



# River Herring Conservation Plan

## Executive Summary and 2015 Year in Review



This document provides highlights of NOAA and Atlantic States Marine Fisheries Commission's (ASMFC) efforts and initiatives related to river herring (alewife and blueback herring), as well as an update of 2015 progress on commitments noted in our joint River Herring Conservation Plan (Plan).<sup>1</sup> The Plan is a holistic strategy, including implementation, to increase public awareness about river herring, stimulate cooperative research, and inform efforts to help restore river herring throughout much of their Atlantic coastal range. The Plan builds upon previous and ongoing efforts to further river herring conservation, coordinates ongoing activities and incorporates information provided by the River Herring Technical Expert Working Group (TEWG).<sup>2</sup>

The Plan is provided in a dynamic web-based format that can be easily updated. The Plan will be monitored, evaluated, and updated to achieve the following goals:

1. Identify key research needs for assessment and conservation;
2. Increase coordination of river herring research and conservation;
3. Identify funding sources for river herring research and conservation;
4. Identify conservation actions to address threats;
5. Cultivate research groups to address key topics;
6. Improve information to be used in the next assessment;
7. Improve information used in conservation efforts;
8. Further conservation efforts to address threats; and,
9. Increase outreach about river herring.

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<sup>1</sup> <http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/conserv/index.html>

<sup>2</sup> A TEWG has been established for river herring throughout both species' range from Canada to Florida, and provided/compiled information that was used by NMFS and ASMFC in the development of the conservation plan. The TEWG includes subgroups by topic to focus discussions (Stock Status, Climate Change, Habitat, Species Interaction, Fisheries, Genetics/Hybrids/Landlocked), and an overarching committee (Ecosystem Integration Committee) comprised of chairs/co-chairs from the subgroups.  
(<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/index.html>)

## **Outcomes (August 2013-December 2015)**

Since initiating its partnership in August 2013, the National Marine Fisheries Service (NMFS) and the ASMFC have worked collaboratively with our partners to make important progress on each of these goals. The progress is a result of both the Plan and related initiatives. Some of the highlighted successes and ongoing efforts in the 2015 Plan include:

- Coordination was increased with partners through establishment of the TEWG, including six subgroups and one integration committee.
- Two projects were funded through a Plan Request for Proposal process to further information on river herring populations (~\$243,659).
- A dynamic and comprehensive plan for advancing research, coordination, conservation and outreach was developed by NMFS and ASMFC. The Plan considers the information compiled by the TEWG and will be further refined based on TEWG and public input.
- NMFS Greater Atlantic Region funded a Northeast Fisheries Science Center project to develop a river herring/ Atlantic herring / Atlantic mackerel overlap forecast tool for use by the Atlantic herring and Atlantic mackerel fisheries to minimize incidental catch of river herring.
- Funding was provided to the Atlantic Salmon Federation and St. Croix International Waterway Commission to continue river herring counts at the Milltown Dam fishway in the St. Croix watershed by NMFS (via ASMFC) and the U.S. Fish and Wildlife Service (USFWS).
- A coastwide social science survey to document fishermen's observations of river herring in commercial, recreational, and subsistence fisheries was conducted through NOAA.
- The Penobscot River in Maine and the Choptank River in Maryland were selected as Habitat Focus Areas under NOAA's Habitat Blueprint, targeting financial resources and technical assistance to support habitat conservation and restoration efforts in these high-priority watersheds including removing passage barriers and restoring unimpeded river herring passage and spawning and rearing habitats.
- Information provided by the Passamaquoddy Tribe, Pleasant Point, on the cultural importance of river herring to the Tribe was incorporated into the Plan.
- Development of a life history-based model to inform the setting of quantitative-supported performance standards for survival and passage of American shad and river herring at hydropower projects is being supported by NMFS.
- Collaboration between NOAA and ASMFC and partners on climate change assessments related to river herring.

