UPPER MOBILE DELTA MANAGEMENT REPORT

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Introduction

The Mobile Delta consists of approximately 20,323 acres of water. It is formed by the confluence of the Alabama and Tombigbee Rivers in northern Mobile and Baldwin Counties and is a major North American river delta (Table 1). Sportfish populations of the Mobile Delta have been sampled since 1988 (Tucker and Johnson 1991) and a summary of all historical data can be found in this report and in Armstrong et al. (2006). Samples are collected to monitor trends in fish abundance, growth, recruitment, and mortality, and to identify any problems with sport fisheries of the Mobile Delta. Management activities have included standardized sampling, evaluation of the need for length or creel limits, stocking of striped bass, hybrid striped bass, Florida largemouth bass, bluegill sunfish, and black crappie (Table 2).

Methods

From March 27 to 30, 2007, sampling in the Upper Mobile Delta was conducted using electrofishing gear. Only largemouth bass were targeted and collections came from ten random sites; eight from backwater lakes and creeks, and two from mainstem rivers. Total length (mm) and weight (g) were recorded for all bass collected. Age determination of largemouth bass was done by two readers examining whole otoliths from both stock and substock fish under a dissecting microscope. Otoliths that were initially determined to be age 5 or older were sectioned and examined by two readers using a compound microscope (Maceina 1988). Sex was examined for bass that were sacrificed for otoliths. Data analysis was prepared using the program ADWFF Data Analysis and Report Utilities (Slipke 2004).

Results and Discussion

Largemouth bass (N=275) were collected at catch rates (CPE) that were lower than average for all relative stock density (RSD) groups except for RSD-M fish (Table 3). Twelve

age classes were represented and the 2005 year class (age 2) bass exhibited the highest CPE rates and RSD composition (Table 4). Both CPE rates (14.9 bass/hr) and percent composition (ratio = 36) for substock bass were below average (Upper Delta average = 32.5 fish/hr, ratio = 59) and the 2006 year class (30.7%) did not recruit as successfully as those in 2005 (36.5%; Table 4, Figures 2, 3). This same pattern occurred during 2000 and 2004 when relatively dry spring months resulted in low relative abundance of age 1 bass the following spring (Armstrong et al. 2001, 2006). CPE rates (8.3 bass/hr) and RSD (20%) of quality-size bass also fell below the Upper Delta IQR. This size group is primarily affected by the 2004 year class (Armstrong et al. 2007).

A weighted catch curve regression was statistically significant with survival of 68% for bass ages 3 to 12 ($r^2 = 0.94$, $\underline{P} < 0.01$; Figure 4). This survival rate is higher than previous years and within an acceptable range (Armstrong et al. 2001, 2006).

Relative weight (Wr) values were below average (range 87 – 88) for all RSD groups. Low Wr values may have been affected by warm spring temperatures (20.9 – 26.3˚ C) and it is probable that the peak bass spawn was prior to sampling.

Sex identification was made on stock bass (N=125) and an approximate 1:1 female to male ratio was observed (Table 5). Females exhibited a greater weight per length unit relation compared to males, diverging at approximately 375 mm (Figure 5). Females exhibited a greater average length and weight, and older age composition compared to males. These results are not uncommon from other largemouth bass populations observed in Alabama waters.

There is a significant positive correlation with sample CPE of young-of-year (age 0+) bass and age 1 recruits ($r = 0.86$, $r^2 = 0.75$, $\underline{P} < 0.05$; Figure 6). Thus, recruitment of age 1 bass are positively related to and dependant upon survival of age 0+ bass. These life stages are

critical in that good recruitment is also related to abundance of bass in older age classes. Indeed, CPE of age 1 bass was a good predictor of age 3 CPE (r = 0.99, r^2 = 0.98, $\underline{P} < 0.05$). It is apparent that sampling of Upper Delta bass populations through both fall and spring seasons have revealed important trends in relative abundance at various ages. Further examination of age, growth, recruitment, and mortality patterns must be done to define the stock-recruitment relationship. This is especially important to determine abundance of older bass that are targeted and preferred by anglers.

Conclusions & Management Recommendations

1. Largemouth bass management should remain under current regulations.
2. Examine data to determine stock-recruitment patterns, especially in older age bass.
3. Compared to the present population structure, anglers should see numbers of quality-size bass increase in 2008 if adequate recruitment of stock-size bass occurs.

