MITCHELL RESERVOIR
MANAGEMENT REPORT

SPRING 2008

Prepared by

R. Graves Lovell
District Fisheries Biologist

J. Chris Greene
District Fisheries Supervisor

and

Rodney A. McVay
District Fisheries Biologist Aide

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

September 1, 2008

Introduction

Mitchell Reservoir is a 5,850-acre impoundment (Table 1) on the Coosa River east of Clanton, immediately downstream from Lay Reservoir. Research has been conducted according to the management program guidelines (Alabama Reservoir Management Manual 1999). Mitchell Reservoir was previously sampled in 1994, 1999, 2001, and 2004. Each of these collections revealed excellent fisheries of both largemouth and spotted bass. The last assessment in 2004 suggested a small, but steady decrease in overall bass abundance since 1987 (Abernethy et al. 2004). There is no minimum size limit for black bass in Mitchell Reservoir.

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

Methods

Mitchell Reservoir was sampled during spring 2008 by electrofishing in order to assess largemouth and spotted bass populations. Ten new sites with preferred bass habitat were systematically chosen such that the sample would represent the entire reservoir (Figure 1). These sites were sampled for 30 minutes each on April 7 through 11.

Total length (mm) and weight (g) were recorded for all largemouth and spotted bass collected. 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 to increase aging accuracy and viewed with a compound microscope (Maceina 1988).

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

Results and Discussion

The spring 2008 bass sample from Mitchell Reservoir included 221 largemouth bass representing 10 year-classes (Table 4) and 173 spotted bass representing 9 year-classes (Table 5). Catch rates of largemouth bass was only 28 percent higher than spotted bass, at 44.2/hour compared to 34.6/hour (Table 3). Sample catch rates of largemouth bass have typically been similar or slightly higher than spotted bass over the last 20 years in Mitchell Reservoir (Abernethy et al. 2004). The only exception to this observation was the 1994 sample where spotted bass were collected at a 71 percent higher rate than largemouth. This was likely a result of an unusually strong 1993 year-class of spotted bass (McHugh et al. 1995). Abernethy et al. (2004) documented an overall bass catch rate of 67 per hour in 2004, which confirmed a steady decrease since 1991. The total bass catch rate in 2008 had increased to 79 per hour. This could be a reflection of new sample sites with regard to habitat preference; however, angler catch rates in BAIT-participating tournaments were higher in 2007 than ever recorded (Abernethy 2008).

Growth of largemouth and spotted bass in 2008 was faster than average compared to other Alabama reservoirs. Abernethy et al. (2004) reported the average relative weight

of spotted bass was lower in 2004 than normal in response to lower shad densities. However, body condition of both largemouth and spotted bass in 2008 was relatively high as is typical with other Coosa River impoundments. Furthermore, PSD values indicate that the relative abundance of both species quality size and greater was higher in 2008 compared to 2004 (Table 3).

Variable catch rates among year-classes prevented an accurate estimation of largemouth bass annual mortality. An annual mortality rate for spotted bass was calculated to be 60% between the ages of 3 and 7 years (Figure 6). However, this estimate is subject to variability since larger spotted bass can be noticeably absent in reservoir electrofishing samples. The oldest largemouth bass collected in this sample was 10 years and the oldest spotted bass was 9 years (Tables 4 and 5).

Based on overall quality of bass fishing, Mitchell Reservoir ranked 4th of 22 reservoirs that had 5 or more tournament reports in the 2007 BAIT program (Abernethy 2008). The relatively high catch rate of quality-size bass was largely responsible for this high ranking. The average size of the bass caught was higher in 2007 than it had been in previous years (Figure 7).

It has been suggested that bass populations in Mitchell Reservoir may benefit from a minimum length limit to protect young fish after a poor recruitment year. However, Abernethy et al. (2004) reported that angler harvest was far too low for any benefit to be gained from a minimum length limit. Furthermore, BAIT data compiled for Mitchell Reservoir shows that angler catch rates of bass have been consistently high for the last 20 years with no size limit at all (Figure 6).

Mitchell Reservoir has historically supported a popular white bass fishery, especially during spawning runs in the upper end of the Hatchet Creek arm. These spawning areas have become inundated with heavy siltation over the past 15 to 20 years. White bass in Mitchell and Jordan Reservoirs were found to exhibit variable recruitment similar to crappie, where high discharge rates during pre-spawn typically stimulate a strong year-class (Lovell and Maceina, 2002). This study also determined that a 12-inch minimum length limit placed on white bass in the lower Coosa impoundments could potentially increase yield in weight if exploitation was over 30 percent. Future sampling consideration should be given to white bass collections in order to monitor population status. Efforts should also be made to determine angler demand for a white bass fishery and to estimate exploitation rates.

Conclusions

- Mitchell reservoir should be sampled again in 3 to 4 years according to the Reservoir Management Program.
- There is no sound reason to establish a minimum length limit on the black bass fishery. Angler harvest is far too low to have an impact on the fishery. Furthermore, catch rates of black bass have been consistently high for the last 20 years with no size limit.
- Collecting white bass during standard spring sampling should be considered to monitor their population status. Continued study is needed to determine angler demand for white bass and an estimate of exploitation.
- Hybrid striped bass stocking should continue at the rate of 6 per acre annually.

