

# **GAINESVILLE RESERVOIR CRAPPIE MANAGEMENT REPORT FY 2009**

Prepared by

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## **Introduction**

Crappies were previously sampled at Gainesville Reservoir from 1991-95 and in 1998, 2002, and 2005 (Haffner et al. 2006). In 2005, white crappies were trap netted at the highest rate ever recorded at Gainesville. Recruitment was excellent. Five strong year classes were present and 5 year-classes contributed to the fishery. Growth of white crappie was slow. Black crappies were incidental in our collection.

## **Methods**

On October 23, 2008, crappies were electrofished from Phanachie Creek. Three weeks later, crappies were collected from 7 trap nets, set the day before in Phanachie Creek, according to the guidelines of the Alabama Reservoir Management Manual (1999). Differences in the size and age structure of the 2 collections will be discussed.

## **Results and Discussion**

### **Black and White Crappie**

On November 13, 2008, 608 white crappies and 5 black crappies were trap netted. The CPE of white crappie (86.9) was the highest ever recorded at Gainesville (Table 2). The PSD for white crappie was 63 and the RSD-P was 31. Incremental RSD values were at or above the lake and statewide average, except for S - Q fish (Table 2 and Figure 4).

Trap net catch rates of white crappie for all incremental RSD size categories were at least twice the lake average and 6 to 10 times higher than the 75% percentile of crappie CPE values, statewide (Figure 3). The CPE of substock, P - M and M - T white crappie were about 4-times higher than the lake average. Mean  $W_r$  values by incremental RSD size categories ranged from 78 to 90 and were similar to the lake average.

Eight year-classes (2001-08) were present in the trap net collection; 4 year-classes (2005-08) were abundant and 7 age classes (1+ to 7+) contributed to the fishery (Table 3). YOY white crappie composed 49.3% of the trap net collection. Growth of white crappies in 2008 was very similar to the lake average (Figure 7). The annual survival rate of "legal-size" white crappie (fish  $\geq 229$  mm) was estimated to be 40% (adjusted  $r^2=0.941$ ) based on catch curve analysis of 2+ to 7+ year old fish (Figure 8).

In the same 64-acres of open water where trap nets were fished in Phanachie Creek, 84 white crappies and 9 black crappies were collected by electrofishing. Not surprisingly, no YOY or substock white crappies were captured electrofishing. Though white crappie ranged in length from 162 to 353 mm, the electrofishing collection was dominated by fish  $\geq 250$  mm (Figure 9).

Length distributions of white crappie were significantly different ( $K_{sa} = 4.88$ ;  $p < 0.0001$ ) between the trap net and electrofishing collections (Figure 11).

Five age classes (ages 1+ to 5+) were present, compared to 8 in the trap net collection. The mean total lengths at capture for 2+ to 5+ white crappies were very similar between the 2 gear types (Tables 3 and 4). Interestingly, age 1+ fish composed 35.7% and 32.4% of the electrofishing and trap netting collections, respectively. The annual survival rate of “legal-size” white crappie (fish  $\geq 229$  mm) was estimated to be 57% (adjusted  $r^2=0.814$ ) based on catch curve analysis of 2+ to 5+ year old fish in the electrofishing collection (Figure 10).

The black crappie sample consisted of 9 fish captured electrofishing and 5 fish captured trap netting. They ranged in total length from 153 - 291 mm. All 5 black crappie trap netted were age 1+. Five year-classes (2002 and 2004-07) were represented in the electrofishing collection.

### **Summary**

The CPE of white crappie was the highest ever recorded at Gainesville Reservoir. Catch rates for all incremental RSD size categories were the highest ever recorded at Gainesville and at least twice the lake average. Recruitment was excellent. Four moderately strong year-classes were present in our collection. Growth of white crappie was satisfactory and similar to previous collections. During the fall, white crappies were easily captured using trap nets or electrofishing gear in the same creek. Length distributions of white crappie were significantly different between the collections. The trap net collection provided a wider length distribution, younger and older fish, a larger sample size with a substantially lower survival rate and a higher adjusted  $r^2$  value, and information on the relative year-class strength of age 0+ fish, compared to the electrofishing collection. However, the trap net sample required about 60% additional resources (man-days and fuel) to collect than did the electrofishing sample.

### **Conclusions**

1. Resample crappie in 2012.
2. Maintain the 9-inch minimum-length limit regulation on all crappie.

## Literature Cited

- Alabama reservoir management program 1999. Alabama Department of Conservation and Natural Resources. 77 pp.
- Haffner, J. B., J. L. Moss, and J. M. Piper. 2006. Management report for Gainesville Reservoir. Alabama Department of Conservation and Natural Resources. Montgomery, AL. 16 pp.
- 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 Resources Symposium. Southern Division American Fisheries Society, Bethesda, Maryland, USA.
- Ryder, R. A. 1965. A method for estimating the potential fish production of north-temperate lakes. Transactions of the American Fisheries Society. 94:213-218.

# Appendix 1

## Tables and Figures

Table 1. Morphometric, physical and chemical characteristics of Gainesville Reservoir.

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|                             |   |
|-----------------------------|---|
| Surface area                | 6,400 acres                             |
| Drainage area               | 7,142 sq. mi.                           |
| Full pool elevation         | 109 feet-msl                            |
| Mean annual fluctuation     | 3 feet                                  |
| Shoreline distance          | 200 miles                               |
| Shoreline development index | 17.8                                    |
| Mean depth                  | 6.7 feet                                |
| Maximum depth               | 51 feet                                 |
| Outlet depth                | Surface                                 |
| Thermocline depth           | None                                    |
| Stratification index        | None                                    |
| Total dissolved solids      | 79 mg/l                                 |
| Chlorophyll a               | 9.7 mg/m <sup>3</sup>                   |
| Retention time              | 2 days                                  |
| Morphoedaphic index         | 11.8 TDS/mean depth(ft)<br>(Ryder 1965) |
| Growing season              | 235 frost free days<br>(Jenkins 1967)   |
| Year of impoundment         | 1978                                    |

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Table 2. Incremental relative stock density (RSD) catch per effort (CPE) and relative weight (Wr) of white crappie captured by fall trap netting at Gainesville Reservoir. Effort is in net-nights. SSR denotes substock ratio; the number of substock fish per 100 stock-size fish.

| Year         | Effort | Substock |      |     | RSD S - Q |      |      |    | RSD Q - P |      |      |    | RSD P - M |      |      |    | RSD M - T |     |      |     | Total |      |
|--------------|--------|----------|------|-----|-----------|------|------|----|-----------|------|------|----|-----------|------|------|----|-----------|-----|------|-----|-------|------|
|              |        | No.      | CPE  | SSR | No.       | CPE  | Pct. | Wr | No.       | CPE  | Pct. | Wr | No.       | CPE  | Pct. | Wr | No.       | CPE | Pct. | Wr  | No.   | CPE  |
| 1991         | 32     | 128      | 4.0  | 60  | 122       | 3.8  | 57   | 79 | 68        | 2.1  | 32   | 87 | 13        | 0.4  | 6    | 92 | 11        | 0.3 | 5    | 92  | 342   | 10.7 |
| 1992         | 32     | 81       | 2.5  | 57  | 59        | 1.8  | 41   | 75 | 36        | 1.1  | 25   | 84 | 41        | 1.3  | 29   | 88 | 7         | 0.2 | 5    | 90  | 224   | 7.0  |
| 1993         | 32     | 296      | 9.3  | 455 | 20        | 0.6  | 31   | 76 | 36        | 1.1  | 55   | 91 | 7         | 0.2  | 11   | 91 | 2         | 0.1 | 3    | 93  | 361   | 11.3 |
| 1994         | 32     | 82       | 2.6  | 32  | 154       | 4.8  | 61   | 74 | 50        | 1.6  | 20   | 80 | 35        | 1.1  | 14   | 87 | 15        | 0.5 | 6    | 92  | 336   | 10.5 |
| 1995         | 15     | 20       | 1.3  | 12  | 48        | 3.2  | 28   | 79 | 68        | 4.5  | 40   | 85 | 37        | 2.5  | 22   | 93 | 16        | 1.1 | 9    | 100 | 189   | 12.6 |
| 1998         | 11     | 64       | 5.8  | 42  | 41        | 3.7  | 27   | 72 | 56        | 5.1  | 36   | 81 | 47        | 4.3  | 31   | 87 | 10        | 0.9 | 6    | 84  | 218   | 19.8 |
| 2002         | 9      | 41       | 4.6  | 19  | 124       | 13.8 | 57   | 82 | 68        | 7.6  | 31   | 88 | 15        | 1.7  | 7    | 93 | 10        | 1.1 | 5    | 95  | 258   | 28.7 |
| 2005         | 12     | 215      | 17.9 | 57  | 213       | 17.8 | 57   | 72 | 94        | 7.8  | 25   | 74 | 53        | 4.4  | 14   | 82 | 16        | 1.3 | 4    | 85  | 591   | 49.3 |
| 2008         | 7      | 252      | 36.0 | 71  | 130       | 18.6 | 37   | 78 | 113       | 16.1 | 32   | 89 | 83        | 11.9 | 23   | 90 | 30        | 4.3 | 8    | 87  | 608   | 86.9 |
| Lake average |        |          | 9.3  | 89  |           | 7.6  | 44   | 76 |           | 5.2  | 33   | 84 |           | 3.1  | 17   | 89 |           | 1.1 | 6    | 91  |       | 26.3 |