Literature Cited

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APPENDIX A

Tables & Figures

Table 1. Morphometric, physical, and chemical characteristics of the Mobile Delta.

Surface area	20, 323 acres (Crance 1971)
Drainage area	43, 683 sq. mi. (Mettee et al. 1996)
Elevation	0 - 5 feet-msl
Average Discharge	58, 636 cfs
Salinity	0 - 5 ppt
Growing season	270 frost free days (Jenkins 1967)

Table 2. Fish stocking in the Mobile Delta, 1999-2007.

Species	Year	No/Ac	Size (in)	Total
Black crappie	2005	0.5	3 - 6	10,016
Bluegill sunfish	2004	16.8	1 - 3	340,532
	2005	7.9	1 - 3	160,000
Largemouth bass (Florida)	1999 *	10.0	1 - 3	4,000
	2000 *	10.0	1 - 3	4,000
Hybrid striped bass	1999	2.7	1 - 3	93,456
	2000	3.7	1 - 3	134,581
	2001	3.7	1 - 3	133,000
	2002	5.9	1 - 3	213,900
	2003	6.7	1 - 3	240,919
	2004	3.2	1 - 2	114,460
Striped bass (Atlantic)	1999	2.4	1 - 3	84,200
	2001	2.8	1 - 3	99,964
	2003	4.3	1 - 3	155,720
Striped bass (Gulf)	1999	1.1	1 - 3	40,068
	2002	1.9	1 - 3	68,306
	2004	3.2	2	117,060
	2005	9.7	1 - 2	196,795
	2006	3.3	1 - 2	67,360
	2007	3.5	1	70,720

* Concentrated localized stocking in Dead Lake

TABLE 3. Relative stock density (pct), catch-per-effort (cpe), number (no), and relative weight (Wr) of largemouth bass in the Upper Mobile Delta, 1990 - 2007. Trophy fish category is not shown here since bass within this size group have never been collected in this area. The most recent data collected for Spring, 2007, are in **BOLD**.

						Total Number, CPE, Percent of Sample, and Wr																			
				No. of samples &		SUBSTOCK			RSD-S				RSD-Q				RSD-P				RSD-M				TOTAL SUB-M	
Species	Season	Year	Gear	Total Effort (Hrs)		no.	cpe	ssr [a]	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe	pct.	Wr	no.	cpe
Largemouth bass	Spring	1990	EL	3	1.60	107	66.9	107	56	35.0	56		35	21.9	35		9	5.6	9						207	129.4
Largemouth bass	Spring	2001	EL	6	2.92	33	11.3	30	62	21.2	57	102	32	11.0	29	98	15	5.1	14	99					142	48.6
Largemouth bass	Spring	2002	EL	6	2.90	114	39.3	101	54	18.6	48	99	36	12.4	32	102	22	7.6	19	101	1	0.3	1	85	227	78.3
Largemouth bass	Spring	2003	EL	6	3.38	73	21.6	58	71	21.0	56	109	28	8.3	22	107	24	7.1	19	106	3	0.9	2	104	199	58.9
Largemouth bass	Spring	2004	EL	3	1.10	73	66.4	64	52	47.3	46	104	42	38.2	37	101	20	18.2	18	102					187	170.0
Largemouth bass	Spring	2005	EL	6	2.84	20	7.0	19	53	18.7	49	104	36	12.7	33	99	18	6.3	17	96	1	0.4	1	95	128	45.1
Largemouth bass	**Spring**	**2007**	**EL**	**10**	**4.84**	**72**	**14.9**	**36**	**121**	**25.0**	**60**	**88**	**40**	**8.3**	**20**	**87**	**39**	**8.1**	**19**	**87**	**3**	**0.6**	**1**	**88**	**275**	**56.8**
	LAKE AVERAGE						32.5	59		26.7	53	101		16.1	30	99		8.3	16	99		0.6	1	93		83.9

[a] SSR is known as substock ratio, derived by the number of substock fish per 100 fish of stock-size and larger.

Table 4. Age composition and mean length of largemouth bass from the Upper Mobile Delta, Spring, 2007. Total sample effort was 4.84 hours.