Literature Cited

Abernethy, D.L. 2008. Bass anglers information team 2007 annual report. Alabama Department of Conservation and Natural Resources, Montgomery.

Abernethy, D.L., J.C. Greene, and R. McVay. 2004. Mitchell Reservoir Management Report 2004. Alabama Department of Conservation and Natural Resources, Montgomery.

Alabama Reservoir Data Collections. 2007. Alabama Department of Environmental Management, Montgomery.

Alabama Reservoir Management Program. 1999. 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 Symposium. American Fisheries Society, Southern Division, Bethesda, Maryland.

Lovell R.G, Maceina M.J. 2002. Population Assessment and Minimum Length Limit Evaluations for White Bass in Four Alabama Reservoirs. North American Journal of Fisheries Management: Vol. 22, No. 2 pp. 609-619.

Maceina, M.J. 1988. Simple grinding procedure to section otoliths. North American Journal of Fisheries Management 8:141-143.

McHugh, J.J., D.L. Higginbotham, and T. Madigan. 1995. Mitchell Reservoir Management Report 1994. 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. 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
Total dissolved solids	66	mg/L (ADEM 2007)
Chlorophyll-a	23.46	µg/L (ADEM 2007)
Morphoedaphic index	2.2	TDS/mean depth (ft.) (Ryder 1965)
Growing season	220	frost free days (Jenkins 1967)
Date of Impoundment	1923	

TABLE 2. Non-target species observed during routine sampling of Mitchell Reservoir, spring 2008.

Species
Bluegill
Black Crappie
Blacktail Shiner
Channel Catfish
Common Carp
Freshwater Drum
Gizzard Shad
Golden Shiner
Green Sunfish
Southern Brook Lamprey
Longear Sunfish
Longnose Gar
Redear Sunfish
River Redhorse
Spotted Gar
Spotted Sucker
Threadfin Shad
Warmouth
Yellow Bass

TABLE 3. Relative stock density (RSD), catch per hour (CPH), substock ratio (SSR), and relative weight (Wr) of largemouth bass and spotted bass collected with electrofishing gear from Mitchell Reservoir, 1994-2008.

LARGEMOUTH BASS

	No. of		Substock			RSD S-Q				RSD Q-P				RSD P-M				RSD M-T				RSD T				Total	
Year	Samples	PSD	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	6	60	6	2.0	6	40	13.3	40	97	29	9.6	29	100	25	8.3	25	97	6	2.0	6	93					106	35.3
1997	6	85	16	5.3	12	21	7.0	15	91	65	21.6	47	92	50	16.6	36	91	1	0.3	1	93					153	51.0
2001	5	82	11	4.4	10	20	8.0	18	88	57	22.8	51	87	31	12.4	28	88	3	1.2	3	94					122	48.8
2004	10	76	35	7.0	21	40	8.0	24	86	53	10.6	32	88	66	13.2	40	89	8	1.6	5	96					202	40.4
2008	10	88	39	7.8	21	22	4.4	12	95	73	14.6	40	92	80	16.0	44	92	7	1.4	4	87					221	44.2
LAKE AVERAGE		78		5.3	14		8.1	22	91		15.8	40	92		13.3	34	91		1.3	4	93						43.9

SPOTTED BASS

	No. of		Substock			RSD S-Q				RSD Q-P				RSD P-M				RSD M-T				RSD T				Total	
Year	Samples	PSD	No.	CPH	SSR	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH	Pct.	Wr	No.	CPH
1994	5	59	13	5.2	13	41	16.4	41	105	24	9.6	24	107	28	11.2	28	105	6	2.4	6	107	1	0.4	1	104	113	45.2
1997	6	88	22	7.3	21	13	4.3	12	102	20	6.7	19	102	54	18.0	51	104	18	6.0	17	105	0	0	0		127	42.3
2001	7	77	3	0.9	3	24	6.9	23	97	38	10.9	36	98	29	8.3	28	100	14	4.0	13	108	0	0	0		108	30.9
2004	10	74	13	2.6	11	31	6.2	26	82	49	9.8	41	86	19	3.8	19	84	21	4.2	18	83	0	0	0		133	26.6
2008	10	77	18	3.6	12	36	7.2	23	105	43	8.6	28	108	58	11.6	37	108	18	3.6	12	103	0	0	0		173	34.6
LAKE AVERAGE		75		3.9	12		8.2	25	98		9.1	30	100		10.6	33	100		4.0	13	101		0.1	0	104		35.9

TABLE 4. Age composition and mean length of largemouth bass collected from Mitchell Reservoir, spring 2008.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
1	2007	42	19.0	8.4	154.7	5.0	90-225
2	2006	44	19.9	8.8	297.5	5.4	169-348
3	2005	56	25.3	11.2	364.8	3.5	315-434
4	2004	25	11.3	5.0	409.6	5.7	348-459
5	2003	36	16.3	7.2	423.2	5.2	368-491
6	2002	7	3.2	1.4	462.9	14.4	410-519
7	2001	4	1.8	0.8	483.8	21.4	423-517
8	2000	4	1.8	0.8	514.8	12.4	482-542
9	1999	1	0.5	0.2	469.0	-	469
10	1998	2	0.9	0.4	531.5	39.5	492-571
Total		221	100.0	44.2			

TABLE 5. Age composition and mean length of spotted bass collected from Mitchell Reservoir, spring 2008.

