

*Atlantic States Marine Fisheries Commission*

**PUBLIC INFORMATION DOCUMENT**

**For Amendment 2 to the  
Interstate Fishery Management Plan  
For**

**SHAD AND RIVER HERRING**



*ASMFC Vision Statement:  
Healthy, self-sustaining populations for all Atlantic coast fish species or successful  
restoration well in progress by the year 2015.*

**November 2007**

**\*\*\*THE DATES IN TABLE 2 HAVE BEEN CORRECTED SINCE THE DOCUMENT  
WAS POSTED ON NOVEMBER 9, 2007.  
THE TITLE OF FIGURE 1 HAS BEEN CORRECTED SINCE THE DOCUMENT WAS  
POSTED ON NOVEMBER 9, 2007 \*\*\***

## **PUBLIC COMMENT PROCESS AND PROPOSED TIME LINE**

The public is encouraged to submit comments regarding this document during the public comment period. Comments will be accepted until **5:00 p.m. (EST) on January 28, 2008**. Regardless of when they were sent, comments received after that time will not be included in the official record. The Shad and River Herring Management Board will use public comment on this Public Information Document to develop the first draft of Amendment 2 to the Shad and River Herring Fishery Management Plan.

You may submit public comment in one or more of the following ways:

1. Attend public hearings held in your state or jurisdiction
2. Refer comments to your state's member on the Shad and River Herring Management Board or Advisory Panel, if applicable
3. Mail, fax, or email written comments to the following address:

Erika Robbins  
Fishery Management Plan Coordinator  
Atlantic States Marine Fisheries Commission  
1444 Eye Street NW, 6<sup>th</sup> Floor  
Washington, DC 20005  
Fax: (202) 289-6051  
[comments@asmfc.org](mailto:comments@asmfc.org) (subject line: River Herring)

If you have any questions please call Erika Robbins at (202) 289-6400.

**Tentative Timeline for Amendment 2 Completion**

|   | Oct 2007 | Nov 2007 | Dec 2007 | Jan 2008 | Feb 2008 | Mar 2008 | Apr 2008 | May 2008 | Jun 2008 | Jul 2008 | Aug 2008 | Sep 2008 | Oct 2008 | Nov 2008 | Dec 2008 | Jan 2009 |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Approval of Draft PID by Management Board   | X        |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| Public review and comment on PID  |          | X        | X        | X        |          |          |          |          |          |          |          |          |          |          |          |          |
| Board review of public comment; Board direction on what to include in Draft Amendment 2 |          |          |          |          | X        |          |          |          |          |          |          |          |          |          |          |          |
| Preparation of Draft Amendment 2  |          |          |          |          | X        | X        | X        |          |          |          |          |          |          |          |          |          |
| Review and approval of Draft Amendment 2 by Management Board                            |          |          |          |          |          |          |          | X        |          |          |          |          |          |          |          |          |
| Public review and comment on Draft Amendment 2  |          |          |          |          |          |          |          | X        | X        | X        | X        | X        |          |          |          |          |
| Board review of public comment on Draft Amendment 2                                     |          |          |          |          |          |          |          |          |          |          |          |          | X        |          |          |          |
| Preparation of Final Amendment 2  |          |          |          |          |          |          |          |          |          |          |          |          |          | X        | X        |          |
| Review and approval of the final Amendment 2 by the Board, Policy Board and Commission  |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          | X        |

**TABLE OF CONTENTS**

*Tentative Timeline for Amendment 2 Completion*..... 3

*Introduction*..... 5

*Management Issues*..... 5

*The Process* ..... 6

*Purpose of the Public Information Document*..... 6

*Background* ..... 7

*Description of the Resource*..... 8

*Description of the Fishery* ..... 8

**Commercial Fishery** ..... 9

**Recreational Fishery** ..... 14

**Subsistence Fishing** ..... 14

*Status of the Stock*..... 15

*Public Comment Issues*..... 18

**Issue 1. Reducing Commercial Fishing Mortality on River Herring**..... 18

        Problem Statement.....18

        Management Options.....19

**Issue 2. Recreational Fishing for River Herring**..... 19

        Problem Statement.....19

        Management Options.....19

*Recommendations for Actions in Federal Waters* ..... 20

*References* ..... 21

## SHAD AND RIVER HERRING PUBLIC INFORMATION DOCUMENT FOR AMENDMENT 2

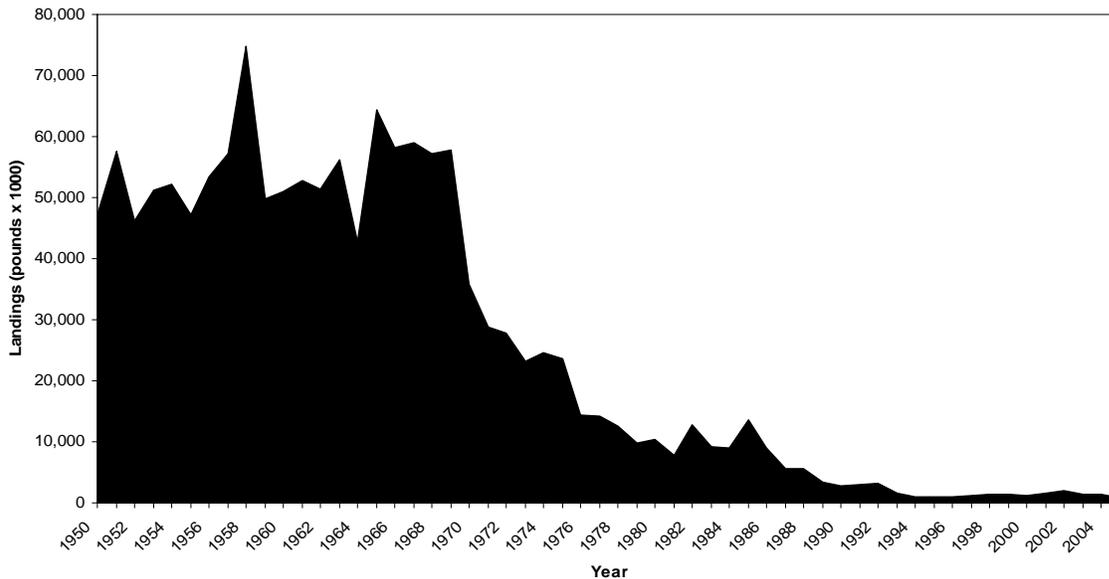
### Introduction

The Atlantic States Marine Fisheries Commission (Commission) is developing an amendment to its Interstate Fishery Management Plan for Shad and River Herring (FMP) under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). Shad and river herring management authority lies with the coastal states and is coordinated through the Commission. Responsibility for compatible management action in the Exclusive Economic Zone (EEZ) from 3-200 miles from shore lies with the Secretary of Commerce through ACFCMA in the absence of a federal FMP.