Annulus	Year Class	Number	Percent	CPE	Mean Length (mm)	Standard Error	Length Range (mm)
1	2006	84	30.7	17.4	153.9	4.4	85 - 249
2	2005	100	36.5	20.7	244.9	3.2	178 - 329
3	2004	31	11.3	6.4	300.4	8.7	216 - 423
4	2003	17	6.2	3.5	369.1	6.5	327 - 411
5	2002	12	4.4	2.5	378.6	17.1	296 - 457
6	2001	11	4.0	2.3	411.9	15.7	347 - 493
7	2000	9	3.3	1.9	450.2	14.5	369 - 498
8	1999	3	1.1	0.6	482.7	22.3	452 - 526
9	1998	2	0.7	0.4	420.0	10.0	410 - 430
10	1997	3	1.1	0.6	517.3	44.6	430 - 577
11	1996	1	0.4	0.2	506.0		
12	1995	1	0.4	0.2	460.0		
Total		274	100.0	56.6			

Table 5. Sex composition of largemouth bass from the Upper Mobile Delta, Spring, 2007.

Sex	Number	Ratio	Mean Length (mm)	Length Range (mm)	Mean Weight (g)	Mean Age (Years)	Age Range
Females	64	1.04	365.4	200 - 577	794.1	4.41	1 to 11
Males	61	0.96	303.2	217 - 460	413.7	3.41	1 to 12