Annulus	Year Class	Number	Percent	CPE	Mean Length	Standard Error	Length Range
1	2007	17	9.8	3.4	128.5	3.8	110-167
2	2006	53	30.6	10.6	255.4	5.4	172-338
3	2005	55	31.8	11.0	355.6	3.4	297-420
4	2004	22	12.7	4.4	401.8	4.7	327-438
5	2003	18	10.4	3.6	429.9	5.5	391-464
6	2002	3	1.7	0.6	414.3	22.7	369-440
7	2001	1	0.6	0.2	466.0	-	-
8	2000	2	1.2	0.4	456.5	3.5	453-460
9	1999	2	1.2	0.4	464.0	10.0	454-474
Total		173	97.7	33.8			

TABLE 6. Mean length-at-age for largemouth bass and spotted bass collected from Mitchell Reservoir from 1994-2008.

	Largemouth Bass					Spotted Bass				
	1994	1997	2001	2004	2008	1994	1997	2001	2004	2008
Age-1	222	108	145	141	155	122	92	141	117	129
Age-2	285	296	288	255	298	260	279	273	250	255
Age-3	340	352	355	352	365	333	359	344	324	356
Age-4	403	395	401	422	410	398	409	387	391	402

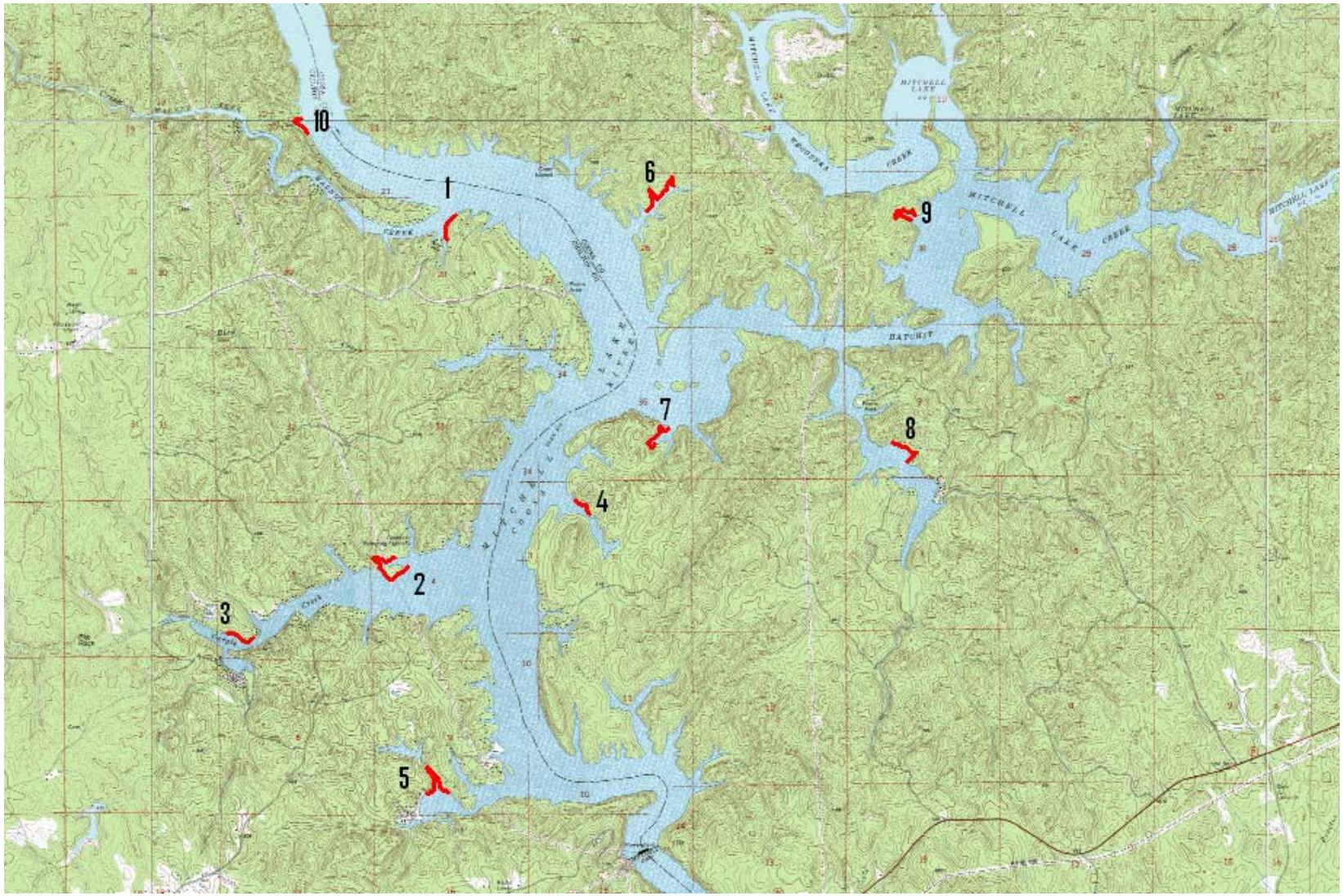

Figure 1. Mitchell Reservoir spring 2008 electrofishing sites.