Table 3. Age composition and mean total length (mm) of white crappie captured in trap nets at Gainesville Reservoir, November 2008.

| Age   | Year Class | Number | Percent | CPE  | Mean TL | SE | Range     |
|-------|------------|--------|---------|------|---------|----|-----------|
| 0+    | 2008       | 300    | 49.3    | 42.9 | 105     | 2  | 66 - 168  |
| 1+    | 2007       | 197    | 32.4    | 28.1 | 203     | 2  | 153 - 276 |
| 2+    | 2006       | 52     | 8.6     | 7.4  | 271     | 3  | 220 - 309 |
| 3+    | 2005       | 43     | 7.1     | 6.1  | 292     | 3  | 260 - 342 |
| 4+    | 2004       | 10     | 1.6     | 1.4  | 310     | 4  | 294 - 333 |
| 5+    | 2003       | 4      | 0.7     | 0.6  | 320     | 10 | 290 - 330 |
| 6+    | 2002       | 1      | 0.2     | 0.1  | 337     |    |           |
| 7+    | 2001       | 1      | 0.2     | 0.1  | 350     |    |           |
| Total |            | 608    | 100.0   | 86.9 |         |    |           |

Table 4. Age composition and mean total length (mm) of white crappie captured electrofishing at Gainesville Reservoir, October 2008.

| Age   | Year Class | Number | Percent | CPH  | Mean TL | SE | Range     |
|-------|------------|--------|---------|------|---------|----|-----------|
| 0+    | 2008       | 0      | 0.0     | 0.0  |         |    |           |
| 1+    | 2007       | 30     | 35.7    | 11.6 | 214     | 5  | 162 - 270 |
| 2+    | 2006       | 20     | 23.8    | 7.7  | 271     | 4  | 250 - 308 |
| 3+    | 2005       | 21     | 25.0    | 8.1  | 295     | 4  | 261 - 325 |
| 4+    | 2004       | 9      | 10.7    | 3.5  | 310     | 7  | 290 - 351 |
| 5+    | 2003       | 4      | 4.8     | 1.5  | 329     | 12 | 298 - 353 |
| Total |            | 84     | 100.0   | 32.4 |         |    |           |

Table 5. Incremental relative stock density (RSD) catch per effort (CPE) and relative weight (Wr) of black and white crappie captured by fall trap netting at Gainesville Reservoir. Total effort is in net-nights. SSR denotes substock ratio; the number of substock fish per 100 stock-size fish.

| Year         | Total effort | Substock |      |     | RSD S - Q |      |      |    | RSD Q - P |      |      |    | RSD P - M |      |      |    | RSD M - T |     |      |     | Total |      |
|--------------|--------------|----------|------|-----|-----------|------|------|----|-----------|------|------|----|-----------|------|------|----|-----------|-----|------|-----|-------|------|
|              |              | No.      | CPE  | SSR | No.       | CPE  | Pct. | Wr | No.       | CPE  | Pct. | Wr | No.       | CPE  | Pct. | Wr | No.       | CPE | Pct. | Wr  | No.   | CPE  |
| 1991         | 32           | 128      | 4.0  | 60  | 122       | 3.8  | 57   | 79 | 68        | 2.1  | 32   | 87 | 13        | 0.4  | 6    | 92 | 11        | 0.3 | 5    | 92  | 342   | 10.7 |
| 1992         | 32           | 81       | 2.5  | 57  | 59        | 1.8  | 41   | 75 | 36        | 1.1  | 25   | 84 | 41        | 1.3  | 29   | 88 | 7         | 0.2 | 5    | 90  | 224   | 7.0  |
| 1993         | 32           | 324      | 10.1 | 405 | 26        | 0.8  | 33   | 76 | 41        | 1.3  | 51   | 91 | 11        | 0.3  | 14   | 91 | 2         | 0.1 | 3    | 93  | 404   | 12.6 |
| 1994         | 32           | 86       | 2.7  | 29  | 169       | 5.3  | 58   | 74 | 60        | 1.9  | 21   | 80 | 46        | 1.4  | 16   | 87 | 17        | 0.5 | 6    | 92  | 378   | 11.8 |
| 1995         | 15           | 21       | 1.4  | 11  | 57        | 3.8  | 29   | 79 | 75        | 5.0  | 38   | 85 | 47        | 3.1  | 24   | 93 | 16        | 1.1 | 8    | 100 | 216   | 14.4 |
| 1998         | 11           | 65       | 5.9  | 38  | 47        | 4.3  | 28   | 72 | 63        | 5.7  | 37   | 81 | 50        | 4.5  | 29   | 87 | 10        | 0.9 | 6    | 84  | 235   | 21.4 |
| 2002         | 9            | 41       | 4.6  | 19  | 124       | 13.8 | 57   | 82 | 68        | 7.6  | 31   | 88 | 16        | 1.8  | 7    | 93 | 10        | 1.1 | 5    | 95  | 259   | 28.8 |
| 2005         | 12           | 215      | 17.9 | 56  | 215       | 17.9 | 56   | 72 | 96        | 8.0  | 25   | 74 | 55        | 4.6  | 14   | 82 | 16        | 1.3 | 4    | 85  | 597   | 49.8 |
| 2008         | 7            | 252      | 36.0 | 70  | 134       | 19.1 | 37   | 78 | 114       | 16.3 | 32   | 89 | 83        | 11.9 | 23   | 90 | 30        | 4.3 | 8    | 87  | 613   | 87.6 |
| Lake average |              |          | 9.5  | 83  |           | 7.9  | 44   | 76 |           | 5.4  | 32   | 84 |           | 3.3  | 18   | 89 |           | 1.1 | 6    | 91  |       | 27.1 |

Table 6. Incremental relative stock density (RSD) catch per effort (CPE) and relative weight (Wr) of white crappie captured by electrofishing at Gainesville Reservoir in October 2008. Effort is in hours. SSR denotes substock ratio; the number of substock fish per 100 stock-size fish.

| Effort | Substock |     |     | RSD S - Q |     |      |    | RSD Q - P |     |      |    | RSD P - M |      |      |    | RSD M - T |     |      |    | Total |      |
|--------|----------|-----|-----|-----------|-----|------|----|-----------|-----|------|----|-----------|------|------|----|-----------|-----|------|----|-------|------|
|        | No.      | CPE | SSR | No.       | CPE | Pct. | Wr | No.       | CPE | Pct. | Wr | No.       | CPE  | Pct. | Wr | No.       | CPE | Pct. | Wr | No.   | CPE  |
| 2.59   | 0        | 0.0 | 0   | 7         | 2.7 | 8    | 82 | 20        | 7.7 | 24   | 84 | 36        | 13.9 | 43   | 87 | 21        | 8.1 | 25   | 88 | 84    | 32.4 |

