# High Rock Lake Crappie Survey, 2009

**SUMMARY REPORT**

**PIEDMONT FISHERIES INVESTIGATIONS**

**Federal Aid in Fish Restoration**
**Project F-23**

**Project Type: Survey**

**Period Covered: November 2009**

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**2012**



This project was funded under the Federal Aid in Sport Fish Restoration Program utilizing state fishing license money and federal grant funds derived from federal excise taxes on fishing tackle and other fishing related expenditures.

Funds from the Sport Fish Restoration Program are used for fisheries management and research, aquatic education, and boating access facilities. The program is administered cooperatively by the N. C. Wildlife Resources Commission and the U. S. Fish and Wildlife Service.

## Background

High Rock Lake is a 6,374-ha mainstream impoundment located on the Yadkin River in Davidson and Rowan counties. The reservoir is operated by Yadkin-APGI for hydropower generation but also facilitates recreational uses. As a result of operational objectives, the lake is subject to a fall drawdown of approximately three meters**.** Shoreline development is relatively heavy with private developments along most of the lake. Shoreline habitat primarily consists of piers, riprap, tree laps and emergent vegetation. The reservoir is classified as eutrophic by the North Carolina Division of Water Quality (2007). Species of interest to anglers include Largemouth Bass *Micropterus salmoides*, White Bass *Morone chrysops*, Striped Bass *M. saxatilis*, Black Crappie *Pomoxis nigromaculatus*, White Crappie *P. annularis*, Flathead Catfish *Pylodictus olivaris*, and Blue Catfish *Ictalurus furcatus*. The minimum size limit for crappies in aggregate is 203 mm with a daily creel limit of 20 fish.

The objective of this survey was to obtain stock assessment data needed to evaluate and manage crappies in High Rock Lake.

## Methods

*Field Collections*

Black Crappies and White Crappies were collected from shoreline areas during the nights of November 17–18, 2009 using 25.4-mm-bar-mesh trap nets. Total length (mm) and weight (g) were measured and sagittal otoliths were collected from a subsample of 10 fish per 10-mm length interval. When fewer than 10 fish were collected per length interval, all fish collected within the interval were utilized. Those fish not subsampled were returned to the reservoir. Because of incomplete species data, population parameters were evaluated at the genus level.

*Data Assessment*

The status of the crappie population was determined by evaluating several variables: 1) Relative Abundance; 2) Size Structure; 3) Age Structure; and 4) Growth. Data were compared with surveys from previous years to monitor population trends and develop management recommendations to maintain and improve the crappie fishery.

*Relative Abundance*—Relative abundance was quantified by using catch-per-unit-effort (CPUE) data and was measured as the number of crappies collected per net night. High catch rates may indicate overcrowding, which can lead to poor growth rates and stunted populations. Low catch rates may indicate high annual mortality (natural and fishing) and poor survival of young fish (recruitment). However, low catch rates can also be due to sample bias. Because trap nets are stationary, catch rates can vary depending on fish movement and the density of fish within the area of the net set.

*Size Structure*—Size structure was evaluated using length frequency histograms and stock density indices. A length frequency index commonly used is the proportion of fish collected that are over the standard minimum length limit (203 mm for crappies). Stock density indices are numerical descriptors of length-frequency data. Two commonly used stock density indices are Proportional Size Distribution (PSD, the percentage of stock-size and larger fish that are also quality-size and larger) and Proportional Size Distribution-Preferred (PSD-P, the percentage of

stock-size and larger fish that are also preferred-size and larger). The length categories for crappies are: 130-199 mm (stock), 200-249 mm (quality), 250-299 mm (preferred), 300-379 mm (memorable), and greater than 380 mm (trophy) (Gabelhouse 1984a). Low PSD and PSD-P values indicate that few large fish were collected, which may be due to insufficient forage or an overcrowded population. High values suggest poor recruitment or sampling bias, such as small fish escaping through the net mesh.

