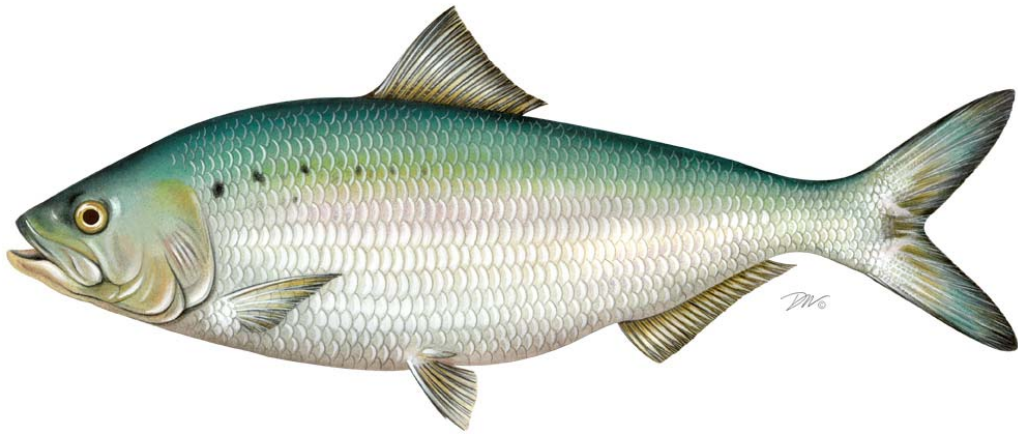


**REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR
SHAD AND RIVER HERRING (*Alosa spp.*)
2007**



October 17, 2008

Shad & River Herring Plan Review Team

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2008 REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR SHAD AND RIVER HERRING (*Alosa spp.*)

I. Status of the Fishery Management Plan

<u>Date of FMP Approval:</u>	October 1985
<u>Amendments:</u>	Amendment 1 (April 1999)
<u>Addenda:</u>	Technical Addendum #1 (February 9, 2000) Addendum I (August 28, 2002)
<u>Management Unit:</u>	Migratory stocks of American shad, hickory shad, alewife, and blueback herring from Maine through Florida
<u>States With Declared Interest:</u>	Maine through Florida, including the Potomac River Fisheries Commission and the District of Columbia
<u>Active Boards/Committees:</u>	Shad & River Herring Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Plan Review Team, Plan Development Team

In 1994, the Plan Review Team and the Management Board determined that the original 1985 Fishery Management Plan (FMP) was no longer adequate for protecting or restoring the remaining shad and river herring stocks. As a result, Amendment 1 was adopted in October 1998 (completed April 1999).¹ Amendment 1 focuses on American shad regulations and monitoring programs, but also requires States to initiate fishery-dependent monitoring programs for river herring and hickory shad in addition to current fishery-independent programs. Such monitoring programs will seek to improve data collection and stock assessment capabilities. Furthermore, Amendment 1 contains specific measures to control exploitation of American shad populations while maintaining the status quo in other alosine fisheries. The amended goal of the FMP is to protect, enhance, and restore East Coast migratory spawning stocks of American shad, hickory shad, and river herring (collectively alewife and blueback herring) in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. The Plan further specifies four (4) management objectives as follows:

- 1) Prevent overfishing of American shad stocks by constraining fishing mortality below F_{30}
- 2) Develop definitions of stock restoration, determine appropriate target mortality rates and specify rebuilding schedules for American shad populations within the management unit
- 3) Maintain existing or more conservative regulations for hickory shad and river herring fisheries until new stock assessments suggest changes are necessary

¹ ASMFC, 1999. Amendment 1 to the Interstate Fishery Management Plan for Shad & River Herring. April, 1999. Washington, D.C. 76 pp.

Portions of this report were taken from 2006 State annual reports, the ASMFC FMP for Shad and River Herring, the ASMFC report *American shad and Atlantic Sturgeon Stock Assessment Peer Review: Terms of Reference and Advisory Report*, the ASMFC Amendment 1 to the ISFMP for Shad and River Herring, and the ASMFC report *American Shad Stock Assessment Report for Peer Review*.

- 4) Promote improvements in degraded or historic alosine habitat throughout the species' range

In the fall of 1999, the Technical Committee reviewed both state annual reports and fishing recovery plans. After doing so, the Technical Committee compiled a report that identified a number of technical errors requiring correction and/or clarification in Tables 2 and 3 of Amendment 1. Upon review by the Shad and River Herring Management Board, the Board concurred with the Technical Committee's report and suggested that a technical addendum be developed to address modifications to the states' fishery-dependent and independent monitoring program for American shad. The Board approved Technical Addendum #1 to Amendment 1 of the Interstate Fishery Management Plan for Shad and River Herring.

In February 2002, the Plan Review Team and the Technical Committee recommended several changes to both Amendment 1 and Technical Addendum #1. The Management Board approved the changes and directed the Commission staff to develop an addendum to both Amendment 1 and Technical Addendum #1. Addendum I does the following: changes the conditions for marking hatchery-reared alosines; clarifies the definition and intent of *de minimis* status for the American shad fishery; and modifies and clarifies the fishery-independent and dependent monitoring requirements of Tables 2 and 3 of Technical Addendum #1. These measures went into effect on January 1, 2003.

II. Status of the Stocks

While the FMP addresses four species including American shad, hickory shad, alewife, and blueback herring, lack of comprehensive and accurate commercial and recreational fishery data for the latter three species make it difficult to ascertain the status of these stocks. A stock assessment for American shad was completed in 1997 and submitted for peer review in early 1998 based on new information and Management Board recommended terms of reference. The 1998 assessment estimated fishing mortality rates for nine shad stocks and general trends in abundance for 13 shad stocks.