- Collaboration with NMFS and partners to: 1) study the long-term benefits of restoring riverine habitat along the Atlantic Coast; and 2) conduct ecosystem research on river herring.
- Continued active partnership within the Atlantic Coastal Fish Habitat Partnership (ACFHP)<sup>3</sup> by ASMFC and NOAA.

Additional information on these actions can be found on the River Herring Conservation Plan website.<sup>4</sup>

## Implementation

NMFS and ASMFC are committed to continuing progress towards the conservation of river herring in collaboration with our partners. Below is an update on the commitments highlighted in the Plan. These commitments were made after reviewing the products from the TEWG, public comment, as well as science and management needs.

- Improving the utility of data collected from state surveys (e.g., use in the next stock assessment) has been discussed at many TEWG meetings. NMFS and ASMFC believed this effort would be important to discuss with its partners through a River Herring Data Collection Standardization Meeting. ASMFC's Shad and River Herring Management Board discussed the outcomes of the TEWG's work in May 2015 and agreed conducting a standardization meeting was a good idea. ASMFC will organize such a meeting in cooperation with NMFS pending available funds.
  - Status: ASMFC, with financial support from NMFS, held a River Herring Data Collection Standardization Meeting in November 2015. In addition to ASMFC and NMFS staff, the 30 participants represented 15 state agencies, 1 federal agency, 1 federally recognized tribe and Canada's Department of Fisheries and Oceans. Current fishery independent and fishery dependent surveys utilized across the Atlantic coast and in inland rivers were reviewed. As a result of the meeting, recommendations for standardization across current surveys and biological sampling programs were developed.<sup>5</sup> Additionally, recommendations to improve consistency for surveys carried out across agencies were discussed with regards to short and long term needs as well as financial considerations.

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<sup>3</sup> ACFHP is a coast-wide partnership of fish habitat resource managers, scientists, and communications professionals from 33 different state, federal, tribal, and non-governmental agencies who have established a commitment to work together for the benefit of aquatic resources.<http://www.atlanticfishhabitat.org/>

<sup>4</sup> <http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/conserv/index.html>

<sup>5</sup> [http://www.asmfc.org/uploads/file/56fc3c6dRH\\_DataCollectionStandardizationWorkshopSummary\\_March2016.pdf](http://www.asmfc.org/uploads/file/56fc3c6dRH_DataCollectionStandardizationWorkshopSummary_March2016.pdf)

- NMFS will continue work towards the development of a life history-based model that can inform the setting of quantitative-based performance standards for American shad and river herring for hydropower projects.
  - Status: Work began in December 2015 and a flexible modeling framework has been developed to estimate effects of passage performance standards on abundance, age structure, and reproduction within American shad populations in space and time. Model development has focused on American shad populations in the Connecticut and Penobscot rivers, but the model can be readily extended to other alosines and river systems. Model development is complete, and is currently undergoing internal reviews with expert working groups comprised of federal, state, and tribal partners. Preliminary results have been presented both informally and formally at scientific meetings; a series of manuscripts are being developed for peer reviewed publication in scientific journals.
- Relay progress on projects funded through the ASMFC and NMFS Plan Request for Proposals.
  - Status: NMFS and ASMFC created a website on the supported river herring research, which includes project abstracts.<sup>6</sup> Final grant reports will be available in 2016; the Plan website will be updated to include report summaries.
- NMFS will continue to implement more detailed, science-based and applied research passage monitoring at barrier removals,<sup>7</sup> and anticipates using available funds for critical Tier II monitoring at targeted, high-priority river herring passage sites in the Northeast region.
  - Status: NMFS has continued to fund and complete river herring passage and other Tier II monitoring at the lower Penobscot River dam removals in Maine and the Patapsco River dam removals in Maryland.
- NMFS, in collaboration with the U.S. Geological Survey (USGS) and the USFWS, will continue to develop passage criteria for alewife, blueback herring and other East Coast diadromous fish species in achieving safe, timely and effective passage by these fishes at targeted passage restoration sites.
  - Status: NMFS, in collaboration with the USGS and USFWS, has developed design guidelines for nature-like fishways addressing 14 Atlantic Coast diadromous fish species including alewife and blueback herring. Public release of these guidelines

