Monitoring Trophy Largemouth Bass in Oklahoma Using a Taxidermist Network[1]

Richard A. Horton, *Oklahoma Fishery Research Laboratory, 500 E. Constellation, Norman, OK 73072*

Eugene R. Gilliland, *Oklahoma Fishery Research Laboratory, 500 E. Constellation, Norman, OK 73072*

Abstract: A network of cooperating taxidermists provided liver samples for phenotypic determination and scale samples for age and growth analysis of trophy largemouth bass (≥3.6 kg). This network provided data not available through standardized sampling methods. Two hundred fifty-one samples were received from 34 lakes over a 6-year period. Ninety-three percent of these bass contained Florida largemouth bass alleles. Florida largemouth bass and F1 hybrids were generally longer and heavier than northern largemouth bass or Fx phenotypes. Florida largemouth bass had significantly faster mean growth rates than other phenotypes. This study showed that stocking Florida largemouth bass into newly constructed lakes, continuous stockings into known trophy bass lakes, and protection of bass to trophy sizes with restrictive creel and length limit regulations may be necessary management practices to produce, enhance and maintain trophy bass fisheries in Oklahoma.

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The Oklahoma Department of Wildlife Conservation (ODWC) began introducing Florida largemouth bass (*Micropterus salmoides floridanus*; FLMB) into Oklahoma reservoirs in 1973. The 41-year-old state bass record was broken in 1983 with a northern largemouth bass (*M. s. salmoides*; NLMB) x FLMB hybrid. The state record was broken 5 more times during the 1980s. Electrophoretic analysis of liver samples indicated that each of these record fish carried FLMB subspecific alleles. During that same time period there was an increase in the number of trophy bass (≥3.6 kg) reported being caught by anglers. Questions were raised as to whether this increase was the result of FLMB introductions or because anglers were becoming better equipped and more proficient in the pursuit of trophy bass. Standardized sampling conducted by ODWC personnel seldom provided data

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on substantial numbers of trophy bass (only 3 bass ≥3.6 kg were collected from all lakes sampled from 1987 through 1992). Alternative methods were needed to obtain age, growth, and phenotypic information on these large fish. Phenotypic identification of state record fish using samples obtained from taxidermists in 1987 raised the possibility that a network of cooperating taxidermists could collect data to aid in management of trophy bass.

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Methods

A mailing list of Oklahoma taxidermists was developed using the Oklahoma Taxidermist Association directory and telephone directories. A letter explaining the proposed program and a pre-paid self-addressed reply postcard was mailed to each taxidermist. Taxidermists who were willing to participate in the program were then mailed instructions on how to collect and store liver and scale samples from bass >3.6 kg caught from public waters. Small plastic bags for liver samples and coin envelopes for scales were provided. Taxidermists were asked to record information on the scale envelope including angler name, address, telephone number, and fish data (length to the nearest one-quarter inch, weight in pounds and ounces or decimal equivalent, and data and location of catch). Samples were stored frozen until they were picked up by ODWC personnel on a biannual basis.

Electrophoretic analyses of the samples followed procedures outlined by Phillip et. al. (1983) and Gilliland and Whitaker (1989) using sAAT-2 and IDHP-2 loci. Phenotypes were designated as FLMB when both loci were homozygous for Florida alleles, NLMB when both loci were homozygous for northern alleles, first generation hybrid (F1) when both loci were heterozygous, or second or subsequent generation hybrid (Fx) when only 1 loci was heterozygous. Fish ages were estimated from scale samples, with bass caught after July 1 assigned an extra one-half year of age. Results were entered into a database and letters were sent to each angler thanking them for participating in the program and reporting their fish's age and phenotype. Taxidermists were sent a summary of the results of all the fish for which they had supplied samples during that year.