A coastwide American shad stock assessment was completed and accepted in August 2007. The 2007 assessment found that American shad stocks are currently at all-time lows and do not appear to be recovering. Recent declines of American shad were reported for Maine, New Hampshire, Rhode Island, and Georgia stocks, and for the Hudson (NY), Susquehanna (PA), James (VA), and Edisto (SC) rivers. Low and stable stock abundance was indicated for Massachusetts, Connecticut, Delaware, the Chesapeake Bay, the Rappahannock River (VA), and some South Carolina and Florida stocks. Stocks in the Potomac and York Rivers (VA) have shown some signs of recovery in recent years. Data limitations and conflicting data precluded the report from indicating much about the current status or trend of many of the stocks from North or South Carolina.

The 2007 report identified primary causes for stock decline as a combination of overfishing, pollution, and habitat loss due to dam construction. In recent years, coastwide harvests have been on the order of 500-900 metric tons, nearly two orders of magnitude lower than in the late 19th century. Given these findings, the peer review panel recommended that current restoration actions need to be reviewed and new ones need to be identified and applied. The peer review panel suggested considering a reduction of fishing mortality, enhancement of dam passage and mitigation of dam-related fish mortality, stocking, and habitat restoration.

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III. Status of the Fisheries

American shad, hickory shad, and river herring formerly supported important commercial and recreational fisheries throughout their range. Fisheries are executed in rivers (both freshwater and saltwater), estuaries, tributaries, and oceans. Although recreational harvest data are scarce, most harvest is believed to come from the commercial industry. Commercial landings for all these species have declined dramatically from historic highs. Following is a summary of fisheries by species:

AMERICAN SHAD:

Total combined river and ocean commercial landings decreased from a high of 2,364,263 pounds in 1985 to a low of 1,390,512 pounds in 1999, but increased in 2000 to 1,816,979 pounds. The closure of the ocean-intercept fishery has lowered the coastwide total landings of American shad. Based upon landings data provided in Compliance Reports from individual states and jurisdictions, 2007 landings totaled 824,730, increasing from 663,067 pounds in 2006 (Table 1). Combined landings from North Carolina and South Carolina accounted for 67.9% of the commercial harvest in 2007. Connecticut, New York, New Jersey, and Georgia accounted for 39.1% of the commercial harvest in 2007. Maine, New Hampshire, Massachusetts, Rhode Island, Pennsylvania, Maryland, the District of Columbia and Florida reported no directed shad harvest in their state Compliance Reports. The National Marine Fisheries Service reported no harvest from Maine, New Hampshire, Massachusetts, Pennsylvania, Georgia, and Florida.

Shad bycatch landings from ocean waters in 2007 decreased from 2006 levels, comprising 4,562 pounds, or about 0.55% of the coastwide total. Only three states—Maine, Massachusetts, and New Jersey—reported landings of ocean bycatch.

Substantial shad sport fisheries occur on the Connecticut (CT and MA), the Hudson (NY), the Delaware (NY, PA and NJ), the Susquehanna (MD), the Santee and Cooper (SC), the Savannah (GA), and the St. Johns (FL) Rivers. Shad sport fisheries are also pursued on several other rivers in Massachusetts, Virginia, North Carolina, South Carolina, and Georgia. In 2007, recreational creel limits ranged from zero to 10 fish per day. The exception to this is the Santee River (SC), which is permitted to have a 20 fish per day creel limit due to the approval of a conservation equivalency plan in 2000. Tens of thousands of shad are caught by hook and line from large East Coast Rivers each year, but detailed creel surveys are generally not available. Actual harvest (catch and removal) may amount to only about 20-40% of total catch, but hooking mortality could boost this “harvest” value substantially. Several comprehensive angler use and harvest surveys are planned or have been recently completed. In October 2006, the Management Board suspended the requirement to monitor the recreational fishery.

MRFSS Data for American Shad are unreliable due to the design of MRFSS that focuses on active fishing sites along coastal and estuarine areas. For 2007, MRFSS reports that 109,115 American shad were caught, with 13,426 American shad harvested. According to MRFSS, New York harvested 100% of the recreational harvest (PSE 100). For 2006, MRFSS reports that 83,123 American shad were caught, with 58,440 harvested. According to MRFSS, Massachusetts harvested 91% of recreational harvest (proportional standard error ranges from 54.2-100).

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Table 1. Commercial landings (lbs.) of American shad reported by ASFMC jurisdictions in 2007.

State	State Compliance Report Landings			NMFS Landings
	Ocean Bycatch	In-river	Total	
Maine	786	-	786	-
New Hampshire	-	-	-	-
Massachusetts	44	-	44	-
Rhode Island	-	-	-	783
Connecticut	-	49,198	49,198	51,747
New York	Not Available	54,930	54,930	46,529
New Jersey	3,732	66,668	70,400	58,981
Pennsylvania	-	-	-	-
Delaware	-	71,438	71,438	85,932
Maryland	-	-	-	3,526
PRFC	-	8,914	8,914	-
DC	-	-	-	-
Virginia	-	1,116	1,116	4,863
North Carolina	-	300,032	300,032	300,040
South Carolina	-	227,107	227,107	223,915
Georgia	-	40,715	40,715	-
Florida	-	-	-	-
Total	4,562	820,168	824,730	776,316
Percent	0.55%	99.45%		
2006 Total	12,529	650,538	663,067	677,362
2006 Percent	2%	98%		

HICKORY SHAD:

New Jersey, North Carolina, South Carolina, and Georgia reported hickory shad commercial landings in 2007. Not all states reported landings. The coastwide commercial landings for hickory shad were 40,360 pounds in 2007. North Carolina reported the highest landings with 35,808 pounds, or 89% of the total landings. This is a 51% decrease from the 2006-coastwide commercial landings, which were 82,011 pounds (from 2007 State Compliance Reports).

