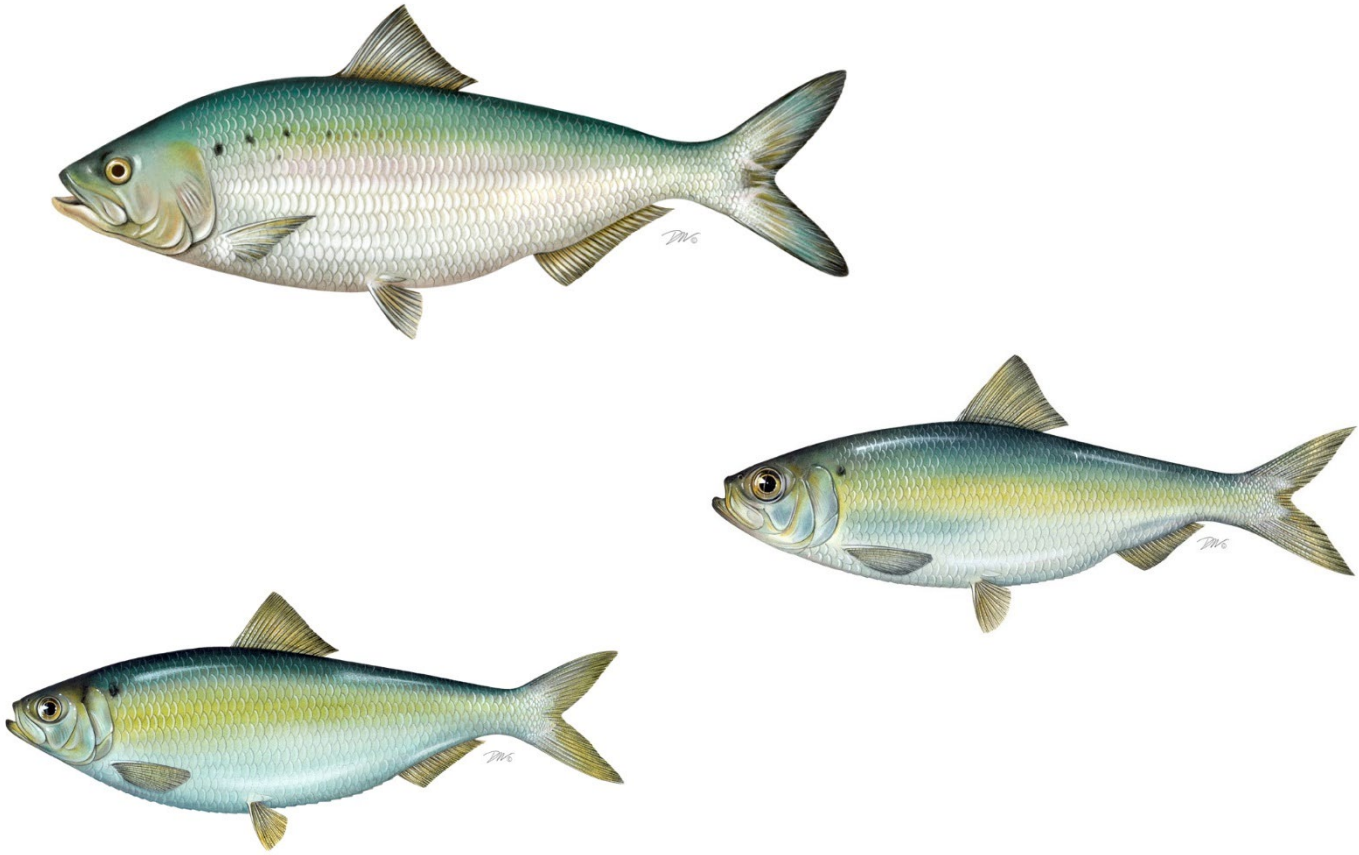
REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR SHAD AND RIVER HERRING *(Alosa spp.)* FOR THE 2023 FISHING YEAR



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REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR SHAD AND RIVER HERRING *(Alosa spp.)*

I. Status of the Fishery Management Plan

Date of FMP Approval:	October 1985
Amendments:	Amendment 1 (April 1999) Amendment 2 (August 2009) Amendment 3 (February 2010)
Addenda:	Technical Addendum #1 (February 2000) Addendum I (August 2002)
Management Unit:	Migratory stocks of American shad, hickory shad, alewife, and blueback herring from Maine through Florida
States With Declared Interest:	Maine through Florida, including the Potomac River Fisheries Commission (PRFC) and the District of Columbia
Active Boards/Committees:	Shad & River Herring Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Plan Review Team, Plan Development Team

The 1985 Fishery Management Plan (FMP) for Shad and River Herring was one of the first FMPs developed by the ASMFC. Amendment 1 was initiated in 1994 to require and recommend specific monitoring programs to inform future stock assessments—it was implemented in October 1998. A Technical Addendum to Amendment 1 was approved in 1999 to correct technical errors.