The ODWC Angler Recognition Program (ARP) provides awards for catches of largemouth bass >3.8 kg or >575 mm long. When an ARP entry was received, the angler was contacted to determine if the fish was to be mounted. If so, the taxidermist's name was obtained to determine if the fish was with a cooperator. Publicity of the ARP was increased with posters and brochures distributed to bait and tackle dealers statewide. The poster included a reference to taxidermist involvement in the Department's genetic research and encouraged anglers to have samples saved if they were having their trophy bass mounted.

Data analyses consisted of comparisons of sample numbers by lake, month, year, and phenotype; comparisons of mean lengths and mean weights among all

fish by phenotype and mean length and mean weight at age among phenotypes (Proc GLM, Duncan's Multiple Range Test; SAS 1987). Mean weight by 25-mm length groups was calculated by phenotype for comparisons to historical length at age data.

Results

Two taxidermists provided samples in 1987. One hundred-thirty additional taxidermists were contacted from 1988 through 1992. Eighty-one taxidermists indicated a desire to participate in the program with 39 having saved samples since the program's inception. All regions of the state were represented except extreme northwest Oklahoma which has few reservoirs and historically produces very few trophy bass.

A total of 302 samples were received from taxidermists over the 6-year period. Samples without location names (14), those under the 3.6 kg minimum weight (25), or those with denatured liver samples (12) were eliminated from these analyses. The 251 useable samples, representing 34 lakes, included 3 samples from 1987, 16 from 1988, 4 from 1989, 78 from 1990, 80 from 1991, and 70 from 1992 (Table 1.)

Electrophoretic analyses indicated FLMB phenotypes made up 54% of the samples collected, 28% were F1, 11% were Fx, and 7% were NLMB (Table 1). One hundred thirty-one samples (52% of the total), were received from Sardis Reservoir in 1990, 1991, and 1992. Of the Sardis bass, 114 (87%) were FLMB phenotypes, 4 (3%) were F1, 10 (8%) were Fx, and 3 (2%) were NLMB. When Sardis samples were removed from the data set, F1 phenotypes made up 56% of

Table 1. Number and percent of each phenotype of largemouth bass caught from Oklahoma reservoirs collected using a taxidermist network by year, the number of lakes represented each year, with samples from Sardis Reservoir listed from 1990 through 1992.

		Phenotype				
Year	*N* Lakes	FLMB *N* (%)	F1 *N* (%)	Fx *N* (%)	NLMB *N* (%)	Combined
1987	1		2(67)	1(33)		3
1988	7		16(100)			16
1989	4	1(25)	3(75)			4
1990	20	37(47)	21(27)	10(13)	10(13)	78
Sardis only		34(81)	3(7)	3(7)	2(5)	42
1991	20	46(58)	17(21)	12(15)	5(6)	80
Sardis only		40(89)	0	4(9)	1(2)	45
1992	15	50(71)	12(17)	5(7)	3(4)	70
Sardis only		40(91)	1(2)	3(7)	0	44
Totals		134(54)	71(28)	28(11)	18(7)	251
Sardis only Totals		114(87)	4(3)	10(8)	3(2)	131
Totals w/o Sardis		20(17)	67(56)	18(15)	15(12)	120

Table 2. Number and percent of samples from trophy largemouth bass caught from Oklahoma reservoirs by month each year as recorded by cooperating taxidermists.

Month	1987 *N* (%)	1988 *N* (%)	1989 *N* (%)	1990 *N* (%)	1991 *N* (%)	1992 *N* (%)	Total *N* (%)
Jan					1(1)	2(3)	3(1)
Feb					5(6)	7(10)	12(5)
Mar		2(13)	2(50)	6(8)	10(13)	13(19)	33(13)
Apr		2(13)		23(28)	19(23)	7(10)	51(20)
May		1(6)		3(4)	11(14)	10(14)	25(9)
Jun	1(33)	1(6)		17(22)	15(19)	5(7)	39(16)
Jul		1(6)	1(25)	2(3)	4(5)	11(16)	19(8)
Aug		6(38)		9(12)	7(9)	7(10)	29(12)
Sep		1(6)		8(10)	6(8)	5(7)	20(8)
Oct	2(67)	1(6)		6(8)	1(1)	1(1)	11(4)
Nov				3(4)		2(3)	5(2)
Dec		1(6)	1(25)	1(1)	1(1)		4(2)

the samples, followed by FLMB (17%), Fx (15%), and NLMB (12%). Samples of 10 or more trophy bass were obtained from 6 other reservoirs. Florida alleles were found in 100% of the samples from Clear Creek and Waurika, 92% of those from Murray, 84% from Humphreys, 80% from McGee Creek, and 77% from Fuqua.

