SMITH RESERVOIR CRAPPIE MANAGEMENT REPORT

FALL 2006

Prepared By

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Introduction

The reservoir management objective for Smith Reservoir is to collect baseline biological data on the important sport fish. Reservoirs are sampled periodically to establish trends in growth, recruitment and mortality, and to identify any potential problems with the major sport fish populations.

Smith Reservoir has been sampled routinely since 1991. Samples have concentrated mainly on the spotted and largemouth bass populations and their response to a 13-16 inch protected size limit. Attempts at sampling crappie populations with standardized methods have produced limited results. Due to the steep topographic relief and clear water, trapnets have limited success capturing crappie. During fall 2003, we began sampling crappie using fall electrofishing in an effort to increase catch rates. This method was also used in fall 2006.

Methods

Smith Reservoir was sampled in fall with daytime electrofishing in the Ryan Creek and Sipsey Fork arms on November 6 and November 8, 2006. Fall 2006 electrofishing sites were concentrated in the upper part of Ryan Creek and in the upper parts of tributary streams of the upper Sipsey Fork arm. Electrofishing sites are shown on Figure 1. Total length (mm) and weight (g) were recorded from all crappie collected. Otoliths were removed from all crappie >100 mm TL and aged by District personnel. Data analysis was conducted with ADWFF Data Analysis and Report Utilities (Slipke, 2004) and F.A.S.T. program (Slipke and Maceina, 2000).

Results and Discussion

White Crappie

One hundred and thirty-three white crappie were collected in the fall of 2006. The catch rate in the fall exceeded the lake average but fell below the 75th percentile. The 2004 year class of white crappie was exceptionally large composing over 60% of the entire collection. The 2003 year class was also large composing 31% of the sample. This year class was also well represented in fall of 2005 (Floyd and Ekema, 2006). The Smith white crappie collection included seven year classes (ages 1+ to 7+).

The RSD values for white crappie in 2006 were 6%, 39%, 36%, and 18% for the Stock, Quality, Preferred, and Memorable size categories, respectively (Table 2). The RSD values for Stock and Preferred size fish fell below the lake average and approximated the 25th percentile of the lake RSD-S and RSD-P values. The RSD values for Quality and Memorable size fish exceeded the lake averages (Table 2). Relative weight (Wr) values (74-88) were below the lake average for all size categories, except Memorable; however relative weight values generally run lower in the fall than those observed in the spring. The high Wr values observed in the spring of 1998 influences the overall average for the reservoir. When this value is excluded from the equation the Wr's observed in fall 2006 are more in line with those observed in the past.

Growth of white crappie was rapid with the mean total-length-at-age exceeding nine inches in 1.4 years and 10 inches by age 2. Although the average growth rate was fast, there was usually a wide range of length groups within each year class (Table 3). While mortality computations did not meet the standards outlined in the Reservoir Manual, estimated total annual survival rates from weighted and un-weighted catch curve regressions ranged from 34% to 40% (Z=-1.0914, r^2=0.8089, Adjusted r^2=0.7611 and Z=-0.9202, r^2=0.8169, Adjusted r^2=0.7712, respectively) for white crappie (Figure 4).

Black Crappie

A total of 44 black crappie were collected in the fall of 2006. The 2004 and 2003 year classes dominated the collection comprising 34 and 36% of the sample, respectively (Table 4). The Smith Reservoir black crappie collection included five year classes (1+ to 5+).

The RSD values for black crappie were 5%, 48%, 36%, and 11% for the Stock, Quality, Preferred, and Memorable size categories, respectively (Table 2). The RSD values for Quality, Preferred, and Memorable categories exceeded the lake average and approximated or exceeded the 75th percentile (Table 2). The stock size category values were below the lake average and was below the 25th percentile. Fewer numbers of stock size black crappie may be an artifact of electrofishing and habitat partitioning of the smaller black crappie.

