

# **PICKWICK RESERVOIR**

## **2008 MANAGEMENT REPORT**

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## Introduction

Pickwick Reservoir is a 43,100-acre impoundment on the Tennessee River in northwest Alabama, southwest Tennessee and northeast Mississippi. The reservoir extends from Pickwick Landing Dam in Tennessee to Wilson Dam at Florence, Alabama, a distance of 52.7 miles.

Pickwick is renowned for its excellent smallmouth bass fishery. Recent establishment of the exotic plants *Myriophyllum spicatum* (Eurasian water milfoil) and *Hydrilla verticillata* (hydrilla), has many bass anglers targeting largemouth bass in the “grass” instead of the renowned smallmouth bass (personal communication with anglers).

The reservoir management objective for Pickwick Reservoir is to collect baseline biological data that is important to the sport fishery. From these data, length-at-age frequencies, growth, relative abundance, and relative weights are calculated. Upon analysis of these data, management recommendations are formulated.

Pickwick Reservoir was previously sampled during 2004 (unpublished), 2001 (Floyd et al. 2002), 1997 (Floyd et al. 1998), 1990 and 1991 (Darr et al. 1994), and 1987 (Hooper et al. 1988).

## Methods

Pickwick Reservoir sampling took place from March 27 to April 3, 2008, using the guidelines of the Alabama Reservoir Management Program Manual (ADCNR 1999). Spring electrofishing consisted of ten thirty-minute sample sites, seven of which were in major creeks, while three were on the main river. Target species included largemouth bass, spotted bass, and smallmouth bass. Lengths and weights were obtained from all

black bass. Otoliths were removed from all spotted and smallmouth bass, but from only 10 per 25mm length group for largemouth bass. All fish that had otoliths removed were sexed. Otoliths were aged at the District-1 Fisheries Office. The ADWFF computer program (Slipke 2004) was used to assign ages to un-aged fish and to analyze length and age data. The time-to-reach various lengths of interest were predicted by fitting von Bertalanffy growth curves to the mean length-at-age data. Simulation modeling was conducted using Fisheries Analysis Simulation Tools (FAST) developed by Slipke and Maceina (2001).

A weekend creel survey took place from March 1 through May 11, 2008, totaling 11 creel survey days. Each survey day lasted 8 hours, starting at 7.5 hours prior to sunset. Catch, harvest and effort data were collected from interviews with anglers upon completion of their fishing trip. Harvested bass and crappie were measured to the nearest 25mm and 10mm length groups, respectively. Previous creel surveys took place in 2004, 2001, and 1997.

The Bass Anglers Information Team (BAIT) program provides tournament catch information on all participating reservoirs. These data compliment the Alabama Reservoir Management Program data. This report used the 2007 BAIT Report data (Abernethy, 2008).

Appendix A includes all the tables and figures, and Appendix B includes the creel survey report. The text of this report does not reference all tables and figures found in the Appendices.

## Results and Discussion

The largemouth bass sample consisted of 431 bass, 295 of which were stock size and larger. Largemouth bass had an overall catch-per-effort (CPE) of 86.2 fish/hour of electrofishing (Table 4), and a CPE of 59.0 bass per hour for stock through memorable categories (Table 3). Both these values exceed all previous electrofishing catch rates for District-1 impoundments, and exceed the statewide mean for CPE for all Relative Stock Density (RSD) categories, except RSD-M (Table 3). The Proportional Stock Density (PSD) value was 47%, which exceeds the reservoir's average of 42.8% (Table 3). This value is at the bottom of the 47-68 range suggested by Alabama reservoir data, and falls below the range of 50-70% suggested by Anderson and Weithman (1978) for reservoirs where shad are the primary forage. The percentage of largemouth bass in stock and quality size categories exceeds statewide means, while preferred and memorable RSD values fell below the 25 percentile for Alabama reservoirs (Table 3, Figure 3).

Largemouth bass relative weights ( $W_r$ ) are near or exceed 100 for all RSD categories (Table 3). In addition,  $W_r$ 's exceed the 75<sup>th</sup> percentile for Alabama reservoir data for all categories except RSD-memorable, which fell between the Alabama mean and the 75<sup>th</sup> percentile for reservoirs statewide (Table 3). Each year class dating back to 1999 was represented in the largemouth bass sample, with 87% of the sample comprised of age one and age 2 bass (Table 4). The 2005 and 2003 year classes appear weak with only 3.2% and 0.7% of the bass sample, respectively (Table 4). Largemouth bass reached lengths of 304mm, 381mm, and 508mm, at ages 2.21, 2.94, and 9.49 years, respectively (Figure 7). The time to reach 304mm and 381mm exceeds the 75<sup>th</sup> and 90<sup>th</sup> percentile, respectively, for Alabama reservoirs, but the time-to-reach 508mm is in the lower 10% of

statewide data. This indicates fast growth to a length of 381mm, but slow growth above this length. The total annual survival rate for largemouth bass ages 3-9, as calculated from un-weighted catch curve regression, was 73% ( $r^2 = 0.6328$ ) (Figure 4).

We captured fewer adult male largemouth bass than adult female largemouth bass. Our ratio of males to females was 1:1.38. We expected to catch more males than females because male bass are shallow and vulnerable to electrofishing gear for the entire spawning period, while females are shallow only for a short period to lay eggs. Our ratio of male to female bass suggests that our sampling period was near optimum for capturing adults of both sexes.

Simulation modeling was done at the average conditional mortality (cm) rate of 0.29 (range = 0.22-0.38, n = 6) for total yield (Figure 8). We used a cm of 0.26 for calculating both percent of largemouth bass >508mm recruiting to the population (Figure 9) and number of largemouth bass >508mm entering the fishery (Figure 10). Simulation modeling used minimum length limits (MLL) of 304mm, 381mm, and 406mm. We assumed that 304mm would reflect current conditions since most anglers use a self-imposed minimum size limit of this length. We predicted that yield would be similar for the three MLL through an exploitation of 48% (Figure 8). At exploitation rates >48% the 406mm MLL would provide slightly higher yields. At the current exploitation rate (1.8%) a MLL on largemouth bass would not increase yield (Figure 8).

We also predicted the number of cohorts recruiting to 508mm would be small under the MLL examined, but would be slightly higher under the larger MLL (Figure 9). For the current survival rates we estimated that the number of largemouth bass >508mm would be small but would increase slightly with the larger MLL (Figure 10). At the

current exploitation and mortality rate, establishing a size restriction would have a miniscule effect on the number of memorable sized fish in the population, therefore a size restriction can not be justified at this time.

The 2007 BAIT report indicates that 16 tournaments took place on Pickwick during 2007 (Abernethy 2008). Pickwick ranked second in average bass weight and pounds per angler-day, third for hours per bass > 5 pounds, fourth in bass per angler-day, and seventh in percent success. Combining all quality indicators, Pickwick ranked second overall for reservoirs with five or more tournaments. All quality indicators expressed increases compared to the 2006 BAIT report. These data support claims regarding increased catch rates and overall size of largemouth bass caught by Pickwick bass anglers (personal communication).

Also targeted in the spring 2008 electrofishing sample were spotted bass and smallmouth bass, but only 23 and 11 were sampled, respectively. It has been difficult to obtain good samples of spotted and smallmouth bass from Pickwick Reservoir. In 2004, 28 spotted bass were sampled (Table 5) and 34 smallmouth bass were captured. In the 2001 spring electrofishing sample, 18 spotted bass and 4 smallmouth bass were captured (Floyd et al. 2002). During April 2008, TVA captured 11 spotted bass and 63 smallmouth bass in 12 hours of spring electrofishing (TVA unpublished).