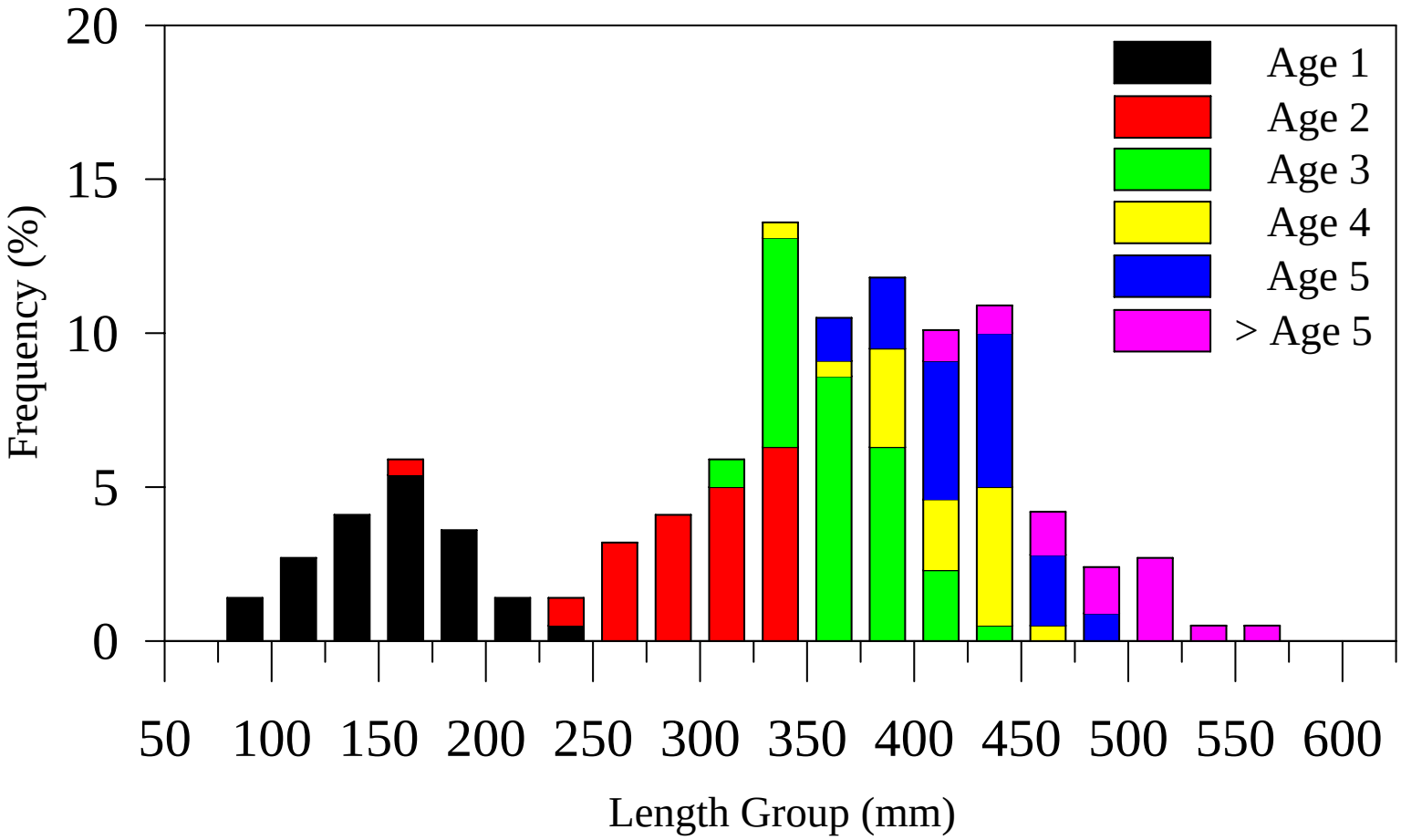

Figure 2. Length-at-age frequency of largemouth bass (N=221) collected from Mitchell Reservoir, spring 2008.

