

**MARTIN RESERVOIR
MANAGEMENT REPORT**

2008

Prepared by

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Introduction

The Alabama Reservoir Management Plan (1999) was established with the objective of collecting baseline information on the major sport fish species in the state's reservoirs. Each reservoir is sampled periodically to identify any problems with the fishery and to follow trends. The black bass population in Martin Reservoir (Lake Martin) is dominated by spotted bass, but also contains a moderate abundance of largemouth bass. Striped bass are stocked in quantities adequate to provide an additional fishery since they do not reproduce naturally in most reservoirs.

Methods

Fall sampling scheduled for 2007 was postponed due to extremely low water levels from the severe summer drought. Spring electrofishing samples were conducted by Alabama Wildlife and Freshwater Fisheries personnel for crappie on April 14, 2008 and for black bass from April 15-17 and again on April 22, 2008. Crappie were targeted at fifteen specific locations in the backs of coves and around woody structure in Elkahatchee Creek (Figure 1). Bass were collected from fifteen systematically chosen sites containing preferred bass habitat for a total of 30 minutes each (Figure 1). Only largemouth bass and spotted bass were collected at each site during this particular sample, although the presence of non-target species were documented. All other procedures followed management program guidelines.

Results and Discussion

According to the spring 2008 electrofishing sample, the largemouth bass population structure is dominated by quality size fish, similar to the 2001 sample (McHugh et al. 2001). A total of 175 fish were collected and 60% of these fish were over 15-inches in total length. Stock

size fish have typically dominated the spring sample at Martin (McHugh et al. 1999, Greene et al. 2004, Greene et al. 2005), although this varies periodically as larger year-classes recruit to different size-groups. The combined CPUE for stock to trophy-sized largemouth bass was 20.1 per hour, which is well below the statewide average of 47.9 .

Average relative weights for largemouth bass have increased slightly since the last spring sample (Greene et al. 2005); however, the values for all size categories except memorable fell below the statewide 25th percentile. Mean total lengths at ages 1-2 were within normal ranges; however, fish 3 years and older exhibited slower than average growth rates. This is presumably due to the lack of larger forage in this nutrient poor system. Martin Reservoir largemouth bass from the spring 2008 sample took 2.86 years, 4.64 years, and 10.67 years to reach 12 inches, 15 inches, and 20 inches respectively according to the von Bertalanffy growth equation. These values indicate that growth is below average when compared to statewide data.

The spotted bass sample consisted of 184 total fish, most of which fell into the stock-quality size category. Bass less than 11-inches in total length are very common in Lake Martin as sub-stock or stock size fish have dominated each past sample (McHugh et al. 1999, McHugh et al. 2001, Greene et al. 2004, Greene et al. 2005). The combined CPUE for stock to trophy-sized spotted bass was 18.8 per hour, which is within the statewide average range of 14.4 to 33.2. The relative weights for stock and quality-sized fish were adequate, but larger fish exhibited poor condition when compared to statewide data. Martin Reservoir spotted bass from the spring 2008 sample took 2.61 years and 5.00 years to reach 12 inches and 17 inches, respectively when the maximum length (L_{∞}) was held constant at 20.7 inches (525 mm). These values indicate that growth is average when compared to statewide data.

Although the overall abundance of black bass is low in Martin Reservoir, recruitment and growth remain respectable. High recruitment rates are typical of nutrient poor systems where species diversity is low and survival of young-of-year fish is high. Spotted bass tend to be the dominant black bass species in these systems due to a competitive advantage from an earlier spawn date (Greene and Maceina 2000). A lack of available forage is often an issue in infertile reservoirs such as Martin; therefore, fish harvest can play an integral role in the management of these systems. Mortality of both species beyond age-3 appears to be high (Tables 3 and 4), although a reliable estimate could not be determined for either species.

Bass tournament data collected for the B.A.I.T. program indicated that Martin Reservoir ranked second out of twenty-two reservoirs statewide in angler percent success, but twenty-first in average weight (Abernethy et al. 2008). The number of bass per angler and pounds of bass per angler were at record highs for Martin Reservoir, although average weight has changed little through time (Figure 10). High angler success rate is primarily due to the abundance of small fish which readily recruit to the fishery. The low average weight is directly related to the lack of available forage and low fertility level. Unfortunately, Martin still ranks poorly in the number of hours to catch a bass greater than five pounds.

Crappie were sampled in 2008 by spring electrofishing, unlike past samples where fall trap-netting was the primary method. Electrofishing typically targets larger individuals, whereas trap-net sampling primarily selects for smaller fish (Figure 7). During the spring sample, 169 stock size and larger fish were captured in Elkahatchee Creek mainly in the backs of coves or around submerged woody structure (Figure 1). Relative weights of quality size and larger fish were slightly lower than past samples, but this is presumably due to the change in sampling season. Variable recruitment did not allow an adequate mortality estimate to be determined.

Crappie mortality from past samples was quite high (McHugh et al. 1999, Greene et al. 2004) and is still likely the case since larger year classes are difficult to track through time (Table 6). Crappie growth was seemingly much slower than in past samples. Fish took 3.32 years to reach nine inches in total length according to the von Bertalanffy equation, although the change in sampling season undoubtedly impacts the comparability among samples.

The drought of 2007 was one of the worst on record in Alabama and Lake Martin never reached full pool elevation after mid-February. The lowest recorded elevation during the entire year was 474.5 msl in December. Summer pool level, which is normally 490 msl, was never achieved and by the end of August the lake level was more than 10-feet below the rule curve. As the summer progressed, the majority of boating access areas on Lake Martin eventually became too shallow to use. For this reason, the Alabama DCNR extended two public access area boat ramps (Kowaliga and Pace's Point) on opposite sides of the reservoir. These two areas were likely the only boat launching sites available for public use during the fall season.

The spring access area creel survey consisted of only 119 angler parties interviewed (Table 8). This total is well below the number of interviews conducted during the previous creel survey at Martin Reservoir (McHugh et al. 2001), although the unpredictable spring 2008 weather and indirect effects of the 2007 drought presumably reduced angler participation. Eighty percent of all groups questioned were specifically fishing for either black bass or crappie. During the entire survey period, no anglers harvested bass and crappie harvest was well below the 2001 value. A survey question was also asked during each interview that pertained to the drought and if limited boating access during 2007 affected their number of fishing trips (Table 8). From the results, it appeared that most Lake Martin anglers were not willing to travel to other lakes even if it meant fishing less often.

According to spring 2008 sampling data, it appears the drought did not have a significant impact on the adult black bass or crappie populations in Lake Martin. It is still unknown what effects the drought had on young-of-year fish, but low water levels have been linked to poor year-class strength in other studies (Maceina and Stimpert 1998, Maceina 2003). These impacts should become apparent in the next sample at Martin Reservoir, when young-of-year fish from 2008 become fully vulnerable to the sampling gear.

Recommendations

- Martin Reservoir should be re-sampled in three years according to the reservoir management program guidelines.
- Due to the high recruitment and low relative weights of black bass in this nutrient poor system, the harvest of smaller fish should be encouraged. A protective slot-limit is not recommended since bass harvest is negligible.
- The nine-inch minimum length limit for crappie should be retained to protect weak year classes and ensure this fishery is preserved.
- Striped bass stockings should continue at the rate of three per acre annually in order to safeguard this unique fishery.