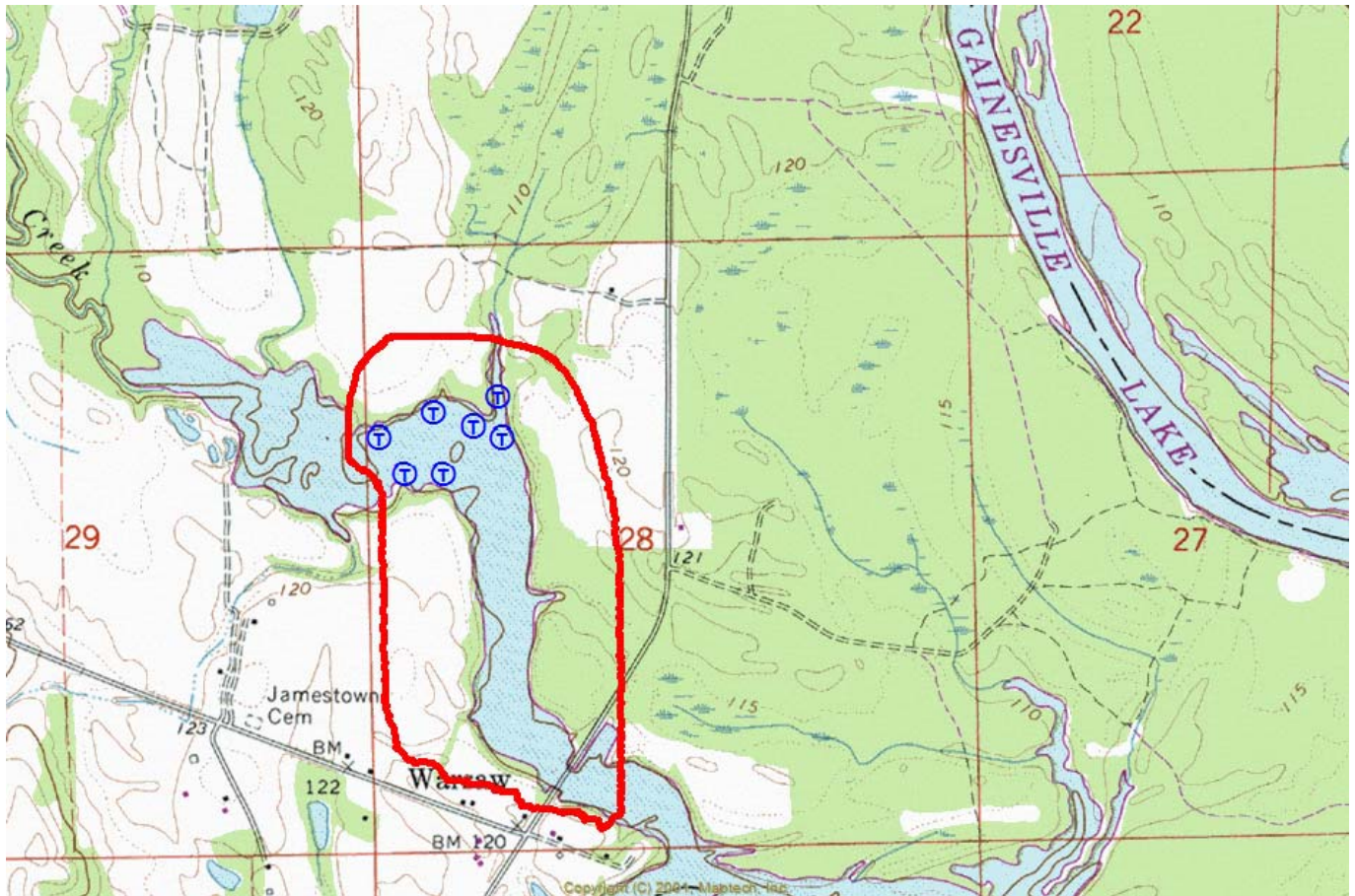


Figure 1. November 2008 trap net locations “T” in Phanachie Creek, Gainesville Reservoir appear in blue. The area of Phanachie Creek that was electrofished in October 2008 is bounded in red.

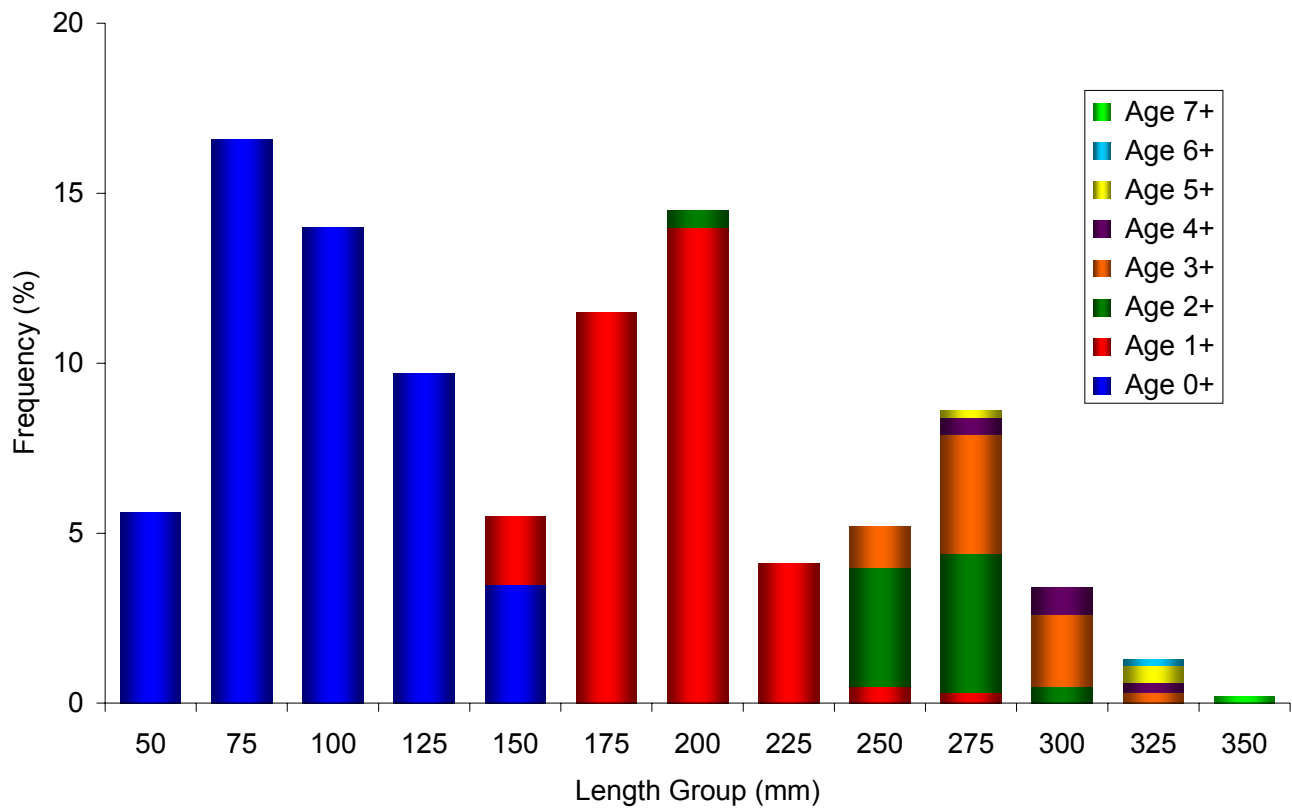


Figure 2. Length at age frequency of white crappie (N=608) captured trap netting at Gainesville Reservoir, November 2008.