### Management Issues

Many populations of blueback herring (*Alosa aestivalis*) and alewife (*Alosa pseudoharengus*), collectively known as river herring, have faced anthropogenic threats since colonial times, including fishing (commercial and recreational) and habitat loss and degradation (e.g., dam construction, siltation, pollution). Currently, many populations of river herring along the Atlantic coast are in decline or are at depressed but stable levels (Crecco and Gibson 1990); however, lack of fishery-dependent and independent data make it difficult to ascertain the status of river herring stocks coastwide. Based on available landings records from the National Marine Fisheries Service (NMFS), commercial landings dropped from 13.6 million pounds in 1985 to 1.33 million pounds in 2004, a difference of 90% (Figure 1; NMFS, Fisheries Statistics Division, Silver Spring, MD, pers. comm.). In 2006, Commission member states reported river herring landings of approximately 1.4 million pounds (Table 1).

**Figure 1.** Total (in-river and ocean) commercial landings of river herring for the U.S. East Coast, 1950-2005 (NMFS, Fisheries Statistics Division, Silver Spring, MD, pers. comm.).



**Table 1.** State-reported commercial landings of river herring for the year 2006 (Source: state compliance reports to ASMFC).

| <u>State</u>   | <u>Landings (lbs)</u> |
|----------------|-----------------------|
| Maine          | 1,178,758             |
| New Hampshire  | 1,717                 |
| New York       | 9,748                 |
| Delaware       | 3,355                 |
| PRFC           | 6,819                 |
| North Carolina | 109,243               |
| South Carolina | 82,798                |
| <b>Total</b>   | <b>1,392,438</b>      |

In response to declining river herring stocks within their own waters, four states—Massachusetts, Rhode Island, Connecticut, and North Carolina—have closed their river herring fisheries. River herring stocks are a multi-jurisdictional resource both while in-river (e.g., Connecticut River, Roanoke River) and in the ocean. Concerns have risen over the status of river herring stocks and their management coastwide. Questions regarding the level of fishing mortality and whether it is low enough to ensure survival and enhancement of depressed stocks or the maintenance of presently stable stocks have been introduced. This document has been developed to address those concerns by seeking comment on regulations to control the harvest of river herring.

### **The Process**

The publication of this document and announcement of the Commission’s intent to amend the existing Shad and River Herring FMP is the first step of the formal amendment process. Following the initial phase of information gathering and public comment, the Commission will evaluate potential management alternatives and the impacts of those alternatives. The Commission will then develop a Draft Amendment to the FMP with the management measures identified for public review. Following that review and public comment, the Commission will specify the management measures to be included in the new amendment. A tentative schedule for the completion of Amendment 2 is included at the beginning of this document. Please note that these dates are subject to change.

This is your opportunity to inform the Commission about: changes observed in the fishery; actions you feel should or should not be taken in terms of management, regulation, enforcement, research, development, and enhancement; and any other concerns you have about the resource or the fishery, as well as reasons for your concerns.

### **Purpose of the Public Information Document**

The purpose of this document is to inform the public of the Commission’s intent to gather information concerning the river herring fishery and to provide an opportunity for the public to identify major issues and alternatives relative to the management of river herring. Input received at the start of the amendment development process can have a major influence in the final outcome of the amendment. The purpose of this document is to draw out observations and suggestions from fishermen, the public, and other interested parties, as well as any supporting documentation and additional data sources. To facilitate

public input, this document provides a broad overview of the issues facing river herring populations and the fishing industry, as well as a wide range of potential management measures that may impact the stocks and dependent fisheries.

## **Background**

Migratory stocks of shad and river herring have been managed under the Commission's FMP since 1985. These alosine species are currently managed under Amendment 1 to the FMP, Technical Addendum #1, and Addendum 1. The Goal of Amendment 1 is to protect, enhance, and restore East Coast migratory spawning stocks of American shad (*Alosa sapidissima*), hickory shad (*Alosa mediocris*), and river herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. To achieve this goal, the plan adopts the following objectives:

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. This should keep fishing mortality sufficiently low to ensure survival and enhancement of depressed stocks and the maintenance of stabilized stocks.
4. Promote improvements in degraded or historic alosine habitat throughout the species' range.
5. Establish criteria, standards, and procedures for plan implementation as well as determination of states' compliance with management provisions.

The management unit for shad and river herring is all migratory American shad, hickory shad, blueback herring, and alewife stocks of the East Coast of the United States.

Amendment 1 considers American shad overfished if it exhibits a fishing mortality rate at or above  $F_{30}$ . No overfishing definitions were developed for hickory shad or river herring.

The Amendment focuses primarily 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.

The goal of the monitoring programs is 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 fisheries for hickory shad and river herring.

Amendment 1 contains three primary regulatory requirements. The first is a closure of the ocean-intercept fishery, which occurred on December 31, 2004. The second requirement established a fishing mortality target for in-river fisheries and called for the maintenance of existing or more conservative regulations for river herring and hickory shad. Lastly, the Amendment implemented an aggregate 10-fish daily creel limit in recreational fisheries for American and hickory shad, with all jurisdictions maintaining existing or more conservative recreational regulations for river herring.

Technical Addendum #1 and Addendum I clarify and update the monitoring requirements contained within Amendment 1.

## **Description of the Resource**

Alewife and blueback herring (collectively termed *river herring* because fishermen do not distinguish between them) are relatively small, anadromous fish, spending their adult lives at sea, returning only to freshwater areas to spawn in the spring. Alewife spawn in rivers and tributaries from northeastern Newfoundland to South Carolina, but are most abundant in the mid-Atlantic and northeastern states. Blueback herring spawn from Nova Scotia to northern Florida, but are most numerous in warmer waters from Chesapeake Bay south. When they migrate to rivers to spawn, river herring generally return to the their river of origin; the mechanism for this process is called natal homing. For this reason, each river with a river herring population is considered a distinct stock.

The onset of spring spawning is related to temperature and thus, varies with latitude. Alewife spawn in a diversity of habitats including large rivers, small streams, ponds, and large lakes over a range of substrates such as gravel, sand, detritus, and submerged vegetation. Blueback herring prefer to spawn in swift flowing sections of freshwater tributaries, in channel sections of fresh and brackish tidal rivers, and in Atlantic coastal ponds over gravel and clean sand substrates, especially in northeastern rivers where alewife and blueback herring co-exist. In southeastern rivers where alewife are few, blueback herring exhibit more variety in their spawning sites including shallow areas covered with vegetation, rice fields, swampy areas, and small tributaries upstream from the tidal zone.

