

**MOBILE DELTA  
MANAGEMENT REPORT  
Fall 2006**

Prepared by

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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 1992, Armstrong et al. 2004). Samples have been collected to monitor trends in fish abundance, growth, recruitment, mortality, and to identify sport fisheries problems. Management activities have included standardized sampling and stocking of striped bass, hybrid striped bass, bluegill, black crappie, and Florida largemouth bass (Table 2).

## **Methods**

Fish sampling in the Mobile Delta included electrofishing surveys using standard methods (Cook 1999). Sampling is stratified by upper and lower delta areas (i.e., areas split by I-65) and sites within each area are randomly selected from a group of ten different watersheds or subbasins that cover a wide range of water quality (Figure 1). Target species sampled included largemouth bass. Total length (mm) and weight (g) were recorded for all individual bass. Age determination of largemouth bass was done on a subsample of substock bass to determine year-class abundance (age 0+) using whole otoliths. Selective sampling of bass otoliths was done using a length range frequency table based on previous fall standardized collection data (2000-2003). Otoliths were examined by two readers using a dissecting microscope. Data analysis was computed using the EXCEL add-in program ADWFF Data Analysis and Report Utilities (Slipke 2004).

## **Results and Discussion**

During Fall, 2006 (October 20 – November 3), ten sites were sampled for largemouth bass in the Upper Mobile Delta (Figure 1). Samples from this area consisted of 341 bass (Table

3). Only substock fish were aged to determine age 0+ abundance which comprised 37.2% of the sample (Table 5, Figure 4). Relative stock density (RSD) values were higher than area average for all RSD groups except for quality-size bass (Figure 2). Below average abundance of larger stock and quality-size bass is also reflected in the length frequency composition (Figure 3). Since bass typically grow up to the upper boundary of stock-size to smaller quality-size at age 2+, this below-average grouping of fish is likely from the 2004 year-class. Catch-per-effort (CPE) rates were higher than area average for all RSD groups except for stock- and quality-size bass (Table 3). Relative weight (Wr) values were below the area average, ranging from 85 to 88.

Seven sites were sampled in the Lower Delta during Fall, 2006 (November 6 – November 27), and CPE (112.3 fish/hr) was higher than average (Table 4). Percent composition varied and was near area averages for substock and quality RSD groups (Figures 2, 3). Abundance of age 0+ bass (CPE = 41.7 fish/hr) was above the area average and somewhat higher than during Fall, 2005 (Table 5, Figure 4). CPE rates were higher than average for all RSD groups. Except for Preferred-size bass, Wr values were below area averages ranging from 88 to 94.

Because abundance of age 0+ bass may in part determine year-class strength, effective sampling of bass may be useful in predicting changes in bass populations and subsequent angler success. Previous sampling results show that year class strength of Upper Delta bass is related to abundance of age 0+ fish the previous year (Armstrong et al. 2006). However, this relation was not the same for Lower delta bass. This is surprising since previous data demonstrate much higher sampling variability of age 0+ Upper Delta bass (Coefficient of variation = 121.04) to that of Lower Delta bass (Coefficient of variation = 70.39; Figure 4). Lower Delta samples also exhibit somewhat higher mean catch rates (11-year Mean = 26.6 fish/hr) of age 0+ bass. It is apparent that several factors (e.g., water quality, hydrology) affect differences in spawning

success as reflected in age 0+ catch rates across years. The same pattern is true when describing variability in percent composition of RSD groups in Fall, 2003 through 2006 (Figure 2). Variability and differences in RSD size composition appeared to be greater for Upper Delta bass compared to Lower Delta groups.

We suggest that the bass population in the Lower Delta is less variable than in the Upper Delta bass with respect to size structure and age 0+ abundance. However, both areas appear to have skewed percent composition across RSD size groups. In both areas of the delta, stock-size bass exhibited a decline in percent composition during 2005, and quality-size bass were similarly below the RSD average during Fall, 2006. Lower relative abundance in these size groups will likely affect angler catch rates of larger quality- and preferred-size bass throughout 2007.

### **Conclusions and Management Recommendations**

1. There are no management recommendations for largemouth bass at this time.
2. Anglers will likely observe preferred- and memorable-size bass in good numbers with somewhat lower than normal catch rates of quality-size bass throughout 2007.
3. Standardized sampling in the Mobile Delta will be conducted during Spring, 2007.
4. Fall sampling, though highly variable is effective in representing year-class strength in the Upper Delta; however, this relation is not apparent for the Lower Delta.

