

**MITCHELL RESERVOIR
MANAGEMENT REPORT
FALL 2007**

Prepared by

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Introduction

Mitchell Reservoir is a 5,850 acre impoundment on the Coosa River east of Clanton, immediately downstream from the more popular Lay Reservoir. The largest tributary on this impoundment is Hatchet Creek, which is a principal crappie sampling location as well as a popular angling site. In recent years, Mitchell was previously sampled for crappie by fall trap-netting in 1994, 1997, 2000, and 2003 (Table 2). Both crappie species subsist in the Coosa River impoundments, but black crappie are distinctly the more dominant species. Crappie year class strength in this reservoir is extremely variable and angler catch rates follow this trend. A nine-inch minimum length limit for crappie is currently in place on this impoundment.

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

Crappie were collected via fall trap-netting and electrofishing according to the guidelines outlined in the Alabama Reservoir Management Manual (1999). Forty nights of trap-net effort from twenty-two separate sites (Figure 1) were exerted by District-IV personnel from December 4-6, 2007. Based on sampling efficiency data from previous reports (McHugh et al. 1995, McHugh et al. 1998, McHugh et al. 2001, Abernethy et al. 2004), nets were primarily concentrated in creeks and shallow flats away from the main river channel (Figure 1). Crappie were also collected via electrofishing on December 10, 2007 to supplement trap-net data and increase sample size. Total electrofishing effort was 2,942 seconds (0.817 hours) of pedal-down

time from twelve selected sites (Figure 1). Emphasis was placed on targeting shoreline areas with submerged woody structure since crappie are known to congregate at these location and therefore sampling success can be increased. All crappie summary statistics in this report, with the exception of growth data, are separated by gear type to reduce bias. Trap-netting typically selects for smaller fish, including young-of-the-year, whereas electrofishing samples are noticeably biased toward larger specimens (Figure 2).

Results and Discussion

The fall 2007 trap-netting sample consisted of only 38 total crappie (Table 2). Black crappie dominated the sample as only two white crappie were collected. Due to the small sample size, few inferences can be made about the crappie population based solely on trap-net data. The absence of young-of-year fish in these samples; however, could suggest a weak 2007 year-class. Young-of-the year crappie have been noticeably absent from Mitchell trap-net samples since the late 90's, with similar results being observed in other Coosa River impoundments such as Jordan (Abernethy et al. 2005), Logan Martin (Andress et al. 2007), Neely Henry (Andress et al. 2007), and Lay (Haffner et al. 2008). A very strong year-class of crappie was produced in 1996 and several moderate size year-classes have been produced in recent years (Tables 5 and 6). Strong year-classes during specific years are remarkably similar among several Coosa River impoundments indicating the immense influence of environmental and hydrological factors on crappie spawning success and survival. It should be noted that the increased Mitchell trap-net sample sizes achieved in 1994, 1997, and 2000 were principally due to the strong 1993 and 1996 year-classes (Table 6).

The fall electrofishing sample consisted of 131 total crappie, all of which were black crappie. White crappie have noticeably declined in abundance over the last several sampling seasons (Table 2) and this observation has also been noted in Lay Reservoir (Haffner et al. 2008). Several year-classes were well represented including fish produced each year from 2001 through 2005 (Table 4). Surprisingly, the strong 1996 year-class continued to be evident and comprised 5% of the total 2007 sample (Table 6). A valid mortality estimate could not be computed due to variable recruitment and inconsistent year-class strength. Poor recruitment of a specific year-class does not necessarily translate into reduced fishing success unless this phenomenon occurs for multiple successive years. This has not been the case in Mitchell Reservoir, as moderate to strong year-classes are typically produced every 3 or 4 years. Reservoir water levels and retention time can affect crappie year-class strength (Maceina and Stimpert 1998) and it is currently unknown how the severe drought of 2006 and 2007 will impact the crappie fishery. It is presumed that the effects of the drought may not be as evident in run-of-river type reservoirs, such as Mitchell, when compared to larger storage reservoirs such as Martin and Lewis Smith where water levels can fluctuate extensively.