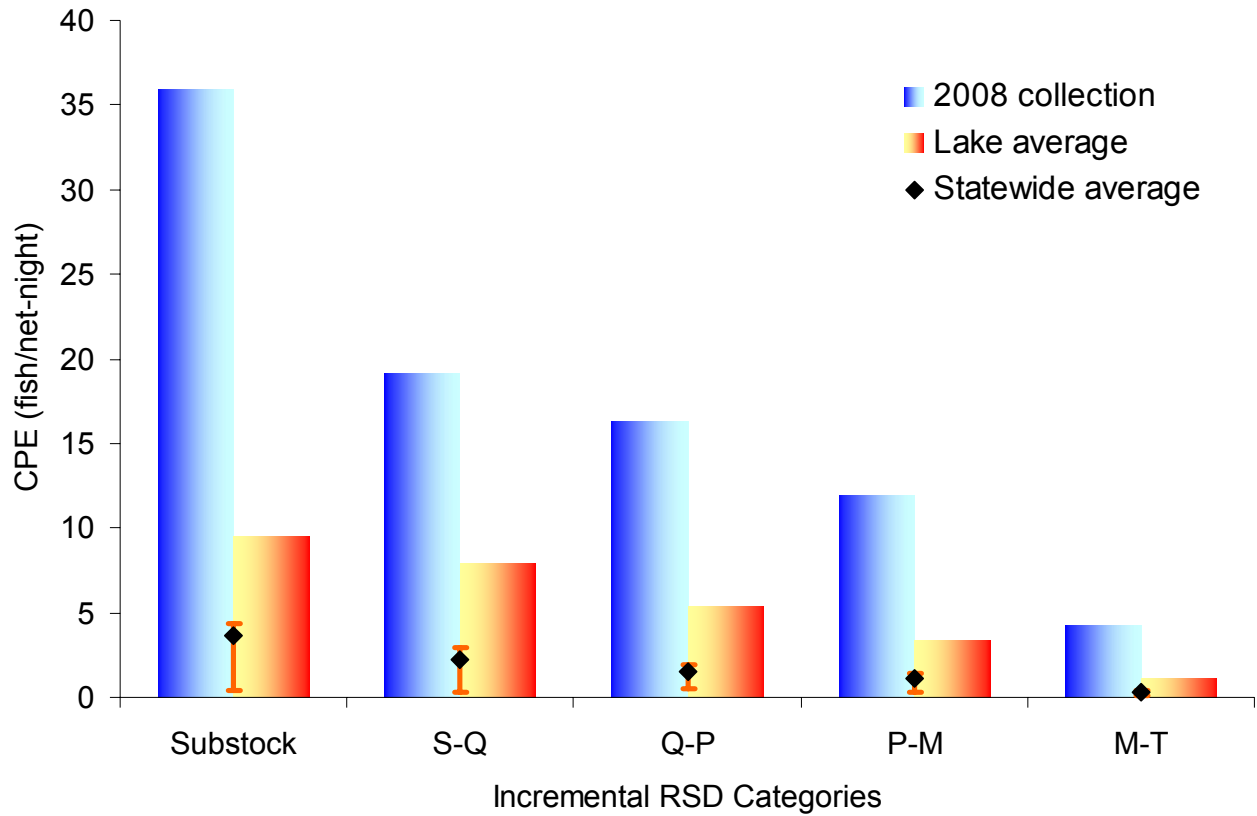


Figure 3. Catch per effort (CPE) of black (N=5) and white crappie (N=608) captured trap netting at Gainesville Reservoir, November 2008. Error bars represent the 25th and 75th percentile of CPE values, statewide.

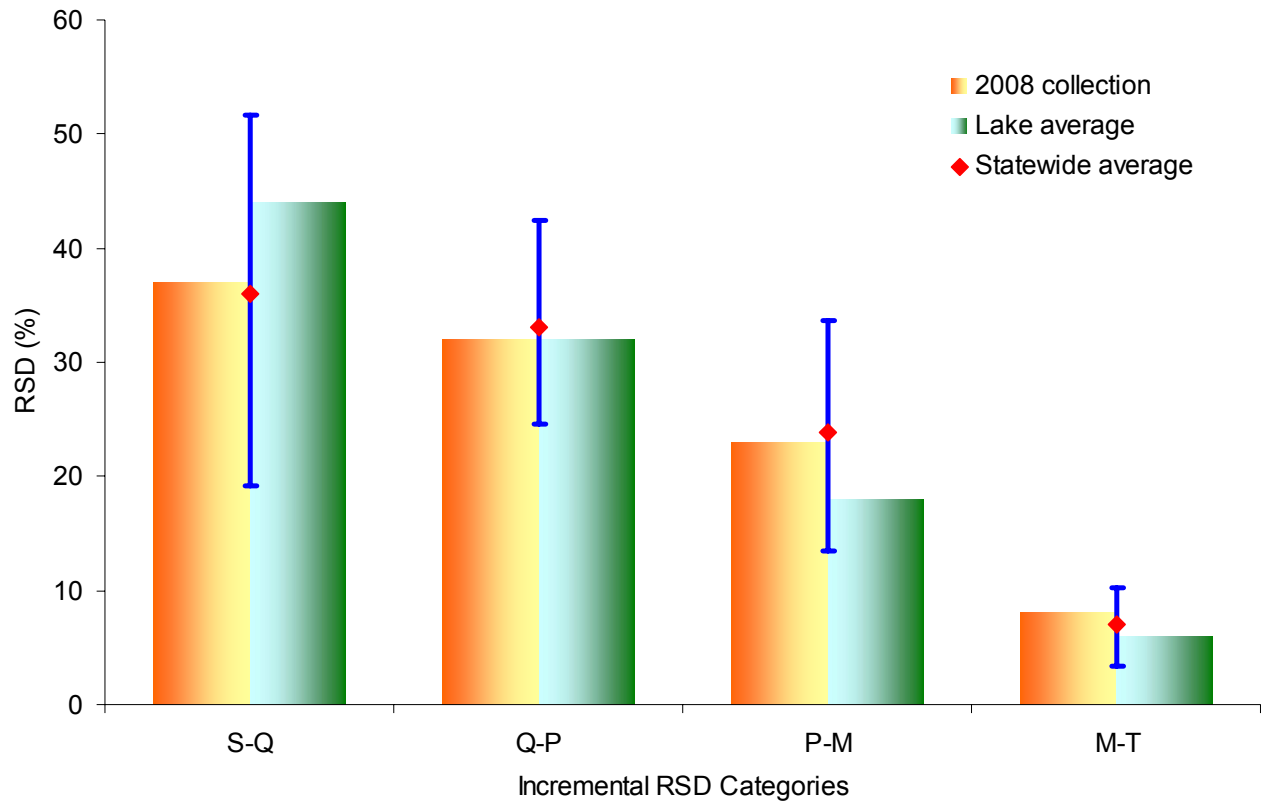


Figure 4. Incremental relative stock density (RSD) of black (N=5) and white crappie (N=608) captured trap netting at Gainesville Reservoir, November 2008. Error bars represent the 25th and 75th percentile of RSD values, statewide.

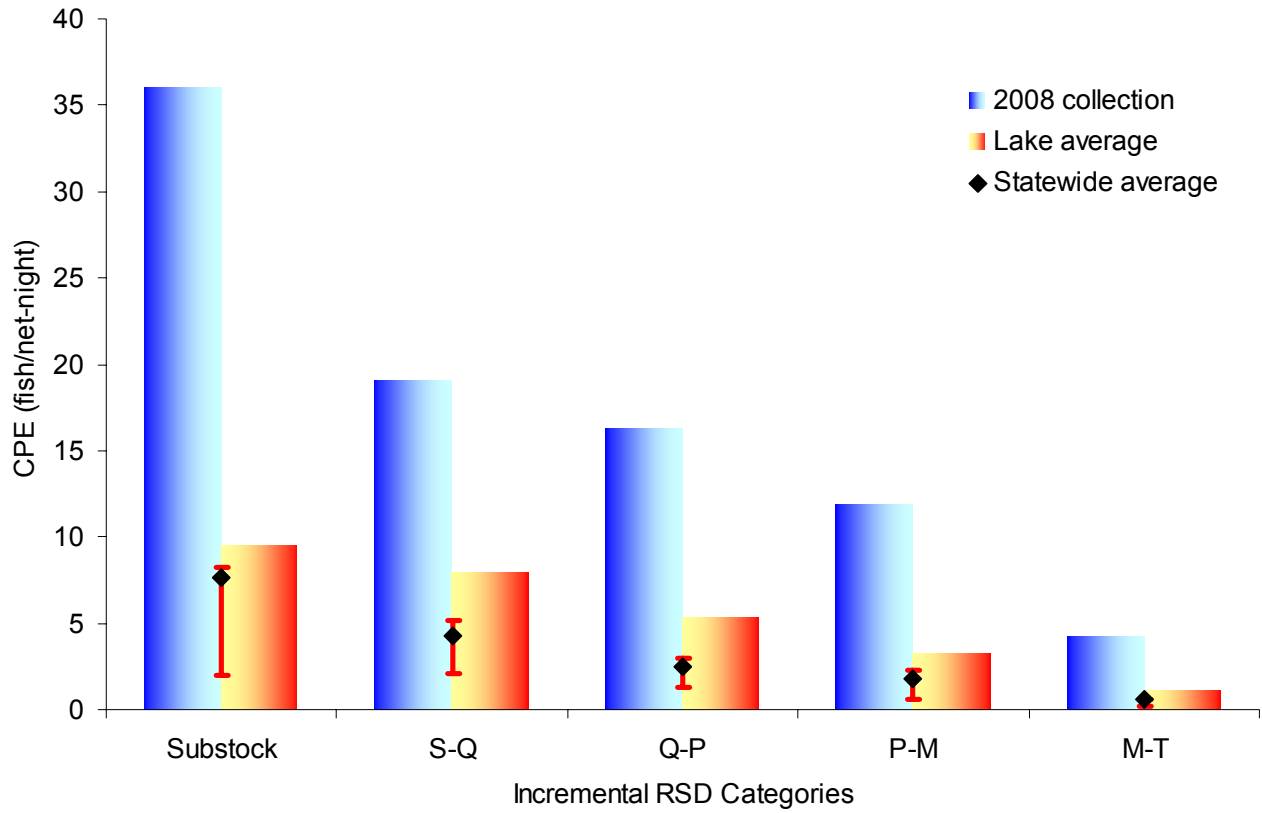


Figure 5. Catch per effort (CPE) of black (N=5) and white crappie (N=608) captured trap netting at Gainesville Reservoir, November 2008. Error bars represent the 25th and 75th percentile of CPE values in lowland reservoirs, statewide.