MRFSS Data for hickory shad are unreliable due to the design of MRFSS that focuses on active fishing sites along coastal and estuarine areas. For 2007, MRFSS reports that 1,320,635 hickory shad were caught and 103,803 were harvested. Connecticut and Massachusetts reported the majority of the recreational harvest (55% and 29.5% respectively, with PSE ranges from 40.5 – 100). The remained of the reported fish were harvested from Rhode Island, Maryland, New Jersey and North Carolina (proportional standard error ranges from 0-100.1). In 2007, MRFSS reported catch and harvest increased from 2006. For 2006, MRFSS reports that 253,905 hickory

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shad were caught and 86,347 were harvested. All reported fish were harvested from Maryland, New Jersey and North Carolina (proportional standard error ranges from 0-100.1).

RIVER HERRING (BLUEBACK HERRING/ALEWIFE COMBINED):

Commercial landings of river herring declined 90% from over 13 million pounds in 1985 to about 1.33 million pounds in 1998. In 2007, river herring landings were reported from Maine, New Hampshire, Delaware, the Potomac River Fisheries Commission, North Carolina, and South Carolina, totaling 317,063 pounds, down from 2006’s total of 1,390,892 (from 2007 State Compliance Reports). Not all states reported their river herring landings.

MRFSS Data for river herring are unreliable due to the design of MRFSS that focuses on active fishing sites along coastal and estuarine areas. For 2007, MRFSS reported 54,025 river herring as being caught coastwide, with 36,434 river herring harvested (proportional standard error ranges from 47 to 100). According to MRFSS, alewife comprised 96% of the recreational river herring catch and 97% of the harvest. In 2007, MRFSS reported catch and harvest increased from 2006. For 2006, MRFSS reported 14,657 river herring as being caught coastwide, with 2,261 river herring harvested (proportional standard error ranges from 71.9 to 99).

Table 2. Shad and River Herring Fish Passage Counts at Select Dams – 2006.

State	Shad	River Herring
Maine		
Androscoggin	6	60,662
Saco	1,428	16,084
St. Croix	0	1,294
Massachusetts		
Essex/Lawrence	17,529	1,169
Holyoke	158,807	75
Westfield River	4,497	0
Rhode Island		
Gilbert Stuart		36,864
Nonquit		59,380
Potter Hill	44	
Pennsylvania/Maryland		
Conowingo	27,765	
Holtwood	10,338	
Safe Harbor	7,215	
York Haven	192	
Lehigh Dams	1612	472
South Carolina		
St. Stephen Dam	283,225	
Total 2007	558,261	79,756
Total 2006	581,604	55,909

IV. Status of Research and Monitoring

Under Amendment 1 (April 1999), fishery-independent and fishery-dependent monitoring programs are now mandatory for American shad. Juvenile abundance index (JAI) surveys,

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annual spawning stock surveys, and hatchery evaluations are required for states and jurisdictions specified in the fishery management plan. In addition, Amendment 1 recommends that JAIs for other alosine species be reported when possible. In February 2000, the Shad Management Board indefinitely deferred the ocean-tagging requirement stipulated by Amendment 1 due to the pending ocean fishery closures, which was to begin in the year 2000 to analyze the mixed stock contribution to ocean landings coastwide.

All 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, States were required to submit State recovery/fishing plans by July 1, 1999. All States plans to implement Amendment 1 were approved by January 1, 2000.

In addition to the mandatory monitoring requirements stipulated under Amendment 1, some states and jurisdictions continue important research initiatives for these species. For example, Maine, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, and 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 2007, several jurisdictions from Maine to North Carolina (including USFWS) reared American shad, hickory shad, and alewife, stocking a total of 22,368,849 American shad, 7,815,640 hickory shad, and 90,120 alewife (Table 3).

V. Status of Management Measures

All state programs must implement commercial and recreational management measures or an alternative program approved by the Management Board. The current status of each state's compliance with these measures is provided in Section VII of this report (See Table 4).

As noted in Section I, the Management Board determined that the original Plan and its lack of mandatory measures were insufficient for protecting and restoring alosine stocks along the East Coast. Accordingly, the 1985 fishery management plan was amended in 1999. The Plan Development Team developed Amendment 1 to expedite recovery of American shad populations and maintain current regulations in the hickory shad and river herring fisheries.

After careful consideration of the 1998 stock assessment results, peer reviewers' comments, and public opinion, the Management Board voted to address in-river or estuarine American shad fisheries differently than oceanic intercept fisheries. Specifically, the Board decided to require states to submit in-river shad restoration plans for stocks under their jurisdiction. For those seven river systems evaluated in the 1998 stock assessment (Connecticut R., Hudson R., Delaware R., Upper Chesapeake Bay MD, Edisto R., Santee R., and Altamaha R.), states could continue current regulations since overfishing was not detected for those respective stocks. States/jurisdictions must maintain a fishing mortality level at or below F_{30} . Also, reporting of catch and effort data for all alosine fisheries is now mandatory under Amendment 1.

Table 3. Stocking of Cultured Alosines in State Waters, 2006.

