

LOGAN MARTIN RESERVOIR MANAGEMENT REPORT

2008

Prepared by

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Introduction

The objective of the Logan Martin Reservoir management plan is to collect quantitative biological data that will assist the district biologists in developing management strategies to enhance the fishery. The reservoir is sampled periodically to follow trends in growth, recruitment, and mortality, of its major sport fish species. Data is collected as outlined in the Fisheries Section's Reservoir Management Program Manual (Cook 1999). Logan Martin Reservoir has previously been sampled in the springs of 1986, 1988, 1994, 2000, 2003, and 2005 by District II Fisheries personnel and in 1993 by Auburn University's Fisheries personnel.

Detailed characteristics of Logan Martin Reservoir can be found in the 1986 management report (Catchings and Cook 1987). A summary of morphometric, physical, and chemical characteristics are listed in Table 1 of this report.

Methods

Logan Martin Reservoir was sampled in the spring of 2008 according to the guidelines of the Reservoir Management Manual (Cook 1999). Beginning in the spring of 2008, nine sample sites were selected downstream of Lock 4 (river mile 29) and one sample site was selected 13 miles upstream of Lock 4. Fish were collected by daytime electrofishing in the spring. Electrofishing was conducted on April 1-4, 2008. Electrofishing target species included largemouth and spotted bass from which length, weight and otoliths were taken.

Electrofishing gear consisted of an 18-foot aluminum boat with bow mounted electrodes. A Smith-Root model 5.0 GPP was used to deliver up to 1,008 volts of pulsed direct current. Detailed descriptions of gear and methods of deployment can be found in the 2003 management report (Catchings and Andress 2004).

Bass tournament information was collected through the Bass Anglers Information Team (BAIT) report of 2007. The results were reviewed with regard to Logan Martin Reservoir and appropriate comments are included in this report.

All tables and figures are located in Appendix A. These should be reviewed carefully because some of them may not be cited specifically within the text.

Results

Largemouth bass in the preferred-memorable relative stock density (RSD) category were best represented (39%) in the 2008 sample, exceeding the statewide 75th percentile with the second highest value (43% in 2003) since 1988 (Table 2, Jim McHugh, unpublished data). Quality-preferred largemouth bass RSD increased from 2005 (30%) to the second highest proportion (35%) collected since 1988 (36% in 1993); exceeding the statewide mean. Memorable-trophy largemouth bass RSD (4%) equaled the statewide mean. Stock-quality largemouth bass density decreased from 2005, to a value (23%) below the lower 25th percentile. Catch rates for stock-quality largemouth bass (5.0 fish/hr) were well below the lake average, while quality-preferred (7.6 fish/hr) and preferred-memorable (8.6 fish/hr) catch rates approximated the lake average. Memorable-trophy (0.8 fish/hr) catch rates equaled the lake average.

Relative weight (Wr) values for stock-quality and quality-preferred largemouth bass categories were above the statewide mean values, while the preferred-memorable category Wr value was slightly less than the statewide mean (Table 2). The memorable-trophy largemouth bass Wr value equaled the statewide 75th percentile.

Growth was average for age 1 largemouth bass (Table 3), approximating the statewide mean (Mike Maceina, unpublished data). Growth of age 2 and age 4 largemouth bass was excellent, exceeding the statewide 75th percentile, while age 3 growth exceeded the statewide mean value. Growth slowed for age 5 largemouth bass, barely surpassing the lower 10th percentile. Annual mortality for largemouth bass was 39% with an $r^2 = 0.96890$ (Figure 4).

Quality-preferred spotted bass RSD showed improvement, increasing to 46% (Table 2), which surpassed the statewide 75th percentile (Jim McHugh, unpublished data) as did the CPE of 16.4 fish/hr. Preferred-memorable (34%) and memorable-trophy (8%)

spotted bass RSD values declined and yet both values still surpassed the statewide 75th percentile, as did their CPE's of 9.6 fish/hr and 3.0 fish/hr, respectively (Table 2). Both sizes, preferred-memorable and memorable-trophy, reflected a CPE approximately double the statewide 75th percentile. However, the stock-quality spotted bass RSD value (19) declined further below the 25th percentile, with the CPE for stock-quality (7.0) spots slightly above the 25th percentile.

Relative weight values (Wr) were excellent, with stock-quality and quality-preferred spotted bass exceeding and equaling the 75th percentile, respectively; while preferred-memorable and memorable-trophy spots exceeded the statewide mean (Table 2).

Spotted bass growth ranged from average to slow, as age 2 spotted bass were slightly below the statewide mean, age 3 spots approximated the statewide 25th percentile, age 4 spots equaled the statewide median, and age 5 spots were below the 25th percentile (Table 4, Mike Maceina, unpublished data). Annual mortality for spotted bass was 58% with an $r^2 = 0.9722$ (Figure 7).

