

Life history-based models as quantitative tools to support passage performance standards for alosines

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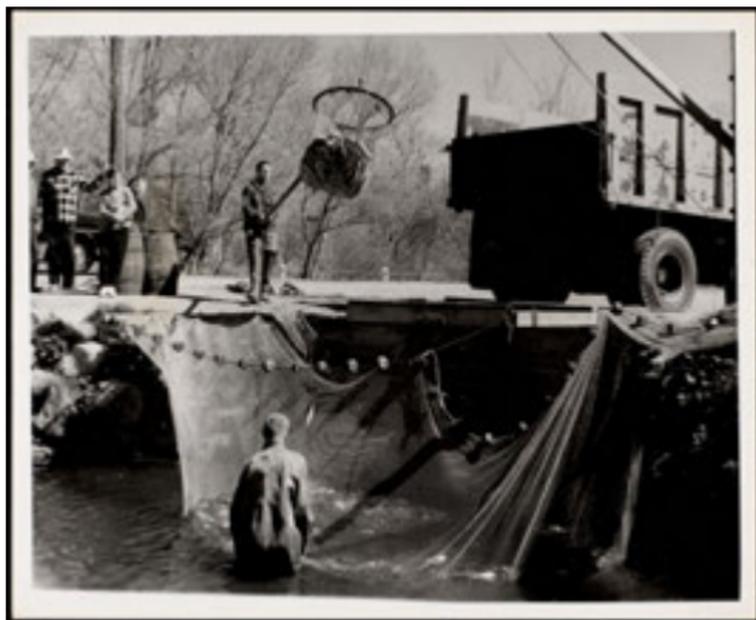
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- 1 Background
 - Life-history and management
 - Need for work
 - Context for work
- 2 Methods
 - Modeling approach
- 3 Results
 - Example model output (preliminary)
- 4 Summary
 - Next steps
- 5 Acknowledgments

American shad & alewife (alosines)

- Anadromous
- Complex life-history
- Population crashes
- Not listed- different challenges for managers from ESA
- Planning for recovery



Understanding effects of dams

- Range-wide population declines
 - Dams are one reason
 - Upstream passage & delays
 - Downstream mortality & delays
 - How is this affecting populations and **how much?**



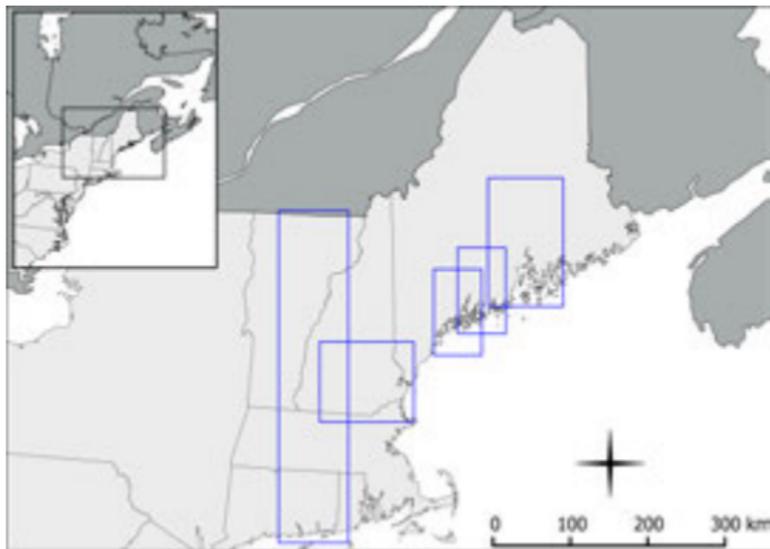
History of performance standards modeling

- Dam Impact Analysis:
 - (Neiland et al. 2013)
 - (Neiland et al. 2015)
 - Atlantic salmon, ESA
 - Used to support FERC re-licensing process
- Extension to other diadromous fishes (non-listed)
- Recovery & management planning



