EUFAULA RESERVOIR
MANAGEMENT REPORT
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Introduction

Lake Eufaula (Figure 1) is a 45,181-acre impoundment on the Chattahoochee River located in Russell, Barbour, and Henry Counties, Alabama. Pertinent characteristics of the lake are listed in Table 1, and an in depth description of the reservoir can be found in Newman et al. (1986). Periodic sampling of Alabama Reservoirs is conducted to monitor fish populations and to predict sportfish population trends. Due to the popularity of the Lake Eufaula fishery, sampling is conducted annually.

Methods

Largemouth bass, bluegill sunfish, and redear sunfish were sampled April 6-7 and April 21, 2010 according to the guidelines of the Reservoir Management Program Manual (Cook 1999). Sampling gear consisted of a 5.5-meter aluminum boat with bow-mounted electrodes, a Smith Root 5.0 GPP and a Honda 5000 watt generator delivering 5-6 amperes at 800 – 1000 volts of pulsed direct current. Ten stratified random sites (Figure 1) were sampled for 1800 seconds and target fish were collected, measured to the nearest millimeter, and weighed to the nearest gram. Otoliths were removed from a maximum of 10 fish per 25 mm group for fish 150 mm in total length and longer for ageing. Remaining fish were released and ages were assigned using an age-length key.

Catch per effort was calculated as the number of fish caught per hour of electrofishing, and stock density indices were calculated according to Anderson and Neumann (1996). Total annual mortality was calculated by regressing the natural log of the number-at-age against age (catch-curve regression).

Prod-pole electrofishing was conducted May 25-26, 2010 to document young-of-year (YOY) largemouth bass distribution and abundance. Gear consisted of the same boat configuration used in the standard electrofishing survey, but the electrode was a fiberglass hand-held pole measuring 8 feet in length with a 10 inch aluminum ring to enhance shoreline sampling in juvenile fish habitat. Pulsator settings were lowered to deliver 2-4 amperes at 800 volts pulsed direct current. Nine stratified random sites were sampled for 300 seconds per site; three transects in the lower (Hardridge Creek), mid (Chewalla Creek), and upper (Cowikee Creek) sections of the lake (Figure 1).

Threadfin shad were collected on August 11, 2010 using a surface trawl at sites along the dam forebay and just north of the Highway 82 causeway (Figure 1). Trawling consisted of five 5-minute pulls at each site. Shad were measured to the nearest centimeter total length and density was calculated as the number of shad per cubic meter of water.

Water quality was evaluated on August 10, 2010 in the main channel slightly upriver of the Highway 82 causeway. A dissolved oxygen meter with a temperature sensor was used to collect data from the water surface to the bottom in 1-meter increments. Chlorophyll-a data was acquired from Alabama Department of Environmental Management (ADEM).

Results and Discussion

Largemouth Bass

Largemouth bass (N=528) were captured at a rate of 105.6 fish/hour and ranged in size from 91 mm to 620 mm total length (Tables 2 & 3, Figure 2) (age was not able to be assigned to the 620-mm fish, warranting exemption from all age-dependent analyses).

Total catch rate was approximately 13% below the lake average of 121.2 fish/hour, but catch rates remain similar to the statewide 75th percentile for RSD S-Q and RSD M-T size categories and considerably higher than the statewide 75th percentile for RSD Q-P and RSD P-M size categories (Table 2, Figure 3).

Largemouth bass proportional stock density (PSD) was 73, consistent with the 2009 value of 72 (Andress et al. 2009). However, relative stock density (RSD) values indicated that the 2010 population is dominated by quality-preferred (RSD Q-P) size fish as they accounted for 42% of the sample as opposed to the preferred-memorable (RSD P-M) size dominant 2009 sample (Table 2, Figure 4). Percentages of fish in both RSD Q-P and RSD P-M size groups exceeded the statewide 75th percentile (Table 2, Figure 4). Approximately 37% of the largemouth bass sampled by Alabama Department of Conservation and Natural Resources in 2010 equaled or exceeded the 14-inch minimum length limit (356 mm), and 2% were longer than 20 inches (508 mm).

Relative weight (Wr) values were consistent across size groups at 88 and remain not only slightly below lake averages for all size groups of largemouth bass, but below statewide averages for all size groups except RSD S-Q (Table 2). Although bass condition could improve, fish were far from poor and growth (measured as mean length-at-age) for fish up to age-2 was acceptable. Age-1 fish mean length was slightly above the statewide average, and age-2 fish mean length approached the statewide upper 75th percentile (Table 3, Mike Maceina, unpublished data). However, growth for fish older than age 2 was disappointing with mean lengths for ages-3 and 4 fish at the statewide lower 25th percentile, and age-5 fish below the statewide lower 10th percentile (Table 3, Mike Maceina, unpublished data). Largemouth bass currently recruit to the fishery (356

mm) in 3.4 years (Figure 5). Annual mortality for bass ages-3 to 6 was estimated to be 44% (Figure 6).

YOY Largemouth Bass

Spawning success was verified at all sampling locations, and the catch rate for YOY bass across all sites was 300 fish/hour of prod-pole electrofishing, an increase of 152% from the 2009 sample (119/hr). Mean CPH was 224, 316, and 360 for the lower (Hardridge Creek), mid (Chewalla Creek), and upper (Cowikee Creek close to Lakepoint Resort) sites, respectively.