Summarized in Appendix B are the creel survey results. Angler interviews took place at three access areas from March through mid May, resulting in 412 angler interviews. These anglers fished a total of 2,504.48 hours, with bass and crappie accounting for 1583.8 hours and 634.32 hours of effort, respectively.

Bass anglers accounted for 59.5% of interviewees. Bass anglers caught bass at a rate of 0.96-bass/hour (Appendix B, No. 48). This is similar to bass catch rates of 0.99-bass/hour from Wilson 2005 (Floyd et al. 2005), more than twice the rate of 0.42-bass/hour from Wheeler 2006 (Floyd et al. 2006), but only half the rate of 1.45-bass/hour experienced at Cedar Creek 2007 (Ekema et al. 2007). Bass harvest consisted of only 30 black bass. Bass anglers harvested bass at a rate of 0.017-bass/hour (Appendix B, No. 47). This is similar to the bass harvest rate of 0.02-bass/hour from Wheeler 2006 (Floyd et al. 2006), but far less than 0.04-bass/hour reported from Cedar Creek 2007 (Ekema et al. 2007) and 0.07-bass/hour from Wilson 2005 (Floyd et al. 2005). The bass exploitation rate (No. harvested/ No. caught) was 1.8%. This is far less than the 7% exploitation rate experienced on Wheeler 2006 (Floyd et al. 2006). Modal length group for bass harvested was 275 mm (Appendix B, Figure 1). “Keeper” sized (>12” for LMB and SPB, >14” for SMB) bass accounted for 54.7% of the total bass catch.

One hundred and seven anglers fished exclusively for crappie, accounting for 26.0% of all anglers. Crappie anglers caught 860-crappie in 634.32 hours of angling time for a catch rate of 1.36-crappie/hour. This is higher than 0.76-crappie/hour from Wheeler 2006 (Floyd et al. 2006) and 1.2-crappie/hour from Wilson 2005 (Floyd et al. 2005), but less than 1.6-crappie/hour experienced at Cedar Creek 2007 (Ekema et al. 2007). Crappie anglers harvested 587-crappie at a rate of 0.93-fish/hour, equaling the harvest rate observed at Cedar Creek 2007 (Ekema et al. 2007). Seventy-five percent of the crappie caught were 9 inches or larger. Crappie exploitation rate (No. harvested/ No. caught) was 66.6% in 2008. The modal length group for harvested crappie was 300mm.

Approximately 65% of the crappie harvest was between 290mm and 320mm in length (Appendix B, Figure 2).

### **Conclusions**

The largemouth bass population has shown variations over the years. Variable recruitment observed on mainstream impoundments of the Tennessee River is predominantly responsible for these changes. Positive changes in abundance, relative weight and growth rates of largemouth bass have occurred over the past decade. The 2007 BAIT data ranks Pickwick as one of the top two reservoirs in the State in overall quality of bass fishing. Strong 2006 and 2007-year classes of largemouth bass should drive this fishery for the next 5-6 years.

Simulation modeling conducted under the current population parameters indicates that we would see a miniscule increase in the number and size of largemouth bass by imposing a MLL. The cost of restricting what anglers could keep or weigh-in for a tournament out weigh any benefit obtained from a MLL. We recommend no change in the present management plan for Pickwick Reservoir.

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## **APPENDIX A**

### **Tables and Figures**

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

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Surface area	43,100 acres
Drainage area	32,820 sq. mi.
Full pool elevation	414 feet-msl
Mean annual fluxuation	6 feet
Shoreline distance	496 miles
Shoreline development index	14.1
Mean depth	21.4 feet
Maximum depth	59 feet
Outlet depth	57 feet
Chlorophyll a (dam forebay)	15.42 ug/l (2000-2004 mean) (TVA unpublished)
Total dissolved solids	92.6 mg/l
Morphoedaphic index	4.3 TDS/mean depth(ft) (Ryder 1965)
Growing season	188 frost free days (Jenkins 1967)
Year of Impoundment	1938

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TABLE 2. FISH STOCKED IN PICKWICK RESERVOIR.

Species	Location	Year	No./Acre	Size (in.)	Total
Largemouth bass (Florida strain)		1993	2.05	2	97,544
Smallmouth bass	McFarland Park	2005	0.15	2	6,970
	McFarland Park	2007	0.11	2	5,000

TABLE 3. RELATIVE STOCK DENSITY, CATCH PER EFFORT, RELATIVE WEIGHT, AND PROPORTIONAL STOCK DENSITY OF LARGEMOUTH BASS FROM PICKWICK RESERVOIR.

Year	Gear	No. of Samples	SUBSTOCK			RSD-S				RSD-Q				RSD-P				RSD-M				TOTAL		PSD
			NO.	CPE	PCT.*	NO.	CPE	PCT.	Wr	NO.	CPE	PCT.	Wr	NO.	CPE	PCT.	Wr	NO.	CPE	PCT.	Wr	NO.	CPE	
2008	Electro.	10	136	27.2	31.6	155	31.0	36.0	97	99	19.8	23.0	102	36	7.2	8.4	104	5	1.0	1.2	99	431	86.2	47
2004	Electro.	10	37	7.4	16.2	113	22.6	49.6	91	50	10.0	21.9	93	27	5.4	11.8	90	1	0.2	0.4	83	228	45.6	41
2001	Electro.	10	89	17.8	45.9	51	10.2	26.3	89	37	7.4	19.1	90	16	3.2	8.2	93	1	0.2	0.5	104	194	38.8	51
1997	Electro.	10	30	6.0	14.2	124	24.8	58.8	92	37	7.4	17.5	92	14	2.8	6.6	96	6	1.2	2.8	96	211	42.2	31
1991	Electro.	8	57	16.1	26.9	76	21.4	49.0	95	44	12.4	28.0	104	32	9.0	21.0	103	3	0.8	1.4	101	212	59.7	51
1990	Electro.	10	---	---	---	4	0.8	17.0	85	8	1.6	35.0	95	10	2.0	43.0	98	1	0.2	4.3	83	23	4.6	83
Lake Average (1997-2008)			73	14.6	27.0	111	22.2	42.6	92	56	11.2	20.4	94	23	4.7	8.8	96	3	0.7	1.2	95	266	53.2	43
Statewide Average				11.5	25.8		20.3	42.8	88		15.8	32.9	91		9.9	20.4	94		1.9	4.0	97		47.9	57
75 %tile				15.2	32.7		25.6	53.2	93		20.7	40.2	95		13.0	26.1	98		2.5	5.2	102		61.1	67
25 %tile				3.9	10.9		10.8	32.8	84		8.6	25.9	85		4.5	13.2	89		0.7	2.0	92		29.7	47

\*SUBSTOCK PCT. is a ratio of substock size fish per 100 stock size and larger.

TABLE 4. AGE COMPOSITION AND MEAN LENGTH OF LARGEMOUTH BASS FROM PICKWICK RESERVOIR, SPRING 2008.

Age	Year Class	Number	Percent	CPE	Mean TL	SE
1	2007	206	47.8	41.2	185.1	2.1
2	2006	169	39.2	33.8	298.0	2.6
3	2005	14	3.2	2.8	365.3	6.3
4	2004	17	3.9	3.4	406.2	9.1
5	2003	3	0.7	0.6	452.7	27.2
6	2002	11	2.6	2.2	451.5	8.8
7	2001	5	1.2	1.0	469.0	23.2
8	2000	3	0.7	0.6	480.0	36.1
9	1999	2	0.5	0.4	494.0	4.0
Total		430	100.0	86.2		

TABLE 5. RELETIVE STOCK DENSITY, CATCH PER EFFORT, RELATIVE WEIGHT AND PROPORTIONAL STOCK DENSITY OF SPOTTED BASS FROM PICKWICK RESERVOIR.

