

Design of population monitoring and modeling to evaluate potential management actions for invasive blue catfish in Maryland

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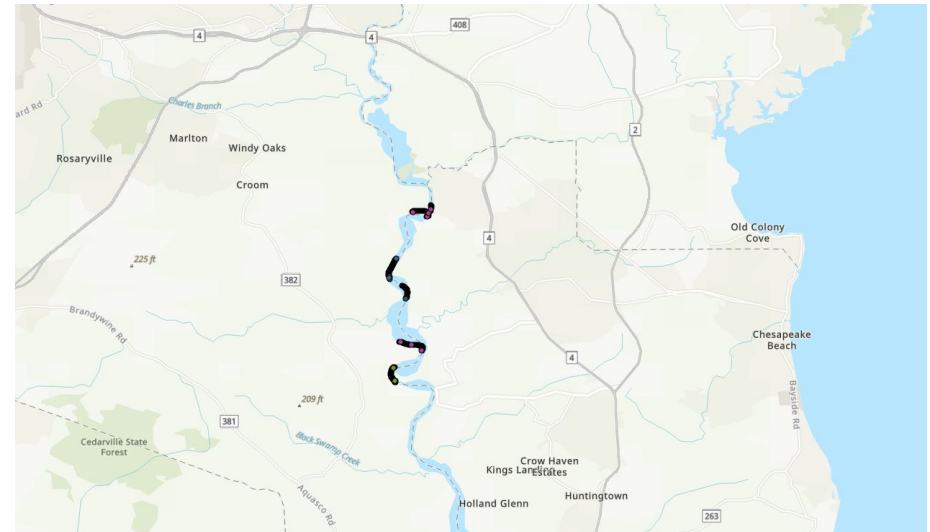
Part 1: Monitoring

Pilot studies 2024:

- MD-DNR and USGS developed pilot study design
- MD-DNR completed 5 surveys (~1km x 100m) to test survey design in Sept 2024
 - Covariates (e.g., environmental conditions, electrofishing settings)
 - Netted ~ 500 blue catfish
- USGS power analyses based on pilot data



Photo by: MD-DNR, Fisheries Service



5 electrofishing surveys by MD-DNR on the Patuxent River

Part 1: Monitoring

Pilot studies 2024:

- Study design for new technologies (MD-DNR, VCU, and USGS)
- Tested new technologies over 2-3 days in August 2024 (VCU, MD-DNR):
 - Unmanned Aerial Vehicles (UAVs)
 - Side-scan sonar



