YATES RESERVOIR

MANAGEMENT REPORT

2005-06

Prepared by

J. Chris Greene
District Fisheries Supervisor

Damon L. Abernethy
District Fisheries Biologist

and

Rodney A. McVay
District Fisheries Aide

Department of Conservation and Natural Resources
Wildlife and Freshwater Fisheries Division
Fisheries Section

September 1, 2006

Introduction

Yates Reservoir is a 1,980 acre impoundment near Tallassee, immediately downstream of the much larger Martin Reservoir. Yates is also referred to as "middle pond" by local anglers, since it falls between the reservoirs of Martin and Thurlow on the Tallapoosa River. The water discharged from Martin Dam is cold and infertile, which directly influences the quality of the Yates Reservoir fishery. Baitfish, such as threadfin and gizzard shad, are not as abundant in Yates as they are in most other Alabama Reservoirs; therefore, growth of game fish is adversely impacted. Yates Reservoir was also sampled in 1994 (McHugh et al. 1995).

Refer to "An Angler's Guide to Interpreting Alabama Wildlife and Freshwater Fisheries Reservoir Reports" for a detailed description of fisheries terms used in this report. The Angler's Guide is available on the Department's website at: http://www.outdooralabama.com/fishing/freshwater/where/reservoirs/guide.pdf.

Methods

Spring electrofishing, fall trap-netting, and fall gill-netting were methods used to collect target species by Alabama Wildlife and Freshwater Fisheries personnel. All collections followed management program guidelines (Alabama Reservoir Management Program 1999).

Fall trap-netting targeted black crappie, although white crappie were also collected, and consisted of sixty net-nights between October 25-27, 2005. Gill-netting was conducted on November 9, 2005 and again on January 10, 2006; target species included striped bass and white bass. To remain consistent with past samples, electrofishing was conducted at night from April 17-28, 2006. Fifteen randomly selected sites were sampled for 30 minutes each. Target species included largemouth bass, spotted bass, bluegill, gizzard shad, and threadfin shad. It should be

noted, for comparison purposes, that most statewide reservoir sampling is conducted during daylight hours only.

Sampling for all target species, except largemouth and spotted bass, continued until a minimum of 100 stock-size and larger fish were collected or until it was deemed impractical to continue. Largemouth and spotted bass were collected from all sampling sites without regard to a minimum collection number. Total length in millimeters and weight in grams were recorded for all target fish collected. Largemouth bass, spotted bass, black crappie, white crappie, striped bass, and white bass otoliths were extracted and placed in vials with a glycerine/alcohol solution to improve clarity. Whole otoliths were later viewed under a dissecting scope and ages were determined by District-IV personnel. Otoliths from older fish were sectioned, in order to increase aging accuracy, and viewed with a compound microscope (Maceina 1988).

Results and Discussion

The fall 2005 trap-netting sample consisted of 182 total crappie. Based on sampling efficiency data from the 1994 report (McHugh et al. 1995), nets were concentrated in major creeks away from the main river channel (Figure 1). Black and white crappie were collected at the rates of 2.7 and 0.4 per net-night, respectively. Due to small sample size (N = 21), limited summary data was calculated for white crappie (Table 4). Black crappie size structure appeared adequate, as most RSD size categories fell within standard ranges (Figure 7). Similar to the 1994 sample, crappie growth rates were poor. No young-of-year crappie exceeded 100mm in length and several Age-1 fish likewise did not exceed this size (Table 8). The von Bertalanffy growth equation suggested that it takes black crappie 2.66 years to reach the 9-inch minimum size limit. Total mortality rates were calculated to be 65% between the ages of 3 and 6 years. Most crappie

die before the age of five, although one uncharacteristic specimen was determined to be twelve years of age (Table 8).

The gill-netting sample resulted in very few target species being collected (Table 4). Nets were set during the fall and again during the winter at a variety of locations; however, catch rates were poor during both time periods. Only seven striped bass and six white bass were collected in ten net-nights of sampling. Due to lack of sufficient data, many summary calculations could not be accurately performed for these two species.

The spring 2006 electrofishing collection consisted of 150 total largemouth bass and 129 spotted bass. Parity in catch rates between the two species was evident more in the 2006 sample than in the 1994 sample (McHugh et al. 1995); however, overall black bass catch rates did not differ greatly between the two years (Table 3). Bass abundance, as anticipated, was very low when compared to other Alabama impoundments. Since electrofishing catch rates are typically elevated at night, it is perceived that the CPE may have been more suppressed if our sample had been collected during daylight hours.

Largemouth bass were collected at the rate of 20.0 fish per hour. This value falls below the 25th percentile of all catch rates calculated from historical reservoir data. Distribution among the different RSD groups was satisfactory, as every size range was adequately represented (Figure 5). Growth is likewise poor, as it takes fish 3.52, 5.36, and 12.10 years to reach twelve, fifteen, and twenty inches respectively, according to the von Bertalanffy growth equation. These rates were below the 10th percentile of growth rates from historical Alabama reservoir data. An accurate mortality estimate could not be computed for largemouth bass; however, fish seemingly reach older ages in Yates than they do in most other Alabama reservoirs. This suggests a low rate of exploitation which is likely a result from the reservoir's lack of popularity and angler's willingness to practice catch-and-release. Other larger, more popular reservoirs such as Martin,

Jordan, and Mitchell are located within a short distance from Yates; therefore, many anglers opt for these higher profile impoundments. The oldest largemouth bass collected in this sample was fourteen (Table 6).

Spotted bass were collected at the rate of 17.2 fish per hour. This rate is slightly higher than the catch rate from the 1994 sample, although is somewhat low compared to other Alabama impoundments. Every size class was adequately represented, with the exception of the quality group (Figure 6). Similar to largemouth bass, von Bertalanffy growth rates for spotted bass are slow as it takes fish 3.21 and 5.85 years to reach twelve and seventeen inches, respectively. These values rank poorly when compared to the historical growth rates from other Alabama impoundments. Mortality for spotted bass was calculated to be 71% between the ages of 3 and 6 years. Although this mortality rate is seemingly high, it is similar to tournament and electrofishing estimates calculated for Lake Martin (McHugh et al. 1993).

Gizzard and threadfin shad collection rates during the spring electrofishing sample declined by an order of magnitude when compared to rates from the 1994 sample (Table 3); however, a severe threadfin shad kill was observed during the summer of 2005 which may have suppressed overall catch rates. Shad are very susceptible to changes in water temperature and Yates has been documented to fluctuate as much as 20°F between the upper and lower reservoir. Cold water, discharged from the Martin powerhouse, and poor trophic status, typical of Tallapoosa River impoundments, adversely affects plankton abundance and thus also limits the prevalence of forage species. Low densities of shad, likewise negatively influences both the growth and abundance of gamefish in Yates Reservoir.

Bluegill were collected at the rate of 65.5 fish per hour during the spring sample. This is almost double the catch rate achieved for the 1994 sample; however, larger fish were not as abundant (Table 3). The sample was dominated by stock size individuals and no fish were

captured greater than eight inches in length; however, several large redear were collected during the spring including one individual fish that weighed 1,098g.