Year	Gear	No. Samples	SUBSTOCK			RSD-S				RSD-Q				RSD-P				TOTAL		
			NO.	CPE	PCT.*	NO.	CPE	PCT.	Wr	NO.	CPE	PCT.	Wr	NO.	CPE	PCT.	Wr	NO.	CPE	PSD
2008	Electro.	10	8	1.6	34.8	6	1.2	26.1	111	4	0.8	17.4	120	5	1.0	21.7	125	23	4.6	60
2004	Electro.	10	6	1.2	21.4	13	2.6	46.4	113	8	1.6	28.6	114	1	0.2	3.6	91	28	5.6	41
Lake Average			7	1.4	28.11	10	1.9	36.3	112	6	1.2	23	117	3	0.6	12.7	108	26	5.1	50
Statewide Average				6.0	31.5		11.9	49.0	94		7.7	29.7	98		4.4	16.4	100		25.3	51
75 %tile				8.7	40.1		16.5	64.2	101		11.7	37.0	103		5.5	22.9	107		33.2	65
25 %tile				2.3	10.7		6.4	36.3	87		3.4	21.0	91		1.4	8.1	92		1.6	36

\*SUBSTOCK PCT. is a ratio of substock size fish per 100 stock size and larger.

TABLE 6. AGE COMPOSITION AND MEAN LENGTH OF SPOTTED BASS  
FROM PICKWICK RESERVOIR, SPRING 2008.

Age	Year Class	Number	Percent	CPE	Mean TL	SE
1	2007	10	43.5	2.0	149.6	16.9
2	2006	5	21.7	1.0	272.8	14.5
3	2005	3	13.0	0.6	320.3	37.8
4	2004	4	17.4	0.8	344.5	13.5
5	2003	0	0.0	0.0	0.0	
6	2002	1	4.3	0.2	362.0	
Total		23	100.0	4.6		