The Shad and River Herring Management Board (Board) initiated Addendum I in February 2002 to change the conditions for marking hatchery-reared alosines; clarify the definition and intent of *de minimis* status for the American shad fishery; and modify and clarify the fishery-independent and dependent monitoring requirements. These measures went into effect on January 1, 2003.

In May 2009, the Board approved Amendment 2 to restrict the harvest of river herring (blueback herring and alewife) due to observed declines in abundance. The Amendment prohibited commercial and recreational river herring harvest in state waters beginning January 1, 2012, unless a state or jurisdiction has a sustainable fishery management plan (SFMP) reviewed by the Technical Committee and approved by the Board. The Amendment defines a sustainable fishery as "a commercial and/or recreational fishery that will not diminish the potential future stock reproduction and recruitment." Catch and release only fisheries may be maintained in any river system without an SFMP. SFMPs have been approved by the Management Board for Maine, New Hampshire, Massachusetts, New York, and South Carolina (Table 1). Amendment 2 also required states to implement fishery-dependent and independent monitoring programs.

In February 2010, the Board approved Amendment 3 in response to the 2007 American shad stock assessment, which found most American shad stocks at all-time lows. The Amendment requires similar management and monitoring for shad as developed in Amendment 2 (for river herring). Specifically, Amendment 3 prohibits shad commercial and recreational harvest in state waters beginning January 1, 2013, unless a state or jurisdiction has an SFMP reviewed by the Technical Committee and approved by the Board. The Amendment defines a sustainable fishery as "a commercial and/or recreational fishery that will not diminish the potential future stock reproduction and recruitment." Catch and release only fisheries may be maintained in any river system without an SFMP. SFMPs have been approved by the Board for Maine, Massachusetts, Connecticut, the Delaware River Basin Fish Cooperative (on behalf of New York, Delaware, New Jersey, and Pennsylvania), PRFC, North Carolina, South Carolina, Georgia, and Florida (Table 1). All states and jurisdictions are also required to identify local significant threats to American shad critical habitat and develop a plan for mitigation and restoration. All states and jurisdictions' habitat plans have been accepted and approved.

Table 1. States/jurisdictions with approved sustainable fishery management plans (SFMPs) for river herring or shad. Includes year of original Board approval and approved updates[1].

State	River Herring SFMP	Shad SFMP
Maine	Approved (2010, 2017, 2020, 2024)	Approved (2020)
New Hampshire	Approved (2011, 2015, 2020, 2024)	
Massachusetts	Approved (2016, 2022)	Approved (2012, 2019, 2024)
Connecticut		Approved (2012, 2017, 2024)
Rhode Island		
Pennsylvania		Approved* (2012, 2017, 2020, 2022)
New York	Approved (2011, 2017, 2022)	Approved* (2012, 2017, 2020, 2022)
New Jersey		Approved* (2012, 2017, 2020, 2022)
Delaware		Approved* (2012, 2017, 2020, 2022)
PRFC		Approved (2012, 2017, 2023)
Maryland		
Virginia		
North Carolina		Approved (2012, 2017, 2020, 2023)
South Carolina	Approved (2010, 2017, 2020)	Approved (2011, 2017, 2020)
Georgia		Approved (2012, 2017, 2020)
Florida		Approved (2011, 2017, 2020)

*The Delaware River Basin Fish and Wildlife Management Co-op has a Shad SFMP, though Delaware and New Jersey are only states that have commercial fisheries. All states have recreational measures, with limited to no catch in the upper Delaware River (New York & Pennsylvania).

[1] SFMPs must be updated and re-approved by the Board every five years.

II. Status of the Stocks

While the FMP addresses four species: two river herrings (blueback herring and alewife) and two shads (American shad and hickory shad)—these are collectively referred to as shad and river herring, or SRH.

The most recent American Shad Benchmark Stock Assessment (ASMFC 2020) indicated American shad remain depleted on a coastwide basis. Multiple factors, such as overfishing, inadequate fish passage at dams, predation, pollution, water withdrawals, channelization of rivers, changing ocean conditions, and climate change are likely responsible for the shad decline from historic abundance levels. Additionally, the assessment found that shad recovery is limited by restricted access to spawning habitat. Current barriers partly or completely block 40% of historic shad spawning habitat, which may equate to a loss of more than a third of spawning adults.

Of the 23 river-specific stocks of American shad for which sufficient information was available, adult mortality was determined to be unsustainable for three stocks (Connecticut, Delaware, and Potomac) and sustainable for five stocks (Hudson, Rappahannock, York, Albemarle Sound, and Neuse). The terms “sustainable” and “unsustainable” were used instead of “not overfishing” and “overfishing” because fishing mortality cannot be separated from other components contributing to total mortality. The assessment was only able to determine abundance status for two stocks: abundance for the Hudson was depleted, and abundance for the Albemarle Sound was not overfished. For the Hudson and coastwide metapopulation, the “depleted” determination was used instead of “overfished” because the impact of fishing on American shad stocks cannot be separated from the impacts of all other factors responsible for changes in abundance.