Electrofishing samples conducted by aquatic resources personnel in the Martin dam tailwater region revealed that the primary species occupying these waters were yellow perch. Yellow perch have recently become prevalent in the Tallapoosa River impoundments and do not appear to be adversely affecting the quality of other fisheries in Yates Reservoir. This species will hopefully fill an unoccupied niche and provide an additional fishery.

Recommendations

- The fish population should be re-sampled again in approximately 5 years.
- Due to slow growth, the black bass population could be severely impacted by over-harvest should it ever become a problem; however, since abundance was adequate, a protective length limit is not suggested at this time.
- Although growth is slow, the 9-inch length limit for crappie should be retained since the abundance of larger fish has declined.
- Striped bass stocking rates should continue at the rate of 1/acre annually.

Literature Cited

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TABLE 1. Yates Reservoir morphometric, physical and chemical characteristics.

Surface area	1,980	surface acres
Drainage area	3,250	square miles
Full pool elevation	344	feet-msl
Mean annual fluxuation	3	feet
Shoreline distance	40	miles
Shoreline development index	6.4	
Mean depth	27.8	feet
Maximum depth	60	feet
Outlet depth	0-43	feet
Thermocline Depth	6-7	feet
Total dissolved solids	37.3	mg/l
Morphoedaphic index	1.34	TDS/mean depth (Ryder 1965)
Growing season	215	frost free days (Jenkins 1967)
Date of Impoundment	1928	

TABLE 2. Fish stocked in Yates Reservoir, 1976-2006.

Species	Year	No/Acre	Size (in)	Total
Largemouth Bass	1993	2.00	1	3,960
	1994	2.00	1	3,960
Smallmouth Bass	1981	20.20	1-2	40,062
	1982	6.10	1	12,000
	1983	8.70	1-2	17,220
	1984	2.30	1-2	4,585
Striped Bass	1976	5.03	1	9,950
	1982	7.07	1	14,000
	1984	5.51	1	10,900
	1985	5.05	1-3	10,000
	1988	1.01	1-2	2,000
	1990	0.30	1-2	600
	1991	1.02	1-2	2,018
	1992	1.01	1-2	1,993
	1993	1.01	1-2	2,000
	1994	1.00	1-2	1,980
	1995	1.02	1-2	2,014
	1996	1.00	1-2	1,980
	1997	1.01	1-2	2,000
	1998	1.01	1-2	1,995
	1999	1.00	1-2	1,980
	2000	1.02	1-2	2,015
	2001	1.03	1-2	2,032
	2002	1.00	1-2	1,980
	2003	1.00	1-2	1,980
	2004	1.00	1-2	1,980
	2005	1.00	1-2	1,980
	2006	1.00	1-2	1,980

TABLE 3. Relative stock density (RSD), catch per hour (CPH), substock ratio (SSR), and relative weight (Wr) of spring collected target species from Yates Reservoir.

LARGEMOUTH BASS

				Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	No. of Samples	Total Effort (hrs.)	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	EF	9	4.50	6	1.4	6	32	7.7	31	86	35	8.4	34	84	20	4.8	19	89	16	3.8	16	88	109	26.1
2006	EF	15	7.50	22	2.9	17	45	6.0	35	85	55	7.3	43	83	23	3.1	18	86	5	0.7	4	92	150	20.0
	LAKE AVERAGE				2.2	12		6.9	33	86		7.9	39	84		4.0	19	88		2.3	10	90		23.1

SPOTTED BASS

				Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	No. of Samples	Total Effort (hrs.)	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	EF	10	5.00	11	2.2	17	37	7.4	57	93	21	4.2	32	98	7	1.4	11	95					76	15.2
2006	EF	15	7.50	27	3.6	26	76	10.1	75	85	13	1.7	13	88	10	1.3	10	93	3	0.4	3	101	129	17.2
	LAKE AVERAGE				2.9	22		8.8	66	89		3.0	23	93		1.4	11	94		0.4	3	101		16.2

BLUEGILL

				Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	No. of Samples	Total Effort (hrs.)	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	EF	6	3.00				60	21.8	60	84	34	12.4	34	83	6	2.1	6	86					100	36.3
2006	EF	4	2.00				104	52.0	79	88	27	13.5	21	88									131	65.5
	LAKE AVERAGE							36.9	70	86		13.0	28	86		2.1	6	86						50.9

GIZZARD SHAD

				Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	No. of Samples	Total Effort (hrs.)	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	EF	5	2.50				46	24.3	46	83	54	28.5	54	79									100	52.8
2006	EF	10	4.66				96	20.6	87	79	14	3.0	13	71									110	23.6
	LAKE AVERAGE							22.5	67	81		15.8	34	75										38.2

THREADFIN SHAD

				Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	No. of Samples	Total Effort (hrs.)	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	EF	10	5.00				38	7.6	51		36	7.2	49										74	14.8
2006	EF	15	7.50								4	0.5	100										4	0.5
	LAKE AVERAGE							7.6	51			3.9	75											7.7

TABLE 4. Relative stock density (RSD), catch per hour (CPH), substock ratio (SSR), and relative weight (Wr) of fall and winter collected target species from Yates Reservoir.

BLACK CRAPPIE

		No. of	Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	Samples	No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
1994	TN	80	45	0.6	39	12	0.2	11	74	28	0.3	25	79	56	0.7	49	81	18	0.2	16	82	159	2.0
2005	TN	60	54	0.9	50	49	0.8	46	70	30	0.5	28	73	25	0.4	23	77	3	0.1	3	84	161	2.7
LAKE AVERAGE				0.8	45		0.5	29	72		0.4	27	76		0.6	36	79		0.2	10	83		2.4

WHITE CRAPPIE

		No. of	Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	Samples	No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
2005	TN	60	6	0.1	40	2	0.0	13	77	5	0.1	33	77	5	0.1	33	73	3	0.1	20	84	21	0.4

STRIPED BASS

		No. of	Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	Samples	No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
2005-06	GN	10								7	0.7	100	83									7	0.7

WHITE BASS

		No. of	Substock			RSD-S				RSD-Q				RSD-P				RSD-M				Total	
Year	Gear	Samples	No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
2005-06	GN	10				3	0.3	50	86	2	0.2	33	89					1	0.1	17	82	6	0.6

TABLE 5. Non-target species observed during routine sampling of Yates Reservoir, 2005-2006.

