

American Shad Habitat Plan



ASMFC Shad and River Herring Management Board

November 8, 2022

Background



- Amendment 3 requires all states and jurisdictions to submit a habitat plan for American shad
 - summary of current and historical spawning and nursery habitat, threats to those habitats, and habitat restoration programs
- In February 2020, the Board asked states to update/submit habitat plans for shad rivers in their state
- The Board has approved 17 plans/updates since then
 - ME, NH, CT River, Merrimack River, Hudson River, MD, VA, DC, NC, Savannah River, GA, MA, RI, CT, Delaware Basin, SC, and FL

Plan for Board Consideration



- October 2022: 1 habitat plan was evaluated by the TC and submitted for Board consideration:
 - Taunton River Plan, MA
- **The TC recommends approval of this Plan**



Taunton River American Shad Habitat Plan

**Massachusetts Division of Marine
Fisheries**

Taunton River Plan



- **Habitat Assessment**

- Largest river in SE Massachusetts
 - No dams along 62 km main stem
- Historical commercial shad fisheries in main stem and tributaries that were impacted by overharvest, dams, and industrial pollution
 - Minimal recent evidence of existing shad run despite stocking efforts in 1960s and 1970s
- DMF survey in 1960s documented 45 km of potential spawning habitat.
- This plan was primarily developed to support the development of a cooperative shad stocking effort in the Taunton River between the Massachusetts Division of Marine Fisheries (DMF), Massachusetts Division of Fish and Wildlife (MassWildlife), and the United States Fish and Wildlife Service (USFWS).
 - Recent improvements in water management, most notably improvements in sewer system integrity and treatment plants and pump station capacity have resulted in declining nutrient and bacteria levels in the Taunton River (TRWA 2019).

Taunton River Plan



• Threats Assessment

- No formal threat assessments have been made for shad in the Taunton River watershed.
- Because there are no main stem dams, the threat of **Barrier to Migration** is not a factor.
- Historical overfishing and industrial pollution were cited in past anadromous fish surveys as impacting shad populations in the Taunton River.

Taunton River Plan



- **Habitat Restoration Programs**

- Mass DMF expects that a habitat survey and assessment would be useful for this watershed with methods potentially transferable to other watersheds in Massachusetts, but funding is not presently available.
- They recommend the following actions for the Taunton River: (1) assessment of the amount and suitability of habitat for shad spawning and rearing; and (2) continued monitoring to document the status of a shad spawning run.

Taunton River Plan



- **Proposed Stocking Plan**

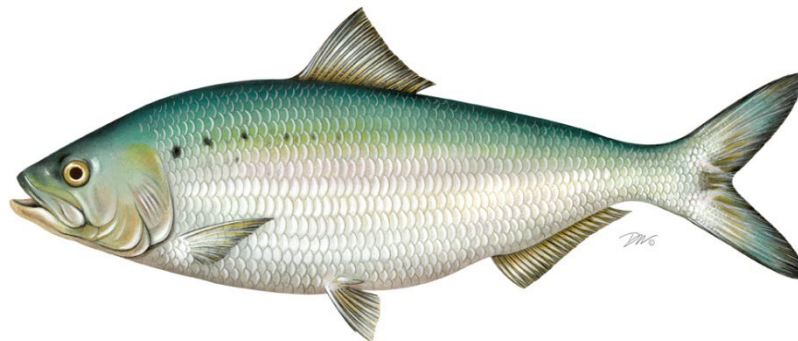
- The Taunton River watershed was previously reported to contain approximately 45 rkm and 79.5 acres of potential American shad spawning habitat
 - Based on this estimate, stocking 2-4 million juvenile American shad each year at 4-5 locations in the river over 6-8 years with a cumulative target of 20 million fish stocked
 - To achieve this goal, approximately 350 broodstock fish would be collected annually from the Connecticut River at the Holyoke Dam fish lift with surviving adults released post-spawning.
 - Additionally, monitoring for juveniles during the summer and fall would continue to document survival; adult monitoring would begin after 3 years of stocking to determine project success
- Over 5 million shad larvae stocked in 2022
 - Juvenile American shad caught at 3 of 5 monitoring stations during June and July



Questions?