The von Bertalanffy growth curve developed from the 2007 black crappie sample indicated that growth is excellent between the ages of 2 and 6 (Figure 5). Since young fish were not adequately represented in the fall samples, the time to recruit to 9-inches could not be accurately determined. Based on composite historical samples from Mitchell Reservoir, crappie reach this size sometime between their first and second year of life. Crappie growth in Alabama tends to be faster from the Tennessee and Coosa River systems when compared to other statewide drainages (Damon Abernethy, unpublished data).

Conclusions

Since recruitment is highly variable in Mitchell Reservoir, the 9-inch minimum length limit should be retained. The last strong year-class of crappie was produced in 1996; however, in recent years several moderate-sized year-classes have sustained the fishery. Sampling crappie with trap-nets has become progressively more difficult in Mitchell Reservoir (Table 2), although this is likely due to the lack of strong year-classes in recent years. Nevertheless, future consideration should be given to using fall electrofishing to augment or replace the trap-net sample due to the success achieved in 2007. Mitchell Reservoir should be resampled for crappie in 2010 according to reservoir program guidelines.

Literature Cited

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

Surface area	5,850 surface acres
Drainage area	9,827 square miles
Full pool elevation	311.9 feet-msl
Mean annual fluxuation	0.5 feet
Shoreline distance	147 miles
Shoreline development index	10.5
Mean depth	30 feet
Maximum depth	72 feet
Outlet depth	40 feet
Thermocline Depth	6-7 feet
Total dissolved solids	101 mg/l (ADEM 2005)
Chlorophyll-a	18.1 µg/l (ADEM 2005)
Morphoedaphic index	3.37 TDS/mean depth (Ryder 1965)
Growing season	220 frost free days (Jenkins 1967)
Year of Impoundment	1923

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

BLACK CRAPPIE

Year	Gear	Number Samples	Substock			RSD _{S-Q}				RSD _{Q-P}				RSD _{P-M}				RSD _{M-T}				RSD _T				Total			
			No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE		
1994	TN	60	37	0.62	34	50	0.83	46	69	27	0.45	25	87	23	0.38	21	91	9	0.15	8	98							146	2.43
1997	TN	20	41	2.05	33	42	2.10	34	69	47	2.35	38	89	25	1.25	20	94	9	0.45	7	96	1	0.05	1	106			165	8.25
2000	TN	40				3	0.08	3	83	30	0.75	31	88	43	1.08	44	93	19	0.48	20	96	2	0.05	2	108			97	2.43
2003	TN	60				6	0.10	21	81	2	0.03	7	85	6	0.10	21	86	14	0.23	50	86						28	0.47	
2007	TN	40				2	0.05	6	74	11	0.28	31	92	11	0.28	31	108	10	0.25	28	101	2	0.05	6	100			36	0.90
2007	EF	12				1	1.22	1	87	20	24.47	15	105	43	52.62	33	100	67	81.99	51	104						131	160.30	

WHITE CRAPPIE

Year	Gear	Number Samples	Substock			RSD _{S-Q}				RSD _{Q-P}				RSD _{P-M}				RSD _{M-T}				RSD _T				Total			
			No.	CPE	SSR	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE		
1994	TN	60	22	0.37	71	12	0.20	39	74	14	0.23	45	90	4	0.07	13	92	1	0.02	3	91							53	0.88
1997	TN	20	44	2.20	244	13	0.65	72	68	2	0.10	11	89	3	0.15	17	102										62	3.10	
2000	TN	40								5	0.13	71	88	2	0.05	29	96										7	0.18	
2003	TN	60								6	0.10	43	95	3	0.05	21	92	5	0.08	36	80						14	0.23	
2007	TN	40								2	0.05	100	90													2	0.05		