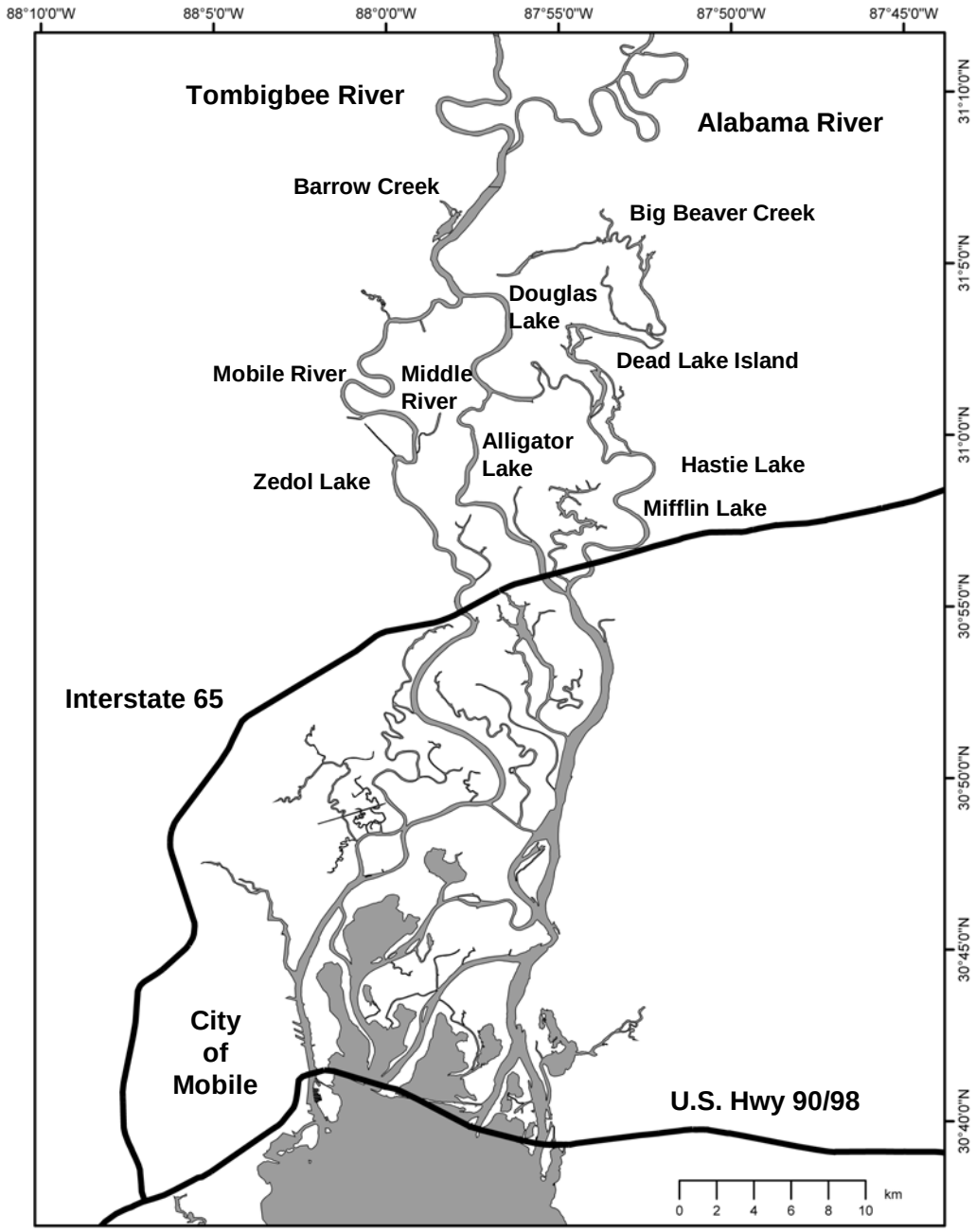


Figure 1. Upper Mobile Delta sample sites during Spring, 2007. The Upper Delta area is bounded by I-65 to the South and by the confluence of the Alabama and Tombigbee Rivers to the North.

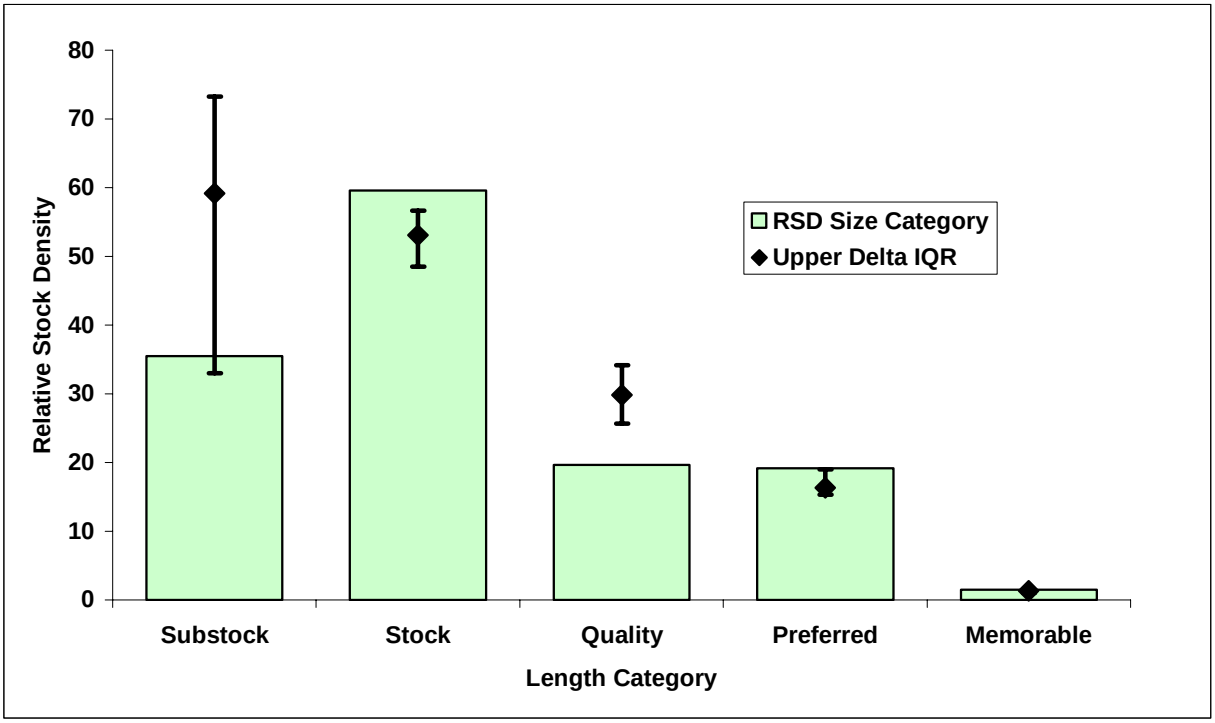


Figure 2. Relative stock density of largemouth bass collected during electrofishing in the Upper Mobile Delta Spring, 2007. Error bars represent 25th and 75th percentile (IQR) ranges developed for average RSD size group composition of bass in this area.