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<sup>6</sup> <http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/rfp/index.html>

<sup>7</sup> For completed passage barrier removal projects, NOAA requires Tier I implementation monitoring to document implementation outcome and basic effectiveness of target species passage following project completion. Tier II monitoring addresses more sophisticated ecological effectiveness questions and conducted over longer post-project periods at selected NOAA-funded barrier removal sites. (<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/conserv/research/restoration/index.html>)

is expected in 2016 to guide engineers and other practitioners in preparing designs for nature-like fishways at passage restoration sites where barrier removal is not a feasible alternative.

- NMFS Northeast Fisheries Science Center will continue its efforts to use environmental data to develop a river herring/ Atlantic herring overlap forecast tool for use by the Atlantic herring fishery to minimize incidental river herring catches.
  - Status: Preliminary species distribution models (SDMs) have been developed and evaluated using fishery-independent data (Turner *et al.*, 2015<sup>8</sup>). These SDMs have been linked to an ocean forecast model (NECOFS – FVCOM) and the system was evaluated again with fishery-independent data (Turner *et al.*, In prep). The forecast tool is now being evaluated with a directed study on commercial fishing vessels.
- NMFS will continue to work with tribal partners to: a) Identify areas where collaboration to restore river herring can occur; b) Identify potential opportunities for funding that may enhance the tribe's ability to engage in river herring conservation and management activities; and, 3) Engage in formal government to government consultation, as well as informal coordination and communication, in fulfillment of federal trust responsibilities.
  - Status: NMFS invited interested tribes to the 2015 River Herring Data Collection Standardization Workshop. The Passamaquoddy Tribe, Pleasant Point, participated in the meeting. NMFS also distributed various Request for Proposals (e.g., Saltonstall-Kennedy) to tribes.
  - NMFS, along with the Atlantic Salmon Federation, The Nature Conservancy and other federal agencies, began discussions with the Penobscot Indian Nation to construct a nature-like fishway at the outlet of South Branch Lake on Mattamiscontis Stream, a tributary to the Penobscot River. This project is expected to begin in 2016 and when completed will provide alewife with access to high-quality spawning habitat in the 2,035-acre lake. NMFS and partners also began discussions with the Penobscot Indian Nation to install a nature-like fishway at the outlet to 1,100-acre East Branch Lake on tribal lands. This fishway will increase access by alewife to important spawning and rearing habitats in the Penobscot River Habitat Focus Area.
  - NMFS engaged in government-to-government consultations (e.g., Vanceboro on the St. Croix River) and information coordination and communication (e.g., St. Croix Next steps Group). NMFS continues to coordinate with the Passamaquoddy Tribe, Pleasant Point, on fish passage interests at the Woodland, Grand Falls and

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<sup>8</sup> Turner, S.M., Manderson, J.P., Richardson, D.E., Hoey, J.J., and J.A. Hare. 2015. Using habitat association models to predict Alewife and Blueback Herring marine distributions and overlap with Atlantic Herring and Atlantic Mackerel: can incidental catches be reduced? ICES J. Mar. Sci. (fsv166 doi:10.1093/icesjms/fsv166) <http://icesjms.oxfordjournals.org/content/early/2015/09/15/icesjms.fsv166.abstract>