## **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                            |
| Thermocline depth | none    |                                |
| Salinity          | 0 - 5   | ppt                            |
| Growing season    | 270     | frost free days (Jenkins 1967) |

Table 2. Fish stocking in the Mobile Delta, 1999-2006.

| 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  |

\* Concentrated localized stocking in Dead Lake

TABLE 3. Relative stock density (pct), catch-per-effort (cpe), number (no), and relative weight (Wr) of target sportfish species in the Upper Mobile Delta, 1991 - 2006. Trophy fish category is not shown here since they have never been collected in this area.

| Species         | Season | Year | Gear | No. of samples &<br>Total Effort (Hrs) | Total Number, CPE, Percent of Sample, and Wr |     |                   |       |     |      |      |       |     |      |    |       |     |      |    |       |     |      |    |       |     |       |
|-----------------|--------|------|------|--|--|-----|-------------------|-------|-----|------|------|-------|-----|------|----|-------|-----|------|----|-------|-----|------|----|-------|-----|-------|
|                 |        |      |      |  | SUBSTOCK                                     |     |                   | RSD-S |     |      |      | RSD-Q |     |      |    | RSD-P |     |      |    | RSD-M |     |      |    | TOTAL |     |       |
|                 |        |      |      |  | no.  | cpe | pct. <sup>a</sup> | no.   | cpe | pct. | Wr   | no.   | cpe | pct. | Wr | no.   | cpe | pct. | Wr | no.   | cpe | pct. | Wr | no.   | cpe |       |
| Largemouth bass | Fall   | 1991 | EL   | 3                                      | 1.49   | 27  | 18.1              | 27    | 42  | 28.2 | 42   | 86    | 42  | 28.2 | 42 | 98    | 15  | 10.1 | 15 | 91    | 1   | 0.7  | 1  | 90    | 127 | 85.2  |
| Largemouth bass | Fall   | 1993 | EL   | 5                                      | 2.22   | 16  | 7.2               | 16    | 34  | 15.3 | 34   | 86    | 49  | 22.1 | 49 | 87    | 15  | 6.8  | 15 | 87    | 2   | 0.9  | 2  | 97    | 116 | 52.3  |
| Largemouth bass | Fall   | 1994 | EL   | 5                                      | 2.20   | 28  | 12.9              | 28    | 42  | 19.4 | 42   | 87    | 22  | 10.1 | 22 | 91    | 34  | 15.7 | 34 | 94    | 3   | 1.4  | 3  | 86    | 129 | 59.5  |
| Largemouth bass | Fall   | 1995 | EL   | 5                                      | 2.50   | 106 | 42.4              | 108   | 56  | 22.4 | 57   | 92    | 28  | 11.2 | 29 | 90    | 13  | 5.2  | 13 | 96    | 1   | 0.4  | 1  | 97    | 204 | 81.6  |