Literature Cited

- Abernethy, D. L. 2008. Bass anglers information team 2007 annual report. Alabama Department of Conservation and Natural Resources, Montgomery.
- Alabama Reservoir Management Program. 1999. Alabama Department of Conservation and Natural Resources, Montgomery.
- Greene, J. C., and M. J. Maceina. 2000. Influence of trophic state on spotted bass and largemouth bass spawning time and age-0 population characteristics in Alabama Reservoirs. *North American Journal of Fisheries Management* 20:100-108.
- Greene, J. C., D. L. Abernethy, T. R. Powell, and R. A. McVay. 2004. Martin Reservoir 2004 management report. Alabama Department of Conservation and Natural Resources, Montgomery.
- Greene, J. C., D. L. Abernethy, and R. A. McVay. 2005. Martin Reservoir 2005 management report. Alabama Department of Conservation and Natural Resources, 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. American Fisheries Society, Southern Division, Bethesda, Maryland.
- Maceina, M. J., and M. R. Stimpert. 1998. Relations between reservoir hydrology and crappie recruitment in Alabama. *North American Journal of Fisheries Management* 18:104-113.
- Maceina, M. J. 2003. Verification of the influence of hydrologic factors on crappie recruitment in Alabama reservoirs. *North American Journal of Fisheries Management* 23:470-480.
- McHugh, J. J., and J. B. Jernigan. 1999. Martin Reservoir 1998 management report. Alabama Department of Conservation and Natural Resources, Montgomery.
- McHugh, J. J., J. B. Jernigan, and T. R. Powell. 2001. Martin Reservoir 2000-2001 management report. Alabama Department of Conservation and Natural Resources, Montgomery.
- Ryder, R. A. 1965. A method for estimating the potential fish production of north-temperate lakes. *Transactions of the American Fisheries Society* 94:214-218.

TABLE 1. Morphometric, physical, and chemical characteristics of Martin Reservoir.

Surface area		39,180 surface acres
Drainage area		3,000 square miles
Full pool elevation		490 feet-msl
Mean annual fluxuation		12 feet
Shoreline distance		700 miles
Shoreline development index		25.2
Mean depth		42 feet
Maximum depth		155 feet
Outlet depth	upper	66 feet
	lower	90 feet
Thermocline depth		varies
Total dissolved solids		13.08 mg/l (ADEM 2007, unpublished)
Morphoedaphic index		0.31 TDS/mean depth (ft) (Ryder 1965)
Chlorophyll-a		2.65 µg/l (ADEM 2007, unpublished)
Growing season		201-220 frost free days (Jenkins 1967)
Date of Impoundment		1926

TABLE 2. Relative stock density (RSD), catch per effort (CPE), substock ratio (SSR), and relative weight (Wr) of target species collected from Martin Reservoir.

LARGEMOUTH BASS																							
Year	Gear	Number Samples	Substock			RSD _{S-Q}				RSD _{Q-P}				RSD _{P-M}				RSD _{M-T}				Total	
			No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
1998	EF	15	22	2.93	20	51	6.80	46	83	41	5.47	37	80	16	2.13	14	78	3	0.40	3	82	133	17.73
2001	EF	14	8	1.14	11	19	2.71	25	75	33	4.71	43	76	22	3.14	29	83	2	0.29	3	88	84	12.00
2004	EF	11	33	6.00	52	38	6.91	59	79	12	2.18	19	79	14	2.55	22	82		0.00	0		97	17.64
2005	EF	12	16	2.67	11	80	13.33	55	76	33	5.50	23	75	28	4.67	19	78	5	0.83	3	82	162	27.00
2008	EF	15	24	3.20	16	46	6.13	30	83	74	9.87	49	81	29	3.87	19	81	2	0.27	1	96	175	23.33

SPOTTED BASS																							
Year	Gear	Number Samples	Substock			RSD _{S-Q}				RSD _{Q-P}				RSD _{P-M}				RSD _{M-T}				Total	
			No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
1998	EF	15	50	6.67	75	41	5.47	61	84	20	2.67	30	82	5	0.67	7	85	1	0.13	1	76	117	15.60
2001	EF	12	42	7.00	39	63	10.50	59	83	31	5.17	29	81	11	1.83	10	83	2	0.33	2	82	149	24.83
2004	EF	11	42	7.64	42	66	12.00	65	84	21	3.82	21	84	10	1.82	10	82	4	0.73	4	86	143	26.00
2005	EF	12	36	6.00	40	49	8.17	54	80	29	4.83	32	80	5	0.83	6	83	7	1.17	8	82	126	21.00
2008	EF	15	43	5.73	30	87	11.60	62	89	40	5.33	28	92	10	1.33	7	87	4	0.53	3	91	184	24.53

BLACK CRAPPIE																							
Year	Gear	Number Samples	Substock			RSD _{S-Q}				RSD _{Q-P}				RSD _{P-M}				RSD _{M-T}				Total	
			No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE
1998	TN	20	7	0.35	5	40	2.00	28	73	64	3.20	44	80	36	1.80	25	81	4	0.20	3	80	151	7.55
2000	TN	50		0.00	0	7	0.14	5	76	55	1.10	43	81	64	1.28	50	81	3	0.06	2	87	129	2.58
2003	TN	20	26	1.30	21	46	2.30	37	78	46	2.30	37	81	31	1.55	25	84	1	0.05	1	86	150	7.50
2008	EF	15		0.00	0	2	1.44	1	79	60	43.22	36	78	96	69.15	57	79	11	7.92	7	79	169	121.73

TABLE 3. Age composition and mean total length of largemouth bass from Martin Reservoir, spring 2008.

Age	Year Class	Number	Percent	CPH	Mean TL	Standard Error	Length Range
1	2007	30	17.1	4.0	179.4	6.0	92 - 243
2	2006	38	21.7	5.1	277.9	5.0	174 - 336
3	2005	48	27.4	6.4	323.8	4.6	252 - 406
4	2004	18	10.3	2.4	340.8	8.3	284 - 416
5	2003	32	18.3	4.3	390.5	6.4	315 - 474
6	2002	3	1.7	0.4	373.7	6.5	364 - 386
7	2001	1	0.6	0.1	488.0	-	-
8	2000	4	2.3	0.5	515.0	13.5	487 - 542
9	1999	1	0.6	0.1	450.0	-	-
Total		175	100.0	23.3			

TABLE 4. Age composition and mean total length of spotted bass from Martin Reservoir, spring 2008.

Age	Year Class	Number	Percent	CPH	Mean TL	Standard Error	Length Range
1	2007	48	26.1	6.4	134.3	4.5	81 - 195
2	2006	96	52.2	12.8	243.0	3.2	184 - 322
3	2005	30	16.3	4.0	320.1	4.7	269 - 376
4	2004	3	1.6	0.4	398.3	22.9	353 - 427
5	2003	6	3.3	0.8	441.8	19.4	372 - 484
6	2002	0	0.0	0.0	-	-	-
7	2001	1	0.5	0.1	495.0	-	-
Total		184	100.0	24.5			

TABLE 5. Age composition and mean total length of black crappie from Martin Reservoir, spring 2008.