TABLE 3. Age composition and mean length of black crappie collected by trap-netting from Mitchell Reservoir, fall 2007.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
0	2007	0	0	0.00			
1	2006	4	11.1	0.10	214	13.1	77 - 226
2	2005	18	50.0	0.45	257	6.9	205 - 302
3	2004	6	16.7	0.15	313	6.1	293 - 330
4	2003	3	8.3	0.08	305	23.7	259 - 338
5	2002	1	2.8	0.03	343		
6	2001	3	8.3	0.08	368	19.2	332 - 398
7	2000	0	0.0	0.00			
8	1999	0	0.0	0.00			
9	1998	0	0.0	0.00			
10	1997	1	2.8	0.03	406		
Total		36	100.0	0.90			

TABLE 4. Age composition and mean length of black crappie collected by electrofishing from Mitchell Reservoir, fall 2007.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
0	2007	0	0	0.00			
1	2006	0	0	0.00			
2	2005	18	13.7	22.03	243	6.3	198 - 302
3	2004	26	19.8	31.82	285	4.3	232 - 318
4	2003	30	22.9	36.71	294	5.3	233 - 329
5	2002	11	8.4	13.46	308	10.0	248 - 366
6	2001	33	25.2	40.38	311	5.2	235 - 371
7	2000	3	2.3	3.67	327	8.0	318 - 343
8	1999	2	1.5	2.45	338	4.0	334 - 342
9	1998	0	0.0	0.00			
10	1997	1	0.8	1.22	330		
11	1996	7	5.3	8.57	333	4.7	312 - 348
Total		131	100.0	160.30			

TABLE 5. Black crappie CPUE (net-nights) by year-class for fall trap-netting samples collected from Mitchell Reservoir.

Year Class	Collection Year				
	1994 (N = 146)	1997 (N = 165)	2000 (N = 97)	2003 (N = 28)	2007 (N = 36)
2007					
2006					0.10
2005					0.45
2004					0.15
2003				0.03	0.08
2002					0.03
2001				0.28	0.08
2000				0.05	
1999			0.48	0.05	
1998			0.10		
1997			0.03	0.03	0.03
1996		7.70	1.78	0.03	
1995		0.10			
1994	0.37	0.05			
1993	1.53	0.30	0.05		
1992	0.33	0.05			
1991	0.03				
1990	0.17	0.05			
Totals	2.43	8.25	2.43	0.47	0.90

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

Year Class	Collection Year					
	1994(T) (N = 146)	1997(T) (N = 165)	2000(T) (N = 97)	2003(T) (N = 28)	2007(T) (N = 36)	2007(E) (N = 131)
2007						
2006					11%	
2005					50%	14%
2004					17%	20%
2003				4%	8%	23%
2002					3%	8%
2001				61%	8%	25%
2000				11%		2%
1999			20%	11%		2%
1998			4%			
1997			1%	7%	3%	1%
1996		93%	73%	7%		5%
1995		1%				
1994	15%	1%				
1993	63%	4%	2%			
1992	14%	1%				
1991	1%					
1990	7%	1%				
Totals	100%	100%	100%	100%	100%	100%