The status of 15 additional stocks could not be determined due to data limitations, so trends in YOY and adult abundance were provided for information on abundance changes since the 2005 closure of the ocean-intercept fishery. For YOY indices, two systems experienced increasing trends while one system experienced a decreasing trend since 2005. All other systems experienced either no trend (eight systems), conflicting trends among indices (one system), or had no data (11 systems). For adult indices, four systems experienced increasing trends while no systems experienced decreasing trends since 2005. All other systems experienced either no trend (11 systems), conflicting trends among indices (seven systems), or had no data (one system). Trend analyses also indicate a continued lack of consistent increasing trends in coastwide metapopulation abundance since 2005.

Taken in total, American shad stocks do not appear to be recovering. The assessment concluded that current restoration actions need to be reviewed and new efforts need to be identified and applied. Because multiple factors are likely responsible for shad decline, the recovery of American shad will need to address multiple factors including improved monitoring, anthropogenic habitat alterations, predation by non-native predators, and exploitation by fisheries. There are no coastwide reference points for American shad. There is no stock assessment available for hickory shad.

The most recent *River Herring Benchmark Assessment Report* (ASMFC 2024) indicated that the coastwide populations of both alewife and blueback herring are depleted relative to historic levels, with the habitat model indicating that overall productivity of both species is lower than an unfished population before the occurrence of any habitat modifications (e.g., dams or human alterations to the environment). The depleted determination was used instead of overfished and overfishing because of the many factors that have contributed to the declining abundance of river herring, which include not just directed and incidental fishing, but also habitat loss, predation, and climate change.

In terms of recent trends, there is no clear signal for either species across the coast. Even within the genetic stock-regions, trends in abundance and mortality differed from river to river, with some rivers showing increasing trends and low mortality rates, and others showing flat or declining trends and total mortality rates above the reference point. Although very few significant trends overall were detected since the adoption of Amendment 2 in 2009, the majority of abundance indices for both alewife and blueback herring are likely to be higher now than they were in 2009. However, half of the blueback populations and 65% of the alewife populations have a high probability of being above the total mortality reference point, indicating total mortality on adult fish was too high. Total mortality is the removal of fish from a population due to both fishing and natural causes.

The northern New England region seemed to have more positive trends and a higher probability of abundance in the most recent years being greater than in 2009. It is unclear why that is the case, especially as the more northern regions also had higher probabilities of being above the total mortality reference point. States in northern New England region have conducted extensive habitat restoration and dam removal, but so have states further south, and they have not seen the same degree of positive trends in run counts and indices. In addition, states in the northern stock-region have also accounted for the majority of directed catch in recent years, while states in the Mid-New England, Southern New England, and Mid-Atlantic stock-regions have closed their fisheries. Genetic analysis indicated that most of the ocean bycatch around Cape Cod and Long Island Sound was of alewife from the Southern New England stock-region and blueback herring from the Mid-Atlantic stock-region, two areas that have had more negative trends in recent years despite habitat restoration efforts and directed fishery closures.

III. Status of the Fisheries

Shad and river herring formerly supported the largest and most important commercial and recreational fisheries throughout their range. Historically fishing took place in rivers (both freshwater and saltwater), estuaries, tributaries, and the ocean. Although recreational harvest data are scarce, today most harvest is believed to come from the commercial industry. Commercial landings for these species have declined dramatically from historic highs. Details on each fishery are provided below.

AMERICAN SHAD:

Total commercial landings throughout the 1950s fluctuated around eight million pounds, then declined to just over two million pounds in 1976. A period of moderate increase occurred through the mid-1980s, followed by further declines through the remainder of the time series.

Since the closure of the ocean intercept fishery in 2005, landings have been substantially lower, falling below one million pounds. Since 2015, landings have remained below half a million pounds.

The total commercial landings (directed and bycatch) reported in compliance reports from individual states and jurisdictions in 2023 were 133,430 pounds, representing a 21% increase from landings in 2022 (110,027 pounds) (Table 2). Bycatch landings accounted for approximately 12% of the total commercial landings of American shad in 2023. Landings from Connecticut, North Carolina, and South Carolina accounted for 12.1%, 23.3%, and 61.2% of the directed coastwide commercial fishery removals in 2023, respectively. The remainder of the directed landings came from Georgia, New Jersey, and Delaware. Maryland commercial fishermen are permitted a bycatch allowance of two fish per day of dead American shad for personal use, provided that shad are captured by gear legally deployed for the capture of other fish species; no sale is permitted. Landings from Virginia and PRFC are attributed to limited bycatch allowances for American Shad.