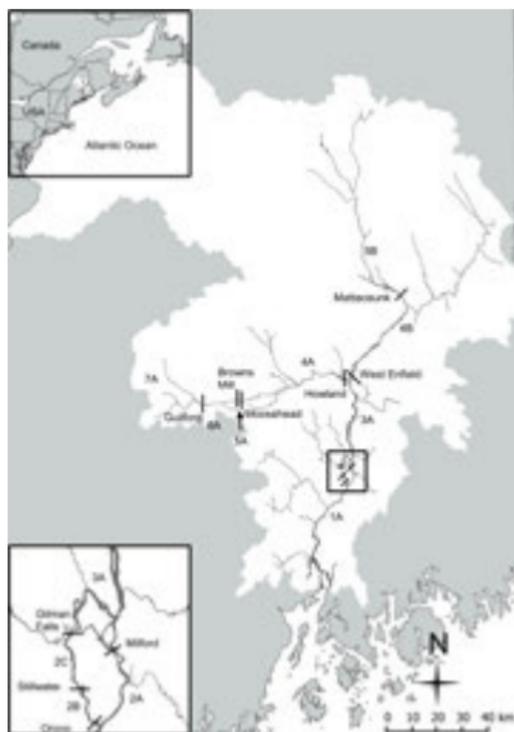
Current scope of project

- Initial focus: CT north
- Hydropower re-lisencing
- Recovery efforts, dam removals, etc.
- Climate change & fishing (directed or bycatch)

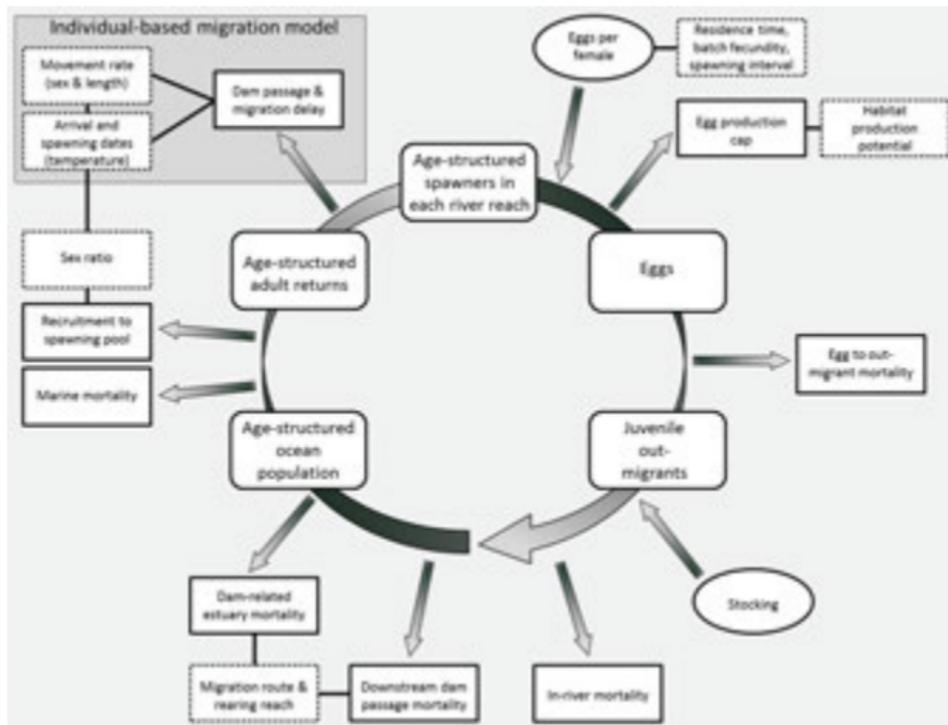


Overview: Penobscot River case study

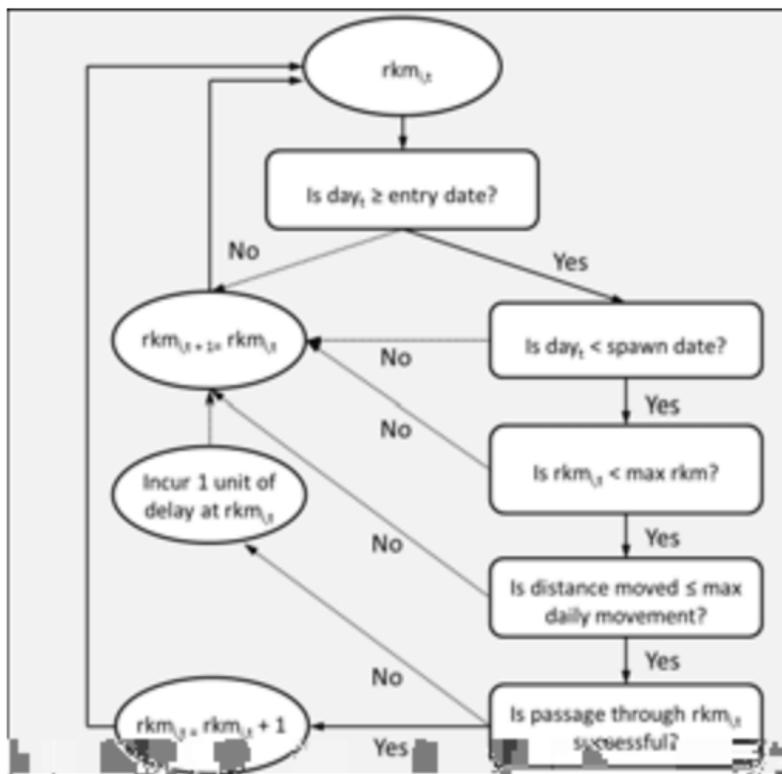
- Simulation models
- Life-history data along east coast (many cooperators)
- Part projection model, part agent-based
- Demographic structuring in space and time vs mgmt decisions