*Age Structure*—Age structure is the number of fish per age in the sample. An age-length key was used to expand age information from the subsample of sacrificed fish to the entire sample. The age structure was evaluated based on the percentage of age-3 and older crappies in the sample. A low percentage indicates that there are few older fish in the population due to high annual mortality caused by either natural events or overharvest. High percentages of older fish in the population may indicate poor recruitment or overcrowding.

*Growth*—Growth was evaluated by examining mean length at age at time of capture. Fast growth may be due to high harvest rates, poor recruitment, or the ability of the reservoir to support more fish. Slow growth may indicate overcrowding or an insufficient food supply.

## Results

*Relative Abundance*

A total of 270 crappies were collected from High Rock Lake. Mean CPUE for crappies was 11.3 fish per net night (SE = 3.6). This is similar to the Yadkin-Pee Dee River reservoir average of 11.8 fish per net night (NCWRC, unpublished data) but lower than the High Rock Lake average of 22.6 fish per net night (NCWRC, unpublished data). Although species data were incompletely recorded in 2009, White Crappies have historically comprised 25% of the sample (NCWRC; unpublished data).

*Size Structure*

Approximately 49% of crappies collected were over the minimum length limit of 203 mm (Figure 1). This is below the Yadkin-Pee Dee River reservoir average for Black Crappies (70%; NCWRC, unpublished data) and would likely be lower if White Crappies were not included. Over the last three surveys the percentage of White Crappies over 203 mm has averaged 62% versus 40% for Black Crappies (NCWRC; unpublished data). Values for PSD and PSD-P were 51 and 19, respectively, and are in the ideal ranges of 30-60 for PSD and 10-20 for PSD-P (Gabelhouse 1984b).

*Age Structure*

A total of 186 crappies were aged and ranged in age from 1 to 8. The percentage of age-3 or older fish was 24% (Figure 2), and is above the Yadkin-Pee Dee River reservoir average for Black Crappies (18%; NCWRC, unpublished data). This value would likely be higher if White Crappies were not included because the percentage of age-3 or older White Crappies has averaged only 4% over the last three samples (NCWRC; unpublished data).

*Growth*

Mean length of age-2 crappies at the time of capture was 227 mm (SE = 3.6; Figure 3) and is below the Yadkin-Pee Dee River reservoir average for Black Crappies (242 mm; NCWRC, unpublished data). Mean total length for age-3 crappies was 232 mm (SE = 13.3). This value is also less than the Yadkin-Pee Dee River reservoir average for Black Crappies (269 mm; NCWRC, unpublished data). Both length-at-age values would likely be lower if White Crappies were not included because age-2 and age-3 White Crappies averaged 21 mm and 35 mm larger, respectively, over the last three samples (NCWRC; unpublished data).

## Summary

Catch rates of black and White Crappies were below normal for High Rock Lake in 2009. Heavy rains prior to the survey increased the lake level and turbidity. This likely affected crappie movement patterns because the catch rate improved daily as the water cleared. However, catch may have also been reduced if a strong year class was not produced in the last 2 to 3 years. Prior samples have had one or more strong year classes that boosted the catch rate. Although partially mitigated by White Crappies in the sample, the size structure, age structure, and growth values indicate that the crappie population is older and slower-growing than average for a Yadkin-Pee Dee River reservoir. Crappies reached the minimum length limit between age 2 and age 3 and the growth rate was flat for older fish. Slow growth and a high proportion of older fish can indicate stunting. Removing the regulations may alleviate a crowded condition by allowing more fish to be taken from the population. Because of sampling problems in 2009, changes in regulation will be evaluated in future samples and are not recommended at this time.

## Recommendations

1. Maintain current 203-mm minimum size limit and 20-fish daily creel limit on crappies at High Rock Lake.

2. Continue to sample High Rock Lake every 2-3 years during fall with trap nets to examine temporal trends in population and recruitment variability and evaluate current regulation.

## References

Gabelhouse, D. W. 1984a. A length categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Gabelhouse, D. W. 1984b. An assessment of crappie stocks in small midwestern private impoundments. North American Journal of Fisheries Management 4:371-384.

