REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR SHAD AND RIVER HERRING *(Alosa spp.)* FOR THE 2018 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 a 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 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 with approved sustainable fishery management plans (SFMPs) for river herring or shad. Includes year of Board approval and year the Board approved the updated[1] SFMP.

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

*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 Stock Assessment Report* (ASMFC 2007) identified that American shad stocks are highly depressed from historical levels. Of the 24 river-specific stocks of American shad for which sufficient information was available, 11 were depleted relative to historic levels, 2 were increasing, and 11 were stable (but still below historic levels). The status of 8 additional stocks could not be determined because the time-series of data was too short or analyses indicated conflicting trends.

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. These include controlling fishing rates, improving dam passage, stocking, and habitat restoration. There are no coastwide reference points for American shad. There is no stock assessment available for hickory shad. A benchmark stock assessment was initiated in 2017 to analyze American shad stock status, with expected completion in 2020.

The most recent *River Herring Benchmark Assessment Report* (ASMFC 2012) indicated of the 24 river herring stocks for which sufficient data were available to make a conclusion, 23 were depleted relative to historic levels and one was increasing. The status of 28 additional stocks could not be determined because the time-series of available data was too short.

Estimates of coastwide abundance and fishing mortality could not be developed because of the lack of adequate data. The “depleted” determination was used instead of “overfished” because of the many factors that have contributed to the declining abundance of river herring, which include not just directed and incidental fishing, but likely also habitat issues (including dam passage, water quality, and water quantity), predation, and climate change. There are no coastwide reference points.

The river herring stock assessment was updated in 2017 (ASMFC 2017) with additional data from 2011-2015, and concluded that river herring remain depleted at near historic lows on a coastwide basis. Total mortality estimates over the final three years of the data time series (2013-2015) were generally high and exceed region-specific reference points for some rivers. However, some river systems showed positive signs of improvement. Total mortality estimates for 2 rivers fell below region-specific reference points during the final three years of the data time series. No total mortality estimates were below reference points at the end of the 2012 stock assessment data time series. Of the 54 stocks with available data, 16 experienced increasing abundance trends, 2 experienced decreasing abundance trends, 8 experienced stable abundance and 10 experienced no discernable trend in abundance over the final 10 years of the time series (2006-2015).

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 combined river and ocean commercial landings decreased from a high of 2.36 million pounds in 1985 to a low of 1.4 million pounds in 1999, but increased in 2000 to 1.8 million pounds. The 2005 closure of the ocean-intercept fishery (phase out began in 2000) has substantially lowered the total coastwide landings of American shad. The total commercial landings (directed and bycatch) reported in compliance reports from individual states and jurisdictions in 2018 were 285,523 pounds, a 27% decrease from landings in 2017 (389,546 pounds) (Table 2). Bycatch landings accounted for approximately 17% of the total commercial landings of American shad in 2018.

In 2018, landings from North Carolina and South Carolina accounted for 18% and 35% of the coastwide commercial fishery removals, respectively. The remainder of the directed landings came from Connecticut, New Jersey, Delaware, and Georgia. 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 may be thousands of fish per year, but 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, Maine, North Carolina, South Carolina and Florida reported American shad recreational harvest estimates for 2018 (Table 3).

HICKORY SHAD:

In 2018, North Carolina, South Carolina, and Georgia reported directed commercial hickory shad landings; Rhode Island, Connecticut, New York, New Jersey and Virginia reported bycatch landings. North Carolina accounts for a vast majority of directed landings, contributing 91% of the total. Coastwide commercial and bycatch landings in 2018 totaled 97,284 pounds, representing a 27% increase from 2017 landings (76,643 pounds) (Table 2). Only North Carolina reported recreational harvest: 18,207 fish totaling 23,925 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 2018, directed commercial river herring landings were reported from Maine, New York, and South Carolina. Landings including bycatch in 2018 totaled 2.45 million pounds, only 1.8% more than the 2017 landings of 2.40 million pounds (Table 2). New Hampshire reported 4,113 pounds of river herring recreationally harvested for personal use by permitted coastal harvesters in 2018.