River Herring Sustainable Fishery Management Plan Updates



ASMFC Shad and River Herring Management Board

November 8, 2022

Background



- Amendments 2 & 3 of the Shad and River Herring FMP require states wishing to have a fishery must submit a Sustainable Fishery Management Plan that will:
 - “demonstrate their stock could support a commercial and/or recreational fishery that will not diminish the future stock reproduction and recruitment.”
- Plans are updated and reviewed every 5 years to reassess stock status and sustainability

Plan Updates for Board Consideration



- October 2022: Three river herring sustainable fishery management plans were evaluated by the TC and submitted for Board consideration:
 - Nemasket River, MA RH SFMP Update
 - Herring River, MA RH SFMP New Plan
 - Addendum to the Maine 2019 SFMP
- **The TC recommends approval of both MA plans and the continuation of the Maine limited fisheries based on the presented update**



Nemasket River, River Herring Sustainable Fishery Management Plan Update

Massachusetts

Nemasket River Update



- The Nemasket River fishery is a small dip-net fishery with harvest primarily used for bait and personal consumption
 - Cooperatively managed by the Massachusetts Division of Marine Fisheries and Middleborough-Lakeville Herring Fishery Commission
- The updated plan remains relatively unchanged from the previous iteration
- Management Measures
 - 5 week season, 3 harvest days/week
 - ~900 permits issued with required reporting
 - 20 fish/permit/week with unique trip tickets required for each trip
- No harvest was permitted throughout the previous tenure of this plan
 - The Herring Commission did not permit harvest due to:
 - A decrease in run counts below a level that the Commission was comfortable with allowing harvest to take place
 - Hesitancy to be the only open fishery in the state
 - Concentration of effort

Nemasket River Update



Management Unit. The SFMP has a river-specific management unit of the Nemasket River herring run in the Towns of Middleborough and Lakeville.

Sustainability Measures. The ongoing spawning run count with calculated run size will serve as the primary measure to monitor the Nemasket River run status.

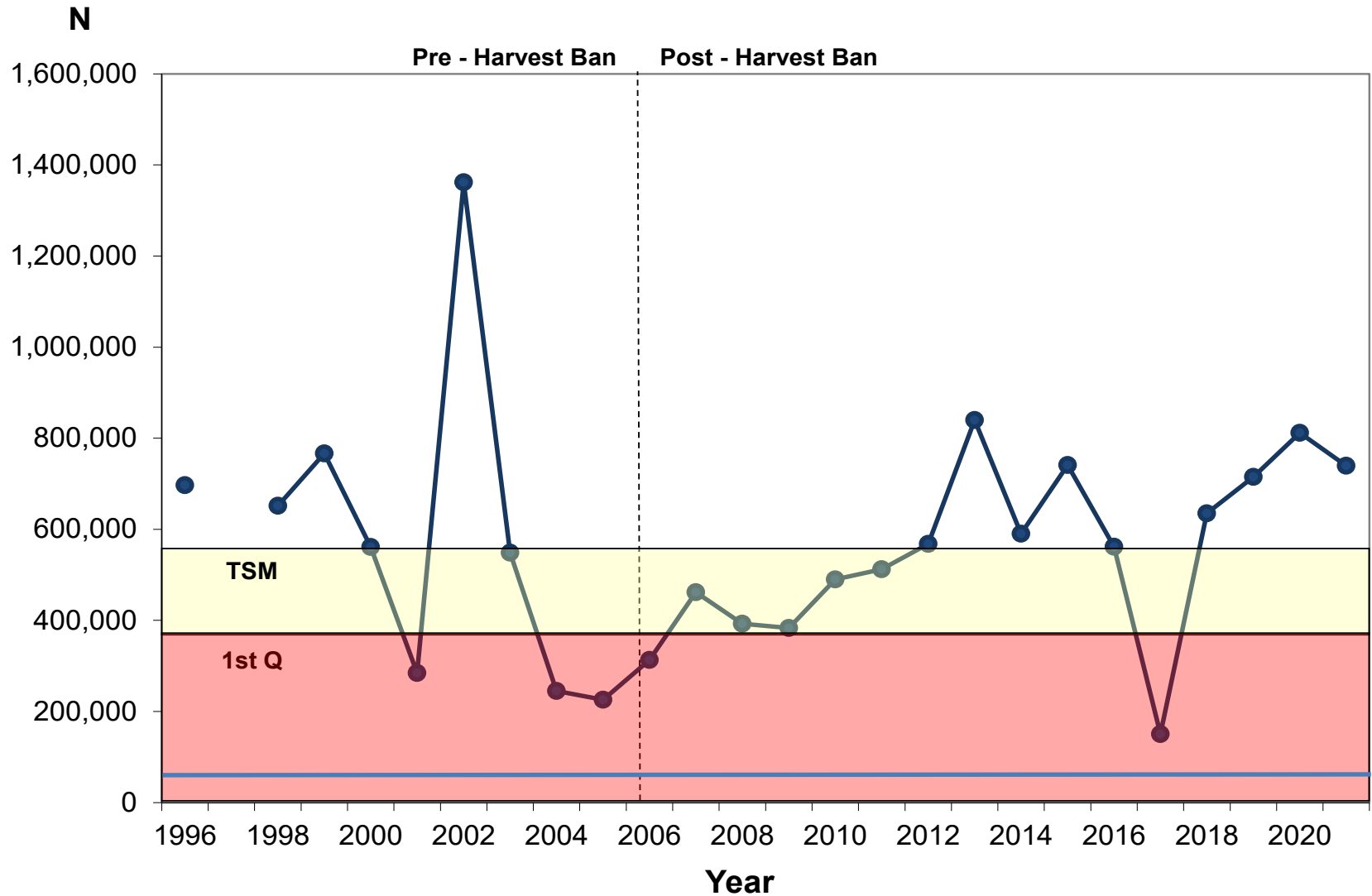
Sustainability Target. One fishery-independent sustainability target will be used. Harvest will be capped at 10% of the time series mean (TSM). This value will be recalculated each year.