The Bass Anglers Information Team 2007 B.A.I.T. Annual Report (Abernethy 2007), was reviewed with respect to the bass tournament data collected, and Logan Martin looked strong in three of the quality indicators for fishing success. Logan Martin was ranked first in percent success with 92% of the anglers catching a least one fish. Logan Martin was ranked third in bass per angler-day with 4.18 bass, which is the highest catch rate recorded on Logan Martin since B.A.I.T. data has been collected. Anglers weighed in an average of 6.44 lbs at tournament weigh-ins in 2007, making it the best year on Logan Martin since the B.A.I.T. program began in 1986 and ranking Logan Martin third in this quality indicator. Overall, Logan Martin was ranked seventh out of 22 reservoirs.

Conclusions

The largemouth bass population in Logan Martin Reservoir is in good to excellent condition. In the 2005 Logan Martin Management Report (Catchings and Andress 2004), the size structure of largemouth bass was dominated by stock-quality largemouth bass; however, in 2008 preferred-memorable and quality-preferred size largemouth bass were dominant and memorable-trophy largemouth equaled the statewide mean value. The severe drought may have contributed to the decline of the 2007 year class of largemouth bass. Largemouth bass exhibited good to excellent condition with all RSD Wr's equaling or exceeding 90. Growth has ranged from average to excellent for ages 1 through age 5. Average growth was observed in age 3 largemouth; excellent growth was found in age 2 and age 4 largemouth; and slowest growth was in age 5 largemouth.

The spotted bass population also looks fairly good. The size structure of the larger spotted bass remains excellent with quality-preferred, preferred-memorable and memorable-trophy spotted bass exceeding the statewide 75th percentile. Stock-quality spotted bass have also declined in numbers, possibly being impacted by drought conditions in 2007. Growth ranged from average to slow while relative weight values remain excellent.

Since 2006, a total of 764,321 Florida largemouth bass fingerlings have been stocked into the Cropwell Creek area of Logan Martin for genetic enhancement.

The black bass population is well structured, with growth ranging from slow to excellent, good abundance, and excellent condition. Recruitment may be a concern due to drought conditions in 2007.

No changes in bag limit or size limit regulations are warranted or recommended at this time.

The Logan Martin bass population will be sampled again in the spring of 2011 and a creel survey will be conducted.

Consumption advisories have been posted for various fish species in Logan Martin Reservoir. For the latest consumption advisory information, check the department public health website: www.adph.org.

Literature Cited

- Abernethy, D.L. 2007. Bass anglers information team 2007 annual report. Division of Wildlife and Freshwater Fisheries, Montgomery.
- Catchings, E. D. and J. D. Cook, 1987. Logan Martin reservoir management report. Alabama Game and Fish Division, Montgomery.
- Cook, S. F. 1999. Reservoir management manual. Alabama Game and Fish Division, Montgomery.
- Jenkins, R. M. 1967. The influence of some environmental factors on the standing crop and harvest of fishes in U.S. reservoirs. Pages 298-321 in Reservoir Fishery Resources Symposium. Southern Division American Fisheries Society, Bethesda, Maryland, USA.
- Ryder, R.A. 1965. A method for estimating the potential fish production of North American temperate lakes. Transactions of the American Fisheries Society. 94:214-218.

Appendix A

Tables and Figures

Table 1. Logan Martin Reservoir morphometric, physical, and chemical characteristics.

Surface area	15,263 acres
Drainage area	7,700 sq. mi.
Full pool elevation	465 feet-msl
Mean annual fluctuation	5 feet
Shoreline distance	275 miles
Shoreline development index	15.9
Mean depth	18 feet
Maximum depth	69 feet
Outlet depth	450 feet (upper) 401 feet (lower)
Total dissolved solids (TDS)	109 mg/l
Morphoedaphic index	6.05 TDS/mean depth(ft) (Ryder 1965)
Growing season	210 frost free days
Date Of Impoundment	1964

Table 2. Relative stock density (RSD), catch per effort (CPE), and relative weight (Wr) of largemouth and spotted bass in Logan Martin Reservoir, 1988, 1993, 1994, 2000, 2003, 2005 and 2008.

