

NOTE: This is a REVISED version of the plan, originally posted to the DEC website in August 2011. Changes were made as a result of public comment received by Sept 22, 2011.



**New York State
Department of Environmental Conservation**

Sustainable Fishing Plan for New York River Herring Stocks

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to the
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EXECUTIVE SUMMARY

Amendment 2 to the Atlantic States Marine Fisheries Commission Shad and river Herring Interstate Fishery Management Plan requires member states to demonstrate that fisheries for river herring (alewife and blueback herring) within their state waters are sustainable. A sustainable fishery is defined as one that will not diminish potential future reproduction and recruitment of herring stocks. If states cannot demonstrate sustainability to the Atlantic States Marine Fisheries Commission (ASMFC), they must close their herring fisheries.

New York State proposes to maintain a restricted river herring (alewife and blueback herring) fishery in the Hudson River and tributaries and to close river herring fisheries elsewhere in the State. This proposal conforms to Goal 1 of the New York State Hudson River Estuary Action Agenda.

Stock Status

Blueback herring and alewife are known to occur and spawn in New York State in the Hudson River and tributaries, the Bronx River, and several streams on Long Island. The Hudson River is tidal to the first dam at Troy, NY (rkm 245). Data on stock status are available for the Hudson River and tributaries. Few data are available on river herring in streams in Bronx County, southern Westchester County, or on Long Island. River herring are absent in the New York portion of the Delaware River.

Hudson River: Commercial and recreational fisheries exploit the spawning populations of river herring in the Hudson River and tributaries. Fixed and drifted gill, cast and scap/lift nets are used in the main stem Hudson, while scap/lift and cast nets are used in the tributaries. Recreational fishers often use commercial net gears because permit fees remain at 1911 levels. Anglers also are allowed take of river herring with variety of small nets and hook and line. In the last ten years, about 250 fishers annually purchased commercial gill net permits and approximately 240 purchased commercial scap net permits. However only 84 gill net and 93 scap/lift fishers reported using the gear licensed. Fishers using commercial gears are required to report landings annually. Most river herring taken in the Hudson and tributaries are used as bait in the recreational striped bass fishery. Anglers and subsistence fishers take a few river herring from Long Island streams.

Data on commercial harvest of river herring are available since the early 1900s. Landings peaked in the early 1900s and in the 1930s and then declined through the 1980s. Landings increased again through 2003, but have since declined. Reported commercial harvest has remained below 50,000 river herring per year since the early 1990s. A series of creel surveys and estimates since 2001 indicated substantial and increasing harvest of river herring by recreational anglers from the Hudson River and tributaries. We estimated that approximately 240,000 river herring were harvested by recreational anglers in 2007. The extent of the loss of river herring through bycatch in ocean commercial fisheries remains largely unknown but is expected to be significant.

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Fishery dependent data on river herring status since 2000 are available from commercial reports and from on-board monitoring. Catch per unit effort (CPUE) in fixed (anchored) gill nets fished in the main stem river has increased. Conversely, CPUE in scap nets fished in tributaries initially declined, but then varied without trend. Mean length of river herring observed in the commercial harvest has declined slightly since 2000. We feel that the CPUE in fixed gear below the Bear Mountain Bridge provides the best annual measure of abundance because it intercepts river herring migrating past the gear to upriver spawning locations..

Fishery independent data on size and age composition of river herring spawning in the Hudson River Estuary are available from 1936 and intermittently since the late 1970s. Sample size has been small in most years. The largest fish were collected in the 1930s. Size of both blueback herring and alewife has declined over the last 30 years. Age data were obtained from scales in 1936 and the late 1980s. Since then, ages were estimated from age length keys developed by Maine, Massachusetts, and Maryland. Observed and estimated age at length of Hudson River fish varied substantially among methods and thus age can only be used for trends within method. Annual mean age since the late 1980s has remained stable in blueback herring and female alewife, but declined in male alewife. Because of the uncertainty with estimated ages, we estimated annual mortality with length-based methods. Estimates varied substantially depending on assumed model inputs and therefore actual total mortality on the stocks remains unknown. However, we should emphasize that mortality on stocks must have been high in the last 30 years to have so consistently reduced mean size and presumably mean age. Within method, estimates of total mortality generally increased for both species since 1980. This increase was most pronounced in alewife.

Young of year production has been measured annually by beach seine since 1980. CPUE of alewife remained low through the late 1990s and has since increased erratically. CPUE of young of year blueback herring has varied with a very slight downward trend since 1980.

Streams on Long Island, Bronx and south shore of Westchester County: Limited data have been collected for some of the river herring populations in these areas. The data are not adequate to characterize stock condition.

Delaware River in New York: No records exist to document the presence of river herring in this portion of the river.

Proposed Fishery for the Hudson River

Given the inconsistent measures of stock status described above, we do not feel that the data warrant a complete closure of the Hudson River fishery at this time. New York State proposes a five year restricted fishery in the main-stem Hudson River, a partial closure of the fishery in tributaries, and annual stock monitoring. We set a sustainability target for juvenile indices. We will monitor, but not set targets for mean length from fishery independent spawning stock sampling and CPUE in the commercial fixed gill net fishery in the lower river below the Bear Mountain Bridge. We will also monitor age structure, frequency of repeat spawning, and total mortality from fishery independent sampling if we can resolve problems with age determination

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and mortality estimation.

A summary of existing and proposed restrictions is provided. Proposed restrictions to the recreational fishery include: a ten fish per day creel limit for individual anglers with a boat limit of 50, and a 10 fish creel limit per day for paying customers with a boat limit of 50 for charter vessels, no fishing within 825 ft (250m) of any man made or natural barrier in the main river and tributaries, no use of nets in tributaries, and the continuation of various small nets in the main river. Proposed restrictions to the commercial fishery and use of commercial gears include: a commercial verification requirement; a net ban in the upper 28 km of the main-stem estuary, shad spawning flats, or tributaries; gill net mesh and size restrictions; a ban on fixed gears or night fishing above the Bear Mountain Bridge; seine and scap/lift net size restrictions; extension of existing 36 hour lift period to all commercial net gears; increased net fees to account for inflation since 1911 when fees were set or the preferred option of creation of a new Hudson River Commercial Fish Permit; extension of the current Marine and Coastal District Charter /Party boat license to the tidal Hudson and tributaries at a cost of \$250.00 annually; and monthly mandatory reporting of catch and harvest.

We should note that Draft Addendum 3 to Amendment 6 of the ASMFC Interstate Management Plan for striped bass stipulates that states should reduce fishing mortality on spawning stocks by 50%. If this draft is approved by the ASMFC Striped Bass Management Board, we may have to restrict effort in the recreational striped bass fishery. Restrictions may include a reduction in use of bait such as river herring. Any reduction in effort will likely reduce demand for river herring and thus reduce losses in the Hudson stocks.

Proposed Moratorium for streams on Long Island, Bronx County, the southern shore of Westchester County, and the Delaware River and its tributaries north of Port Jervis NY. Due to the inability to determine stock condition for these areas, the ASMFC Amendment 2 requires that a moratorium on river herring fishing be implemented.

This SFP does not directly address ocean bycatch but focuses on fisheries in New York State waters. New York is working with the National Marine Fisheries Service, the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council to deal with this issue. Both councils are in the process of amending the Atlantic Herring and the Atlantic Mackerel, Squid and Butterfish Plans to reduce bycatch of river herring.

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2 INTRODUCTION

Amendment 2 to the Atlantic States Marine Fisheries Commission Shad and River Herring Interstate Fishery Management Plan was adopted in 2009. It requires member states to demonstrate that fisheries for river herring (alewife and blueback herring) within state waters are sustainable. A sustainable fishery is defined as one that will not diminish potential future reproduction and recruitment of herring stocks. If states cannot demonstrate sustainability to ASMFC, they must close their herring fisheries.

The following proposes a plan for a sustainable fishery for river herring in waters of New York State. The goal of this plan is to ensure that river herring resources in New York provide a source of forage for New York's fish and wildlife and provide opportunities for recreational and commercial fishing now and in the future.

The fisheries that existed back in colonial days in the Hudson Valley of New York undoubtedly included river herring among the many species harvested. River herring, comprised of both alewife (*Alosa pseudoharengus*), and blueback herring (*Alosa aestivalis*) were among the fish mentioned by early explorers and colonists – the French Jesuits, Dutch and English. Archaeological digs along the Hudson in Native American middens indicates that the fishery resources in the river provided an important food source to Native Americans.

Written records for river herring harvest in New York begin in the early 1900. Landings peaked in the early 1900s and in the 1930s and then declined through the 1980s. Landings increased again through 2003, but have since declined. Factors in addition to fishing have affected the stocks: habitat destruction (filling of shallow water spawning habitat) and water quality problems associated with pollution that caused oxygen blocks in major portions of the river (Albany and New York City). Water quality has improved over the last 30 years.

New York State does not augment wild river herring stocks with hatchery progeny. The New York City Parks Department initiated an experimental restoration program in which alewife were captured in a Long Island Sound tributary in Connecticut and released in the Bronx River above the first barrier. Limited returns to the river suggest that some reproduction has occurred from these stockings. A variety of non-governmental organizations along with state and federal agencies are working on development of fish passage for alewife in Long Island streams

3 MANAGEMENT UNITS

The management unit for river herring stocks in New York State comprises three sub-units. All units extend throughout the stock's range on the Atlantic coast.

- The largest consists of the Hudson River Estuary from the Verrazano Narrows at New York City to the Federal Dam at Troy including numerous tributary streams (Figure 1).
- The second is made up of all Long Island streams that flow into waters surrounding Long Island and streams on the New York mainland (Bronx and Westchester Counties) that

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flow into the East River and/or Long Island Sound (Figure 2).

- The third subunit consists of the non-tidal Delaware River and tributaries upriver of Port Jervis, NY.

Range of the New York river herring along the Atlantic coast is from the Bay of Fundy, Canada and Gulf of Maine south to waters off Virginia (NAI 2008).

A listing of most Hudson River tributaries, and streams on Long Island, and the Bronx and southern Westchester Counties are in Appendix Table A.

3.1 Description of the Management Unit Habitat

3.1.1 Hudson River and tributaries

Habitat Description

The Hudson River Estuary is tidal its entire length of 246 km from the Battery (tip of Manhattan Island) in New York City to the Federal Dam at Troy (Figure 1). The estuary is fresh water above Newburgh (km 90).

The estuarine portion of the Hudson River is considered a “drowned” river valley in that the valley slopes steeply into the river. Many of the tributaries below the Troy Dam are tidal for a short distance (usually about a kilometer) ending at a natural or man-made barrier, often built on a natural barrier. There are approximately 67 primary and secondary, both named and unnamed, tributaries to the tidal portion of the Hudson River Estuary (Figure 1). Schmidt and Cooper (1996) catalogued 62 of these tributaries for the presence or absence of barriers to migratory fish. They found that only one had no barrier for migratory fish, 31 were blocked (either partially or completely) by natural barriers, and the remaining 30 had artificial barriers, dams or culverts, that reduced or eliminated access for fish. We estimated stream length of all these tributaries to be about 97 km that is accessible to river herring below the first impassable man-made or natural barrier.

The Mohawk River is the largest tributary to the Hudson River. It enters the Hudson 2 km north of the Troy Dam. Cohoes Falls, a large scenic waterfall of 20 m is the first natural barrier on the Mohawk just upriver of the confluence with the Hudson. Access into the Mohawk system was created through the Waterford Flight – a series of five locks and dams, built as part of the Erie Canal to circumvent the falls. The canal lock and dam system was built in 1825, to connect the Hudson to central New York and Lakes Ontario and Erie. The Canal parallels and/or is part of the Mohawk River for the river’s entire length to Rome, a distance of 183 km. A series of permanent and seasonal pools make up the canal where it intertwines with the Mohawk River. Permanent pools created from hydro-power dams are found in the Waterford section. Temporary pools are created each year in early spring by removable dams (series of gates) that increase water levels to 14 feet (4.3 m) while the canal is in operation (May through November). During the winter months, the river is returned to its natural state of riffles and pools.