Primary Action Threshold. The 25th percentile of the Nemasket River run count time series will serve as the primary action threshold to trigger a management response to declining run size.

Management Actions. Two consecutive years where the Nemasket River run count is below the 25th percentile, the sustainability target will be reduced to 5% of the TSM for the following year. Three consecutive years with the run count below the 25th percentile of the time series will trigger a minimum 3-year closure the following year. In order to reopen the harvest, an opening threshold of three consecutive years above the TSM would have to occur.

Secondary Threshold. An annual exploitation rate of 10% of the run size will serve as a secondary threshold or warning limit. Following a single, annual exceedance of this threshold, DMF will meet with the Herring Commission to review harvest records and management practices and document the review and cause of increase in exploitation rate in a joint memorandum.

Nemasket River Update





Herring River, River Herring Sustainable Fishery Management Plan

Massachusetts

Herring River Plan



- The proposed Herring River Fishery characteristics and management plan mirror those of the Nemasket River
 - Cooperatively managed by the Massachusetts DMF and the Town of Harwich DNR
- Management Measures
 - 5 week season, 3 harvest days/week
 - ~600 permits issued with required reporting
 - 20 fish/permit/week with unique trip tickets required for each trip
- Similar hesitancy to the Nemasket River to opening the fishery if approved
 - Hesitancy to be the only open fishery in the state
 - Concentration of effort

Herring River Plan



Management Unit. The SFMP has a river-specific management unit of the Herring River herring run in the Town of Harwich.

Sustainability Measures. The ongoing spawning run count will serve as the primary measure to monitor the Herring River run status.

Sustainability Target. One fishery-independent sustainability target will be used that limits harvest at 10% of the time series mean (TSM). This value will be recalculated every three years. The target is 10% of the TSM with adjusted count data for 2009-2022. This approach will be substituted with a sustainability target derived solely from the electronic counter at the next SFMP update.

Primary Action Threshold. The 25th percentile of the Herring River run count time series distribution will serve as the primary action threshold to trigger a management response to declining run size.