Although trophy bass were caught in all months of the year, April produced 20% of samples, followed by June (16%), March (13%), and August (12%; Table 2). The most productive months for catching trophy fish varied among years. The pattern in 1992 showed the greatest change over previous years with March the most productive month (19%), followed by July (16%), then May (14%). Sixty-five percent of samples from fish caught in late summer came from Sardis Reservoir (44 of 68 samples in July, August, and September).

Table 3. Sample size (*N*), mean total length (TL in mm), and mean weight (Wt in kg) at age for each phenotype of trophy largemouth bass caught from Oklahoma reservoirs, collected using a taxidermist network from 1987 through 1992.

	FLMB			F1			Fx			NLMB		
Age	*N*	TL	WT	*N*	TL	WT	*N*	TL	WT	*N*	TL	WT
5	4	629	4.0	1	559	3.8						
6	36	603	4.3	7	584	3.7	3	560	3.9			
7	41	618	4.3	7	610	4.2	7	617	4.2	3	567	3.9
8	34	610	4.3	20	605	4.1	10	590	4.0	7	592	3.9
9	13	617	4.5	15	622	4.8	8	631	4.0	5	591	3.8
10	2	686	4.6	12	630	4.7				2	610	3.8
11	4	652	5.1	3	648	5.3				1	635	4.8
12				5	627	4.9						
13				1	660	6.1						
Overall Mean	134	614	4.5	71	612	4.4	28	605	4.1	18	592	3.9

Ages of trophy bass ranged from 5 to 13 years, with 55% of the samples being 7 or 8 years old (Table 3). Trophy NLMB ranged from age 7 to age 11, FLMB were age 5 to age 11, F1's were age 5 to age 13, and Fx bass were age 6 to age 9.

Mean lengths of FLMB and F1 phenotypes were significantly longer than NLMB (614 mm and 612 mm v. 592 mm; $P = 0.0474$) but not Fx phenotypes (605 mm; Table 3). Mean lengths of NLMB and Fx phenotypes were not significantly different. Mean weights of FLMB and F1 phenotypes were similar and were both significantly heavier than NLMB and Fx phenotypes (4.5 kg and 4.4 kg vs. 3.9 kg and 4.1 kg, respectively; $P = 0.0001$). Due to small sample sizes among phenotypes at ages 5, 11, 12, and 13, statistical comparison of lengths and weights showed no significant differences, however, FLMB and F1 phenotypes were generally longer and heavier at given ages than were NLMB or Fx phenotypes (Table 3).

Mean growth rates were variable among phenotypes with NLMB and Fx bass ranging from 0.38 kg to 0.68 kg per year, while FLMB and F1 phenotypes grew from 0.38 kg to 0.94 kg per year. Mean growth rates of FLMB were significantly faster (0.59 kg/year; $P = 0.0001$) than F1, Fx, or NLMB phenotypes (0.51, 0.51, and 0.47 kg/year, respectively). These growth rates do no imply growth was linear; rather, they provided a convenient index for comparison.

Discussion

A network of cooperating taxidermists provided information about the success of Florida bass introductions into Oklahoma reservoirs and the age and growth of trophy bass that standardized electrofishing was unable to supply. Ninety-three percent of the trophy bass samples analyzed during this study contained FLMB alleles and were direct or indirect results of the ODWC stocking program. The taxidermist network identified lakes where FLMB stockings produced substantial numbers of trophy fish. Forshage et al. (1989) reported that bass populations in Texas lakes producing largemouth bass eligible for trophy recognition awards usually exhibited a high frequency of FLMB alleles. Similar results were seen in our study. Eight Oklahoma lakes, identified by Gilliland and Whitaker (1989) as containing populations in which ≥50% of the bass carried FLMB alleles, produced 74% of the samples received in this study.