Species	No. of samples	SUBSTOCK			RSD-S				RSD-Q				RSD-P				RSD-M				RSD-T				CPE		TOTAL					
		Effort	No.	CPE	Pct.	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	S-T	P-T	No.	CPE			
Largemouth Bass	1988	6	3.0	0	0.0	0	53	17.7	53		32	10.7	32		12	4.0	12		3	1.0	3								33.3	5.0	100	33.3
	1993	6	3.0	5	1.7	5	23	7.7	21	98	38	12.7	36	103	41	13.7	38	101	5	1.7	5	91							35.7	15.3	112	37.3
	1994	7	3.5	10	2.9	10	55	15.7	54	96	28	8.0	27	98	16	4.6	16	100	3	0.9	3	101							29.1	5.4	112	32.0
	2000	10	5.0	17	3.4	8	154	30.8	74	96	33	6.6	16	94	20	4.0	10	97	1	0.2	0	111							41.6	4.2	225	45.0
	2003	10	5.0	5	1.0	3	35	7.0	22	97	48	9.6	31	102	68	13.6	43	99	6	1.2	4	101							31.4	14.8	162	32.4
	2005	10	5.0	8	1.6	8	39	7.8	38	95	31	6.2	30	102	32	6.4	31	104	1	0.2	1	108							20.6	6.6	111	22.2
	2008	10	5.0	9	1.8	8	25	5.0	23	90	38	7.6	35	93	43	8.6	39	92	4	0.8	4	102							22.0	9.4	119	23.8
LAKE AVERAGE				1.8	6	13.1	41	95		8.8	29	99		7.8	27	99	0.9	3	102									30.5	8.7	32.3		
STATEWIDE MEAN						11.5	26	20.3	43	88	16.8	33	91	9.9	20	94	1.9	4	97										47.9	11.8		
25TH PERCENTILE						3.9	11	10.8	33	84	8.6	26	85	4.5	13	89	0.7	2	92										29.7	5.5		
75TH PERCENTILE						15.2	33	25.6	53	93	20.7	40	95	13.0	26	98	2.5	5	102										61.1	15.7		
Spotted Bass	1988	5	1.7	0	0.0	0	51	20.4	46		46	18.4	42		10	4.0	9		1	0.4	1		2	0.8	2	100	44.0	5.2	110	44.0		
	1993	6	3.0	0	0.0	0	31	10.3	40	105	35	11.7	45	109	8	2.7	10	114	4	1.3	5	115	0	0.0	0		26.0	4.0	78	26.0		
	1994	7	3.5	9	2.9	9	24	6.9	24	102	38	10.9	37	110	27	7.7	26	108	13	3.7	13	118	0	0.0	0		29.1	11.1	111	31.7		
	2000	10	5.0	25	5.0	12	84	16.8	41	99	62	12.4	31	101	42	8.4	21	109	15	3.0	7	110	0	0.0	0		40.6	11.4	228	45.6		
	2003	10	5.0	23	4.6	8	145	29.0	49	102	50	10.0	17	105	81	16.2	27	108	22	4.4	7	111	0	0.0	0		59.6	20.6	321	64.2		
	2005	10	5.0	14	2.8	9	45	9.0	30	99	33	6.6	22	102	51	10.2	34	110	19	3.8	13	112	3	0.6	2	117	30.2	14.6	165	33.0		
	2008	10	5.0	2	0.4	1	35	7.0	19	104	82	16.4	46	103	48	9.6	27	103	15	3.0	8	107	0	0.0	0		36.0	12.6	182	36.4		
LAKE AVERAGE				3.1	8	14.2	36	102		12.3	34	105		8.4	22	109	2.8	8	112	0.2	1	109	37.9	11.4	40.1							
STATEWIDE MEAN						6.0	32	11.9	49	94	7.7	30	98	4.4	16	100	1.2	5	105									25.3	5.6			
25TH PERCENTILE						2.3	11	6.4	36	87	3.4	21	91	1.4	8	92	0.2	1	97									14.4	1.6			
75TH PERCENTILE						8.7	40	16.5	64	101	11.7	37	103	5.5	23	107	1.6	7	115									33.2	7.0			

*Substock Pct. is substock ratio: number of substock size fish collected for every 100 fish of stock size and larger.

Table 3. Age composition and mean length of largemouth bass from collected from Logan Martin Reservoir, April 2008.

Age	Year Class	Number	Percent	CPE	Mean TL	SE	Length Range
1	2007	11	9.2	2.2	174.7	8.3	133-213
2	2006	31	26.1	6.2	290.2	4.8	242-376
3	2005	28	23.5	5.6	349.3	6.2	275-407
4	2004	20	16.8	4.0	416.1	6.0	368-463
5	2003	12	10.1	2.4	418.8	14.6	300-473
6	2002	7	5.9	1.4	455.3	18.2	382-504
7	2001	4	3.4	0.8	471.5	14.3	437-500
8	2000	4	3.4	0.8	516.5	20.4	457-550
9	1999	1	0.8	0.2	476.0		
10	1998	1	0.8	0.2	555.0		
Total		119	100.0	23.8			

Table 4. Age composition and mean total length of spotted bass from Logan Martin Reservoir, April 2008.

Age	Year Class	Number	Percent	CPE	Mean TL	SE	Length Range
1	2007	2	1.1	0.4	112.0	14.0	98-126
2	2006	42	23.1	8.4	252.3	5.7	185-317
3	2005	82	45.1	16.4	322.0	3.1	242-385
4	2004	35	19.2	7.0	387.1	5.1	320-448
5	2003	12	6.6	2.0	414.1	9.6	379-466
6	2002	4	2.2	0.8	453.5	6.0	442-467
7	2001	4	2.2	0.8	437.8	41.0	315-485
8	2000	1	0.5	0.2	475.0		
Total		182	100.0	36.4			