North Carolina Division of Water Quality. 2007. Lake and reservoir assessments – Yadkin-Pee Dee River Basin. Final Report, Raleigh.

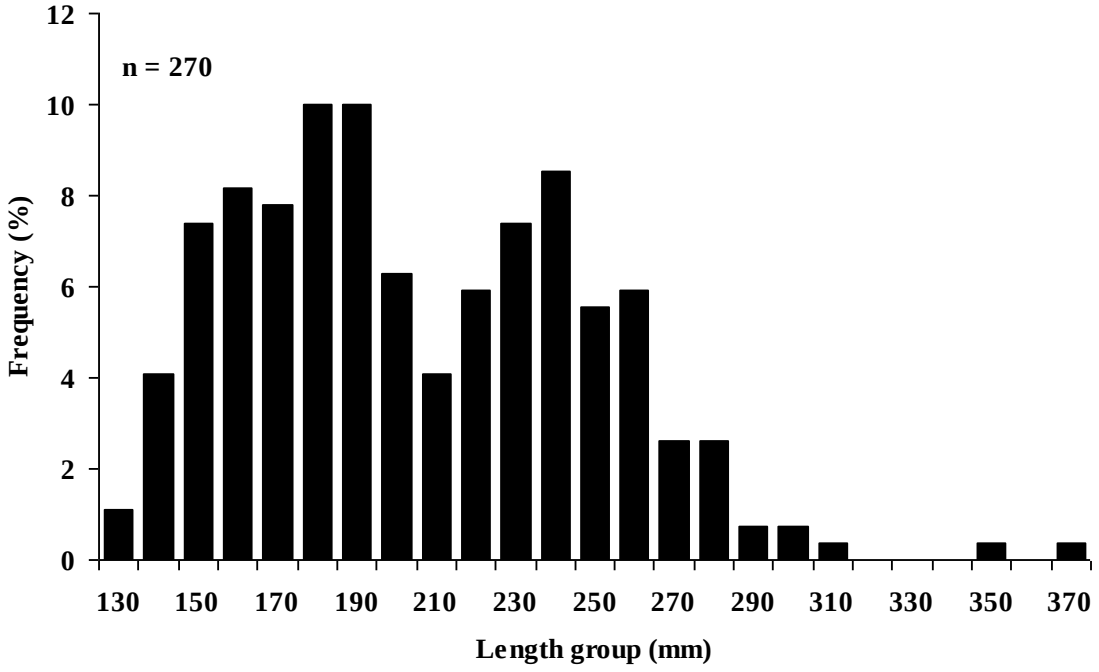


FIGURE 1.—Length frequency distribution of crappies collected from High Rock Lake with trap nets, November 2009.