Mature river herring broadcast their eggs and sperm simultaneously into the water column and over the substrate. Immediately after spawning, adults migrate rapidly downstream. Larvae begin to feed externally three to five days after hatching and transform gradually into the juvenile stage. Juveniles remain in freshwater nursery areas during the spring and early summer, feeding mainly on zooplankton. As water temperatures decline in the fall, juveniles move downstream to more saline waters and eventually to the sea. Little information is available on the life history of sub-adult and adult river herring after they immigrate to the sea as young-of-year or yearlings, and before they mature and return to freshwater to spawn.

## **Description of the Fishery**

River herring formerly supported important commercial and recreational fisheries along the entire Atlantic coast; however, these fisheries have declined dramatically. Two types of fisheries have exploited spring spawning migrations of river herring: in-river and ocean-intercept. In-river fisheries only exploit the stock native to that system, whereas ocean-intercept fisheries exploit mixed stocks of different river origins.

River herring are traditionally caught with gillnets, dip nets, and seines. Some in-river fisheries operate at the base of spillways where river herring are aggregated while waiting to ascend fish ladders or where their upstream progress is retarded by dams. River herring have reportedly been harvested incidentally from the ocean in gear targeting Atlantic herring and Atlantic mackerel, although such harvest largely goes unreported.

Catch statistics for both ocean-intercept and in-river fisheries on the Atlantic Coast are compiled by the NMFS and state agencies for both commercial and recreational fisheries; however, there are data gaps in these records. It is important to note that harvest from fishers operating in-river or from fishers that are not federally licensed might not be reported to the NMFS.

## Commercial Fishery

Total commercial landings of river herring from the Gulf of Maine to Florida were approximately 10.5 million pounds in 1980 (NMFS, Fisheries Statistics Division, Silver Spring, MD, pers. comm.). Yet by 1992, total landings decreased to 3.2 million pounds and in 2005 they only equaled 732,979 pounds (Data from the NMFS for 2006 landings are incomplete). State-reported river herring commercial landings have been steadily decreasing from a high of 13.7 million pounds in 1985 to approximately 760,000 pounds in 2005. In 2006, state-reported landings equaled 1,358,262 pounds.<sup>1</sup>

From 1980 through 2006, North Carolina (62%), Maine (18%), and Virginia (13%) have accounted for the majority of total coastwide landings (Table 2; NMFS, Fisheries Statistics Division, Silver Spring, MD, pers. comm.).<sup>2</sup> River herring fisheries are minimal or non-existent in Pennsylvania, the District of Columbia, Georgia, and Florida. There are currently moratoriums on commercial fishing for river herring in Massachusetts, Rhode Island, Connecticut, and North Carolina (Virginia Division of Game and Inland Fisheries has promulgated regulations that close fisheries for river herring that operate in waters shared with North Carolina). There are many factors influencing the reported commercial river herring landings that might explain the large degree of variability observed in data on a state-by-state basis.

**Table 2.** Total state commercial landings of river herring and proportion of coastwide harvest as reported to the National Marine Fisheries Service, 1980-2006 (NMFS, Fisheries Statistics Division, Silver Spring, MD, pers. comm.).

| <b>State</b>   | <b>Landings (lbs)</b> | <b>Proportion</b> |
|----------------|-----------------------|-------------------|
| Maine          | 20,168,684            | 18.064%           |
| New Hampshire  | 489,315               | 0.438%            |
| Massachusetts  | 1,057,349             | 0.947%            |
| Rhode Island   | 23,939                | 0.021%            |
| Connecticut    | 425,891               | 0.381%            |
| New York       | 391,255               | 0.350%            |
| New Jersey     | 152,775               | 0.137%            |
| Delaware       | 328,525               | 0.294%            |
| Maryland       | 4,749,354             | 4.254%            |
| Virginia       | 13,970,442            | 12.512%           |
| North Carolina | 69,896,286            | 62.601%           |
| Florida        | 352                   | 0.000%            |
| <b>Total</b>   | <b>111,654,167</b>    |                   |

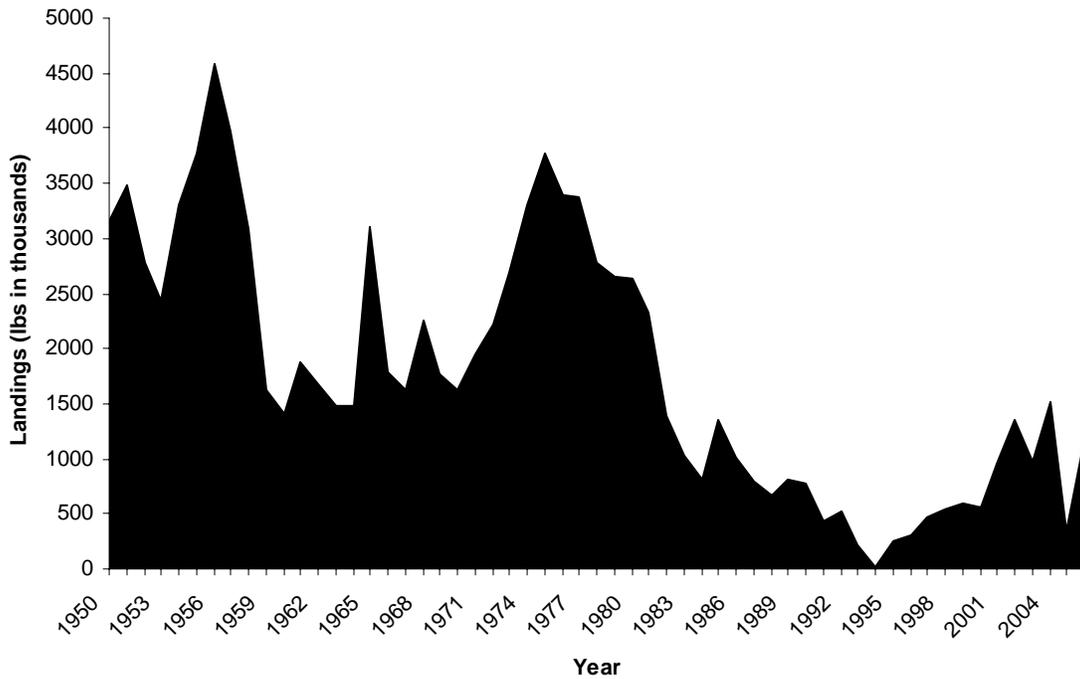
Reliable data on river herring fisheries in the Mid-Atlantic and Southeast regions are scarce. Even so, it has been reported that river herring landings from North Carolina increased from approximately 6.2 million pounds in 1980 to 11.6 million pounds in 1985. However, commercial landings have been rapidly decreasing since then, and by 1996 only 529,474 pounds were reported as harvested. In 2005, North Carolina's river herring landings totaled only 250,021 pounds (Note: North Carolina has been operating

<sup>1</sup> River herring landings data may not accurately represent stock abundance.