Growth of black crappie was similar to that observed for white crappie where fish reached harvestable size between ages one and two (Table 4). From von Bertalanffy equations it took 1.89 and 2.91 years for black crappie to reach nine and ten inches, respectively. This was slightly slower than observed for white crappie. Although the mean length-at-age indicated fast growth rates, there was a wide range of lengths within each year class (Table 4). The mortality estimates did not meet minimum requirements; we had an estimated total annual survival rate of 61% for black crappie (Z=-0.4946, r^2=0.8677, adjusted r^2=0.8015).

Conclusion

The overall crappie population in Smith Reservoir is characterized by fast growth and low relative weights. The lack of age 0 and few age 1 individuals is due to the inefficiency of electrofishing to collect smaller crappie.

The strong 2004 and 2005 year classes should continue to provide adequate angling opportunities. No major changes in the management of crappie are warranted at this time.

Literature Cited

Floyd, K.B. and P.E. Ekema. 2006. Smith Reservoir crappie management report 2005-2006. Alabama Department Conservation and Natural Resources. Montgomery, AL.

Slipke, J.W. and M.J. Maceina. 2001. Fisheries analysis and simulation tools (FAST). Auburn University, Auburn, Alabama.

Slipke, J. W. 2004 ADWFF data and report utilities: Version 2.2. Alabama Division of Wildlife and Freshwater Fisheries. Montgomery, Alabama.

APPENDIX A

TABLES AND FIGURES

TABLE 1. SMITH RESERVOIR MORPHOMETRIC, PHYSICAL AND CHEMICAL CHARACTERISTICS.

Surface area	21,200	surface acres
Drainage area	944	square miles
Full pool elevation	510	feet-msl
Mean annual fluxuation	18	feet
Shoreline distance	500	miles
Shoreline development index	24.5	
Mean depth	65.5	feet
Maximum depth	264	feet
Outlet depth	210	feet
Total dissolved solids	22	mg/l
Morphoedaphic index	0.34	
Growing season	220	frost free days (Jenkins 1967)
Year of Impoundment	1961	

TABLE 2. RELATIVE STOCK DENSITY, CATCH PER EFFORT, RELATIVE WEIGHT, AND PROPORTIONAL STOCK DENSITY OF WHITE CRAPPIE FROM SMITH RESERVOIR, 1998, 2003, 2005 AND 2006.

White Crappie

Year	Gear	No. of Samples	SUBSTOCK NO.	SUBSTOCK CPE	SUBSTOCK PCT.[1]	RSD-S NO.	RSD-S CPE	RSD-S PCT	RSD-S Wr	RSD-Q NO.	RSD-Q CPE	RSD-Q PCT	RSD-Q Wr	RSD-P NO.	RSD-P CPE	RSD-P PCT	RSD-P Wr	RSD-M NO.	RSD-M CPE	RSD-M PCT	RSD-M Wr	RSD-T NO.	RSD-T CPE	RSD-T PCT	RSD-T Wr	TOTAL NO.	TOTAL CPE	PSD
2006	F Electro	2	0	0.0	0	8	4.0	6	74	52	26.3	39	79	48	24.2	36	84	24	12	18	88	1	1	1	78	133	67.2	94
2005	F Electro	3	0	0.0	0	1	0.3	2	84	8	2.3	12	83	39	11.4	59	83	18	5.3	27	84	0	0.0	0	0	66	19.3	98
2003	F Electro	1	0	0.0	0	0	0.0	0	0	7	17.0	18	89	30	73.0	79	88	1	2.4	3	91	0	0.0	0	0	38	92.5	100
1998	S Electro	10	0	0.0	0	26	5.0	22	91	61	11.7	51	90	14	2.7	12	86	17	3.3	14	89	1	0.2	1	96	119	22.9	78
	Lake Average			0	0		2.3	8	83		14.3	30	85		27.8	46.5	85		5.8	15.5	88		0.3	1	87		50.5	93

