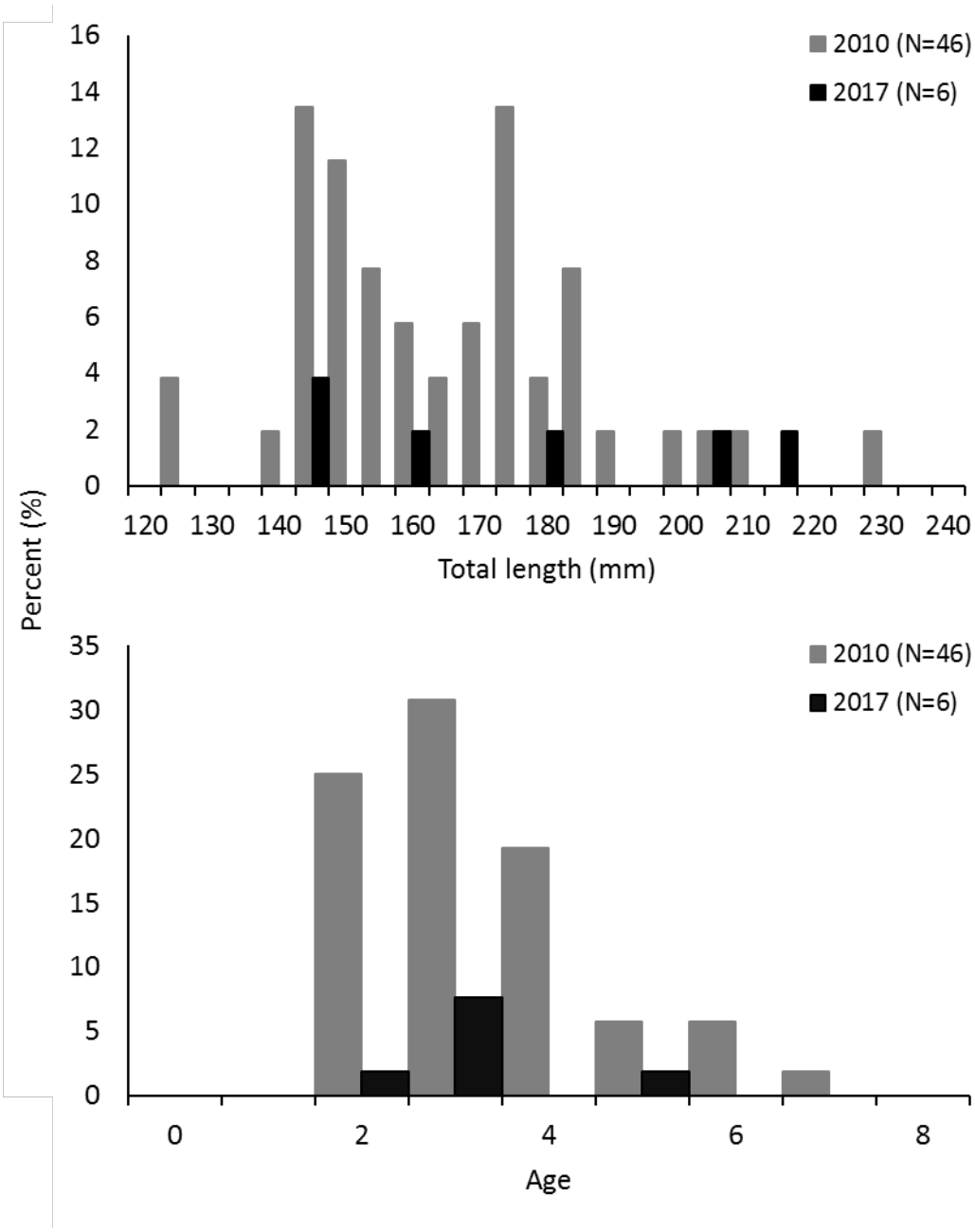

FIGURE 2.—Length frequencies (top) and age frequencies (bottom) of Rock Bass collected in 2010 and 2017 gill-net surveys on Nantahala Reservoir.