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 2018.

	River Herring	American Shad	Hickory Shad
Maine	*	*	*
New Hampshire	*	0	0
Massachusetts	173,971	*	0
Rhode Island	0	0	11,529
Connecticut	0	20,530	*
New York	*	*	*
New Jersey	0	16,960	*
Pennsylvania	0	0	0
Delaware	0	9,638	0
Maryland	0	0	0
D.C.	0	0	0
PRFC	3,372	37,820	0
Virginia	0	4,310	2,700
North Carolina	0	53,878	75,481
South Carolina	289,978	107,829	*
Georgia	0	27,484	6,010
Florida	0	0	0
Total Directed	2,257,693	236,319	82,485
Total Bycatch	187,845	49,204	14,799
Total	**2,445,538**	**285,523**	**97,284**

*Values not shown due to confidential data

[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 estimates for American shad in 2018 (in numbers of fish) provided by states and MRIP.

State	American Shad Harvest	Source of Estimates
Maine	4,108	MRIP*
North Carolina	6,163	Recreational creel surveys on the Roanoke, Tar, Neuse, and Cape Fear rivers
South Carolina	870	Creel surveys and mandatory reporting for recreational gill netters
Florida	47	Access point creel survey on St. Johns River
Total	**11,188**	

*MRIP estimate considered highly uncertain, with a PSE of 90.8. Spatial coverage of MRIP sampling may not align with recreational harvest areas for shad. In Maine, only 3 shad were sampled in 2018 and fewer than 56 shad have been sampled since 1996.

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 2018, several jurisdictions reared American shad, stocking a total of 22,754,925 American shad, a decrease of 15% from the 26,647,458 shad stocked in 2017 (Table 5).

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 (enclosed).

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 a 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. In 2017, states reviewed their SFMPs and made changes based on fishery performance or observations (e.g., revised sustainability targets) where necessary. At a minimum, states updated data for their commercial and/or recreational fisheries and recommended the current sustainability measures be carried forward in the next plan. To date the Board has reviewed and approved updated SFMPs for all states, with the updated Massachusetts SFMP for shad being approved in February 2019.

Table 4. American shad and river herring passage counts at select rivers along the Atlantic coast in 2018. This table includes only fish passage counts required by Amendments 2 and 3.

State/River	Shad	River Herring
Maine		
Androscoggin	32	170,040
Saco	4,107	92,836
Kennebec	437	307,035
Sebasticook	26	5,579,903*
Penobscot	3,958	2,174,745
St. Croix		270,659
New Hampshire		
Cocheco	0	24,743
Exeter	0	32
Oyster	0	5,716
Lamprey	0	50,884
Taylor		**
Winnicut		0
Massachusetts		
Merrimack	29,069	449,356
Rhode Island		
Gilbert Stuart		88,080
Nonquit		32,653
Buckeye Brook		16,048
Connecticut River		
Holyoke Dam	275,232	1,061
Pennsylvania		
Schuylkill (Fairmont Dam)	624	
Pennsylvania/Maryland/Delaware		
Susquehanna (Conowingo)	6,992	60
Susquehanna (Holtwood)	1,458	0
Susquehanna (Safe Harbor)	661	0
Susquehanna (York Haven)	**	0
South Carolina		
St. Stephen Dam	320,092	140,169
Total 2018	642,688	9,404,020
Total 2017	761,386	5,876,375
Total 2016	540,917	5,514,890
Total 2015	611,368	3,825,435
Total 2014	426,073	3,031,753

*Passage after harvest removals.

**Fishway operated but not monitored. Monitoring for the Taylor River has not been required since 2015 and will not be reported in future reports.

Note: Passage numbers on Susquehanna River are cumulative and listed in ascending order of passage mile with Conowingo being nearest the river's mouth.

Table 5. Stocking of Hatchery-Cultured Alosines in State Waters, 2018.