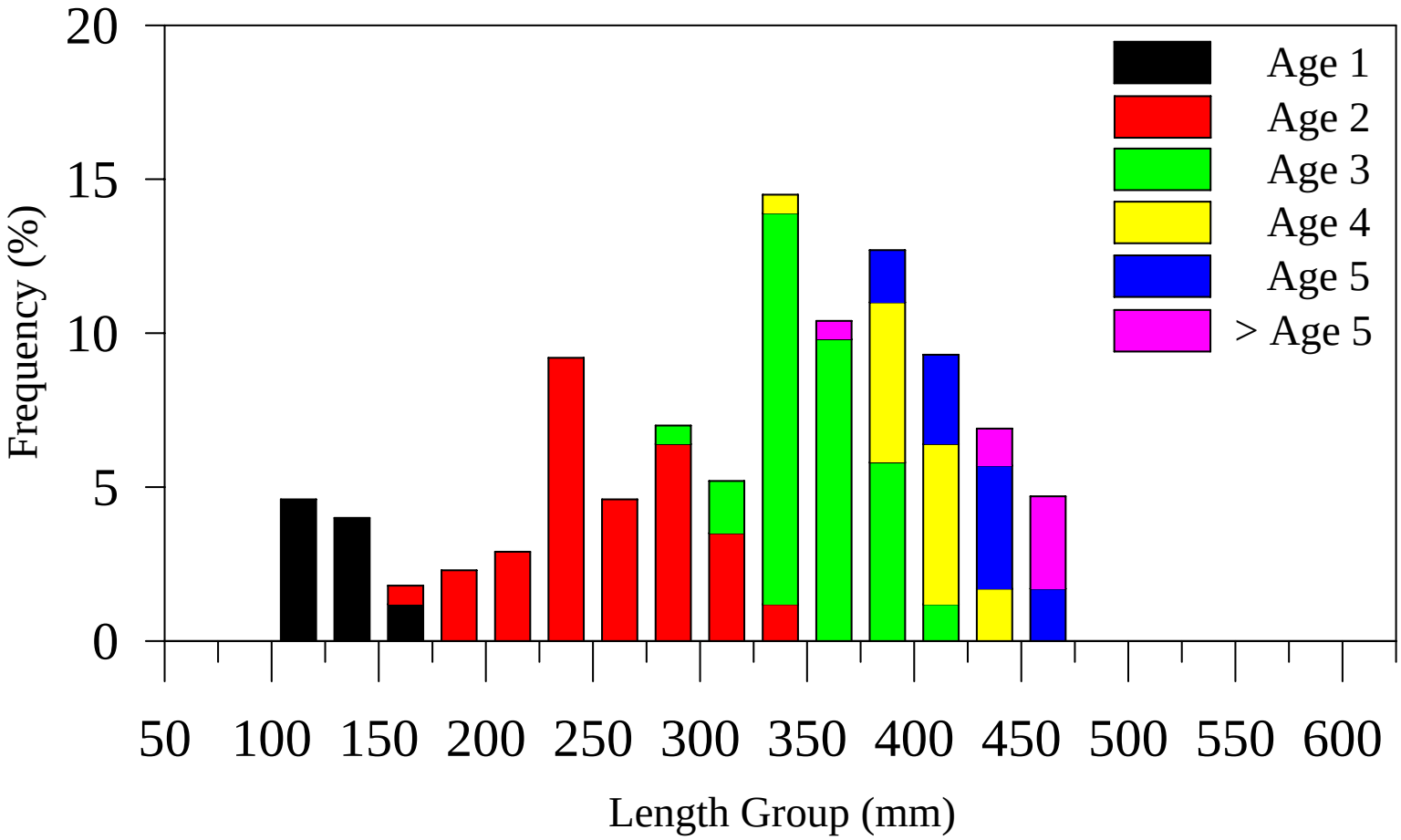

Figure 3. Length-at-age frequency of spotted bass (N=173) collected from Mitchell Reservoir, spring 2008.