Species
Black redhorse
Blacktail redhorse
Channel catfish
Common carp
Flathead catfish
Longear sunfish
Mobile logperch
Redbreast sunfish
Redear sunfish
Spotted sucker
Warmouth
Yellow perch

TABLE 6. Age composition and mean total length of largemouth bass collected from Yates Reservoir, spring 2006.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
1	2005	15	10.0	2.0	139	6.5	83-184
2	2004	24	16.0	3.2	210	6.9	131-255
3	2003	34	22.7	4.5	282	7.0	186-378
4	2002	33	22.0	4.4	327	5.0	268-397
5	2001	21	14.0	2.8	363	8.8	272-427
6	2000	9	6.0	1.2	393	12.5	342-466
7	1999	2	1.3	0.3	434	43.0	391-477
8	1998	3	2.0	0.4	466	30.5	421-524
9	1997	4	2.7	0.5	467	27.0	398-522
10	1996	1	0.7	0.1	485	-	485
11	1995	2	1.3	0.3	493	67.0	426-560
12	1994	0	0.0	0.0		-	-
13	1993	1	0.7	0.1	600	-	600
14	1992	1	0.7	0.1	552	-	552
Total		150	100.0	20.0			

TABLE 7. Age composition and mean total length of spotted bass collected from Yates Reservoir, spring 2006.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
1	2005	14	10.9	1.9	100.6	6.0	78-145
2	2004	61	47.3	8.1	197.7	3.8	113-252
3	2003	38	29.5	5.1	268.2	6.8	182-345
4	2002	12	9.3	1.6	366.3	19.9	232-447
5	2001	3	2.3	0.4	438.7	20.3	398-460
6	2000	1	0.8	0.1	408.0	-	408
Total		129	100.0	17.2			

TABLE 8. Age composition and mean total length of black crappie collected from Yates Reservoir, fall 2005.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
0	2005	38	23.6	0.6	62.6	1.1	55-84
1	2004	29	18.0	0.5	135.9	5.3	90-189
2	2003	64	39.8	1.1	200.8	5.3	101-275
3	2002	20	12.4	0.3	238.3	8.5	145-287
4	2001	8	5.0	0.1	284.6	8.0	245-319
5	2000	1	0.6	0.0	294.0	-	294
6	1999	0	0.0	0.0	0.0	-	-
7	1998	0	0.0	0.0	0.0	-	-
8	1997	0	0.0	0.0	0.0	-	-
9	1996	0	0.0	0.0	0.0	-	-
10	1995	0	0.0	0.0	0.0	-	-
11	1994	0	0.0	0.0	0.0	-	-
12	1993	1	0.6	0.0	351.0	-	351
Total		161	100.0	2.7			

TABLE 9. Age composition and mean total length of white crappie collected from Yates Reservoir, fall 2005.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
0	2005	5	23.8	0.1	63.4	3.2	58-76
1	2004	5	23.8	0.1	207.6	25.7	112-264
2	2003	8	38.1	0.1	250.3	17.5	186-314
3	2002	2	9.5	0.0	261.5	50.5	211-312
4	2001	1	4.8	0.0	280.0	-	280
Total		21	100.0	0.4			

TABLE 10. Age composition and mean total length of striped bass collected from Yates Reservoir, winter 2005-2006.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
2	2003	6	85.7	0.6	577.0	10.6	534-606
3	2002	0	0.0	0.0	0.0	-	-
4	2001	1	14.3	0.1	671.0	-	671
Total		7	100.0	0.7			

TABLE 11. Age composition and mean total length of white bass collected from Yates Reservoir, winter 2005-2006.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
0	2005	2	33.3	0.2	203.5	4.5	199-208
1	2004	3	50.0	0.3	257.0	29.3	200-297
2	2003	0	0.0	0.0	0.0	-	-
3	2002	0	0.0	0.0	0.0	-	-
4	2001	1	16.7	0.1	394.0	-	394
Total		6	100.0	0.6			

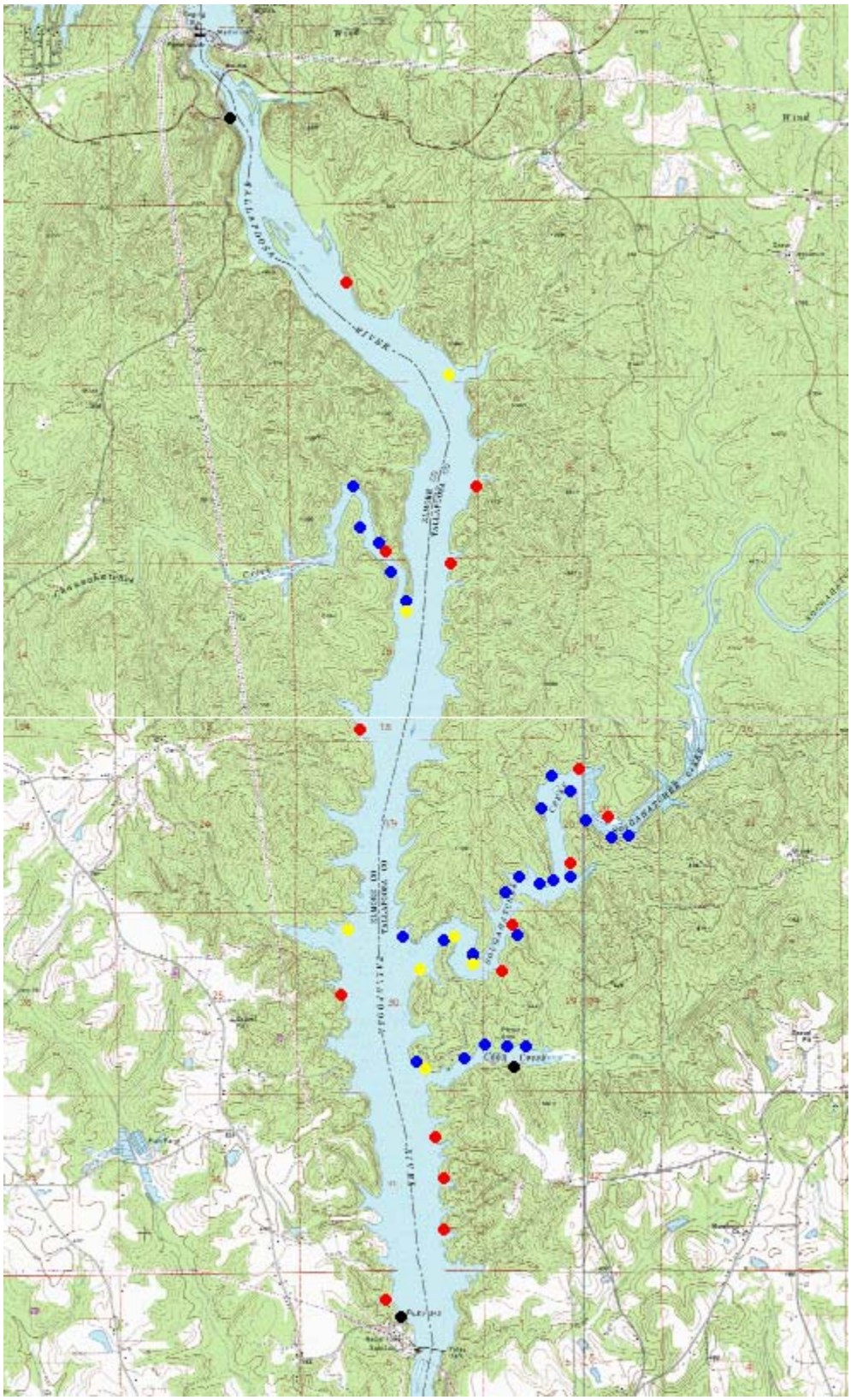

FIGURE 1. Sampling sites during 2005-06: trap-net (blue), gill-net (yellow), and electrofish (red). Access areas are identified by a black dot.