Secondary Threshold. An annual exploitation rate of 10% of the run size will serve as a secondary threshold or warning limit. Annual exploitation rates will be tracked each year with a threshold of 10% assigned as a warning limit. Following a single, annual exceedance of this threshold, DMF will meet with the Harwich Department of Natural Resources to review harvest records and management practices and document the review and cause of the increase in exploitation rate in a joint memorandum.

Management Actions. In any given year, a run count falling below the 25th percentile will result in DMF reporting this to ASMFC in their annual compliance report for Shad and River Herring. If the run count drops below the 25th percentile for two consecutive years, the sustainability target will be reduced to 5% of the TSM. If the run count drops below the 25th percentile three consecutive years a minimum 3-year closure will be imposed on harvest for the following year. In order to reopen the harvest, a threshold of three consecutive years above the 25th percentile would have to occur.



Update on Maine River Herring SFMP Addendum

Maine River Herring SFMP Addendum



- In 2019, the Board approved an addendum to the Maine River Herring SFMP to allow for three provisional fisheries through 2024 in an effort to incentivize the continuation of local restoration efforts.
- The Board required an update in 2022
- Three habitats in the addendum ranging from 43 – 135 acres
 - All habitats are small compared to typical river herring fisheries
 - Locations did not meet existing Maine SFMP metrics but were under restoration (dam removal, culvert replacement, fish passage improvements)
 - Active restoration efforts underway to increase population size, age structure, repeat spawning ratio and lower the mortality of river herring

Maine River Herring SFMP Addendum



- Control Rules and Assessment Criteria Summary
 - Harvest will occur after May 18 to allow older river herring to escape the fishery.
 - Municipalities that allow a recreational fishery must enumerate and subtract the recreational harvest from the commercial catch allowance for the season.
 - The release of a minimum spawning stock threshold of 235 fish/acre. A commercial fishery that does not meet the 235 spawning stock escapement will close until fishery achieves the escapement goal the following year.
 - Annual review of age data, mortality rates, and repeat spawning rates derived from annual data collection to assess the need to reduce harvest numbers or suspend any fishery short of the 5-year period.

Maine River Herring SFMP Addendum



- **Preliminary Results**

- Sewall Pond located in Arrowsic, Maine is the only municipality in the Addendum to the Maine SFMP to have achieved the metrics to be included in the State plan.
- Two of the three municipalities have chosen not to fish even though they have been allowed to harvest small numbers (Sewall and Center ponds). Focus remains on collecting biological data, counting returns and improving passage.
- One municipality harvested the maximum allowed quota up until 2022. In 2022, the run was over before they could harvest on May 18th and chose to harvest runbacks which increased mortality on older fish.
 - Age structure, mortality, repeat spawning remain an issue even at low harvest rates.
 - The municipality still collects biological data, count returns and work toward improving passage.
 - Addendum requires management action resulting in reduction in 2023 harvest to meet mortality and repeat spawning goals.

Maine River Herring SFMP Addendum



- **Recommendations**

- Allow municipalities within the plan to continue to fish for the remainder of the 5-year period.
- Maintain the existing control rules that manage harvest based on returns, biological data, data metrics and associated management actions.
- At the end of the Addendum period make a final determination regarding whether allowing a limited harvest furthers restoration success and helps municipalities meet the Maine/ASMFC sustainability metrics.



River Herring Benchmark 2023

Terms of Reference

Stock Assessment Subcommittee

K. Drew

Nov. 9, 2022

Timeline



	Milestone	Deadline
✓	TC/SAS assessment planning webinar	March 2022
✓	All data through 2021 submitted	July 1, 2022
✓	Data Workshop	July 2022
	SAS & TORs approved by Board	November 2022
	Methods Workshop	February 2023
	Assessment Workshop	April 2023
	TC Review of Final Report	July 2023
	Review Workshop	August 2023
	Assessment presented to Board	October 2023



TERMS OF REFERENCE

TORs



- Terms of Reference for ASMFC River Herring Benchmark Stock Assessment
- Terms of Reference for Peer Review of ASMFC River Herring Stock Assessment

TOR #1



1. Define and justify stock structure.

TOR #2



2. Characterize precision and accuracy of fishery-dependent and fishery-independent data used in the assessment, including life history data (e.g., age and repeat spawner data) and nontraditional data (e.g., entrainment, impingement, passage).