| Largemouth bass | Fall   | 1996 | EL   | 3                                      | 1.27   | 10  | 7.9               | 9     | 51  | 40.2 | 47   | 90    | 30  | 23.6 | 28 | 93    | 26  | 20.5 | 24 | 91    | 1   | 0.8  | 1  | 92    | 118 | 92.9  |
| Largemouth bass | Fall   | 1999 | EL   | 6                                      | 2.69   | 27  | 10.0              | 26    | 66  | 24.5 | 63   | 87    | 26  | 9.7  | 25 | 95    | 13  | 4.8  | 12 | 93    |     |      |    |       | 132 | 49.1  |
| Largemouth bass | Fall   | 2000 | EL   | 10                                     | 5.00   | 20  | 4.0               | 21    | 40  | 8.0  | 42   | 80    | 34  | 6.8  | 36 | 83    | 20  | 4.0  | 21 | 80    | 1   | 0.2  | 1  | 86    | 115 | 23.0  |
| Largemouth bass | Fall   | 2001 | EL   | 7                                      | 3.50   | 56  | 16.0              | 32    | 77  | 22.0 | 44   | 85    | 59  | 16.9 | 34 | 88    | 39  | 11.1 | 22 | 91    |     |      |    |       | 231 | 66.0  |
| Largemouth bass | Fall   | 2002 | EL   | 8                                      | 4.02   | 111 | 27.6              | 84    | 71  | 17.7 | 53   | 92    | 42  | 10.4 | 32 | 89    | 20  | 5.0  | 15 | 91    |     |      |    |       | 244 | 60.7  |
| Largemouth bass | Fall   | 2003 | EL   | 4                                      | 1.52   | 127 | 83.6              | 98    | 81  | 53.3 | 63   | 93    | 29  | 19.1 | 22 | 97    | 18  | 11.8 | 14 | 99    | 1   | 0.7  | 1  | 93    | 256 | 168.5 |
| Largemouth bass | Fall   | 2004 | EL   | 6                                      | 3.00   | 5   | 1.7               | 10    | 14  | 4.7  | 29   | 89    | 21  | 7.0  | 44 | 91    | 12  | 4.0  | 25 | 93    | 1   | 0.3  | 2  | 93    | 53  | 17.6  |
| Largemouth bass | Fall   | 2005 | EL   | 8                                      | 3.88   | 226 | 58.2              | 215   | 32  | 8.2  | 30   | 95    | 49  | 12.6 | 47 | 95    | 24  | 6.2  | 23 | 100   |     |      |    |       | 331 | 85.3  |
| Largemouth bass | Fall   | 2006 | EL   | 10                                     | 4.85   | 157 | 32.4              | 85    | 90  | 18.6 | 49   | 86    | 43  | 8.9  | 23 | 85    | 45  | 9.3  | 25 | 87    | 6   | 1.2  | 3  | 88    | 341 | 70.3  |
|                 |        |      |      | LAKE AVERAGE                           |  |     | 24.8              | 58    |     |      | 21.7 | 46    | 88  |      |    | 14.4  | 33  | 91   |    |       |     |      |    |       |     | 70.2  |