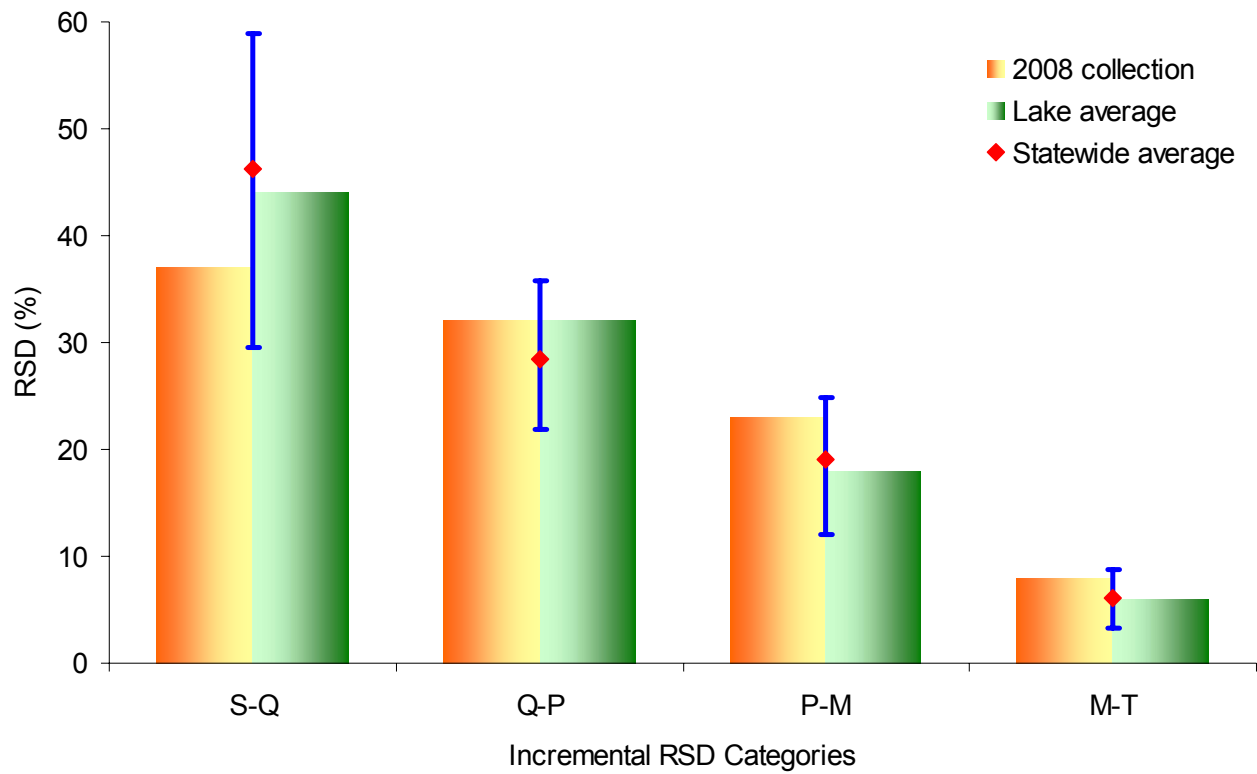


Figure 6. Incremental relative stock density (RSD) of black (N=5) and white crappie (N=608) captured trap netting at Gainesville Reservoir 2008. Error bars represent the 25th and 75th percentile of RSD values in lowland reservoirs, statewide.

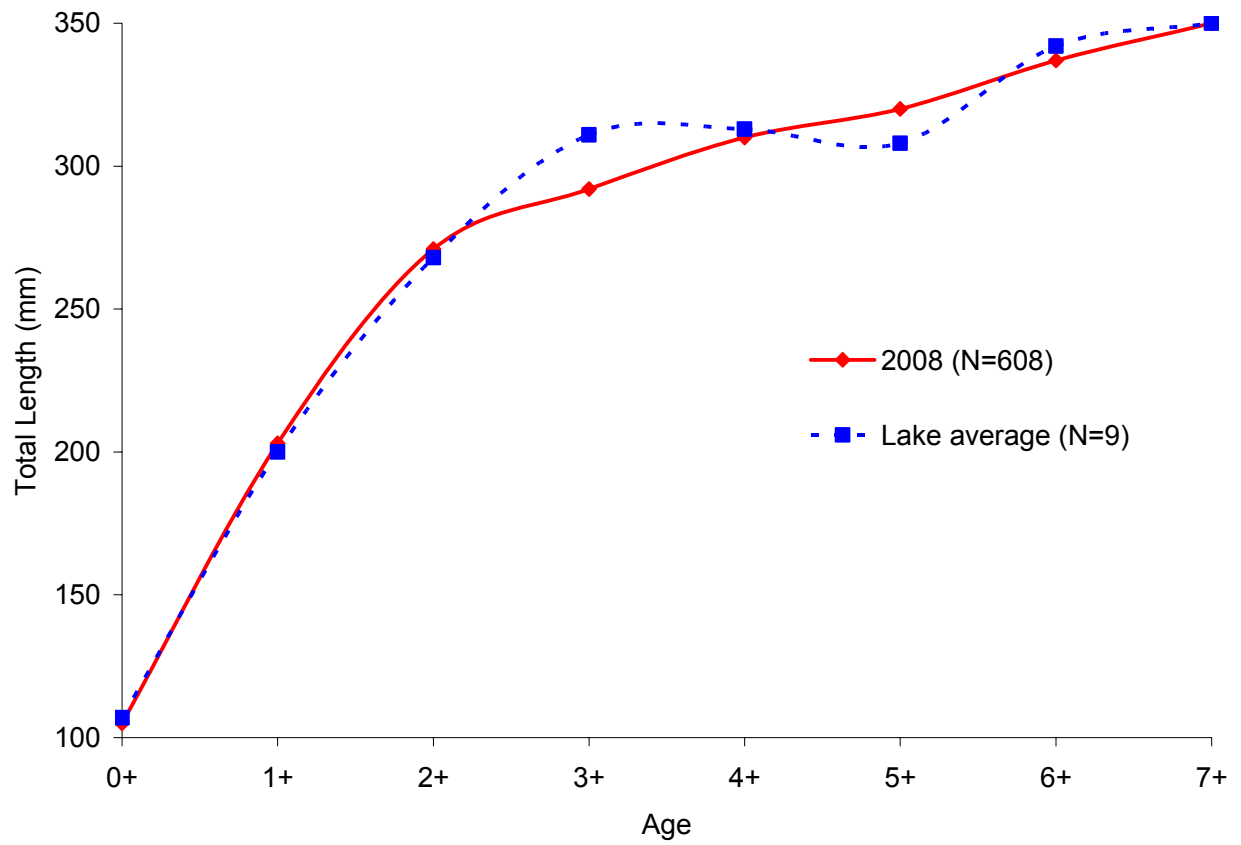


Figure 7. Length at capture of white crappie in trap nets at Gainesville Reservoir.