Few studies in the literature reported on age and growth of trophy bass so direct comparisons of our data with those from other states were difficult. Estimates of growth from samples collected from taxidermists were likely to be biased compared to electrofishing or rotenone samples because anglers selectively harvest the largest and/or fastest growing bass (Miranda et al. 1987). Despite differences in sampling methods, mean lengths at age for all phenotypes appeared much greater than those reported for NLMB in previous Oklahoma rotenone studies by Houser and Bross (1963) and Mense (1976). Total lengths of Oklahoma trophy FLMB at all ages were greater than those of trophy class bass reported from electrofishing catches in Florida by Porak et al. (1986) or Schramm and Smith (1987). Oklahoma trophy FLMB and F1 phenotypes were longer than those seen in California electro-

fishing samples through age 8 and similar from age 9 through age 11 (Bottroff and Lembeck 1978).

Most of the trophy FLMB seen in this study were relatively young (age 5 to age 9). This indicated that if other individuals maintained similar growth rates and lived to ages seen among fish sampled in this study (up to age 13), bass exceeding the current state record (6.64 kg) could be produced.

Three special situations were identified during this study that will help shape ODWC FLMB stocking and management plans. The city of Duncan, Oklahoma, conducted an active FLMB stocking program in their 4 municipal water supply reservoirs until 1985. Dripping Springs Lake was impounded and stocked with FLMB and F1 phenotypes in 1976 and gained a reputation as a trophy bass lake (Wright and Wigtil 1980). These lakes were regarded as Oklahoma's premier trophy bass lakes throughout the 1980s. The numbers of trophy bass being caught from these lakes declined noticeably in the 1990s, 8 to 10 years after stockings were discontinued despite special length limit regulations. This suggested that a continuous stocking program was needed to maintain trophy bass production.

Stocking FLMB in newly impounded reservoirs proved to be a successful management practice in the production of trophy bass. Sardis Reservoir was stocked for 3 years with FLMB following impoundment in 1983. By 1990, bass >4.5 kg were being caught regularly and age-6 FLMB >5.5 kg were documented during this study. Analysis of liver and scale samples obtained from taxidermists revealed that 78% of these trophies were FLMB from the 1983, 1984, or 1985 year classes (Table 1). Skiatook and McGee Creek reservoirs, impounded and stocked with FLMB in 1985 and 1986, respectively, each produced trophy bass in <6 years, of which 88% were FLMB, F1, or Fx phenotypes.

Konowa Reservoir, a power-plant cooling-water reservoir with a high frequency of FLMB alleles in the population, has also gained a reputation as a trophy bass lake (Gilliland and Whitaker 1989). However, despite reports of numerous catches of bass >3.6 kg, few >4.5 kg were documented by the ARP, in local newspapers, or by bait shop operators. Only 6 samples from Konawa were submitted through taxidermists since 1990 (all FLMB phenotypes). Konowa currently is regulated with a 6 largemouth bass per day creel limit and no size restrictions. High fishing pressure and low numbers of bass >4.5 kg indicated the need for a special regulation (406 mm to 559 mm slot length limit, 1 fish >559 mm creel limit) to help the lake realize its trophy producing potential.

The Angler Recognition Program and taxidermist network worked well together to help track trophy catches. Some bass that were recorded by the ARP were not received via the taxidermist network. Conversely some trophy samples from taxidermists were not submitted for the awards program. When records from both programs were compared, several new taxidermists were enlisted, useful samples procured, and anglers that might not have otherwise received awards had their catch recognized. Public relations with the ODWC were enhanced because cooperating anglers and taxidermists felt that they were contributing to research that would benefit the resource.

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