TOR #2



2. Characterize precision and accuracy of fishery-dependent and fishery-independent data used in the assessment, including life history data (e.g., age and repeat spawner data) and nontraditional data (e.g., entrainment, impingement, passage). Characterization should include the following but is not limited to:

- a. Provide descriptions of each data source (e.g., time series, geographic location, sampling methodology and changes, potential explanation for outlying or anomalous data).
- b. Describe calculation and potential standardization of abundance indices.
- c. Discuss trends and associated estimates of uncertainty (e.g., standard errors).
- d. Where possible, explore reader consistency, potential bias, and agreement statistics for age and repeat spawner data.
- e. Justify inclusion or elimination of available data sources.

TOR #3



3. Estimate bycatch where and when possible

TOR #4



4. Summarize data availability and trends by stock.

TOR #5



5. If possible, develop models used to estimate population parameters (e.g., Z , biomass, abundance) and biological reference points, and analyze model performance.

TOR #5



5. If possible, develop models used to estimate population parameters (e.g., Z , biomass, abundance) and biological reference points, and analyze model performance.

- a. Briefly describe history of model usage, its theory and framework, and document associated peer-reviewed literature. If using a new model, test using simulated data.
- b. Clearly and thoroughly explain model strengths and limitations.
- c. Discuss the effects of data strengths and weaknesses (e.g., temporal and spatial scale, gear selectivity, ageing accuracy, sample size) on model inputs and outputs.
- d. State assumptions made for all models and explain the likely effects of assumption violations on synthesis of input data and model outputs. Examples of assumptions may include (but are not limited to):
 - Choice of stock-recruitment function.
 - Calculation of M . Choice to use (or estimate) constant or time-varying M and catchability.
 - Choice of equilibrium reference points or proxies for MSY -based reference points.
 - Choice of a plus group for age-structured species.
 - Constant ecosystem (abiotic and trophic) conditions.
- e. Justify choice of coefficients of variation (CVs), effective sample sizes, or likelihood weighting schemes.
- f. Describe stability of model (e.g., ability to find a stable solution, invert Hessian).
- g. Perform sensitivity analyses for starting parameter values, priors, etc. and conduct other model diagnostics as necessary.
- h. Characterize uncertainty of model estimates and biological or empirical reference points.
- i. If multiple models were considered, justify the choice of preferred model and the explanation of any differences in results among models.

TOR #6



6. If possible, develop methods to calculate a biologically-based cap or limit on bycatch of river herring in ocean fisheries

TOR #7



7. Recommend stock status as related to reference points, if available.

TOR #8



8. Other potential scientific issues:

- a. Compare trends in population parameters and reference points with current and proposed modeling approaches. If outcomes differ, discuss potential causes of observed discrepancies.
- b. Compare reference points derived in this assessment with what is known about the general life history of the exploited stock. Explain any inconsistencies.
- c. Explore climate change impacts on the species.
- d. Explore predation impacts on the species.
- e. Discuss all known anthropogenic sources of mortality and productivity (i.e., stocking, passage mortality) by stock.

TOR #9



9. If a minority report has been filed, explain majority reasoning against adopting approach suggested in that report. The minority report should explain reasoning against adopting approach suggested by the majority.

TORs #10 and #11



10. Develop detailed short and long-term prioritized lists of recommendations for future research, data collection, and assessment methodology. Highlight improvements to be made by initiation of next benchmark stock assessment. Note research recommendations from the previous assessment that have not been addressed and those that have been partially or fully addressed.

11. Recommend timing of next benchmark assessment and intermediate updates, if necessary relative to biology and current management of the species.

TORs for Peer Review



1. Evaluate choice of stock structure.
2. Evaluate the thoroughness of data collection and the presentation and treatment of fishery-dependent and fishery-independent data in the assessment, including the following but not limited to:[...]
3. Evaluate the methods and models used to estimate population parameters (e.g., Z , biomass, abundance), biological reference points, and bycatch caps/limits including but not limited to:

TORs for Peer Review



4. If a minority report has been filed, review minority opinion and any associated analyses. If possible, make recommendation on current or future use of alternative assessment approach presented in minority report.
5. Recommend best estimates of stock biomass, abundance, and exploitation from the assessment by stock for use in management, if possible, or specify alternative estimation methods.
6. Evaluate the choice of reference points and the methods used to determine or estimate them. Recommend stock status determination from the assessment, or, if appropriate, specify alternative methods/measures for management advice.