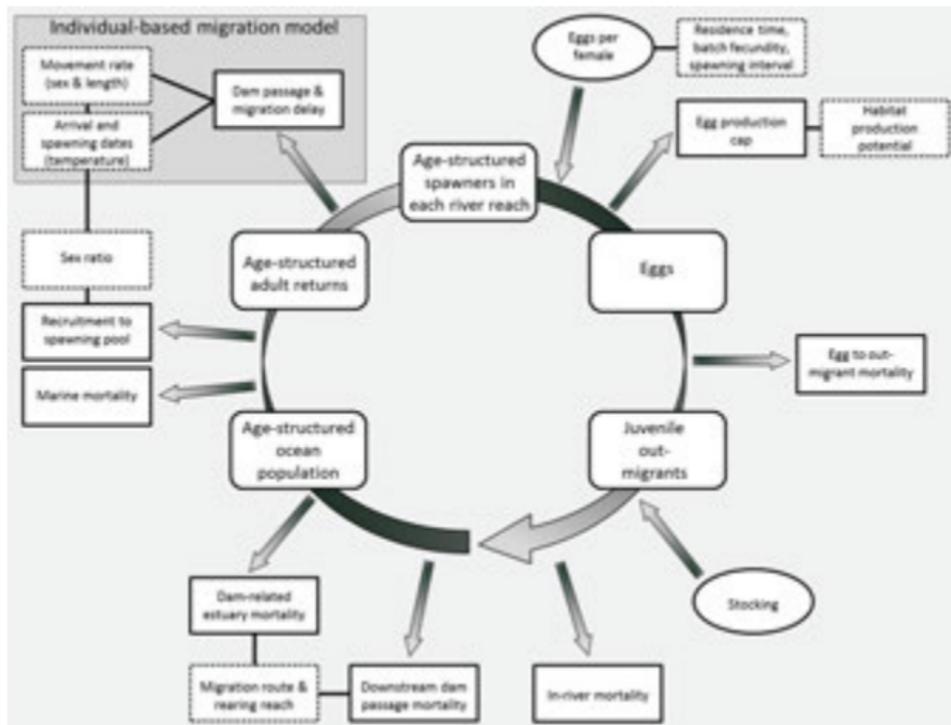
Conceptual model



Individual-based upstream migration model

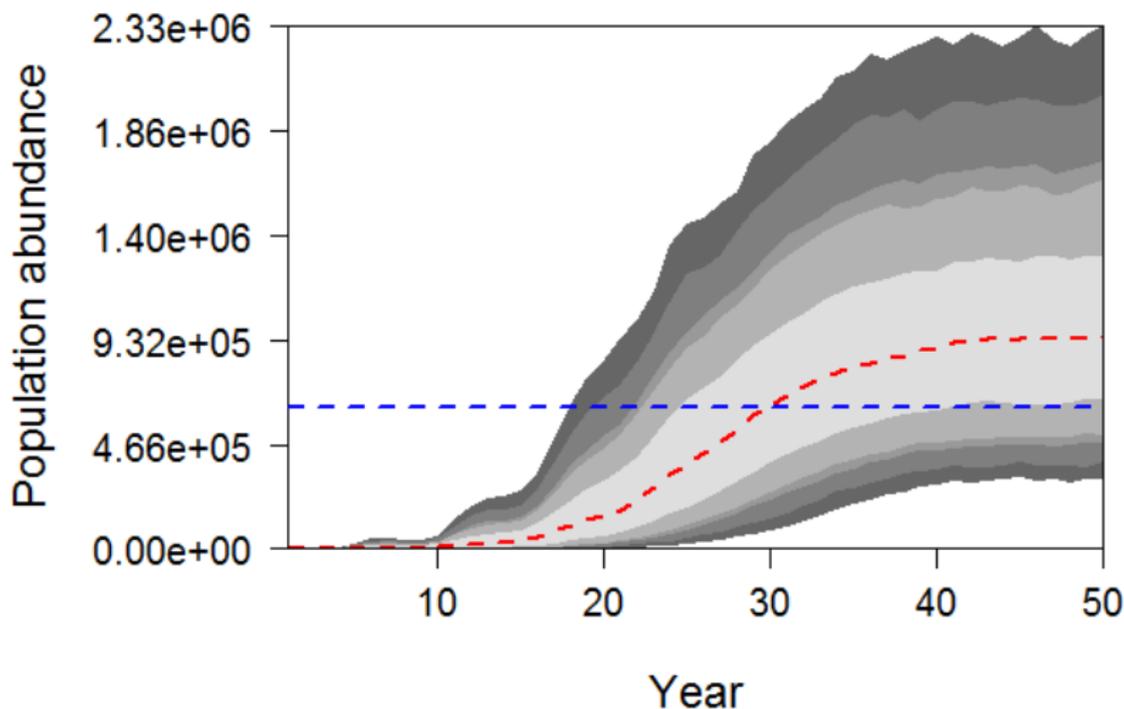