Habitat Use

Hudson River alewife, blueback herring and American shad are spring spawners. Alewives are the first of the herring to enter the estuary, arriving as early as mid-March with continued spawning through early May. Blueback herring prefer slightly warmer temperatures and arrive later, usually in April.

Adults of both species spawn in Hudson River tributaries and in the shallow waters of the main stem Hudson. Alewife prefer to spawn over gravel, sand and stone in back water and eddies whereas bluebacks tend to spawn in fast moving water over a hard bottom. Herring spawn in the tidal freshwater Hudson from Kingston (km 144) to Troy (km 256) (Figure 1) and its tributaries for approximately six to ten weeks, dependent on water temperature (Smith 1985, Hattala et al. 2011). Once spawning ends, most mature fish quickly return to ocean waters. The nursery area includes the spawning reach and extends south to Newburgh Bay (km 90), encompassing the freshwater portion of the Estuary.

Some blueback herring of the Hudson River migrate above the Federal Dam at Troy. A few continue upriver in the non-tidal Hudson as far as Lock 4 on the Champlain Canal (NAI 2007). However, most fish turn west into the Mohawk River. This larger portion migrates as far inland as Rome (439 km inland), via the Erie Canal and the Mohawk River. The canal system opens in New York on or about May 1st. Since most alewives are already spawning by then, they do not move into the system (J. Hasse, NYSDEC retired, personal communication).

Blueback herring began colonizing the Mohawk River in the 1970s. By 1982, they had migrated into Oneida Lake in the Great Lakes drainage. The number of herring using the Mohawk increased through the 1990s, but since 2000 herring have rarely occurred in the upper end of the River. Blueback herring were historically unable to access the Mohawk River until the locks of the Erie Canal provided upstream passage into the system. Now that they are established, however, they have become important forage for local sport fish populations.

3.1.2 Long Island and Westchester County

The herring runs in streams on Long Island are comprised almost exclusively of alewife (B. Young, NYSDEC retired, personal communication). Most streams are relatively short runs to saltwater from either head ponds (created by dammed streams) or deeper kettle-hole lakes. Either can be fed by a combination of groundwater, run-off or area springs. Spawning occurs in April through May in the tidal freshwater below most of the barriers. Natural passage for spawning adults into the head ponds or kettle lakes is present in very few streams.

There have been limited efforts to understand river herring runs on Long Island since 1995. Several known runs of alewives on Long Island occur in East Hampton, Southampton, Riverhead and Brookhaven. With the advent of a more aggressive restoration effort in Riverhead on the Peconic River other runs have come to light. Since 2006, an annual volunteer alewife spawning

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run survey has been conducted. This volunteer effort basically documents the presence or absence of alewives in Long Island Coastal Streams. In 2010 a volunteer investigation was initiated to quantify the Peconic River alewife run. Size and sex data have been collected for 2010 and 2011. A crude estimate of the runs size was also made in 2010, this effort was improved during 2011 with the placement of a video camera for recording alewife passage through the fish passage. These efforts have been undertaken to understand the Long Island Coastal streams and to improve the runs that exist there.

We have no record of river herring in any of the streams in southern Westchester County. In the Bronx River (Bronx County) alewives were introduced to this river in 2006 and 2008 and some adult fish returned in 2010. Monitoring of this run is in its early stages.

3.1.3 Delaware River

No records exist to document the presence of river herring in the New York portion of the Delaware River.

3.2 Habitat Loss and Alteration

Hudson River: Much spawning and nursery habitat in the upper half of the tidal Hudson was lost due to dredge and fill operations to maintain the river's shipping channel to Albany. Most of this loss occurred between the end of the 19th century (NYS Department of State 1990) and the first half of the 20th century. Preliminary estimates are that approximately 57% of the shallow water habitat (1,821 hectares or 4,500 acres) north of Hudson (km 190) was lost to filling (Miller and Ladd 2004). Work is in progress to map the entire bottom of the Hudson River. Data from this project will be used to characterize and quantify existing spawning and nursery habitat. While most of the dredge and fill loss affected American shad, it is suspected that herring were also affected as they spawn along the shallow water beaches in the river.

Very little, or no, habitat has been lost due to dam construction. The first major dam was constructed in 1826 at Rkm 256 at Troy. Prior to the dam, the first natural barrier occurred at Glens Falls, 32 km above the Troy Dam. The construction of the dam is not known to have reduced spawning or nursery habitat.

The introduction of zebra mussels in the Hudson in 1991, and their subsequent explosive growth in the river, quickly caused pervasive changes in the phytoplankton (80% drop) and micro- and macro- zooplankton (76% and 50% drop respectively) communities (Caraco et al. 1997). Water clarity improved dramatically (up by 45%) and shallow water zoobenthos increased by 10%. Given these massive changes, (Strayer et al. 2004) explored potential effects of zebra mussel impact on young-of-year (YOY) fish species. Most telling was a decrease in observed growth rate and abundance of YOY fishes, including both alewife and blueback herring. It is not yet clear how this constraint affects annual survival and subsequent recruitment.

Long Island: Most all streams on Long Island have been impacted by human use as the

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population expanded. Many streams were blocked off with dams to create head ponds, initially used to contain water for power or irrigation purposes. The dams remain; only a few with passage facilities. Many streams were also impacted by the construction of highways, with installations of culverts or other water diversions which impact immigrating fish.

Recent efforts at restoration look to provide fish passage over or around these barriers, or even removal of small obstructions. Permanent fish passage was recently installed on the Carmans River in the South Shore Estuary near Shirley, NY. This project was the result of advocacy and cooperation by environmental groups and local, state and federal agencies. Additional protections for the River are assured due to legislation enacted in 2011, and community awareness is building. An earlier cooperative effort resulted in the installation of a rock ramp passage in the Peconic River within the Peconic Bays Estuary. Local citizens monitor the spring alewife run in this river. As awareness of these successful efforts spreads, interest in replicating that success on other systems grows.

3.3 Habitat Water Quality

The Hudson has a very long history of abuse by pollution. New York City Department of Environmental Protection recognized pollution, primarily sewage, as a growing problem as early as 1909. By the 1930s over a billion gallons a day of untreated sewage were dumped into New York Harbor. (NYCDEP <http://home2.nyc.gov/html/dep/html/news/hwqs.shtml>)

New York City was not the only source of sewage. Most major towns and cities along the Hudson added their share. It was so prevalent that the Hudson was often referred to as an open sewer. Biological demand created by the sewage created oxygen blocks that occurred seasonally (generally mid to late summer) in some sections of the river. One of the best known blocks occurred near Albany in the northern section of the tidal estuary in the 1960s through the 1970s. This block often developed in late spring and remained through the summer months. It essentially cut off the upper 40 km of the Hudson for use as spawning and nursery habitat. A second oxygen block occurred in the lower river in the vicinity of New York City in late summer. This block could potentially have affected emigrating age zero river herring. This summer oxygen-restricted area occurred for decades until 1989 when a major improvement in a sewage treatment plant came on line in upper Manhattan. It took decades, but water quality in general has greatly improved in both areas since the implementation of the Clean Water Act in the 1970s and subsequent reduced sewage loading to the river.

4 STOCK STATUS

Following is a description of all available data for the Hudson's river herring stocks, plus a brief discussion of their usefulness as stock indicators. Sampling data are summarized in Tables 1 and 2. Sampling was in support of Goal 1 of the Hudson River Estuary Action Agenda and has been partially funded by the Hudson River Estuary Program.

4.1 Fisheries Dependent Data

4.1.1 Commercial Fishery

Commercial fisheries for river herring in New York State waters occur in the Hudson River Estuary and in marine waters around Long Island. Current commercial fishing restrictions for New York waters are listed in Appendix Table B.

The present commercial fishery in the Hudson River and tributaries exploits the spawning migration of both alewife and blueback herring. The primary use of commercially caught herring is for bait in the recreational striped bass fishery. The herring fishery occurs from March into early June annually, although some fishers report catching herring as late as July.

Ocean bycatch

River herring occur as bycatch in many commercial fisheries which are in the known migratory range of the Hudson stock from North Carolina up to the Gulf of Maine. Fishery bycatch is mostly un-documented but has the potential to harvest Hudson stock and many other stocks along the coast. In some years, estimated bycatch of river herring in the Atlantic herring fishery equaled or exceeded the total of all coastal in-river landings (Cieri et al. 2008). More recent analyses by the National Marine Fisheries Service's Northeast Fisheries Science Center (2011) indicated that total annual incidental catch of river herring in all fishing fleets sampled by the Northeast Fisheries Observer Program during 1989-2010 ranged from 108 to 1867 mt. It is not known how much of current ocean river herring bycatch consists of Hudson River fish.

This SFP does not directly address ocean bycatch but focuses on fisheries in New York State waters. New York is working with the National Marine Fisheries Service, the New England Fishery Management Council (www.nefmc.org) and the Mid-Atlantic Fishery Management Council (www.mafmc.org) to deal with this issue. Both councils are in the process of amending the Atlantic Herring (Amendment 5) and the Atlantic Mackerel, Squid and Butterfish (Amendment 14) Plans to reduce bycatch of river herring.

Gear Use in the Hudson River and Tributaries

The fixed gill net fishery occurs in the mainstem river from km 40 to km 75 (Piermont to Bear Mountain Bridge, Figure 1). In this stretch, the river is fairly wide (up to 5.5 km) with wide, deepwater (~ six to eight m) shoals bordering the channel. Fishers use particular locations within this section away from the main shipping channel. Over the past ten years, an average of 22 active fishers participated in this lower river fixed gill net fishery annually. Nets are 3.7 to 183 m (12 to 600 ft) long. Above the Bear Mountain Bridge gill net fishers use both drift (~58%) and fixed gill nets (~42%). These gears are used up to km 225 (Castleton) where the river is much narrower (1.6 to 2 km wide). Approximately 60 fishers participate in this mid river gill net fishery. Nets range in size from 7.6 to 183 m (25 to 600 ft).

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The other major gear used in the river herring fishery is scap nets (also known as lift and/or dip nets). The scap/lift net fishery occurs from km 70 to km 130 (Peekskill to New Baltimore), primarily in the major river herring spawning tributaries. Scap/lift nets range in size from 0.2 to 121.9 m² (0.5 to 400ft²). On average, about 96 fishers participate annually.

Marine permits are required of fishers to use seines or scap nets greater than 36 ft², dip or scoop nets exceeding 14 in. in diameter, and all gill nets. Marine permit holders are required to report effort and harvest annually to the Department. Many marine permit holders are recreational anglers taking river herring for personal use as bait or food. It should be noted that over the last ten years, an average of over 260 gill net and 260 scap nets permits were sold annually. According to the required annual reports, however, only 36% of the permittees actively catch fish.

In addition to Marine permits, New York has a bait license that allows the take and sale of bait fish (river herring included) using seines and cast nets. As no reporting is required for this license, harvest of river herring using this license is unknown.

Commercial Landings and License Reporting

Recorded landings of river herring in New York State began in the early 1900s. Anecdotal reports indicate that herring only played a small part in the historic commercial fishing industry in the Hudson River. Total New York commercial landings for river herring include all herring caught in all gears and for both marine and inland waters. Several different time series of data are reported including several state sources, National Marine Fisheries Service (NMFS), and more currently Atlantic Coastal Cooperative Statistics Program (ACCSP). NMFS data do not specify river or ocean source(s) and landings are often reported as either alewife or blueback herring, but not both in a given year. It is unlikely that only one species was caught. From 1995 to the present, the Department has summarized landings and fishing effort information from mandatory state catch reports required for Hudson River marine permits. Full compliance for this reporting started in 2000. All Hudson River data are sent to NMFS and ACCSP for incorporation into the national databases.

Because of the discrepancies among the data series and the lack of information to assign the landings to a specific water body source, only the highest value from all sources is used to avoid double counting. Several peaks occur in the river herring landings for New York (Figure 3). The first peak occurred in the early 1900s followed by a lull (with some gaps) until the period prior to, during, and after World War II when landing peaked a second time. By the 1950s landings were in a serious decline. A few unusual peaks occurred in the NMFS data series. In 1966, 1.9 million kg were landed (omitted on Figure 3), followed by a series of years of low landings with another peak in 1982. Landings were low, with some data gaps during the rest of the 1980s through 1994.

