

SMITH RESERVOIR CRAPPIE MANAGEMENT REPORT

2005-2006

Prepared By

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Introduction

The reservoir management objective for Smith Reservoir is to collect baseline biological data on the important sport fishes. From the data, length-at-age frequencies, growth, relative abundance, and relative weight will be obtained. This information will be analyzed and used to formulate management recommendations where needed to correct existing or potential problems concerning the reservoir fishery.

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 characteristic of Smith Reservoir, trap nets have limited success capturing crappie. Due to the limited catch efficiency of trap nets, we decided to sample crappie in the fall of 2005 by electrofishing.

Methods

Smith Reservoir was sampled in fall 2003 and 2005 with daytime electrofishing in the Ryan Creek and Sipsey Fork arms. The fall 2003 sample was restricted to the Ryan Creek arm in the vicinity of Cullman County Park. Fall 2005 electrofishing sites were chosen based on habitat characteristics of the areas. Mainly those areas that had suitable wood/brush habitat were sampled. Electrofishing sites are shown on Figure 1. Data analysis was conducted with ADWFF Data Analysis and Report Utilities (Slipke, 2004). Data was pooled for both 2003 and 2005 for catch curve regressions and length-at-age distributions.

Results

A total of 85 crappie (66 white; 19 black) was collected in the fall of 2005. Relative Stock Density (RSD) calculations revealed that the preferred and memorable categories were above the statewide 75th percentile and dominated the sample. This is probably to be expected due to the size selectivity that can occur with electrofishing gear. Also, the selectivity of different size groups to specific habitat can skew the size distribution. The overall catch per unit effort (CPUE) was 24.3 fish / hr. This is similar to what Auburn University (AU) found in the spring of 1998 (personal communication). Also, the spring collection by AU showed a higher number of stock and quality size crappie with the preferred category falling below statewide

averages and the 25th percentile. Due to the lack of information on Smith crappie we can not determine if this is a shift in the population over time, an artifact of electrofishing size selectivity or temporal and spatial distribution of crappie throughout the year.

Age distribution was acceptable with five year classes represented. Year class strength is highly variable with 2003 and 2001 having a strong year class and 2002 and 2000 being weak year classes (Table 3). The collection in 2003 also showed a strong year class in 2001 (Table 4). The variable year class strength is also evident in the 1998 collection by AU (Table 5). From catch curve regression an estimated annual mortality rate (A) of 72% was calculated (Figure 4).

Growth of white crappie is very rapid with fish reaching harvestable size by age 2 (Table 3 and Figure 2). This is significantly faster than that observed in 1998 where crappie reached harvestable size between age 3 and age 4 (Table 5).

The creel survey conducted in the spring of 2002 showed that 30% of the anglers were fishing for crappie (Greene et al. 2002). Anglers had a catch rate of 1.38 crappie /hour and a harvest rate of 0.45 crappie/hour. The harvest rates for crappie have remained fairly stable since 1992 ranging between 0.38-0.49 crappie/hr. In 1991 harvest rates peaked at 0.98 crappie/hr. Catch rates have been similar for 1991, 1998 and 2002 at 1.3-1.38 crappie/hr. In 1992 and 1993 crappie catch rates were 0.5 and 0.76 crappie /hr, respectively. In 1991, 1992 and 1993 harvest rates were only slightly less than the catch rates indicating that anglers were keeping most of the fish they caught. In the 2002 and 1998 creel surveys 53% and 61%, respectively, of the anglers catch consisted of crappie 9 inches or less. This explains the large difference that is observed in the catch and harvest of crappies by anglers at this time (Figure 5).

Comparison of crappie growth rates in Lewis Smith with that of other reservoirs revealed that it takes from four to seven months less time to reach harvestable size. Crappie catch rates were two times higher than that observed from creels conducted on Tennessee River impoundments, while harvest rates were slightly higher (authors personal observation).

Conclusions

The sampling conducted in fall 2005 and 2003 indicates that the crappie population is fast growing and exhibits highly variable recruitment. Relative abundance and relative weights were similar between 1998 and 2005. Also, the abundance of crappie less than 9 inches in the 1998 sample correlates with the high number of small crappie caught by anglers that same year in the creel. No major changes in the management of the crappie are warranted at this time.