<sup>2</sup> Although not reported to the NMFS, SC DNR has records of approximately 7 million pounds of river herring harvested from their waters between 1980 and 2006.

under harvest restrictions since 1995). Similar to North Carolina, Virginia landings increased to a high of 18.4 million pounds in 1983 and continued to decrease to 112,402 pounds in 2006. Since 1976, Maine has been the major contributor to New England river herring landings; however, these numbers have shown a major downward trend since the early 1970s. Maine's reported landings have slightly increased over the last decade. The following series of figures show state commercial landings of river herring as they were reported by the respective jurisdictions to the Commission (Note: time and magnitude vary by state). It is important to note that landings might not be complete, as river herring are retained as bycatch and harvested for bait in other fisheries and are not reported.

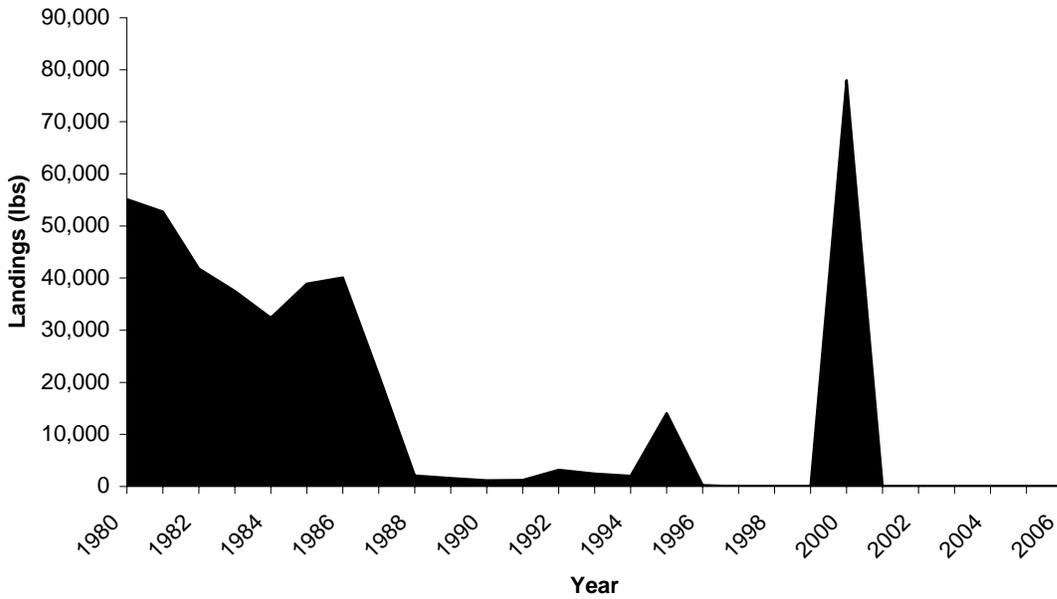
**Figure 2.** Commercial river herring landings in the State of Maine, 1950-2007 (Source: Maine DMR).



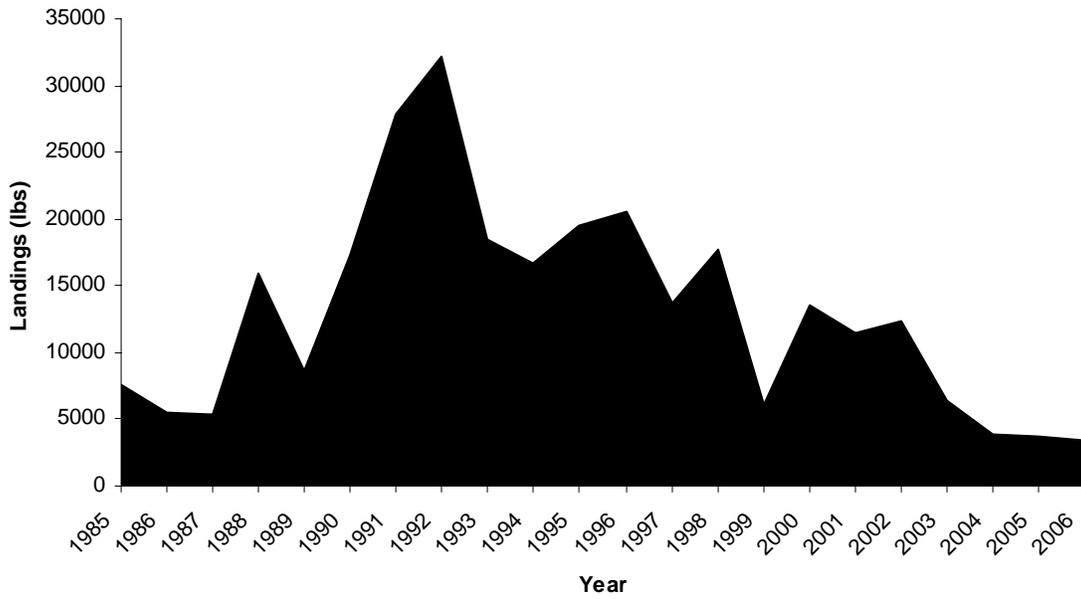
**Figure 3.** Commercial river herring landings in the State of New Hampshire, 1988-2006 (Source: NH F&G).



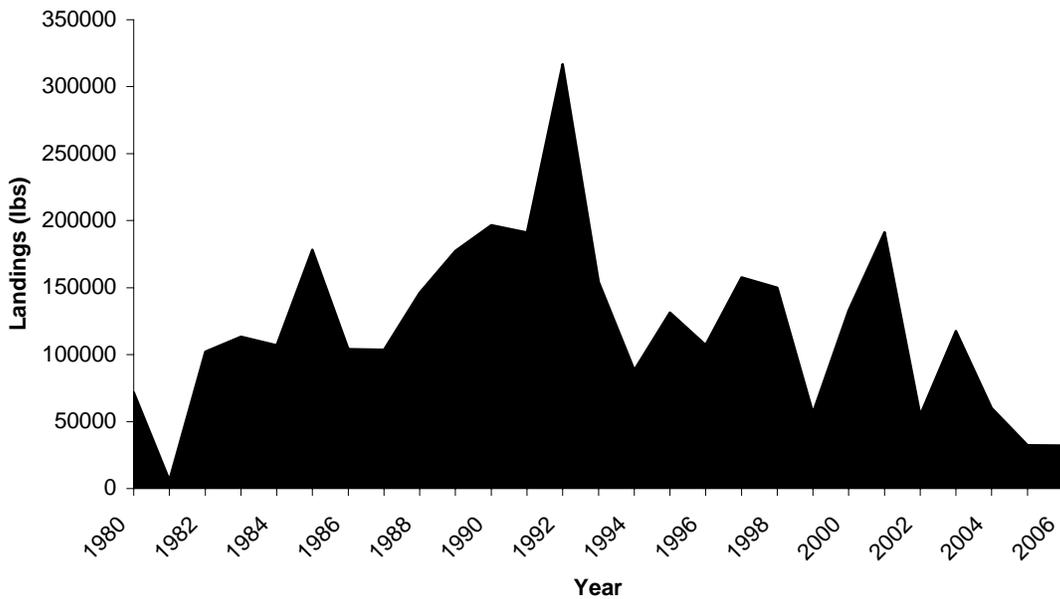
**Figure 4.** Commercial river herring landings in the State of Connecticut, 1980-2006 (Source: CT DEP).