Back to our conceptual model



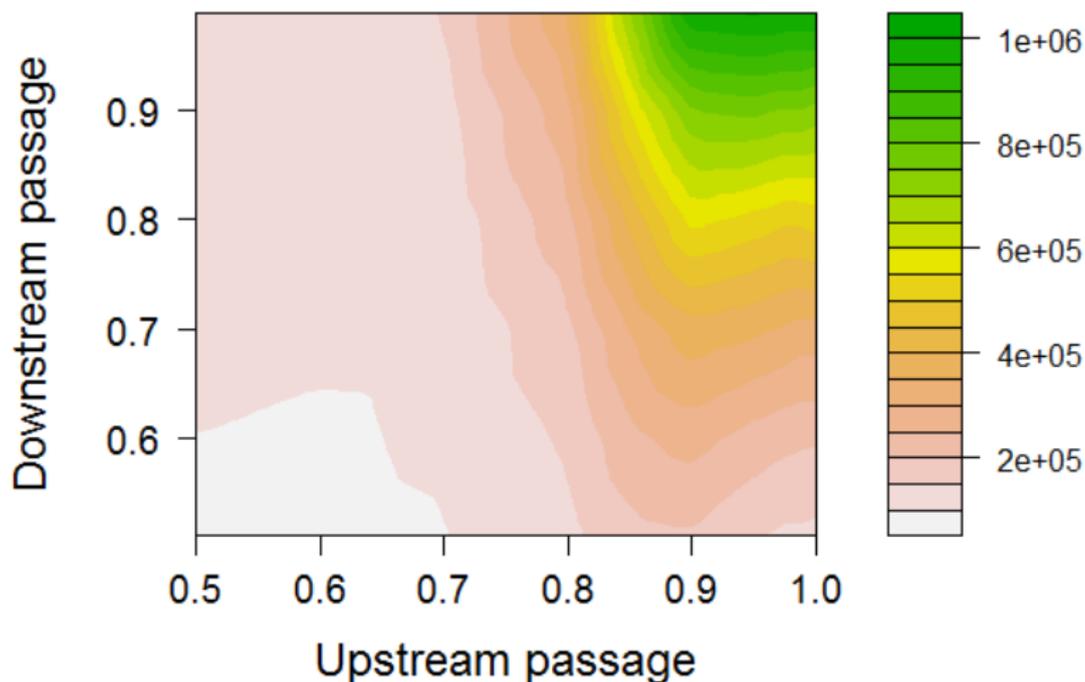
Example model output (preliminary)