Bluegill Sunfish

Bluegill sunfish (N=123) were collected at a rate of 63.1/hr and ranged in size from 87 to 188 mm (Table 4, Figure 7). The 2010 catch rate was approximately 45% lower than the lake average and 30% lower than the average statewide catch rate (Table 4).

Bluegill population size structure revealed no changes from the 2009 sample as PSD (15) and RSD values were equivalent in 2010 (Table 4, Andress et al. 2009). The 2010 sample did reveal 9% and 8% decreases in Wr values from the 2009 sample for RSD S-Q and RSD Q-P size groups, respectively (Table 4). However, bluegill sunfish remained in decent condition as Wr values were 90 or better.

Redear Sunfish

Redear sunfish (N=100) were collected at a rate of 40.0/hr and ranged in length from 96 mm to 266 mm (Table 5, Figure 8). RSD analysis revealed that stock-quality size redear sunfish were most abundant (55%) in the 2010 Eufaula sample followed by quality-preferred sized fish (36%), while preferred-memorable size fish comprised 9% of

the sample (Table 5). Size structure shifted more toward smaller fish in 2010 as there was a 22% increase in RSD S-Q and a 47% decrease in RSD P-M from the 2009 sample (Table 5). Redear sunfish remain in excellent condition as Wr values were all 120 or higher for fish in the RSD S-Q through RSD P-M size categories (Table 5).

Shad

Shad catch rates dropped 42% from summer 2009 to summer 2010 (Figure 9). The lower catch rate is attributable to another weak year class in 2010 as no YOY shad were observed. According to Mettee et al. 1996, threadfin shad are considered adults at 5.1 cm, and all sampled threadfin were between 5 and 9 cm in length (Figure 10). If the cycle from 2005 through 2010 of a strong year class followed by two poor year classes holds, we should see an increase in YOY shad numbers in 2011 (Figure 9).

Water Quality

No problems are associated with water quality at this time. Water temperature was fairly consistent through the upper 13 meters of the water column, dropping only 1.2^{o}C from the surface temperature of 32^{o}C (Figure 11). Dissolved oxygen dropped below 4 mg/L around 5 meters (Figure 11). As of 2008, ADEM water quality data indicated that Lake Eufaula is in a eutrophic state as chlorophyll-a measured 13.2 ug/L.

Summary

The largemouth bass fishery is currently in decent shape despite continued variability in shad year classes. The high trophic level, plentiful bream forage, minimal bass harvest, and a relatively low total annual mortality are all likely factors contributing to the recruitment of largemouth bass to the quality-preferred and preferred-memorable size ranges, which both exceeded the statewide 75th percentile. However, the bass

population is beginning to show signs of becoming too dense, or stockpiling: predator/prey PSD analysis reveals that large bass are excessively cropping large bluegill, sampling catch rates are extremely high compared to state averages, the size structure has shifted toward smaller fish (preferred-memorable size dominant in 2009 back to quality-preferred size dominant in 2010) and relative weights dropped across RSD categories to values below 90. We will continue to monitor the sportfish population closely. It is possible that dropping the 356 mm minimum length limit may need to be considered in the near future.

The reservoir fact sheet and general reconnaissance survey was conducted in August of 2010 and no notable change has occurred since the 2009 Lake Eufaula Reservoir Report (Andress et al. 2009). Boaters are encouraged to view the Freshwater Fisheries website at www.outdooralabama.com to view boating access information for their favorite ramp.

Conclusions

1. No change is recommended at this time concerning management of the largemouth bass, bluegill sunfish or redear sunfish. However, the warning signs of largemouth bass stockpiling in the 275 to 325 mm size range are becoming evident.
2. District personnel will continue to encourage B.A.I.T. participation by leaving program literature at local bait and tackle stores, and contacting bass clubs.
3. Lake Eufaula should be sampled again in the spring of 2011.

References

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APPENDIX A

TABLES AND FIGURES

Table 1. Lake Eufaula morphometric, physical, and chemical characteristics.

Surface area	45,181	acres
Drainage area	7,460	sq. mi.
Full pool elevation	190	feet-msl
Mean annual fluxuation	6	feet
Shoreline distance	515	miles
Shoreline development index	17.3	(Welch 1948)
Mean depth	20.4	feet
Maximum depth	93	feet
Outlet depth	65	feet
Total dissolved solids	84	mg/l
Morphoedaphic index	4.1	TDS/mean depth(ft) (Ryder 1965)
Growing season	249	frost free days (Jenkins 1967)
Date of Impoundment	1962	

Table 2. Relative stock density (RSD), catch per effort (CPE), and relative weight (Wr) of largemouth bass in Lake Eufaula, spring 2003-2010.