State	American Shad	Alewife*
New Hampshire		
Lamprey River	2,442,094	
Massachusetts		
Merrimack River	288,000	
Charles River	300,000	
Rhode Island		
Pawcatuck River	2,979,802	
Pawtuxet River	1,184,673	
Pennsylvania		
Susquehanna River	2,740,679	
Lehigh River	304,362	
Schuykill River	74,174	
Delaware		
Nanticoke River	346,000	
Maryland		
Choptank River	2,010,000	
District of Columbia/PRFC		
Potomac River**	369,683	
Virginia		
James River***	0	
North Carolina		
Neuse River	669,902	
Roanoke River	2,304,279	
South Carolina		
Edisto River	38,660	
Wateree River	1,362,961	
Broad River	3,864,496	
Georgia		
Altamaha River		
Oconee River	473,775	
Ocmulgee River	388,646	
Ogeechee	612,739	
Total	**22,754,925**	**0**

*In Maine only river herring of wild origin are stocked as adult pre-spawning individuals on the Androscoggin, Kennebec and Union Rivers

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

***In 2018, stocking efforts on the James River ceased operation.

VI. Prioritized Research Needs

Fishery-Dependent Priorities

High

- Expand observer and port sampling coverage to quantify additional sources of mortality for alosine species, including bait fisheries, as well as rates of bycatch in other fisheries to reduce uncertainty.[2]

Moderate

- Identify directed harvest and bycatch losses of American shad in ocean and bay waters of Atlantic Maritime Canada.

Low

- Identify additional sources of historical catch data of the US small pelagic fisheries to better represent earlier harvest of river herring and improve model formulation.

Fishery-Independent Priorities

Moderate

- Develop demersal and pelagic trawl CPUE indices of offshore river herring biomass.

Modeling / Quantitative Priorities

High

- Conduct population assessments on river herring, particularly in the south.[3]
- Analyze the consequences of interactions between the offshore bycatch fisheries and population trends in the rivers.
- Quantify fishing mortality for major river stocks after ocean closure of directed fisheries (river, ocean bycatch, bait fisheries).
- Improve methods to develop biological benchmarks used in assessment modeling (fecundity-at-age, sex specific mean weight-at-age, partial recruitment vector/maturity schedules) for river herring and American shad of both semelparous and iteroparous stocks.
- Improve methods for calculating M.

Moderate

- Consider standardization of indices with a GLM to improve trend estimates and uncertainty characterization.
- Explore peer-reviewed stock assessment models for use in additional river systems as more data become available.

Low

- Develop models to predict the potential impacts of climate change on river herring distribution and stock persistence.

Life History, Biological, and Habitat Priorities

[2] A prior statistical study of observer allocation and coverage should be conducted (see Hanke et al. 2012).

[3] A peer reviewed river herring stock assessment was completed in 2012 by the ASMFC.

High

- Conduct studies to quantify and improve fish passage efficiency and support the implementation of standard practices.
- Assess the efficiency of using hydroacoustics to repel alosines or pheromones to attract alosines to fish passage structures. Test commercially available acoustic equipment at existing fish passage facilities. Develop methods to isolate/manufacture pheromones or other alosine attractants.
- Investigate the relationship between juvenile river herring/American shad and subsequent year class strength, with emphasis on the validity of juvenile abundance indices, rates and sources of immature mortality, migratory behavior of juveniles, and life history requirements.
- Develop an integrated coastal remote telemetry system or network that would allow tagged fish to be tracked throughout their coastal migration and into the estuarine and riverine environments. UPDATE: currently available for American shad but not in use due to tagging mortality
- Continue studies to determine river herring population stock structure along the coast and enable determination of river origin of catch in mixed stock fisheries and incidental catch in non-targeted ocean fisheries. Spatially delineate mixed stock and Delaware stock areas within the Delaware system. Methods to be considered could include otolith microchemistry, oxytetracycline otolith marking, genetic analysis, and/or tagging.[4]
- Validate the different values of M for river herring and American shad stocks through shad ageing techniques and repeat spawning information.
- Continue to assess current ageing techniques for river herring and American shad, using known-age fish, scales, otoliths, and spawning marks. Conduct biannual ageing workshops to maintain consistency and accuracy of ageing fish sampled in state programs.[5]
- Summarize existing information on predation by striped bass and other species. Quantify consumption through modeling (e.g., MSVPA), diet, and bioenergetics studies.
- Refine techniques for tank spawning of American shad. Secure adequate eggs for culture programs using native broodstock.