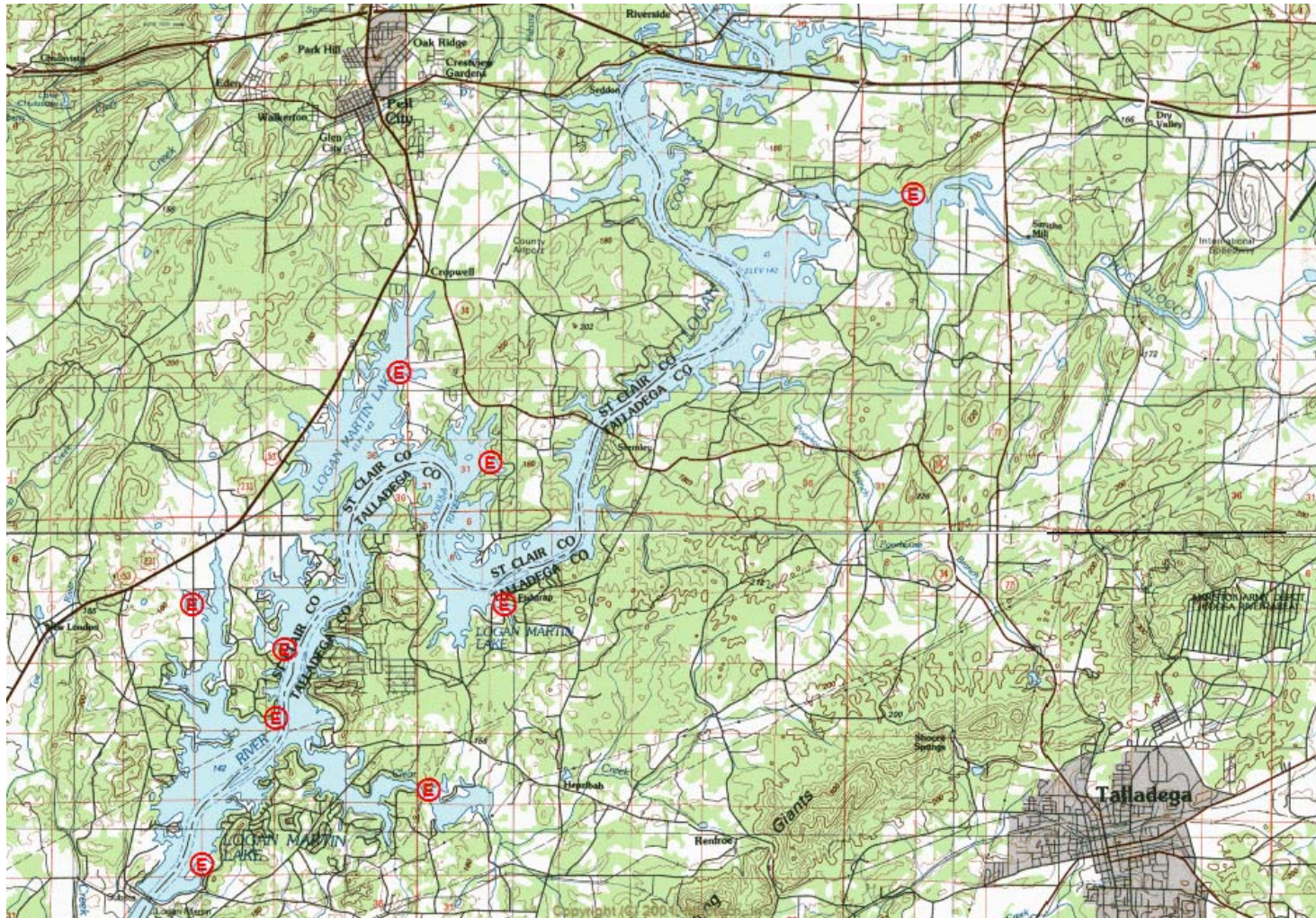


Figure 1. Logan Martin Reservoir 2008 Electrofishing sample sites = **E**.
The tenth sample site was located 14 miles upstream from I-20 at Woods Bend.