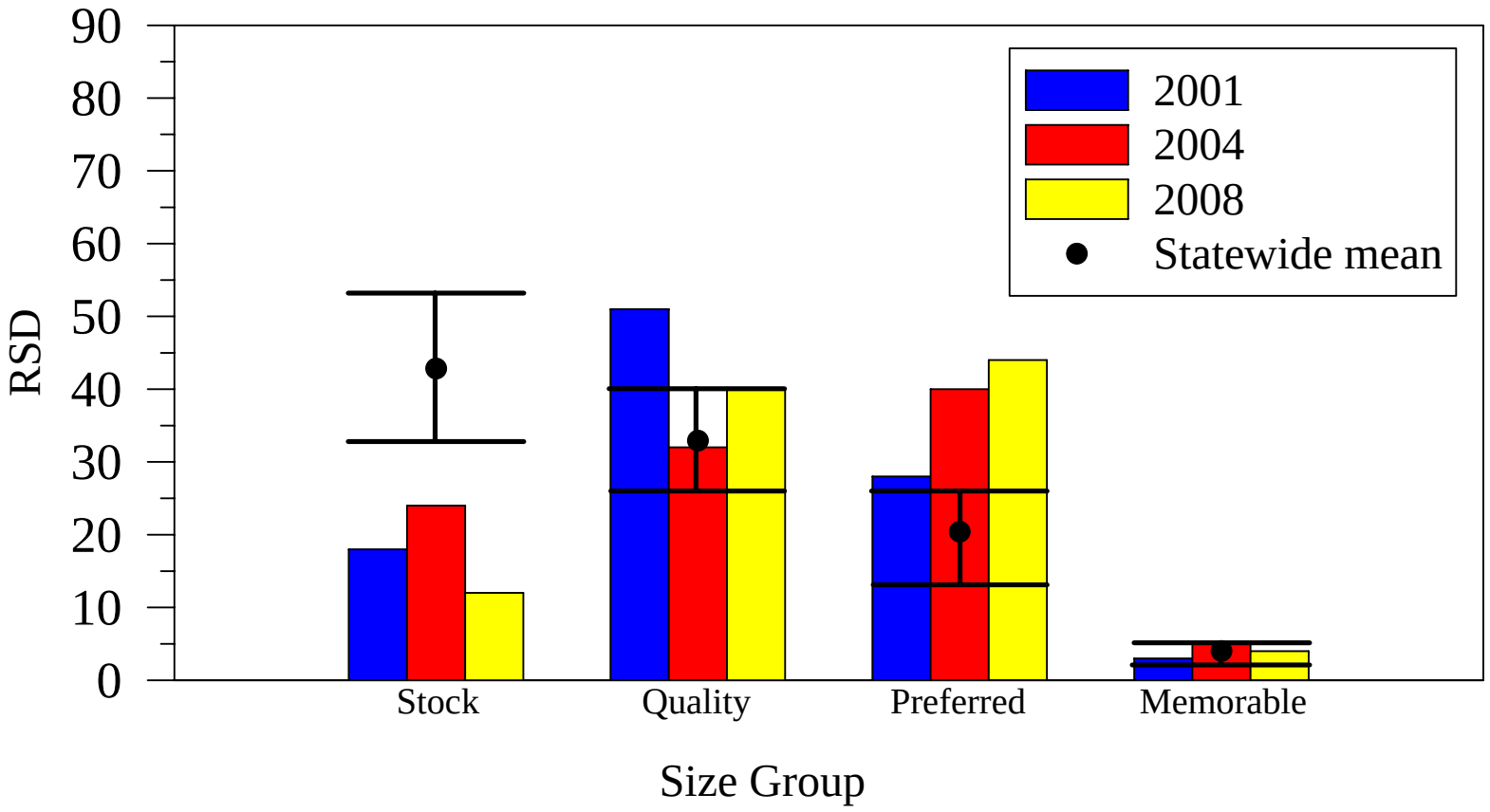

Figure 4. Relative stock density (RSD) and statewide means of largemouth bass in Mitchell Reservoir, spring 2001, 2004, and 2008. The I-beam denotes the 25th and 75th percentiles of RSD values of largemouth bass, statewide.