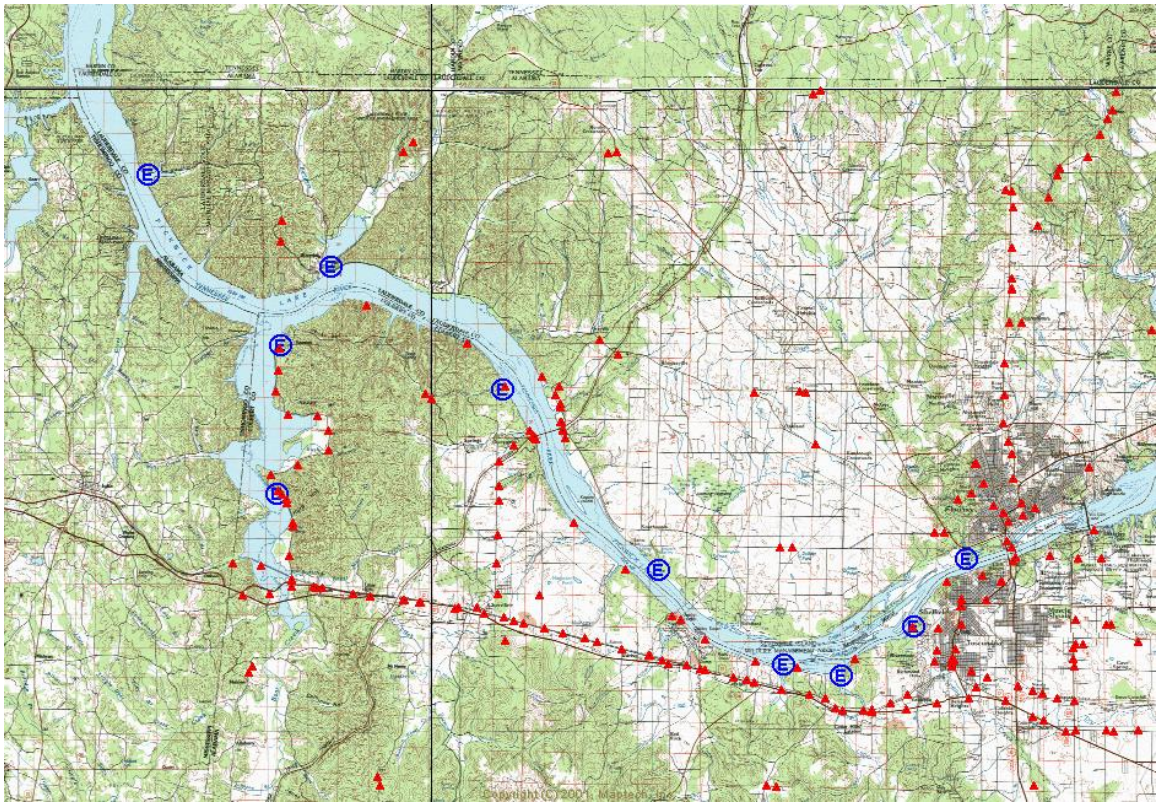
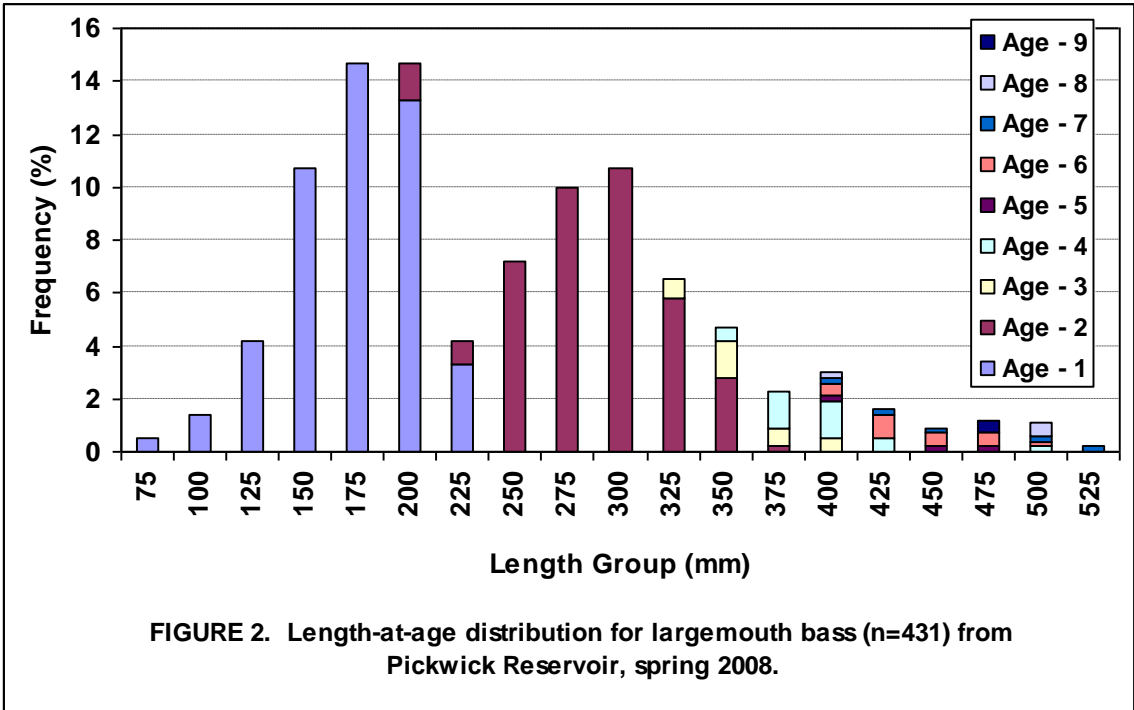
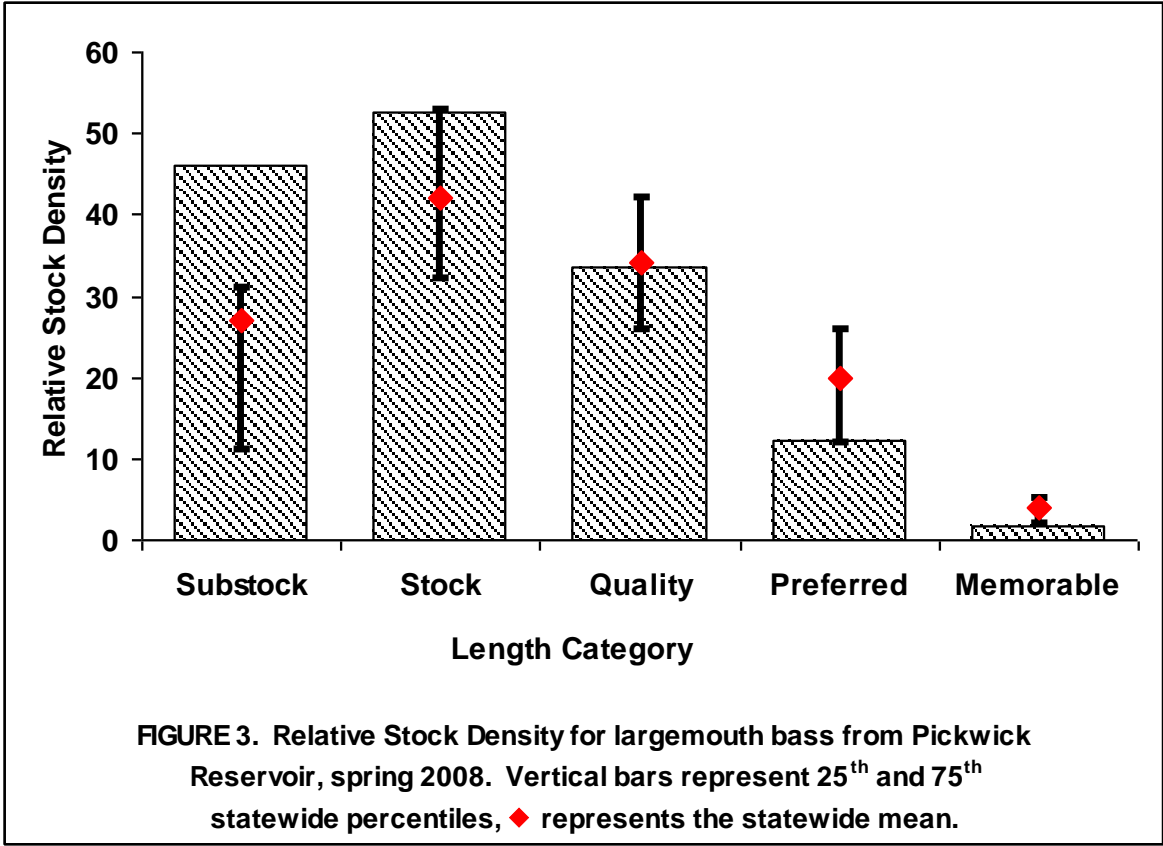
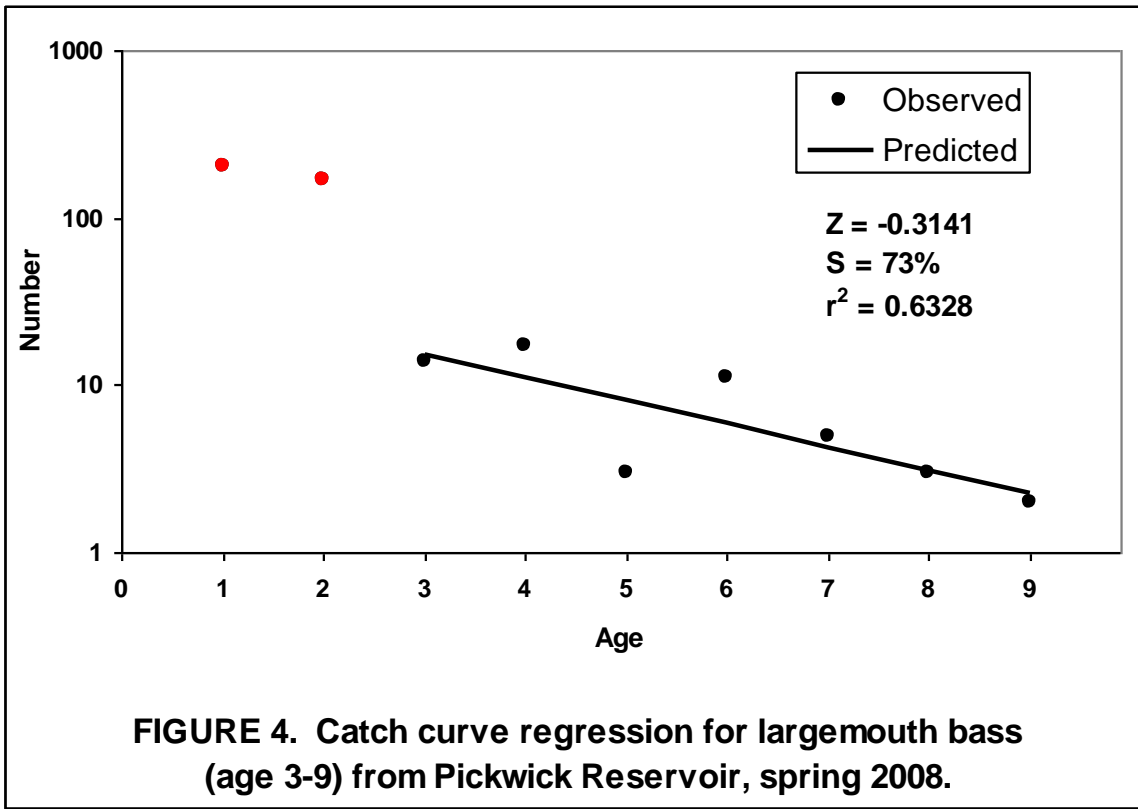
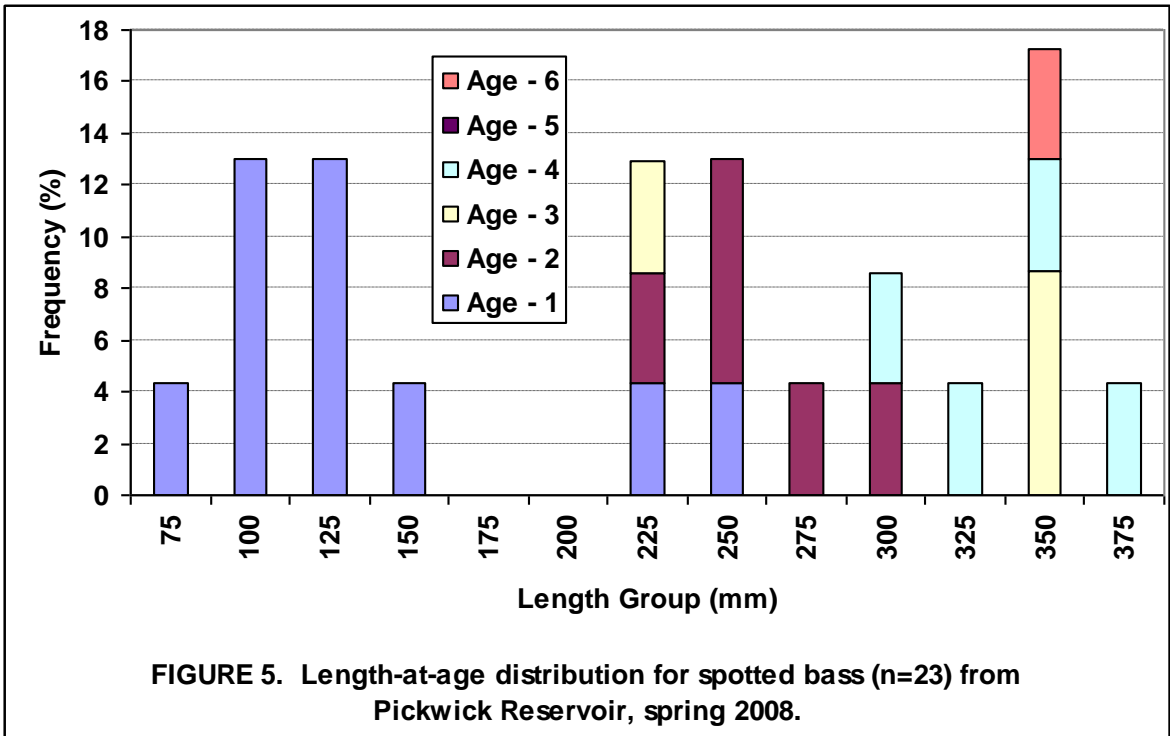