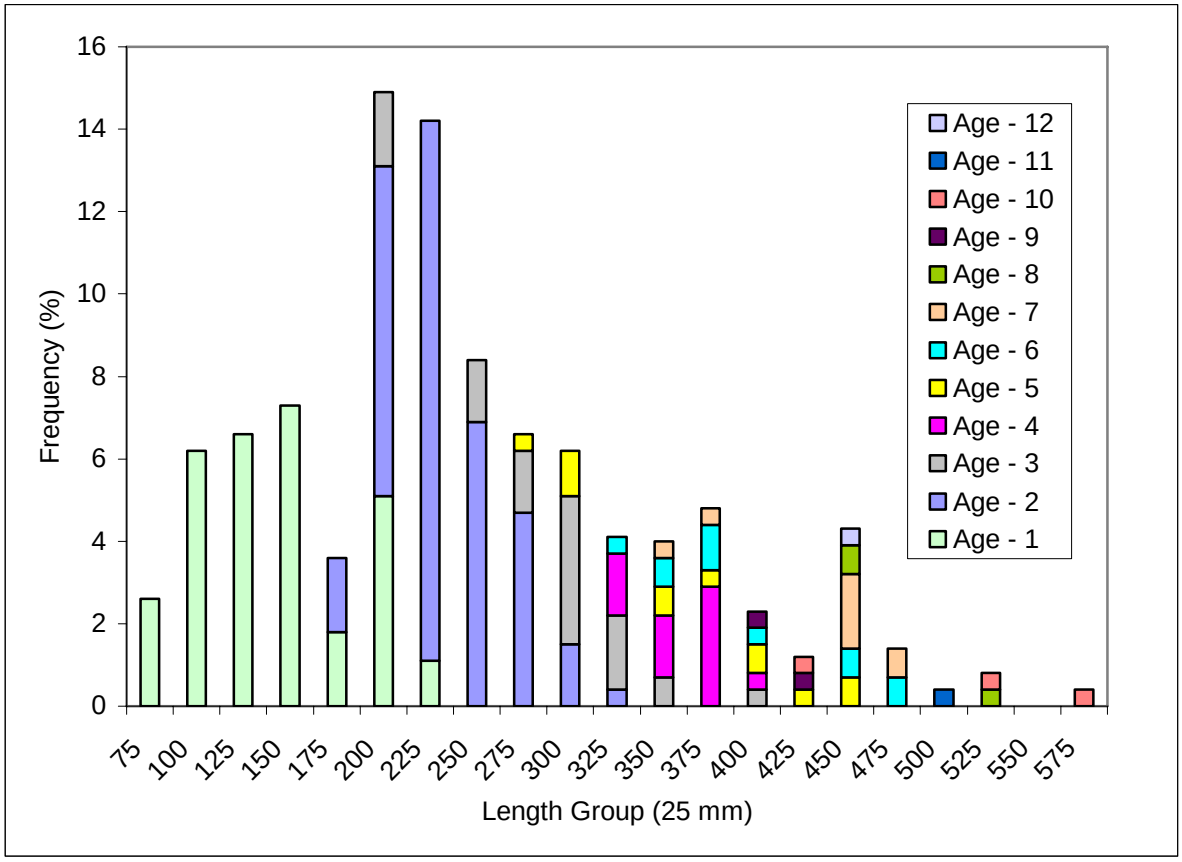


Figure 3. Percent length frequency at age of largemouth bass collected from the Upper Mobile Delta during Spring, 2007.