Moderate

- Determine the effects of passage barriers on all life history stages of American shad and river herring. Conduct studies on turbine mortality, migration delay, downstream passage, and sub-lethal effects. UPDATE: Recent studies have been conducted by T. Castro-Santos of UMass.
- Evaluate and ultimately validate large-scale hydroacoustic methods to quantify river herring and American shad escapement in major river systems.
- Conduct studies of egg and larval survival and development.
- Conduct studies on energetics of feeding and spawning migrations of American shad on the Atlantic coast.
- Resource management agencies in each state shall evaluate their respective state water quality standards and criteria and identify hard limits to ensure that those standards,

[4] Genetic research currently underway in combination with otolith chemistry.

[5] River herring ageing workshop occurred in 2013.

criteria, and limits account for the special needs of alosines. Primary emphasis should be on locations where sensitive egg and larval stages are found.
- Encourage university research on hickory shad.
- Develop better fish culture techniques, marking techniques, and supplemental stocking strategies for river herring.

Low
- Characterize tributary habitat quality and quantity for Alosine reintroductions and fish passage development.
- States should identify and quantify potential shad and river herring spawning and nursery habitat not presently utilized, including a list of areas that would support such habitat if water quality and access were improved or created, and analyze the cost of recovery within those areas. States may wish to identify areas targeted for restoration as essential habitat.[11]
- Investigate contribution of landlocked versus anadromous produced river herring.

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 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 2018 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 2018:
- Maine (American shad)
- New Hampshire (American shad and river herring)
- Massachusetts (American shad)
- Florida (American shad and river herring)

State Compliance
All states with a declared interest in shad and river herring management have submitted annual compliance reports. Virginia has also submitted a separate bycatch report in accordance with the provisions of their limited bycatch program.

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 continue to allow recreational harvest for shad and/or river herring in absence of an approved SFMP, though Amendments 2 and 3 require all states and

jurisdictions to submit SFMPs for systems that remain open to commercial and recreational harvest. Those states are:

- Maine: no SFMP for shad, statewide recreational creel limit of 2 fish per day
- Georgia: no SFMP for river herring, no regulations to prohibit recreational harvest of river herring
- Florida: no SFMP for river herring, statewide recreational creel limit of 10 fish for aggregated alosine species

The PRT acknowledges that the Board is aware of additional inconsistencies between state management programs and the FMP requirements. In October 2017 the Technical Committee (TC) was tasked with developing recommendations and proposed improvements to the FMP to resolve these issues.

2. Several states did not report on all monitoring requirements listed under Amendments 2 and 3 (see Table 6). A few states have consistently omitted the same information from compliance reports for the past few years (CT, NY, NC, GA). These states should take note of the required monitoring programs that were not reported and make a concerted effort to report all monitoring programs in future compliance reports. The most common omissions were: characterization of other losses, variance, characterization of recreational harvest, length and age frequency, and degree of repeat spawning.

3. Most states did not submit their monitoring data in a separate Excel file along with the compliance report, as is required by Amendment 3. If data from required monitoring is provided in a separate file, the compliance report should also indicate what data were provided.

4. In each of their compliance reports, states and jurisdictions that share monitoring should indicate which jurisdiction is responsible for the required monitoring, rather than omitting the information. In addition, separate reports could be sent for each state or jurisdiction.

5. All sections of the compliance report should be addressed, even if no changes occurred from the previous year. The PRT found it difficult to evaluate compliance when sections only included a statement of “no changes from the previous report.”

Table 6. Summary of PRT Review of 2017 State Compliance Reports.