				TOTAL NUMBER, CPE, PERCENT OF SAMPLE AND Wr																			
				SUBSTOCK			RSD S-Q				RSD Q-P				RSD P-M				RSD M-T				TOTAL	
Year	Gear	Number Samples	Effort (hours)	no.	cpe	ratio	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe
2003	E	3	1.13	16	14.2	15	23	20.4	22	97	33	29.2	32	99	43	38.1	41	98	5	4.4	5	104	120	106.2
2004	E	3	0.83	10	12.1	9	25	30.1	24	89	41	49.4	39	91	34	41.0	32	95	6	7.2	6	96	116	139.8
2005	E	3	0.74	9	12.2	8	24	32.4	22	96	41	55.4	38	96	42	56.8	39	102	1	1.4	1	96	117	158.1
2006	E	3	1.22	28	23.0	25	41	33.6	36	91	31	25.4	27	96	40	32.8	35	94	2	1.6	2	111	142	116.4
2007	E	6	3.01	73	24.3	23	111	36.9	36	88	104	34.6	33	91	92	30.6	29	93	5	1.7	2	87	385	127.9
2008	E	6	2.99	54	18.1	20	56	18.7	21	83	109	36.5	41	89	91	30.4	34	92	10	3.3	4	92	320	107.0
2009	E	10	5.00	56	11.0	11	138	27.6	28	88	125	25.0	26	91	208	41.6	43	94	18	3.6	4	94	545	109.0
2010	E	10	5.00	31	6.2	6	134	26.8	27	88	210	42.0	42	88	140	28.0	28	88	13	2.6	3	88	528	105.6
Lake Average					15.1	15		28.3	27	90		37.2	35	93		37.4	35	95		3.2	3	96		121.2
Statewide Average					11.5	26		20.3	43	88		15.8	33	91		9.9	20	94		1.9	4	97		

Table 3. Age composition and mean total length of largemouth bass from Lake Eufaula, spring 2010.

Age	Year Class	Number	Percent	CPE	Mean TL	SE	Length Range (mm)
1	2009	41	7.8	8.2	178.3	5.0	91-219
2	2008	135	25.6	27.0	280.8	2.3	201-338
3	2007	137	26.0	27.4	328.4	2.2	257-392
4	2006	86	16.3	17.2	382.1	4.4	325-495
5	2005	63	12.0	12.6	401.7	5.2	331-474
6	2004	22	4.2	4.4	454.2	6.0	412-518
7	2003	29	5.5	5.8	459.0	11.4	351-592
8	2002	2	0.4	0.4	569.0	3.0	566-572
9	2001	4	0.8	0.8	455.5	17.0	429-505
10	2000	4	0.8	0.8	490.5	4.5	480-499
11	1999	4	0.8	0.8	540.8	20.5	501-584
Total		527	100.0	105.6			

Table 4. Relative stock density (RSD), catch per effort (CPE), and relative weight (Wr) of bluegill sunfish in Lake Eufaula, spring 2002-2010.

				TOTAL NUMBER, CPE, PERCENT OF SAMPLE AND Wr													
				RSD S-Q				RSD Q-P				RSD P-M				TOTAL	
Year	Gear	Number Samples	Effort (hours)	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe
2002	E	3	0.46	90	195.7	90	88	9	19.6	9	87	1	2.2	1	89	100	217.4
2003	E	3	1.05	78	74.3	78	94	21	20.0	21	88	1	0.9	1	103	100	95.2
2004	E	3	1.06	105	99.1	91	88	10	9.4	9	88	0	0.0	0	0	115	108.4
2006	E	3	0.87	88	101.1	87	87	13	14.9	13	79	0	0.0	0	0	101	116.1
2008	E	3	1.05	86	81.9	84	101	16	15.2	16	89	0	0.0	0	0	102	97.1
2009	E	3	1.07	96	89.7	85	100	17	15.9	15	98	0	0.0	0	0	113	105.6
2010	E	4	1.95	104	53.3	85	91	19	9.7	15	90	0	0.0	0	0	123	63.1
Lake Average					99.3	86	93		15.0	14	88		1.6	0	96		114.7
Statewide Average					72.8	78	85		16.7	21	84		0.8	1	89		90.3

Table 5. Relative stock density (RSD), catch per effort (CPE), and relative weight (Wr) of redear sunfish in Lake Eufaula, spring 2009-2010.

				TOTAL NUMBER, CPE, PERCENT OF SAMPLE AND Wr													
				RSD S-Q				RSD Q-P				RSD P-M				TOTAL	
Year	Gear	Number Samples	Effort (hours)	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe
2009	E	4	1.77	45	25.4	45	137	39	22.0	39	131	17	9.6	17	141	101	57.0
2010	E	5	2.50	54	21.6	55	122	35	14.0	36	120	9	3.6	9	127	100	40.0
Lake Average					23.5	50	130		18.0	38	126		6.6	13	134		48.5