Black Crappie

Year	Gear	No. of Samples	SUBSTOCK NO.	SUBSTOCK CPE	SUBSTOCK PCT.[1]	RSD-S NO.	RSD-S CPE	RSD-S PCT	RSD-S Wr	RSD-Q NO.	RSD-Q CPE	RSD-Q PCT	RSD-Q Wr	RSD-P NO.	RSD-P CPE	RSD-P PCT	RSD-P Wr	RSD-M NO.	RSD-M CPE	RSD-M PCT	RSD-M Wr	RSD-T NO.	RSD-T CPE	RSD-T PCT	RSD-T Wr	TOTAL NO.	TOTAL CPE	PSD
2006	F Electro	2	0	0.0	0	2	1.0	5	76	21	10.6	48	80	16	8.1	36	87	5	2.5	11	98					44	22.2	95
2005	F Electro	3	1	0.3	6	6	1.8	33	74	7	2.0	39	77	5	1.5	28	84	0	0.0	0	0					19	5.6	67
2003	F Electro	1	0	0.0	0	3	7.3	16	84	8	19.5	42	87	7	17.0	37	83	1	2.4	5	90					19	46.2	84
	Lake Average			0.1	2		3.4	18	78		10.7	43	81		8.9	34	85		1.6	5	94	0	0	0	0		24.6	82

TABLE 3 . AGE COMPOSITION AND MEAN LENGTH OF WHITE CRAPPIE FROM SMITH RESERVOIR, FALL 2006.

Age	Year Class	Number	Percent	CPE	Mean TL	SE	Range
1	2005	2	1.5	1.0	220.0	23.0	190-240
2	2004	80	60.2	40.0	241.5	3.5	180-300
3	2003	42	31.6	21.0	288.3	5.4	220-340
4	2002	2	1.5	1.0	296.0	1.0	295-297
5	2001	5	3.8	2.5	311.8	12.4	280-350
6	2000	1	0.8	0.5	335.0		
7	1999	1	0.8	0.5	388.0		
Total		133	100.0	66.5			

TABLE 4 . AGE COMPOSITION AND MEAN LENGTH OF BLACK CRAPPIE FROM SMITH RESERVOIR, FALL 2006.

Age	Year Class	Number	Percent	CPE	Mean TL	SE	Range
1	2005	3	6.8	1.5	207.0	1.5	200-210
2	2004	15	34.1	7.6	240.5	9.2	180-320
3	2003	16	36.4	8.1	240.3	8.5	190-310
4	2002	6	13.6	3.0	286.5	13.3	250-330
5	2001	4	9.1	2.0	275.8	14.3	250-310
Total		44	100.0	22.2			