STATE	2018 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
ME	In 2018, river herring passage counts were above average on the Androscoggin, Sebasticook, Kennebec, Saco, and St. Croix rivers. The JAI for alewives showed 4 of 7 river segments had above average CPUEs. MRIP estimated 45,146 American shad were caught in 2018 recreationally in Maine, with 4,108 harvested. Spawning stock analysis showed shad mortalities (1.3%) in 2018 were similar to recent years.	Maintained recreational shad fishery with bag limit of 2 fish per day, but does not have an approved SFMP for shad. There were 2 law enforcement violations in 2018.
NH	No commercial landings of river herring in 2018. Recreational creel data indicated 11,150 alewives and 0 RH were harvested in 2018. For fishery-independent river herring data, the JAI was higher in 2018 than 2017, and spawning stock assessment found an increase in the number of returning fish in 2018 as compared to 2017. For fishery-independent shad data, no JAI could be done due to 0 shad caught in seines in 2018, and spawning stock assessment found there were 0 American shad returns to NH coastal rivers in 2018. Multiple fish passage projects occurred in 2018, including the removal of the Lower Sawyer Mill Dam.	NA
MA	A record 449,356 river herring passed upstream of the Essex Dam lift. Census counting stations were established at 3 new stations. A new volunteer visual count for river herring was established at Horn Pond. Recreational creel data indicated 226 American shad trips were taken. American shad counts on the Merrimack and Connecticut rivers were below 2017 levels.	MA did not implement juvenile abundance survey in Merrimack or Connecticut rivers. In 2018, three civil violations were reported by the Massachusetts Environmental Police with two violations involving illegal possession of river herring and one violation involving illegal possession of river herring for the purpose of sale.
RI	Results of river herring counts showed increased numbers in 2018 from 2017 in the Gilbert Stuart, Nonquit, and Buckeye Brook locations. Pawtucket River JAI results for river herring indicated similar catches in 2018 (0.51) as compared to 2017 (0.6). The JAI for shad in 2018 (0.45) is similar to 2017 (0.49). Spawning stock assessments for shad in 2018 (103) were below 2017 levels (331).	Did not include harvest and losses table; no indication of other losses related to research, passage, etc. Did not report on progress in implementing habitat recommendations.

Table 6. Summary of PRT Review of 2017 State Compliance Reports.

STATE	2018 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
CT	Adult blueback herring collection efforts were not conducted by CT DEEP in 2018 due to funding and staffing shortages; only JAI was completed in 2018. The USFWS Connecticut River Fish and Wildlife Conservation Office (CTRFWCO) conducted a river herring electrofishing survey in 2018 to collect biological information on river herring, but data is not yet available. The river herring JAI increased this year to highest level since 2015. CT is looking to improve upstream and downstream passage at 3 main stem dams and some tributary dams of CT river. The American shad JAI was the highest among years reported (2014-2018).	For fishery-dependent monitoring, no commercial effort, size, or age composition was provided. Sex composition was provided but there was no description of how it was attained. No recreational landings, catch, or effort reported. Did not include copy of commercial and recreational regulations that were in effect.
NY	1) Hudson commercial age structure estimated using length age-key derived from 2018 fishery independent sampling. CPUE from adult FI survey is calculated, but due to variability in number of sites and river reaches sampled, staff do not feel that it is suitable as an index of relative abundance. Absolute abundance is determined via electronic count on Black creek, a tributary of Hudson. 2) There is a high percentage of males in adult FI haul seine samples. Some comparable studies demonstrate more even sex ratios for the Hudson. Staff hypothesize that females may congregate further from shore and are not as accessible to their gear; they will be looking into this further. 3) Hudson River adult spawning stock for shad is sampled by both haul seine and electrofishing boat. Data is combined for all bio-characteristic analyses, but gear bias has been investigated and will continue to be monitored. 4) From 1990-present, mortality estimates of the Hudson stock have been above the Z30 reference point. 5) The 2018 YOY index for American shad was 4.88, making this the fourth consecutive year below the recruitment failure limit.	A river herring recreational creel survey was not conducted in 2018 due to funding constraints. Did not report on progress in implementing habitat recommendations.
NJ	Both the Blueback and Alewife index obtained through the Ocean Trawl Survey were below the 30-year time series mean. For shad, the geometric CPUE index (0.66) for the Ocean Trawl Survey was below the time series average (0.78) and ranked 17th for the 30-year time series, but up from 2017 CPUE values of 0.18.	Did not include summary of regulatory or monitoring changes for the following year. Did not report on progress in implementing habitat recommendations.