Substantial recreational shad fisheries occur on the Connecticut (CT and MA), Delaware (NY, PA NJ, and DE), Susquehanna (MD), Santee and Cooper (SC), and St. Johns (FL) Rivers. Shad recreational fisheries are also pursued on several other rivers in Massachusetts, District of Columbia, Virginia, North Carolina, South Carolina, and Georgia. Though shad are recreationally targeted in these locations, many fisheries are catch and release only. Hook and line shad catch levels are not well understood; actual harvest and/or effort is only estimated by a few states through annual creel surveys (e.g. Maryland, North Carolina, Georgia, and Florida). Harvest may only amount to a small portion of total catch (landings and discards), but hooking mortality could increase total recreational fishery removals substantially.

Since 2009, recreational harvest data from the Marine Recreational Information Program (MRIP) are generally not provided for American shad due to high proportional standard errors (PSEs). This is a result of the MRIP survey design, which focuses on active fishing sites along coastal and estuarine areas and is unsuitable for capturing inland harvest. However, Massachusetts, North Carolina, South Carolina, and Florida reported American shad recreational harvest estimates for 2023 (Table 3).

HICKORY SHAD:
In 2023, North Carolina, South Carolina, and Georgia reported directed commercial hickory shad landings; Rhode Island, New York, Virginia, and North Carolina reported bycatch landings. North Carolina accounts for a vast majority of directed landings, contributing 99% of the total. Coastwide commercial and bycatch landings in 2023 totaled 116,187 pounds, representing a 17.4% increase from 2022 landings (98,962 pounds) (Table 2). North Carolina reported a recreational harvest of 5,147 pounds.

RIVER HERRING (BLUEBACK HERRING/ALEWIFE COMBINED):
Commercial landings of river herring declined 95% from over 13 million pounds in 1985 to about 733 thousand pounds in 2005. Recent commercial landings continue to increase, despite the closure of the ocean-intercept fishery in 2005 and North Carolina implementing a no-harvest provision for commercial and recreational fisheries of river herring in coastal waters of

the state in 2007. In 2023, the coastwide directed commercial river herring landings reported in state compliance reports were 2.79 million pounds, a 1% decrease from 2022 (2.82 million pounds). Bycatch landings in 2023 totaled 2,584 pounds, a 0.6% decrease from the 2022 total of 2,599 pounds (Table 2). However, the PRT notes that low estimates of bycatch since 2021 were strongly influenced by Massachusetts ending their portside sampling program and instead reporting mixed stock bycatch figures from NOAA's Northeast Fisheries Observer Program (NEFOP). In 2023, Massachusetts reported an additional 403,005 pounds of shad and river herring bycatch from NEFOP data. North Carolina, South Carolina, and Florida provided an estimate of recreational river herring harvest in 2023; recreational harvest estimates for Maine and Massachusetts are produced by MRIP but highly uncertain (Table 3).

Table 2. Shad and river herring total commercial fishery removals (directed landings and bycatch[1], in pounds) provided by states, jurisdictions and NOAA Fisheries for 2023.

	River Herring	American Shad	Hickory Shad
Maine	2,602,917	C	C
New Hampshire	0	0	0
Massachusetts	0	0	0
Rhode Island	0	0	7,758
Connecticut	0	14,243	0
New York	2,196	C	C
New Jersey	0	120	0
Pennsylvania	0	0	0
Delaware	0	C	0
Maryland	C	C	0
D.C.	0	0	0
PRFC	1,855	14,321	0
Virginia	0	1,192	2,524
North Carolina	0	27,341	104,923
South Carolina	189,382	71,908	C
Georgia	0	3,875	671
Florida	0	0	0
Total Directed	2,793,766	117,522	105,008
Total Bycatch	2,584	15,908	11,179
Total	**2,796,350**	**133,430**	**116,187**

*Confidential values are indicated by "C." Some values are listed as confidential to protect the confidentiality of other states.

[1] Available information on shad and river herring bycatch varies widely by state. Estimates may not capture all bycatch removals occurring in state waters.

Table 3. Recreational harvest information for river herring and American shad in 2023 from MRIP and state compliance reports.

State	River Herring Harvest	American Shad Harvest	Source of Estimates
Maine	119 fish	4,134 fish	MRIP*
New Hampshire	0	0	Due to failure to meet fishery-independent target in NH's SFP, the recreational river herring fishery was closed in 2021.
Massachusetts	0	1,481 fish	MRIP*
North Carolina		7,552 pounds	Recreational creel surveys on the Roanoke, Tar, Neuse, and Cape Fear rivers
South Carolina	5,926 pounds	42,703 pounds	Creel surveys and mandatory reporting for recreational gill netters.
Florida		22 pounds	Access point creel survey on St. Johns River

*MRIP estimate considered highly uncertain. Spatial coverage of MRIP sampling may not align with recreational harvest areas for shad.