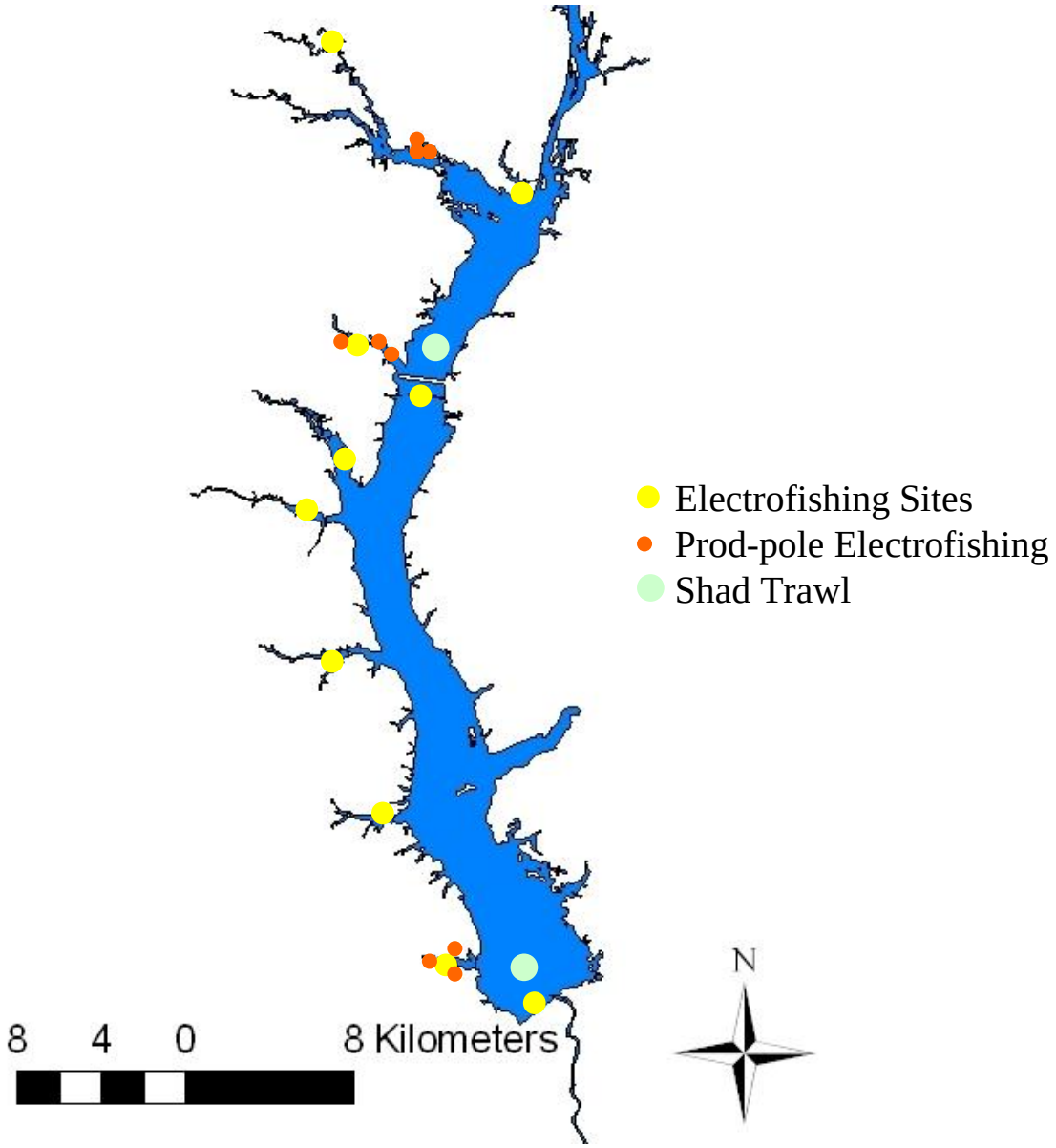

Figure 1. Map of Lake Eufaula, and sampling locations for Spring-Summer, 2010.

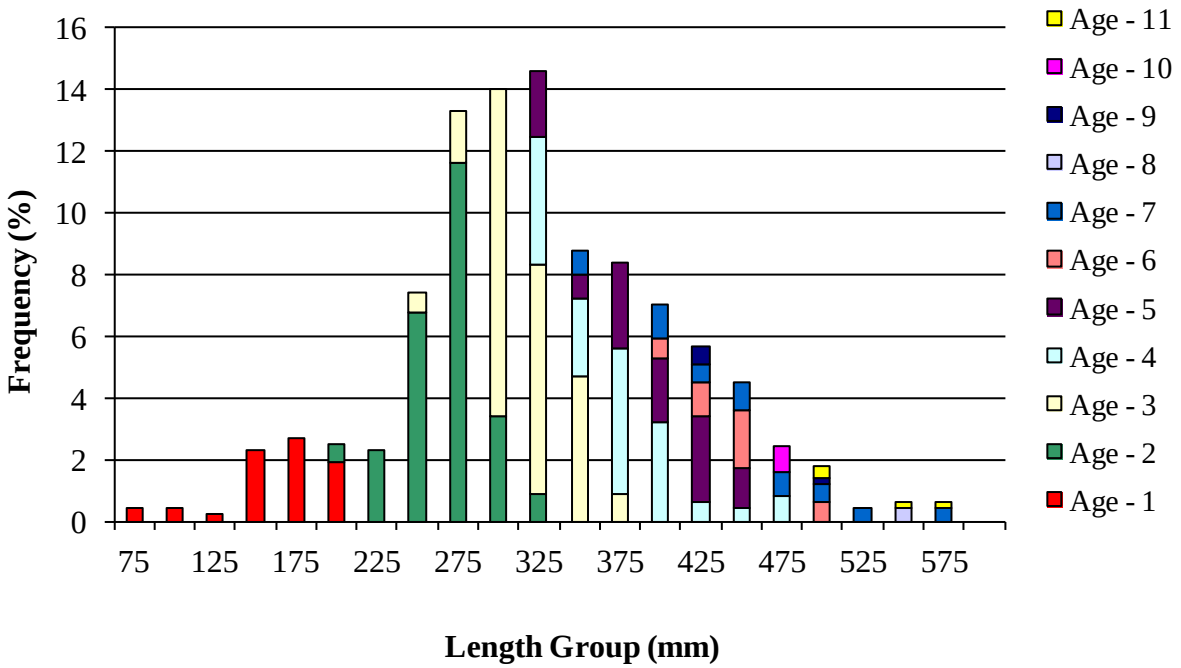

Figure 2. Length at age frequency for Lake Eufaula largemouth bass spring 2010 (N = 527).