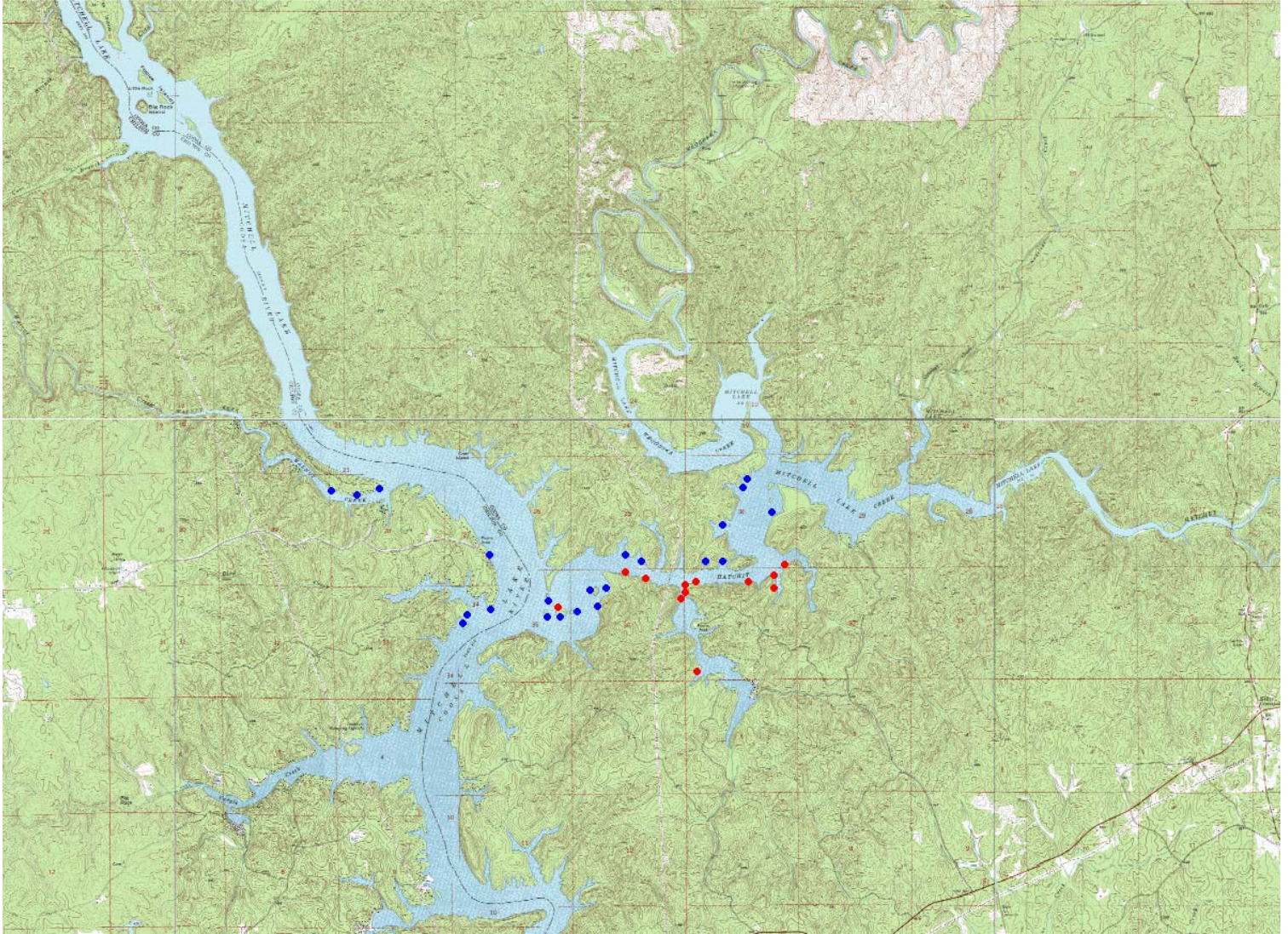


FIGURE 1. Map of Mitchell Reservoir with fall 2007 sampling locations. Trap-netting sites are designated in blue and electrofishing sites in red.

