Early life survival and growth of Coho Salmon (*Oncorhynchus kisutch*) in a small Lake Superior tributary

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**Introduction**

Coho Salmon (*Oncorhynchus kisutch*) were introduced into the Lake Superior basin in the late 1960s and have established breeding populations in many Wisconsin streams. The species has been extensively studied within its native range, but until recently there has been little research on the Great Lakes populations. In this study, we hypothesized that survival, and growth of juvenile Coho Salmon over their first summer would be correlated with age. Young-of-the-year fish were captured in early and late summer would be correlated with age.

**Methods**

Field Collections:
- Samples were taken on May 5 and August 22, 2012 (n=100) during periods of base flow (<10cfs)
- Sample locations were 100m long and approximately 2km upstream from the mouth in Lake Superior

Sample preparation and data collection:
- Total length (+/- 0.1 mm) and weight (+/- 0.1g) were recorded for each fish.
- Left and right sagittal otoliths were removed. Left otoliths were dried and mounted on microscope slides using super glue.
- Each polished otolith was imaged, and emergence checkpoints were noted and marked on each photo.
- Daily growth rings were counted for each sample (similar to counting rings on a tree) in order to back calculate date of emergence. Samples were separated into age categories based on the Julian Date of emergence.

Data Analysis:
- Emergence distributions were plotted for the two sample periods
- Using weight(g) and length(cm) at capture and estimated size at emergence we were able to estimate daily growth rates for each age category.
- Good et al’s (2001) maximum likelihood method allowed us to examine the magnitude of directional mortality between the two samples.

**Results**

Effects of Age on Survival and Growth

![Figure 1. Frequencies of emergence date for Coho salmon (*Oncorhynchus kisutch*) from the Onion River in Bayfield County, WI.](image1)

![Figure 2. Estimated survivalship proportions by emergence date through the first summer for Coho salmon (*Oncorhynchus kisutch*) collected from the Onion River in Bayfield County, WI.](image2)

![Figure 3. Mean growth (mm) per day by age category for Coho salmon (*Oncorhynchus kisutch*) from samples collected from the Onion River in Bayfield County, WI on May 5, 2012.](image3)

![Figure 4. Mean growth (mm) per day by age category for Coho salmon (*Oncorhynchus kisutch*) from samples collected from the Onion River in Bayfield County, WI on August 22, 2012.](image4)

![Figure 5. Mean growth (mm) per day by age category for Coho salmon (*Oncorhynchus kisutch*) from samples collected from the Onion River in Bayfield County, WI in August 9, 2012.](image5)

**Discussion**

The survivorship curve generated showed earlier emerging fish had experienced lower survivorship than those that emerged later. This may suggest earlier emerging fish may have been disadvantaged due to environmental factors such as flooding or increased predation risks.

**Acknowledgements**

The authors would like to sincerely thank the Office of Research and Sponsored Programs UW-Eau Claire for funding this study, Dr. Lonzarich for his extensive contributions to this study and B. Bausch for assisting in data collection and processing, Dr. Kraker for assistance in method development and statistical analysis, and Dr. Cronje for advice and general helpfulness, particularly in structuring the research paper.