Literature Cited

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- Greene, J. C., P. D. Ekema and K. B. Floyd. 1999. Lewis Smith Reservoir Management Report, 1998. Alabama Department of Conservation and Natural Resources. Montgomery, AL
- Greene, J. C., T. D. Berry, K. B. Floyd. 2002. Lewis Smith Reservoir Management Report, 2002. Alabama Department of Conservation and Natural Resources. Montgomery, AL.
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- Moss, J. L., J. B. Haffner, and J. M. Piper. 1994. Lewis Smith Reservoir 1993 Management report. Alabama Department of Conservation and Natural Resources. Montgomery, AL.
- 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) |
| Date 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 AND 2005.

| White Crappie | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|-----------|----------------|----------|-----|-------------------|-------|------|-----|----|-------|------|-----|----|-------|------|-----|----|-------|-----|-----|----|-------|-----|-----|----|-------|------|------|----|
| Year | Gear | No. of Samples | SUBSTOCK | | | RSD-S | | | | RSD-Q | | | | RSD-P | | | | RSD-M | | | | RSD-T | | | | TOTAL | | | |
| | | | NO. | CPE | PCT. ¹ | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PSD | |
| 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 | | | | | 66 | 19.3 | 98 | |
| 2003 | F Electro | 1 | 0 | 0.0 | 0 | | | | | 7 | 17.0 | 18 | 89 | 30 | 73.0 | 79 | 88 | 1 | 2.4 | 3 | 91 | | | | | 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 | 0 | 9 | 1.77 | 8 | 58 | 25 | 10.3 | 27 | 87 | 28 | 29 | 50 | 86 | 12 | 3.7 | 15 | 88 | 0.3 | 0.1 | 0.3 | 32 | 0 | 74 | 44.9 | 92 |

| Black Crappie | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|-----------|----------------|----------|------|-------------------|-------|------|------|----|-------|------|------|----|-------|------|------|----|-------|-----|-----|----|-------|-----|-----|----|-------|------|-----|
| Year | Gear | No. of Samples | SUBSTOCK | | | RSD-S | | | | RSD-Q | | | | RSD-P | | | | RSD-M | | | | RSD-T | | | | TOTAL | | |
| | | | NO. | CPE | PCT. ¹ | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PCT | Wr | NO. | CPE | PSD |
| 2005 | F Electro | 3 | 1 | 0.3 | 6 | 6 | 1.8 | 33 | 74 | 7 | 2.0 | 39 | 77 | 5 | 1.5 | 28 | 84 | | | | | | | | | 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 | | | 0.5 | 0.15 | 3 | 4.5 | 4.55 | 24.5 | 79 | 7.5 | 10.8 | 40.5 | 82 | 6 | 9.25 | 32.5 | 84 | 0.5 | 1.2 | 2.5 | 45 | 0 | 0 | 0 | 0 | 19 | 25.9 | 76 |

TABLE 3 . AGE COMPOSITION AND MEAN LENGTH OF WHITE
CRAPPIE FROM SMITH RESERVOIR, FALL 2005.

| Age | Year Class | Number | Percent | CPE | Mean TL | SE |
|-------|------------|--------|---------|------|---------|------|
| 1 | 2004 | 4 | 6.1 | 1.2 | 214.3 | 13.0 |
| 2 | 2003 | 43 | 65.2 | 12.6 | 270.7 | 3.1 |
| 3 | 2002 | 7 | 10.6 | 2.0 | 294.1 | 9.2 |
| 4 | 2001 | 11 | 16.7 | 3.2 | 329.4 | 6.6 |
| 5 | 2000 | 1 | 1.5 | 0.3 | 335.0 | |
| Total | | 66 | 100.0 | 19.3 | | |

TABLE 4 . AGE COMPOSITION AND MEAN LENGTH OF WHITE
CRAPPIE FROM SMITH RESERVOIR, FALL 2003.

| Age | Year Class | Number | Percent | CPE | Mean TL | SE |
|-------|------------|--------|---------|------|---------|-----|
| 1 | 2002 | 2 | 5.3 | 4.9 | 210.5 | 0.5 |
| 2 | 2001 | 36 | 94.7 | 87.6 | 269.4 | 3.7 |
| Total | | 38 | 100.0 | 92.5 | | |

TABLE 5 . AGE COMPOSITION AND MEAN LENGTH OF WHITE
CRAPPIE FROM SMITH RESERVOIR, SPRING 1998.

| Age | Year Class | Number | Percent | CPE | Mean TL | SE |
|-------|------------|--------|---------|------|---------|------|
| 1 | 1997 | 1 | 0.8 | 0.2 | 160.0 | |
| 2 | 1996 | 78 | 65.5 | 15.0 | 205.3 | 2.0 |
| 3 | 1995 | 7 | 5.9 | 1.3 | 225.7 | 4.2 |
| 4 | 1994 | 21 | 17.6 | 4.0 | 289.0 | 6.2 |
| 5 | 1993 | 8 | 6.7 | 1.5 | 323.8 | 12.2 |
| 6 | 1992 | 1 | 0.8 | 0.2 | 340.0 | |
| 7 | 1991 | 3 | 2.5 | 0.6 | 368.7 | 12.2 |
| Total | | 119 | 100.0 | 22.9 | | |