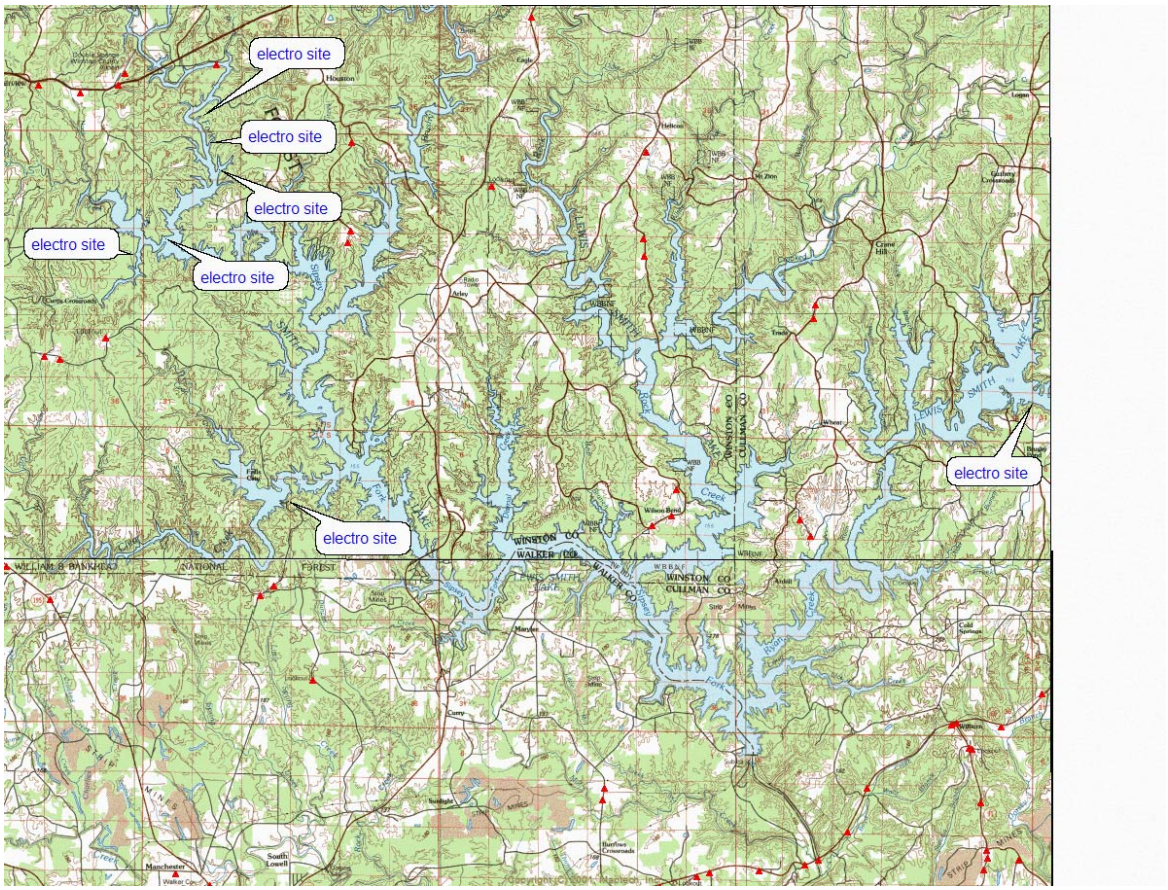

Figure 1. Electrofishing sites for fall 2006.