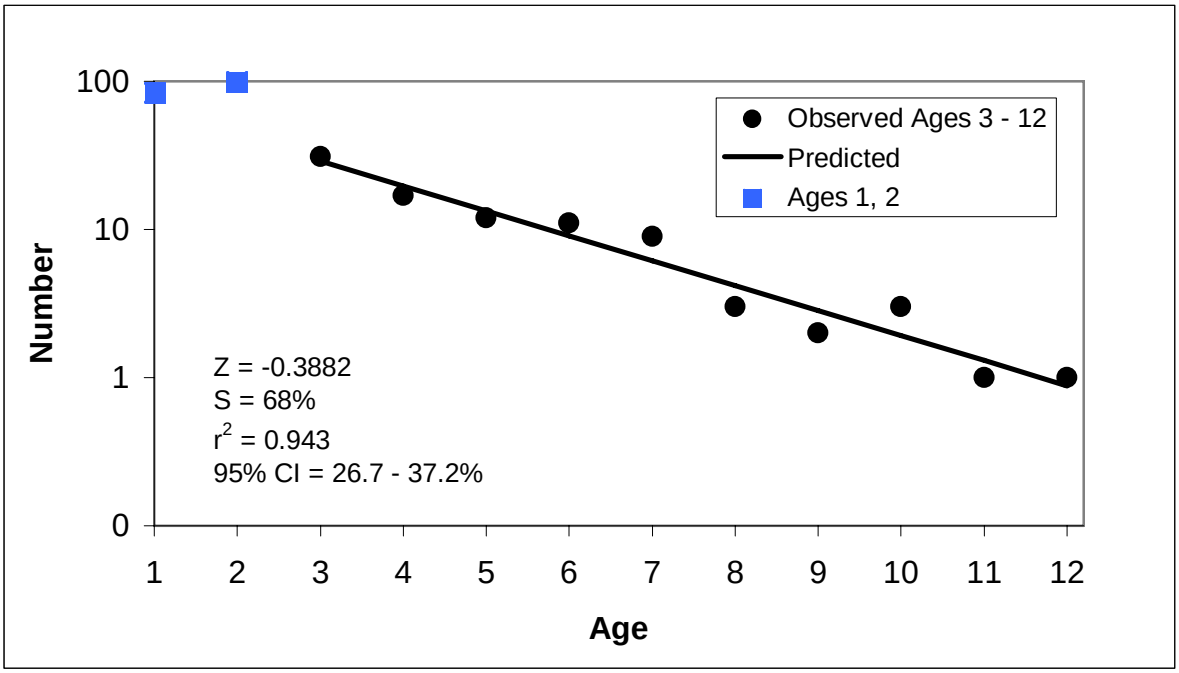


Figure 4. Mortality and survival statistics of Upper Delta largemouth bass collected during Spring, 2007. Regression used weighted data of bass ages 3 to 12 from Table 4.