TORs for Peer Review



7. Review the research, data collection, and assessment methodology recommendations provided by the TC and make any additional recommendations warranted. Clearly prioritize the activities needed to inform and maintain the current assessment, and provide recommendations to improve the reliability of future assessments.

8. Recommend timing of the next benchmark assessment and updates, if necessary, relative to the life history and current management of the species.

TORs for Peer Review



9. Prepare a peer review panel terms of reference and advisory report summarizing the panel's evaluation of the stock assessment and addressing each peer review term of reference. Develop a list of tasks to be completed following the workshop. Complete and submit the report within 4 weeks of workshop conclusion.



STOCK ASSESSMENT SUBCOMMITTEE

SAS Nominees



- Jason Boucher, NOAA Fisheries
- Michael Brown, ME DMR
- Margaret Conroy, DE DFW
- William Eakin, NY DEC
- Ben Gahagan, MA DMF
- Kyle Hoffman, SC DNR
- Trey Mace, MD DNR
- John Sweka, USFWS
- Joe Zydlewski, UMaine/USGS
- Katie Drew, ASMFC



NOAA
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River Herring Habitat Conservation Plan

Ben German & Jonathan Watson
National Marine Fisheries Service
Habitat & Ecosystem Services Division (HESD)

River Herring Habitat Conservation Plan

Funding

NMFS, Office of Habitat Conservation

NMFS-HESD Core Team

- Ben German
- Jonathan Watson
- Matthew Best
- Sean McDermott

NMFS Working Group

Habitat

- Chris Boelke
- Fritz Rohde
- Lou Chiarella
- Twyla Cheatwood

Restoration Center

- Howard Schnabolk
- Jim Turek
- John Catena

ASMFC

- Caitlin Starks
- James Boyle

Steering Committee

- Alan Weaver (*VA DWR*)
- Bill Post (*SC DNR*)
- Ken Sprankle (*USFWS*)
- Roger Rulifson (*ECU*)
- Steve Gephard (*CTDEEP - ret.*)
- Tara Trinko-Lake (*NOAA NEFSC*)
- Wilson Laney (*NC State*)

River Herring Habitat Conservation Plan

- HCP Overview

- Builds on 2015 web-based plan that NMFS developed through the Technical Expert Working Group (TEWG)
- Update documenting recent developments across range of topics.
- Recommends future actions to help conserve/restore river herring populations
- Coastwide Scale



River Herring Habitat Conservation Plan

Differences from our previous work on RH:

- TEWG (2015) focused on past work
- This plan is forward-looking
- Identifies information needs and challenges/opportunities for restoration
- Single, publicly available document



Ben German, NMFS

River Herring Habitat Conservation Plan

- High-level Goals
 - Provide a framework for restoration
 - Support for NMFS
 - Cross-regional coordination
 - Encourage collaboration among stakeholders engaged in restoration



River Herring Habitat Conservation Plan

- HCP development, two committees:
 - **Working Group**
 - **Steering Committee**
- Publication in GARFO Policy Series anticipated in Q4 2022



HCP Overview

- Introduction to the plan and coordinating agencies (NMFS/ASMFC)
- River herring life history, distribution, and ecology
- Stock status, fisheries (commercial & recreational), and management history
- Threats to river herring
- Data gaps and research needs
- Ecosystem integration: social-ecological benefits
- Watershed overview
- HCP goals, objectives, and recommendations
- Restoration project showcase



Life History and Stock Status

- Places recent studies in the context of past life history literature
- Describes recent fisheries management efforts
- Provides several decades of information on commercial and recreational river herring fisheries by region



Threats to River Herring

- Builds upon previous literature reviews
- Updates previous list using recent studies on known threats
- Includes information on emerging threats