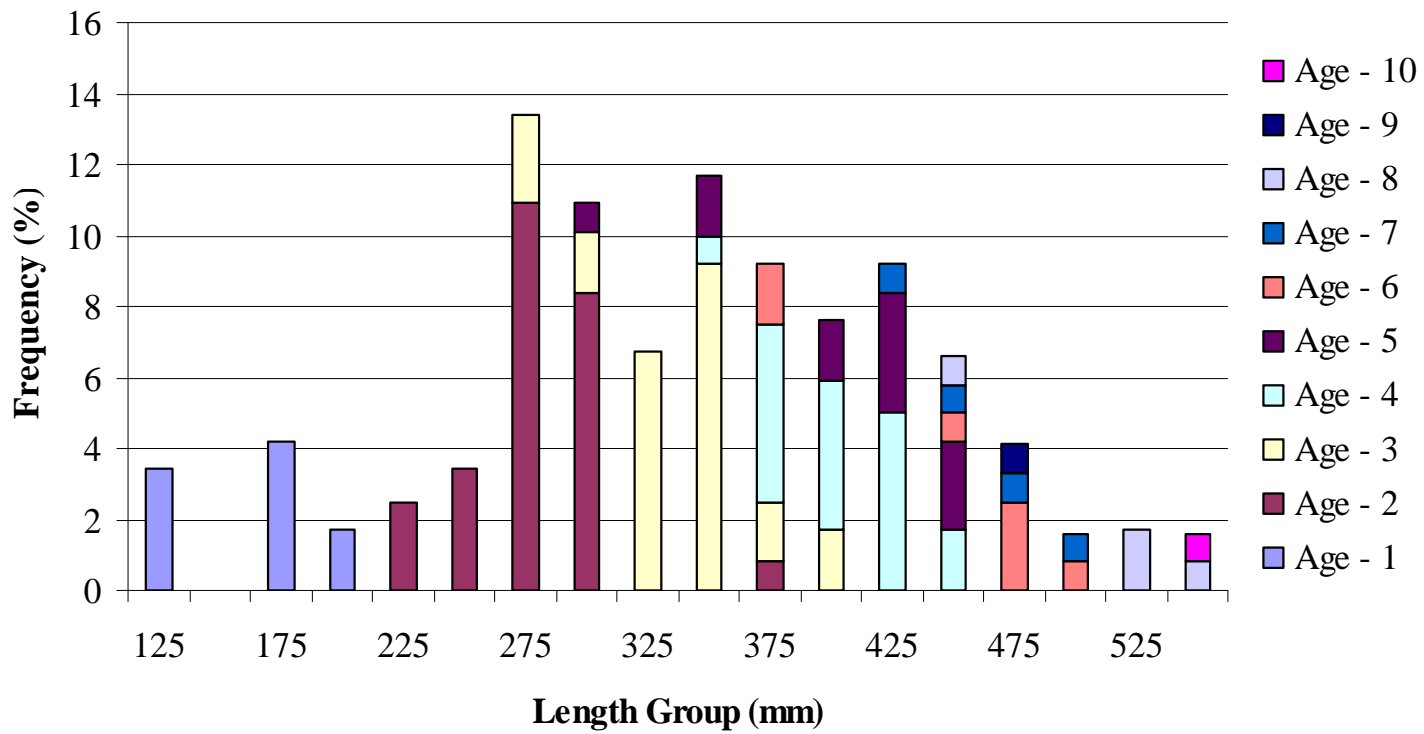


Figure 2. Length at age frequency of largemouth bass (N=119) at Logan Martin Reservoir, April 2008.