Hudson River landings

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Since 1995, landings have been separated between the Hudson and other water (marine). Harvest in the river was relatively low in 1995, but grew in response to the need for bait for the expanding striped bass recreational fishery. In-river landings peaked in 2003 and have slowly declined since then (Figure 4). The reason for the decline is unknown. The striped bass fishery and the need for bait have not diminished. It is possible that recreational fishers have shifted harvest to non commercial gears which do not have a mandatory reporting requirement. The landings from these “personal use” gears are unknown. Reporting rate from fishers using commercial gear is unknown.

The primary outlet for harvest taken by Hudson River marine permits is for the in-river bait industry. Since 2000, most commercially caught river herring have been taken by scap/lift nets (10 year mean of 48% of the catch) (Figure 5). The remaining 52% was split between drift and fixed gill nets.

Commercial Discards

From 1996 to 2010, river herring were not reported as discards on any mandatory reports targeting herring in the Hudson River or tributaries. Our commercial fisheries monitoring data, however, (See program description below) suggests otherwise. Since 1995, we have observed a 0.12% rate of discard in the anchored gill net fishery. Reasons for discards are unspecified. Discard rates are unknown for ocean fisheries.

Hudson River Commercial Catch Rates – Mandatory Reports

Relative abundance of river herring is tracked through catch per unit effort (CPUE) statistics of fish taken from the targeted river herring commercial fishery in the Estuary. All commercial fishers annually fill out mandatory reports. Data reported include catch, discards, gear, effort, and fishing location for each trip. Data within week is summarized as total catch divided by total effort (square yards of net x hours fished), separately by gear type (fixed gill nets, drift gill nets, and scap nets). Annual means are summarized in two ways. Above the Bear Mountain Bridge and within the spawning reach, annual CPUE is calculated as total catch/total effort. Below the Bear Mountain Bridge (km 75) and thus below the spawning reach, annual CPUE is calculated as an annual sum of weekly CPUE. Here, nets capture fish moving through to reach upriver spawning locations and run size is determined by number (density) of spawners each week as well as duration (number of weeks) of the run. The sum of weekly CPUE mimics area under the curve calculations where sampling occurs in succeeding time periods. The downside of using reported CPUE to monitor relative abundance is that results can be influenced by inter-annual, location, and inter-gear differences in reporting rate.

We use the CPUE of the fixed gear fishery below the Bear Mountain Bridge for estimating relative abundance because effort expended by the fishery below this bridge is much greater (~70% of fixed gill net effort) than in the river above this point (remaining 30%). Moreover, fixed gear below the bridge (rkm 40 to 75) is always fished in relatively the same location each year, is passive in nature, and intercepts fish that pass by. Annual CPUE for the lower river fixed gill net remained relatively flat until 2006 and has since increased (Figure 6).

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We do not consider the CPUE of gears fished above the Bear Mountain Bridge and within the spawning reach as reliable an annual abundance indicator as that from fixed gill nets below the bridge. Upriver gears catch fish that are either staging (getting ready to spawn) or moving into areas to spawn and gears are generally not employed until fish are present. The gears include drift gill nets, scap nets and some fixed gill nets (Figure 5). Drift gill net CPUE is also more variable as it can be actively fished – set directly into a school of fish. Drifted gill net CPUE varied widely without trend through the time period. Scap net CPUE declined slightly from 2000 through 2003, and has since remained relatively stable (Figure 6). Fixed gill nets fished within the spawning reach show the same recent increasing trend as lower in the river, but effort expended is much less than below Bear Mountain Bridge.

Hudson River Commercial Catch Rates – Monitoring Program

Up until the mid-1990s, the Department's commercial fishery monitoring program was directed at the American shad gill net fishery, a culturally historic and economically important fishery. We expanded monitoring to the river herring fishery in 1996, but were limited by available manpower and the ability to connect with the fishers. Monitoring focused on the lower river fixed gill net fishery since we considered it to be a better measure of annual abundance trends (see section above).

Data were obtained by observers onboard fishing vessels. Technicians recorded data on numbers of fish caught, gear type and size, fishing time and location. Scale samples, lengths and weights are taken from a subsample of the fisher's catch. CPUE was calculated by the method used for summarizing mandatory report data (above).

Since 1996, 66 trips targeting river herring (lower river: 53; mid and upper river: 13) have been monitored. These trips were sporadic and sample size is low, from one to 11 trips per year. Because of these few samples, the resulting CPUE is considered unreliable for tracking relative abundance. However, active monitoring provided the only data on catch composition of the commercial harvest and we consider these data to be useful.

Commercial Catch Monitoring- Size and Age Structure

Commercial fixed gill net fishers use 1 $\frac{3}{4}$ to 2 $\frac{3}{4}$ inch stretch mesh sizes to target herring. Catch composition include fish caught in all meshes. For trend analysis of size change, we subset the data to include only fish caught in similar size mesh each year; these include gill nets of 2 $\frac{1}{2}$ and 2 $\frac{3}{4}$ inch mesh.

Catch composition varied annually most likely due to the low number of monitored trips each year, and the timing of when the trips occurred. Annual sample size was relatively low, ranging from 40 to 185 fish from 2001 to 2007 (Table 3). Alewives were observed more often than blueback herring. The species difference may be the result of when the samples occurred (early or late in the run). The sex ratio of alewife in the observed catch was nearly equal (~ 50:50) in all years; more blueback herring females were caught than males (60:30 ratio). From 2001 to 2010,

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a slight decline was observed in mean total length (mm) for both alewife and blueback herring (Figure 7).

Age data for samples collected during the commercial monitoring program are yet to be analyzed (see discussion in Age section under FI programs below).

4.1.2 Recreational Fishery

Hudson River and tributaries: The recreational river herring fishery exists throughout the main-stem Hudson River, and its tributaries including those in the tidal section and above the Troy Dam (Mohawk River). Herring are sought from shore and boat by angling (jigging) and multiple net gears (see Appendix B). Boat fishers utilize all allowable gears while shore fishers predominantly use scap/lift nets, or angling (jigging). Some recreational herring fishers use their catch as food (smoking/pickling). However, the recreational herring fishery is driven primarily by the need for bait in the striped bass fishery.

The magnitude of the recreational fishery for river herring is unknown for most years. NYSDEC contracted with Normandeau Associates, Inc. to conduct creel surveys on the Hudson River in 2001 and 2005 (NAI 2003 and 2007). Estimated catch of river herring in 2001 was 34,777 fish with a 35.2% retention rate. When the 2001 data were analyzed, NAI found that the total catch and harvest of herring was underestimated due to the angler interview methods. In the 2001 survey, herring caught by fishers targeting striped bass were only considered incidental catch, and not always included in herring total catch and harvest data. Fishers were actually targeting herring and striped bass simultaneously. Corrections were made to the interview process for the 2005 survey and estimated catch increased substantially to 152,117 herring with an increased retention rate of 75.1% (Table 4). Although some fish were reported as released, we consider these mortalities due to the herring's fragile nature. We also adjusted the 2001 catch using the 2005 survey data. The adjusted catch rose to 93,157 fish.

We also evaluated river herring use by striped bass anglers using data obtained from our Cooperative Angler Program (CAP). The CAP was designed to gather data from recreational striped bass anglers through voluntary trip reports. Volunteer anglers log information for each striped bass fishing trip including fishing time, location, bait use, and fish caught, including length, and weight, and bycatch. In 2006 through 2010, volunteer anglers were asked to provide specific information about herring bait use. The annual proportion of angler days where herring was used for bait ranged from 71% to 93 % with a mean of 77%. The proportion of herring used by anglers that were caught rather than purchased increased through the time period (Table 4). Herring caught per trip varied from 1.6 to 4.8 and with the highest values in the last two years. Herring purchased per trip ranged from 0.63 to 1.5 with the lowest value in 2009. We calculated the total number of herring caught or purchased by striped bass anglers in 2007 as the estimated number of striped bass trips from a statewide creel survey (90,742) * average proportion of angler days using herring in the CAP in 2007 (0.77) * number of herring caught or purchased per trip in the CAP (1.8 and 1.7). The result was 125,502 caught and 115,816 bought for a total of 241,318 herring used.

The number of river herring taken from the Hudson River and tributaries for personal use as food by anglers is unknown.

Long Island: Alewives can be caught in many of the small streams on Long Island, though only the Peconic River sees more than occasional effort. No creel data are available but anecdotal information (B. Young, NYSDEC retired, personal communication) suggests that harvest is rising in the more easily accessible streams. Herring taken are used for personal consumption as well as for bait.

The town of Southampton, on Long Island's East End, has local ordinances in place to prevent fishing (dipping) during the alewife spawning runs.

Bronx and Westchester Counties: We do not know if any fishery occurs in the streams in Bronx and Westchester Counties that empty into the East River and Long Island Sound.

4.2 Fishery Independent Surveys

4.2.1 Spawning Stock Surveys – Hudson River

Several surveys have sampled the alewife and blueback herring spawning stocks of the Hudson River and tributaries. The spawning stocks are made up of the fish which have escaped from coastal and in-river commercial and recreational fisheries.

The earliest data is from a biological survey of the Hudson in 1936 by the then New York State Conservation Department (Greeley 1937). The sample size was small (25 fish) but indicates the fish were relatively large compared to recent data. More recent data on river herring come from several Department surveys. The longest dataset (1975-2000) is from an annual survey of chemical contaminants in fish that targeted multiple species within the Hudson River estuary. Fish were collected by electro-fishing and river herring sample size varied among years. In most years, length data were recorded for a sub sample of herring. The Department also conducted a two-year electro-fishing survey in 1989 and 1990, to examine the population characteristics of blueback herring in the Hudson and the Mohawk River, the Hudson's largest tributary. Data were obtained on length, age, and sex.

Limited data on river herring stock characteristics have also been collected during annual monitoring of American shad and striped bass spawning stocks. Sampling occurs in the main-stem Hudson River between km 145 and 232 from late April through early June. Fish are collected by haul seines and electro-fishing. The 10.2 cm stretch mesh in the haul seines was specifically designed to catch shad and striped bass and avoid river herring, but some large (> 280mm) herring were occasionally retained in these gears. Herring were an incidental catch of the electro-fishing. Data were collected on length, age, and sex of river herring caught in both gears.

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In 1987, the Department began to target adult river herring during the spring spawning stock survey. From 1987 to 1990, two small mesh (9.5 mm) beach seines (30.5 and 61m) were occasionally used with some success. In 1998, we specifically designed a small haul seine (91 m) with an appropriate mesh size (5.1 cm) to target herring. It was designed to capture all sizes of herring present with the least amount of size, and age, bias. We have used this gear since 1999. Sampling occurs during the shad and bass survey within the area described above, using the same field crew.

We only use data from the least size-biased gears to describe characteristics of the herring spawning stock: electro-fishing, the beach seine (61m) and the herring haul seine (91m). As sample size varied among years, all data were combined to characterize size and weight composition of the spawning population. Mean total length and weight data are summarized for adults only (≥ 170 mm TL).

4.2.2 Hudson River Spawning Stock - Characteristics

Mean Size and Growth

Mean size of fish has been calculated for all years that samples were obtained (Figure 8). Sample size is relatively small, however, in most years presented ($n < 34$ fish). Adequate samples ($n > 34$), following the method described by Lynch and Kim (2010) to characterize length (depicted with an X over the graph's data point) were collected in the late 1980s, early 1990s, then occasionally since 2001 for both species. Lengths have declined since the early 1980s. Since 2000, mean size of female alewife has been stable, but declined slightly in males (Figure 8). Mean size of blueback herring has declined for both sexes from 1989 to the present.

Age

The Department samples from the 1989-1990 were primarily blueback herring. The aging method used was that of Cating (1954), developed for American shad. More recent scale samples from Department surveys remain un-aged and therefore we have limited age or repeat spawn data directly from scales of Hudson River fish. In attempting to age Hudson River herring scales, we relied on techniques used by other state agencies. As an alternative, and for a very general picture of potential age structure, we estimated annual age structure using length at age keys from datasets provided by Maine, Massachusetts, and Maryland for alewife and Massachusetts and Maryland for blueback herring. We found that three state agencies differ enough in their technique to produce variation in the results.

