North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

6/12/2019

MEMORANDUM

TO: District-9 Files

FROM: Staff
Inland Fisheries Division

SUBJECT: Lake Fontana Black Bass Electrofishing Survey (2007–2009)

Lake Fontana is a large (4,318 ha), deep (146 m at the dam), long (47 km pool), high elevation (521 m above mean sea level), oligotrophic, hydropower reservoir on the Little Tennessee River in Swain County and Graham County, North Carolina (TVA 1954; NCDENR 2005). Lake Fontana was impounded in 1944 and Largemouth Bass *Micropterus salmoides* and Smallmouth Bass *M. dolomieu* have inhabited Lake Fontana since the earliest available survey (Chance 1953). Spotted Bass *M. punctulatus* (or possibly Alabama Bass *M. henshalli*) are a relatively recent addition to the black bass *Micropterus* spp. community and were initially collected by Dycus et al. (1999). Black bass compete with Walleye *Sander vitreus* for the most popular sport fish in the reservoir (Yow et al. 2019).

A boat electrofishing survey was conducted annually on Lake Fontana, 2007–2009. The study used a stratified design with three strata: 1) the Little Tennessee River arm, 2) the Tuckasegee River arm, and 3) the main channel below the confluence of the two arms. Eight coves were selected for electrofishing on the river arms and seven cove sites were selected on the main channel. Electrofishing transects started approximately 150 m from the end-point of the cove, followed the shoreline to the backend of the cove, then went along the opposite shoreline out of the cove 150 m to the stop location. The start and stop locations for the electrofishing transects were determined by using a laser range finder to measure 150 m from the back of the cove. Unfortunately, most of the site locations are unknown and the electrofishing effort (time) are lost. The Little Tennessee River arm was not sampled in 2009 due to equipment failure.

All collected black bass were stored on ice and transported to the Balsam Depot where they were measured for TL (mm) and weighed (g) within 24 h. Sagittal otoliths were removed, read under a dissecting scope in whole or section view, and ages assigned using methods in Bushon and Wheeler (2018). Catch-per-unit-effort (CPUE; fish/site) was used to index population abundance. Mean population statistics including TL (mm), weight (g), and relative weight (W_r; Wege and Anderson 1978; Wiens et al. 1991; Kolander et al. 1993) were calculated by age-class. Finally, due to concerns about shifts in the black bass community potentially occurring from the recently introduced Spotted Bass, the

percentage of each species in the samples are reported and the Sison and Glaz (1995) method was used to calculate 95% CIs about the percentages with the DescTools library (Signorell et al. 2019) in R (R Core Team 2019).

The CPUE of black bass in Lake Fontana is relatively low (Table 1). Largemouth Bass CPUE was higher than the other species (Table 1); however, Largemouth Bass more strongly associate with the littoral zone than Smallmouth Bass and Spotted Bass and are therefore more vulnerable to boat electrofishing gear. In contrast, both Spotted Bass and Smallmouth Bass are more common than Largemouth Bass in gill net samples targeting Walleye on Lake Fontana (unpublished data).

The Largemouth Bass population was characterized by a much wider age, TL, and weight distribution than the other species (Table 2). In addition, their W_r values were generally higher. Finally, the Spotted Bass population was very young (≤age-4), suggesting that this population was still expanding during this survey.

The ratios of the three species seem to be changing in Lake Fontana, although the absence of Little Tennessee River arm sites in 2009 makes interpretation less certain (Table 3). Largemouth Bass were 66% of the black bass catch in 2007, but only 44% in 2009. Similarly, Smallmouth Bass declined from 34% of the catch in 2007 to 18% in 2009. In contrast, the percentage of Spotted Bass in the collection increased from 1% in 2007 to 50% in 2009.

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TABLE 1.—Electrofishing CPUE (fish/site) of black bass collected from the Little Tennessee River arm (LTN), Tuckasegee River arm (TUCK), and main channel (MAIN) of Lake Fontana, 2007–2009. Standard deviations are reported parenthetically.