TABLE 6 . AGE COMPOSITION AND MEAN LENGTH OF BLACK
CRAPPIE FROM SMITH RESERVOIR, FALL 2005.

| Age | Year Class | Number | Percent | CPE | Mean TL | SE |
|-------|------------|--------|---------|-----|---------|------|
| 1 | 2004 | 6 | 31.6 | 1.8 | 163.5 | 11.7 |
| 2 | 2003 | 10 | 52.6 | 2.9 | 235.7 | 7.1 |
| 3 | 2002 | 1 | 5.3 | 0.3 | 270.0 | |
| 4 | 2001 | 2 | 10.5 | 0.6 | 264.0 | 6.0 |
| Total | | 19 | 100.0 | 5.6 | | |

TABLE 7 . AGE COMPOSITION AND MEAN LENGTH OF BLACK
CRAPPIE FROM SMITH RESERVOIR, FALL 2003.

| Age | Year Class | Number | Percent | CPE | Mean TL | SE |
|-------|------------|--------|---------|------|---------|------|
| 1 | 2002 | 5 | 26.3 | 12.2 | 201.2 | 6.4 |
| 2 | 2001 | 11 | 57.9 | 26.8 | 245.3 | 5.8 |
| 3 | 2000 | 1 | 5.3 | 2.4 | 254.0 | |
| 4 | 1999 | 2 | 10.5 | 4.9 | 298.5 | 11.5 |
| Total | | 19 | 100.0 | 46.2 | | |



Figure 1. Electrofishing sites for fall 2005.

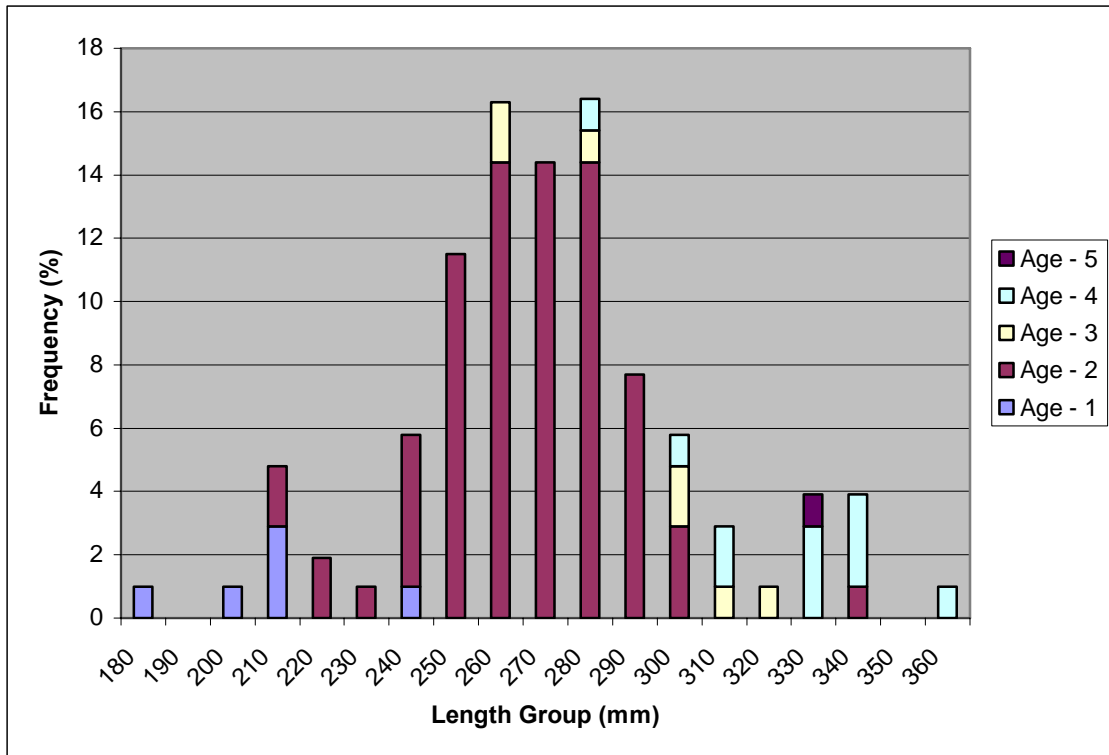


Figure 2. Length-at-Age frequency distribution for white crappie from Smith Reservoir, fall 2005.