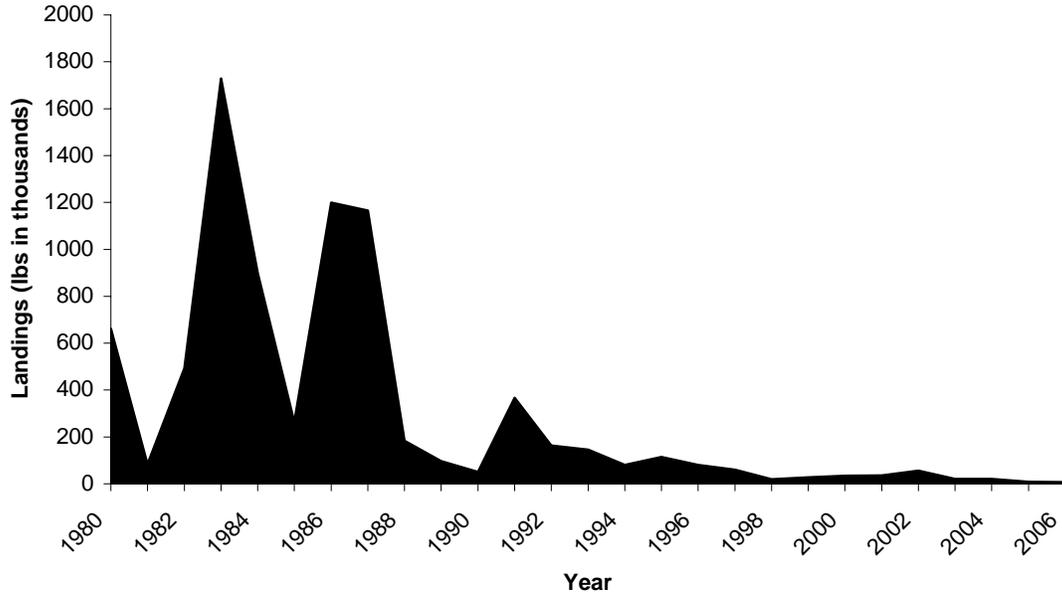
**Figure 5.** Commercial river herring landings in the State of Delaware, 1985-2006 (Source: DE DFW).



**Figure 6.** Commercial river herring landings in the State of Maryland, 1980-2006 (Source: MD DNR). Note: these landings exclude fish landed from the Potomac River.



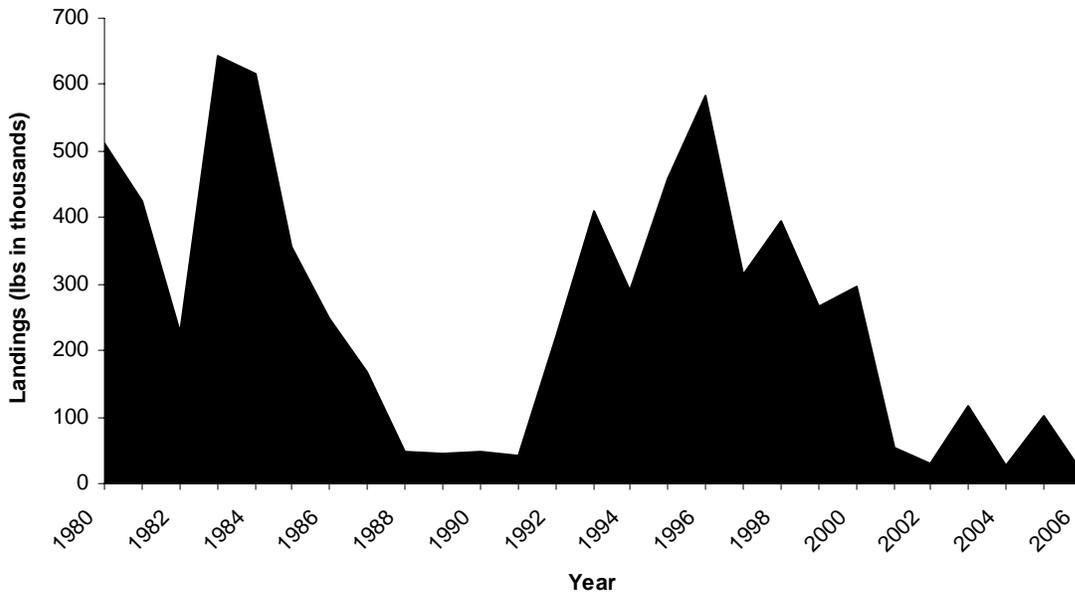
**Figure 7.** Commercial river herring landings from the Potomac River, 1980-2006 (Source: Potomac River Fisheries Commission).



**Figure 8.** Commercial river herring landings in the State of North Carolina, 1980-2006 (Source: NC DMF).



**Figure 9.** Commercial river herring landings from the Santee-Cooper system in South Carolina, 1980-2006 (Source: SC DNR).



The river herring commercial fishery was exclusively a U.S. inshore fishery until the late 1960s when distant-water fleets began fishing for river herring off the mid-Atlantic coast. Commercial ocean harvest of river herring, which includes the harvest of sexually mature and immature fish, occurs as bycatch in other fisheries of various gear types: gill net, bottom otter trawl, mid-water trawl, and purse seine. Much of this incidental catch is utilized, although it goes undocumented or unreported. The NMFS Sea Sampling (Observer) Program estimated harvest and bycatch from a limited number of Atlantic herring trips taken between 2005 and 2007. Observers documented bycatch of river herring to be 41,458 pounds in 2005, 50,681 pounds in 2006, and 121,246 pounds in 2007 (the 2007 value is preliminary as only observed trips from January to April have been recorded in the Observer Database; NEFMC 2006; Steele 2007). Only two states—Maine and North Carolina—landed more river herring than was caught as bycatch in 2005.