Age	Year Class	Number	Percent	CPH	Mean TL	Standard Error	Length Range
1	2007	0	0.0	0.0	-	-	-
2	2006	1	0.6	0.7	185.0	-	-
3	2005	40	23.7	28.8	220.3	2.3	190 - 254
4	2004	24	14.2	17.3	253.5	4.2	208 - 294
5	2003	72	42.6	51.9	260.8	2.4	208 - 325
6	2002	25	14.8	18.0	287.8	3.5	257 - 326
7	2001	4	2.4	2.9	301.3	13.4	272 - 337
8	2000	2	1.2	1.4	302.5	17.5	385 - 320
9	1999	1	0.6	0.7	330.0	-	-
Total		169	100.0	121.7			

TABLE 6. Percentage year-class composition by sampling year for black crappie collected by fall trap-netting (T) and spring electrofishing (E) from Martin Reservoir.

Year Class	Collection Year					
	1992(T) (N = 107)	1995(T) (N = 145)	1998(T) (N = 153)	2000(T) (N = 129)	2003(T) (N = 150)	2008(E) (N = 169)
2007						
2006						1%
2005						24%
2004						14%
2003					18%	43%
2002					44%	15%
2001					33%	2%
2000					4%	1%
1999				36%		1%
1998			4%	46%	1%	
1997			53%	16%		
1996			29%	2%		
1995		4%	11%	1%		
1994		27%	4%	1%		
1993		59%				
1992	5%	4%				
1991	50%	5%				
1990	33%					
1989	10%	1%				
1988	1%					
1987	1%					
1986	1%					
Totals	100%	100%	100%	100%	100%	100%

TABLE 7. Non-target species observed during routine sampling of Martin Reservoir, spring 2008.

Species
Black crappie
Blacktail redhorse
Blacktail shiner
Bluegill sunfish
Channel catfish
Common carp
Flathead catfish
Gizzard shad
Green sunfish
Longear sunfish
Redbreast sunfish
Redear sunfish
River redhorse
Spotted sucker
Warmouth sunfish
White bass

TABLE 8. Fishery statistics for the Martin Reservoir access area creel survey, March through April 2008.

		Number of anglers	Hours
Fishing for:	Black Bass ¹	105	532.1
	Crappie	82	426.8
	Striped Bass	5	24.3
	Catfish	0	0.0
	Bluegill	0	0.0
	Anything	45	219.8
	TOTALS	237	1202.9
		Number of Fish	
Harvested:	Largemouth bass		0
	Spotted bass		0
Released:	Crappie		76
	Bass <12 inches		36
	Bass >12 inches		125
	Crappie <9 inches		76
	Crappie >9 inches		88
		Catch/Hour	Harvest/Hour
Catch and harvest:	Bass ²	0.29	0.00
	Bass ³	0.23	0.00
	Crappie ⁴	0.55	0.18
		Number of Parties	
County of origin:	Tallapoosa		39
	Elmore		35
	Lee		19
	Coosa		7
	Montgomery		5
	Talladega		4
	Autauga		3
	Others (in state)		3
	Others (out of state)		4
		Number of Parties	
Comments:	Thanks to DCNR for boat ramp extensions		2
	Gas prices too high		1
	Too windy		1

¹Tournament anglers were not interviewed.

²Includes only bass anglers and fish of all sizes.

³Includes only bass anglers and fish 12 inches and larger.

⁴Includes only crappie anglers and fish of all sizes.

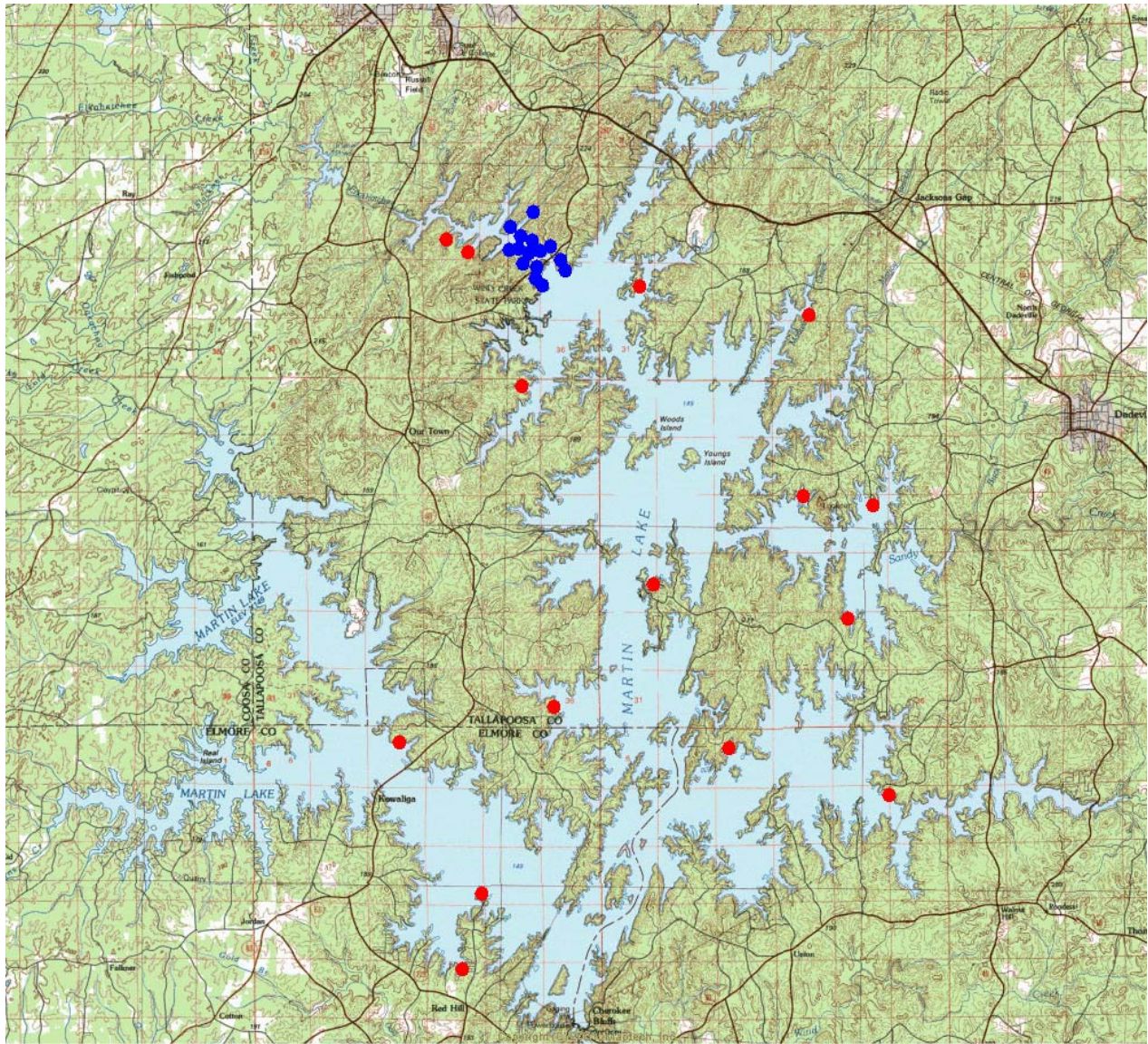


Figure 1. Spring 2008 sampling locations on Martin Reservoir for black bass (red) and crappie (blue).