Penobscot River stock under perfect passage



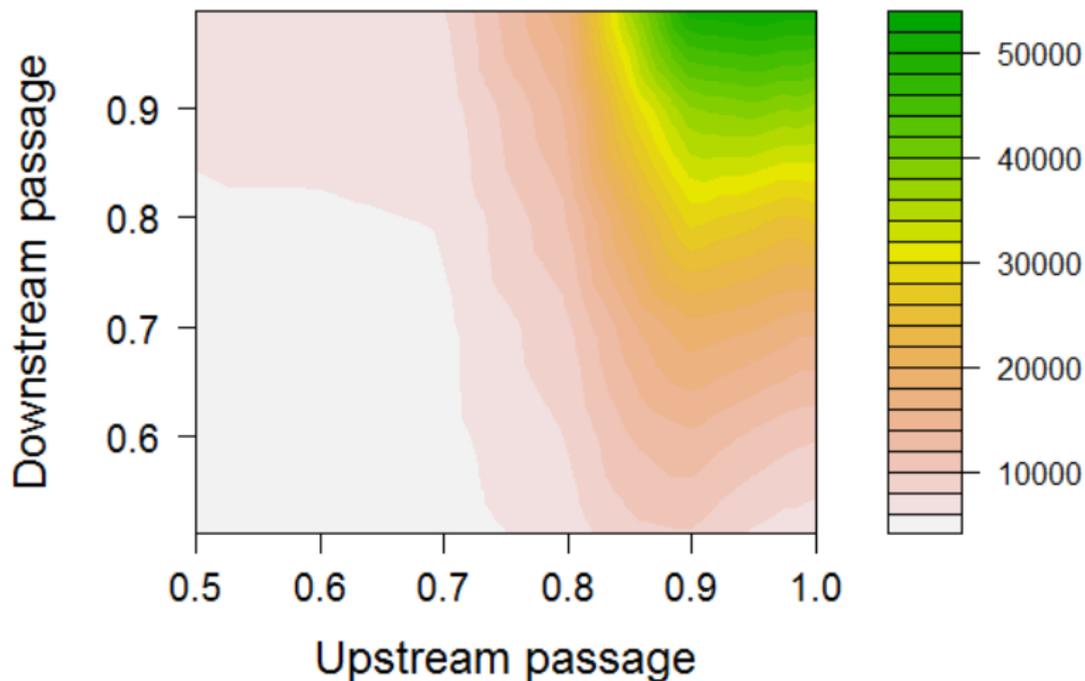
Example model output (preliminary)

Spawner abundance after 41-50 years



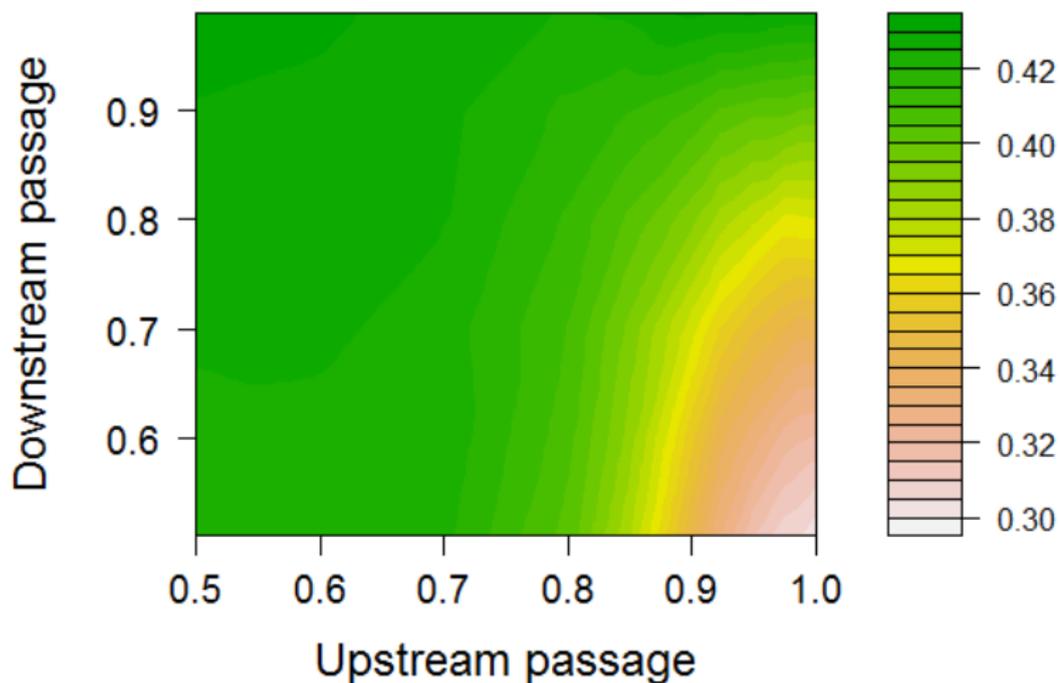
Example model output (preliminary)