IV. Status of Research and Monitoring

Amendment 2 (2009) and Amendment 3 (2010) required fishery-independent and fishery-dependent monitoring programs for select rivers. Juvenile abundance index (JAI) surveys, annual spawning stock surveys (Table 4), and hatchery evaluations are required for specified states and jurisdictions. States are required to calculate mortality and/or survival estimates, and monitor and report data relative to landings, catch, effort, and bycatch. States must submit annual reports including all monitoring and management program requirements on or before July 1 of each year.

In addition to the mandatory monitoring requirements stipulated under Amendments 2 and 3, some states and jurisdictions continue important voluntary research initiatives for these species. For example, Massachusetts, Pennsylvania, Delaware, Maryland, District of Columbia, North Carolina, South Carolina, and the United States Fish and Wildlife Service (USFWS) are actively involved in shad restoration using hatchery-cultured fry and fingerlings. All hatchery fish are marked with oxytetracycline marks on otoliths to allow future distinction from wild fish. During 2023, several jurisdictions reared American shad, stocking a total of 19,710,302 shad, a 35% increase from the 14,643,171 shad stocked in 2022 (Table 5). In addition, 130,000 river herring (both alewife and blueback) larvae were stocked in the James River system in 2023.

V. Status of Management Measures

All state programs must implement commercial and recreational management measures or an alternative program approved by the Management Board (Table 1). The current status of each state's compliance with these measures is provided in the Shad and River Herring Plan Review Team Report (Table 6).

Amendment 2 (2009) prohibits river herring commercial and recreational harvest in state waters beginning January 1, 2012, unless a state or jurisdiction submits a sustainable fishery management plan and receives approval from the Board. Amendment 3 (2010) also requires the development of an SFMP for any jurisdiction maintaining a shad commercial or recreational fishery after January 1, 2013 (with the exception of catch and release recreational fisheries).

States are required to update SFMPs every five years.

Under Amendments 2 and 3 to the FMP, states may implement, with Board approval, alternative management programs for river herring and shad that differ from those required by the FMP. States and jurisdictions must demonstrate that the proposed management program will not contribute to overfishing of the resource or inhibit restoration of the resource. The Management Board can approve a proposed alternative management program if the state or jurisdiction can show to the Management Board's satisfaction that the alternative proposal will have the same conservation value as the measures contained in the FMP. In August 2020, the Board approved alternative management plans for recreational fishery regulations in South Carolina, Georgia, and Florida.

The PRT noted exceeded sustainability metrics in the Delaware Co-op and Florida that triggered management reviews. Both jurisdictions conducted reviews, satisfying their SFMP requirements, and determined that no management action was warranted at this time. The Technical Committee reviewed reports from Delaware Co-op and Florida staff and did not express any concerns with the lack of additional management measures. Additionally, Maryland is no longer able to conduct the Nanticoke River stock survey due to a lack of commercial fishing effort, and they are considering alternative fishery-independent surveys for the future (Table 6).

Table 4. American shad and river herring passage counts at select rivers along the Atlantic coast in 2023.

State/River	Shad	River Herring
Maine		
Androscoggin	14	67,927
Saco	1,176	1,263
Kennebec	1	137,752
Sebasticook	2	C
Penobscot	4,154	5,490,383
St. Croix	0	841,357
New Hampshire		
Cocheco		6,143
Exeter		234,948
Oyster		8,935
Lamprey		59,793
Winnicut		
Massachusetts		
Merrimack	28,438	10,315
Rhode Island		
Pawcatuck	198	
Gilbert Stuart		4,104
Nonquit		18,970
Buckeye Brook		107,151
Connecticut River		
Holyoke Dam	277,367	
Pennsylvania		
Schuylkill (Fairmont Dam)		
Pennsylvania^/Maryland/Delaware		
Susquehanna (Conowingo)	9,422	386
Susquehanna (Holtwood)	^	^
Susquehanna (Safe Harbor)	^	^
Susquehanna (York Haven)	69	63
South Carolina		
St. Stephen Dam	541,480	37,501
Total 2023	869,014	6,822,458
Total 2022	483,587	4,547,796
Total 2021	377,472	4,438,865
Total 2020	713,520	6,252,726
Total 2019	437,853	6,543,632
Total 2018	642,688	9,404,020

^ = Fish lift not operational

Table 5. Stocking of Hatchery-Cultured Alosine Larvae (Fry) in State Waters, 2023.

State	American Shad	River Herring
Maine		
Androscoggin River	0	*
New Hampshire		
Lamprey River	0	*
Massachusetts*		
Merrimack River	0	0
Nashua River	0	0
Rhode Island		
Pawcatuck River	1,034,872	0
Pawtuxet River	0	0
Pennsylvania		
Susquehanna River	1,078,273	0
Lehigh River	0	0
Schuykill River	0	0
Delaware		
Nanticoke River	657,000	0
Maryland		
Choptank River	3,390,000	0
Patapsco River	450,000	0
Maryland/District of Columbia/PRFC**		
Potomac River	260,000	0
Virginia		
James River	0	130,000
North Carolina		
Neuse River	0	0
Roanoke River	0	0
South Carolina		
Santee	11,837,384	0
Edisto River	1,002,773	0
Wateree River	0	0
Georgia		
Altamaha River	0	0
Oconee River	0	0
Total	**19,710,302**	**130,000**

*In Maine and Massachusetts river herring of wild origin are stocked as adult pre-spawning individuals through trap and transfer programs. Similarly, New Hampshire stocked river herring are adults of wild origin. These are not counted toward the total because they are not of hatchery origin.

