MICHIGAN STATE UNIVERSITY

Quantitative Fisheries Center (QFC) Ongoing Project Briefing

Catchability Dynamics of Walleye in the Ceded Territory of Wisconsin, 1990-2023

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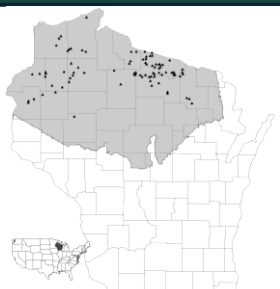
Funding Agency: USGS Midwest CASC
Start Date/Status Date: 2023



Caption: Map of the Ceded Territory of Wisconsin, USA, with 86 lakes used in this study.

Goal: Quantify how the density-dependent catchability relationship between angler CPUE and Walleye population density varies across the Ceded Territory of Wisconsin and to determine under what conditions can angler CPUE can be used as an index of relative abundance when nonlinearity in the angler CPUE-population density relationship exists

Objectives:

1. Quantify how the density dependent catchability relationship between angler CPUE and population density varies among lakes in the Ceded Territory of Wisconsin.
2. Understand how inferences regarding the relationship between angler CPUE and population density are affected by measurement error.
3. Evaluate the conditions under which angler CPUE data can be used to detect population changes in inland fisheries when nonlinearity exists in the relationship between angler CPUE and population density.

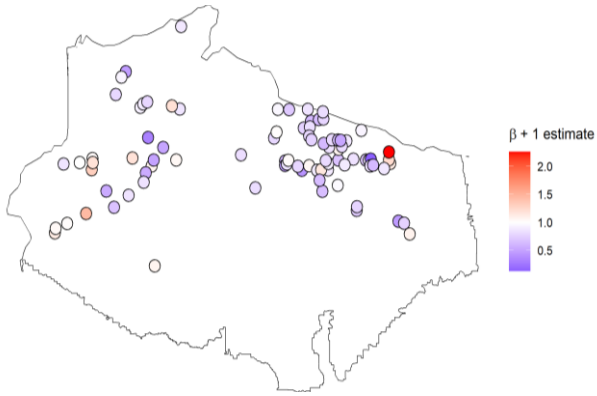
Management Implications: Walleye support culturally, economically, and ecologically important inland fisheries. However, there are too many waterbodies to monitor populations in a given year using fishery independent methods. Angler CPUE could be used to monitor population changes if the relationship between angler CPUE and population density is linear. However, the relationship between angler CPUE and population density is often nonlinear according to previous work. This study provides further insight on the density-dependent catchability relationship of Walleye in the Ceded Territory of Wisconsin, and when angler CPUE can or cannot be used to monitor changes in Walleye abundance when nonlinearity is present.

Methods:

- Developed an ensemble of models that explicitly account for variability of density-dependent catchability across lakes and that explicitly account for measurement error using error-in-variables.
- Developed a simulation framework to test under what scenarios angler CPUE can be used to monitor changes in Walleye populations.

Prelim. Findings/ Next Steps:

- Strong among-lake variability of density-dependent catchability.
- By not accounting for measurement error, nonlinearity between angler CPUE and population density is stronger.
- Ongoing evaluation of how nonlinearity affects the ability to use angler CPUE data to monitor population changes.



Caption: Spatial distribution of the MLE estimates of density-dependent catchability and corresponding standard errors for the 86 lakes in the study, overlaid on a map of the Ceded Territory of Wisconsin, based on data collected from 1990 to 2023.

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