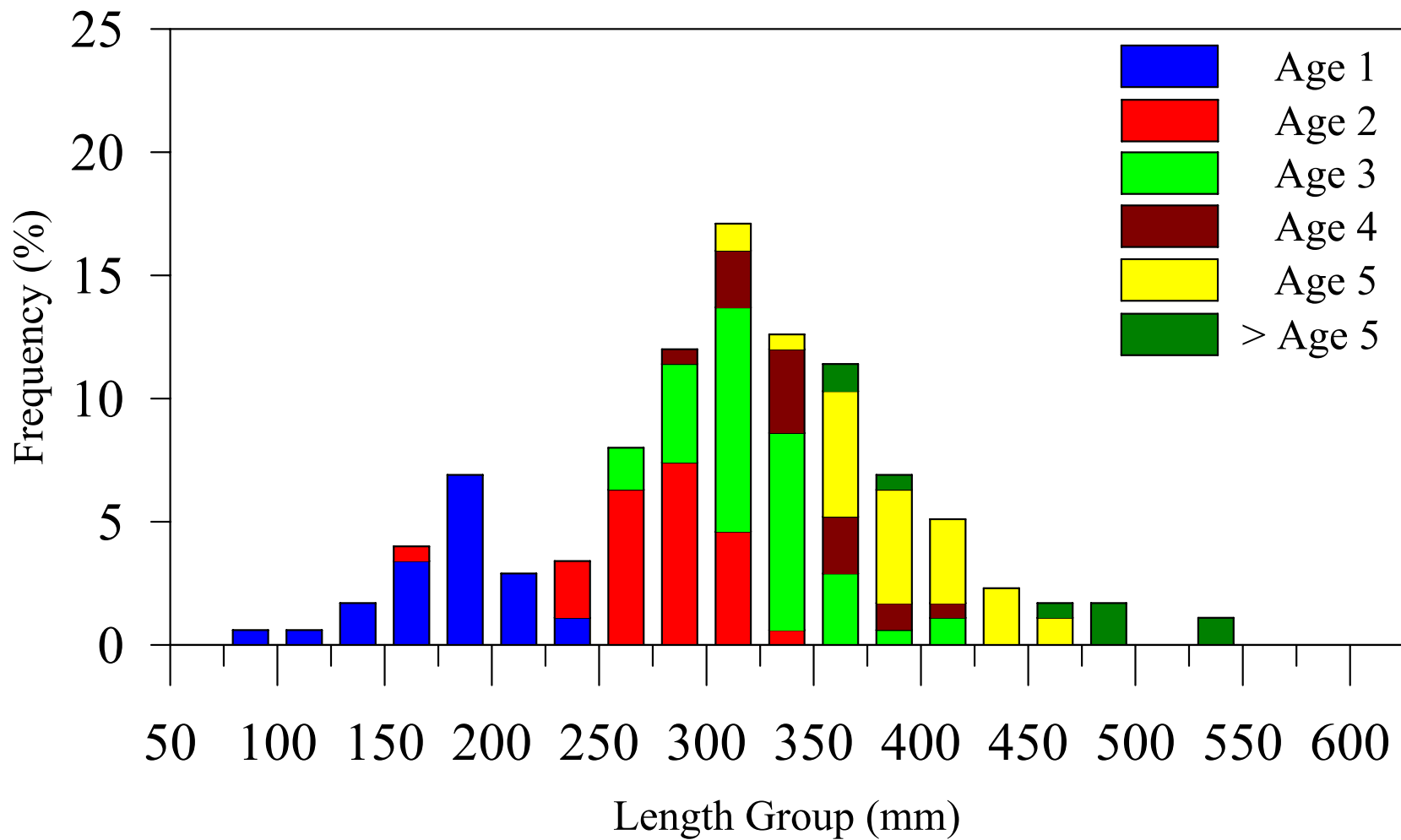


Figure 2. Length-at-age frequency of largemouth bass (N=175) taken from Martin Reservoir, spring 2008.