State	American Shad	Hickory Shad	Alewife
Maine			
Graham Lake			90,120
Kennebec River	8,360,359 (fry)		
Androscoggin River	721,819 (fry)		
Massachusetts			
Charles River	660,000 (fry)		
Pennsylvania			
Susquehanna River	3,570,675 (fry)		
Lehigh	276,000 (fry)		
Conowingo Reservoir	1,380,463 (fry)	3,323,741 (larvae)	
Ridley Creek		500,000 (fry)	
Pennypack Creek		3,991,899 (fry)	
Delaware			
Nanticoke Tributaries	231,000 (larvae)		
Maryland			
Choptank River	980,000 (larvae)		
	139,000 (juvenile)		
Patuxent River	431,220 (larvae)		
	204,882 (juvenile)		
Nanticoke River	0 (larvae)		
	137,000 (juvenile)		
District of Columbia			
Anacostia River	963,600 (fry)		
North Carolina			
Roanoke River	4,312,831		
Total 2007	22,368,849	7,815,640	90,120
Total 2006	16,541,517	12,061,349	90,000

In addition, the Management Board voted to phase out all ocean intercept fisheries for American shad within five years of Amendment 1 implementation. States were to comply with a 40% reduction in effort within the ocean intercept fishery by December 31, 2002. States with non-directed harvest of American shad in ocean fisheries can permit the landing of shad bycatch, provided that American shad do not constitute more than 5% of the total landings (in pounds) per trip. As required, each state submitted a proposal for a 40% reduction in effort by December 31, 2002. All states have closed their ocean-intercept fisheries as of January 1, 2005.

For recreational fisheries, the states voted to implement a 10 fish combined daily creel limit for American and hickory shad. In October of 2000, the Board approved a 10 fish per day creel limit (combined American and hickory shad) for all waters of South Carolina except the Santee River, which will have a 20 fish, combined daily limit. Existing or more conservative recreational/personal use regulations for river herring will be maintained under Amendment 1.

In addition, the states are required to submit annual reports on harvest and certain required fishery-independent and dependent monitoring programs. Implementation of these programs and

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reporting schedules is intended to improve future assessments of alosine populations and permit adaptive management of fisheries as stock recovery is documented.

In February 2002, the Shad and River Herring Plan Review Team and Technical Committee recommended several changes to both Amendment 1 and Technical Addendum #1. The Shad and River Herring Management Board approved the changes and directed Atlantic States Marine Fisheries Commission (ASMFC) staff to develop an addendum to both Amendment 1 and Technical Addendum #1. The proposed changes in Addendum I supersede the requirements described in Technical Addendum #1. Addendum I changes the conditions for marking hatchery-reared alosines. The addendum clarifies the definition and intent of *de minimis* status for the American shad fishery. It also further modifies and clarifies the fishery-independent and fishery-dependent monitoring requirements in Tables 2 and 3 of Technical Addendum #1. These measures became effective upon approval by the Shad and River Herring Management Board in August of 2002.

VI. Prioritized Research Needs

High Priority

- Continue to assess current aging techniques for American shad and river herring, using known age fish, scales, otoliths, and spawning marks. Conduct bi-annual aging workshops to maintain consistency and accuracy of aging of fish sampled in state programs.
- Validate the different values of M for shad stocks through verification of shad aging techniques and repeat spawning information and develop methods for calculating M.
- Determine which stocks are impacted by coastal intercept fisheries (including bycatch fisheries) and evaluate the fishing mortality on those stocks. Methods to be considered to differentiate among stocks could include otolith micro-chemistry, oxytetracycline otolith marking, tagging or DNA/RNA methods.
- Identify ways to improve fish passage efficiency using hydroacoustics to repel alosines or pheromones or other chemical substances to attract them. Test commercially available acoustic equipment at existing fish passage facility to determine effectiveness. Develop methods to isolate/manufacture pheromones or other alosine attractants.
- Refine techniques for tank spawning of American shad. Evaluate the use of hormone implants vs. natural spawning without hormones. Secure adequate eggs for culture programs using native broodstock.
- Conduct population assessments on river herrings - particularly needed in the south.
- Evaluate effectiveness of fishways for American shad. Compare features of effective fishways and in-effective fishways and develop guidelines for fishway design.
- Conduct basic research on American shad behavior as it relates to fishways to assist in development of design parameters.
- Quantify fishing mortality (in-river, ocean bycatch, bait fisheries) for major river stocks.

Medium Priority

- Determine and update biological benchmarks used in assessment modeling (fecundity at age, mean weight at age for both sexes, partial recruitment vector/maturity schedules) for

American shad and river herring stocks in a variety of coastal river systems, including both semelparous and iteroparous stocks.

- Develop effective culture and marking techniques for river herring.
- Develop and implement techniques to determine shad and herring population targets for tributaries undergoing restoration (dam removals, fishways, supplemental stocking, etc.).
- Characterize passage-associated mortality, migration delay, and sub-lethal effects on American shad at hydroelectric dams.
- Conduct studies of river herring egg and larval survival and development.
- Identify directed harvest and bycatch losses of American shad in ocean and bay waters of Atlantic Maritime Canada.
- Spatially delineate between mixed stock and Delaware stock areas within the Delaware system.

Low Priority

- Characterize tributary habitat quality and quantity for *Alosa* reintroductions and fish passage development.
- Evaluate and ultimately validate large-scale hydroacoustic methods to quantify American shad escapement (spawning run numbers) in major river systems. Identify how shad respond (attract/repelled) by various hydroacoustic signals.
- Identify and quantify potential American shad spawning and rearing habitat not presently utilized and conduct an analysis of the cost of recovery.
- Conduct studies on energetics of feeding and spawning migrations of shad on the Atlantic coast.
- Encourage university research on hickory shad.
- Conduct studies of shad egg and larval survival and development.
- Conduct and evaluate historical characterization of socio-economic development (potential pollutant sources and habitat modification) of selected shad rivers along the east coast.
- Review studies dealing with the effects of acid deposition on anadromous alosids.

