Quantitative Fisheries Center (QFC) Completed Project Briefing

Re-Evaluation of An Adaptive Management Framework for Invasive Grass Carp within Lake Erie

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Active Dates: 2022 – 2024

Caption: Schematic of a double-loop adaptive management process

Goal: Update the adaptive management framework that is foundational for the Lake Erie grass carp control, including revising objectives and updating management alternatives and the population model for assessing consequences of management actions, to improve decision making
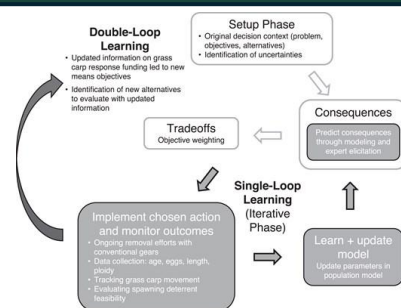
Objectives:
1. Revise objectives and alternatives of the grass carp adaptive response process
2. Evaluate new alternative management actions
3. Identify and evaluate sources of uncertainty relevant to grass carp control actions
4. Reevaluate the decision framework under different levels of spawning deterrent effectiveness for a potential Sandusky River spawning barrier

Management Implications: A coordinated control program has been conducted on Lake Erie since 2019 to reduce grass carp densities and limit possibility of spread to other lakes. Updates to the adaptive management framework underlying the program will help improve program effectiveness.
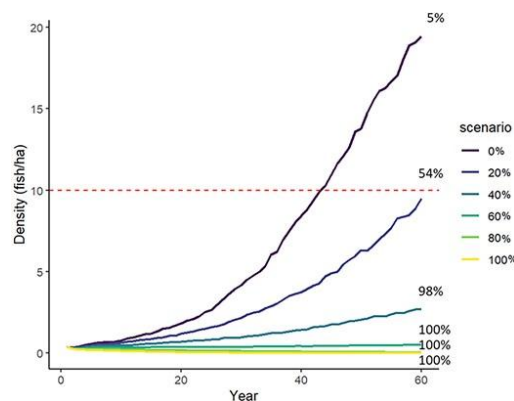
Methods:
- Updated the spatially-structured projection model incorporating new data on movement, spawning probabilities, survival, and initial abundance
- Structured decision making and a double-loop learning process were conducted to reassess objectives, management alternatives, etc.
- Value of information analyses were conducted to quantify how uncertainty in demographic parameters and deterrent efficiency influenced optimal decisions

Caption: Density of Grass Carp projected under various scenarios of deterrent passage on the Sandusky River, Ohio assuming a fishing morality of 0.05.

Key Findings:
- Direct removal and spawning deterrents capable of reducing spawning by > 50% in combination was consistently the most effective control action
- Uncertainty analysis showed that survival rates and stock-recruitment productivity had the greatest expected value of perfect information

Deliverables: Bopp, J., K.F. Robinson, L.R. Nathan, T.O. Brenden, C.M. Mayer, and J. Dettmers. 2025. Re-evaluation of an adaptive management framework for invasive grass carp within Lake Erie. Transactions of the American Fisheries Society 82:490-504. Download here

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