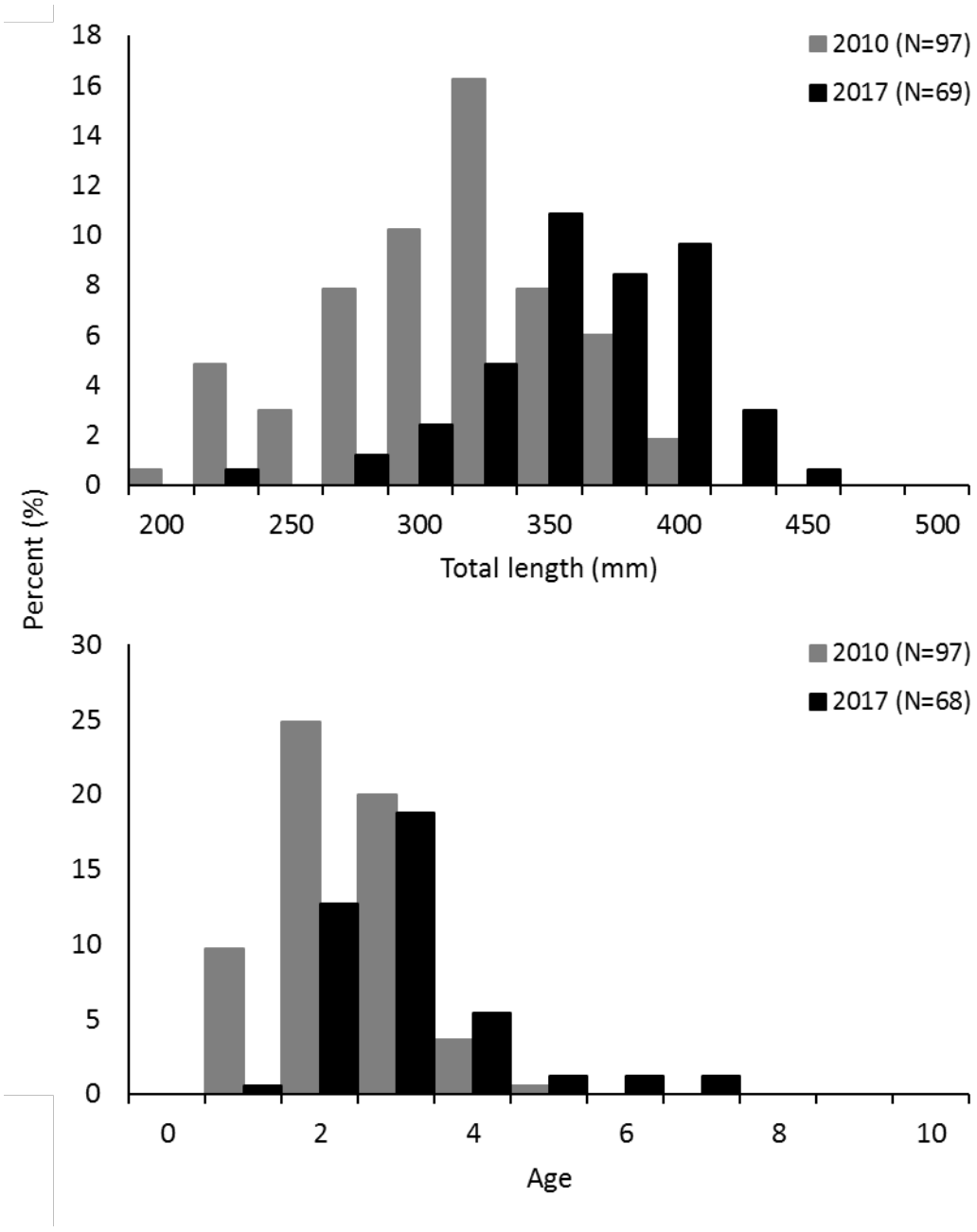

FIGURE 3.—Length frequencies (top) and age frequencies (bottom) of Smallmouth Bass collected in 2010 and 2017 gill-net surveys on Nantahala Reservoir.