VII. Current State-by-State Implementation of Compliance Requirements

Upon review of the state annual reports, the PRT has determined that all states have fully implemented the required provisions of Amendment 1 to the Shad and River herring Fishery Management Plan. The PRT notes, however, that some states did not document that landings were less than 5% in pounds per trip and some states did not include the Harvest and Loss table as required in Table 10.1 D in Amendment 1.

Maine, New Hampshire and Massachusetts have requested *de minimis* status for 2008. These states continue to meet the standards for commercial *de minimis* as defined in Amendment 1 and clarified in Addendum I. Qualification for *de minimis* status was calculated by using the highest reported landings for 2007 based upon data from the 2008 State Compliance Reports and the National Marine Fisheries Service. The following states had landings that were reported to be less than 1% of the coast-wide commercial landings for American shad: Maine, New Hampshire, Massachusetts, Rhode Island, Pennsylvania, Maryland, PRFC, D.C., Virginia, and Florida.

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VIII. Recommendations of Plan Review Team

1. The PRT recommends that states requesting additional catch or bycatch allowances be required to implement a survey, if none exists, in order to effectively characterize the fishery in question. Additionally, monitoring programs should be designed in order to adequately assess the impact of the allowances. Any information on the status of the specific fishery should be reviewed annually.
2. The PRT recommends that states consider recommendations from the most recent Shad stock assessment (Volume 1, “*Recommendations for Fisheries and Fisheries Assessment*”) in their monitoring programs and assessments. This information will be helpful for subsequent stock assessments.
3. Recreational Creel Surveys are to be completed once every five years. The PRT requests that states include the year of the most recent creel survey and any plans for future surveys in the annual report. If creel surveys are not complete the PRT requests that states include MRFSS (or MRIP, once it is available) reporting, despite the known limitations of MRFSS system. States can qualify the MRFSS reporting with the following statement, if they choose:

“Data collected by MRFSS for recreational alosine fisheries are unreliable due to the current survey design that focuses on active fishing sites along coastal and estuarine areas. Error associated with data on harvest, catch, and effort is often high.”

4. The PRT recommends increased communication between state shad and river herring technical committee members and Atlantic sturgeon technical committee members to better facilitate accurate reporting of Atlantic sturgeon bycatch. Amendment 1 requires that all states report any estimates of Atlantic sturgeon bycatch in their shad and river herring fisheries.
5. The PRT recommends that states report absence of fisheries in state waters rather than omitting these fisheries from the compliance report, in order to prevent mistaken compliance issues (e.g. reporting of hickory shad).
6. Several of the states did not report all of the monitoring requirements listed under Amendment 1, Technical Addendum #1, and Addendum I. The states should take note of the required monitoring programs that were not reported and make concerted effort to report all monitoring programs in forthcoming annual reports.
7. The PRT recommends that river herring fisheries should be closely monitored and characterized in the subsequent years to assist with the current river herring stock assessment. Amendment 1, though focused on American shad monitoring programs, requires states to report any available fishery-dependent and independent information for river herring and recommends, if no information is available, that states initiate fishery-

dependent and independent monitoring programs for river herring in various river systems according to tables 4, 5, and 6 in Amendment 1 to the Interstate Fishery Management Plan for Shad and River Herring. States should also report landings (in pounds) of river herring from their fisheries if available.

8. Amendment 1 requires each state report to include a Harvest and Losses Table. Many of the states followed the PRT’s request from the 2006 PRT Report and included this table in their compliance report. The PRT requests that all states include this table in their 2008 compliance report even it there is no information. According to Amendment 1, Table 10 “Format Required for Annual State Report,” the Harvest and Losses Table should have the following information:

D. Table 1. Harvest and Loss – including all above estimates in numbers and weight (pounds) of fish and mean weight per fish for each gear type.
An example of the format for the table would be:

Harvest and Losses	Number	Weight (pounds)	Mean weight per fish (pounds)
Commercial			
Gear			
Set Gill Nets			
Drift Gill Nets			
Recreational			
Gear			
Hook and Line			
Fish Passage Mortality			
Discarded Males			
Brood Stock Capture			
Research Losses			

APPENDIX A

STATE-BY-STATE REPORT

MAINE

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Maine has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

De minimis

The State of Maine requests *de minimis* for the commercial fishing year 2008.

Comments or trends highlighted in state report:

- Maine completed additional fishery-independent work on the Kennebec River, namely calculating a juvenile abundance index as well as performing a hatchery evaluation. A hatchery evaluation was also completed for the Androscoggin River.
- The CPUE for American shad was the second highest on record for the Eastern River, the second highest on record for Merrymeeting Bay and the third highest on record for the Abadagasset River.
- In 2007 the average alewife CPUE values were below average for all river segments with the exception of the Lower Kennebec. The average blueback herring CPUE values were below average for all river segments, with the exception of the Cathance River which was the second highest on record.

Sturgeon bycatch report:

There was no known bycatch of Atlantic or shortnose sturgeon within the recreational fishery.

NEW HAMPSHIRE

New Hampshire has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

De minimis:

The State of New Hampshire requests *de minimis* for the commercial fishing year 2008.

Comments or trends highlighted in state report:

- The year 2007 catch curve analysis was not conducted due to no returns. Regardless, NHF&G does not place a high level of confidence in any of the estimates of total mortality because of low sample sizes.

Sturgeon bycatch report:

No protected species were reported taken as bycatch from New Hampshire's coastal harvest program.

MASSACHUSETTS

The Commonwealth of Massachusetts has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

De minimis:

The Commonwealth of Massachusetts requests *de minimis* for the commercial fishing year 2008.

