



Effects of Proposed Length Limit Changes & “5 under rule” on Lake Washington Crappie Populations and Harvest

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Introduction

The problem:

- 595 anglers signed a petition to increase the minimum length limit on Lake Washington (Figure 1) from 10 inches to 12 inches because they believe overfishing is occurring based on perceived decreases in catch rates and size.
- Mississippi Department of Wildlife Fisheries and Parks survey data indicate that catch rate and size has not decreased (Figure 2)

Lake Washington is:

- 25 miles from Greenville MS in Washington County
- One of state's largest natural lakes (5,000 acres) providing a recreational and subsistence fishery
- World renowned crappie fishing attracting out of state anglers

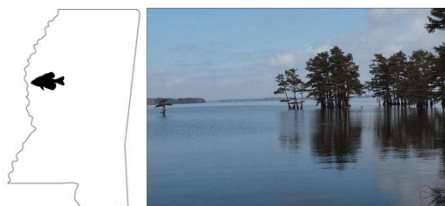


Figure 1. Location of Lake Washington.

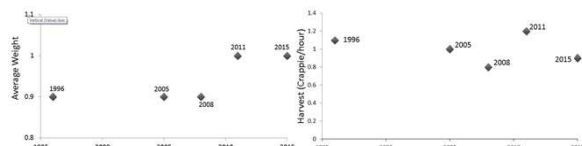


Figure 2. Average weight and catch rate for Black and White Crappie in Lake Washington for MDWFP surveys conducted from 1995 to 2015.

Current Fishing Regulations for Lake Washington Are:

- Black and White Crappie managed collectively
- 10" Minimum length limit
- 30 fish daily bag limit
- Harvest of 5 fish under 10" - this regulation is unique, providing the opportunity for subsistence harvest

MDWFP survey data indicates that overfishing is not occurring at current regulations, but a formal Yield Per Recruit analysis should be done to evaluate the potential for overfishing and evaluate the requested change from 10 to 12 inches.

About Yield Per Recruit Models

- Uses mortality and growth data to evaluate yield with for a given fishing mortality rate by calculating the area under the yield curve (Figure 3).
- If yield decreases with increasing harvest, there is a potential for overfishing
- Can evaluate harvest yields for varying minimum length limits and harvest rates
- Current yield per recruit models do not account for harvest below the minimum length limit, but this is happening at Lake Washington (Figure 4)

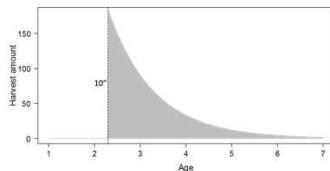


Figure 3. Yield curve for a cohort of fish subjected to a 10 inch minimum length limit. The area under the curve is total yield

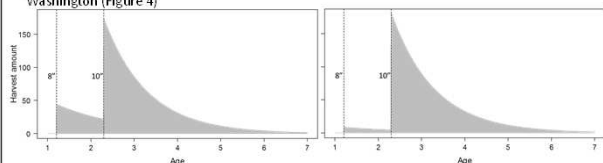


Figure 4. Yield curve for a cohort subjected to a 10 inch MLL and harvest below the MLL, simulating the “5 under rule”. Lake Washington anglers rarely harvest fish under 8 inches.

Study objectives

1. Evaluate potential for growth overfishing at current and proposed length limits
2. Evaluate at different mortality rates between 8" and MLL “5 under” rule using a new generalization of the tradition Yield Per Recruit Model

Methods

A combination of existing data and field sample was used for analysis.

What is need to evaluate Yield Per Recruit?

1. Mortality-66% annual mortality estimated by MDWFP
2. Length-Weight Relationship-based off of field collected data
3. Growth relationship-based off of field collected data

Field data collection

- Lead nets and trap nets to capture crappie (12 each at 24 locations)
- Captured fish measured for length and weight
- Subset of fish aged using otoliths (2 readers) (Figure 6)

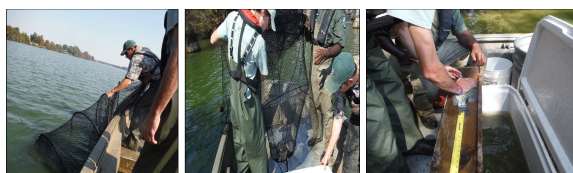


Figure 5. Setting and retrieving trap nets (left, center). Measuring the length of a captured Crappie (right).



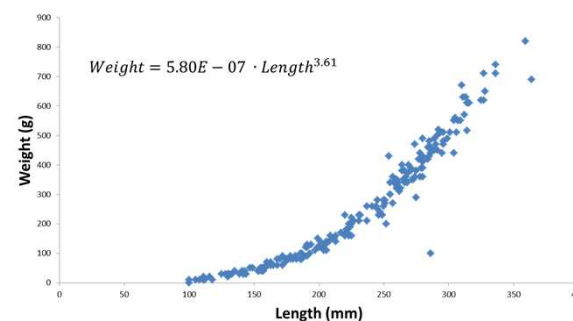
Figure 6. A Crappie otoliths used to age fish. Black dots denote annuli used to estimate age of Lake Washington Crappie

Analysis

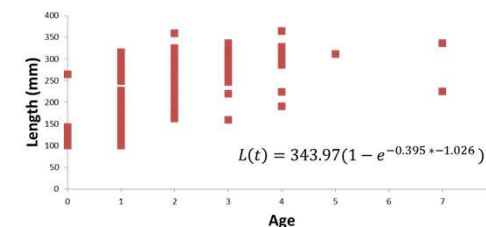
- Length-weight data used to estimate length-weight relationship
- Age-length data used to estimate growth relationship
- Mortality rate, length-weight, and growth relationship used in Yield Per Recruit model to evaluate overfishing and “5 under rule”

Results

Length weight

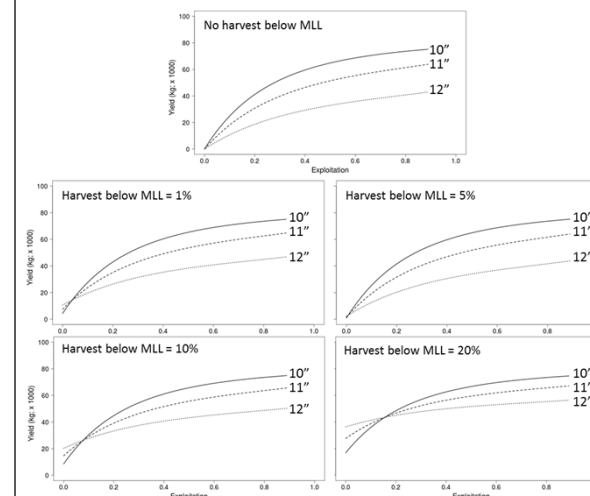


Growth



Yield Per Recruit Models

- Used MLL of 10", 11", and 12"
- 5 models showing different rates of conditional fishing mortality below MLL at 0, 0.01, 0.05, 0.1, and 0.2



Conclusions

- No potential for overfishing, yield increased with increasing exploitation
- If MLL is 12 inches and exploitation is high there may be a potential for overfishing, although exploitation rates this high for fish below the MLL are unlikely
- Supports MDWFP catch rate and weight data

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