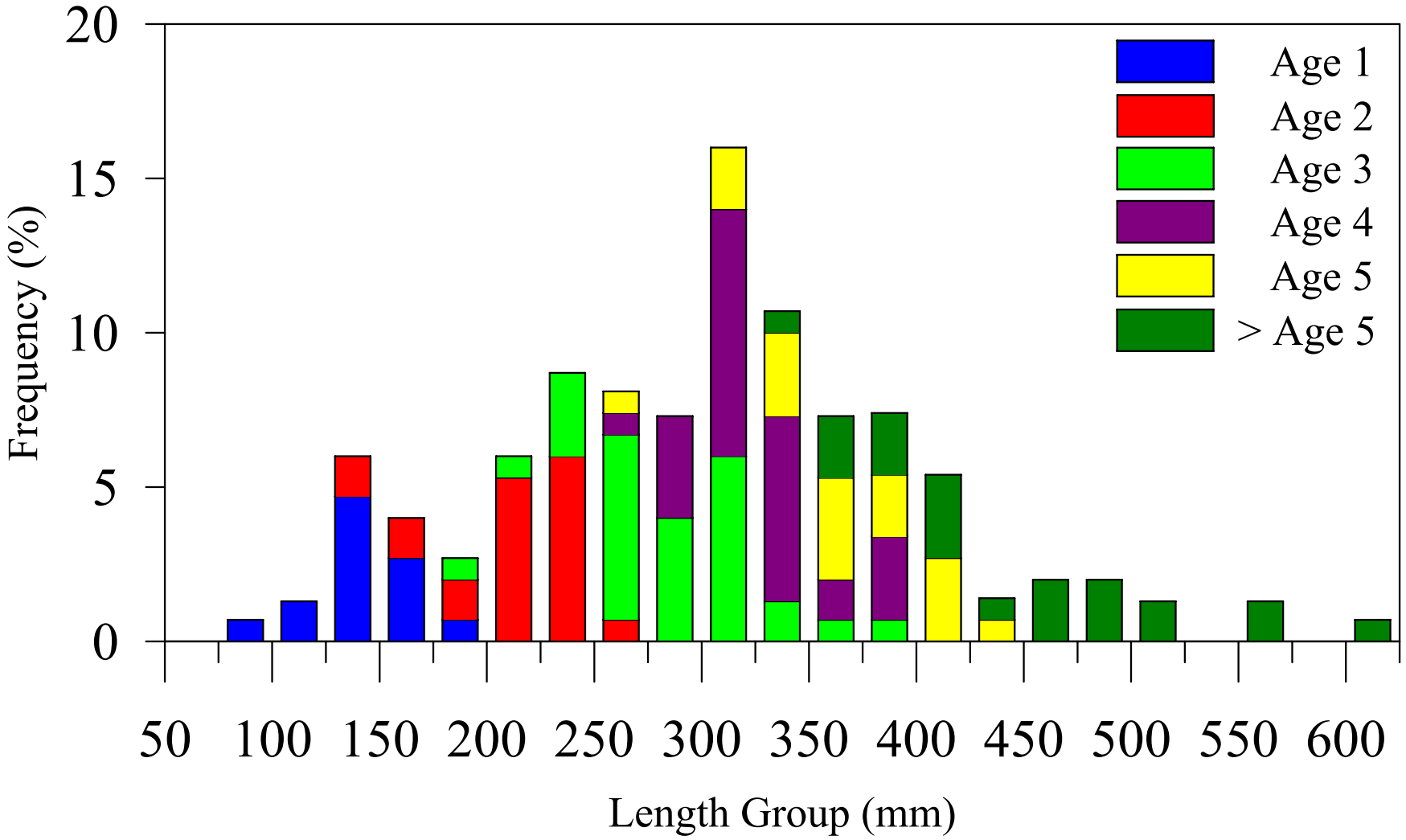

FIGURE 2. Length-at-age frequency of largemouth bass (N=150) collected from Yates Reservoir, spring 2006.

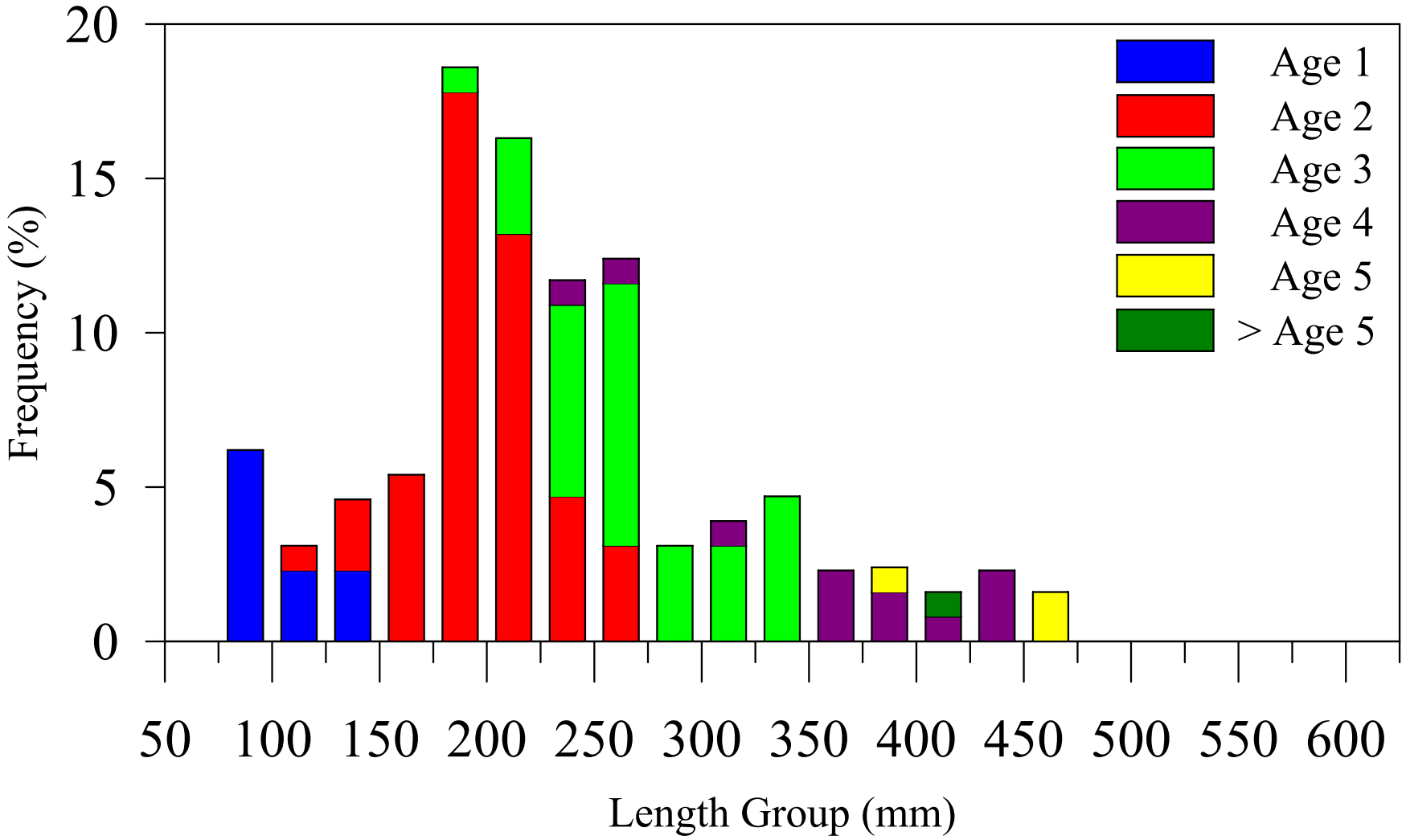

FIGURE 3. Length-at-age frequency of spotted bass (N=129) collected from Yates Reservoir, spring 2006.