Blueback herring: Age estimates using length-age keys differed from ages assigned by the Department for the 1989- 1990 samples and from each other for most years (Figure 9). In general, keys from MD and MA were mostly in agreement for male blueback herring in most years, but MA aged females slightly older (Figure 10). Ages from two through eight were present in the spawning stock. Most fish were ages three, four, and five. Mean age remained

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relatively stable among years within method (Figure 11).

Alewife: Age estimates using length-age keys from the three states differed from each other for alewife (Figure 12). In general, the ME key resulted in the youngest ages, followed by older ages from MA, then MD. Ages from two through eight or nine were present in the spawning stock. Peak age varied with key used and by sex; most fish were ages three or four for males and four or five for females. Mean age was youngest for the ME key, older for MA, and oldest for MD age key (Figure 13). Mean age for males was greater in 2001 and 2003, then dropped and remained relatively stable for 2005 through 2010. Mean age for females was slightly lower in 2008 and 2009 but by 2010 returned to the same level as estimated for 2001 and 2003.

Maximum age that the Hudson River herring stock can attain is unknown. Jessop (B. Jessop DFO retired, personal communication) reported a maximum age of 12 for both alewife and blueback herring for the St. John's River in New Brunswick.

Given current uncertainty about aging methods and age of Hudson River river herring, we suggest that available estimates should only be used for a general discussion of age structure and for trends within estimate method. We do not feel that age estimates should be used to monitor changes in stock status or to set sustainable fishing targets until aging methods can be verified. This issue is currently being discussed in the ongoing ASMFC River Herring stock assessment where resolution to the differences in ageing methods is being sought..

Mortality Estimates

The variation in annual age structure translated into comparable variation in estimates of total mortality when various age-based estimation methods were used. This difficulty in estimating ages precluded the use of age-based mortality estimators. As an alternative, we explored use of the Beverton-Holt length-based method (Gedamke and Hoenig 2006) using growth parameters for length calculated from the 1936 length at age data (see section above). Since the definition of length at full recruitment (L_c) given by Nelson et al. (2010) seemed arbitrary, we estimated total mortality using the Nelson et al. (2010) and two additional L_c values. Results from the length based method were also influenced by L_∞ . The Beverton-Holt method also relies on several population assumptions including continuous recruitment to the stock that the population is in equilibrium. Neither of these assumptions are true for Hudson herring stocks.

Total mortality estimates for alewife of both sexes varied tremendously within and among years depending on assumed model inputs (Figure 14). Estimates increased until 2006, after which a decline occurred to 2010. An even greater variation occurred for blueback herring (Figure 15) with a series of very high peaks followed by low values. Given this demonstrated sensitivity to model inputs, we suggest that total mortality of Hudson River river herring stocks remains unknown. However, we should emphasize that mortality on stocks must have been high in the last 30 years to have so consistently reduced mean size and presumably mean age. We do not feel that estimates of total mortality should be used to monitor stock change during the proposed experimental fishery unless uncertainty in estimation methodology can be resolved. Current uncertainty precludes use of total mortality to set sustainability targets.

4.2.3 Spawning Stock Surveys – Long Island

Young (2011) sampled alewife in the Peconic River 32 times throughout the spawning season in 2010. Sampling occurred by dip net just below the second barrier to migration at the lower end of a tributary stream. A rock ramp fish passage facility was completed at the first barrier near the end of February 2010. The author collected data on total length and sex and estimated the number of fish present based on fish that could be seen below the barrier. Peak spawning occurred during the last three weeks of April. The minimum estimate of run size was 25,000 fish and was the total of the minimal visual estimates made during each sample event. Males ranged from 243- 300 mm with a mean length of 263 mm. Females ranged from 243-313 mm with a mean of 273 mm.

4.2.4 Volunteer and Other river herring monitoring

The Department's Hudson River Fisheries Unit (HRFU), Hudson River Estuary Program and the Environmental Defense's South Shore Estuary Reserve Diadromous Fish Workgroup (SSER) have begun to incorporate citizen volunteers into the collection of data on temporal variation of and physical characteristics associated with spawning of river herring in tributaries. These data were not provided by the fishery dependent and independent sample programs discussed above. The volunteer programs also bring public awareness to environmentally important issues.

Long Island Streams

The SSER began a volunteer survey of alewife spawning runs on the south shore of Long Island in 2006. The survey is designed to identify alewife spawning in support of diadromous fish restoration projects. The survey also evaluates current fish passage projects (i.e. Carmans River fish ladder), and sets a baseline of known spawning runs. Data were available for surveys in 2006 – 2008. Monitoring occurred on six to nine targeted streams annually, with volunteer participation ranging from 24 to 68 individuals. Monitoring takes place from March through May. Alewife were seen as early as March 5 (2006) and as late as May 31 (2008). Data indicated that alewife use multiple streams in low numbers. It is not clear whether each stream supports a spawning population since total sightings were very low. The Carmans and Swan Rivers showed the most alewife activity and likely support yearly spawning migrations. The first permanent fish ladder on Long Island was installed in 2008 on the Carmans River. Information gathered during this study will aid in future construction of additional fish passage (Kritzer et al. 2007a, 2007b and Hughes and O'Reilly 2008).

In addition to the SSER, other interested individuals have also monitored Long Island runs (see Appendix Table A). Anecdotal data provides valuable information on tracking existing in-stream conditions, whether streams hold active or suspected runs, interaction with human land uses and suggestions for improvement (L. Penney, Town of East Hampton, personal communication). A rock ramp was constructed around the first barrier to migration on the Peconic River in early

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2010 (B. Young, retired, NYS Dept of Environmental Conservation, personal communication). The Peconic River Fish Restoration Commission set up an automated video counting apparatus at the upriver end of this ramp. Data are still being analyzed.

The Department has conducted a similar river herring volunteer monitoring program annually since 2008 for tributaries of the Hudson River Estuary (Dufour et al. 2009, NYSDEC 2010, Hattala et al. 2011). We designed this project to gather presence–absence and temporal information about river herring spawning runs from the lower, middle and upper tributaries of the Estuary. Between nine and 11 tributaries were monitored annually by 70 to 213 volunteers in 2008, 2009, and 2010. Herring were seen as early as 31 March and as late as 1 June. River herring were observed in all but one of the tributaries. However, several tributaries with known strong historical runs had very few sightings. Water temperature seemed to be the most important factor determining when herring began to run up a given tributary. Sightings of herring were most common at water temperature above 50 F. Tributaries in the middle part of the estuary warmed the fastest each spring and generally had the earliest runs.

4.2.5 Young-of-the-Year Abundance

Since 1980, the Department has obtained an annual measure of relative abundance of young-of-the-year (YOY) alewife and blueback herring in the Hudson River Estuary. Although the program was designed to sample YOY American shad, it also provides data on the two river herring species. Blueback herring appear more commonly than alewife. In the first four years of the program, sampling occurred river-wide (rkm 0-252), bi-weekly from August through October, beginning after the peak in YOY abundance occurred. The sampling program was altered in 1984 to concentrate in the freshwater middle and upper portions of the Estuary (km 88-225), the major nursery area for young herring. Timing of samples was changed to begin in late June or early July and continue biweekly through late October each year. Gear is a 30.5 m by 3.1 m beach seine of 6.4 mm stretch mesh. Collections are made during the day at approximately 28 standard sites in preferred YOY herring habitat. Catch per unit effort is expressed as annual geometric and arithmetic means of number of fish per seine haul for annual weeks 26 through 42 (July through October). This period encompasses the major peak of use in the middle and upper estuary.

From 1980 to 1998, the Department's geometric mean YOY annual index for alewife was low, with only one year (1991) over one fish per haul. Since 1998, the index has increased erratically (Figure 16).

From 1980 through 1994, the Department's geometric mean YOY annual index for blueback herring averaged about 24 fish per haul, with only one year (1981) dropping below 10 fish per haul (Figure 16). After 1994, the mean dropped to around 17 fish per haul, and then began the same high-low pattern observed for alewife.

The underlying reason for the wide inter-annual variation in YOY river herring indices is not clear. The same erratic trend that occurred since 1998 has also occurred in American shad

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(Hattala and Kahnle 2007). The increased inter-annual variation in relative abundance indices of all three Alosines may indicate a change in overall stability in the system.

4.2.6 Conclusion

Over the last 30 years, the Hudson River stocks of alewife and blueback herring have shown inconsistent signs in stock status trends. Calculated CPUE for commercial gill net gears has increased in recent years, while CPUE in scap nets fished in tributaries initially declined, but has remained relatively stable since 2003. Apparent mortality increased on mature fish and as mortality rose, mean total length and weight declined. Similar trends occur in the both the fishery dependent and independent data. Recruitment has become extremely variable since the mid-1990s for both species. Some decline is occurring for YOY blueback herring while, counter-intuitively, there has been an increasing trend for YOY alewife. Anecdotal evidence from anglers and commercial fishermen suggest a decline in abundance in tributaries yet a dramatic increase of herring in the main-stem river in the last few years.

The upsurge in river herring used as bait for striped bass has placed herring in a tenuous position. With this continuing demand, declining size, and increasing mortality, careful management is needed despite variable but stable recruitment.

5 PROPOSED FISHERY CLOSURES

5.1 Long Island, Bronx County and Westchester County

Limited data that have been collected for Long Island river herring populations are not adequate to characterize stock condition or to choose a measure of sustainability. Moreover, there are no long-term monitoring programs in place that could be used to monitor future changes in stock condition. In 2010, the Peconic River Fish Restoration Commission installed a rock ramp to provide fish passage at the first dam on the Peconic River system. In the spring of 2011, a fish counting apparatus was installed upriver of this ramp. In addition, the Commission initiated biological fish sampling of species, sex, length and scales. If these operations continue in the future and if these provide information that could be used to set and monitor a sustainability target, we will consider a fishery for this river. Little data have been collected for river herring populations in the Bronx and Westchester Counties.

For the above reasons, New York State will close all fisheries for river herring in Long Island streams and in the Bronx and Westchester County streams that empty into the East River and Long Island Sound.

5.2 Delaware River

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We have no data that suggest river herring occur in New York waters of the Delaware River. New York State proposes to close fishing for river herring in New York waters of the Delaware River to prevent future harvest should the Delaware stock rebound and expand upriver. This closure conforms to similar closures planned for the Delaware River and Bay by Pennsylvania, New Jersey, and Delaware.

6 PROPOSED SUSTAINABLE FISHERY

6.1 Hudson River and Tributaries

Given the mixed picture of stock status provided by available data on Hudson River herring, New York State proposes a restricted fishery in the main-stem Hudson River coupled with a partial closure of the fishery in all tributaries. We do not feel that the data warrant a complete closure of all fisheries. We propose that the restricted fishery would continue for five years concurrent with annual stock monitoring. We propose a five-year period because the full effect of our proposed restrictions will not become apparent until all age classes in the population have been exposed to the change. Most of the fish in the Hudson River herring spawning stocks are estimated to be three through seven years old and these ages predominate in the fishery. Sustainability targets would be set juvenile indices. We would monitor, but not yet set targets for mean length from fishery independent spawning stock sampling and CPUE in the commercial fixed gill net fisheries in the lower river below Bear Mountain Bridge. We will also monitor age structure, frequency of repeat spawning, and total mortality (Z) if we can resolve uncertainties about aging methods and mortality estimate methodology. Stock status would be evaluated during and after the five year period and a determination made whether to continue or change restrictions. Moreover, we do not know how much of the apparent high mortality is caused by bycatch in ocean fisheries and thus outside current scope of restrictions proposed in this plan.

Recreational harvest of river herring is much greater than reported harvest from commercial gears. Data from a creel survey in 2005 estimated approximately 152,000 herring were taken in the recreational fishery (NAI 2007) while some 31,000 herring were reported from commercial gears (Table 2). For this reason, we feel that restrictions to the recreational fishery will likely have a greater impact on take of herring than commercial restrictions.