Table 6. Summary of PRT Review of 2017 State Compliance Reports.

STATE	2018 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
PA	*River Herring*: 1) Only two blueback herring and 58 alewife herring passed Conowingo dam east fish lift. 2) 21 blueback herring and 6 alewife herring were capture in the Conowingo west fish lift. These were sacrificed for biological sampling. Sample size was too small for mortality estimates 3) Fish passage at Conowingo focused on American shad. Passage operations start too late for early stages of alewife migration. Overall passage conditions are likely not conducive to capture of river herring. 4) As us the case with almost all previous years, no river herring were captured in juvenile abundance index survey. Too few river herring pass Conowingo for successful spawning. 5) Juvenile index sampling at only one site in 2018 due to budget constraints. *Shad*: 1) 6,992 American shad passed Conowingo dam in 2018. This is less than half of the number passed in 2017. 2) Only 21% of fish passing Conowingo passed the next Susquehanna barrier, Holtwood dam. 3) 2018 shad scales from Conowingo sampling had not been read at time of reporting. 4) 38.9% of fish analyzed from Conowingo collections were hatchery origin. 5) Juvenile index effort lower this year due to funding constraints and high flow events. No juveniles were captured by this survey, continuing a trend since the early 2000s. 6) Conowingo FERC relicensing process is ongoing. Once passed, it should include inmproved standards for fish passage. 7) Final design of the York Haven nature-like fishway is still being modified.	Did not include copy of commercial and recreational regulations that were in effect.
DELAWARE BASIN COOP	Delaware River and upper bay YOY Alewife index from the Trawl Survey increased compared to 2017 index values. 2018 commercial landings of American shad attributed to NJ were up 80% over 2017 landings but still well below the 50,000 pound average captured since 2000 when the limited entry fishery went into effect. Delaware commercial shad harvest increased by 4,049 pounds but was still lower than the average 5-year and 10-year period.	Did not include summary of monitoring changes for the following year. Did not report on progress in implementing habitat recommendations.
DE	For the Nanticoke river, both the Alewife and Blueback Herring Haul Seine Survey indices were down in 2018; they were the third and tenth lowest values respectively of the 20-year time series. Juvenile shad Seine Haul (JAI) was down compared to 2017 and the adult shad electrofishing survey was the sixth lowest in the 17 year time series.	Did not include copy of commercial and recreational regulations that were in effect. Did not report on progress in implementing habitat recommendations.
MD	The alewife and blueback herring juvenile abundance index values for 2018 showed an increase over the 2017 values for all areas sampled (Upper Bay, Potomac River, Nanticoke River). The geometric mean CPUE of adult alewife and blueback herring rom Nanticoke fyke nets continues to show decline in catches. The American shad juvenile abundance index values for 2018 showed an increase over the 2017 values for all areas sampled (Upper Bay, Potomac River, Nanticoke River). Mortality rates were not calculated for Amirian shad in the Nanticoke River as a result of small sample size (n=5) and the Nanticoke River GM CPUE could not be calculated in 2018 because the Mill Creek pound net was not deployed by commercial fishermen in 2018.	NA

Table 6. Summary of PRT Review of 2017 State Compliance Reports.