- Milltown Dams on the St. Croix River, and with the Penobscot Indian Nation on fish passage issues on the Penobscot River.
- There has been coordination and collaboration with our tribal partners on the development of the Plan. For example, in response to NMFS' interest in understanding the cultural importance of river herring in the U.S. and Canada to East Coast Native American Tribes and First Nations to support the Plan, the Passamaquoddy Tribe, Pleasant Point, drafted a comprehensive paper entitled: The Cultural Importance of River Herring to the Passamaquoddy People.<sup>9</sup>
  - NOAA will continue on-going regulatory actions at hydropower dams in support of improving or maintaining safe, timely, and effective migratory pathways.
    - Status: NMFS continued its efforts to ensure compliance with Federal Energy Regulatory Commission (FERC) license articles for monitoring of fish passage through quantitative assessment of alewife passage at Milford Dam, Maine, and qualitative assessment of river herring presence at the West Enfield Dam, Maine. NMFS continues to work on relicensing actions in support of improving fish passage at FERC licensed projects (e.g., Weldon/Mattaceunk Dam, Maine).
  - NOAA and ASMFC will continue to work with our many partners on on-going habitat conservation and passage restoration efforts. This will include furthering work on the NOAA Habitat Blueprint and Atlantic Habitat Focus Areas.
    - Status: In 2015, NOAA awarded coastal resiliency funds for implementing the Exeter dam removal in Exeter, New Hampshire, that will eliminate this passage barrier immediately upstream of the head-of-tide and provide river herring passage on the Exeter River. NOAA also provided funding and technical assistance on the removal of two barriers in Connecticut completed in 2015: the Ed Bill's Pond dam in Salem and Pond Lilly dam in West Haven, Connecticut.
    - ACFHP helped to fund the following projects<sup>10</sup> which will benefit river herring: fish passage on Patten Stream, in Surry, Maine; removal of the Cotton Gin Mill dam on the Satucket River in East Bridgewater, Massachusetts; and a spawning fish habitat enhancement project downstream of Lock and Dam 2 on the Cape Fear River in North Carolina.
  - NOAA will continue various efforts to improve climate assessments, including working with its partners on those specifically related to river herring.
    - Status: NOAA was involved in a study with its partners on the effect of environmental conditions on river herring freshwater survival (Tommasi *et al.*,

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<sup>9</sup> [http://www.wabanaki.com/wabanaki\\_new/documents/Passamaquoddy%20and%20River%20Herring-Cultural%20Importance%20v5.pdf](http://www.wabanaki.com/wabanaki_new/documents/Passamaquoddy%20and%20River%20Herring-Cultural%20Importance%20v5.pdf)

<sup>10</sup> <http://www.atlanticfishhabitat.org/projects/fundedprojects/>

2015).<sup>11</sup> This study served as a first step in the evaluation of the effect of climate change on the freshwater phase of these species. NOAA also worked with its partners to study the impacts of climate change on river herring in the marine environment (Lynch *et al.*, 2015). This study looked at the impacts of projected ocean warming on river herring populations.

- NMFS was engaged in a Northeast Fisheries Climate Vulnerability Assessment in 2015 which included river herring (Hare *et al.*, 2016<sup>12</sup>). The assessment found alewife and blueback herring are very highly vulnerable to climate change. The potential for alewife to shift distribution is low and the potential for blueback herring to shift distribution is moderate; this potential to shift distribution is limited by natal homing. Overall, the directional effect of climate change on alewife is expected to be negative and the directional effect on blueback herring is expected to be neutral; but, there is substantial uncertainty in the directional effect estimate for blueback herring.
- NOAA will research climate downscaling techniques to improve climate assessments.
  - Status: In 2015, a team of NOAA scientists from NMFS, Oceanic and Atmospheric Research, and Earth System Research Laboratory completed an analysis and published a paper (Saba *et al.*, 2016<sup>13</sup>). Saba *et al.* (2016) found prior climate change projections for the Northwest Atlantic may be far too conservative. The study points to the need to improve simulations of basin and regional-scale ocean circulation. The high-resolution climate model used in the study (NOAA Geophysical Fluid Dynamics Laboratory's CM2.6; 10 km ocean, 50 km atmosphere) is now being used by NMFS Northeast Fisheries Science Center to project changes in U.S. Northeast Shelf marine species distributions under climate change scenarios.
- NMFS will continue to work with its partners to study the long-term benefits of restoring riverine habitat along the Atlantic Coast.