We should note that Draft Addendum 3 to Amendment 6 of the ASMFC Interstate Management Plan for striped bass stipulates that states should reduce fishing mortality on spawning stocks by 50%. If this draft is approved by the ASMFC Striped Bass Management Board, we may have to restrict effort in the recreational striped bass fishery. Restrictions may include a reduction in use of bait such as river herring. Any reduction in effort will likely reduce demand for river herring and thus reduce losses in the Hudson stocks.

A summary of the following fishery restrictions are contained in Tables 5 and 6. These restrictions were based on public comments received from public information meetings held in

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the Hudson valley in 2010 in addition to the need to reduce harvest. Public suggestions for restrictions are listed in Appendix C.

6.1.1 Proposed Restrictions – Recreational Fishery

Recreational fishing season

Currently none; proposed season is March 15 to June 15.

Recreational Creel Limit

Currently there are no restrictions on daily take of river herring in the Hudson and its tributaries. To reduce harvest and waste, we propose to implement a restrictive recreational creel limit of ten river herring per day, or a total maximum boat limit of 50 per day for a group of boat anglers, whichever is less. A Charter boat captain (see Commercial Fishery Restrictions) will be responsible for a possession limit of 10 river herring per paying customer or a total maximum boat limit of 50 herring per day, whichever is less. Charter boat captains are required, at minimum, to hold a US Coast Guard “six pack” license, i.e. a maximum number of six passengers can be on board. However, most vessels fishing the Hudson relatively small (20 to 30 ft) with an average of four fares maximum.

Most of the river herring harvest is driven by striped bass fishermen catching herring for bait. Anecdotal reports and comments at public meetings suggest that many anglers take many more herring than they need for a day’s fishing. The proposed creel limit will prevent such overharvest and avoid waste. We obtained an idea of potential harvest reduction from the proposed creel survey from data in the Cooperative Angler Program described in Section 2.1.3. Data were available on herring harvest during 502 trips. Since trip level reports often included more than one angler, we divided the reported herring catch by the number of anglers for an estimate of catch per angler trip. These data indicated that 56 percent of the catch per angler trips caught six or more herring suggesting that a five fish limit could reduce harvest by 56 percent.

To track harvest, New York will implement the on line creel survey/ diary program coordinated by ACCSP. It is scheduled to go live by Jan. 1, 2012. New York will increase public outreach to encourage angler use of this program. We will also continue the Cooperative Angler Program for comparison and for individuals not savvy with on-line tools.

Prohibit Harvest by Nets in Tributaries

Recreational anglers generally use hook and line (jigging) in the main-stem river and are allowed to use personal use gears (without a license) of scap/lift nets (36 sq ft or less), small dip nets, and cast nets. They are not required to report this catch and the number of herring taken by these gears is unknown. Anecdotal reports and observations suggest tributaries are popular locations for recreational harvest by these net gears, especially in the middle section of the estuary (Figure 1).

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Information from the volunteer angler program along with anecdotal data on recreational harvest suggests that abundance of river herring, mostly alewife, has declined in some spawning tributaries. This may be due to the increased vulnerability to harvest as herring often concentrate in these tributaries in large schools to spawn. Tributaries with an impassable barrier close to the mouth confine fish to even smaller areas. For these reasons, we feel it prudent to close recreational harvest by nets from tributaries until measures of stock condition improve. We did not feel that it was feasible or desirable to enforce a closure on angling for river herring in tributaries.

In the main-stem Hudson, personal use nets will be allowed to continue but with a reduced size for scap/ lift nets (16 sq ft instead of 36 sq ft); seine, cast, and dip nets sizes will remain the same (Table 5).

Closed areas

Although personal-use net fishing by recreational anglers will not be allowed in tributaries, angling will continue. However, to further relieve fishing pressure in areas of fish concentration, in addition to the net ban, no fishing will be allowed within the River Herring Conservation Area (RHCA) defined as stream length within 250 m (825 feet) of any type of barrier, natural or man-made. This is similar to a fishing ban within 50 rods of fishways instituted in New York in 1895. Many of the Hudson's tributaries have natural (rapids) or man-made barriers a short distance in from the main river. River herring concentrate in great numbers below these barriers making them very vulnerable to any fishing. This closed area will allow them to spawn in this undisturbed stretch. The RHCA closure will effectively end all fishing in the eight smallest tributaries, or 14% of the tributaries in the estuary.

Above the Troy Dam, an area closure is already in effect for the "Waterford Flight", Lock 2 to Guard Gate 2, a series of dams and locks at the entrance to the Mohawk River. Within the Mohawk, a RHCA will be in effect below any of the remaining locks and dams up to Lock 21 in Rome.

Escapement period

None are proposed.

Licensing and reporting

In 2011, New York State implemented a recreational marine fishing registration. All anglers fishing for anadromous fish must register prior to fishing for migratory fish of the sea. For the Hudson this includes river herring and striped bass. The recreational and commercial fisheries for American shad were closed in the Hudson River in 2010.

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By Jan 1 2012 New York, in cooperation with ACCSP, will start up an online angler survey. The Department will increase public outreach to strongly encourage fishers to use this new tool to aid in understanding recreational catch and harvest.

6.1.2 Proposed Restrictions – Commercial Fishery

License Required:

Currently, fishers using commercial, non-personal use size gears to take and /or sell fish must be in possession of a Marine Permit for that gear. Marine permits have an annual reporting requirement, but no requirements for proof that harvest was for commercial purposes. Recreational fishermen commonly purchase marine permits and use commercial gears because of the low cost. We propose to strengthen the commercial aspects of these gears by requiring proof that harvest was sold as a requirement for license renewal.

The overlap with gears licensed under the NY bait license will be minimized by requiring a Marine Permit to take river herring. Cast nets will be included under the Marine Permit licensing system.

Closed area

We propose to continue the current closures as listed in Table 6 and implement a new closure:

Prohibit Harvest by Nets in Tributaries: Closing the tributaries to harvest by nets will likely reduce overall harvest, but the actual size of this reduction is not known. We do not know the size of recreational net harvest from tributaries. We can infer current commercial harvest from tributaries by the number of fish taken in scap nets since most river herring taken in tributaries are taken by this gear and most scap nets are fished in tributaries. Mean annual reported harvest by commercial scap nets in the last five years was about 15,000 river herring or 48% of the total reported commercial harvest. The mean number of commercial fishing trips using scap nets during this time period was 611 trips which were about 59% of all reported trips in the estuary and tributaries. Elimination of commercial net harvest from these waters will eliminate commercial fishing in 175 miles, or approximately 65% of linear spawning streams in the Estuary and above the Troy Dam.

Gear Restrictions

All current gear restrictions will remain in place (Table 6). Other changes include:

Gill nets: Currently both anchor and drift gill nets are used in the mid and upper estuary above the Bear Mountain Bridge (> rkm75). Both gears catch herring, but losses can be higher in anchored nets because they are often not tended as frequently as drifted nets. This is especially the case with recreational fishermen who are often not experienced in use of gill nets. We propose to ban use of fixed gill nets in the Hudson River above Bear Mountain Bridge; drift gill

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nets are required to be tended by owners as they are fished. We don't know what reduction in harvest would result, but some will occur and the change will certainly reduce waste of fish.

Scap /Lift nets: Currently there are no limits on size of scap nets to be used. Mandatory reports indicate that the largest nets in use are 400 sq ft (20 by 20 ft). The proposed maximum net size is 10 ft by 10 ft.

Fyke and Trap nets: Although currently legal for the take of river herring, no commercial harvest is reported from these gears. We propose that their use not be allowed for harvest of river herring.

Commercial Net Permit and Fees

Commercial gears in the main-stem Hudson and tributaries are licensed under a NYSDEC Bureau of Marine Resources Marine Permit. Access to obtain a Marine Permit remains open, with no prior requirements. These commercial gears are often used by recreational fishermen because current permit fees are very low. Most fees were set in 1911 by the then New York Forest, Fish and Game Commission and no fee increases have occurred through the present time. Commercial gears such as gill nets can take high numbers of herring and are not considered to be recreational gear in New York. For the purposes of harvest in ocean waters (Marine and Coastal District), gill nets are considered commercial gear and their use for recreational purposes is not permitted.

We propose regulations to increase fees to account for inflation, to emphasize that nets are commercial gears, and to discourage casual use by recreational anglers. Current fee structure can be found in New York Code of Rules and Regulation- Part 35 (see <http://www.dec.ny.gov/regs/4019.html>). We considered two alternatives.

1. Increased gear and fishing vessel fees.
 - a. In 1911, fees were \$5.00 per each trap, seine or gill net, and \$1.00 per scap net. These fees would translate to \$115.00 per gill net or seine and \$25.00 per scap net in today's (2011) dollars.
 - b. Gill nets and seines can also be licensed by the linear foot of net rather than as a type of net. We propose that the current \$ 0.05 per foot be increased to \$1.00 per foot. Data from the mandatory reports indicates that the most recent (2010) licensed gill net lengths ranged from 10 ft (\$10 fee) to 600 ft (\$600 fee). Seines have no maximum length restriction in place; current use is 50 ft (\$50 fee) to 100 ft (\$100 fee).
 - c. Another way to differentiate between recreational and commercial fishermen is to reinstitute the 1911 fishing vessel registration for the Hudson River, which is still active for other waters of NY. The 1911 fee of \$15.00 for the smallest motorized vessel translates to \$350.00 per vessel in today's dollars.
2. A single commercial gear permit.

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This approach simplifies the above combination of gear fees and is our preferred alternative.

We would create a Hudson River Commercial Fish Gear Permit (HRCFGP): for individuals who want to harvest river herring or Atlantic menhaden; fee of \$150. This would be instead of individual gear licenses.

- a. Qualifications needed: proof of previous sale to a licensed retail bait shop; if a business (retail bait shop), proof of business incorporation (LLC)
- b. If applicant holds a valid New York food fish or crab permit(s); cost of HRCFGP to be offset by valid permit fee(s)
- c. To include all restrictions as listed in Table 6.
- d. Gears to be used include anchored (fixed) and drifted gill nets, scap/lift nets, seines and cast nets (see Table 6 for size limitations)

Gear restrictions outlined above will still apply to any alternative chosen.

Closed Fishing Days

A 36-hour escapement period per week, from 6 AM prevailing time on Friday to 6 PM prevailing time on Saturday, is in effect for commercial gill nets from March 15 to June 15. We propose to expand this closure to include all commercial nets.

Reporting

Current mandatory reports of daily catch and effort data are submitted annually. We will continue to require these reports, but decrease the time of report submission to monthly.

Charter Boat License

In order to distinguish Charter Boat operators from recreational anglers, we propose to use the existing Marine & Coastal District Party & Charter Boat License (CPBL), as it exists for NY's Marine District. CPBL holders will follow all regulation as established for the Marine District with two exceptions: creel and size limit for striped bass will comply with limits set for the Hudson River above the G. Washington Bridge and the creel limit for a charter boat will be 20 river herring per day. Hudson valley charters can take up to three to six individuals per trip.

7 PROPOSED MEASURES OF SUSTAINABILITY

7.1 Targets

Juvenile Indices

We propose to set a sustainability target for juvenile indices using data from the time period of

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1983 through 2010 for both species. We will use a more conservative definition of juvenile recruitment failure than described in section 3.1.1.2 of Amendment 2 to the ASMFC Interstate Fisheries Management Plan for Shad and River herring (ASMFC 2009). Amendment 2's definition is that recruitment failure occurs when three consecutive juvenile index values are lower than 90 % of all the values obtained in the base period. We will use a 75% cut off level. The 75% level for alewife is 0.35 (instead of 0.19) and 11.14 (instead of 2.86) for blueback herring (Figure 16).

The fishery will close system-wide if recruitment failure, defined as three consecutive years below the recruitment failure limit, occurs in either species and will remain closed until we see three consecutive years of recruitment greater than the target values.

7.2 Sustainability Measures

There are several measures of stock condition of Hudson River herring that can be used to monitor relative change among years. However, these measures have limitations (described below) that currently preclude their use as targets. These include mean length in fishery independent samples, catch per unit effort (CPUE) in the reported commercial harvest and age structure. We propose to monitor these measures during the fishery and use them in concert with the sustainability target to evaluate consequences of a continued fishery.