Comments or trends highlighted in state report:

- High waters levels in 2005 and 2006 at the Essex Dam fish-lift in Lawrence caused the closure of the lift, which severely limited counts and collections. In 2007 the counts had increased but were still the lowest on record in the past decade (not including counts during 2005 and 2006). Water flow was higher at the commencement of the 2007 run than in 2006. Water temperatures were cooler than in 2006.
- In 2007, adult shad entering the fish lift in Lawrence were far less ripe throughout the run, and mortality of adults was higher in the hatchery following hormone (Luteinizing Releasing and Salmon Gonadotropin Releasing) injection. Of the 3.8 million eggs produced in 2007 there was only 20% viability, down from 50% the previous year.
- In response to recent drastic declines of many river herring spawning runs a harvest moratorium was enacted and the harvest, possession, or sale of river herring in the Commonwealth of Massachusetts or in the waters under the jurisdiction of the Commonwealth by any person is prohibited through 2008.
- Landing of American shad by net is illegal in MA but the report does indicate that 44 pounds of American shad were landed illegally in this fishery in 2007, down from 100 pounds in 2006.

Sturgeon bycatch report:

No legal citations or data of unusual circumstances were reported by DFWELE in 2007. No information was included from other sources (i.e. NOAA observers or inshore trawl surveys)

RHODE ISLAND

Rhode Island has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- Geometric mean of the CPUE was the third highest reported since 1999.

Unreported information:

- The Harvest and Loss Table was not reported as required in Table 10 1.D of Amendment 1. This is the third reported year this information has been omitted.
- Amendment 1 requires that each state annually document that the American shad ocean bycatch did not exceed 5% of the total landings (in pounds) per trip. The State of Rhode Island does not include this information in the compliance report. "Data is not available but considered to be negligible." However, NMFS indicates 783 pounds of American shad were landed in 2007.

Sturgeon bycatch report:

During the 2007 season, the NMFS observer program monitored catches from trawl and gillnet surveys in Rhode Island waters and 10 Atlantic sturgeon were sampled, up from none the year before.

Portions of this report were taken from 2006 State annual reports, the ASMFC FMP for Shad and River Herring, the ASMFC report *American shad and Atlantic Sturgeon Stock Assessment Peer Review: Terms of Reference and Advisory Report*, the ASMFC Amendment 1 to the ISFMP for Shad and River Herring, and the ASMFC report *American Shad Stock Assessment Report for Peer Review*.

CONNECTICUT

Connecticut has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- The number of fish lifted at the Holyoke Dam in 2007 was up from 2005 and 2006, but is the third lowest number of fish lifted in the last 10 years.
- Age structure of the 2007 run suggests that five-year-old fish from the 2005-year class dominated the run for males and six-year-old fish from the 2001-year class dominated the run for females.
- The 2007 landings and net days are the second lowest recorded since 1990 in the in-river commercial gill net fishery.
- No bycatch of American shad was reported in any of the commercial fisheries logbooks submitted to Connecticut DEP for 2007.

Sturgeon bycatch report:

18 sturgeon (unknown Atlantic or shortnose) were reported caught and released by American shad fishermen in 2007.

NEW YORK

New York has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments and trends highlighted in state report:

- There was an increase in shad and herring gill net licenses, which reflects the increase in purchases by individuals fishing for bait, primarily river herring.
- American shad in the Hudson River Estuary are becoming smaller caused by poor recruitment from very weak year classes.
- Total mortality calculated from catch curve analysis decreased slightly for both males and females from 2006.
- The next scheduled creel survey will be in 2009

Unreported information:

- In 2007 the sample size of observed commercial catch was too small to report an accurate sex ratio.
- Scales from the commercial catch as well as the fishery-independent monitoring are being aged.
- Amendment 1 requires that each state annually document that the American shad ocean bycatch did not exceed 5% of the total landings (in pounds) per trip. The State of New York did not include this information in the compliance report. This information is compiled by the National Marine Fisheries Service from their weigh-out database. Requests for landings and vessel trip report data are still pending at NMFS. Data will be reported when received.

Sturgeon bycatch report:

No Atlantic sturgeon were reported caught and released as incidental bycatch in the American shad in-river gill net fishery in 2007.

NEW JERSEY

New Jersey has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- The JAI survey in the upper Delaware will be discontinued in 2008 as a cost cutting measure and approved by the TC. The JAI survey in the lower Delaware will continue.
- The American shad JAI in both the upper and lower Delaware were the second highest on record and the alewife JAI was the fifth highest on record.
- The JAI for blueback herring was well below average for the second year in a row. If the 2008 survey shows another year of declining blueback production, discussions may be necessary for potential recovery plans.
- This was the final year of hydroacoustic sampling due to controversies surrounding the reliability of the estimates.
- In 2007, seven fishermen reported landings of American shad during fifty-nine trips in the coastal gill net fishery for a total of 3,732 pounds. Only two of these trips reported levels of American shad harvest over the five percent trip limit. American shad harvested in these two trips totaled 72 pounds. The Bureau of Law Enforcement has been notified of the situation and additional discussion with commercial fishermen should rectify the situation in the future.

Unreported information:

- No age estimates were provided.

Sturgeon bycatch report:

Bycatch reporting of Atlantic sturgeon remains on a voluntary basis. According to logbooks collected from six commercial shad fishermen there were 79 Atlantic sturgeon caught as bycatch in 2007 (58 in coastal waters and 19 in Delaware Bay). This data was extrapolated to the entire fishery for 2007 and a total estimate of Atlantic sturgeon caught as bycatch. This number is considered an underestimate.