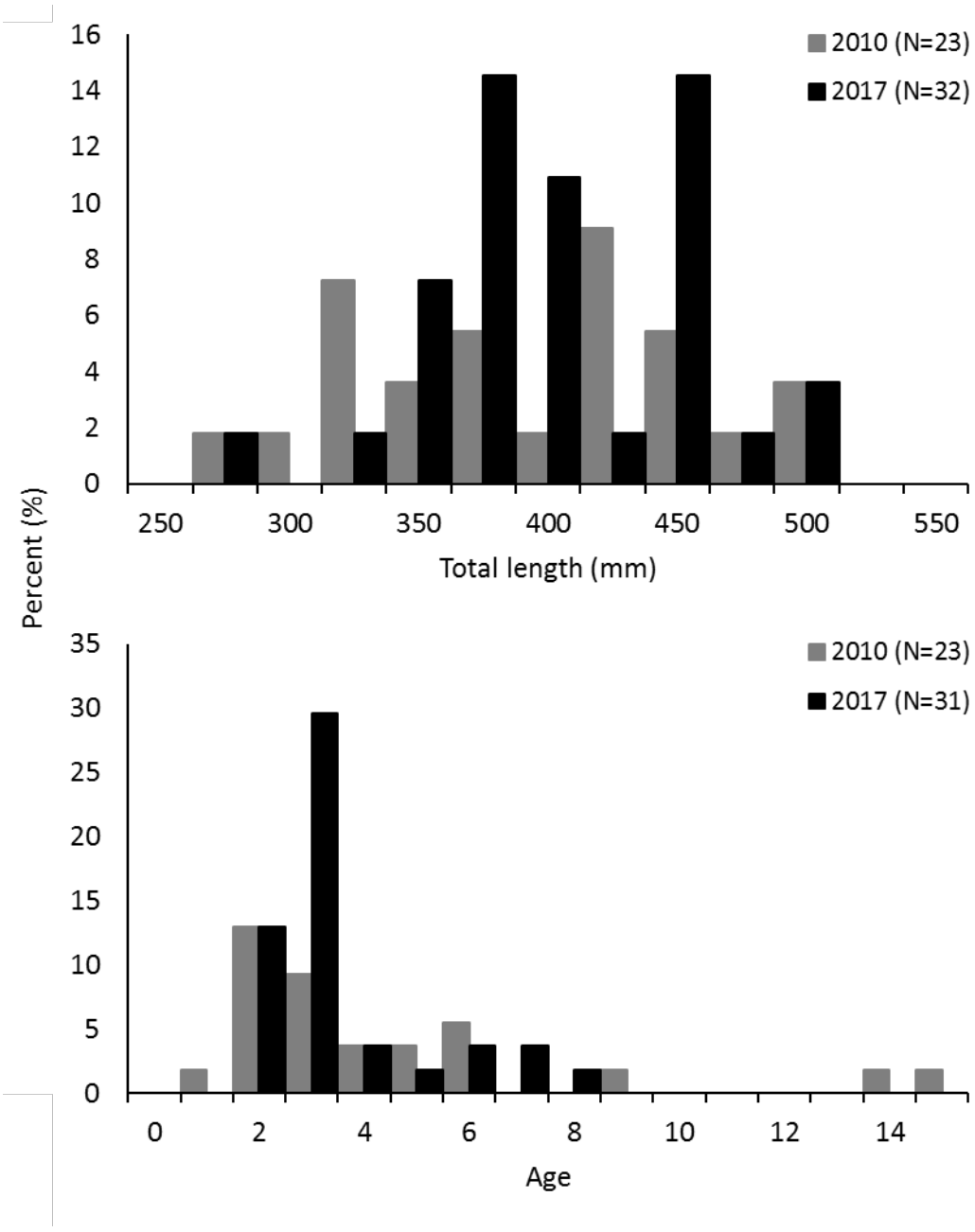

FIGURE 4.—Length frequencies (top) and age frequencies (bottom) of Walleye collected in 2010 and 2017 gill-net surveys on Nantahala Reservoir.