<sup>a</sup> The substock pct. is known as substock ratio, derived by the number of substock fish per 100 fish of stock-size and larger.

TABLE 4. Relative stock density (pct), catch-per-effort (cpe), number (no), and relative weight (Wr) of target species in the Lower Mobile Delta, 1993 - 2006. Trophy fish category is not shown here since they have never been collected in this area.

| Species         | Season | Year | Gear | No. of samples &<br>Total Effort (Hrs) |              | Total Number, CPE, Percent of Sample, and Wr |      |                  |       |      |      |     |       |      |      |     |       |      |      |     |       |     |      |     |       |       |
|-----------------|--------|------|------|--|--------------|--|------|------------------|-------|------|------|-----|-------|------|------|-----|-------|------|------|-----|-------|-----|------|-----|-------|-------|
|                 |        |      |      |  |              | SUBSTOCK                                     |      |                  | RSD-S |      |      |     | RSD-Q |      |      |     | RSD-P |      |      |     | RSD-M |     |      |     | TOTAL |       |
|                 |        |      |      |  |              | no.  | cpe  | pct <sup>a</sup> | no.   | cpe  | pct. | Wr  | no.   | cpe  | pct. | Wr  | no.   | cpe  | pct. | Wr  | no.   | cpe | pct. | Wr  | no.   | cpe   |
| Largemouth bass | Fall   | 1993 | EL   | 3                                      | 1.17         | 5  | 4.3  | 5                | 33    | 28.3 | 33   | 94  | 43    | 36.8 | 43   | 93  | 22    | 18.8 | 22   | 87  | 2     | 1.7 | 2    | 105 | 105   | 89.7  |
| Largemouth bass | Fall   | 1994 | EL   | 6                                      | 2.60         | 13   | 5.0  | 10               | 68    | 26.2 | 51   | 97  | 48    | 18.5 | 36   | 104 | 18    | 6.9  | 13   | 101 |       |     |      |     | 147   | 56.5  |
| Largemouth bass | Fall   | 1995 | EL   | 4                                      | 1.52         | 22   | 14.5 | 21               | 66    | 43.4 | 64   | 93  | 31    | 19.7 | 30   | 93  | 5     | 3.3  | 5    | 91  | 1     | 0.7 | 1    | 78  | 125   | 81.6  |
| Largemouth bass | Fall   | 1996 | EL   | 5                                      | 2.26         | 74   | 32.7 | 69               | 30    | 13.3 | 28   | 94  | 62    | 27.4 | 58   | 98  | 14    | 6.2  | 13   | 90  | 1     | 0.4 | 1    | 96  | 181   | 80.1  |
| Largemouth bass | Fall   | 2000 | EL   | 6                                      | 3.05         | 42   | 13.8 | 39               | 66    | 21.6 | 61   | 100 | 28    | 9.2  | 26   | 97  | 15    | 4.9  | 14   | 95  |       |     |      |     | 151   | 49.5  |
| Largemouth bass | Fall   | 2001 | EL   | 7                                      | 3.08         | 78   | 25.3 | 42               | 111   | 36.0 | 60   | 92  | 60    | 19.5 | 32   | 92  | 13    | 4.2  | 7    | 90  | 1     | 0.3 | 1    | 93  | 263   | 85.4  |
| Largemouth bass | Fall   | 2002 | EL   | 8                                      | 4.09         | 98   | 24.0 | 80               | 69    | 16.9 | 57   | 94  | 42    | 10.3 | 34   | 94  | 11    | 2.7  | 9    | 95  |       |     |      |     | 220   | 53.8  |
| Largemouth bass | Fall   | 2003 | EL   | 8                                      | 3.93         | 174  | 44.3 | 155              | 58    | 14.8 | 52   | 94  | 42    | 10.7 | 38   | 93  | 12    | 3.1  | 11   | 93  |       |     |      |     | 286   | 72.8  |
| Largemouth bass | Fall   | 2004 | EL   | 4                                      | 1.98         | 132  | 66.7 | 123              | 64    | 32.3 | 60   | 99  | 30    | 15.2 | 28   | 98  | 13    | 6.6  | 12   | 93  |       |     |      |     | 239   | 120.7 |
| Largemouth bass | Fall   | 2005 | EL   | 5                                      | 2.44         | 105  | 43.0 | 102              | 47    | 19.3 | 46   | 95  | 48    | 19.7 | 46   | 98  | 7     | 2.9  | 7    | 102 | 1     | 0.4 | 1    | 98  | 208   | 85.2  |
| Largemouth bass | Fall   | 2006 | EL   | 7                                      | 3.50         | 146  | 41.7 | 59               | 126   | 36.0 | 51   | 93  | 86    | 24.6 | 35   | 94  | 32    | 9.1  | 13   | 94  | 3     | 0.9 | 1    | 88  | 393   | 112.3 |
|                 |        |      |      |  | LAKE AVERAGE |  | 28.7 | 64               |       | 26.2 | 51   | 95  |       | 19.2 | 37   | 96  |       | 6.2  | 11   | 94  |       | 0.4 | 1    | 93  |       | 80.7  |