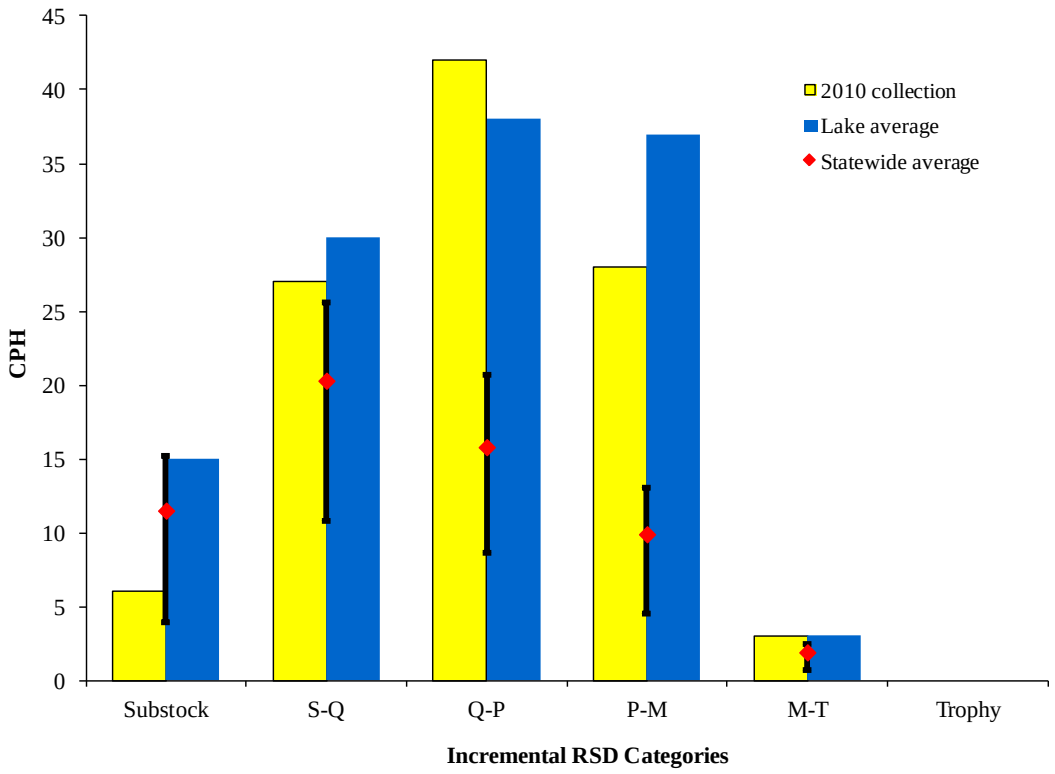

Figure 3. Catch per effort for Lake Eufaula largemouth bass. The I-beam represents the 25th and 75th percentiles for largemouth bass catch rates in each RSD category across Alabama reservoirs. The red diamonds are the statewide mean catch rates, and the yellow and blue bars are 2010 collection and lake average values, respectively.

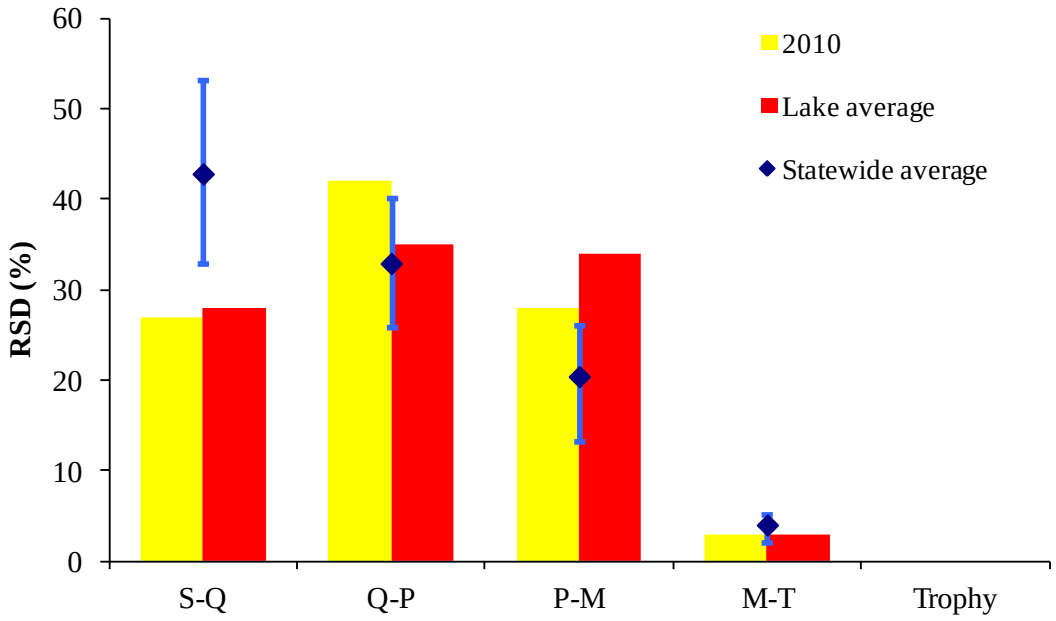

Figure 4. Relative stock densities (RSD) for Lake Eufaula largemouth bass. The I-beam represents the 25th and 75th percentiles for largemouth bass population RSD values in Alabama reservoirs. The blue diamonds are the statewide mean values, and the yellow and red bars are 2010 collection and lake average values, respectively.