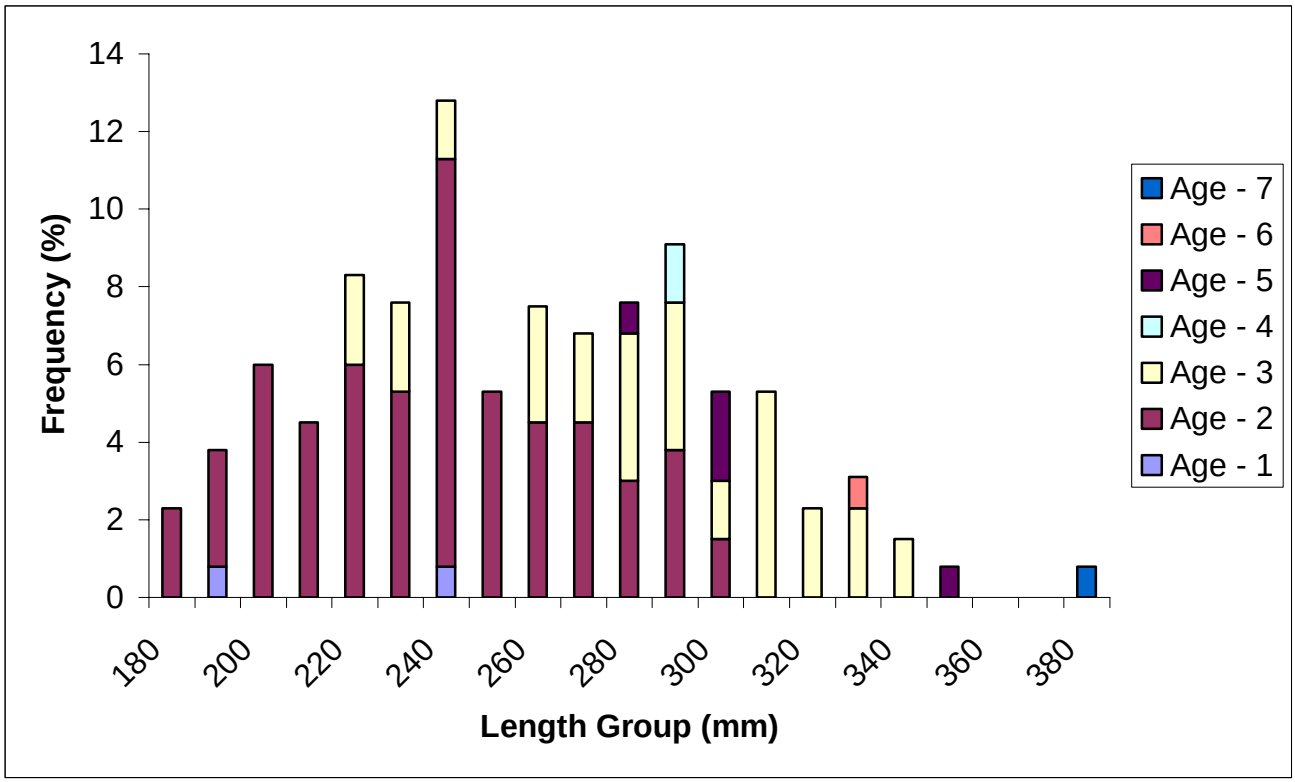

Figure 2. Length-at-Age frequency distribution for white crappie from Smith Reservoir, fall 2006.

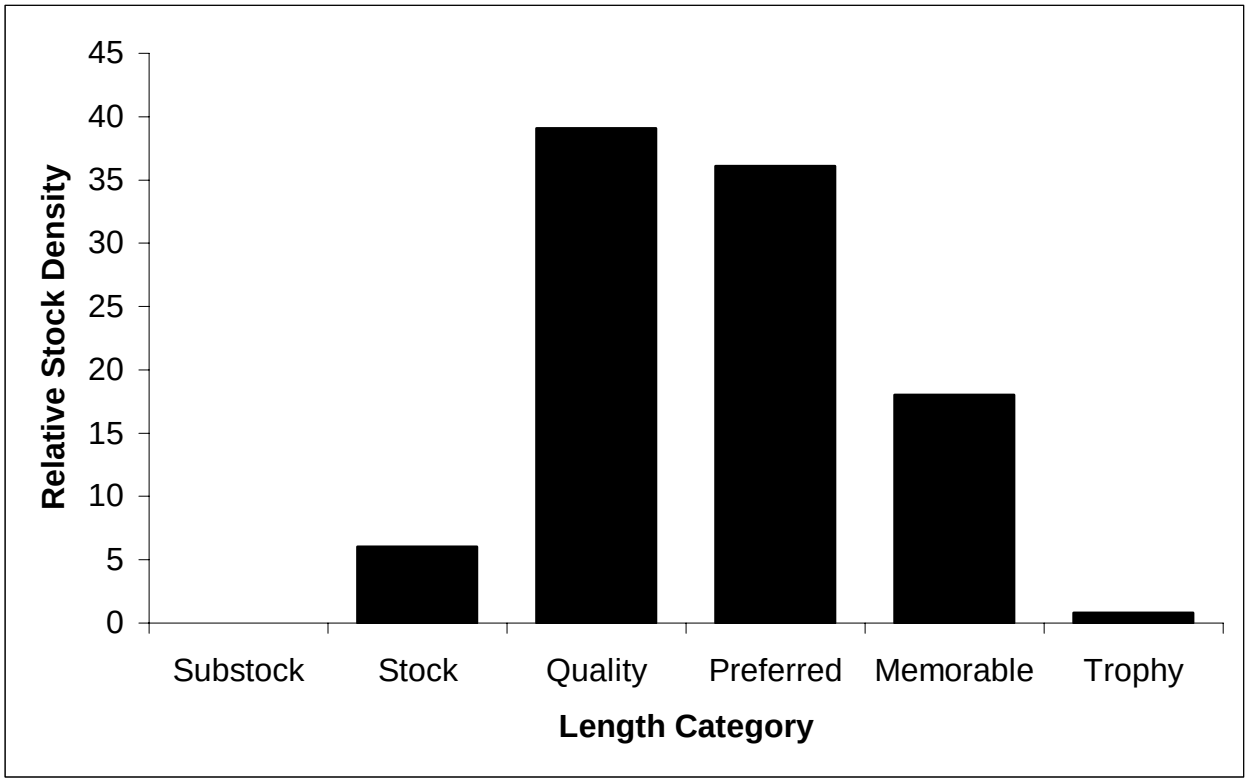

FIGURE 3. Relative Stock Density (RSD) of white crappie from Smith Reservoir, fall 2006.