STATE	2018 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
DC	No juvenile shad were stocked in 2018. Progress was made restoring habitat in Rock Creek through dam removal and installation of a fish ladder at the Pierce Mill Dam on Rock Creek. The geometric mean of the Seining Survey Push-Net Survey for Alosines and the Alewife CPUE for the Spawning Stock Survey both increased.	No ages calculated to conduct mortality or survival estimates.
PRFC	The 2018 young of year index values for alewife and blueback increased in comparison to the 2017 values. The Potomac River American Shad Restoration Target (31.1) was exceeded in 2018 (47.2) for the eighth year in a row. The 2018 YOY index value (7.36) saw a significant increase over 2017 (3.79). There has been a marked increase in American shad bycatch landings from the Potomac River pound net fishery in 2017 and 2018 with these two years having an average bycatch landing of 14,396 pounds. The previous 19 years (1998-2016) had an average bycatch landing of 4,306 pounds.	NA
VA	In 2018, 4,310 pounds of shad were landed as part of the small bycatch fishery. The American shad juvenile abundance index values for 2018 showed an increase over the 2017 values for all rivers sampled, excluding the Chickahominy which yielded no juvenile shad for the third year in a row.	Did not include summary of regulatory or monitoring changes for the following year. Did not report on progress in implementing habitat recommendations.
NC	North Carolina fishermen landed 53,878 pounds of shad in the 2018 directed fishery, representing a near 40,000 decrease from 2017 (92,769).	Due to budgetary constraints, Recreational Commercial Gear License harvest data for shad has not been collected since 2008. Did not include summary of regulatory changes for the following year.
SC	No management actions were triggered due to any benchmark exceedances during the 2018 fishing year. The sustainability benchmark of 0.050 for blueback herring in the Santee Cooper was not exceeded in 2018 (u=0.037). The 3 year running average harvest blueback herring on the Pee Dee River (382 kg) did not exceed the benchmark (1,000 kg). Observed sex ratios for American shad for the Santee River was 2.3 females per male and 4.9 females per male for the Waccamaw. The female-skewed sample ratios are most likely due to the marketability of females vs. males.	Did not include summary of regulatory or monitoring changes for the following year. Did not report on progress in implementing habitat recommendations. For shad and river herring, state regulations allow recreational harvest statewide, though not all systems are included in the SFMP.

Table 6. Summary of PRT Review of 2017 State Compliance Reports.

STATE	2018 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
GA	The 2018 population estimate of American shad in the Altamaha River in 2018 was 300,576, a 27% increase from 2017. The male:female sex ratio of American shad harvested was 1:16 from the Altamaha River; 1:334 for the Savannah River. The 5 year running average CPUE for the Savannah River in 2018 (35.51) was above the sustainability benchmark (25.5). The Savannah River American shad electrofishing catch rate increased 54% from 2017 rate.	Age data were not provided to meet the fishery-dependent monitoring requirements for the Savannah River. For river herring, state regulations allow recreational harvest though there is no approved SFMP.
FL	No commercial fishery exists for shad or river herring. Total estimated American recreational shad catch in Mullet Creel area and Puzzle Lake Creel area increased from 1,468 fish in 2017 to 5,543 fish in 2018. The total shad harvest at both sites combined was 47 fish. 350 American shad and 552 blueback herring were caught during 80 electrofishing transects on the St. Johns River. These numbers represent an increase from 2017. The season average geometric mean CPUE of blueback herring ranked 1st and 3rd in the time series for the 2 reaches of St. Johns River sampled.	For river herring, state regulations allow recreational harvest though there is no approved SFMP. For shad, state regulations allow recreational harvest statewide, though not all systems are included in the SFMP.

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

Jurisdiction	Atlantic sturgeon		Shortnose sturgeon		Unclassified		Total by State	
	Catch	Mortalities	Catch	Mortalities	Catch	Mortalities	Catch	Mortalities
RI	*	*	*	*	*	*	*	*
CT					32	0	32	0
NJ	39	7					39	7
PRFC	1	0					1	0
VA	11	0					11	0
NC	52	4					52	4
SC	138	0	9	0			147	0
GA	19	0	42	0			61	0
Total by Species	260	11	51	0	32	0	**343**	**11**

*Rhode Island reported 2 sturgeon mortalities for 2017. Reporting lags behind by one year due to data availability from the Northeast Fisheries Observer Program.