<sup>a</sup> The substock pct. is known as substock ratio, derived by the number of substock fish per 100 fish of stock-size and larger.

Table 5. Age composition and mean length of largemouth bass from the Upper and Lower Mobile Delta, Fall, 2006. Only age 0+ fish were aged to determine year-class strength.

| Delta Area | Age | Year Class | Number | Percent | CPE  | Mean TL (mm) | Standard |                   |
|------------|-----|------------|--------|---------|------|--------------|----------|-------------------|
|            |     |            |        |         |      |              | Error    | Length Range (mm) |
| Upper      | 0   | 2006       | 127    | 37.2    | 26.2 | 127.3        | 2.5      | 77 - 199          |
| Lower      | 0   | 2006       | 146    | 37.2    | 41.7 | 135.2        | 2.6      | 75 - 222          |

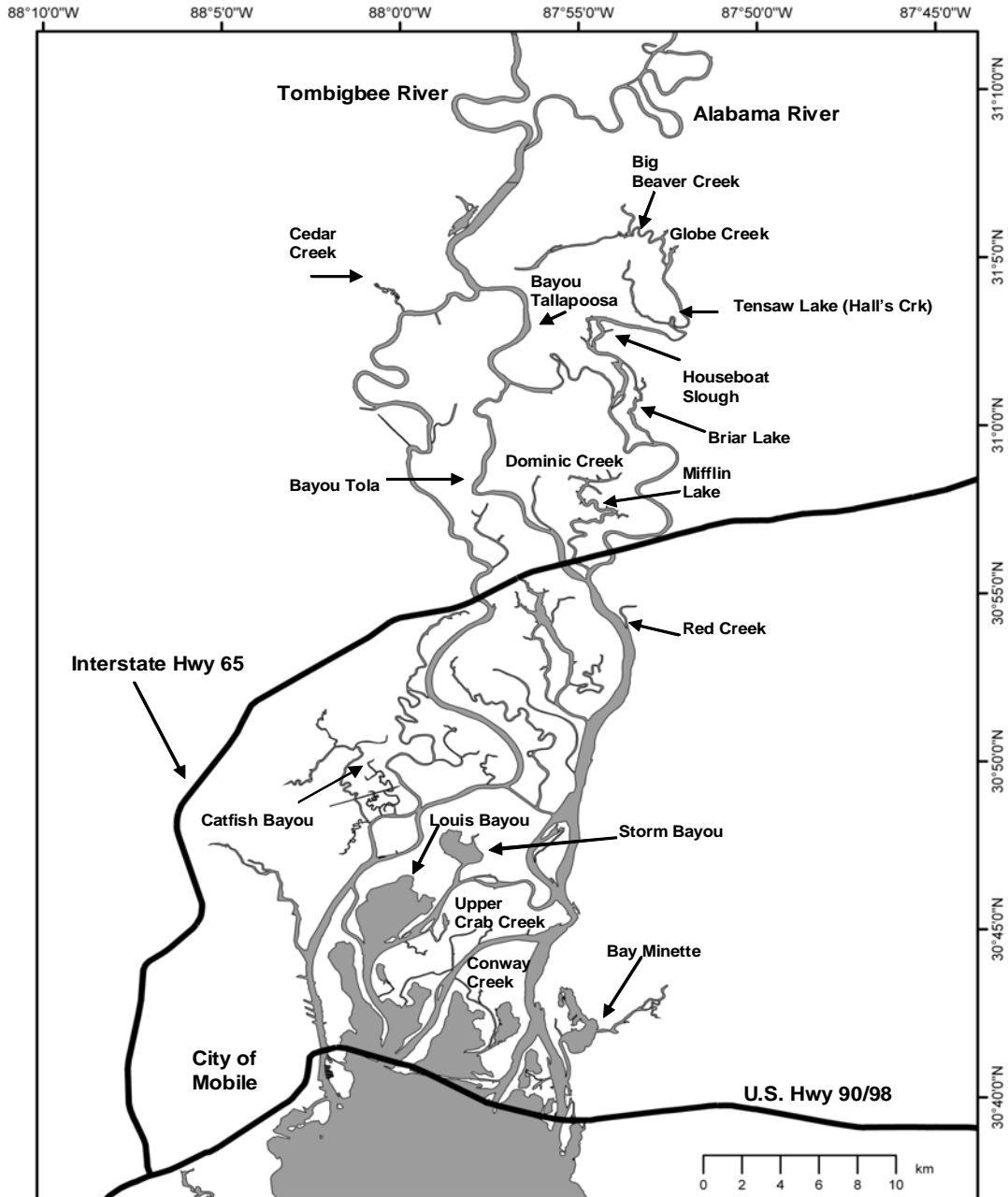


Figure 1. Map of Mobile Delta sample sites during Fall, 2006 electrofishing (black labels). Upper and Lower Delta areas are separated by I-65, bounded to the South by U.S. 90/98, and to the North by the confluence of the Alabama and Tombigbee Rivers.