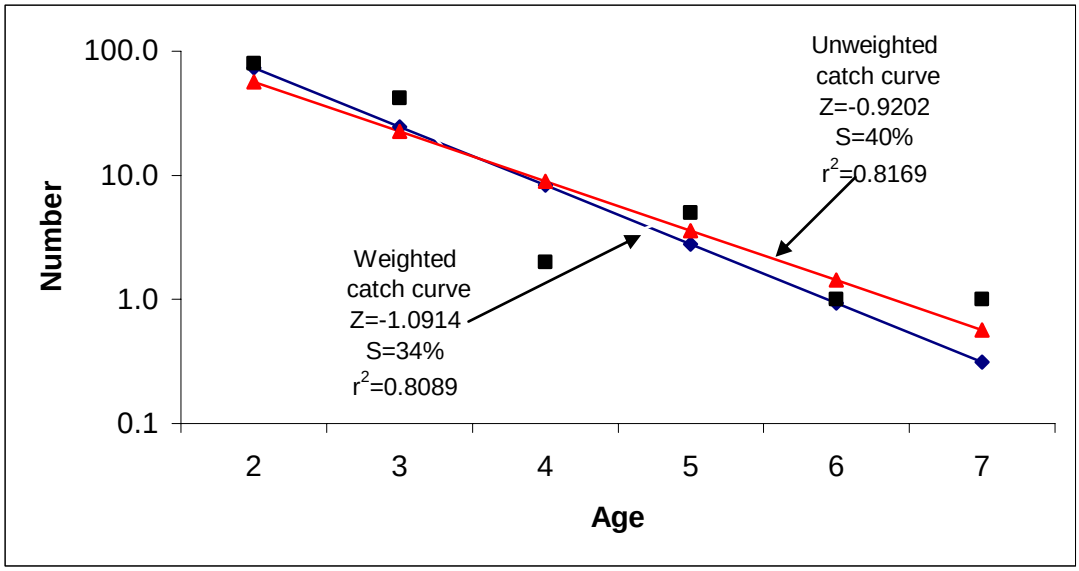

FIGURE 4. Catch-curve regression for white crappie from Smith Reservoir, fall 2006. Solid squares represent observed values.