**Numbers of fry stocked from combined efforts of PRFC, DC, and MD.

VI. Prioritized Research Needs

Due to the large number of research recommendations identified during stock assessments of these alosine species, only research recommendations identified as high priority are presented below. Recommendations are categorized by the expected time frame necessary to complete the recommendation (short term vs. long term). See the most recent benchmark stock assessment of each species (2020 for American shad, 2024 for blueback herring and alewife) for additional important research recommendations.

AMERICAN SHAD

Short Term

- Otoliths should be collected as the preferred age structure. If collection of otoliths presents perceived impact to conservation of the stock, an annual subsample of paired otolith and scales (at least 100 samples if possible) should be collected to quantify error between structures.
- Error between structures, if scales are the primary age structure collected, and for spawn mark count estimates (either between multiple readers or within reader) should be quantified on an annual basis. A mean coefficient of variation (CV) of 5% and detection of no systematic bias should serve as targets for comparisons.
- Two readers should determine consensus ages and spawn mark counts based on improvements in ageing error in the Delaware system when consensus-based estimates were part of the ageing protocol.

Long Term

- Develop a centralized repository for agencies to submit and store genetic sampling data for future analysis. The Atlantic sturgeon repository at the United States Geological Survey (USGS) Leetown Science Center should serve as an example.
- Collect genetic samples from young-of-year (YOY) and returning mature adults during spawning runs for future analysis of baseline genetic population structure and site fidelity/straying rates. These data will help define stock structure, identify stock composition from genetic sampling of American shad catch in mixed-stock fisheries, and provide information on recolonization capabilities in defunct American shad systems.
- Conduct annual stock composition sampling through existing and new observer programs from all mixed-stock fisheries (bycatch and directed). Potential methods include tagging (conventional external tags or acoustic tags) of discarded catch and genetic sampling of retained and discarded catch. Mortality rates of juvenile fish in all systems remain unknown and improvement in advice from future stock assessments is not possible without this monitoring. Known fisheries include the Delaware Bay mixed-stock fishery and all fisheries operating in the Atlantic Ocean (U.S. and Canada) that encounter American shad (see Section 4.1.4 in the stock assessment report).
- Implement fishery-independent YOY and spawning run surveys in all systems with open fisheries. Surveys should collect catch rates, length, individual weight, sex (spawning runs), and age (spawning runs) data at a minimum to allow for assessment of stocks with legal harvest. Require these surveys be in operation in systems with requested fisheries before opening fisheries.
- Conduct complete in-river catch monitoring in all systems with open fisheries. Monitoring programs should collect total catch, effort, size, individual weight, and age data at a

minimum. Require these surveys be in operation in systems with requested fisheries before opening fisheries.
- Conduct maturity studies designed to accommodate the unique challenges American shad reproductive behavior (i.e., segregating by maturity status during spawning runs) poses on traditional monitoring programs. This information will also improve understanding of selectivity by in-river fisheries and monitoring programs.
- Conduct fish passage research at barriers with adults for both upstream and downstream migration and movements and with juveniles for downstream as discussed in Section 1.1.9.5 of the stock assessment report.

RIVER HERRING

Short Term

- Develop consistent ageing protocols across all states.
- Develop a database of existing data sources with documentation of time series length, current and past methodology, data quality, and recommended usage.
- Continue development of species-distributions models like Turner et al. (2016, 2017) and Roberts et al. (2023) to identify potential time-area closures as an alternative to bycatch caps to mitigate river herring bycatch in ocean fisheries.
- Expand observer and port sampling coverage to quantify additional sources of mortality for alosine species, including bait fisheries, as well as rates of incidental catch in other fisheries.
- Encourage studies to quantify and improve fish passage efficiency and support the implementation of standard practices.
- Continue genetic analyses to monitor river origin of incidental catch in non-targeted ocean fisheries.
- Continue to develop models to predict the potential impacts of climate change on river herring distribution and stock persistence and develop targets for rivers undergoing restoration (dam removals, fishways, supplemental stocking, etc.).
- Evaluate and ultimately validate large-scale hydroacoustic methods to quantify river herring escapement (spawning run numbers) in major river systems.

Long Term

- Conduct exchanges or workshops to monitor the precision of ageing across states.
- Conduct workshops on river herring spawning run count technologies and data quality.