***Recreational Fishery***

Recreational fisheries, both coastal and in-river, for river herring are poorly documented and monitored; however, it is believed that extensive recreational fisheries exist for river herring in many rivers along the East Coast and in marine waters. While some are hook-and-line fisheries (e.g., Delaware River), many states permit the use of various types of dip nets and seines by recreational fishers. The total quantity of fish landed by these recreational fishers for personal use (e.g., bait, consumption) is unknown. The majority of these landings are unreported and thus, represent a large potential error in recorded recreational river herring harvests.

***Subsistence Fishing***

There are known subsistence fisheries for river herring, but the extent of effort and harvest is undocumented.

## Status of the Stock

The most recent Commission assessment of river herring stocks occurred in 1990 (Crecco and Gibson 1990). Fifteen stocks were assessed between New Brunswick and North Carolina. The assessment used data on catch-per-unit-effort, age composition, fishing mortality (F), and relative population abundance. The populations were assessed with the Shepherd Stock-Recruitment model. The  $r^2$  produced from the model was highly variable.

The model best described the Lamprey River (NH) alewife population ( $r^2 = 0.75$ ), the St. John River (NB) blueback herring population ( $r^2 = 0.56$ ), the Connecticut River (CT) blueback herring population ( $r^2 = 0.59$ ), and the Damariscotta River (ME) alewife population ( $r^2 = 0.56$ ). The model's poorest fit was for the Chowan River (NC) blueback herring population ( $r^2 = 0.15$ ) and the Annaquatucket River (RI) alewife population ( $r^2 = 0.32$ ).

Five stocks were determined to be overfished: St. John River alewife and blueback herring, Damariscotta River alewife, Potomac River (VA) alewife, and Chowan River alewife. Four stocks were determined to be experiencing recent stock declines, however, they were not overfished: Potomac River blueback herring, Chowan River blueback herring, Nanticoke River (MD) alewife, and Rappahannock River (VA) alewife (Table 3).

**Table 3.** Status of several blueback and alewife runs along the Atlantic coast based on data from the 1990 River Herring Stock Assessment. *Severely Overfished* indicates that  $\mu$  exceeds  $\mu_{coll}$ , *overfished* indicates that  $\mu$  exceeds  $\mu_{msy}$ , *fully exploited* indicates that  $u$  is within 75% of  $\mu_{msy}$ , and *partially exploited* means that  $u$  is less than 75% of  $\mu_{msy}$ .

| <b>River</b>      | <b>Species</b>           | <b>Status</b>                    | <b>Stock Condition*</b> |
|-------------------|--------------------------|----------------------------------|-------------------------|
| St. John, NB      | Alewife                  | Severely Overfished              | Severely Depleted       |
|                   | Blueback Herring         | Overfished                       | No Trend                |
| Damariscotta, ME  | Alewife                  | Severely Overfished              | Severely Depleted       |
|                   | Lamprey, NH              | Alewife                          | Partially Exploited     |
| Herring, MA       | Alewife/Blueback Herring | Partially Exploited              | No Trend                |
| Annaquatucket, RI | Alewife                  | Partially Exploited              | No Trend                |
| Connecticut, CT   | Blueback Herring         | Partially Exploited              | No Trend                |
|                   | Nanticoke, MD            | Alewife                          | Fully Exploited         |
| Blueback Herring  |                          | Partially Exploited              | No Trend                |
| Potomac, VA       | Alewife                  | Severely Overfished <sup>^</sup> | Severely Depleted       |
|                   | Blueback Herring         | Fully Exploited                  | Severely Depleted       |
| Rappahannock, VA  | Alewife                  | Partially Exploited              | Severely Depleted       |
|                   | Blueback Herring         | Partially Exploited              | No Trend                |
| Chowan, NC        | Alewife                  | Overfished                       | Severely Depleted       |
|                   | Blueback Herring         | Fully Exploited                  | Severely Depleted       |

\**Severely depleted* was defined as at least a 50% decline in recent landings or juvenile indices relative to the landings and juvenile indices from the first five years of data.

<sup>^</sup>Overfished during the 1960s and 1970s.

The assessment estimated ocean landings as constituting 20-30% of total river herring landings. This is contrary to Harris and Rulifson's 1989 paper that reports ocean landings from all Atlantic coast states as approximately 3% of total landings between 1978 and 1987. There are potential sources of discrepancy between landings from the coastal river herring fishery and the non-directed ocean fishery: (1) potential high discard mortality; (2) underreporting of total ocean river herring landings or overestimation of in-river landings; (3) computation of weight of ocean landings to numbers of fish could produce erroneous numbers because the ocean fishery harvests both juvenile and adult river herring; and (4) estimation of M too low.

The assessment reported that in all fisheries with depleted or overfished stocks there were significant weir or pound net fisheries. This led to the recommendation that additional conservation measures be adopted to reduce fishing mortality (F).

Heavy fishing pressure in Maine, Virginia, and North Carolina were identified in the assessment as being primarily responsible for the continued decline of river herring stocks in the Damariscotta, Rappahannock, and Chowan rivers.

The State of North Carolina completed an assessment of river herring stocks of the Chowan River in May 2005. North Carolina used catch-at-age data from the Chowan River pound net fishery to estimate exploitation rates and abundance from 1972 to 2003. Cohort and annual catch curves provided initial estimates of mortality, while a spreadsheet-based catch-at-age model incorporating a multinomial error distribution provided estimates of annual recruitment, abundance-at-age, and fishing mortality.

In the Chowan River, estimated fishing mortality for the period 1972 to 1994 is over 0.90 for blueback herring, and except for 1995 and 1997, fishing mortality has ranged from 0.98 in 1998 to 1.91 in 2003, with a corresponding exploitation ranging from 63-85%. Estimated fishing mortality for 1972 to 1994 is 0.98 for alewife, and except for 1995 and 1997, fishing mortality has ranged from 1.01 in 1998 to 1.86 in 2002, with corresponding exploitation ranging from 64- 85%.

Chowan River blueback herring recruitment averaged 28.9 million age-3 fish per year between 1972 and 1985. Since 1986, it has only averaged around 3.6 million fish, and in the last five years, only 552,000 fish. Chowan River alewife recruitment averaged 7.5 million age-3 fish a year between 1972 and 1986, although since 1987 it has only averaged around 587,000 fish, and in the last five years, only 317,000 fish. Blueback herring declines in recruitment through the 1990s dramatically reduced spawning stock biomass to a record low of 89,678 pounds in 2003. Similarly, alewife spawning stock biomass declined rapidly during the early 1990s. From 1994 to 1999, alewife spawning stock biomass averaged 22,953 pounds, with a record low of 10,862 pounds in 1995.