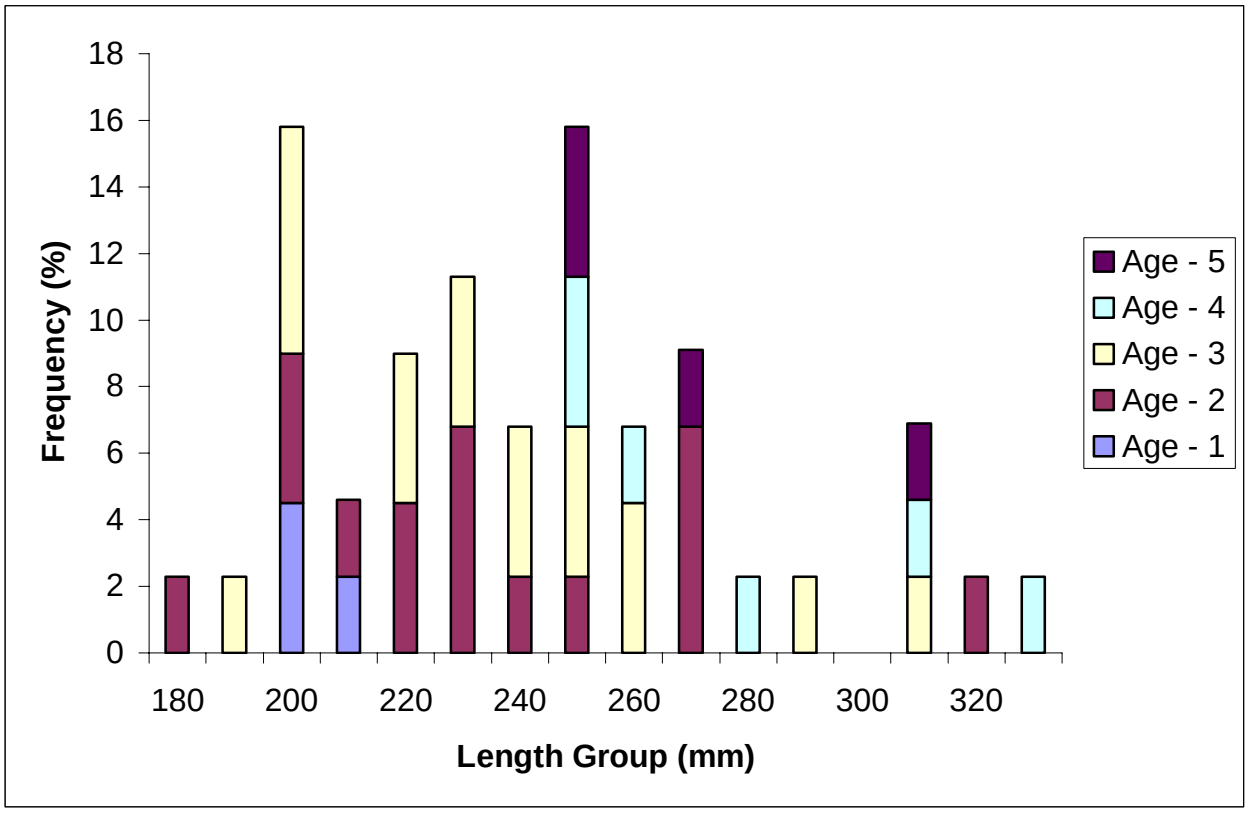

Figure 5. Length-at-Age frequency distribution for black crappie from Smith Reservoir, fall 2006.