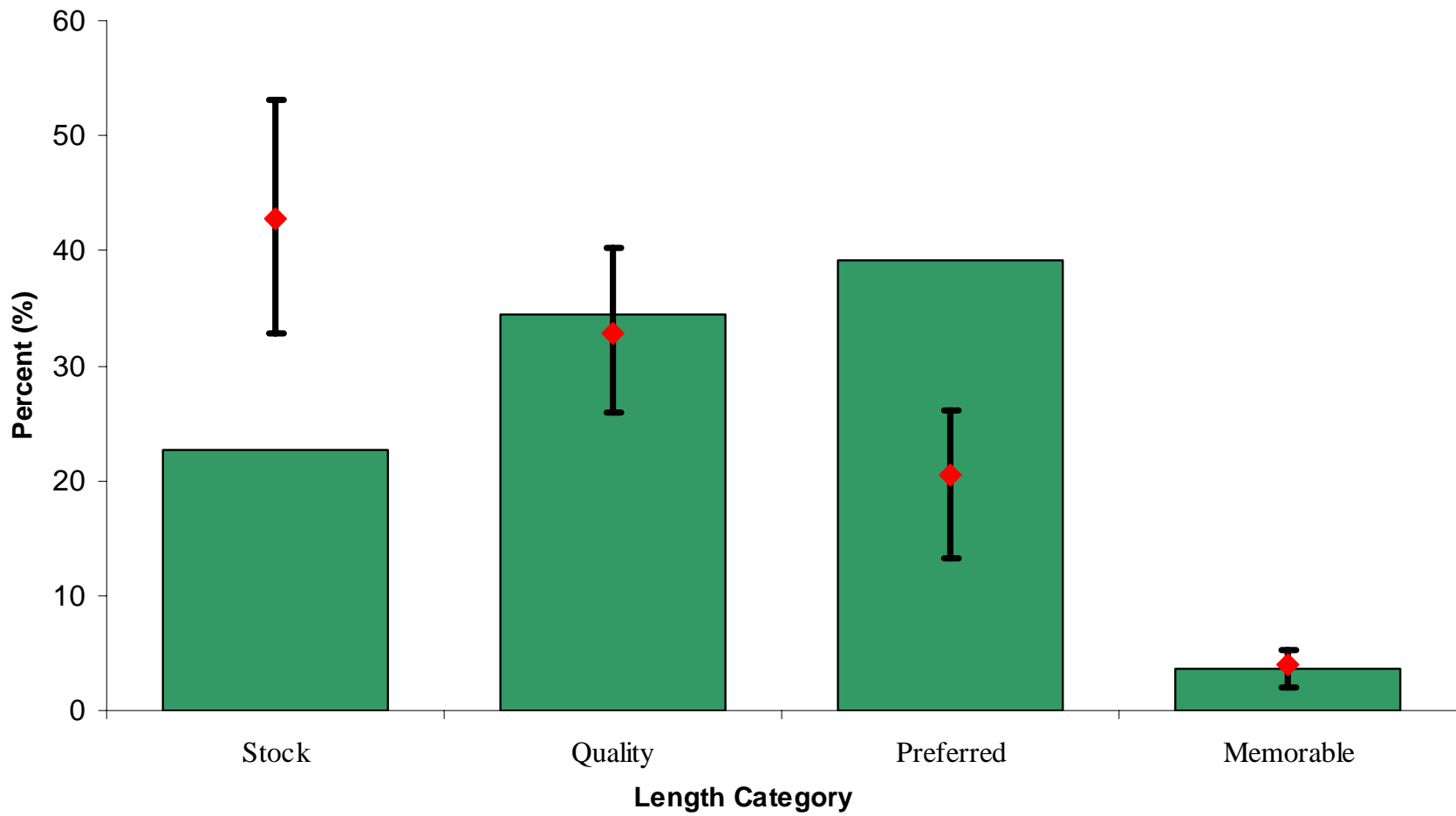


Figure 3. The relative stock density (RSD) of largemouth bass in Logan Martin Reservoir, April 2008, and the statewide mean. The I-beam denotes the 25th and 75th percentiles of RSD values of largemouth bass, statewide.

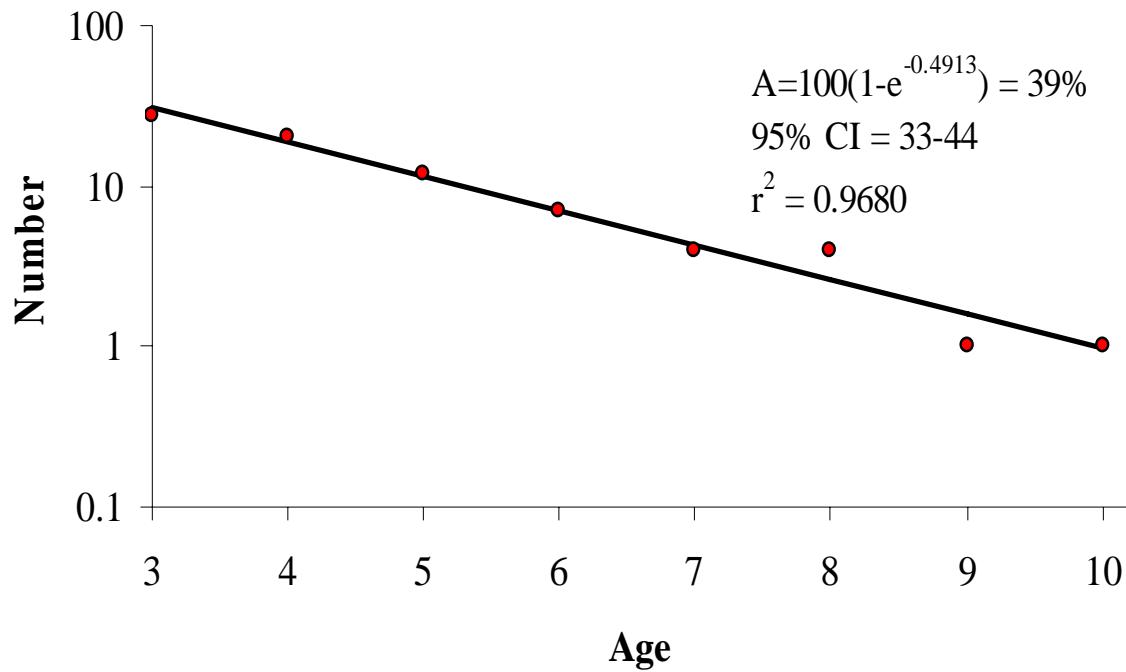


Figure 4. Annual mortality (A) for largemouth bass from Logan Martin Reservoir, spring 2008. Diamonds represent number-at-age, and the solid line is the predicted number-at-age.