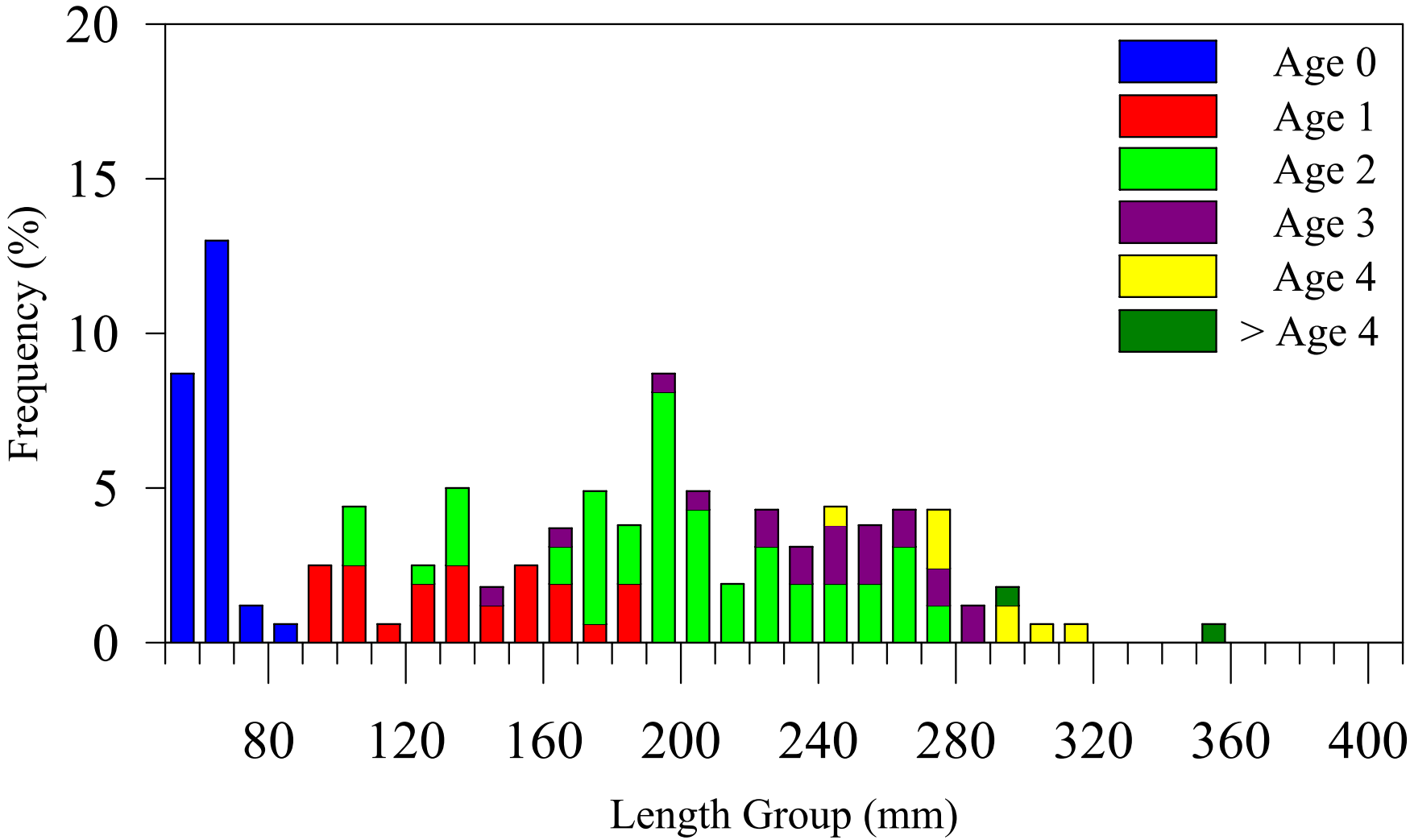

FIGURE 4. Length-at-age frequency of black crappie (N=161) collected from Yates Reservoir, fall 2005.