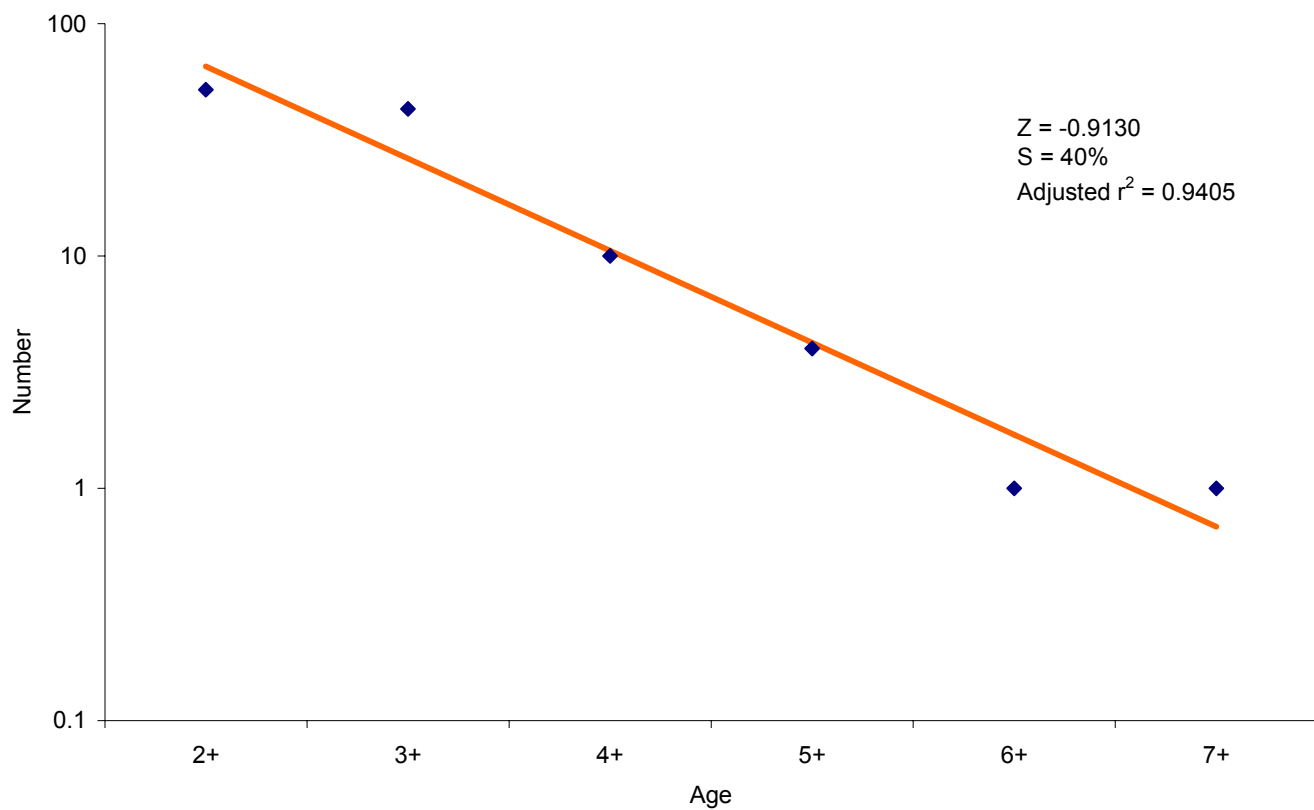


Figure 8. Catch curve regression of age 2+ and older legal-size white crappie (N=111) captured in trap nets at Gainesville Reservoir, November 2008.

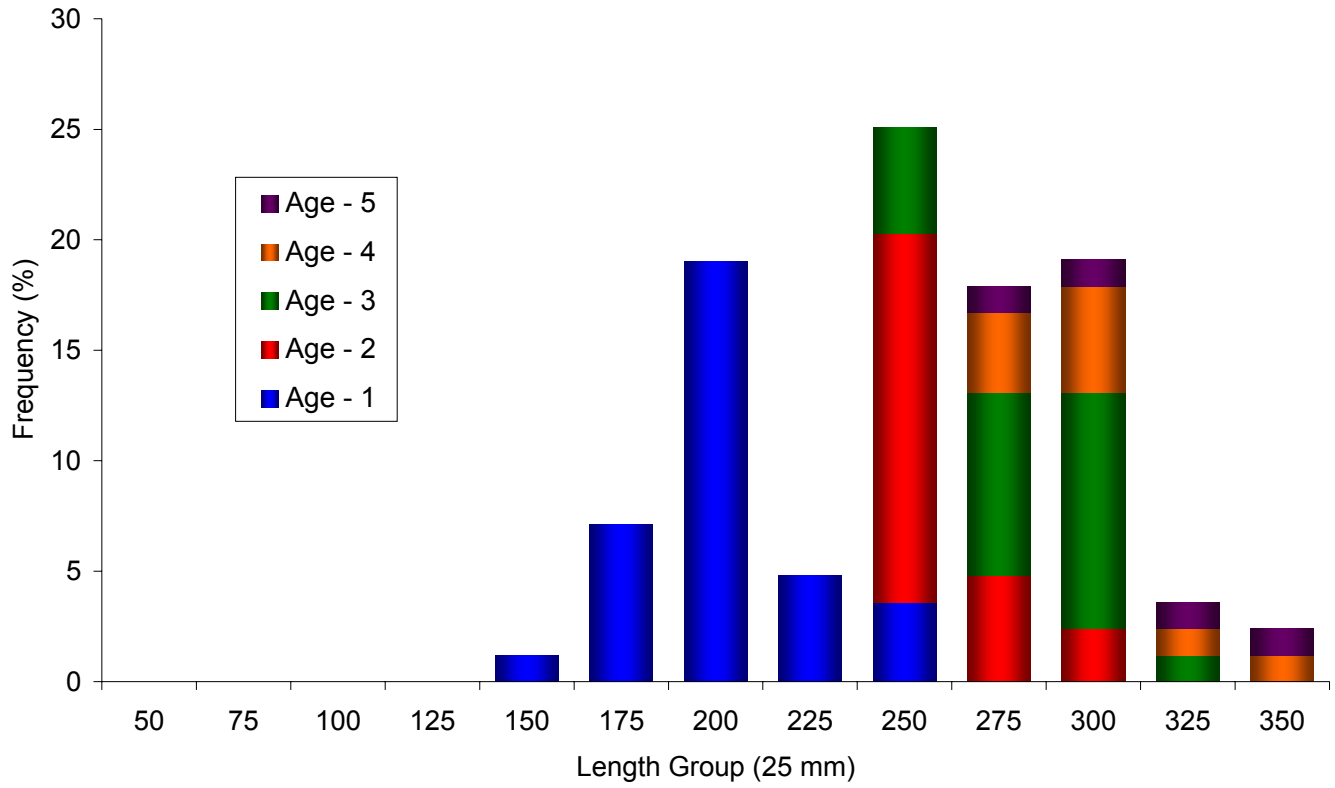


Figure 9. Length at age frequency of white crappie (N=84) captured electrofishing at Gainesville Reservoir, October 2008.