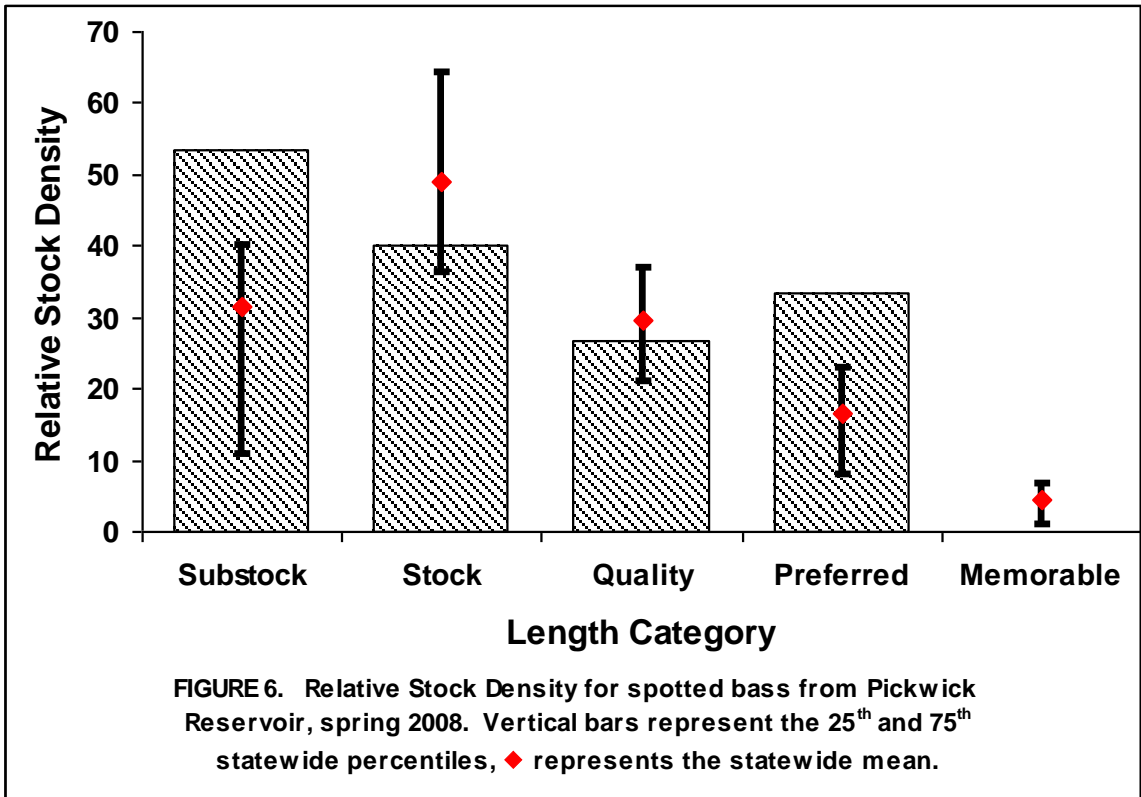
FIGURE 1. Electrofishing (E) sites on Pickwick Reservoir, spring 2008.