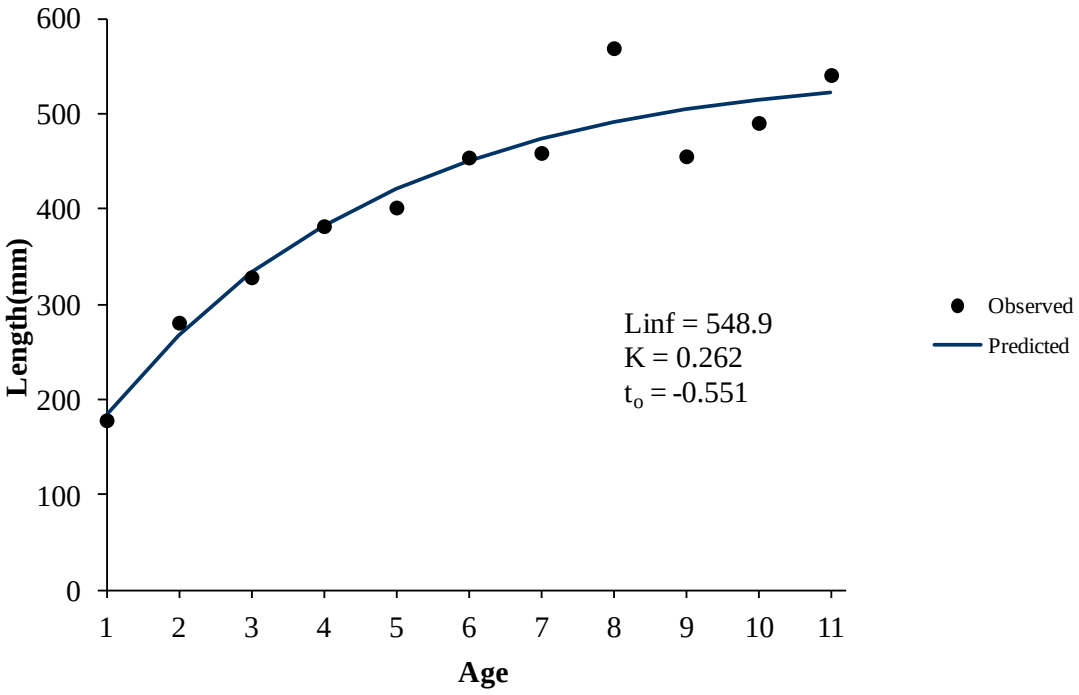

Figure 5. The von Bertalanffy growth curve for largemouth bass (N=527) collected from Lake Eufaula, spring 2010. Observed values indicate average bass length at each age.

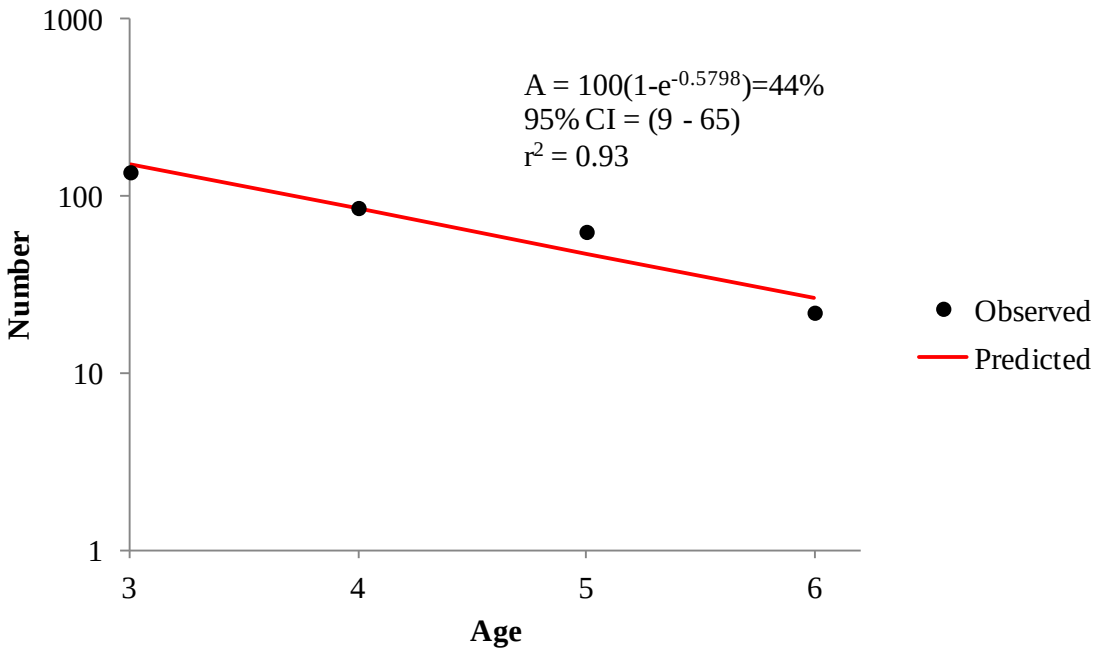

Figure 6. Unweighted catch-curve regression for largemouth bass (N=527) collected from Lake Eufaula, spring 2010.