PENNSYLVANIA

Pennsylvania has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- The number of American shad counted at the Conowingo Dam fish passage (combined East and West lift) on the Susquehanna River was the lowest on record for the past ten years. The number of American shad counted at Holtwood and Safe Harbor fish passage facilities on the Susquehanna River was the second lowest on record and the lowest on record for the York Haven fish passage facility.
- Two 9-year old females were reported (via otoliths) on the Delaware River at Smithfield Beach.
- The male to female ratio of American shad was the highest on record in the Lehigh River below the Chain Dam in the last ten years.

Unreported information:

- Information on juvenile American shad geometric mean and the percent marked hatchery juveniles from the Lehigh River in 2007 was not included. This is the fifth year this information was not provided.

Sturgeon bycatch report:

No take of Atlantic sturgeon was known to occur in the Susquehanna, Delaware or Lehigh Rivers in 2007.

DELAWARE

Delaware has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- The total pounds of American shad landed in commercial gill net fisheries in the Delaware River and Bay increased nearly 54% from 2006, with effort remaining similar.
- The Nanticoke River has shown substantial increases of American shad since restoration efforts began in 1999. Hatchery contribution represented approximately 13% of the catch of adults.
- Annual abundance of YOY alewife remained relatively low for the Delaware Bay and River in 2007. Abundance of age one alewife remained at low levels.
- There was only two YOY blueback herring taken in the Delaware Estuary in 2007 resulting in a low geometric mean.

Unreported information:

- Amendment 1 requires that each state annually document that the American shad ocean bycatch did not exceed 5% of the total landings (in pounds) per trip. The State of Delaware reported in 2007 that “it is possible that there may have been some American

shad caught as bycatch” in the striped bass ocean fishery, but this is the only information provided.

Sturgeon bycatch report:

Some 26% of commercial gill netters (striped bass, American shad and weakfish) submitted voluntary logbooks and reported 122 Atlantic sturgeons caught as bycatch. Expansion to the entire fishery yielded a total estimate of 386 Atlantic sturgeon caught as bycatch. Only one mortality was recorded.

MARYLAND

Maryland has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- Angler logbooks indicate that Susquehanna River American shad recreational CPUE in 2007 was 2.99, up from 0.91 in 2006. Creel survey CPUE was 1.19 down from 2006 (1.34).
- In 2007, Juvenile American shad from the Patuxent, Choptank and Nanticoke Rivers were comprised of 94%, 84% and 84% hatchery fish, respectively.
- American shad JAI from the Chesapeake Bay and Potomac River have increased linearly since 1980, show no trend on the Nanticoke River and increased on the Patuxent River.
- The age structure of American shad from the Conowingo Dam was dominated by the 2003 year-class.
- Abundance of American shad at the Conowingo Dam has decreased since 2001.

Unreported information:

- Although presented in other forms, the Harvest and Loss Table was not reported as required in Table 10 1.D of Amendment 1. This is the third year this information has been omitted.

Sturgeon bycatch report:

The Atlantic sturgeon bycatch for Maryland’s American shad ocean intercept fishery was zero since this fishery was closed in 2005.

POTOMAC RIVER FISHERIES COMMISSION

The Potomac River Fisheries Commission has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- No significant changes in the Potomac River recreational or charter boat regulations for shad or river herring occurred in 2007.
- Regulations for 2007 commercial fishing allowed pound nets a tolerance of 2% by volume of the total catch in possession, not to exceed one standard bushel per licensee, of

Portions of this report were taken from 2006 State annual reports, the ASMFC FMP for Shad and River Herring, the ASMFC report *American shad and Atlantic Sturgeon Stock Assessment Peer Review: Terms of Reference and Advisory Report*, the ASMFC Amendment 1 to the ISFMP for Shad and River Herring, and the ASMFC report *American Shad Stock Assessment Report for Peer Review*.

American or hickory shad, and for gill nets a tolerance of one standard bushel per licensee of American or hickory shad.

- The commercial harvest of river herring in 2007 was slightly lower than the 2006 level, which was previously the lowest value on record.
- The American shad and alewife juvenile indices were slightly higher in 2007.

Unreported information:

- No age/length data is available on American shad bycatch in the pound and gill net fishery.

Sturgeon bycatch report:

In 2007, there were 36 live sturgeon caught by commercial fishermen in the Potomac River and reported to the USFWS. All except one of the fish were released which was kept by Maryland DNR.

DISTRICT OF COLUMBIA

The District of Columbia has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- There were no significant changes in monitoring, regulations or harvest for the 2007 fishing season.
- Currently the angler creel survey is being modified to specifically target species of interest including American shad and river herrings and will be implemented for the 2009 fishing season.
- The Districts recreational fishery remained closed for 2007, however the Division is considering a limited season for American and hickory shad beginning in 2009.
- The District of Columbia released 963,600 American shad fry into the Anacostia River. These fish were not marked with oxytetracycline, as required by Addendum 1 to Amendment 1. In 2008, Division staff at the Aquatic Resources Education Center will begin marking American shad fry with OTC. For the first time in 100 years the 2007 spawning alosids had access to all of the 32 stream miles within Rock Creek.

Unreported information:

- No direct estimates of losses in any of the fisheries.
- No aging, estimates of repeat spawning or annual mortality rate was determined. This is the third time in four years this information was not included.
- The Harvest and Loss Table was not reported as required in Table 10 1.D of Amendment 1. This is the first year this information has been omitted.

Sturgeon bycatch report:

There were no documented sturgeon captures reported in the District of Columbia during 2007.