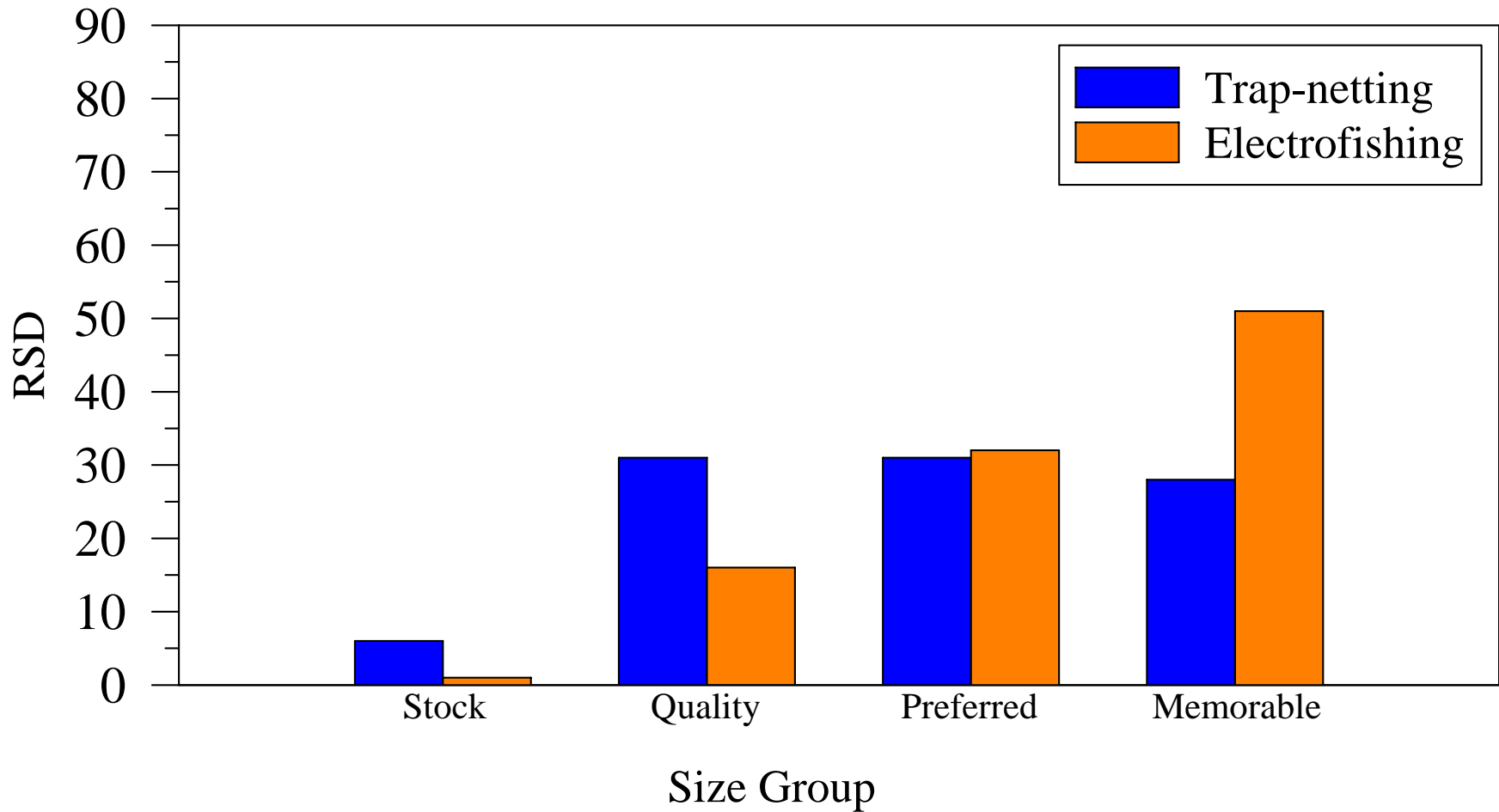


FIGURE 2. Relative stock density (RSD) of black crappie collected by trap-netting (N = 36) and electrofishing (N = 131) in Mitchell Reservoir, fall 2007.