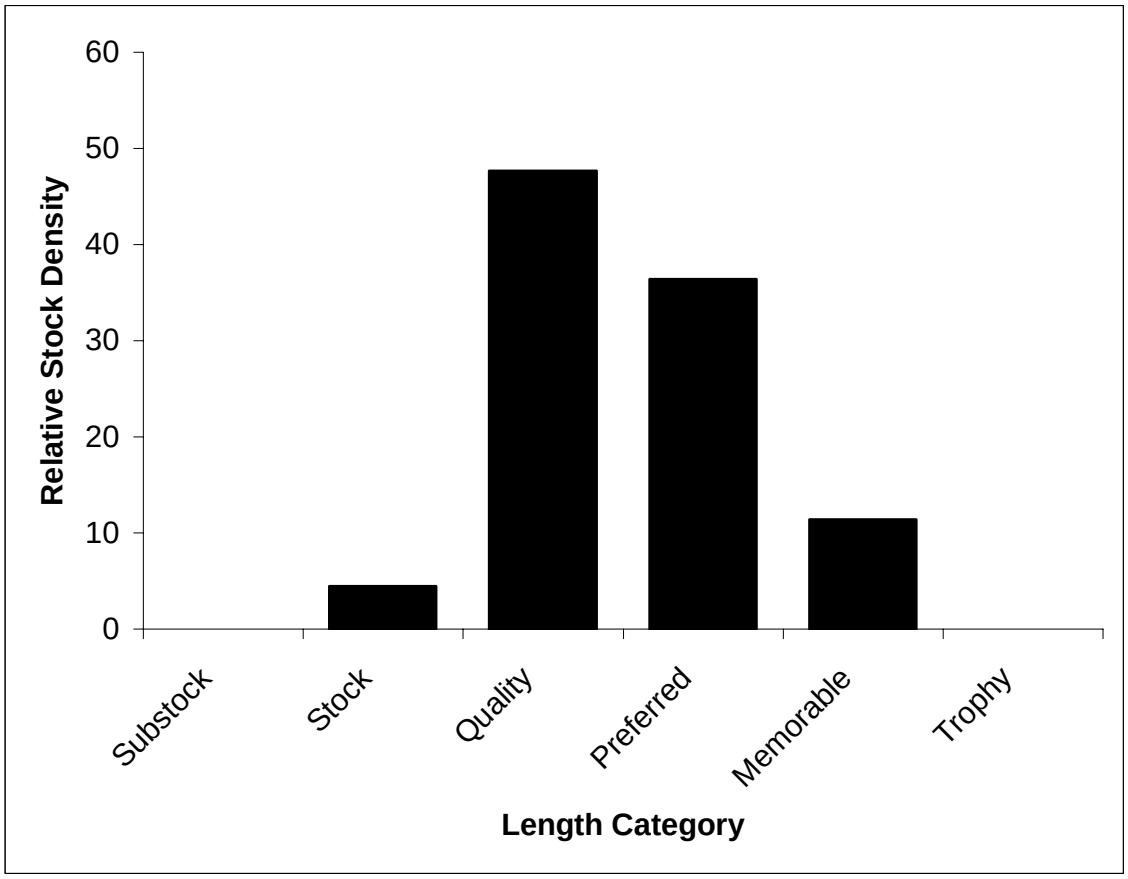

FIGURE 6. Relative Stock Density (RSD) of Black crappie from Smith Reservoir, fall 2006.

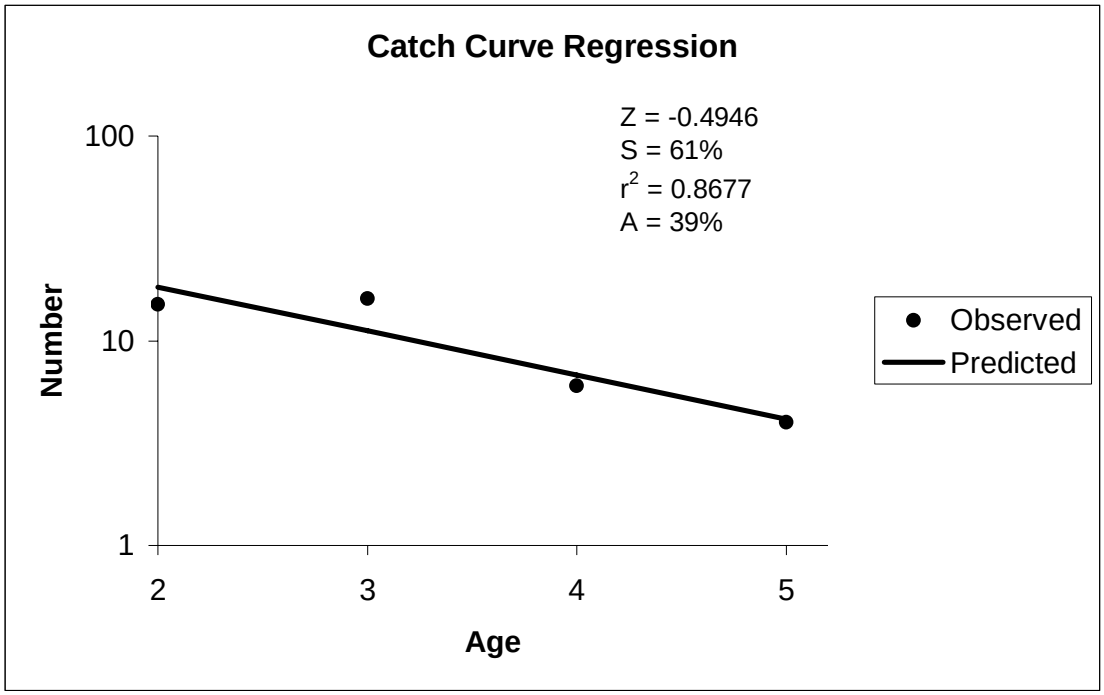

FIGURE 7. Catch-curve regression for black crappie from Smith Reservoir, fall 2006.