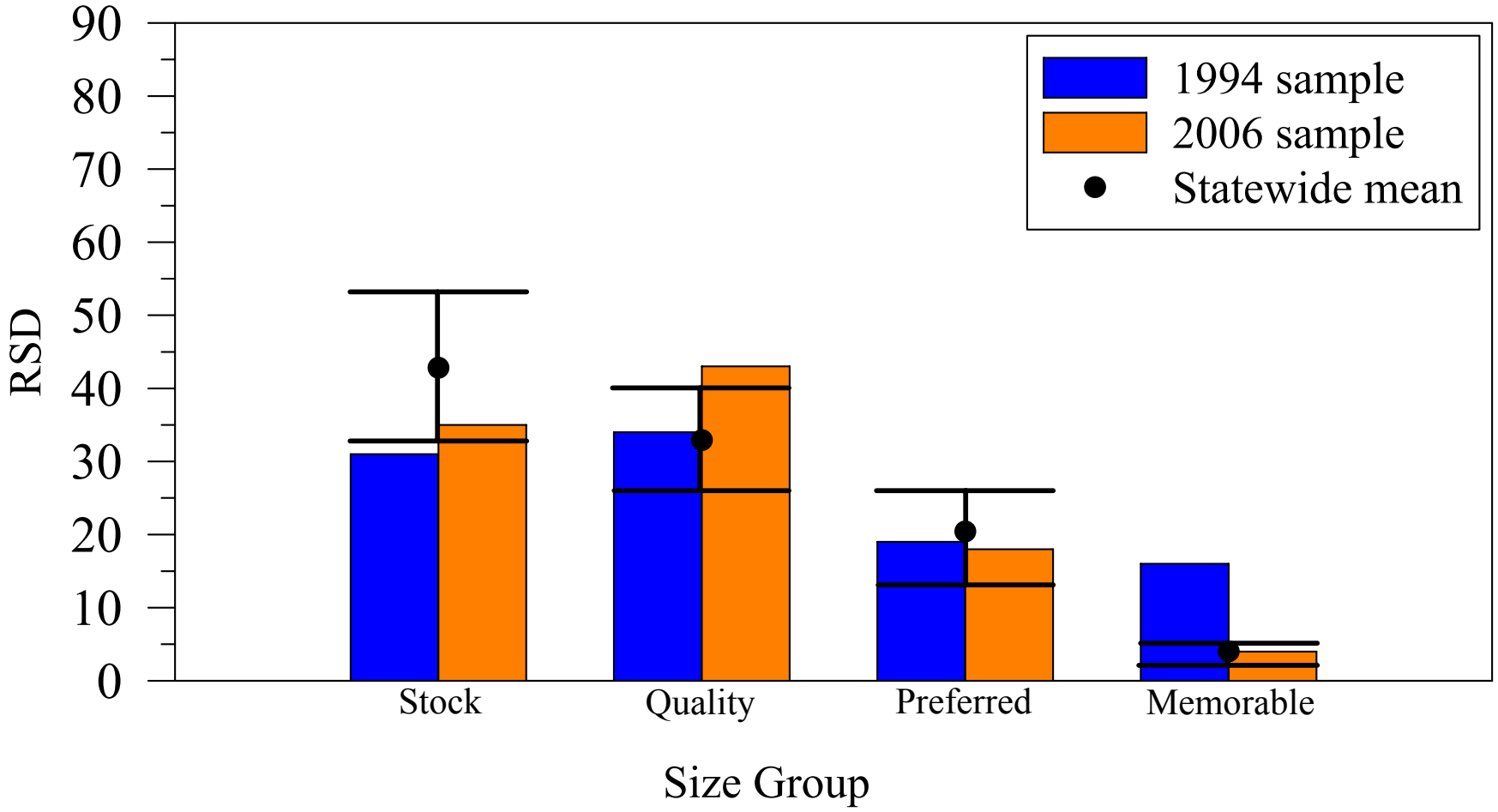

FIGURE 5. The relative stock density (RSD) and statewide mean of largemouth bass in Yates Reservoir, 1994 and 2006. The I-beam denotes the 25th and 75th percentiles of RSD values of largemouth bass, statewide.

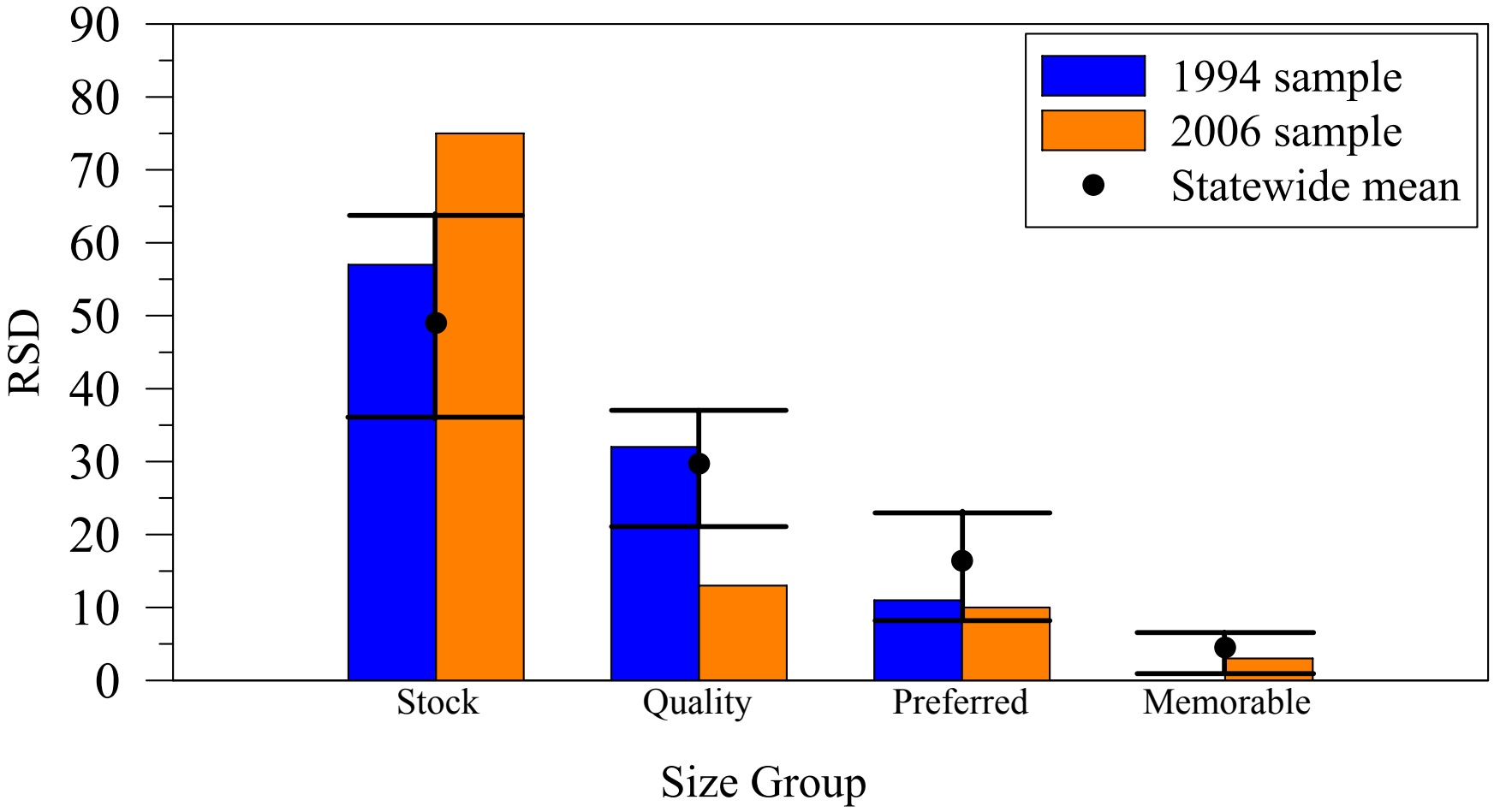

FIGURE 6. The relative stock density (RSD) and statewide mean of spotted bass in Yates Reservoir, 1994 and 2006. The I-beam denotes the 25th and 75th percentiles of RSD values of spotted bass, statewide.