Mean Length

Mean total length reflects age structure of the populations and thus some combination of recruitment and level of total mortality. Mean total lengths of both river herring species in the Hudson River system has declined over the last 20 years and the means are now the lowest of the time series. Since this has been a persistent change in the face of stable recruitment, we suggest that the reduction in length has been caused by excessive mortality of adults within the river and during their ocean residency (bycatch). The bycatch fishery is a large unknown and not solely controlled by New York State to effect a change. Current annual reproduction now relies on a few returning year classes making the populations vulnerable to impacts of poor environmental conditions during the spawning and nursery seasons. We propose to monitor mean total lengths during the proposed fishery.

Catch per Unit Effort in Report Commercial

We suggest that CPUE values of the reported harvest reflect general trends in abundance. However, annual values can be influenced by changes in reporting rate and thus we do not feel that CPUE should be used as a target. Rather, we will follow changes within gear types and fisheries for general trends.

Age structure and Total mortality

We will monitor age structure, frequency of repeat spawning, and total mortality (Z) if we can

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resolve uncertainties about aging methods and estimate methodology discussed in Status Section 4.2.2.

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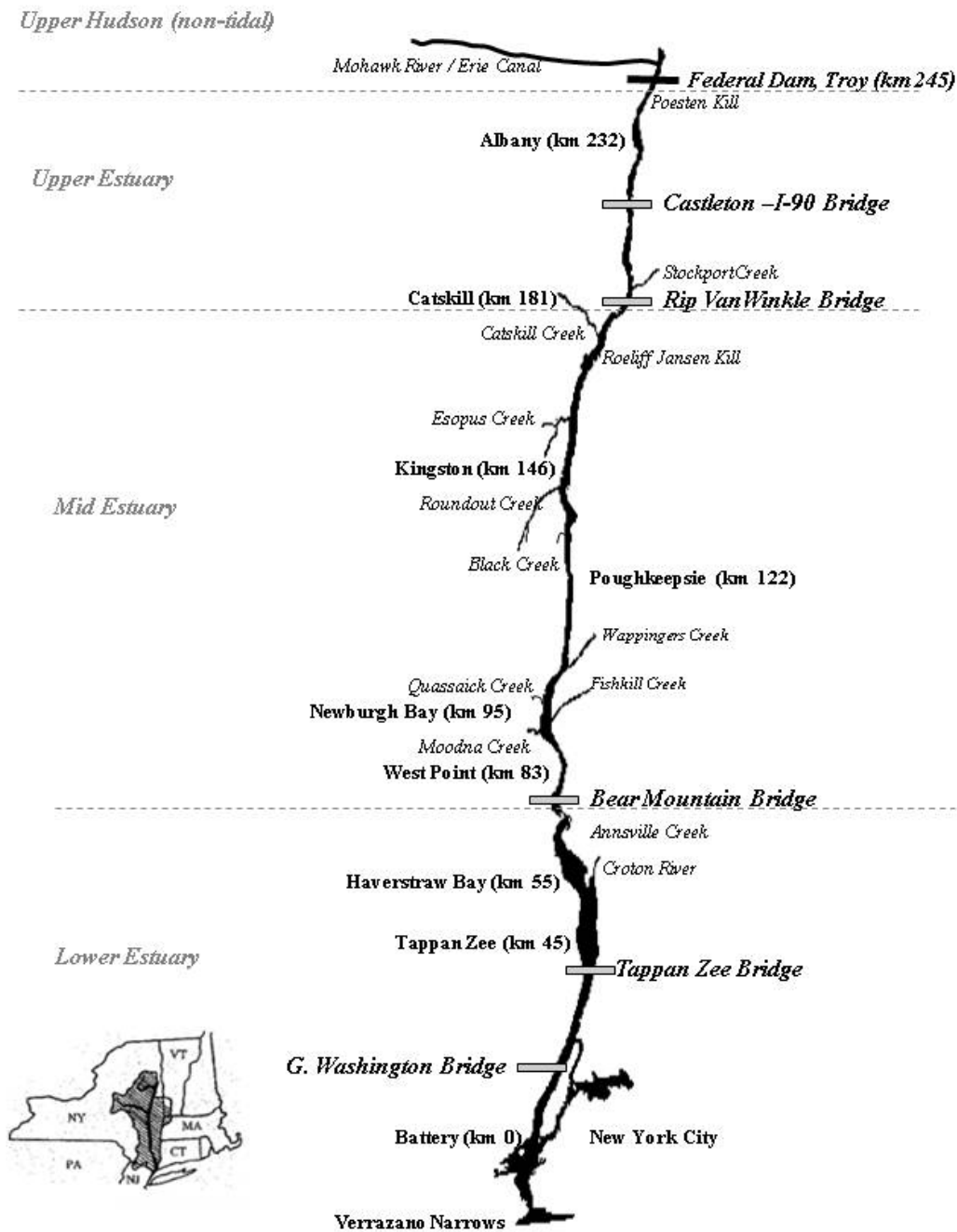


Figure 1 Hudson River Estuary with major spawning tributaries for river herring. (see Appendix Table A for complete list)

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Figure 2 Long Island, Bronx and Westchester Counties, New York, with some river herring (primarily alewife) spawning streams identified (See Appendix Table A for list)

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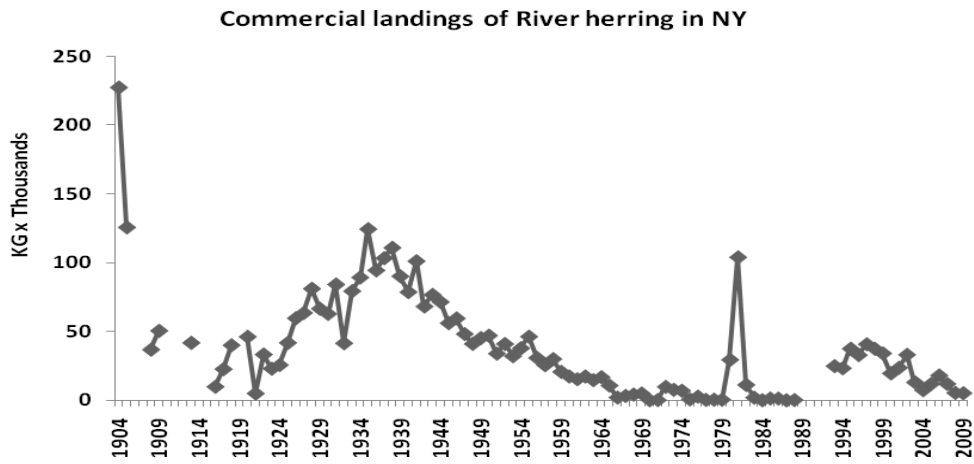


Figure 3 Commercial landings of river herring from all waters of New York State.

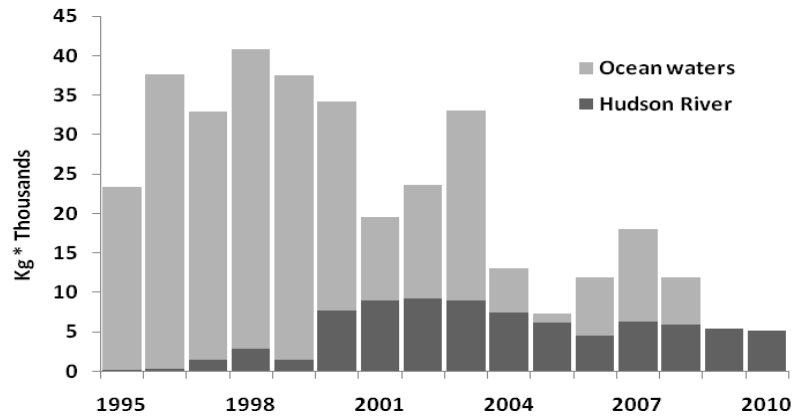


Figure 4 Commercial landings of river herring in the Hudson River and NY Ocean waters.

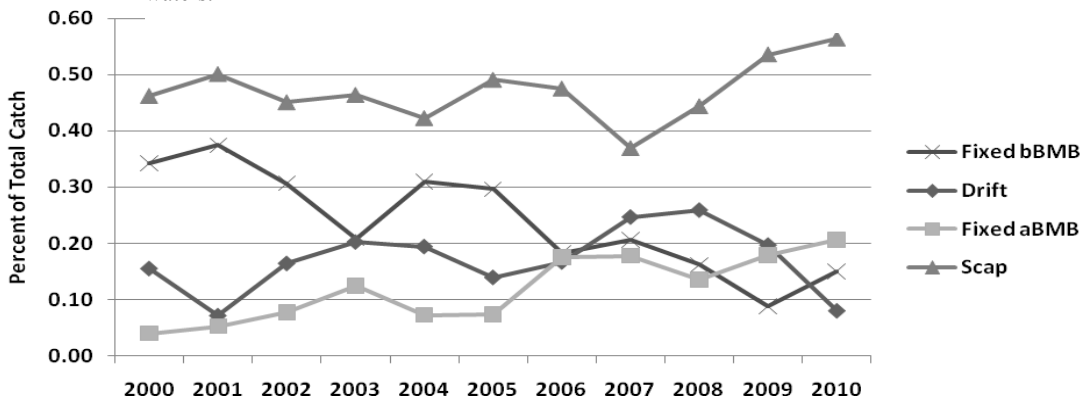


Figure 5 Percent commercial catch by gear of river herring in the Hudson River (a/b BMB=above and below Bear Mountain Bridge).

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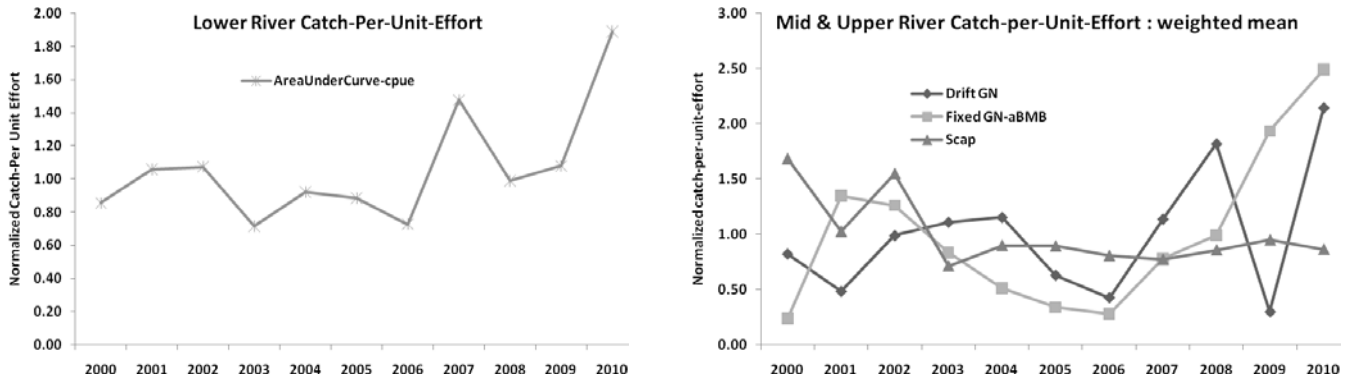


Figure 6 Catch per Unit Effort (number of fish per hours fished) by area of the river and gear. Lower estuary = below Bear Mountain Bridge [rkm 75]; Mid & Upper estuary = above the Bear Mountain Bridge.