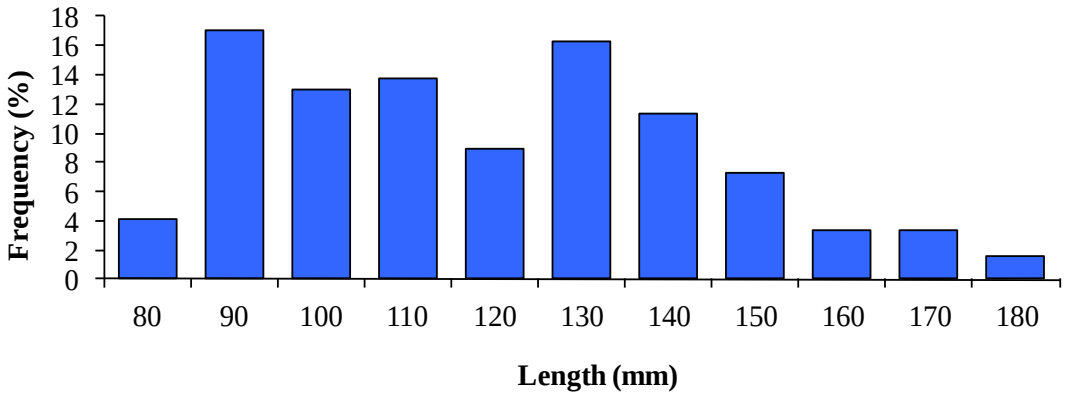

Figure 7. Length frequency of bluegill sunfish (N=123) collected from Lake Eufaula, spring 2010.

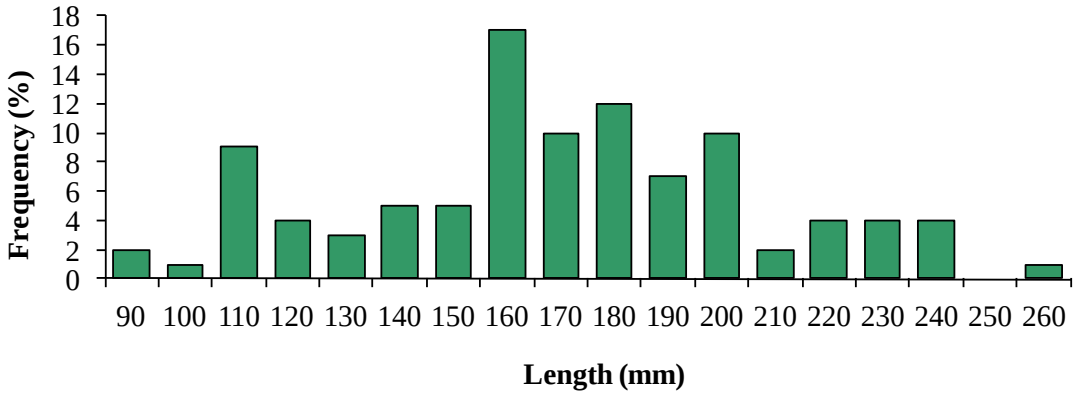

Figure 8. Length frequency of redear sunfish (N=100) from Lake Eufaula, spring 2010.

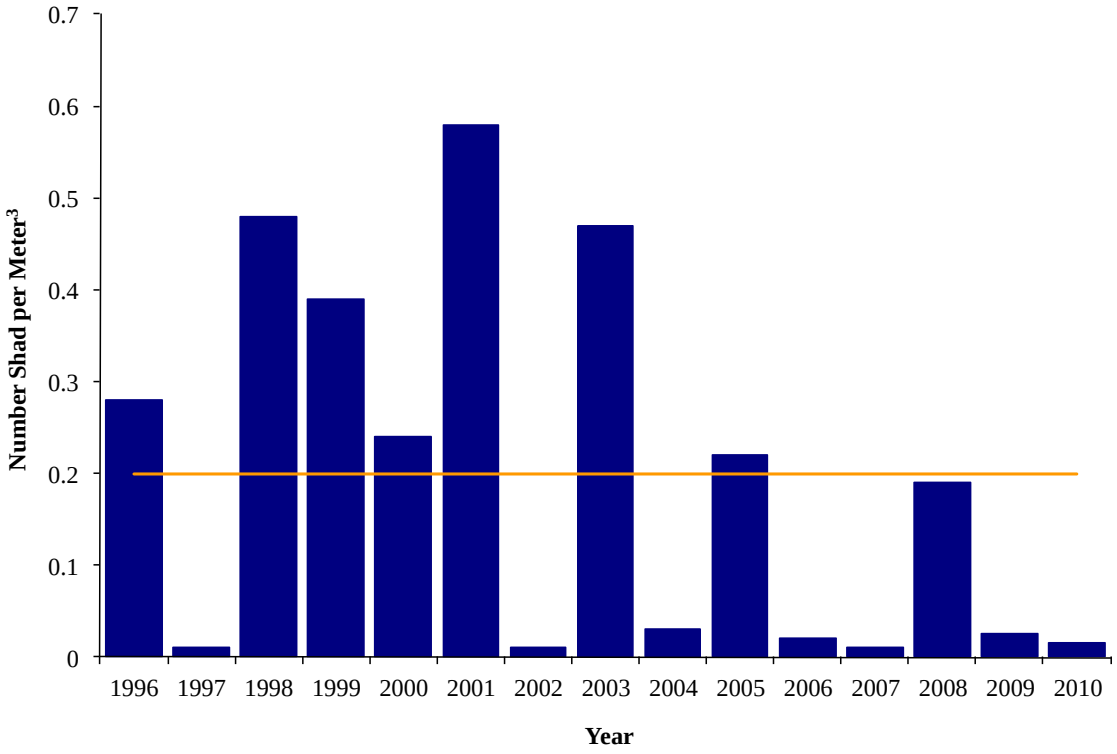

Figure 9. Historical shad density (number/cubic meter) estimated with a surface trawl. The vertical blue bars represent yearly density estimates, and the orange line is the mean density over a 15 year period.