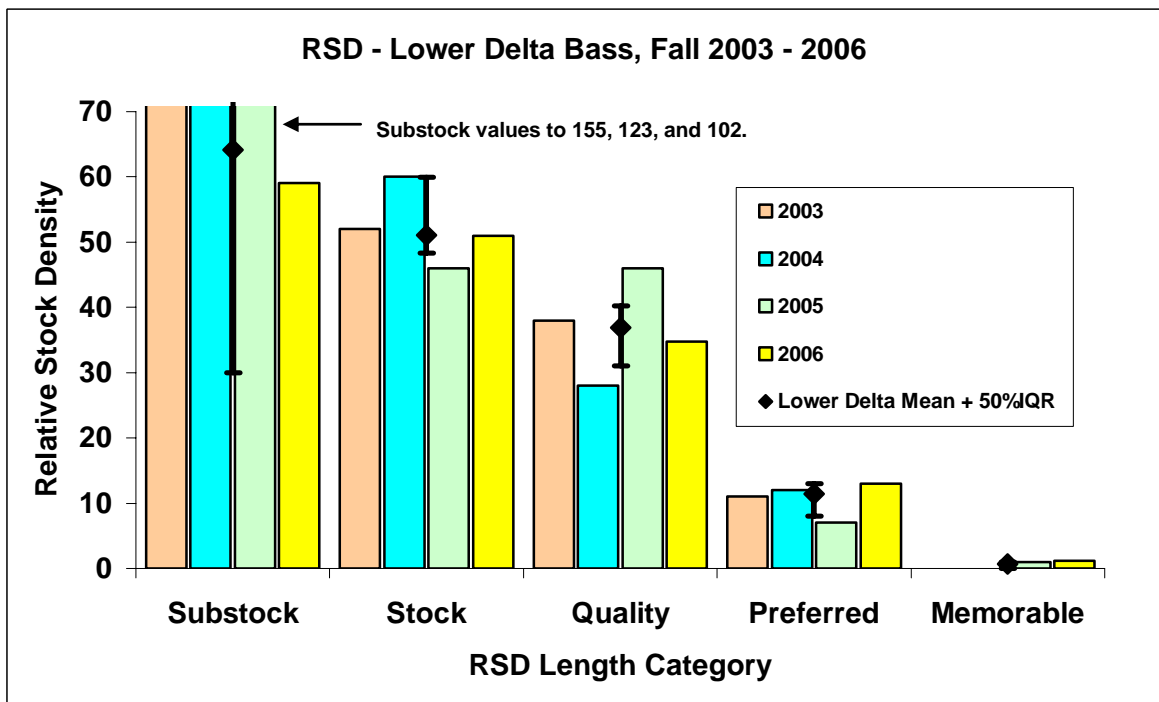
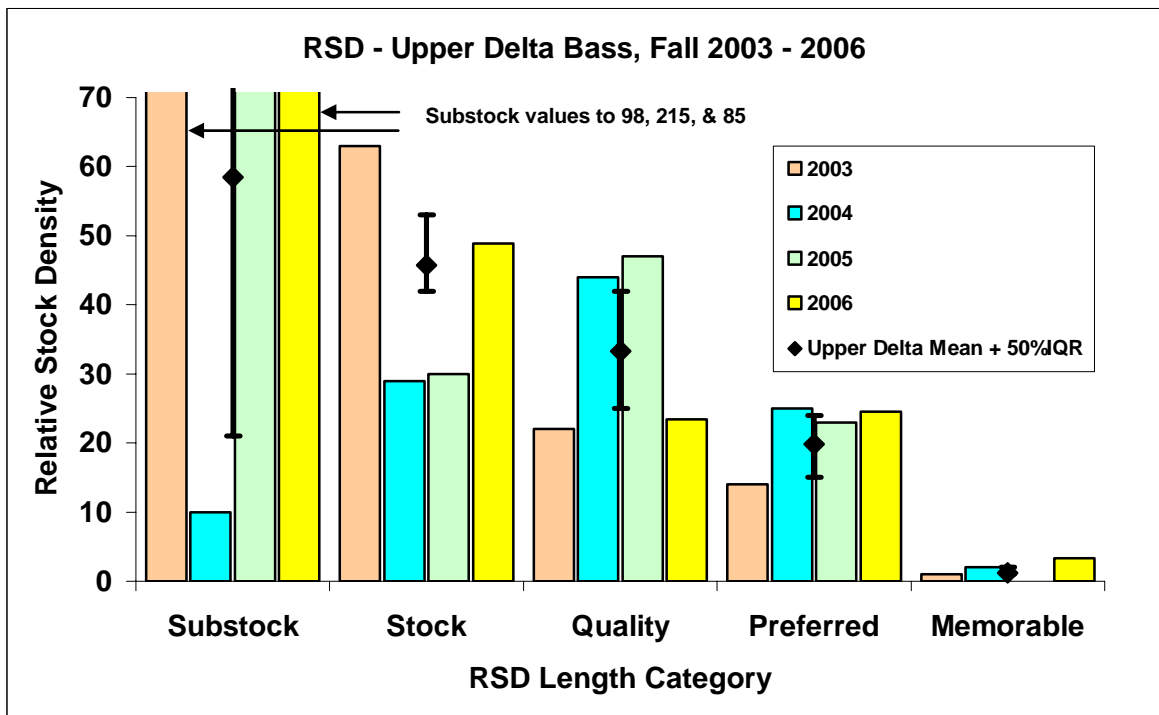


Figure 2. Relative stock density (RSD) of largemouth bass collected from the Upper (top panel) and Lower (bottom panel) Mobile Delta during Fall, 2003-2006. Error bars represent central 50% of interquartile (IQR; 25th & 75th percentile) range of RSD values from tables 3 and 4.