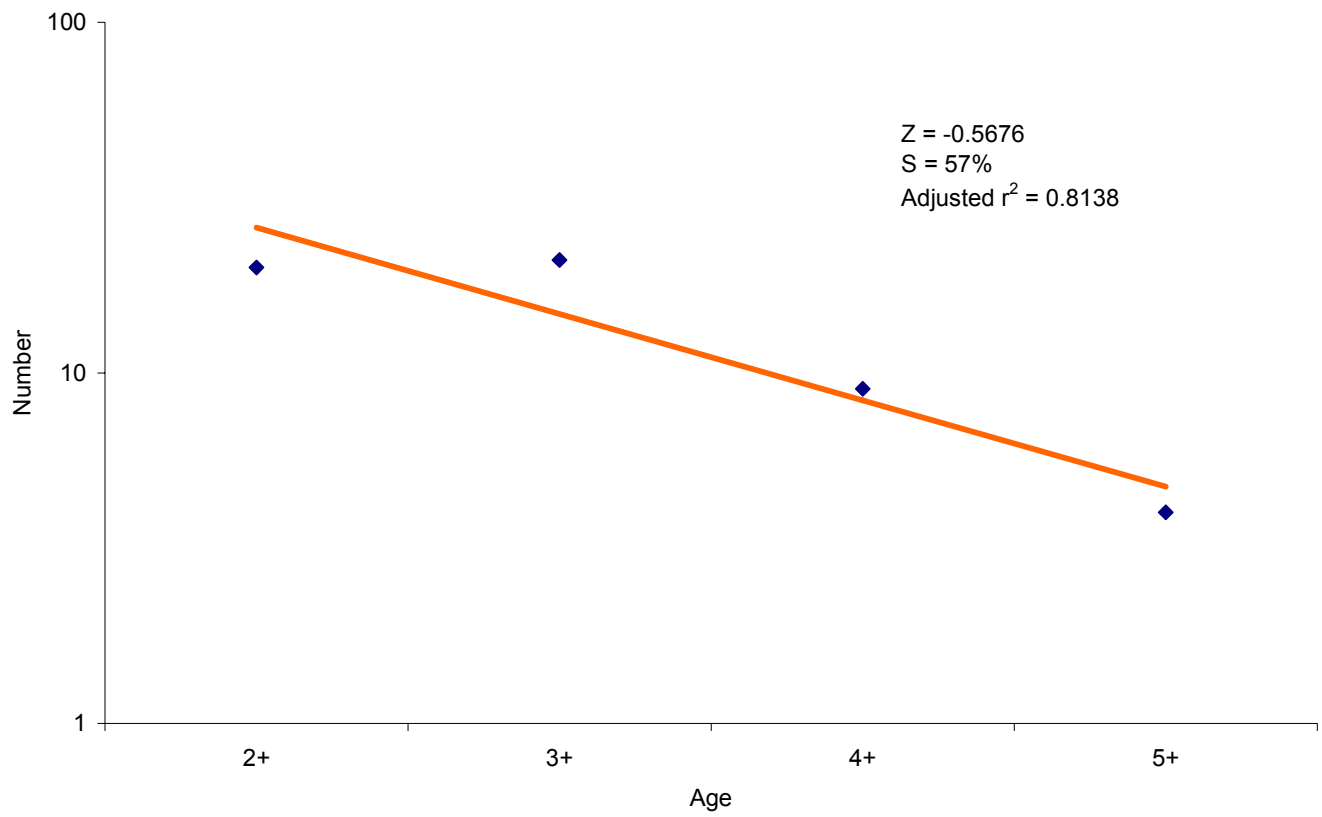


Figure 10. Catch curve regression of age 2+ and older, legal-size white crappie (N=54) captured electrofishing at Gainesville Reservoir, October 2008.

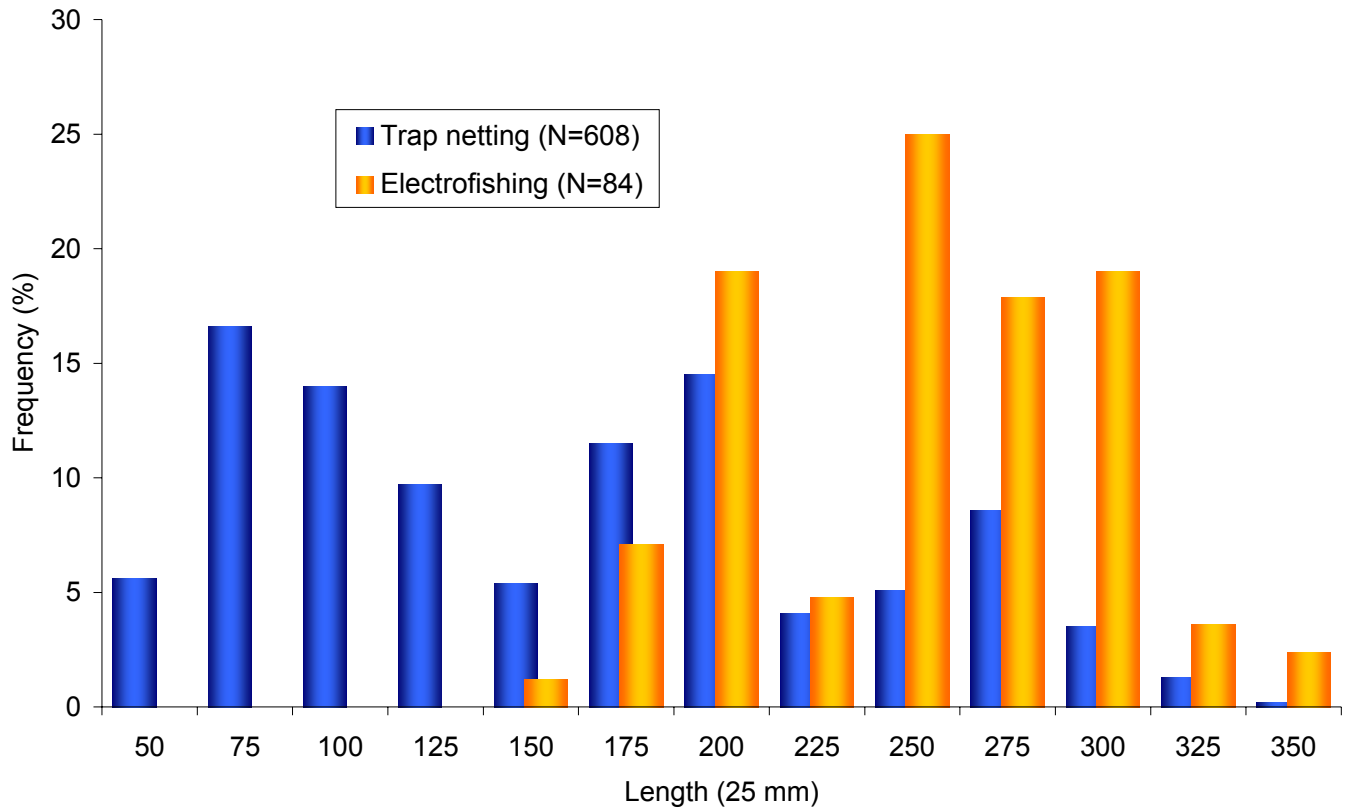


Figure 11. Length frequency distribution of white crappie at Gainesville Reservoir, fall 2008.

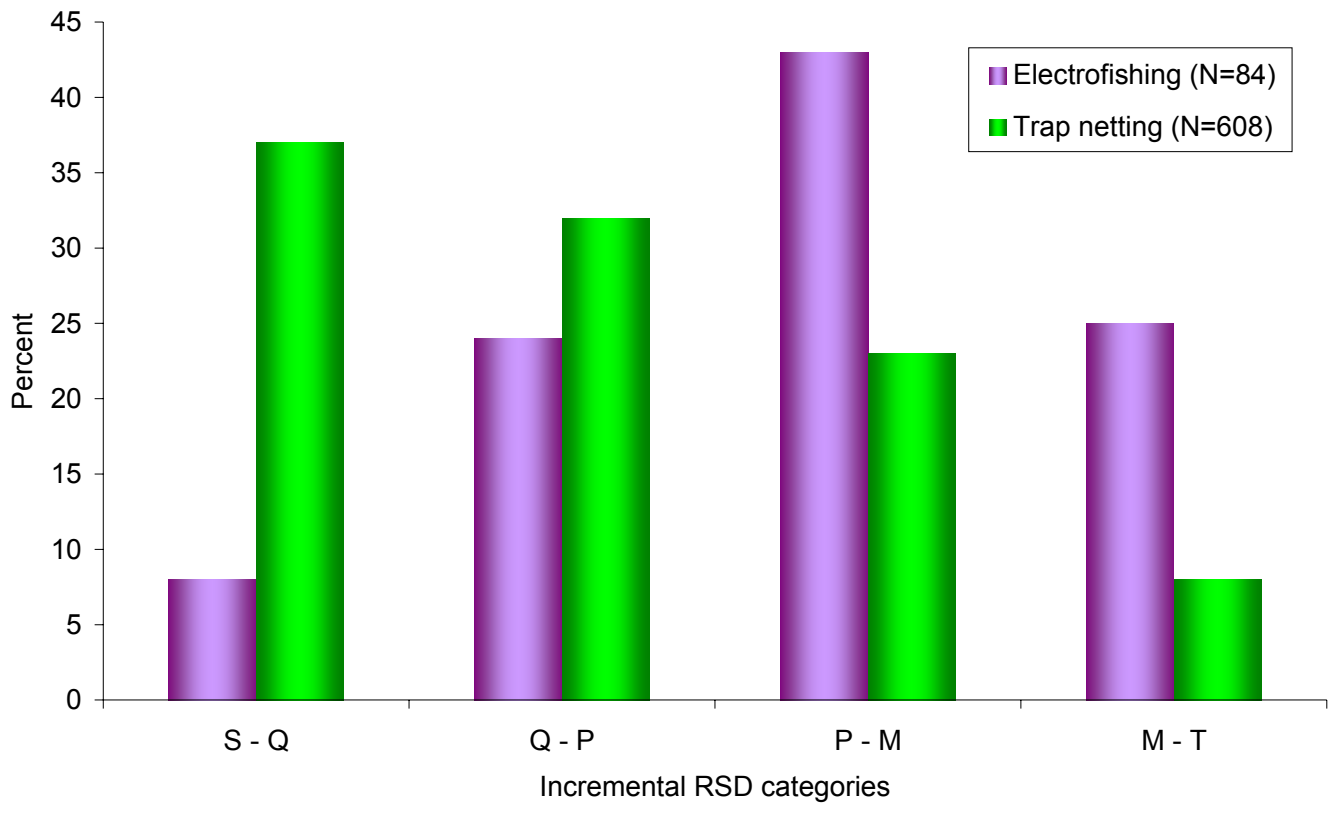


Figure 12. Incremental relative stock density (RSD) values of white crappie at Gainesville Reservoir, fall 2008.