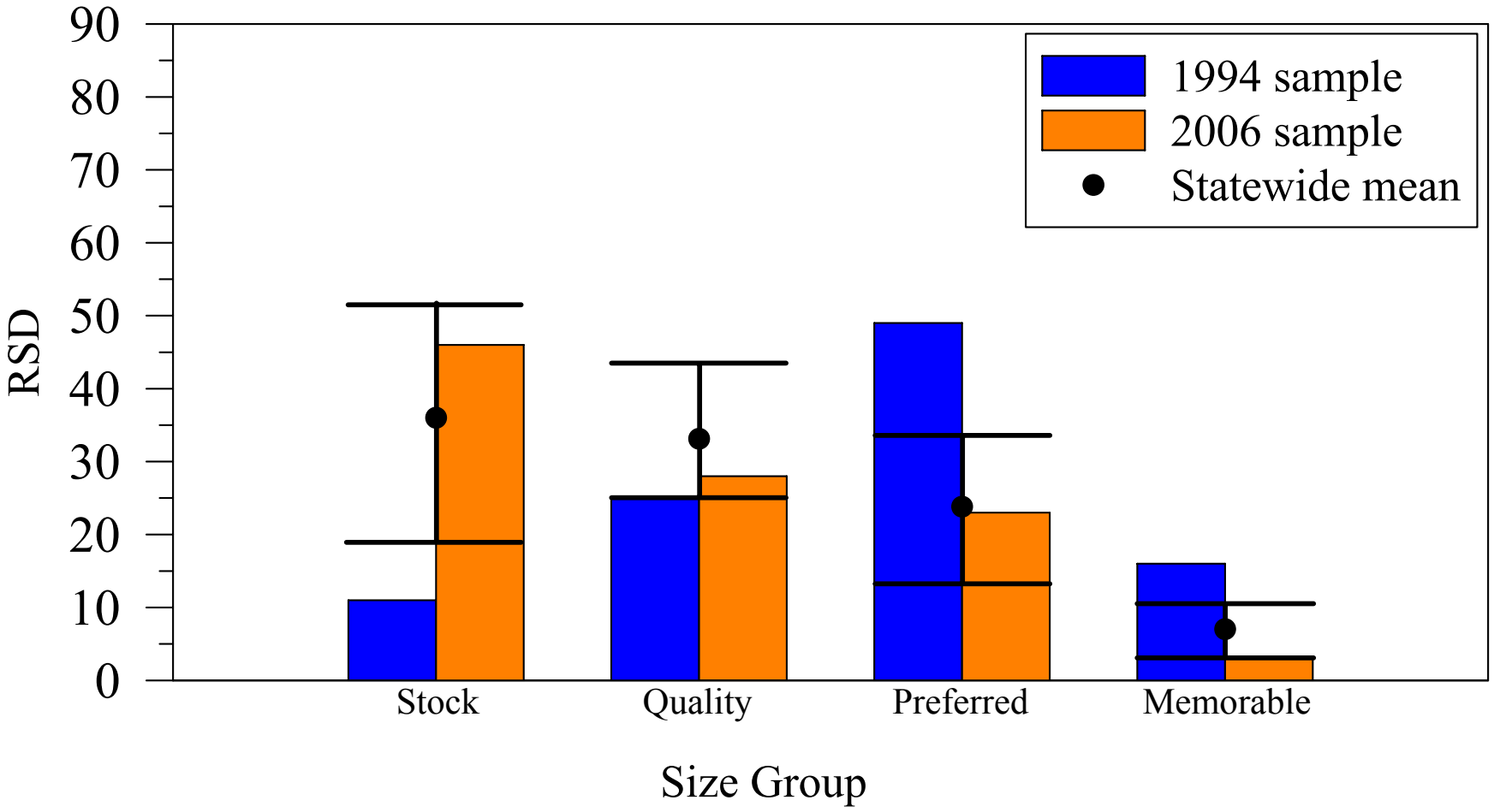

FIGURE 7. The relative stock density (RSD) and statewide mean of black crappie in Yates Reservoir, 1994 and 2006. The I-beam denotes the 25th and 75th percentiles of RSD values of black crappie, statewide.

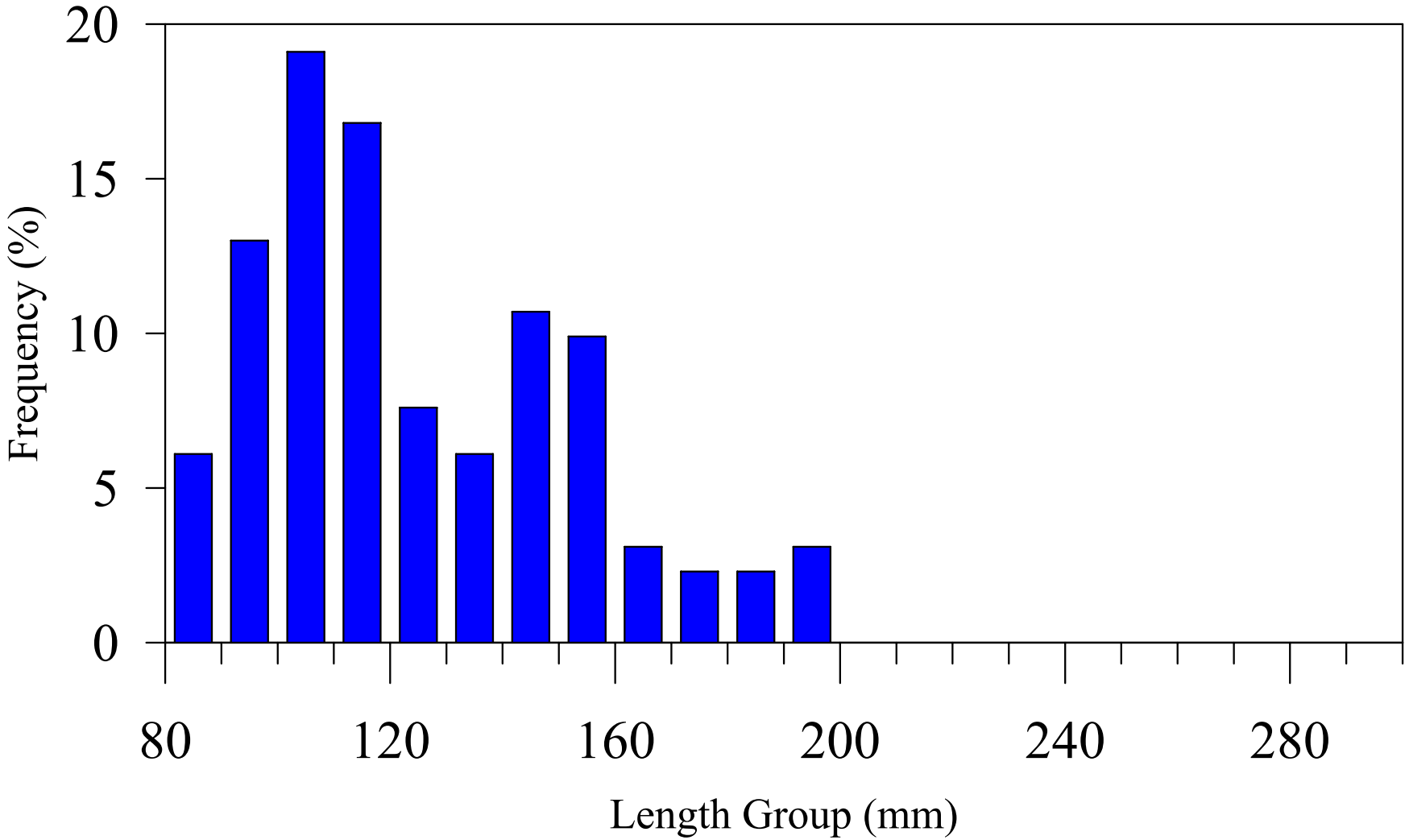

FIGURE 8. Length frequency distribution of bluegill (N=131) collected from Yates Reservoir, spring 2006.