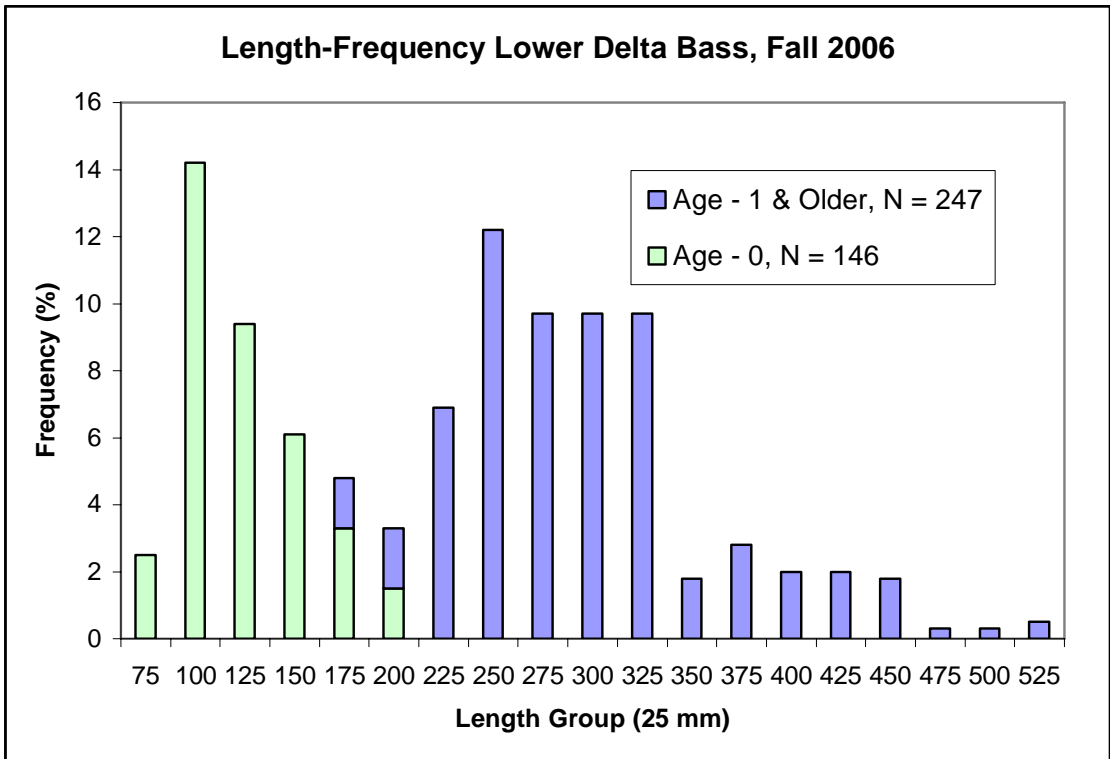
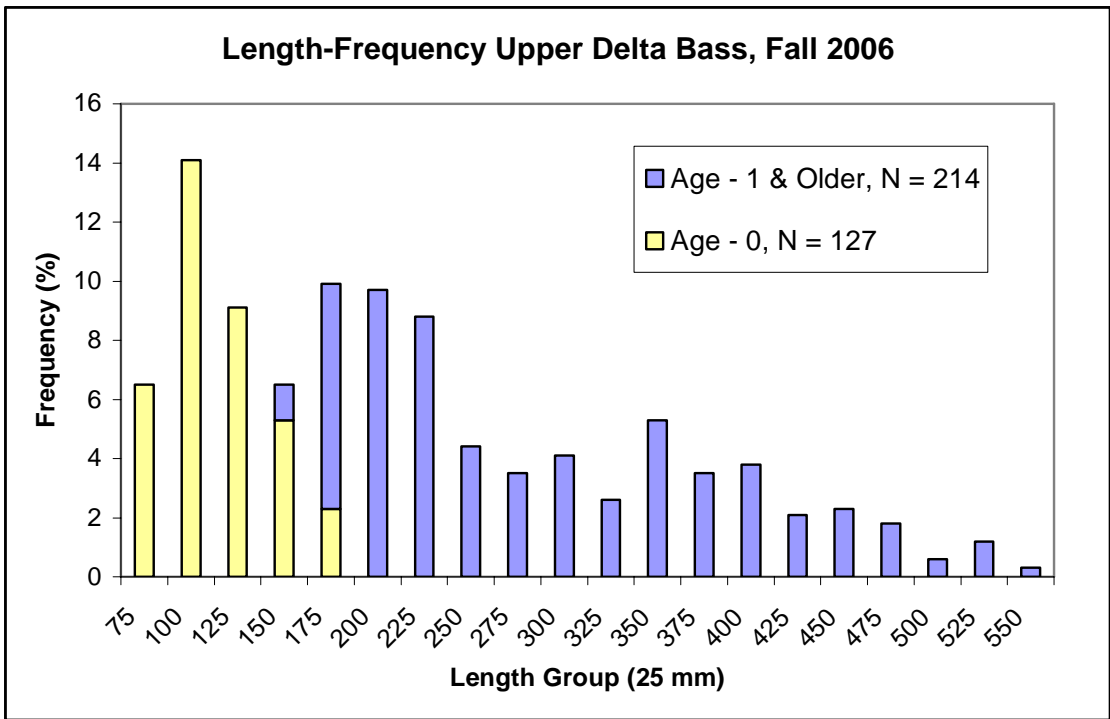


Figure 3. Length frequency of largemouth bass collected in the Upper (top panel) and Lower (bottom panel) Delta, collected during Fall, 2006.