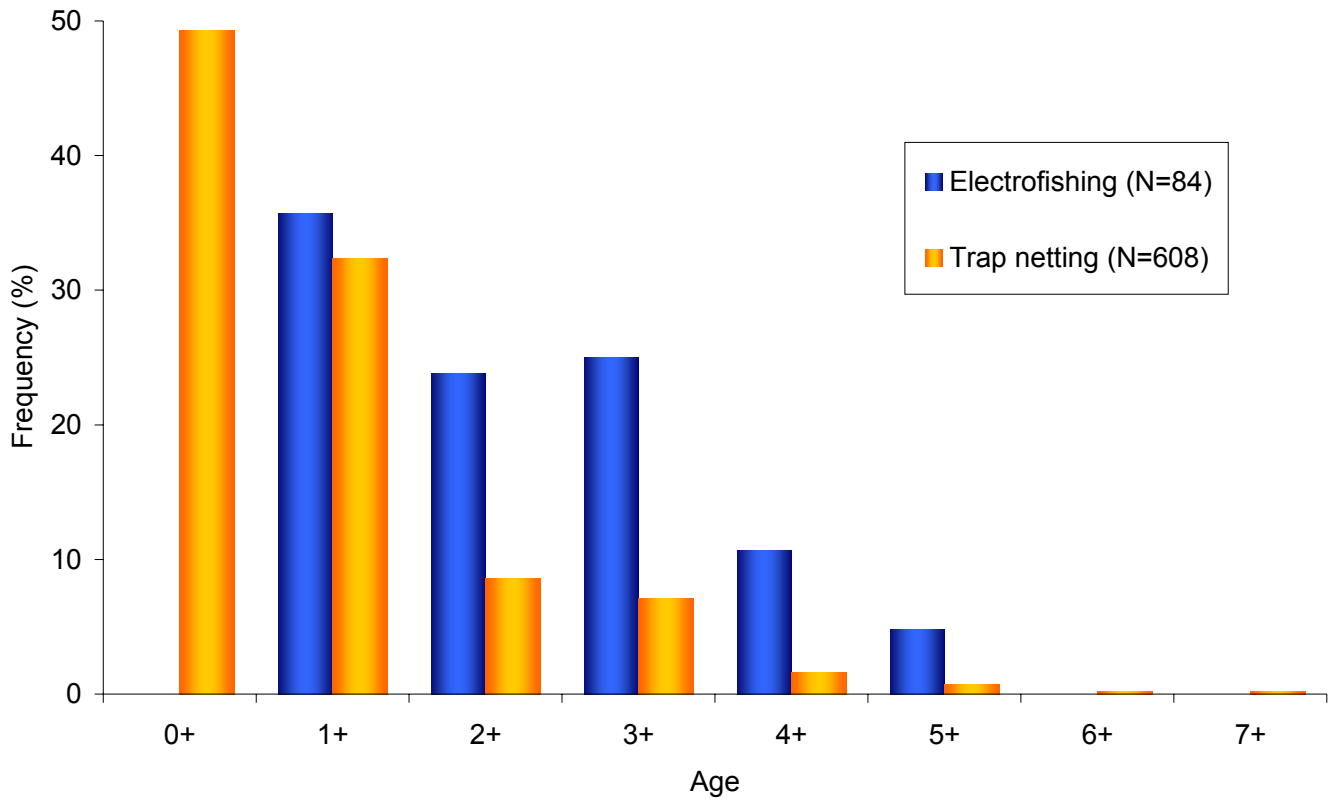


Figure 13. Age frequency histogram of white crappie at Gainesville Reservoir, fall 2008.

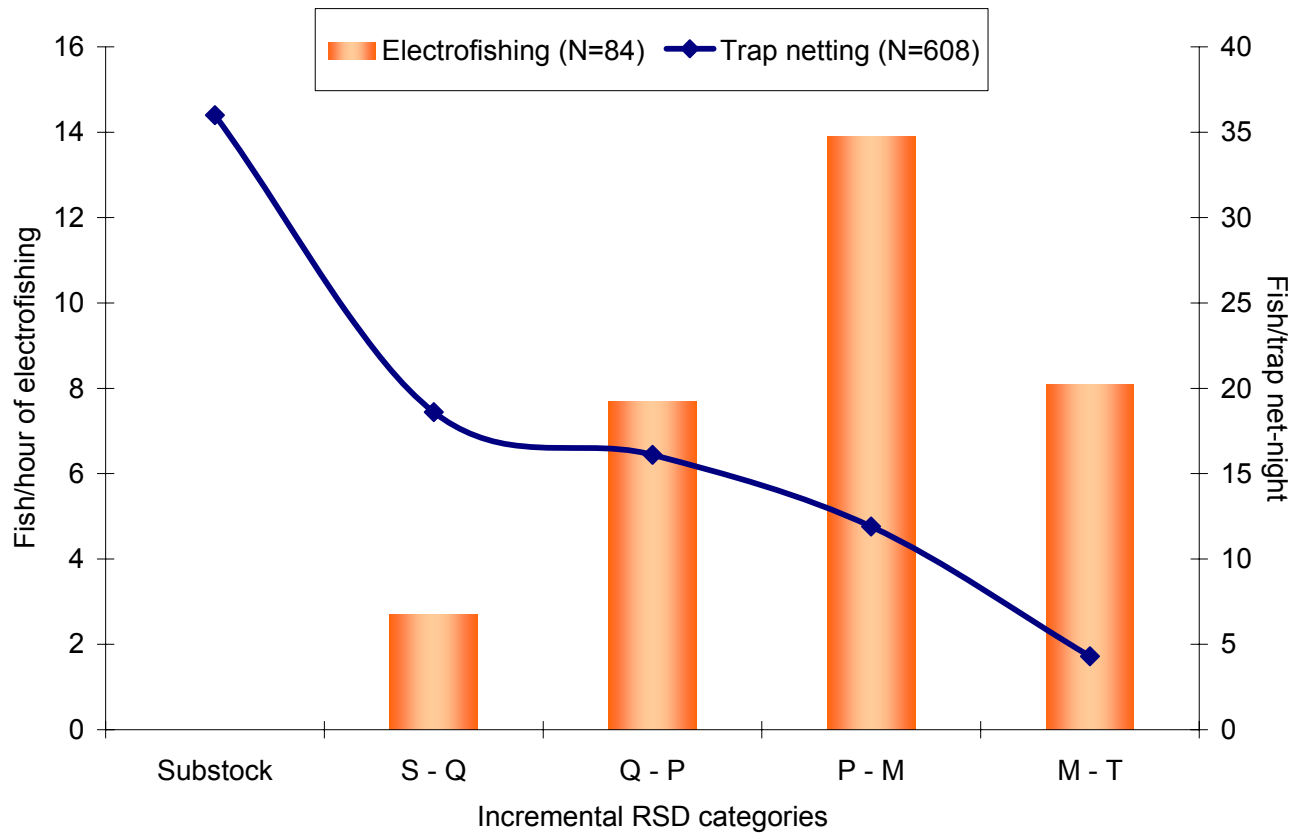


Figure 14. Catch rates of white crappie at Gainesville Reservoir, fall 2008.