Data Gaps and Research Needs

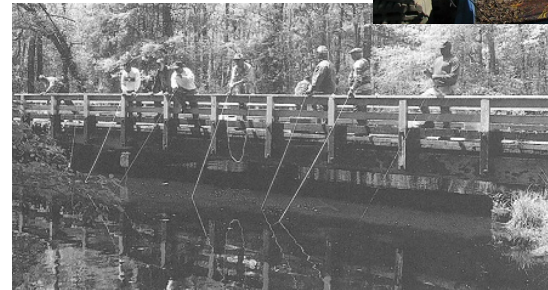
- Reflects guidance from 2015 plan with updates
- Notes research needs for important emerging threats
- Identifies topics lacking sufficient or reliable information for decision making



Tate Yoder, MCCF

Ecosystem integration: social-ecological benefits

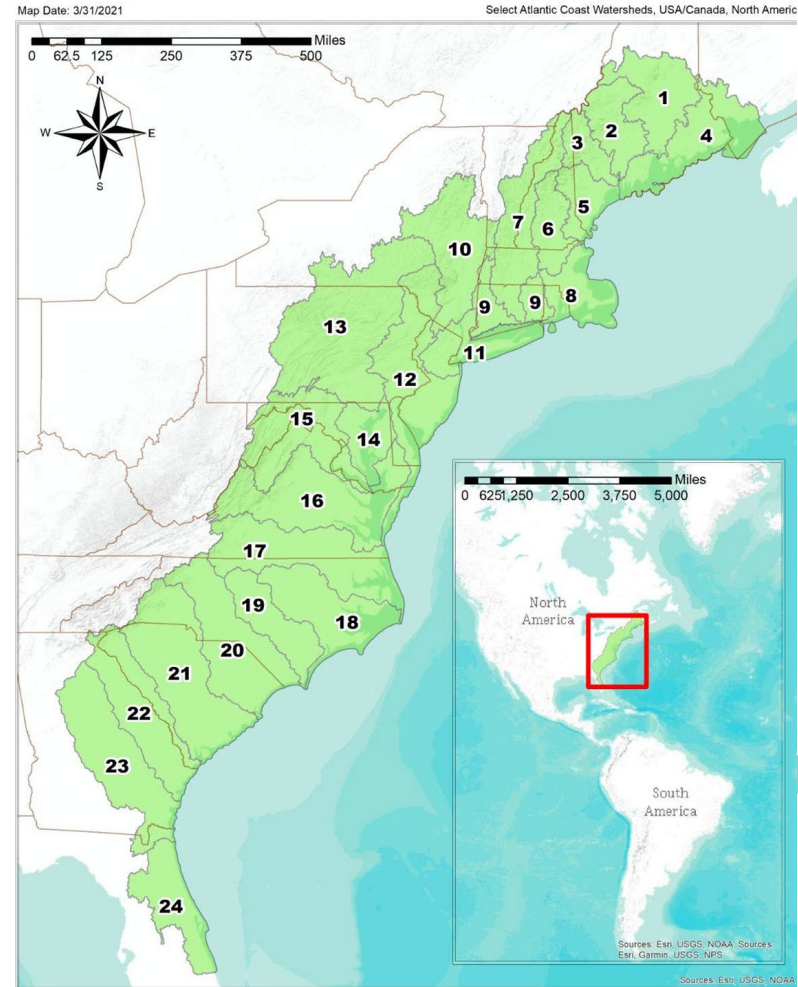
- Describes historical significance of river herring runs to coastal communities
- Highlights social benefits of functional natural ecosystems:
 - Economic
 - Cultural value
 - Recreational value
- Describes some of the ecosystem function benefits associated with river herring
 - Marine-derived nutrients
- River Herring Festival Showcase