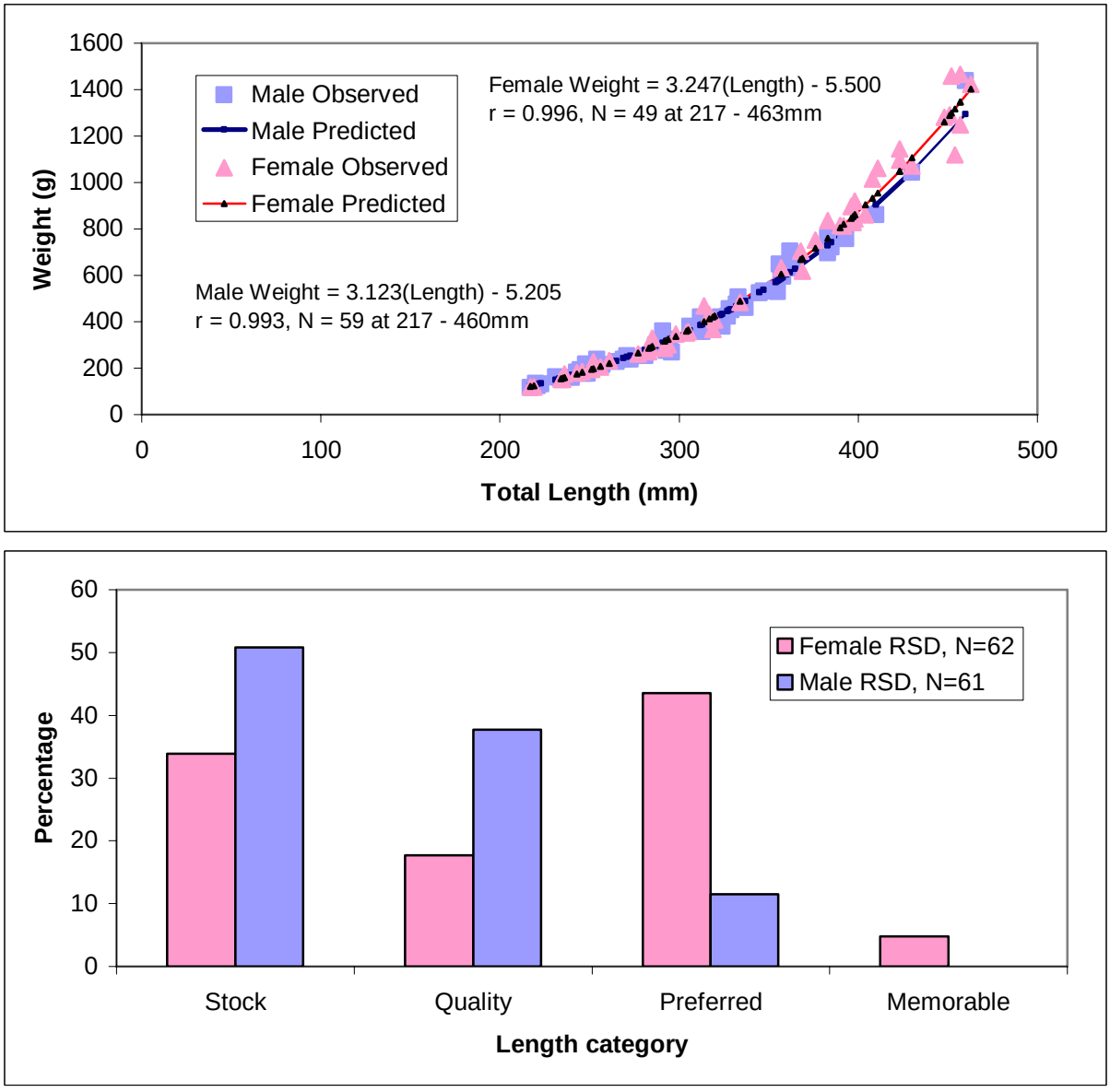
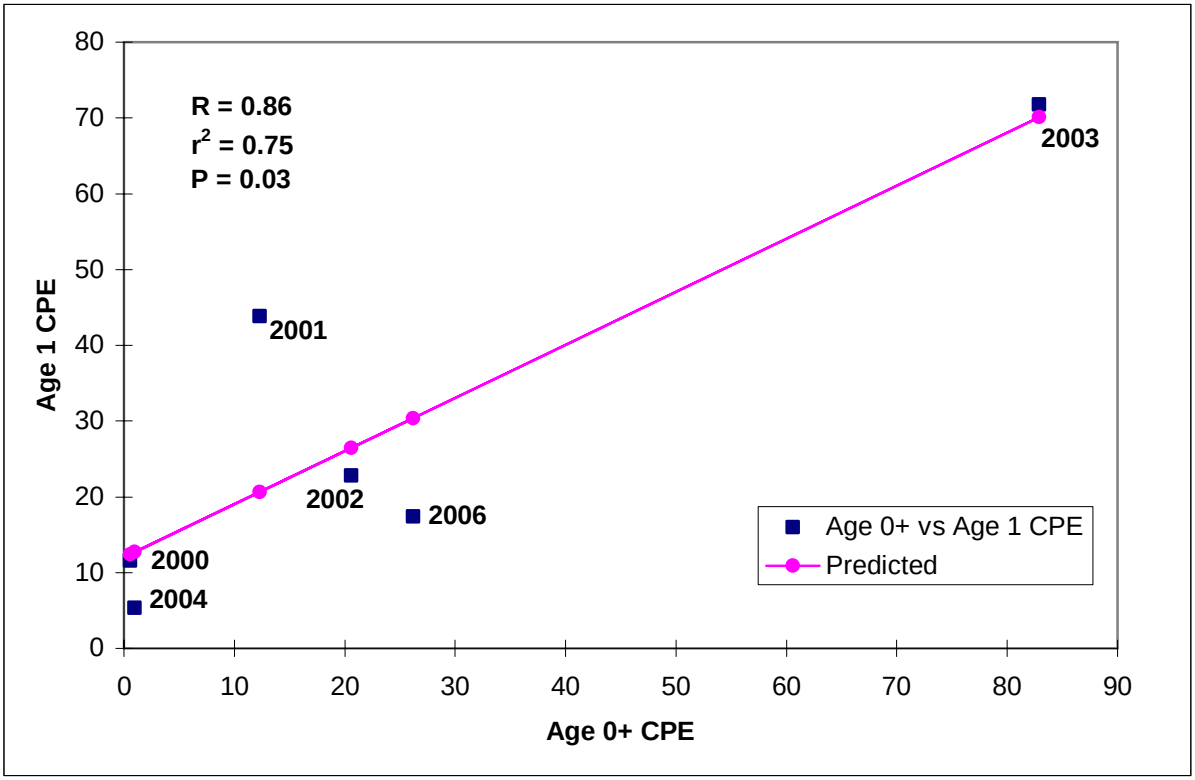