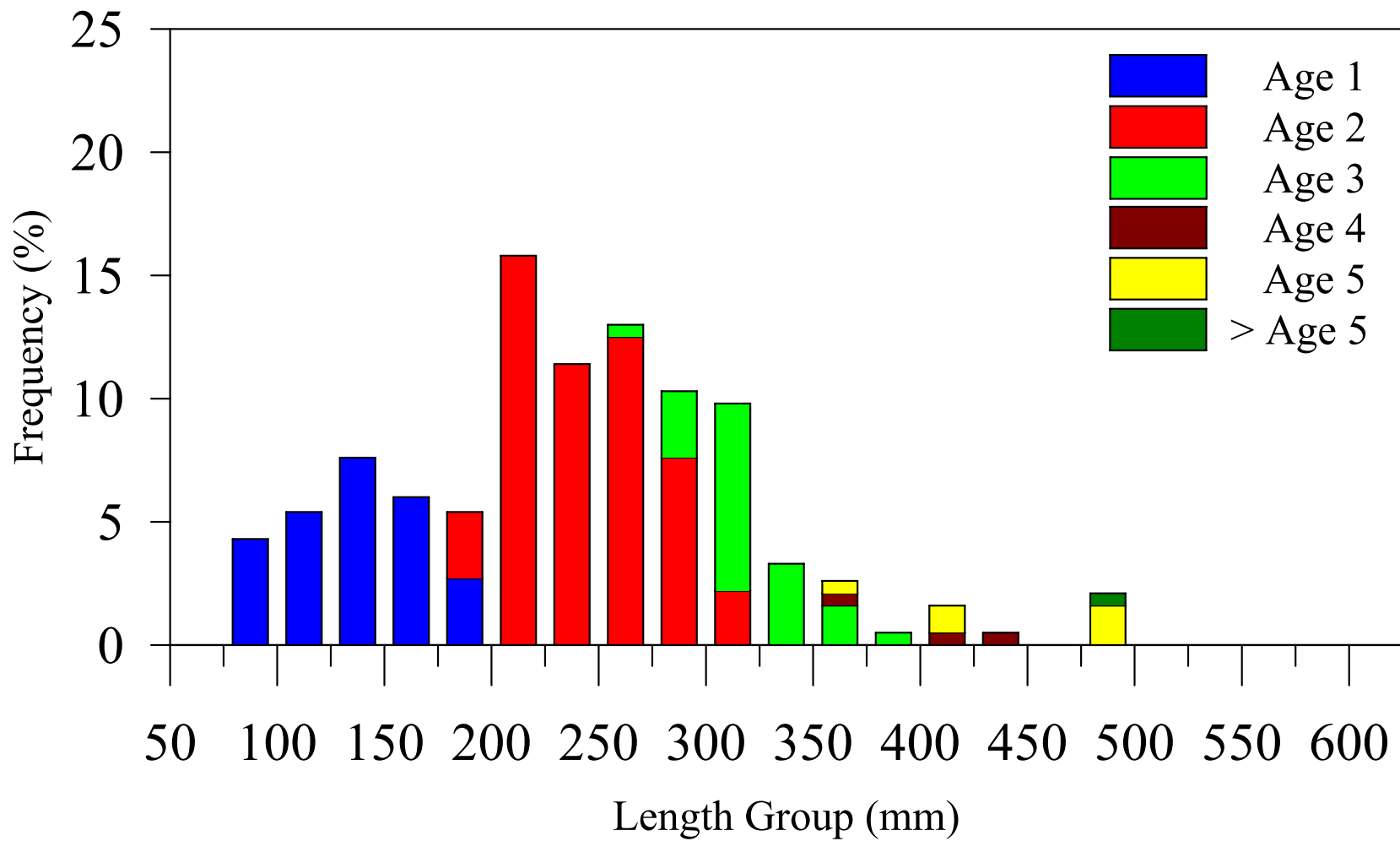


Figure 3. Length-at-age frequency of spotted bass (N=184) taken from Martin Reservoir, spring 2008.

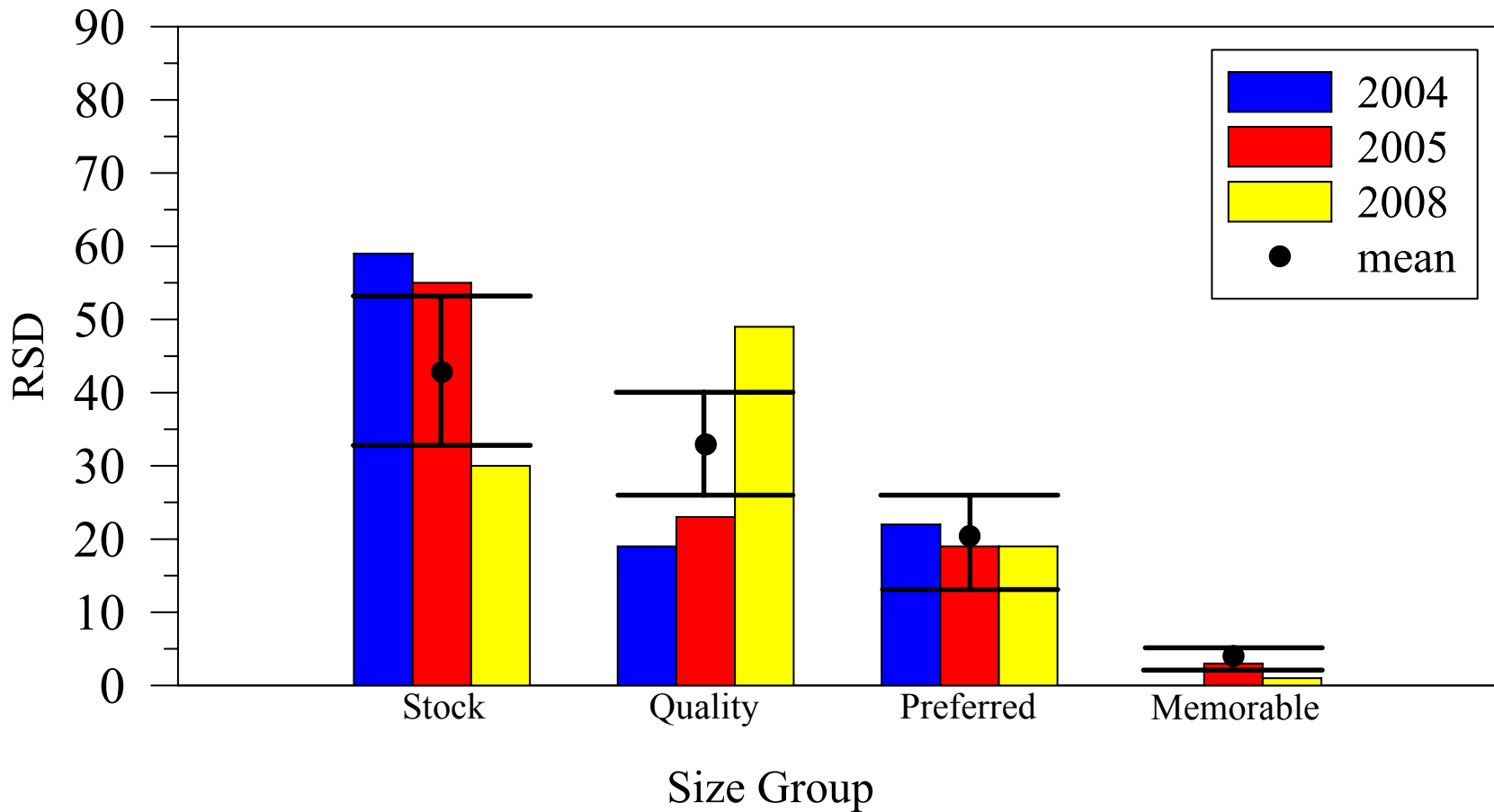


Figure 4. The relative stock density (RSD) and statewide mean of largemouth bass in Martin Reservoir, 2004, 2005, and 2008. The I-beam denotes the 25th and 75th percentiles of RSD values of largemouth bass, statewide.