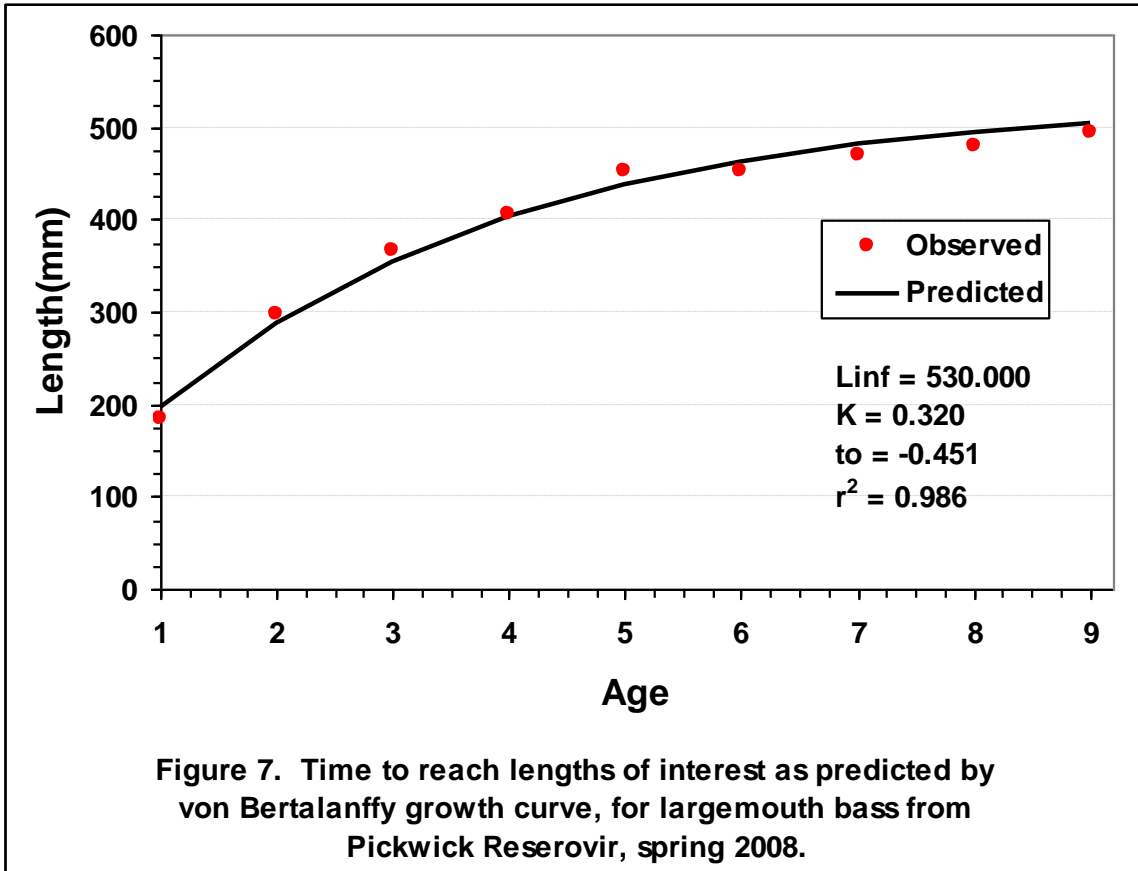


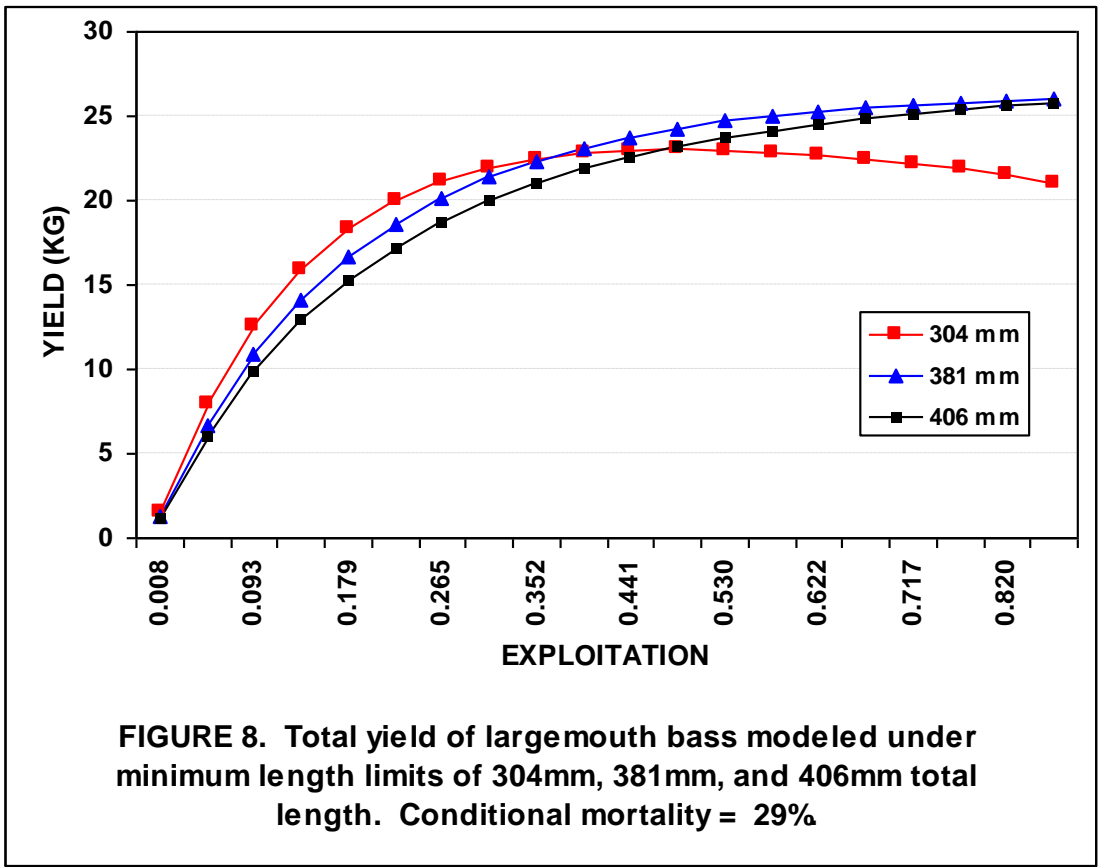


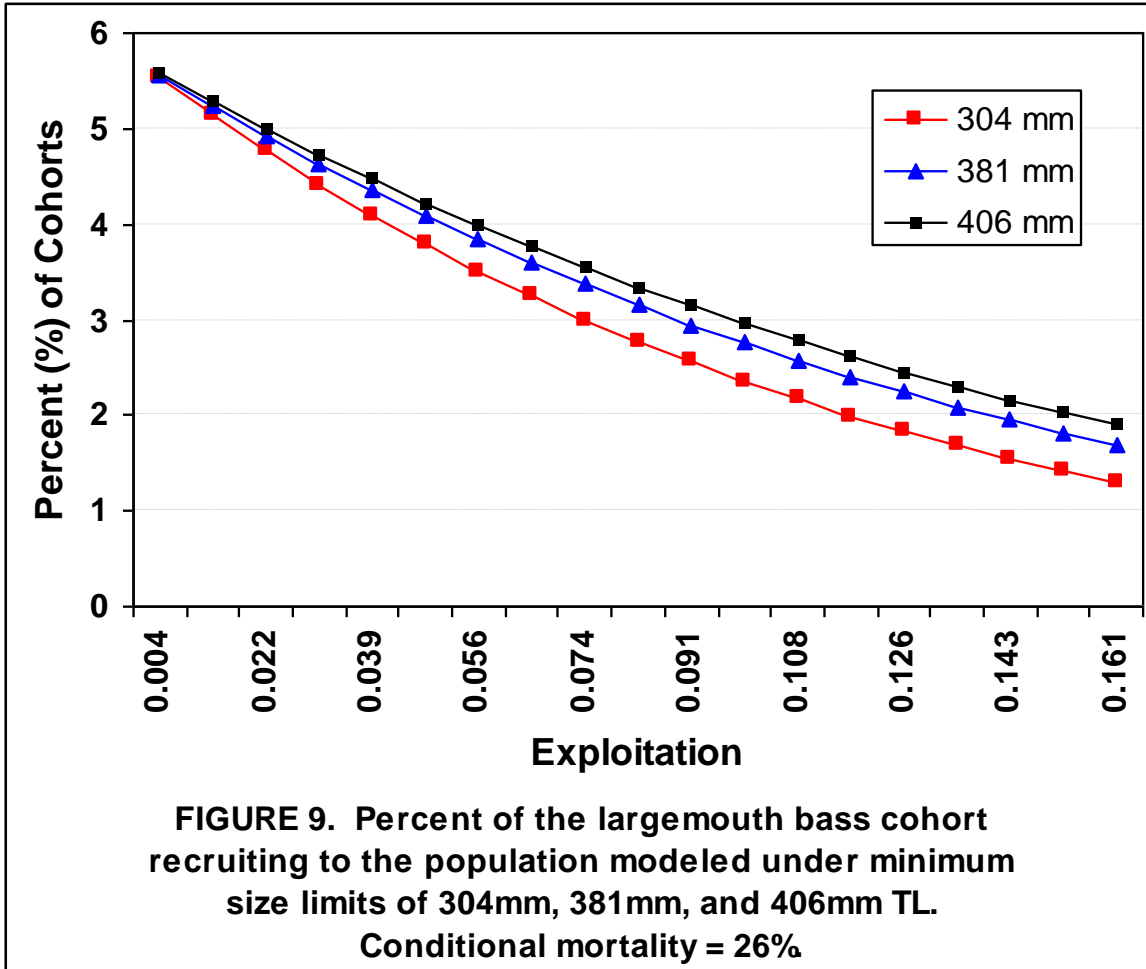


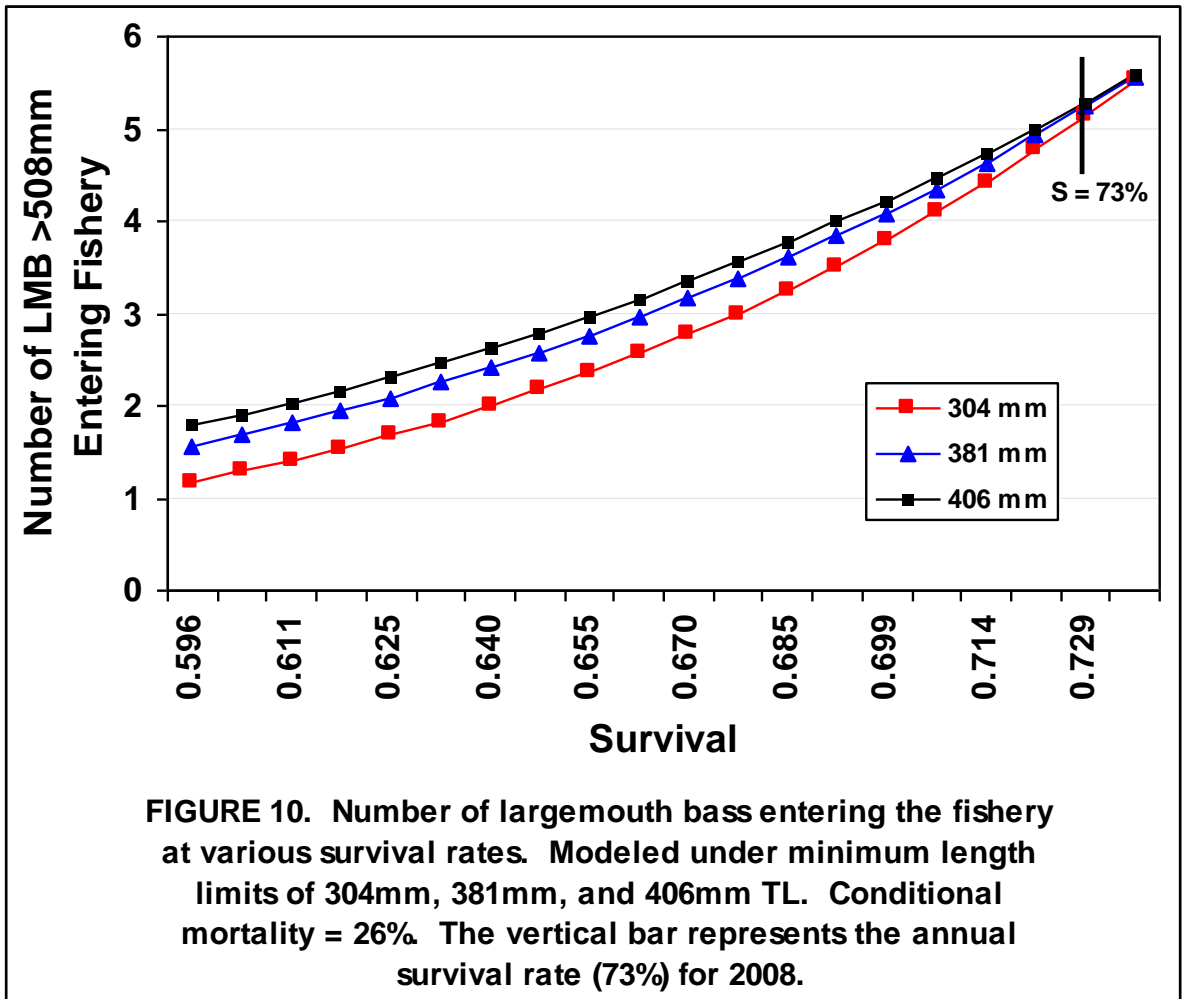


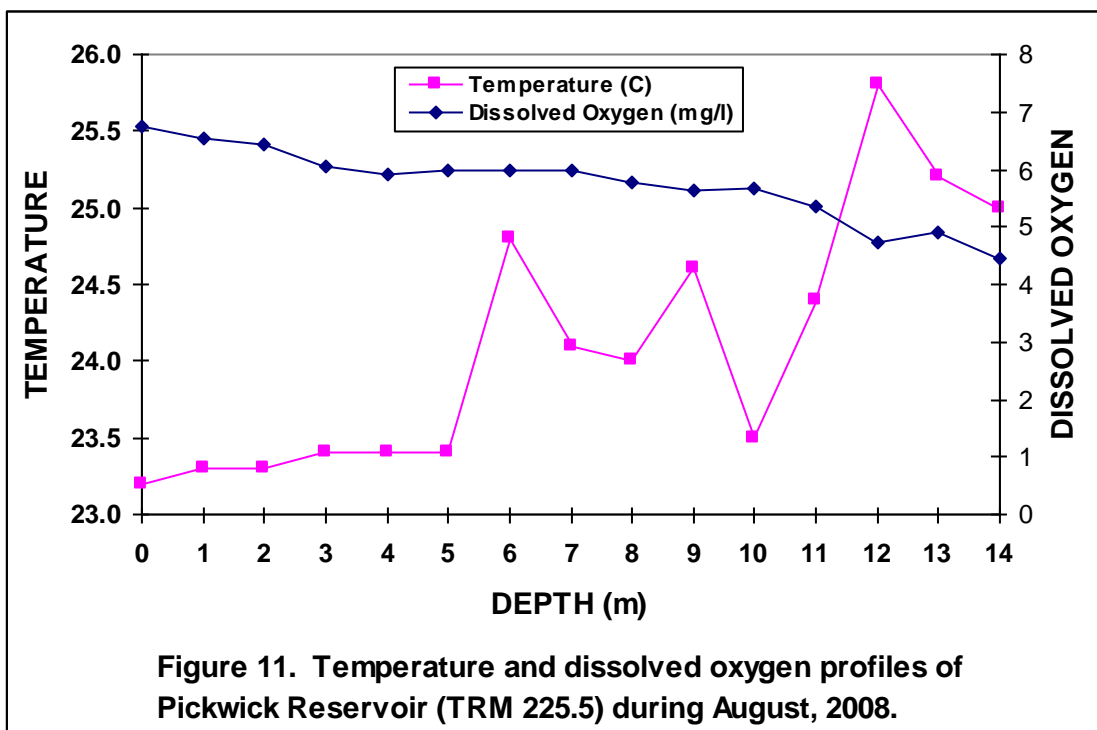












## **APPENDIX B**

### **Access Area Creel Survey Report**

## PICKWICK RESERVOIR 2008 ANGLER SURVEY REPORT

1. Number of parties interviewed	= 216
2. Number of anglers interviewed	= 412
3. Total fishing effort (hours)	= 2504.48
4. Mean trip length (hours)	= 6.08
5. Number of parties fishing for bass	= 127
6. Percent of parties in survey fishing for bass	= 58.80
7. Number of bass anglers	= 245
8. Percent of anglers in survey fishing for bass	= 59.50
9. Fishing effort for bass (hours)	= 1583.80
10. Percent effort for bass	= 63.20
11. Mean trip length for bass anglers (hours)	= 6.46
12. Number of parties fishing for crappie	= 62
13. Percent of parties in survey fishing for crappie	= 28.70
14. Number of crappie anglers	= 107
15. Percent of anglers in survey fishing for crappie	= 26.00
16. Fishing effort for crappie (hours)	= 634.32
17. Percent effort for crappie	= 25.30
18. Mean trip length for crappie anglers (hours)	= 5.93
19. Number of parties fishing for anything	= 10
20. Percent of parties in survey fishing for anything	= 4.63
21. Number of anglers fishing for anything	= 26
22. Percent of anglers in survey fishing for anything	= 6.31
23. Fishing effort for anything (hours)	= 117.73
24. Percent effort for anything	= 4.70
25. Number of parties fishing for other species	= 17
26. Percent of parties in survey fishing for other species	= 7.87
27. Number of anglers fishing for other species	= 34
28. Percent of anglers in survey fishing for other species	= 8.25
29. Fishing effort for other species (hours)	= 168.63
30. Percent effort for other species	= 6.73