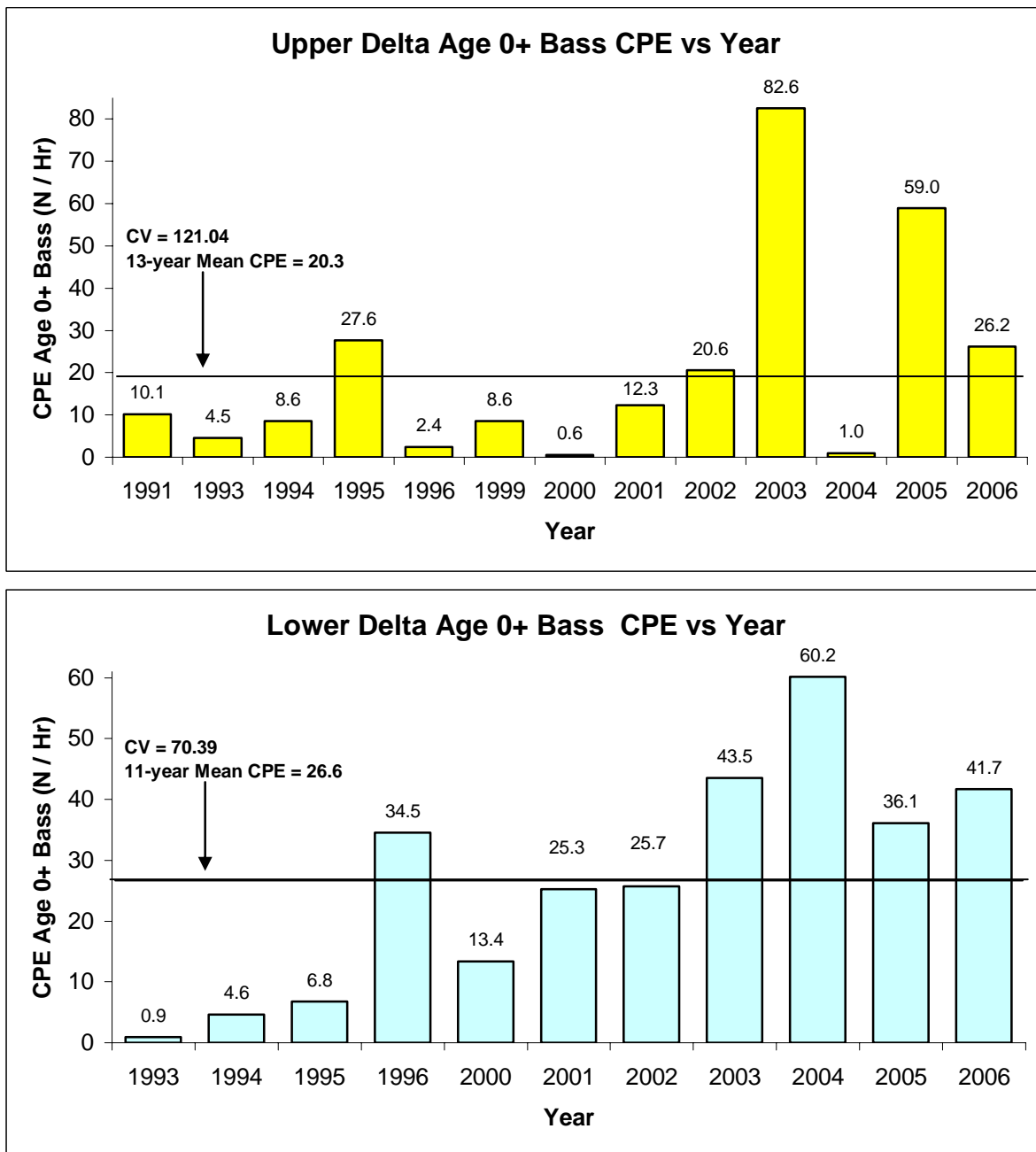


Figure 4. Historical catch (CPE) rates of fall-collected age 0+ largemouth bass from the Upper (top panel) and Lower (bottom panel) Mobile Delta. Coefficients of variation (CV) were calculated from CPE rates across years to evaluate sampling variability in young of year catch.