		CPUE		
Year	Stratum	Largemouth Bass	Smallmouth Bass	Spotted Bass
2007	LTN	2.5 (3.9)	2.3 (4.2)	0.0
	TUCK	2.7 (4.1)	0.7 (1.3)	<0.1 (0.2)
	MAIN	2.6 (5.2)	1.0 (2.3)	<0.1 (0.2)
2008	LTN	1.0 (2.0)	0.6 (1.1)	0.1 (0.4)
	TUCK	2.1 (3.9)	0.5 (1.9)	0.3 (0.9)
	MAIN	1.5 (2.7)	0.3 (0.9)	1.3 (0.3)
2009	LTN	—	—	—
	TUCK	1.3 (2.4)	0.3 (0.6)	0.9 (2.3)
	MAIN	1.2 (2.4)	0.7 (1.6)	1.3 (2.2)

TABLE 2.—Mean TL, weight, and W_r of black bass by age class collected by electrofishing from Lake Fontana, 2007–2009. Standard deviations are reported parenthetically.

	Largemouth Bass				Smallmouth Bass				Spotted Bass			
		Mean				Mean				Mean		
Age	*N*	TL (mm)	Weight (g)	W_r	*N*	TL (mm)	Weight (g)	W_r	*N*	TL (mm)	Weight (g)	W_r
1	20	183 (44)	87 (51)	98 (8)	28	114 (40)	21 (29)	67 (34)	21	104 (27)	13 (19)	83 (13)
2	88	258 (44)	248 (120)	98 (7)	78	206 (35)	116 (64)	88 (10)	39	196 (41)	97 (69)	87 (9)
3	85	334 (34)	511 (152)	92 (9)	24	277 (58)	313 (119)	89 (5)	2	349 (21)	534 (93)	88 (1)
4	50	365 (31)	667 (175)	90 (9)	10	330 (60)	477 (170)	83 (9)	3	332 (107)	559 (422)	82 (14)
5	22	399 (22)	853 (160)	88 (7)	7	320 (89)	483 (328)	83 (11)	0	—	—	—
6	24	419 (27)	1020 (212)	89 (9)	1	389	334	36	0	—	—	—
7	11	431 (38)	1149 (321)	91 (11)	2	390 (33)	686 (223)	74 (4)	0	—	—	—
8	9	437 (35)	1183 (323)	89 (6)	0	—	—	—	0	—	—	—
9	14	431 (23)	1066 (240)	85 (10)	0	—	—	—	0	—	—	—
10	8	454 (53)	1138 (554)	73 (16)	0	—	—	—	0	—	—	—
11	7	463 (41)	1420 (500)	88 (11)	0	—	—	—	0	—	—	—
12	2	459 (16)	1299 (199)	85 (88)	0	—	—	—	0	—	—	—
13	0	—	—	—	0	—	—	—	0	—	—	—
14	1	611	3579	92	0	—	—	—	0	—	—	—

TABLE 3.—The quantity of black bass collected from Lake Fontana 2007–2009 in three strata: Little Tennessee River arm (LTN), Tuckasegee River arm (TUCK), and main channel (MAIN). The percentage of each species is reported along with 95% CIs.

		Largemouth Bass		Smallmouth Bass		Spotted Bass	
Year	Stratum	*N*	% (CI)	*N*	% (CI)	*N*	% (CI)
2007	LTN	58	53 (44–63)	52	47 (38–57)	0	0 (0–10)
	TUCK	63	79 (71–88)	16	20 (13–29)	1	1 (0–11)
	MAIN	59	69 (60–79)	25	29 (20–39)	1	1 (0–11)
	ALL	180	66 (60–71)	93	34 (28–40)	2	1 (0–7)
2008	LTN	22	60 (46–77)	13	35 (22–52)	2	5 (0–23)
	TUCK	48	73 (64–84)	12	18 (9–29)	6	9 (0–20)
	MAIN	34	76 (64–87)	8	18 (7–30)	3	7 (0–19)
	ALL	104	70 (64–78)	33	22 (16–30)	11	7 (1–15)
2009	LTN	—	—	—	—	—	—
	TUCK	30	54 (41–67)	6	11 (0–24)	20	36 (23–49)
	MAIN	27	37 (26–50)	17	23 (12–36)	30	41 (30–54)
	ALL	57	44 (35–54)	23	18 (9–27)	50	38 (30–48)