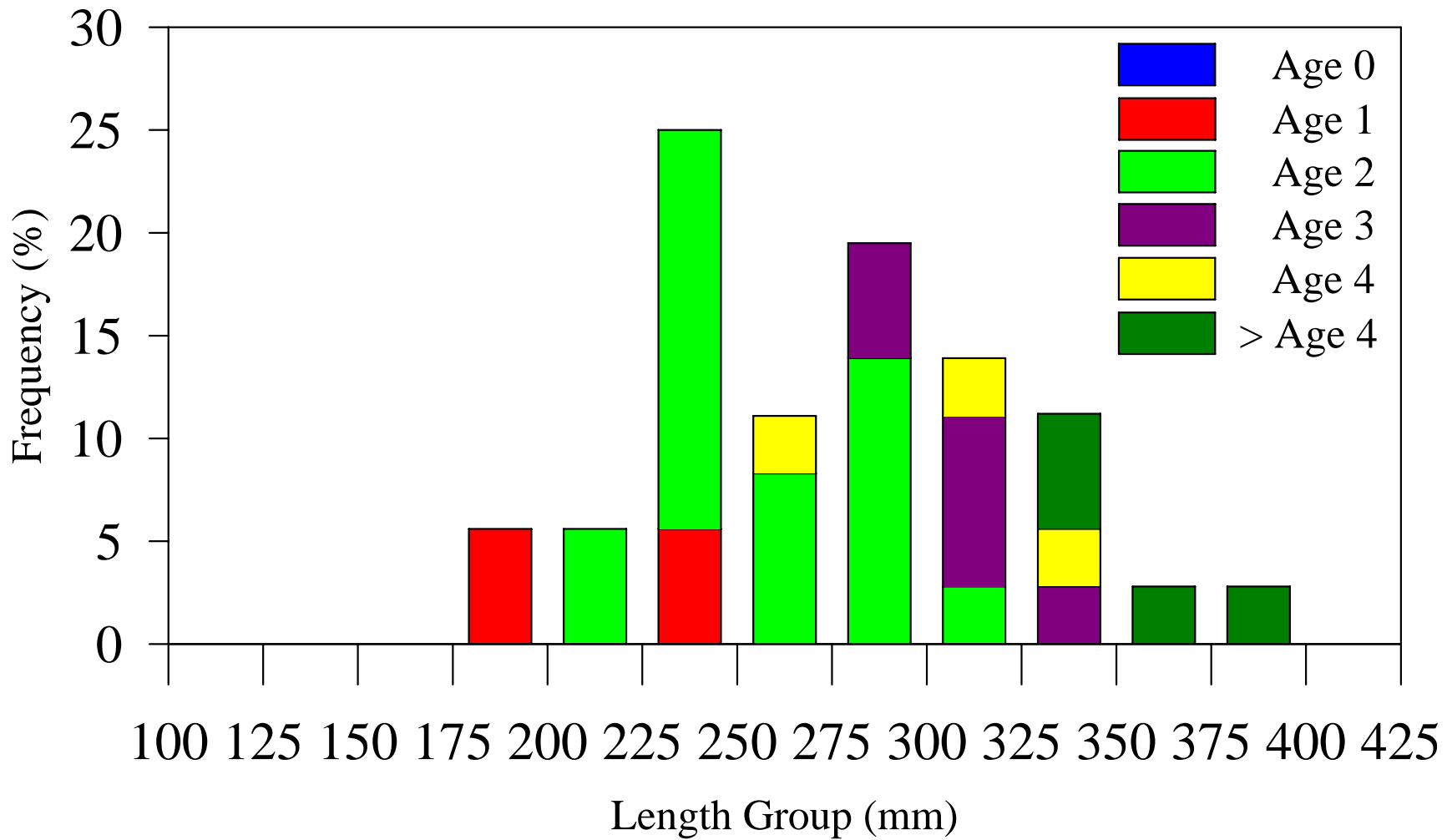


FIGURE 3. Length-at-age frequency of black crappie (N=36) collected by trap-netting from Mitchell Reservoir, fall 2007.