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<sup>11</sup> Tommasi, D., Nye, J., Stock, C., Hare, J.A., Alexander, M. and K. Drew. 2015. Effect of environmental conditions on juvenile recruitment of alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) in fresh water: a coastwide perspective. *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 72, No. 7: pp. 1037-1047. (doi: 10.1139/cjfas-2014-0259).

<http://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2014-0259>

<sup>12</sup> Hare, J.A., Morrison, W.E., Nelson, M.W., Stachura, M.M., Teeters, E.J., Griffis, R.B., et al. 2016. A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. *PLoS ONE*, Vol. 11, No. 2: e0146756. doi:10.1371/journal.pone.0146756

<sup>13</sup> Saba, V.S., Griffies, S.M., Anderson, W.G., Winton, M., Alexander, M.A., Delworth, T.L., Hare, J.A., Harrison, M.J., Rosati, A., Vecchi, G.A. and R. Zhang. 2016. Enhanced warming of the northwest Atlantic Ocean under climate change. *Journal of Geophysical Research: Oceans*. Vol. 121, Issue 1, Pages 118–132. <http://onlinelibrary.wiley.com/doi/10.1002/2015JC011346/full>

- Status: NMFS is continuing to work with its partners to study long-term benefits of restoring riverine habitat. Additionally, NOAA staff are working with the USFWS and other partners to address fish passage and stream connectivity through the North Atlantic Landscape Conservation Collaborative and priority project funding along the Atlantic Coast.
- NMFS and ASMFC will continue to present to its partners on the River Herring TEWG and Conservation Plan to identify next steps and areas for continued collaboration.
  - Status: NMFS and ASMFC presented on the TEWG and Plan at various meetings including the New England Fishery Management Council, Mid-Atlantic Fishery Management Council (including the River Herring and Shad Advisory Panel), ASMFC, and Northeast Association of Fish and Wildlife Agencies. TEWG meetings will continue on a semi-annual basis in 2016. Additional subgroup meetings will be scheduled as information and discussion needs arise.
- NMFS will continue to work with its partners to conduct ecosystem research on river herring.
  - Status: NMFS has been involved in a number of research projects with its partners related to ecosystem research on river herring including a study on life history (Stevens et al., 2015<sup>14</sup>). These studies continue to broaden the scope and depth of river herring research in the region.

NMFS, ASMFC, and our partners continue to make progress to further river herring conservation and address data gaps through a coordinated coastwide effort. Progress on the goals to date show a commitment to increase coordination with partners, as well as obtain and improve information on river herring.

### Looking Forward

Based on the coastwide range and many threats river herring face, conservation of river herring must be looked at holistically. Although there have been many successes to fill-in data gaps and conserve river herring, numerous challenges remain. The TEWG has identified important conservation efforts and remaining data gaps for river herring. NMFS and ASMFC have developed research priorities factoring in specific management and science needs.

These research priorities are intended to assist NMFS and ASMFC partners, including fishery management councils, state agencies, fishery management organizations, non-profit

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<sup>14</sup> Stevens, J. R., Saunders, R., and W. Duffy. (2015, August). Evidence of River Herring Life History Variation in Penobscot River Estuary, Maine USA. In 145th Annual Meeting of the American Fisheries Society. AFS. 2015 <https://afs.confex.com/afs/2015/webprogram/Paper20209.html>

organizations, scientists, academic institutions, and industry in both the development of funding opportunities and to demonstrate river herring needs when applying for funds. Research can be integrated into river herring management efforts and should inform and improve current and future conservation efforts. Efforts will continue to increase outreach, both internally and externally, to help create funding options, and increase awareness of priority needs.

This Plan will be monitored and evaluated to determine success in achieving the goals. The research needs and goals will evolve over time as we continue to learn about river herring. River herring conservation is not a single agency effort and will require commitments from all partners, including the TEWG. Continued involvement of the TEWG is needed to track and monitor progress of conservation actions and research. Additional input from the TEWG and the public on this initial conservation plan will inform future updates.