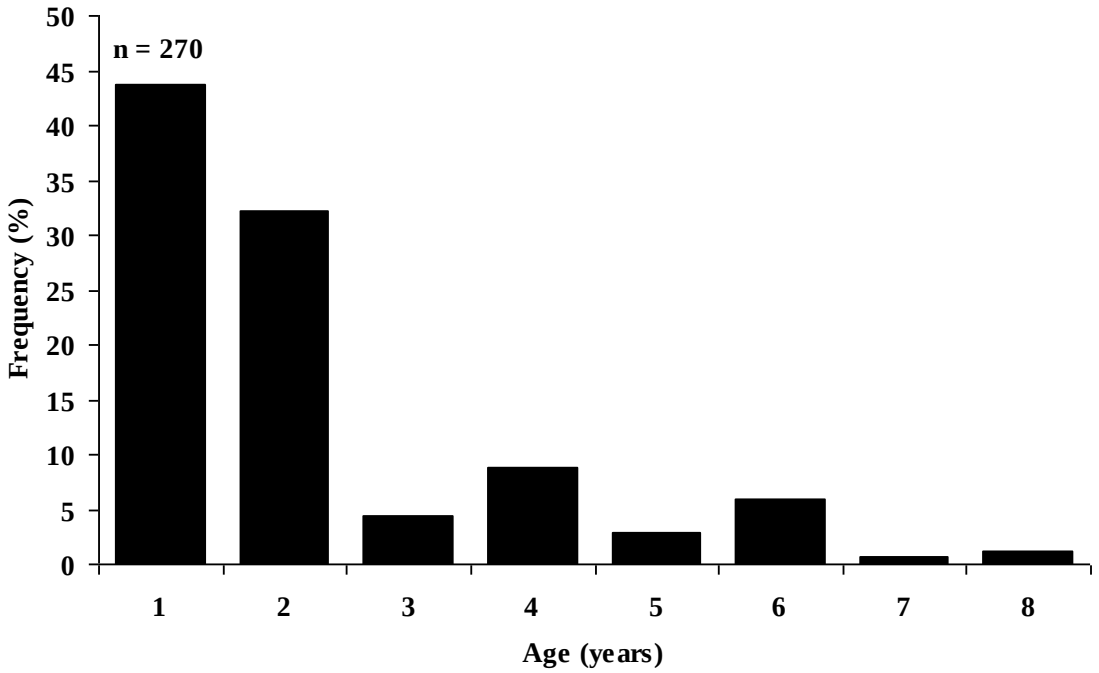

FIGURE 2.—Age frequency distribution of crappies collected from High Rock Lake with trap nets, November 2009.

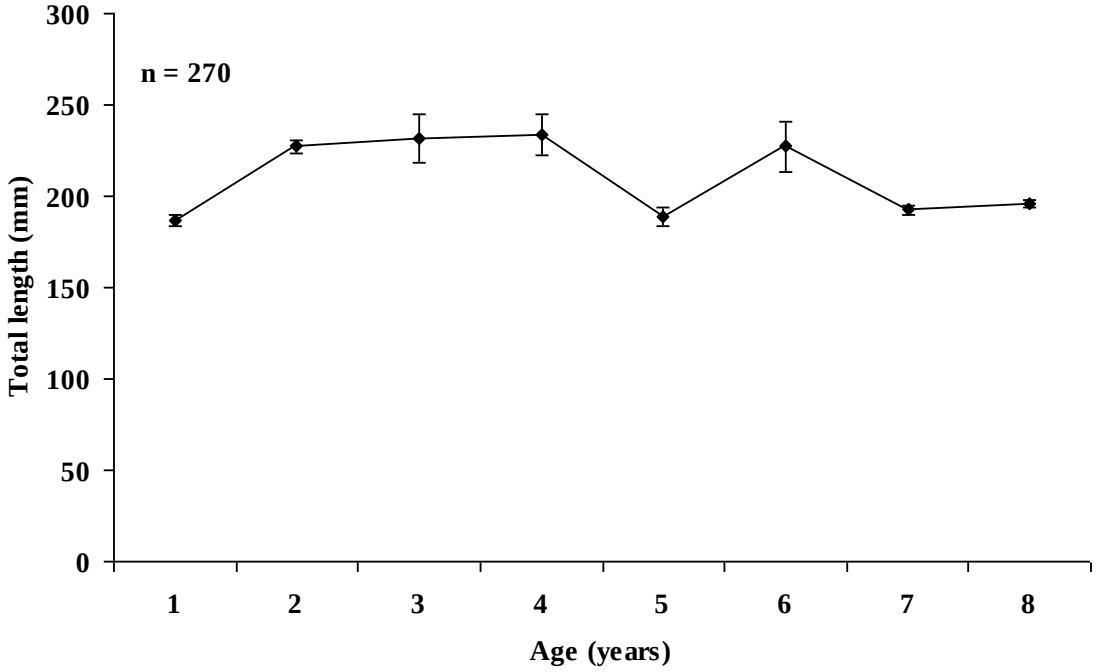


FIGURE 3.—Mean total length at age (± 1 SE) at time of capture of crappies collected from High Rock Lake with trap nets, November 2009.