Photo by Will Stuart

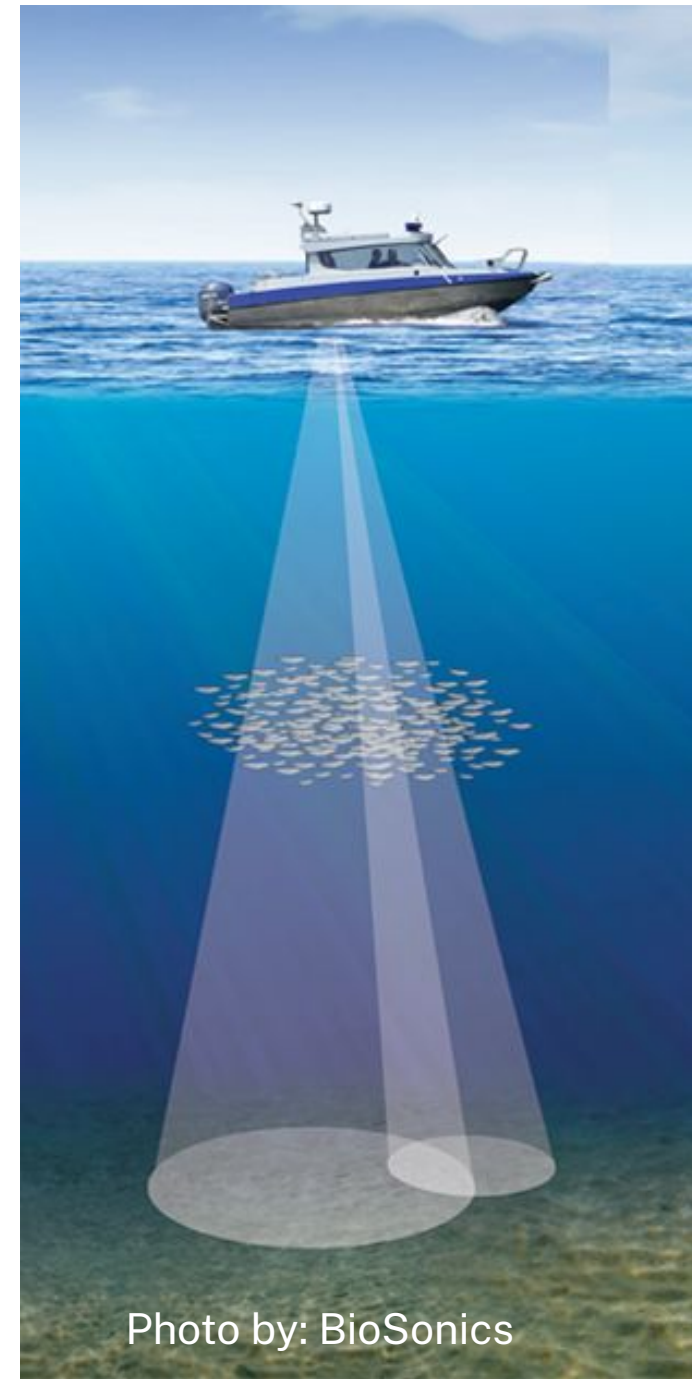


Photo by: BioSonics

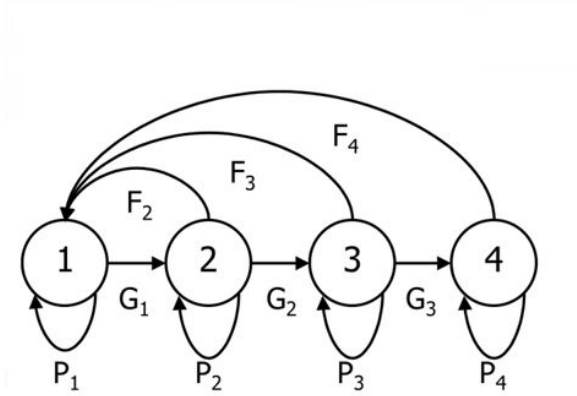
Part 1: Monitoring

Plans for 2025:

- Continue developing electrofishing study design (MD-DNR, USGS)
 - Relative abundance models
 - N-mixture models
- Additional electrofishing surveys (Patuxent, Susquehanna, Choptank) (MD-DNR)
 - 2 commercial chase boats this year, side-scan sonar, 1 day of drone work
- Statistically integrate the sonar/drone data with MD-DNR's electrofishing data (USGS)
 - Bayesian hierarchical models with informed priors

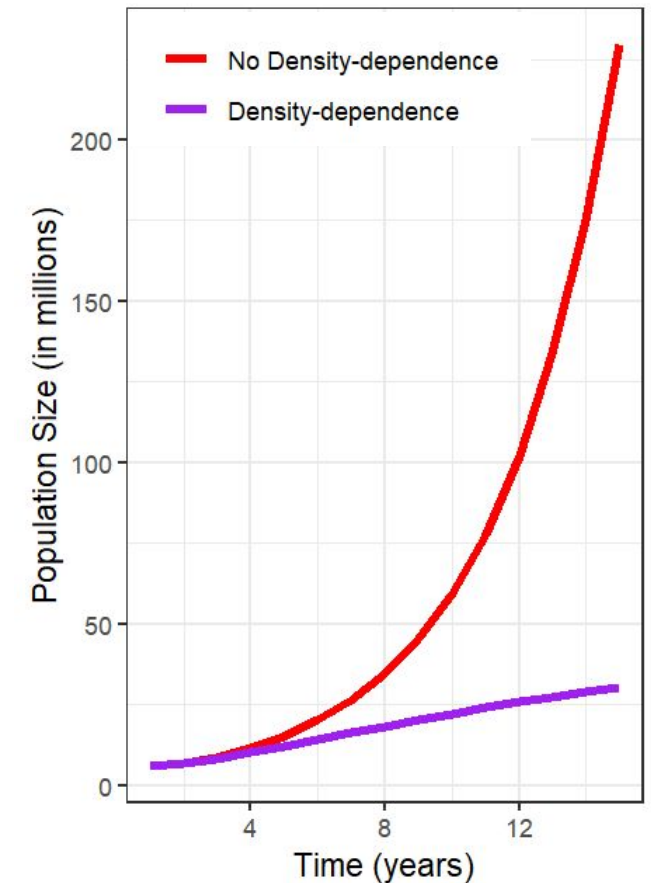


Part II: Removal modeling



$$\mathbf{A} = \begin{bmatrix} P_1 & F_2 & F_3 \\ G_1 & P_2 & 0 \\ 0 & G_2 & P_3 \end{bmatrix}$$

Projecting blue catfish population size



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ARTICLE

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A size-based stock assessment model for invasive blue catfish in a Chesapeake Bay sub-estuary during 2001–2016

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Part II: Removal modeling

Plans for 2025:

- Expert elicitation
 - vital rates specific to Maryland
 - management strategies
- Improve model (e.g., customize for Maryland, density dependence)
- Sensitivity analyses
 - Which vital rate most influences population size?
 - Which size class should be targeted for removals?
- Simulate management scenarios
 - e.g., population impacts of removing 20, 30, 40% of size classes that are harvested commercially



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Photo by Jay Fleming