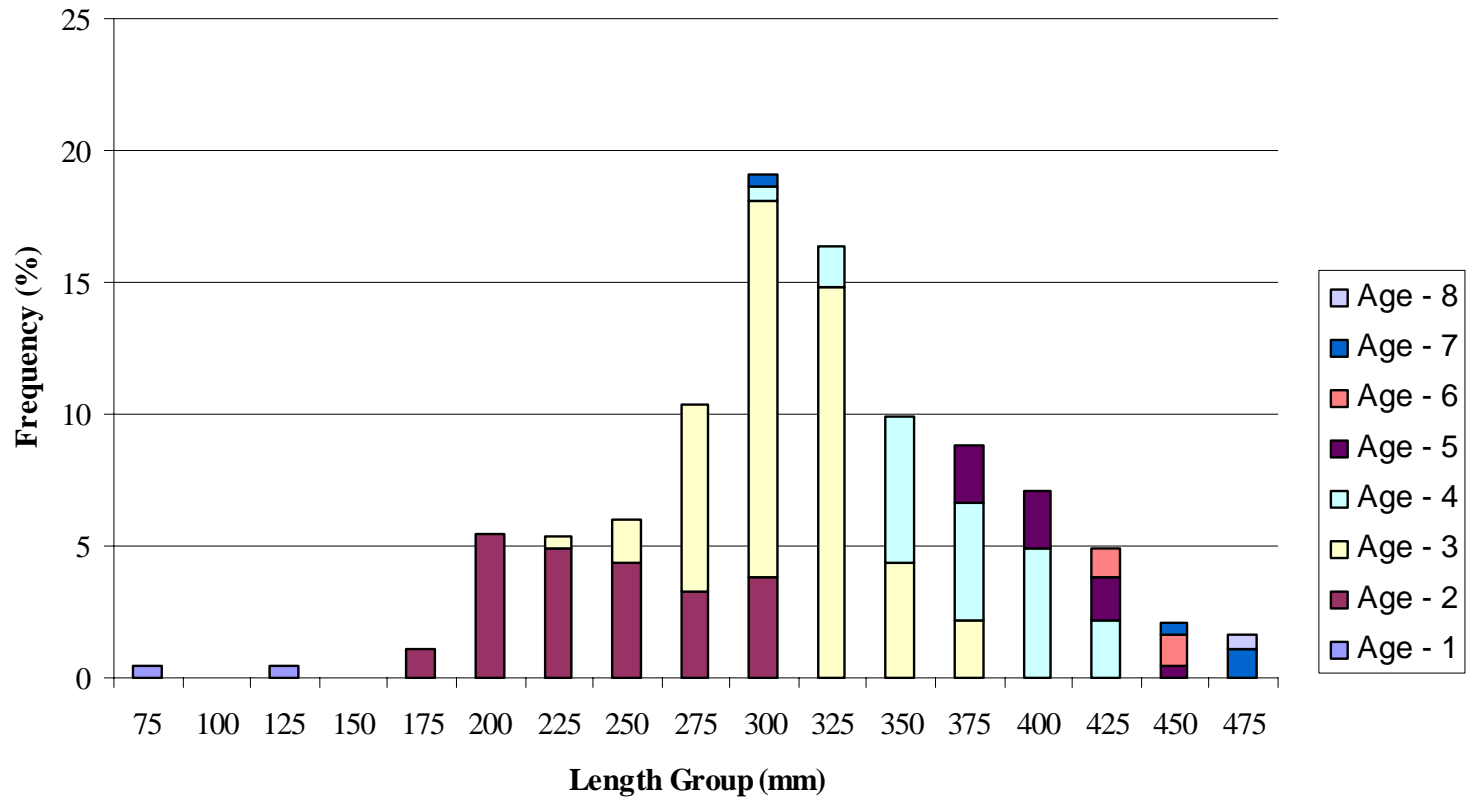


Figure 5. Length at age frequency of spotted bass (N=182) at Logan Martin Reservoir, April 2008.