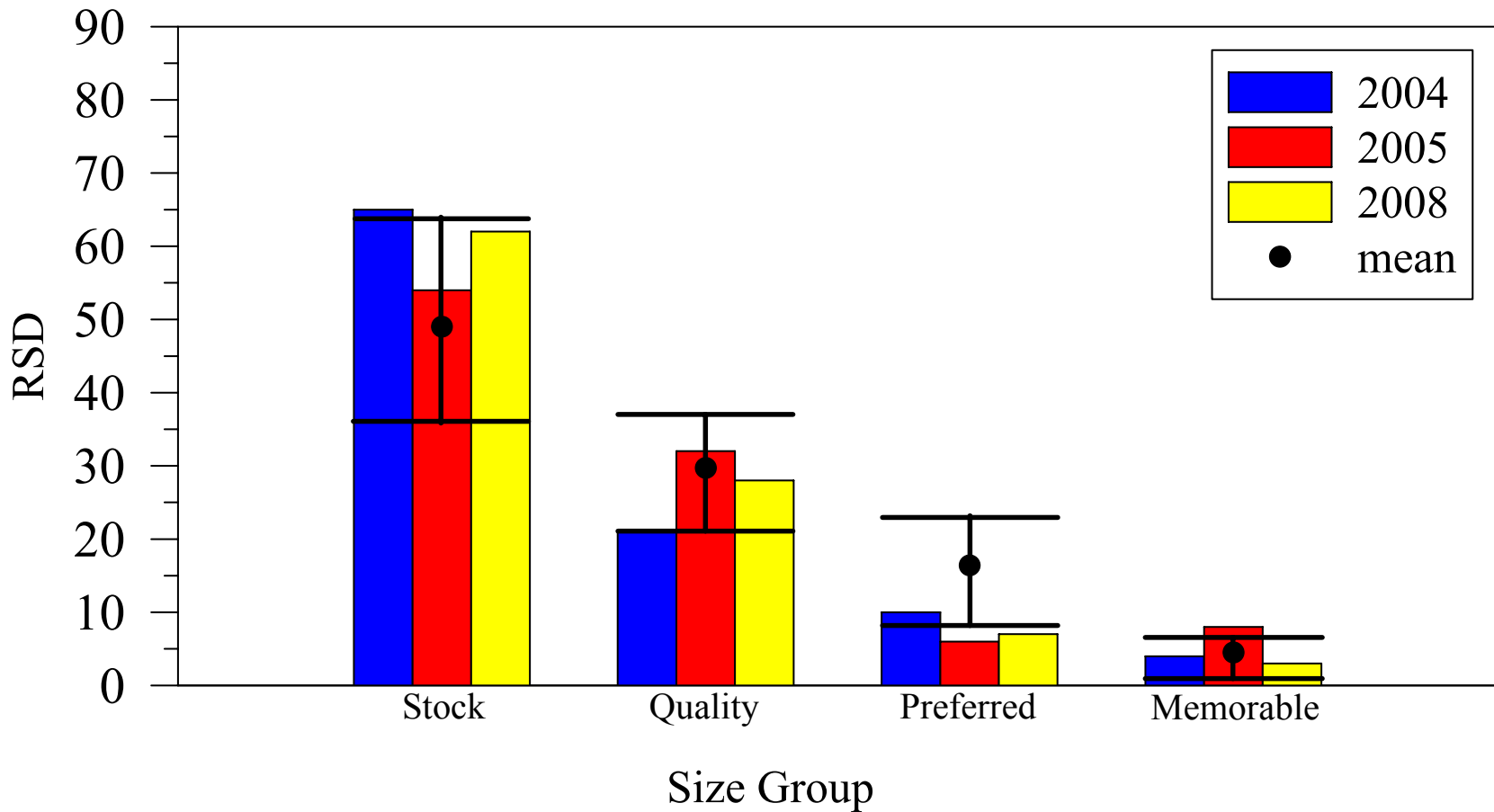


Figure 5. The relative stock density (RSD) and statewide mean of spotted bass in Martin Reservoir, 2004, 2005, and 2008. The I-beam denotes the 25th and 75th percentiles of RSD values of spotted bass, statewide.

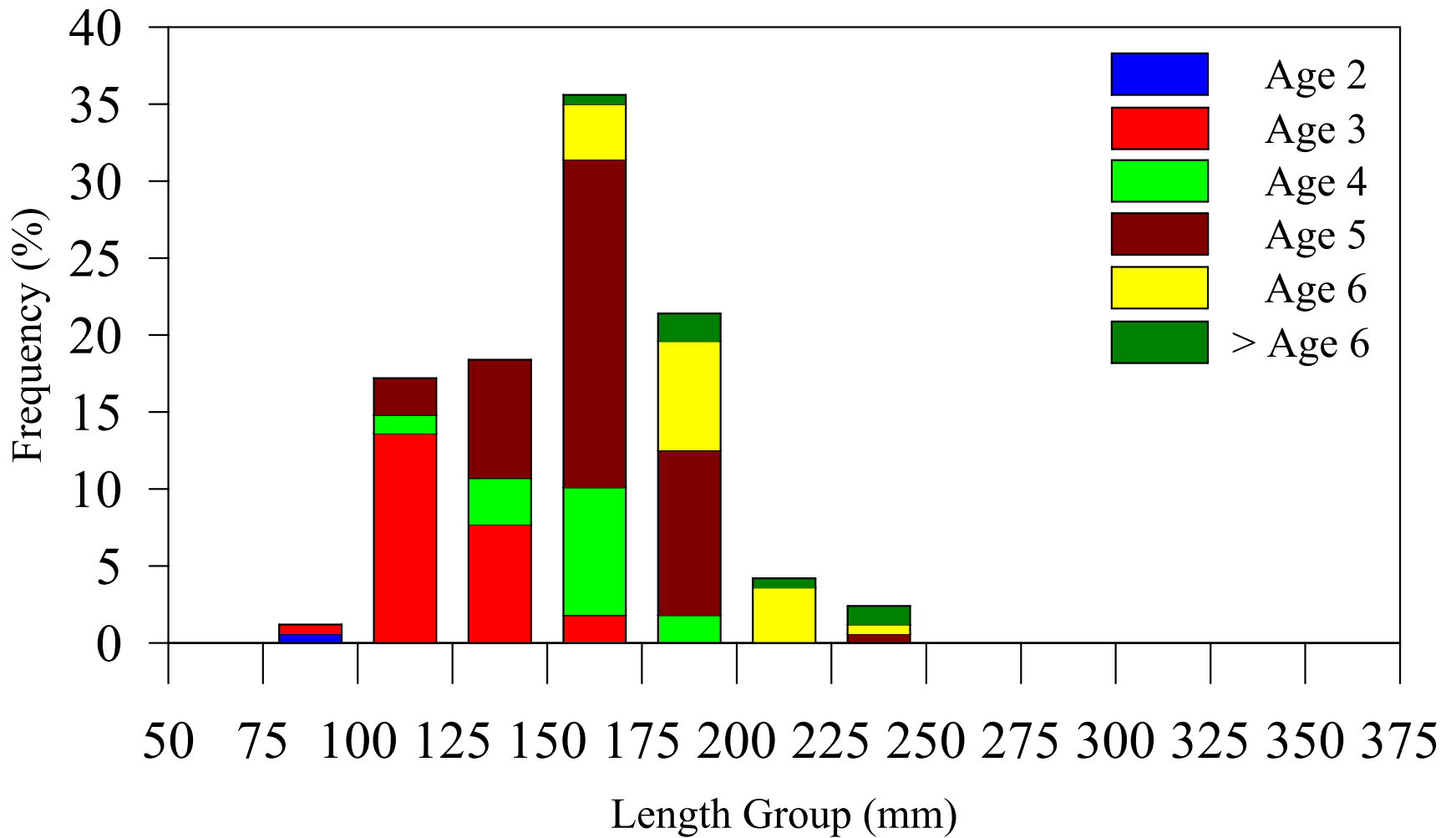


Figure 6. Length-at-age frequency of black crappie (N=169) collected by electrofishing from Martin Reservoir, spring 2008.