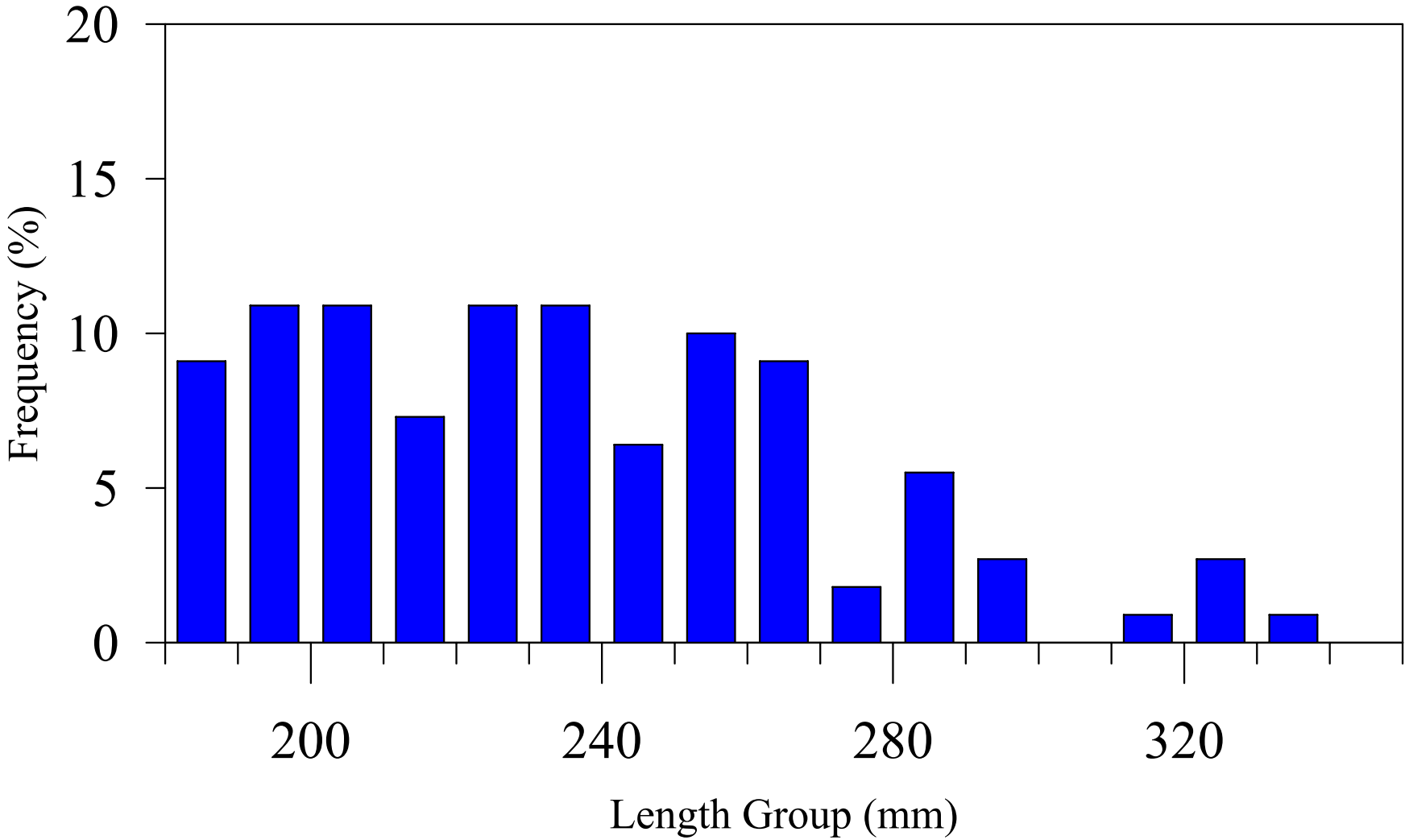

FIGURE 9. Length frequency distribution of gizzard shad (N=110) collected from Yates Reservoir, spring 2006.

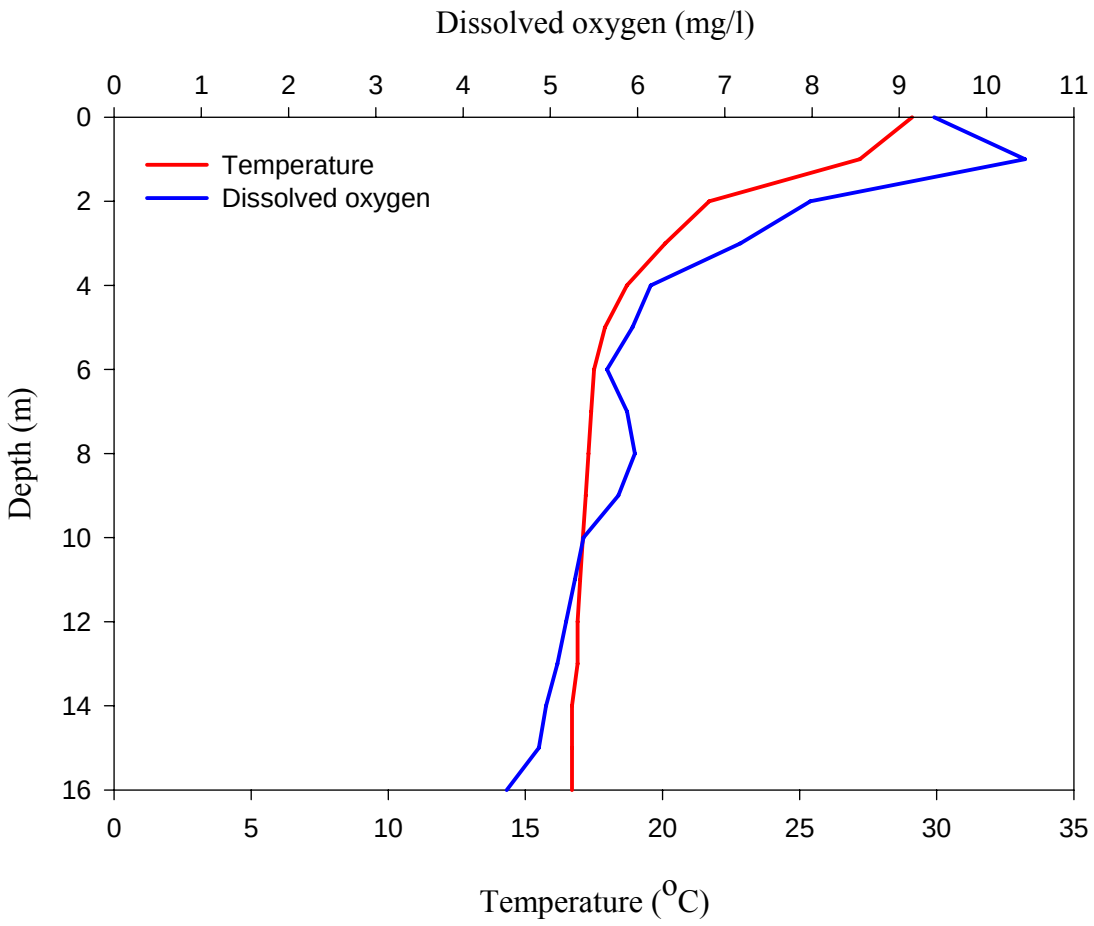

FIGURE 10. Temperature and dissolved oxygen profiles in Yates Reservoir forebay, August 15, 2006.