The North Carolina river herring assessment determined that excessive exploitation combined with poor recruitment has significantly reduced abundance of both river herring species in the Chowan River over the last 20 years and has led to much lower catches than were supported historically.

Fish passage can be used as an indicator of trends in stock abundance, although it is important to note that fish passage can be strongly influenced by water flow and changes in operation of fish passage. Fish passage numbers for river herring are available for six dams in New Hampshire (Table 4) and the St. Stephen Dam in the Santee-Cooper River in South Carolina (Figure 10).

**Table 4.** Number of river herring returning to fishways on coastal New Hampshire river, 1972-2006.

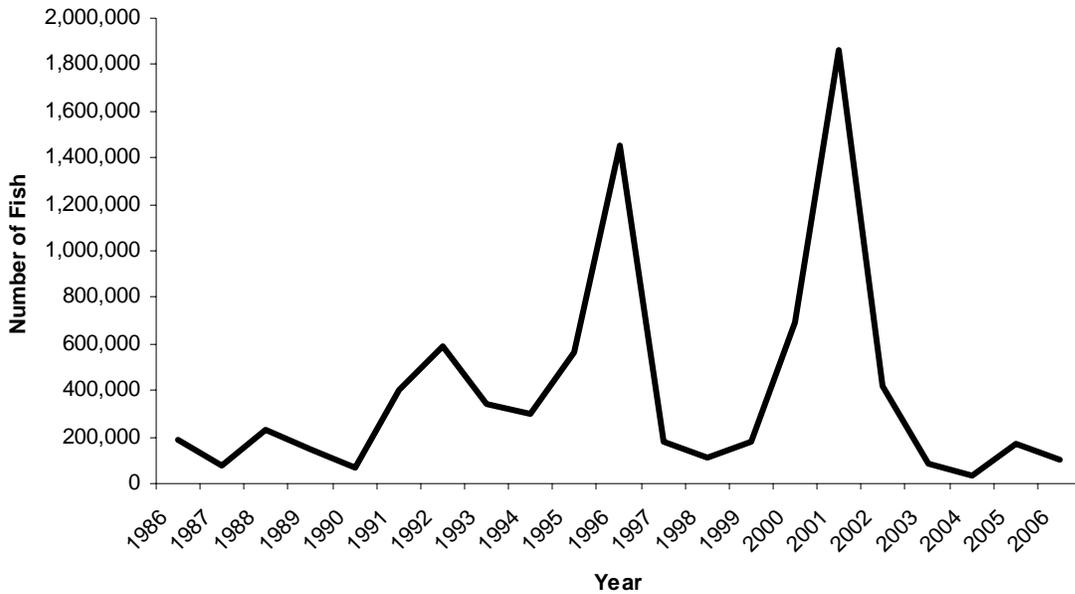
| Year | Cochecho River | Exeter River | Oyster River | Lamprey River | Taylor River | Winnicut River | Annual Total |
|------|----------------|--------------|--------------|---------------|--------------|----------------|--------------|
| 1972 |                |              |              | 2,528         |              | +              | 2,528        |
| 1973 |                |              |              | 1,380         |              | +              | 1,380        |
| 1974 |                |              |              | 1,627         |              | +              | 1,627        |
| 1975 |                | 2,639        |              | 2,882         |              | +              | 5,521        |
| 1976 | 9,500          |              | 11,777       | 3,951         | 450,000      | +              | 475,228      |
| 1977 | 29,500         |              | 359          | 11,256        |              | 2,700++        | 43,815       |
| 1978 | 1,925          | 205          | 419          | 20,461        | 168,256      | 3,229++        | 194,495      |
| 1979 | 586            | 186          | 496          | 23,747        | 375,302      | 3,410++        | 403,727      |
| 1980 | 7,713          | 2,516        | 2,921        | 26,512        | 205,420      | 4,393++        | 249,475      |
| 1981 | 6,559          | 15,626       | 5,099        | 50,226        | 94,060       | 2,316++        | 173,886      |
| 1982 | 4,129          | 542          | 6,563        | 66,189        | 126,182      | 2,500++        | 206,105      |
| 1983 | 968            | 1            | 8,866        | 54,546        | 151,100      | +              | 215,481      |
| 1984 | 477            |              | 5,179        | 40,213        | 45,600       | +              | 91,469       |
| 1985 | 974            |              | 4,116        | 54,365        | 108,201      | +              | 167,656      |
| 1986 | 2,612          | 1,125        | 93,024       | 46,623        | 117,000      | 1,000++        | 261,384      |
| 1987 | 3,557          | 220          | 57,745       | 45,895        | 63,514       | +              | 170,931      |
| 1988 | 3,915          |              | 73,866       | 31,897        | 30,297       | +              | 139,975      |
| 1989 | 18,455         |              | 38,925       | 26,149        | 41,395       | +              | 124,924      |
| 1990 | 31,697         |              | 154,588      | 25,457        | 27,210       | +              | 238,952      |
| 1991 | 25,753         | 313          | 151,975      | 29,871        | 46,392       | +              | 254,304      |
| 1992 | 72,491         | 537          | 157,024      | 16,511        | 49,108       | +              | 295,671      |
| 1993 | 40,372         | 278          | 73,788       | 25,289        | 84,859       | +              | 224,586      |
| 1994 | 33,140         | *            | 91,974       | 14,119        | 42,164       | +              | 181,397      |
| 1995 | 79,385         | 592          | 82,895       | 15,904        | 14,757       | +              | 193,533      |
| 1996 | 32,767         | 248          | 82,362       | 11,200        | 10,113       | +              | 136,690      |
| 1997 | 31,182         | 1,302        | 57,920       | 22,236        | 20,420       | +              | 133,060      |
| 1998 | 25,277         | 392          | 85,116       | 15,947        | 11,979       | 219            | 138,930      |
| 1999 | 16,679         | 2,821        | 88,063       | 20,067        | 25,197       | 305            | 153,132      |
| 2000 | 30,938         | 533          | 70,873       | 25,678        | 44,010       | 525            | 172,557      |
| 2001 | 46,590         | 6,703        | 66,989       | 39,330        | 7,065        | 1,118          | 167,795      |
| 2002 | 62,472         | 3,341        | 58,179       | 58,605        | 5,829        | 7,041          | 195,467      |
| 2003 | 71,199         | 71           | 51,536       | 64,486        | 1,397        | 5,427          | 194,116      |
| 2004 | 47,934         | 83           | 52,934       | 66,333        | 1,055        | 8,044          | 176,383      |
| 2005 | 16,446         | 66           | 12,882       | 40,026        | 223          | 2,703          | 72,346       |
| 2006 | 4,318          | 16           | 6,035        | 23,471        | 147          | 822            | 34,809       |

\* Due to damage to the fish trap, fishway became a swim through operation.