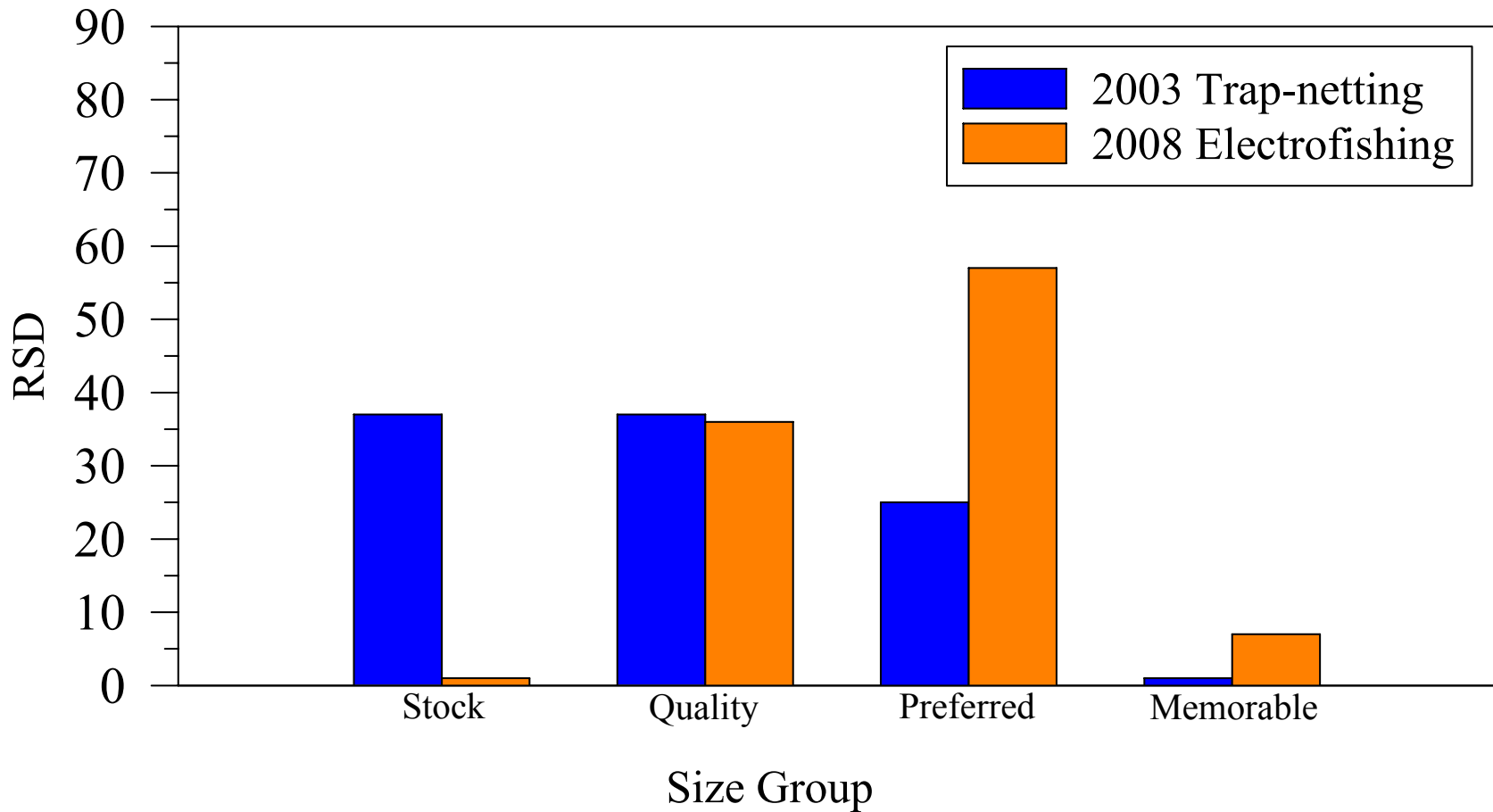


Figure 7. Relative stock density (RSD) of black crappie collected by 2003 trap-netting (N = 150) and 2008 electrofishing (N = 169) in Martin Reservoir.

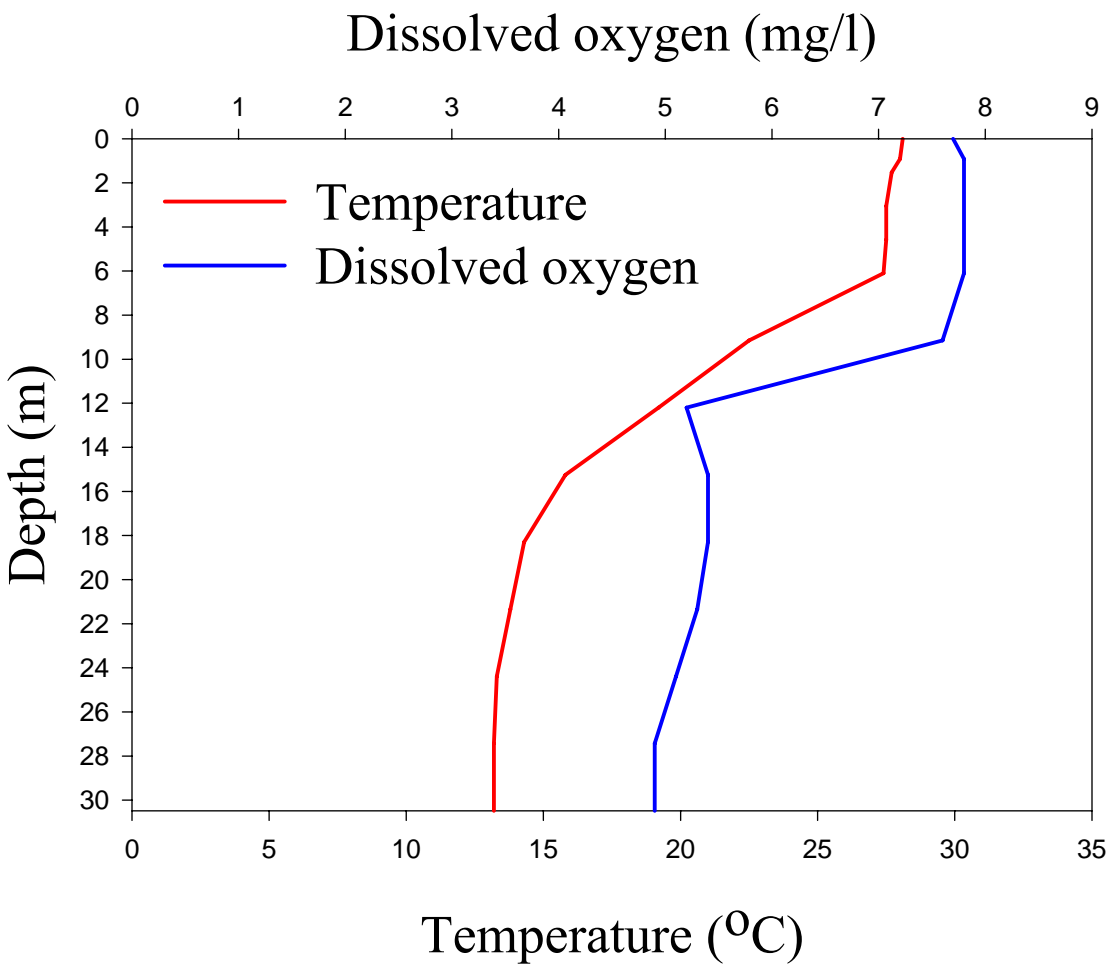


Figure 8. Temperature and dissolved oxygen profiles in Martin Reservoir forebay, July 2, 2008. Profiles taken by Alabama Power Company personnel.