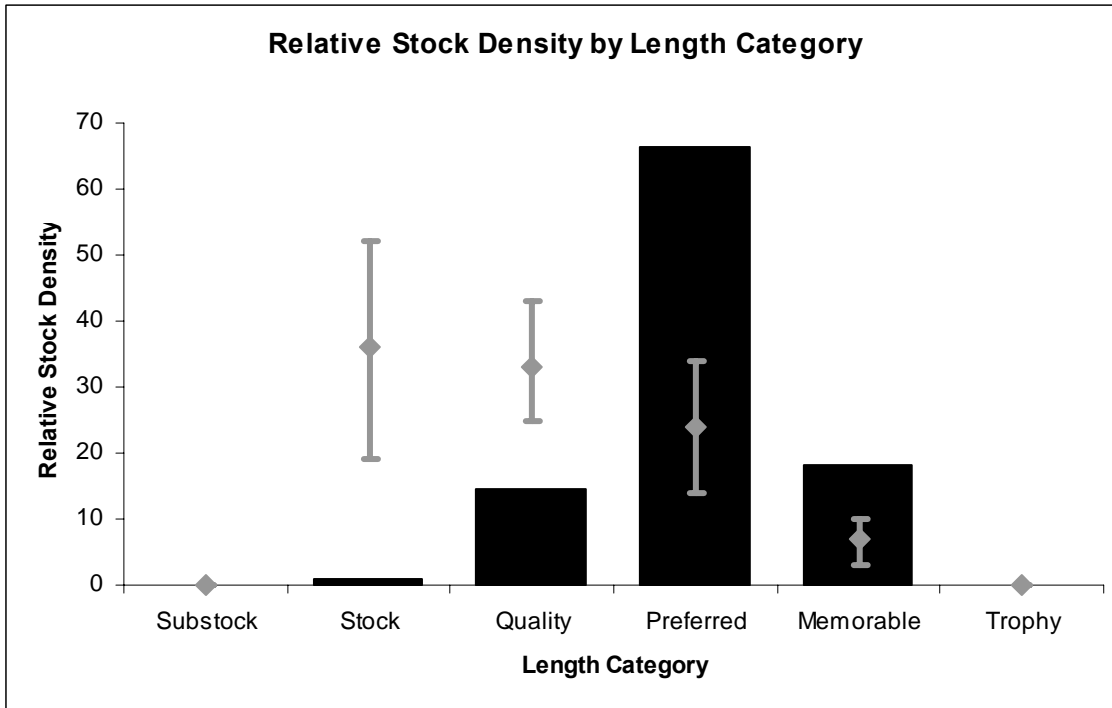


FIGURE 3. Relative Stock Density (RSD) of white crappie from Smith Reservoir, fall 2005. The I-bars represent the statewide 75th and 25th percentile where as the ◇ represents the statewide mean.