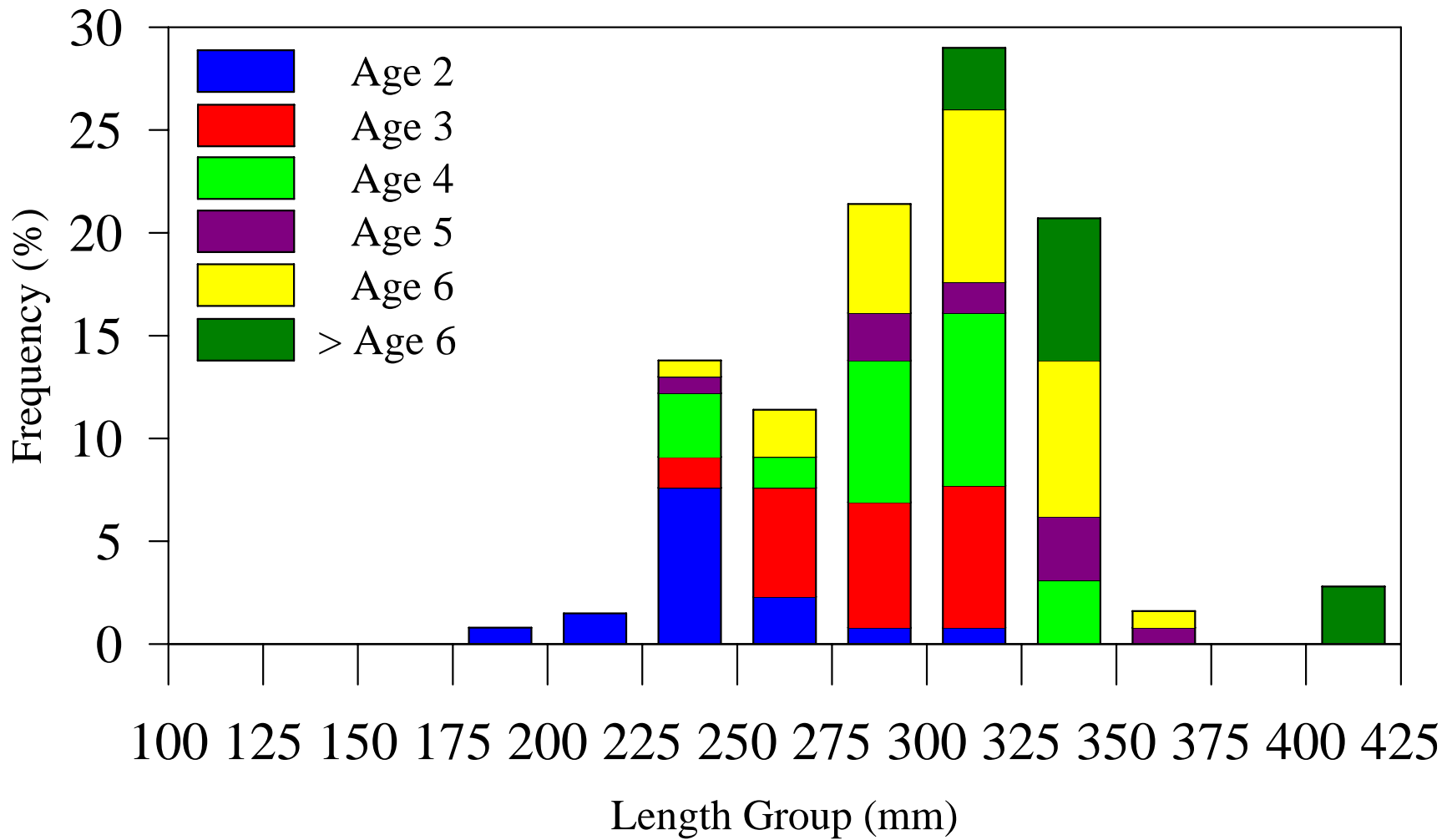


FIGURE 4. Length-at-age frequency of black crappie (N=131) collected by electrofishing from Mitchell Reservoir, fall 2007.