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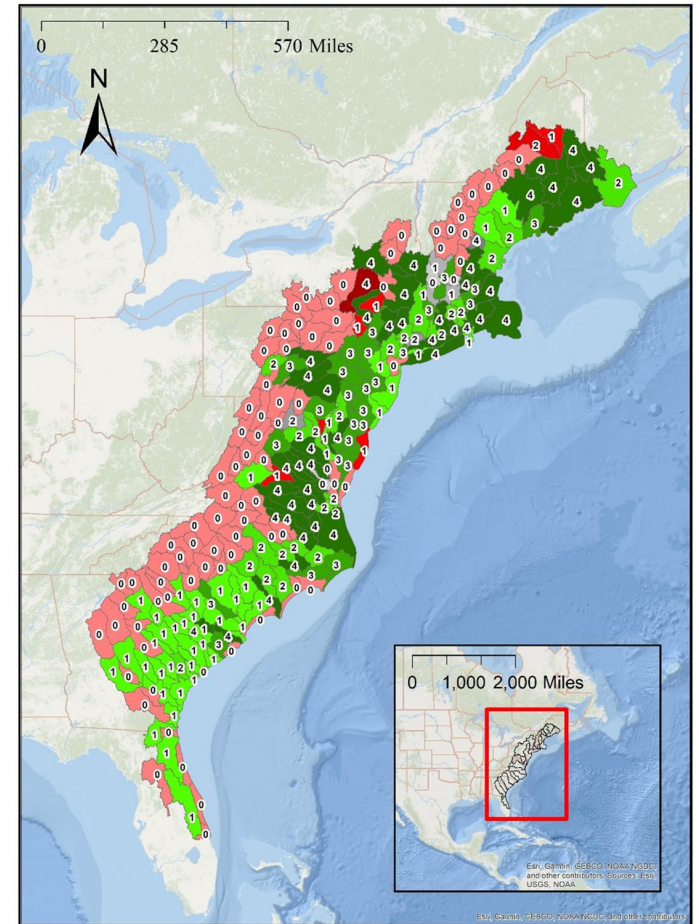
Coastwide Watershed Characterization

- 24 coastal HUC4 watersheds, ME to FL
 - Covers over 300,000 square miles
- Broad overview of river herring management and threats documented in each watershed



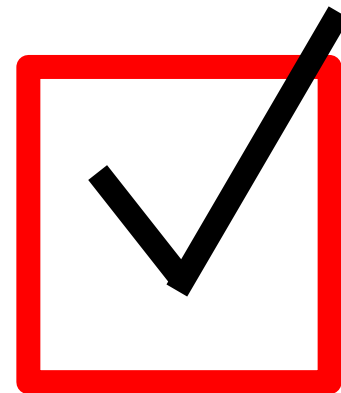
Coastwide Watershed Characterization

- Details Management Perspectives on 233 HUC-8 Watersheds
 - Described as “focus areas”
- Identifies habitat units with:
 - High production potential
 - Greatest restoration need
 - Historically-significant runs
 - Ongoing restoration efforts



Goals, Objectives, and Recommendations

- Goals
 - Broad, focused on outcomes
- Objectives
 - Measurable actions supporting goals
- Recommendations
 - Specific steps that, if executed, are designed to support objectives/goals
- Recommendations are broad
- Language crafted to strengthen and support regional, watershed, and local restoration efforts



Goals, Objectives, and Recommendations

- 1) Improve connectivity of river herring habitats throughout the species' ranges
- 2) Assess and enhance spawning and rearing habitat for river herring throughout their coastwide ranges
- 3) Establish and build partnerships among state/federal agencies, NGOs, tribes, and other river herring stakeholders
- 4) Address information gaps and research needs where applied research is needed to expand knowledge of river herring related topics.

Restoration project showcase

- Describes 11 recent restoration projects for river herring
- Case study format has several advantages:
 - Highlights successes and lessons learned
 - Describes a variety of successful techniques and approaches
 - Highlights the cross-functional and collaborative efforts that are often essential to achieve success
 - Identifies potential pitfalls similar projects may face



Benefits of the Plan

- Brings together and presents information relevant to river herring habitat/management at a coastwide scale
- Provides comprehensive guidance on river herring conservation strategies
- Supports conservation and restoration efforts by tribes, states, NGOs, etc.
- Coordinates goals and approach across NMFS regions and divisions
- Demonstrates recent restoration success with concrete examples



Questions?

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www.fisheries.noaa.gov/species/river-herring

Photo: Tate Yoder MCCF



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