VII. Status of Implementation of FMP Requirements

In accordance with the Shad and River Herring Fishery Management Plan, the states are required to submit an annual compliance report by July 1st of each year. The Plan Review Team (PRT) reviewed all submitted state reports for compliance with the mandatory measures in Amendments 2 (River Herring) and 3 (American shad). Table 6 provides important information on each state's fisheries, monitoring programs, and compliance issues pertaining to the 2023 fishing year. Table 7 summarizes state reports of protected species interactions.

De Minimis Status

A state can request *de minimis* status if commercial landings of river herring or shad are less than 1% of the coastwide commercial total. *De minimis* status exempts the state from the sub-

sampling requirements for commercial and recreational catch for biological data. The following states have met the requirements and requested continued *de minimis* status in 2025:

- Maine (American shad)
- New Hampshire (American shad and river herring)
- Massachusetts (American shad)
- Georgia (river herring)
- Florida (American shad and river herring)

State Compliance

Most states have regulations in place that meet the intent of the requirements of the Interstate Fisheries Management Plan for Shad and River Herring. The PRT notes the following compliance issues encountered in their review of the state reports:

1. Several states did not report on all monitoring requirements listed under Amendments 2 and 3 (see Table 6). Persistent funding and staffing issues prevented states from conducting the required surveys.
    a. The Delaware Co-op has not conducted recreational monitoring for American shad since 2002.
    b. Massachusetts does not conduct a JAI for American shad in the Merrimack River
    c. Rhode Island takes river herring samples for mortality/survival estimates but mortality rates have not been updated since 2015.
    d. New York has not completed a creel survey for river herring since 2003.
2. Maine, DC, and South Carolina did not provide a copy or link to their current fishery regulations.
3. Connecticut and New Hampshire did not include a section for hickory shad reporting.

Per Amendment 3, states are required to report bycatch from state waters of rivers and estuaries and recommended to coordinate coastwide at-sea bycatch information. However, several states report only NMFS landings in federal waters or report that no bycatch information is available.

VIII. PRT Recommendations

While considering the issues listed above, the PRT recommends approval of the state compliance reports for the 2023 fishing year and *de minimis* requests. The PRT requests that states with no new information to report still include the hickory shad, law enforcement reporting, and implementation of habitat recommendations sections in their reports. Additionally, the PRT reviewed the additional bycatch information provided by the states in the new report template. Reported bycatch information varies widely by state: Vessel trip reports, creel survey data, on-board observer data, and NMFS landings in federal waters are all listed as state sources of bycatch data, while some states report that no information is available. Given the importance of bycatch losses identified in both the 2020 American Shad Benchmark Stock Assessment and 2024 River Herring Benchmark Stock Assessment, the PRT recommends the Board consider the inconsistency of bycatch/discard reporting sources coastwide and its impact on evaluating bycatch annually.

Table 6. Summary of PRT Review of 2023 State Compliance Reports.

STATE	2023 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
MAINE	Due to the low numbers of fish that ascend these fishways during any given year biological samples data (length, weight, sex, and scale sample) are not collected from American shad. Mortality estimates cannot be developed as a result.	
NEW HAMPSHIRE	Due to failure to meet the fishery-independent target in New Hampshire's river herring SFMP the river herring commercial and recreational fisheries remained closed in 2023. Biological assessment and annual mortality rates for American shad could not be completed due to no American shad returning to the fishways in 2023.	No hickory shad section or data was included in the report.
MASSACHUSETTS	Efforts to initiate a stocking program for American shad in the Taunton River advanced in 2023 with the stocking and monitoring of larval and juvenile shad in the Taunton River between May and September 2023.	No JAI program; requirement for American shad to develop one in the Merrimack River.
RHODE ISLAND	In 2021, RIDFW implemented video monitoring to report on spawning stock passing through the Potter Hill Fishway on the Pawcatuck River. The system is still experimental but will hopefully lead to accurate reporting on spawning stock size in the future. RIDFW, along with volunteer counters, has also implemented point counts on the Saugatucket River.	Samples were taken for mortality/survival estimates for river herring but mortality rates have not been updated since 2015. RH scales taken but not yet aged for Pawcatuck River.
CONNECTICUT	Biological sampling of American Shad was resumed for the duration of the 2023 fish passage season. Ageing has not been completed and information is unavailable at this time.	Shad: Due to a lack of funding and staff, the spawning stock survey, calculation of mortality/survival estimates, and recreational FD monitoring were not completed. Fishery independent work was completed but the state is still processing and analyzing data. River Herring: Unable to collect spawning stock data due to funding and staffing issues. Did not include a section for hickory shad.
NEW YORK	The annual index of relative abundance is the Delta Mean of catch per haul. NY switched to the Delta Mean method for calculating annual indices of abundance following methods used in the most recent ASMFC River Herring Benchmark Stock Assessment in 2024.	Did not include a section for implementation of habitat recommendations. River herring: Monitoring of recreational landings was not completed. Creel surveys have not been completed since 2003.
NEW JERSEY		Did not include a section for implementation of habitat recommendations.