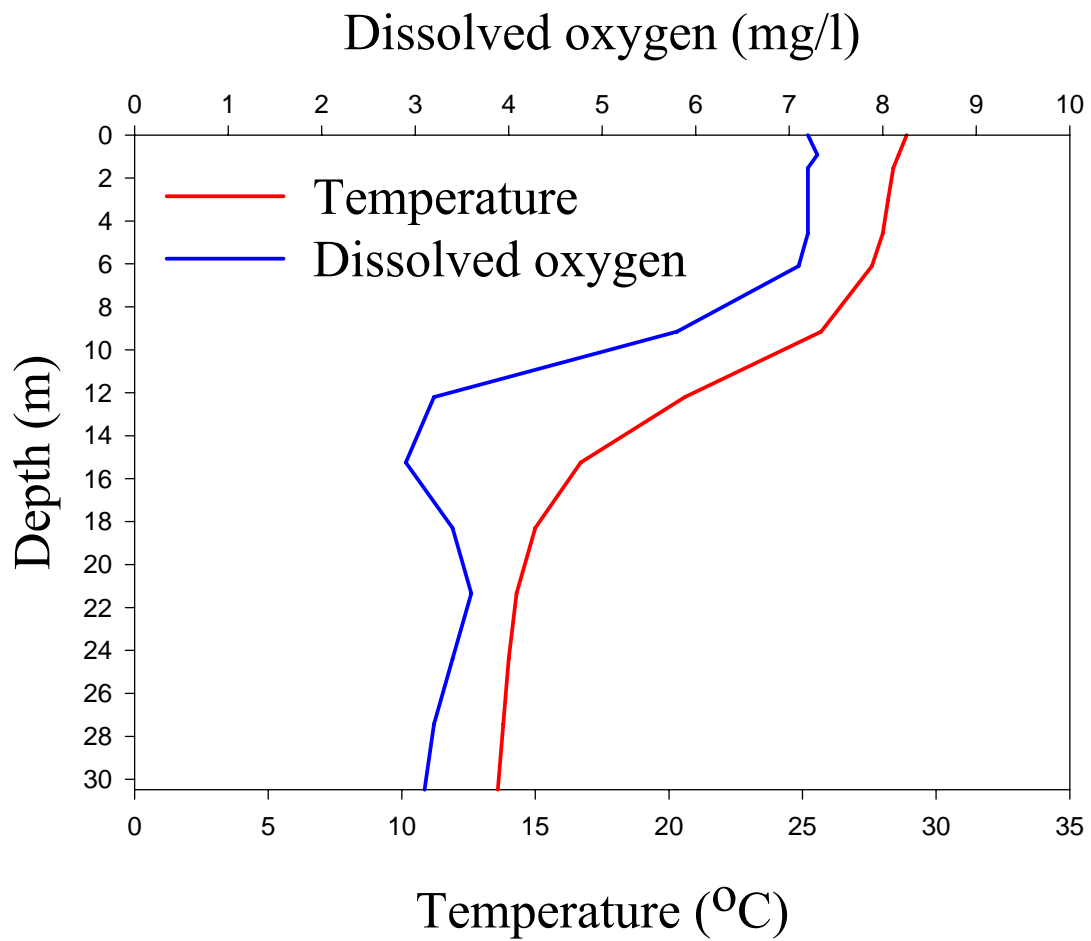


Figure 9. Temperature and dissolved oxygen profiles in Martin Reservoir forebay, August 18, 2008. Profiles taken by Alabama Power Company personnel.

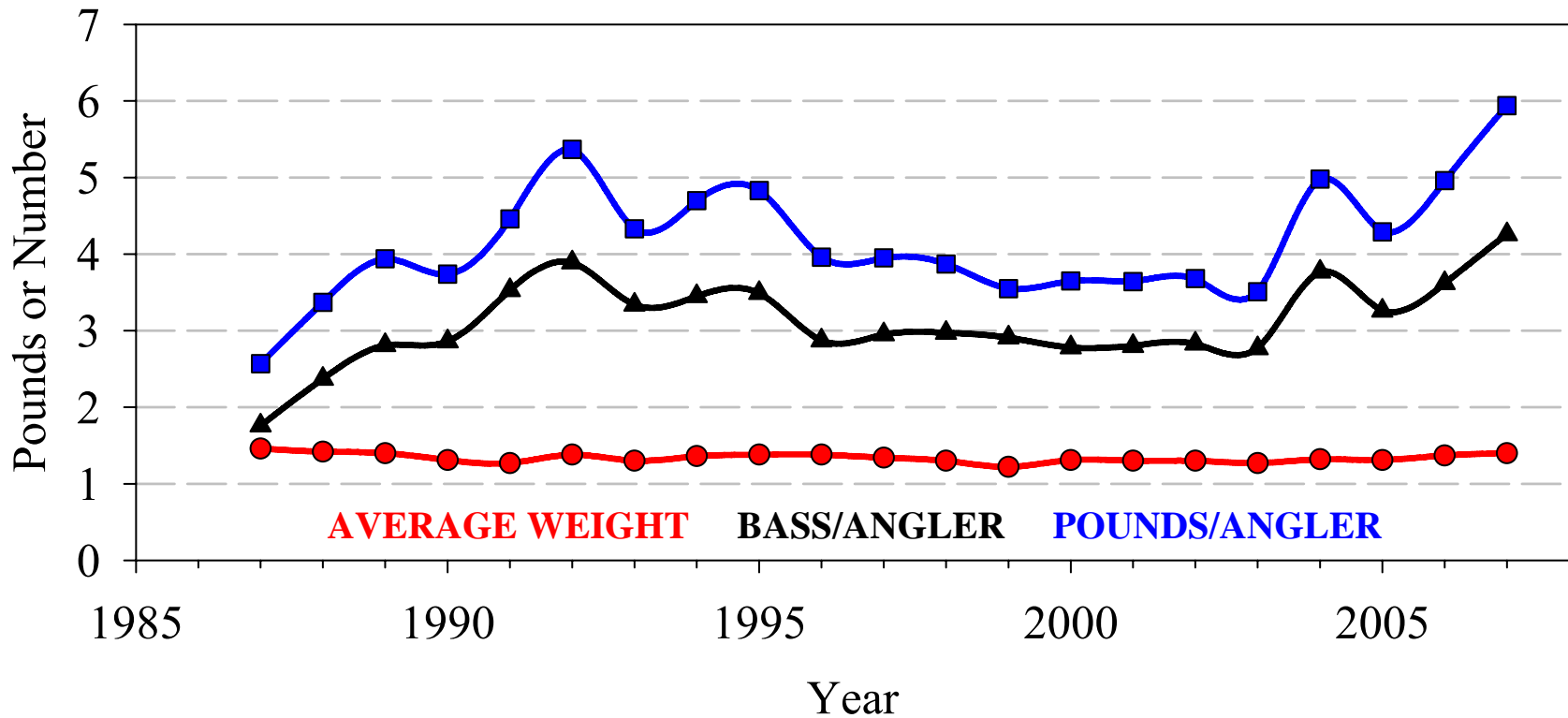


Figure 10. B.A.I.T. reported annual quality indicators for black bass in Martin Reservoir, 1985-2007 (Abernethy et al. 2008).