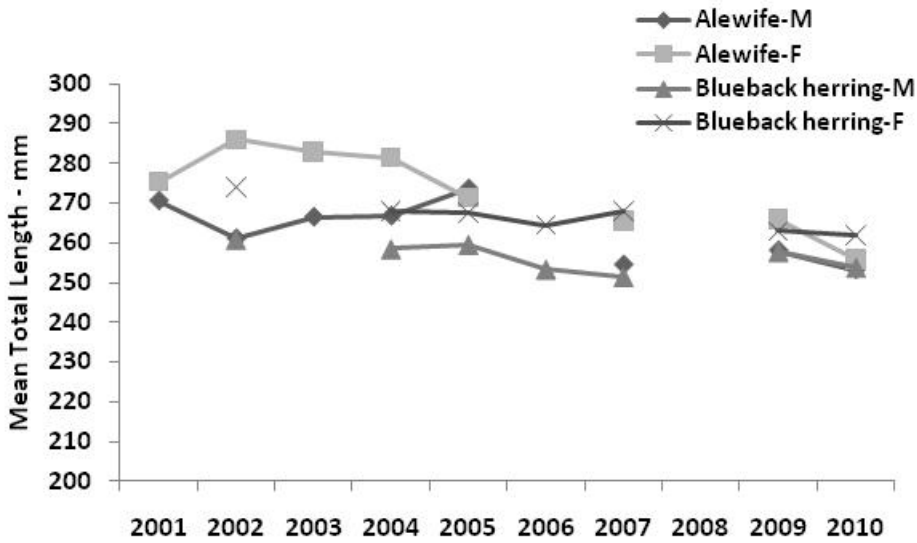


Figure 7 Mean total length of river herring collected from commercial fishery monitoring trips in the Hudson River Estuary

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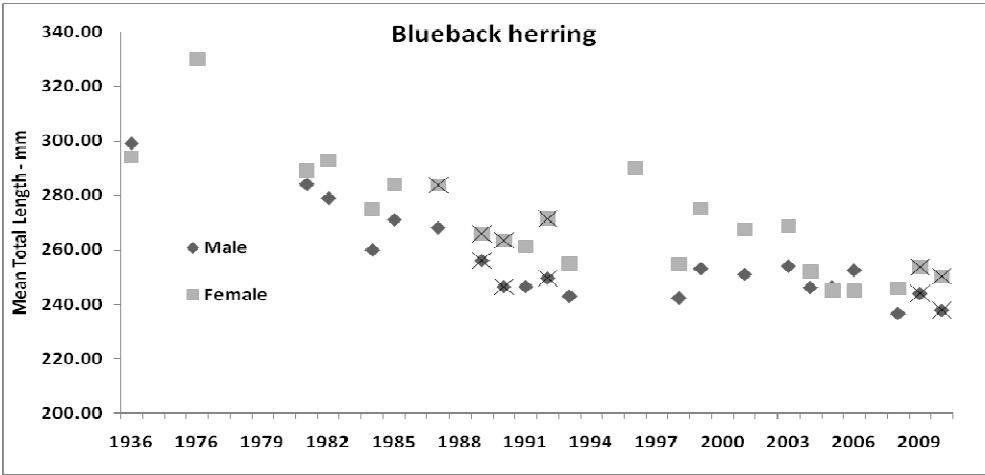
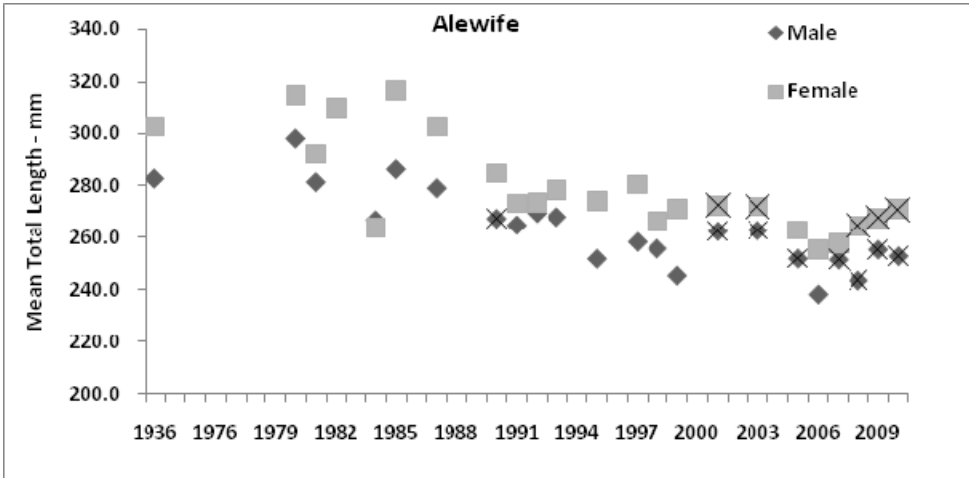


Figure 8 Mean total length of river herring in the Hudson River Estuary. Symbols with an “X” indicate adequate sample size (N > 34) to characterize the stock.

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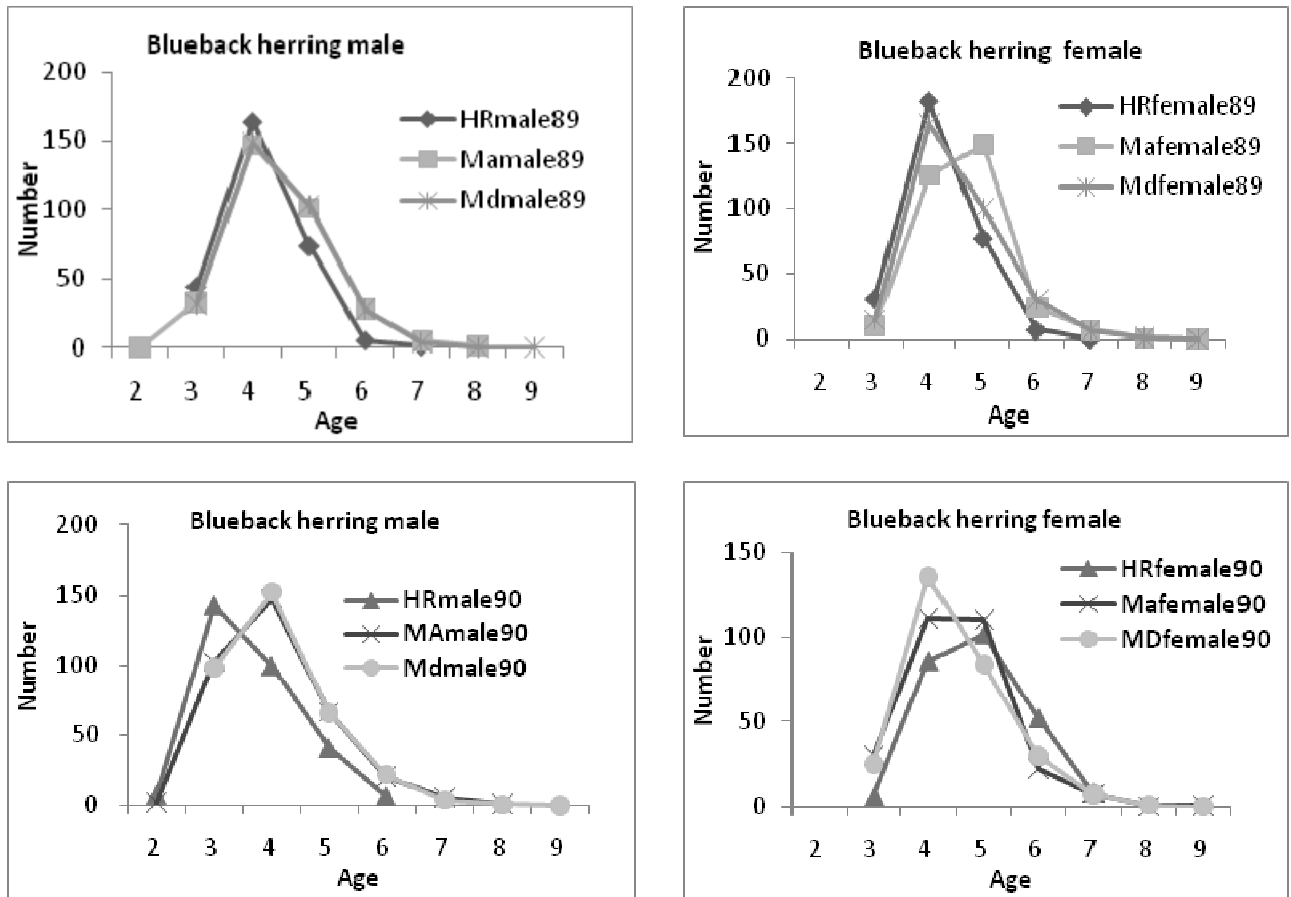


Figure 7 Hudson (HR) age structure and estimated age structure of Hudson River blueback herring based on length-at-age keys from Massachusetts (MA) and Maryland (MD) blueback herring.

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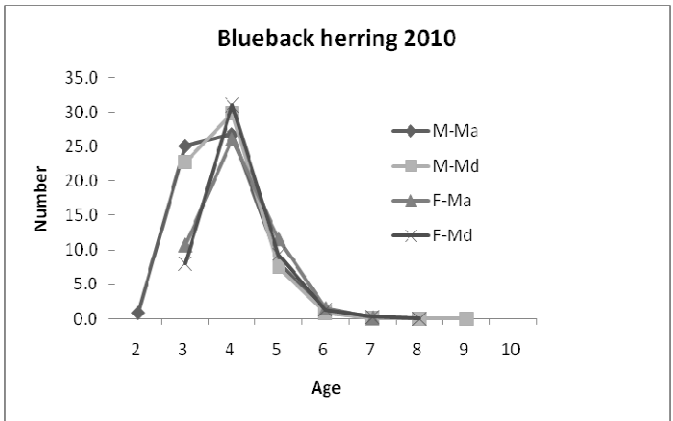
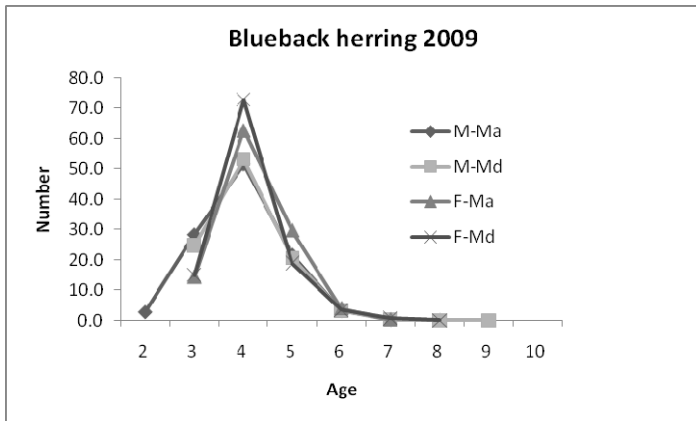
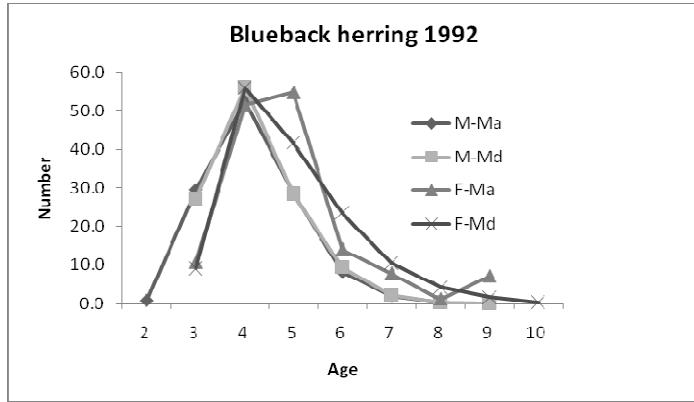


Figure 10 Estimated age structure of Hudson River blueback herring based on length-at-age keys from Massachusetts (MA) and Maryland (MD).

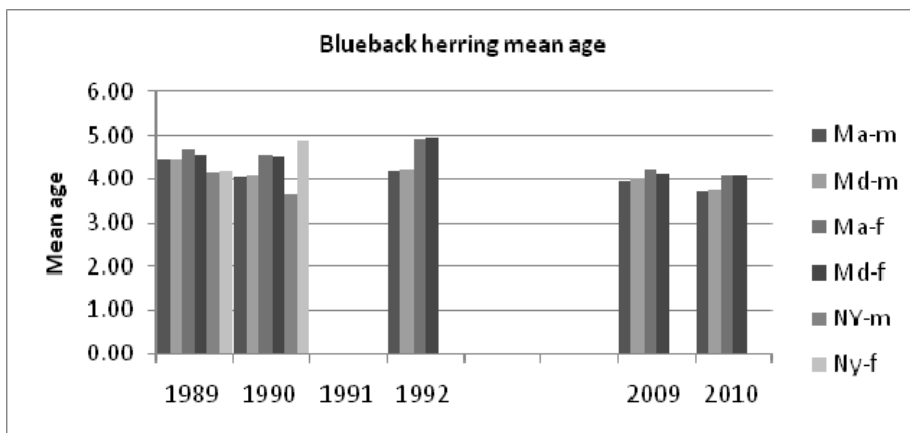


Figure 11 Mean age of Hudson River blueback herring based on length-at-age keys from Massachusetts (MA) and Maryland (MD).