Table 6. Summary of PRT Review of 2023 State Compliance Reports.

STATE	2023 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
PENNSYLVANIA		PA requirements are relevant to Susquehanna only. Delaware River requirements summarized as part of Delaware Basin Co-op. Prior to 2020, Normandeau Associates Environmental Consultants conducted the juvenile abundance index (JAI) survey and catch rates were extremely low from year to year. The PFBC conducted the JAI in 2021 and caught zero American Shad. No JAI surveys were conducted (shad + RH) in 2022 or 2023 and none are planned for 2024 due to extremely poor capture efficiency and staff limitations in the PFBC Anadromous Fish Restoration Unit. Also did not complete 1. Annual spawning stock survey and representative sampling for biological data for Shad and for River Herring and 2. Calculation of mortality and/or survival estimates.
DELAWARE BASIN COOP	Changes were made to the recreational and commercial regulations for American shad in the Delaware River Basin in 2023. The creel limit was decreased from three to two American shad per day in all basin states. Delaware also implemented a twine size diameter requirement of 0.52 mm or larger for anchored gill nets with stretch mesh greater than or equal to 4 inches. The sustainability target for the adult female spawning stock at Smithfield Beach was exceeded in 2023 and management action consideration was triggered. No management actions were taken to allow for the 2023 management changes to take effect.	American Shad: No recreational monitoring for American shad since 2002, though implementation of a creel survey is being considered for 2026. No FD sampling due to there being no cooperating commercial fishermen in DE. NJ's cooperating fishermen retired in 2023. Otoliths have only been archived, not aged. River Herring: No river herring are aged, thus no mortality rates are calculated.
DELAWARE	The Delaware Division of Fish and Wildlife discontinued monitoring American Shad bycatch during the commercial Striped Bass season since no bycatch had been reported over a 10-year period from the Striped Bass Fishery.	Shad : Did not calculate mortality and/or survival rates.
MARYLAND	Nanticoke River spawning stock survey not conducted due to lack of cooperating watermen. It's unlikely for them to fish again, so MD is exploring options for the future. The alternative survey will likely be a fishery-independent survey for river herring. The Nanticoke River is monitored jointly by Maryland and Delaware. Delaware monitors the American shad spawning stock through an electrofishing survey, so all monitoring requirements under Amendment 3 are still satisfied.	
D.C.	For 2023 the creel survey was reinstated to pre 2020 protocol.	Shad and River Herring: Non-harvest mortality was not calculated for 2023. Did not include a section for habitat recommendation implementation.

Table 6. Summary of PRT Review of 2023 State Compliance Reports.

STATE	2023 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
PRFC		Did not include a section for habitat recommendation implementation.
VIRGINIA		Did not include a section for habitat recommendation implementation.
NORTH CAROLINA	Age data unavailable. NCWRC PBT ages are not sufficient for mortality estimates. Added river herring monitoring sites in two Roanoke River tributaries in 2023.	Did not include a section for habitat recommendation implementation. One reported law enforcement violation for American shad.
SOUTH CAROLINA	Under reporting of tagged shad has persisted since new regulations were enacted in 2013. SC does record this information and provides estimates of exploitation but does not consider data reliable for mortality estimates.	Did not include a section on habitat recommendation implementation.
GEORGIA	Shad tagging ceased after the 2023 fishing season. From January-December 2023 the Georgia Department of Natural Resources, Law Enforcement Division issued one warning specific to shad.	No creel surveys, other than MRIP surveys, were conducted in 2023. The state completes a creel survey every 5 years. The last survey was completed in 2021.
FLORIDA	The St. Johns River SFMP was below the threshold for the 7th year consecutive year. Low effort and limited geographic extent of recreational fishery do not warrant regulation change. Secondary sampling reach remained above threshold for three consecutive years. Could not calculate age frequency or mortality estimates for adult blueback in the St. Johns River due to a low sample size.	

Table 7. Reported protected species interactions (sturgeon species) in shad or river herring fisheries in 2021. Only the states listed below reported interactions.

Jurisdiction	Atlantic sturgeon		Shortnose sturgeon		Unclassified		Total by State	
	Catch	Mortalities	Catch	Mortalities	Catch	Mortalities	Catch	Mortalities
RI	*						Unavailable *	Unavailable *
CT							0	0
NJ	**	**	**	**	**	**	**	**
PRFC	5						5	0
VA	3						3	0
NC	10	1			2		10	3
SC	5						5	0
GA	10		5				23	0
Total by Species	33	3	13	0	2	0	**46**	**3**

*Rhode Island reports NOAA NEFOP and ASM data, which is available after the compliance report submission deadline. Therefore, their data lags by one year. Rhode Island reported 23 sturgeon caught, but none in hauls that started or ended in Rhode Island waters in 2021.

**In 2022 gill netters in New Jersey coastal waters reported discarding 653 pounds of sturgeon.