VIRGINIA

Virginia has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments or trends highlighted in state report:

- Bycatch harvests of American shad totaled 271 fish, equal to an estimated 1,166 pound and this number is considerably less than expected from an earlier projection based on 1993 effort and harvest data.
- As in previous year of monitoring, numbers and catch rates of males were lower than catch rates of females throughout the period. The monitoring gear mimics an historical fishery, which selects for mature female fish.
- The assessment of the James River found that the stock remains at a low level of abundance but is slowly recovering. An increase in the proportion of younger year classes entering the monitoring gear was observed in 2006 and 2007.
- The assessment for the York River found that the stock is recovered to a level close to its average abundance during the 1980's, but is still well below the proposed 1950's target when abundance was higher and harvest was apparently sustainable. The proportion of older females increased in 2007 and resulted in an increase in the mean age of females.
- There is little evidence of severe stock decline in the Rappahannock River, although such a decline was reported in the most recent stock assessment. Recruitment has increased in recent years. There is uncertainty about what an appropriate target level should be for this stock.

Sturgeon bycatch report:

No data are available from any offshore fishery. Atlantic sturgeon is taken as bycatch in the staked gill nets used to monitor abundance of adult American shad in three rivers: the James, York and Rappahannock. The number of Atlantic sturgeon captured in the James River in 2007 was 30. Most fish are taken in the James River. The number of Atlantic sturgeon taken in the York and Rappahannock was not provided.

NORTH CAROLINA

North Carolina has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments and trends highlighted in state report:

- Effective 2007, NC implemented a no harvest provision for river herring, commercial and recreational.
- The Albemarle Sound area accounted for 70.4% of the states total shad harvest, contributing the highest percentage of the in-river fisheries. Gill nets contributed the highest percentage of any commercial gears to the overall harvest.
- The recreational hook and line fishery for American shad was assessed on the Neuse River in 2007. A total catch of 303 fish was reported with no harvest. There was found to be low recreational effort, catch and harvest suggesting a limited in-river fishery for this species.

- Scales from a single 9-year old fish were doubled checked and indeed indicated that the fish had entered fresh water 7 times.
- In the required fisheries independent monitoring, the CPUE increased on the Roanoke River, was similar to previous years in the Neuse River and decreased in the Cape Fear River and the Tar River (although the 2007 Tar River monitoring was performed under variable flow conditions).
- The majority of males from the Roanoke and Cape Fear River were from the 2003-year class (age 4) and females were from the 2002-year class (age 5). In the Tar River the majority of males were from the 2002-2003 year classes the majority of females were from the 2001-2002 year classes. In the Neuse River, for fish aged 3-5 males were more abundant, while females were more abundant for age classes older than five.

Sturgeon bycatch report:

In 2007, no Atlantic sturgeon bycatch was recorded from the spring commercial shad gillnet fishery in the Albemarle Sound area. The Division's independent gillnet survey captured 5 Atlantic sturgeon in the mesh sizes allowed in the commercial fishery. Based on contact with fishermen, no Atlantic sturgeon bycatch was recorded from the commercial shad fishery in the Pamlico Sound area. One Atlantic sturgeon was captured in the Division's independent gill net survey in Pamlico Sound in April.

SOUTH CAROLINA

South Carolina has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments and trends highlighted in state report:

- The sample site selected for 2007 sampling differed from the site used in previous sampling efforts for the Edisto River because numerous longnose gar were being incidentally caught at the previous site and caused the net to become very inefficient. Similar results occurred in 20007 and the decision has been made to sample the Santee River in 2008 as a reference river and rely on commercial catch records for trend data on other rivers in the state.
- South Carolina will begin JAI surveys in 2008 due to concern over declining trends in some rivers.
- South Carolina will begin hatchery operation/evaluations in 2008 due to concern over declining trends in some rivers.
- The mortality estimate is not considered accurate due to a small sample size

Unreported information:

- No data are available on the composition of American shad bycatch in the Santee River Rediversion Canal fishery for blueback herring, but the potential exists to collect scale samples in the future.
- Biologists did not take scale samples in 2007 from fish to be tagged from the Edisto River over concern for pre and post-release mortality.

Sturgeon bycatch report:

In 2007, 168 Atlantic sturgeons were reported as bycatch from the shad gill net fishery. The majority was reported in the Santee River (162). Additionally, 25 shortnose sturgeon were reported as incidental catches in 2007 (16 from the Savannah River and 9 from the Santee River). No sturgeon were reported from the herring fisheries.

GEORGIA

Georgia has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments and trends highlighted in state report:

- In 2007 the commercial shad (American and hickory) season on the portion of the Savannah River above the I-95 bridge in Georgia waters was extended to April 15th to coincide with closing of the season in the South Carolina portion of this segment of the river.
- The exploitation rate of American shad in the Altamaha River during 2007 was well below the overfishing rate (24%/41%) and a similar rate is assumed in the Savannah River as well by DNR.

Sturgeon bycatch report:

A total of 13 shortnose sturgeon and 2 Atlantic sturgeon were captured and released alive in the Altamaha River American shad set-net fishery in 2007. During 20 field days of tagging adult American shad by DNR staff in 2007, 8 shortnose sturgeon and 5 Atlantic sturgeon were captured in drift gill nets and released alive.

FLORDIA

Florida has implemented and enforced the required provisions of Technical Addendum #1 and Amendment 1 to the Shad and River Herring Fishery Management Plan.

Comments and trends highlighted in state report:

- The American shad juvenile geometric mean CPUE was 1.49, which was similar to the previous four years. American shad electrofishing CPUE was been low in the “Creel Area” for four out of the last five years with the preponderance of the catch coming from the upstream area.
- There is no evidence of repeat spawning.

Unreported information:

- The Harvest and Losses Table was not reported as required in Table 10 1.D of Amendment 1. This is the third year this information has been omitted.
- Aging has not been completed.
- Data are not available to estimate mortality.

Sturgeon bycatch report:

No netting is allowed for shad, so sturgeon bycatch is probably zero.