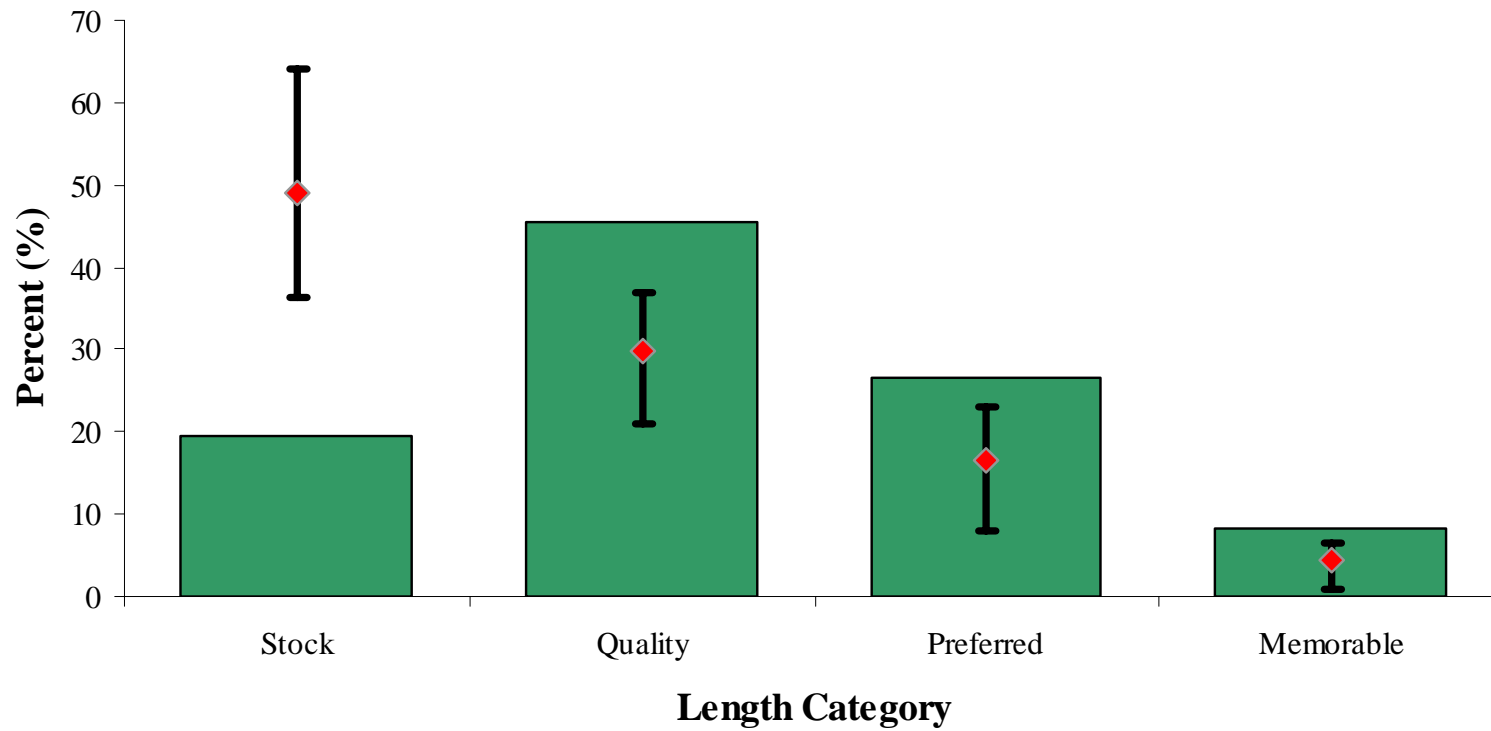


Figure 6. The relative stock density (RSD) of spotted bass in Logan Martin Reservoir, spring 2008, and the statewide mean. The I-beam denotes the 25th and 75th percentiles of RSD values of spotted bass, statewide.

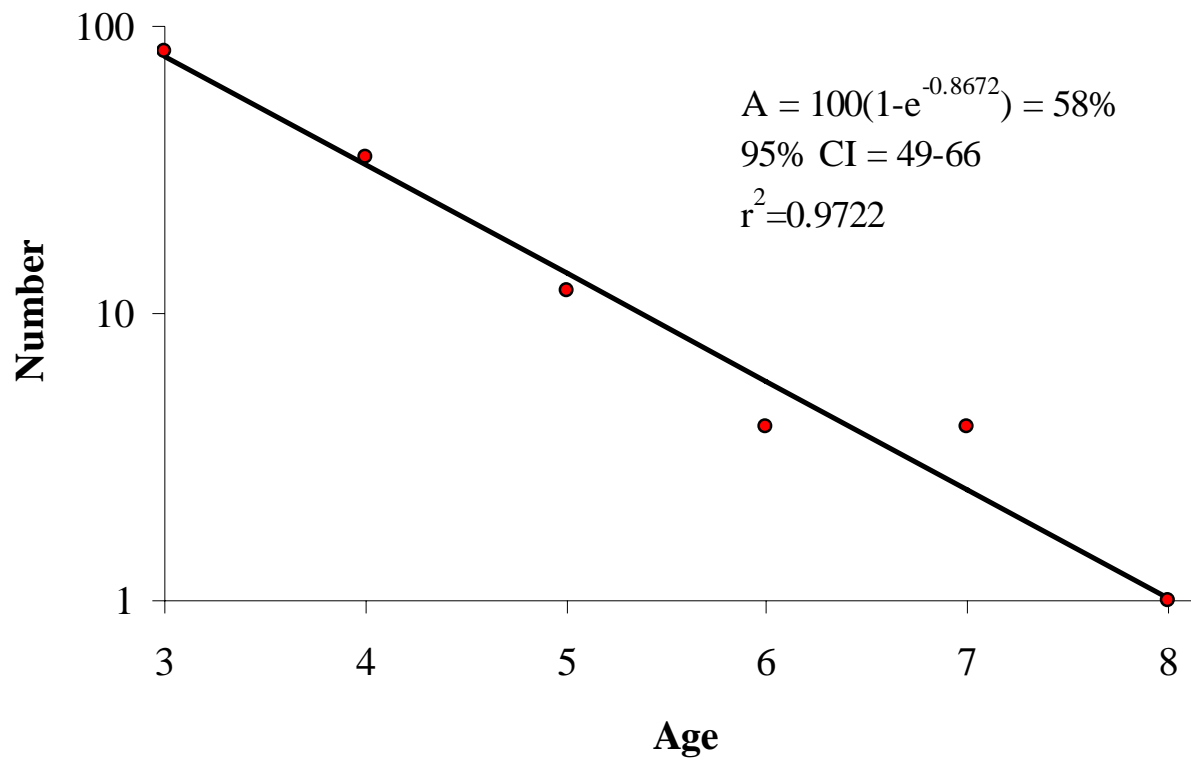


Figure 7. Annual mortality (A) for spotted bass from Logan Martin Reservoir, spring 2008. Diamonds represent number-at-age, and the solid line is the predicted number-at-age.