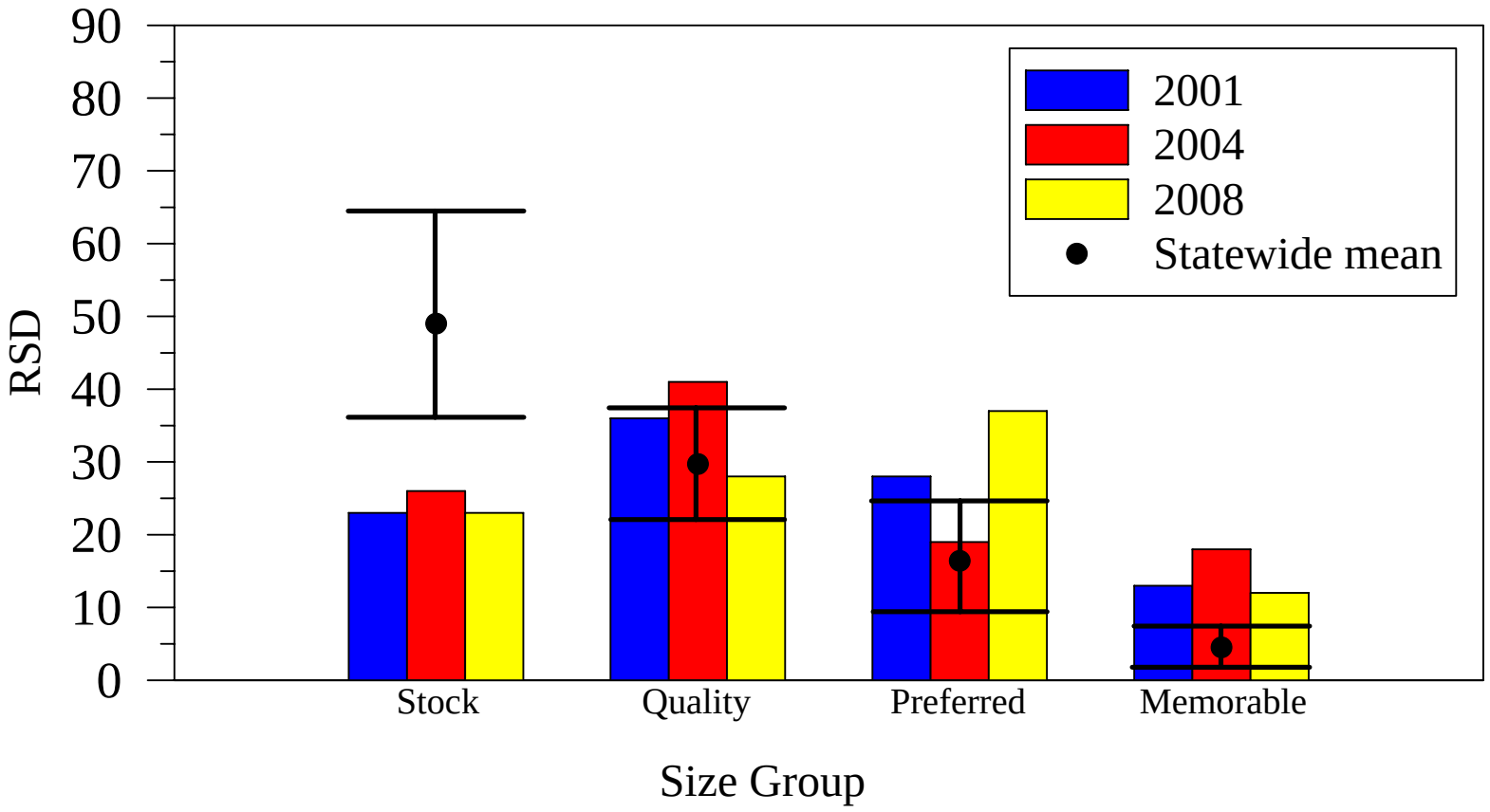

Figure 5. Relative stock density (RSD) and statewide means of spotted bass in Mitchell Reservoir, spring 2001, 2004, and 2008. The I-beam denotes the 25th and 75th percentiles of RSD values of spotted bass, statewide.

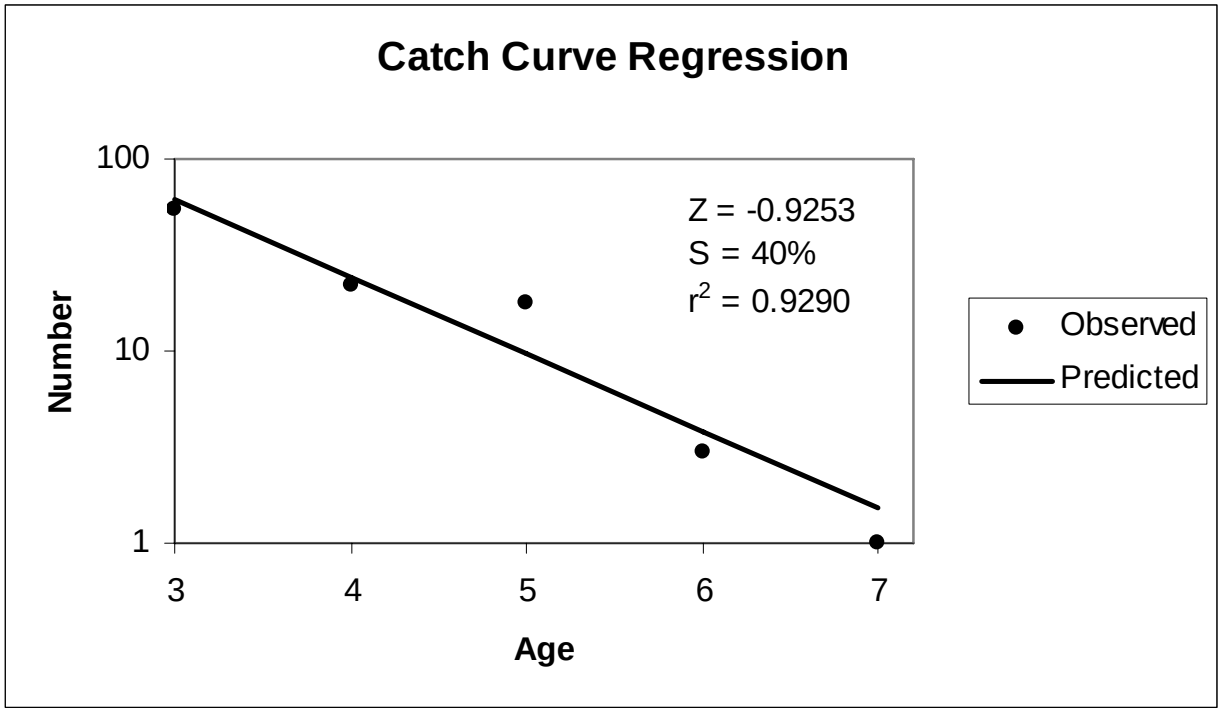

Figure 6. Catch-curve analysis of spotted bass ages 3 through 7 in Mitchell Reservoir, spring 2008.