Figure 5. Length-weight relationship (top panel) and relative stock density (bottom panel) of male and female Upper Delta largemouth bass collected during Spring, 2007. Only males and females of similar length ranges were used in length-weight analysis.



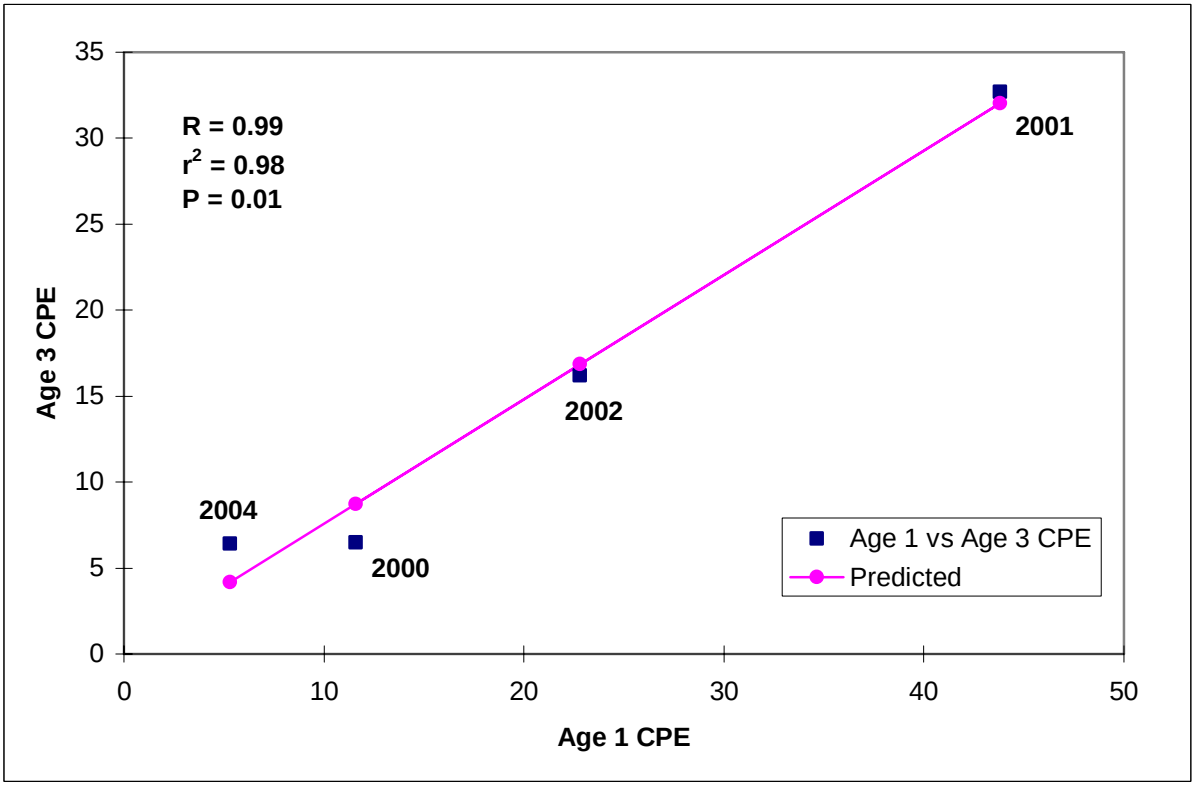


Figure 6. Regression and correlation relation of electrofishing catch rates (CPE) for Fall (age 0+) and Spring (age 1 and 3) collections of Upper Mobile Delta largemouth bass. Data are untransformed, comparing samples across years within each year/age-class labeled.