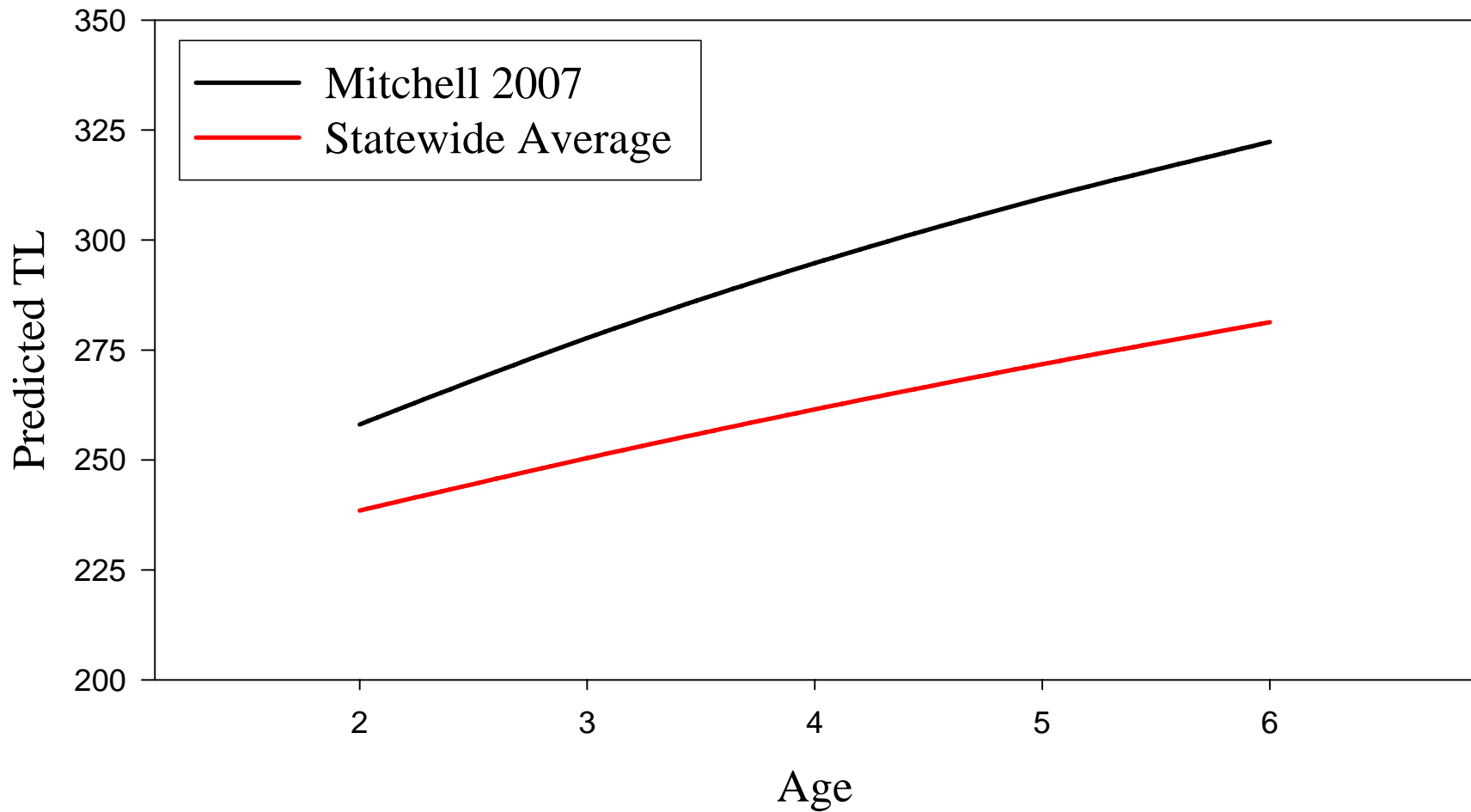


FIGURE 5. Predicted total length-at-age from the von Bertalanffy growth equation for black crappie collected in Mitchell Reservoir 2007 (N = 167) versus the statewide average.