Age-specific abundance: age 7



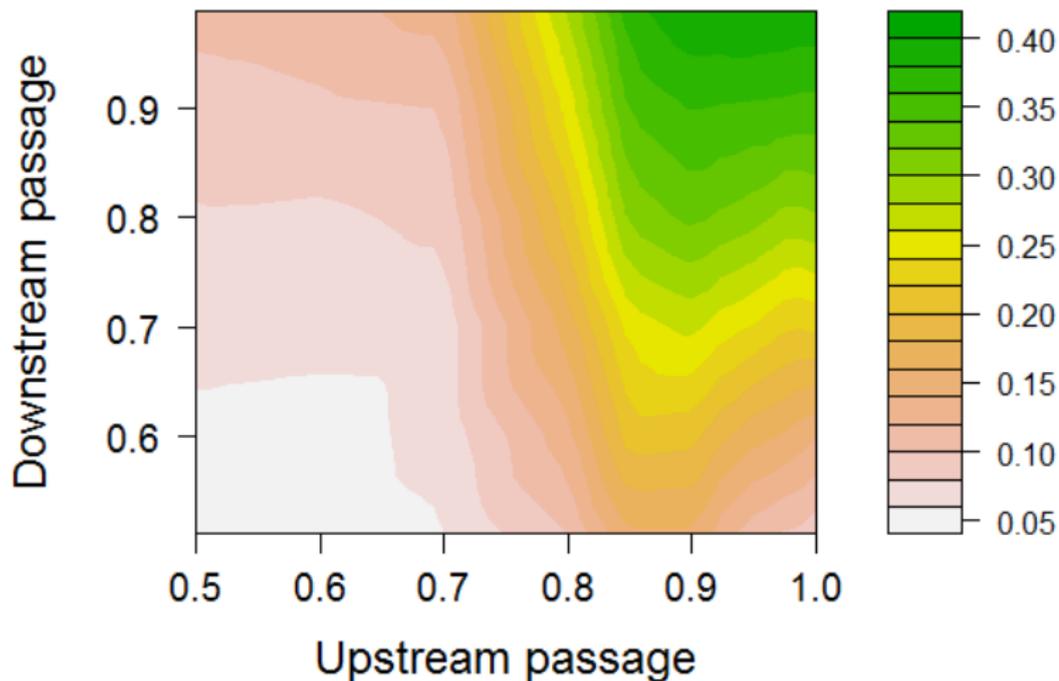
Example model output (preliminary)

Repeat spawners: age 7



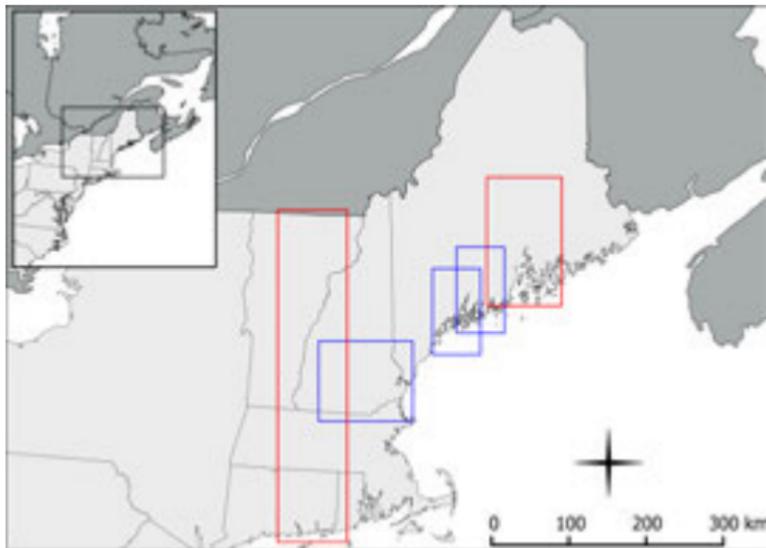
Example model output (preliminary)

Repeat spawners: age 8



Summary

- Working models in Connecticut and Penobscot
- Model readily adapted to other species
- Standardized approach
- Building support with managers
- Identifying important considerations



Penobscot River herring populations

- Same model with different inputs, blue backs easier
- 3 Phases of lakes being opened to alewife
- How does lake access affect alewife populations?
- Nutrient import and export: St. Croix River



Acknowledgments

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