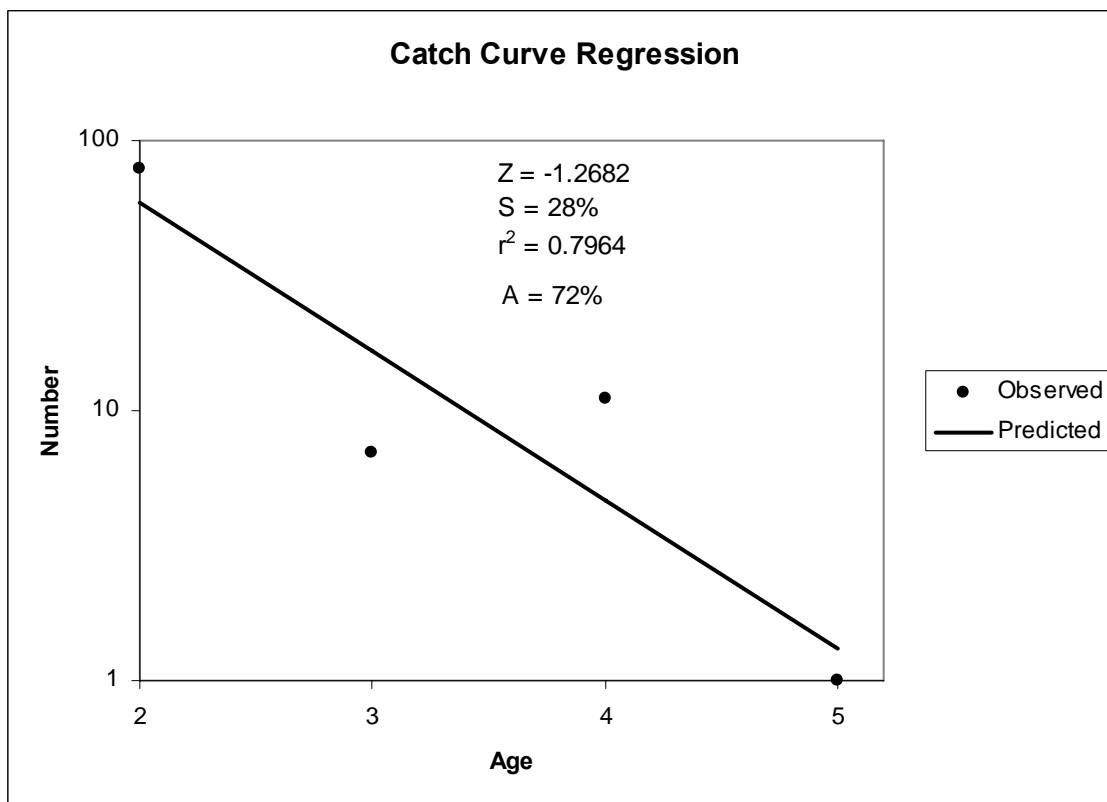


FIGURE 4. Catch-curve regression for white crappie from Smith Reservoir, fall 2005.

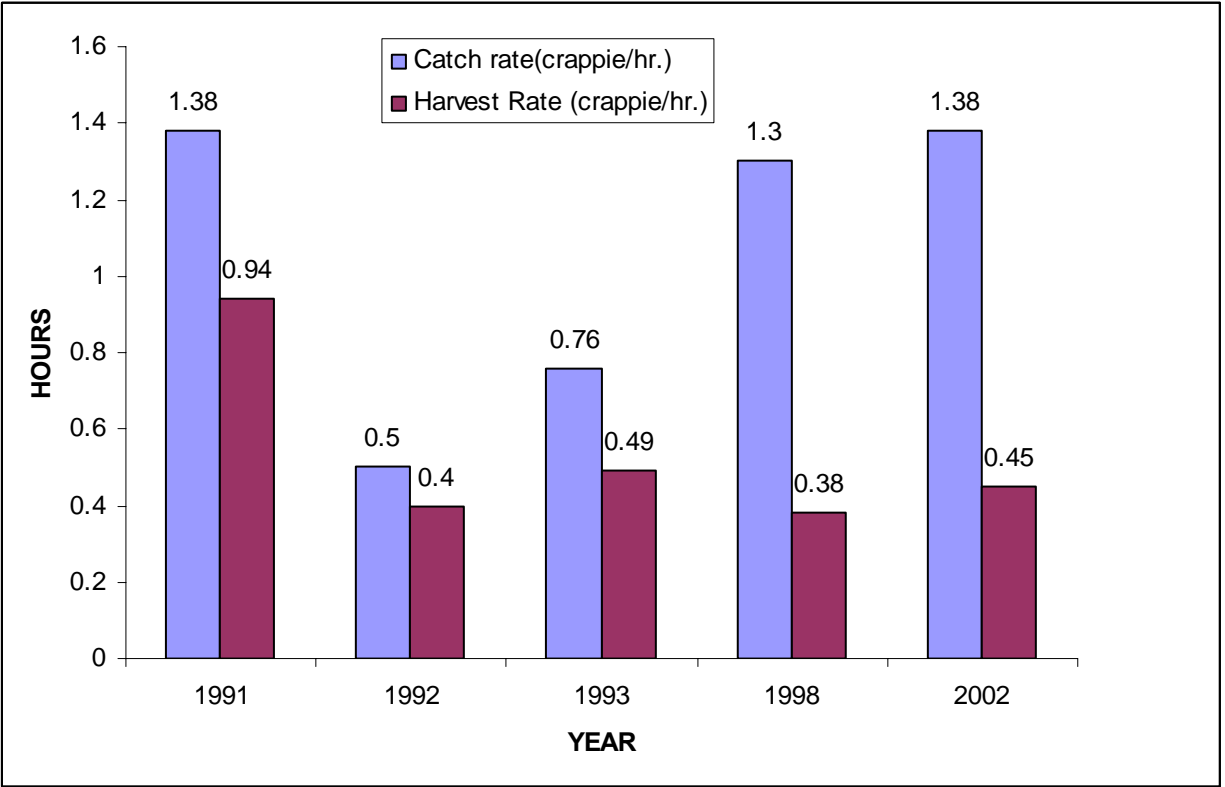


Figure 5. Catch and harvest rates for crappie from Smith Reservoir access creel surveys, 1991-1993,1998 and 2002.