+ Fishway unable to pass fish until modifications in 1997.

++ Fish netted below and hand passed over Winnicut River dam.

**Figure 10.** Fish passage at St. Stephen Dam on the Santee-Cooper system in South Carolina, 1986-2006 (Source: SC DNR).



**Public Comment Issues**

Public comment is being sought on two issues for consideration in Amendment 2. The issues listed below are intended to focus the public comment and provide the Management Board the input necessary to develop a Draft Amendment 2. The public is encouraged to submit comments on the issues listed below as well as any other issues that may need to be addressed in Amendment 2.

***Issue 1. Reducing Commercial Fishing Mortality on River Herring***

*Problem Statement*

Many populations of river herring have faced anthropogenic threats since colonial times, including fishing. Currently, many populations of river herring along the Atlantic coast are in decline or are at depressed but stable levels (Crecco and Gibson 1990); however, lack of fishery-dependent and independent data make it difficult to ascertain the status of river herring stocks coastwide. Based on available landings records from the NMFS, commercial landings dropped from 13.6 million pounds in 1985 to 1.33 million pounds in 2004, a difference of 90% (Figure 1; NMFS, Fisheries Statistics Division, Silver Spring, MD, pers. comm.). In 2006, Commission member states reported river herring landings of approximately 1.4 million pounds (Table 1).

In response to declining river herring stocks within their own waters, four states—Massachusetts, Rhode Island, Connecticut, and North Carolina—have closed their river herring fisheries. River herring stocks are a multi-jurisdictional resource both while in-river (e.g., Connecticut River, Roanoke River) and in the ocean. Concerns have risen over the status of river herring stocks and their management coastwide. Questions regarding the level of fishing mortality and whether is it low enough to ensure survival and

enhancement of depressed stocks or the maintenance of presently stable stocks have been introduced. This document has been developed to address those concerns by seeking comment on regulations to control the harvest of river herring.

### *Management Options*

#### Option 1: Status Quo (No Action)

This option would allow individual states to maintain the rights to manage all fisheries in state waters as outlined in Amendment 1. Currently, all states and jurisdictions are allowed to maintain the commercial coastal and in-river fishing regulations that were in place as of April 1999 or they may institute more conservative regulations.

#### Option 2: Reduce Fishing Effort in Directed Fisheries for River Herring

Under this option, states and jurisdictions would be required to implement commercial regulations that would reduce fishing effort in directed fisheries for migratory stocks of river herring.

#### Option 3: Close Directed Fisheries for River Herring and Regulate Bycatch

Under this option, states and jurisdictions would be required to implement regulations closing all directed fisheries, both coastal and in-river, for river herring from migratory stocks. States and jurisdictions must regulate non-directed harvest or bycatch of river herring.

#### Option 4: Moratorium on River Herring Harvest, Possession, and Landing

This option requires states and jurisdictions to implement commercial regulations that would ban the harvest, possession, and landing of river herring from migratory stocks.

### ***Issue 2. Recreational Fishing for River Herring***

#### *Problem Statement*

There are extensive recreational fisheries for river herring in many rivers along the East Coast. While some are hook-and-line fisheries (e.g., Delaware River), many states permit various types of dip nets and seines. The total quantity of fish landed by these recreational netters for personal use (e.g., bait, consumption) has not been quantified. All of these landings are unreported and thus, represent a large potential error in recorded recreational river herring harvests.

#### *Management Options*

##### Option 1: Status quo.

This option would leave the management of recreational river herring fisheries as it currently exists under Amendment 1. Currently, there are no requirements for recreational fisheries for river herring.

### Option 2: Recreational License/Permit

Under this option, states and jurisdictions would be required to institute licensing or permitting requirements for the recreational harvest of river herring from state waters. The requirements for a license or permit could include, but are not limited to data collection elements such as harvest numbers.

### Option 3: Reduce Effort

States and jurisdictions would be required to implement measures to reduce effort within the recreational fishery for river herring.

### Option 4: Close the Recreational Fishery

States and jurisdictions would be required to close their recreational fisheries for river herring. Recreational fishermen would not be allowed to harvest or possess river herring.

### **Recommendations for Actions in Federal Waters**

River herring spend the majority of their time at sea. The Commission will be developing recommendations for actions in Federal waters that are consistent with the final Amendment. The public is welcome to comment on potential Commission recommendations concerning actions in Federal waters.

## References

- Atlantic States Marine Fisheries Commission (ASMFC). 1999. Amendment 1 to the Interstate Fishery Management Plan for Shad & River Herring. Fishery Management Report No. 35. Washington, D.C. 76 p.
- Carscadden, J. E. and W. C. Leggett. 1975. Meristic differences in spawning populations of American shad, *Alosa sapidissima*: evidence for homing to tributaries in the St. John River, New Brunswick. Fisheries Research Board of Canada Bulletin 32:653-660.
- Crecco, V. A. and M. Gibson. 1990. Stock Assessment of River Herring from Selected Atlantic Coastal Rivers. Special Report No. 19 of the Atlantic States Marine Fisheries Commission. 103pp.
- Dadswell, M. J., G. D. Melvin, P. J. Williams and D. E. Themelis. 1987. Influences of origin, life history, and chance on the Atlantic coast migration of American shad. American Fisheries Society Symposium 1:313-330.
- Harris, P. J. and R. A. Rulifson. 1989. Investigations of the ocean landings for American shad and river herring from United States East Coast waters. Completion report to ASMFC ICMR Technical Report 89-02. 98 p.
- Jones, P. W., F. D. Martin, and J. D. Hardy, Jr. 1978. Development of fishes of the mid-Atlantic Bight. An atlas of egg, larval, and juvenile stages. Vol. 1 Acipenseridae through Ictaluridae. U.S. Fish and Wildlife Service, FWS/OBS-78/12.
- Levesque, R. C. and R. J. Reed. 1972. Food availability and consumption by young Connecticut River shad *Alosa sapidissima*. Journal of the Fisheries Research Board of Canada 29:1495-1499.
- Marcy, B. C., Jr. and P. Jacobson. 1976. Early life history studies of American shad in the Lower Connecticut River and the effects of the Connecticut Yankee plant. American Fisheries Society Monograph 1:141-168.
- New England Fishery Management Council. 2006. Proposed Atlantic Herring Specifications for the 2007-2009 Fishing Years. 201 p.
- Steele, L. 2007. Atlantic Herring Stock/Fishery Update. Report to the New England Fishery Management Council.