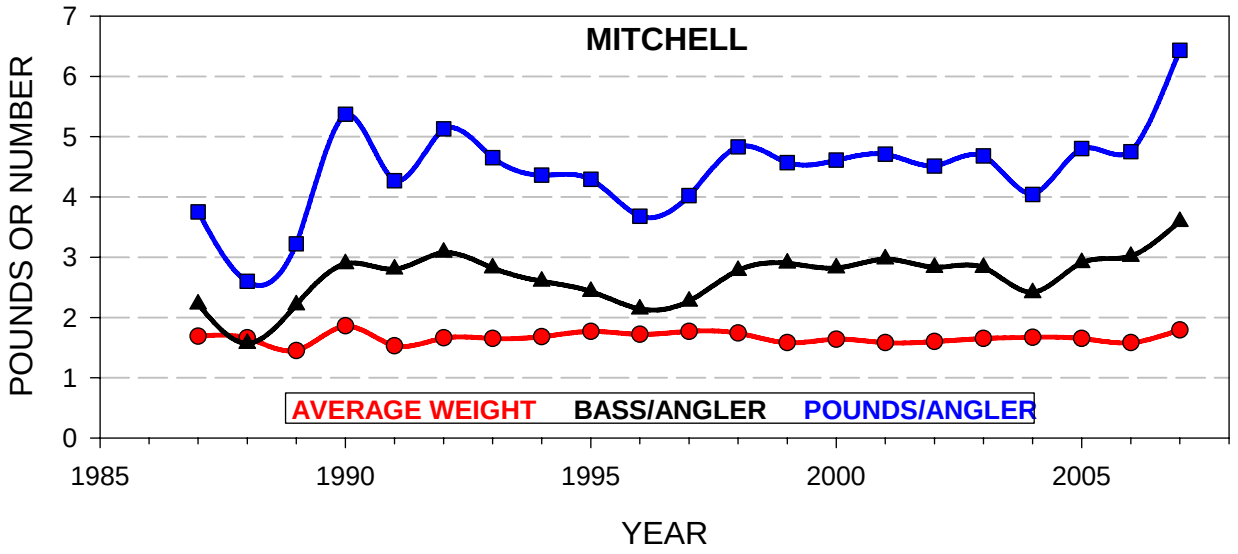

Figure 7. Average bass weight, bass per angler, and pounds per angler caught during bass club tournaments on Mitchell Reservoir, 1987-2007 (Abernethy 2008).

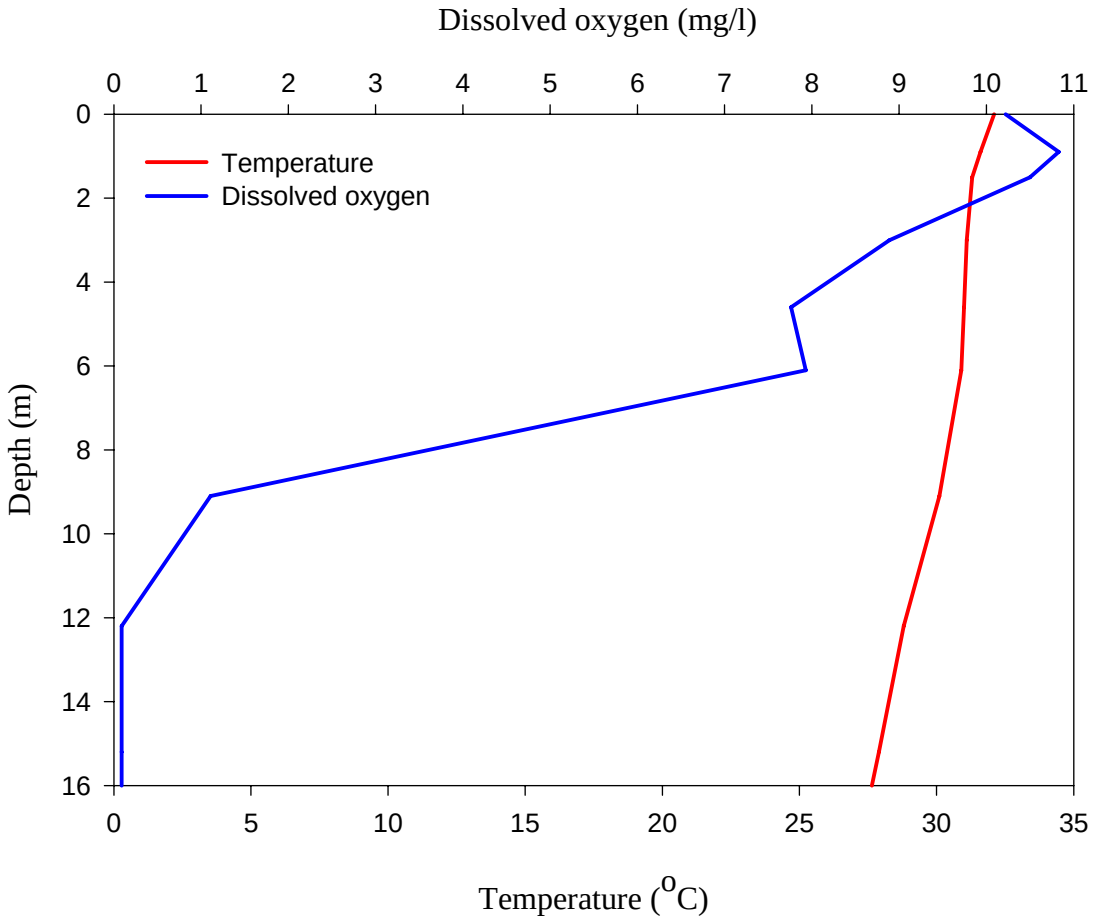

Figure 8. Temperature and dissolved oxygen profiles in Mitchell Reservoir forebay, August 11, 2008.