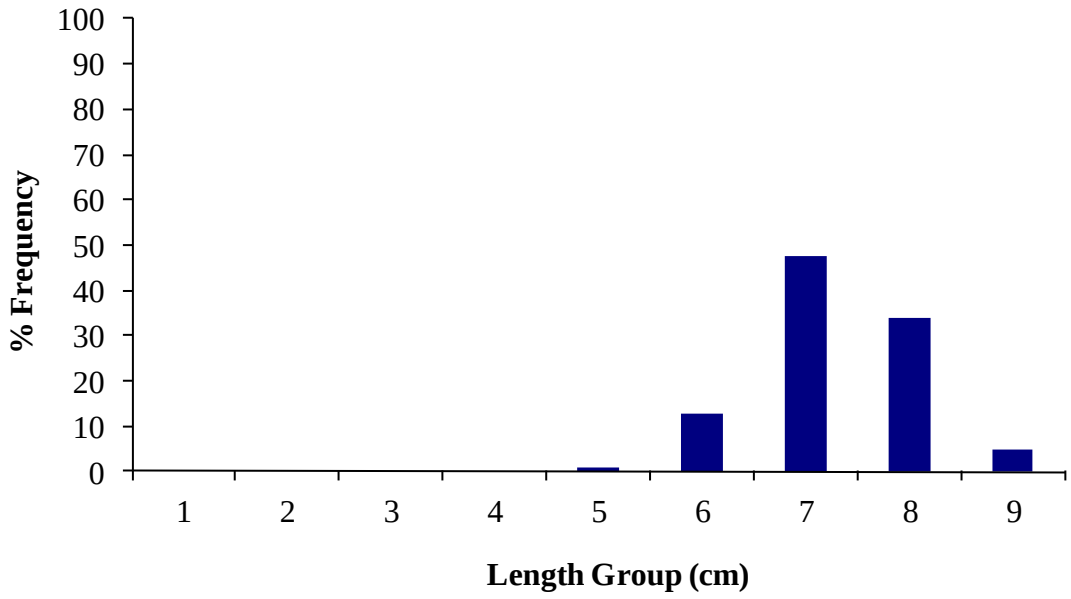

Figure 10. Length frequency of threadfin shad collected with a surface trawl at Lake Eufaula, summer 2010.

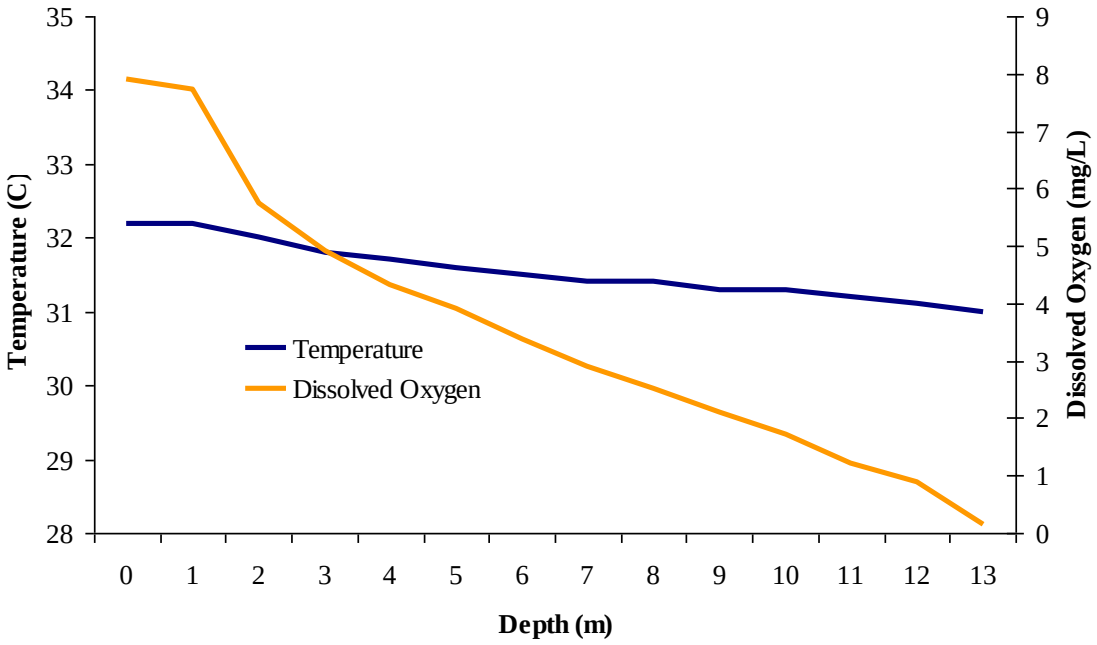

Figure 11. Temperature and dissolved oxygen profile for Lake Eufaula, spring 2010.