31. Number of LMB <12" released by all anglers	= 678
32. Number of LMB >12" released by all anglers	= 701
33. Number of LMB <12" released by bass anglers	= 594
34. Number of LMB >12" released by bass anglers	= 672
35. Number of SMB <14" released by all anglers	= 88
36. Number of SMB >14" released by all anglers	= 79
37. Number of SMB <14" released by bass anglers	= 62
38. Number of SMB >14" released by bass anglers	= 79
39. Number of SPB <12" released by all anglers	= 49
40. Number of SPB >12" released by all anglers	= 41
41. Number of SPB <12" released by bass anglers	= 47
42. Number of SPB >12" released by bass anglers	= 41
43. Number of bass harvested by all anglers	= 30
44. Number of bass harvested by bass anglers	= 27
45. Bass harvest rate (bass/hr.) for all anglers	= 0.012
46. Bass catch rate (bass/hr.) for all anglers	= 0.67
47. Bass harvest rate (bass/hr.) for bass anglers	= 0.017
48. Bass catch rate (bass/hr.) for bass anglers	= 0.96
49. Modal length group (25mm) of black bass harvested	= 275
50. Number of crappie < 9" released by all anglers	= 228
51. Number of crappie > 9" released by all anglers	= 68
52. Number of crappie < 9" released by crappie anglers	= 212
53. Number of crappie > 9" released by crappie anglers	= 61
54. Number of crappie harvested by all anglers	= 590
55. Number of crappie harvested by crappie anglers	= 587
56. Crappie harvest rate (crappie/hr.) for all anglers	= 0.24
57. Crappie catch rate (crappie/hr.) for all anglers	= 0.34
58. Crappie harvest rate (crappie/hr.) for crappie anglers	= 0.93
59. Crappie catch rate (crappie/hr.) for crappie anglers	= 1.36
60. Modal length group (10mm) of crappie harvested	= 300

61. Effort by access area

Access area	No. of parties	Effort (hrs.)	Percent Effort
McFarland Park	130	1357.40	59.04
Rose Trail	42	597.57	16.17
Waterloo	44	549.52	24.78
Total	216	2504.48	99.99

62. The state and county of residence for Pickwick Reservoir angler parties

State	County / City	Parties	Percent of All
AL	BLOUNT	1	0.43
AL	COLBERT	46	20.00
AL	CULLMAN	2	0.87
AL	FRANKLIN	5	2.17
AL	JEFFERSON	2	0.87
AL	LAUDERDALE	89	38.70
AL	LAWRENCE	33	14.35
AL	LIMESTONE	10	4.35
AL	MADISON	2	0.87
AL	MARION	3	1.30
AL	MARSHALL	2	0.87
AL	MORGAN	2	0.87
AL	PICKENS	1	0.43
AL	TUSCALOOSA	2	0.87
AL	WALKER	2	0.87
IN	HAMILTON	1	0.43
MS	ALCORN	1	0.43
MS	DESOTO	1	0.43
MS	LOWNDES	1	0.43
MS	MONROE	1	0.43
MS	PRENTISS	1	0.43
MS	TISHOMINGO	1	0.43
NC	BUMPKUM	1	0.43
ND	CUSTER	1	0.43
ND	MINIHAHA	1	0.43
TN	FAYETTE	1	0.43
TN	FRANKLIN	1	0.43
TN	GILES	5	2.17
TN	HAMILTON	1	0.43
TN	MARSHALL	1	0.43
TN	MAURY	8	3.48
TN	MCNAIRY	1	0.43
Total		230 *	99.92

\* In an interview, a party may include anglers from different counties; therefore, this total is higher than the total number of parties interviewed.

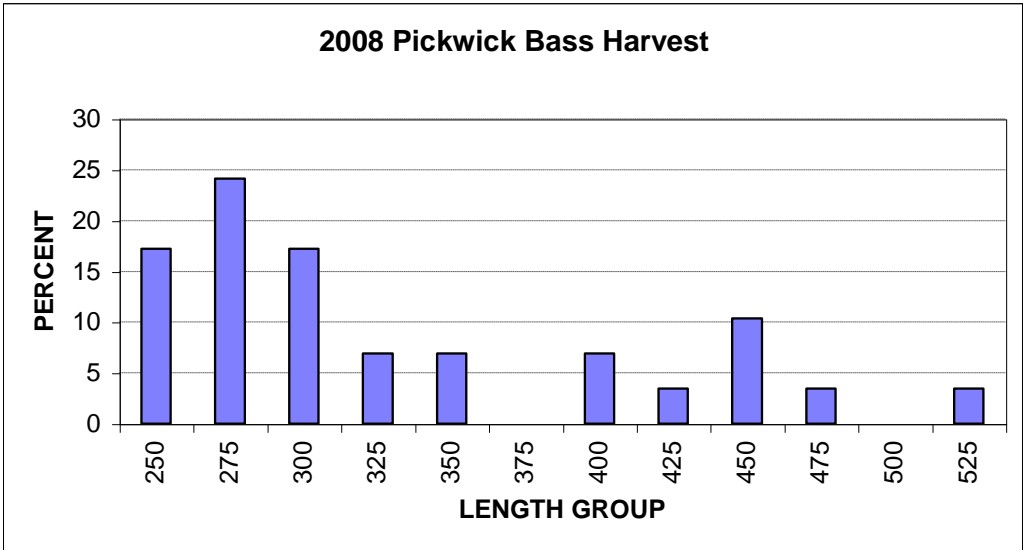


FIGURE 1. Percent of black bass harvested (N=29) by 25mm length groups from Pickwick Reservoir, spring 2008.

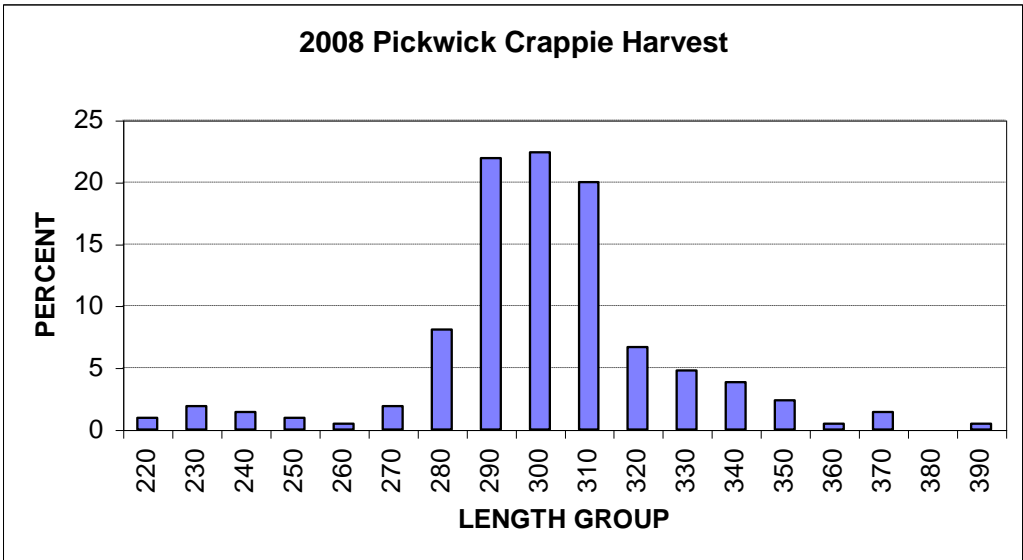


FIGURE 2. Percent of crappie harvested (N=210) by 10mm length groups from Pickwick Reservoir, spring 2008.