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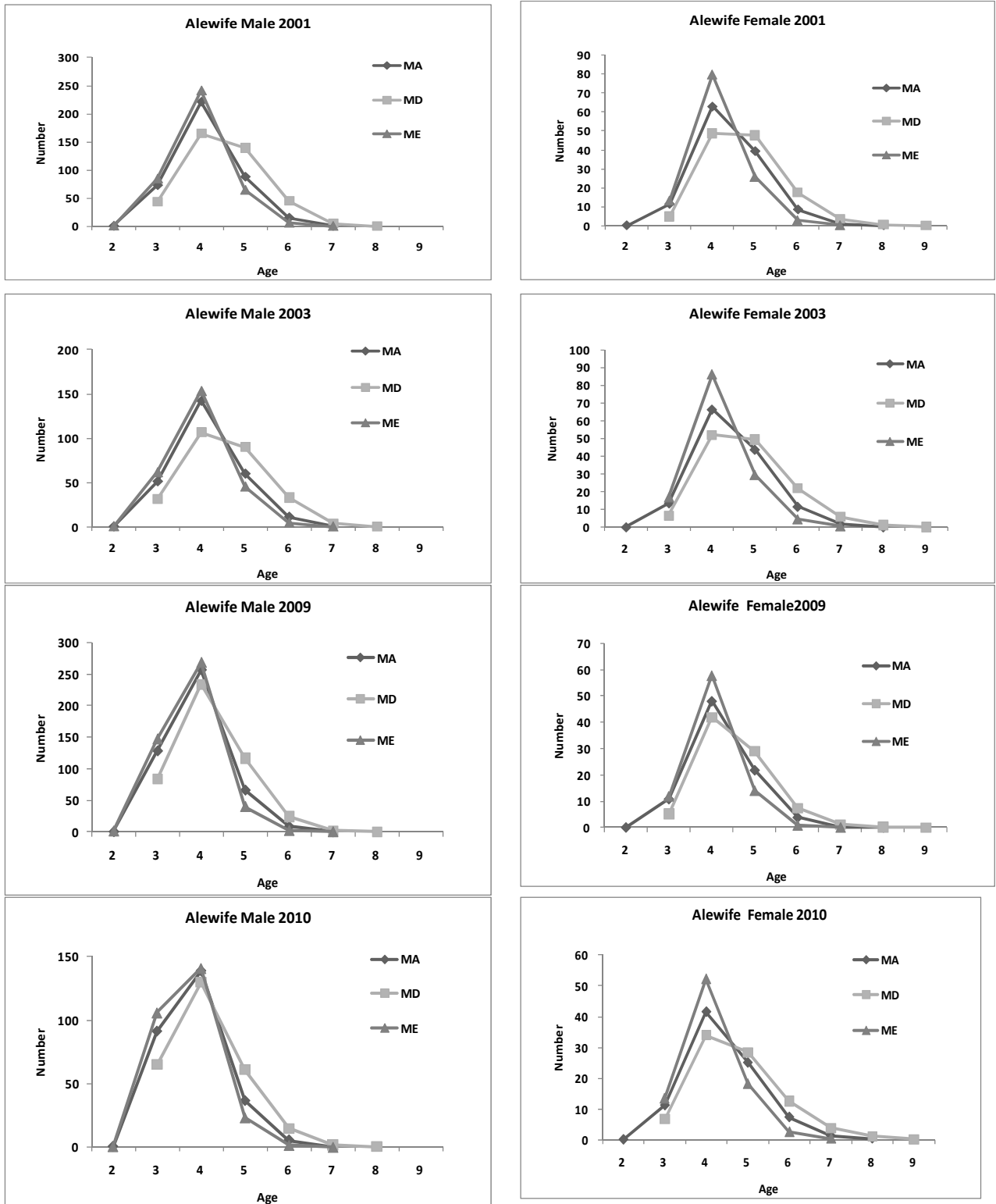


Figure 12. Estimated age structure of Hudson River alewife based on length-at-age keys from Maine (ME), Massachusetts (MA) and Maryland (MD).

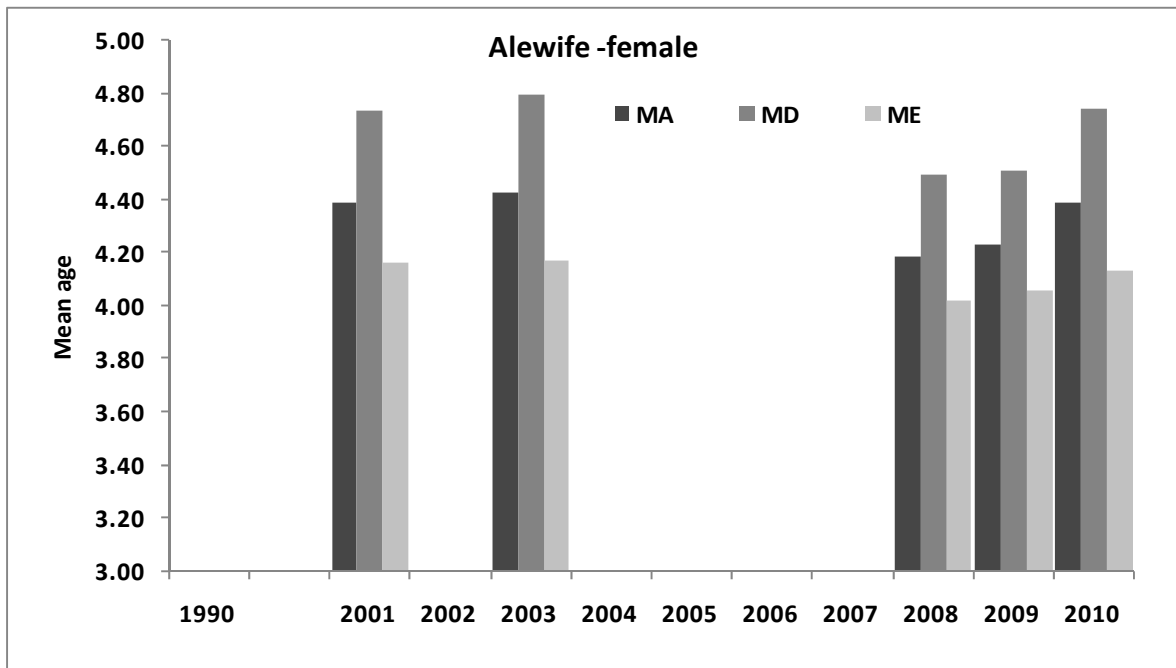
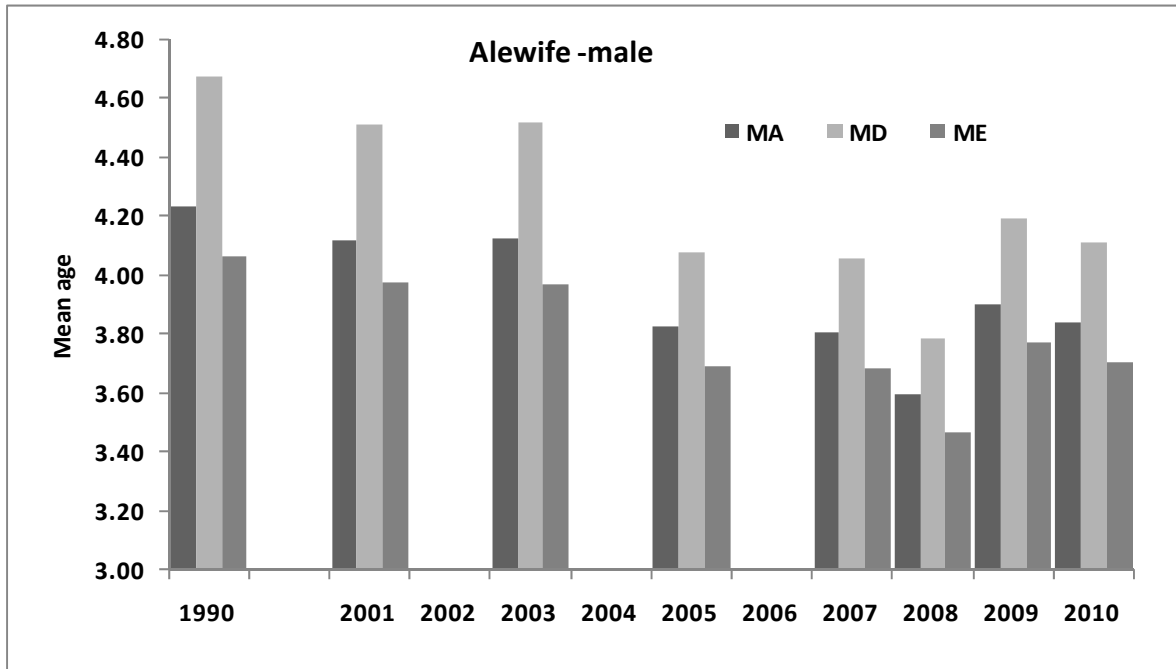


Figure 13. Mean age of Hudson River alewife, ages estimated from age-length keys from Maine (ME), Massachusetts (MA) and Maryland (MD).

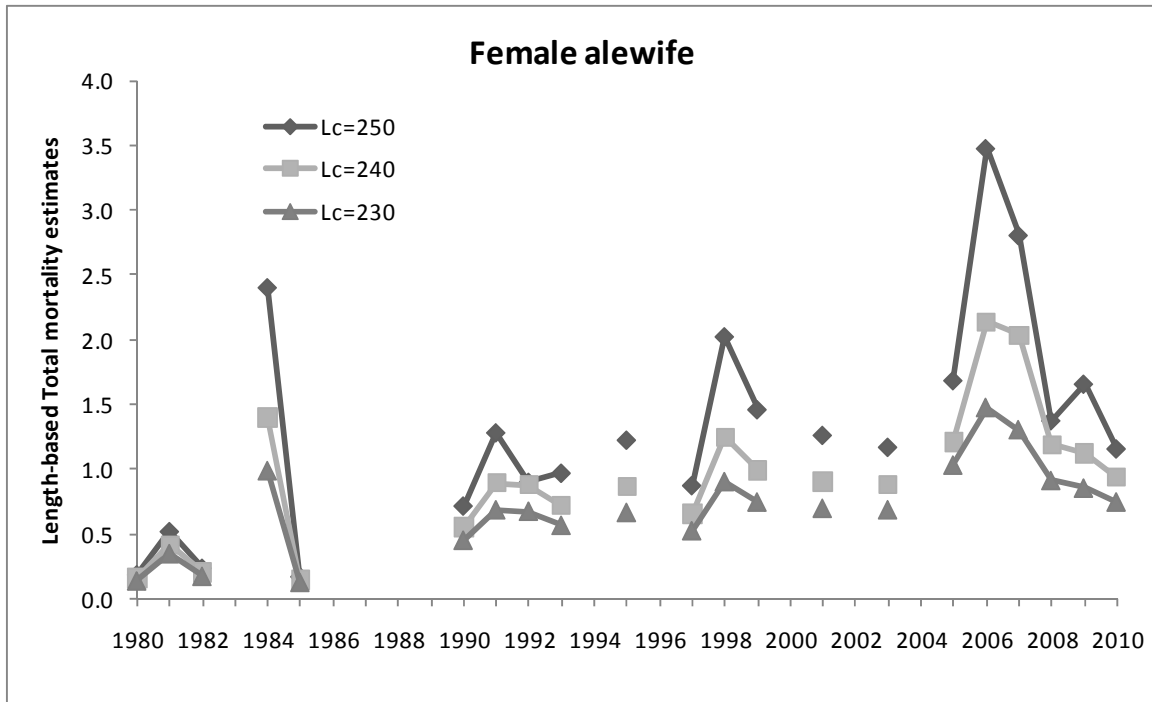
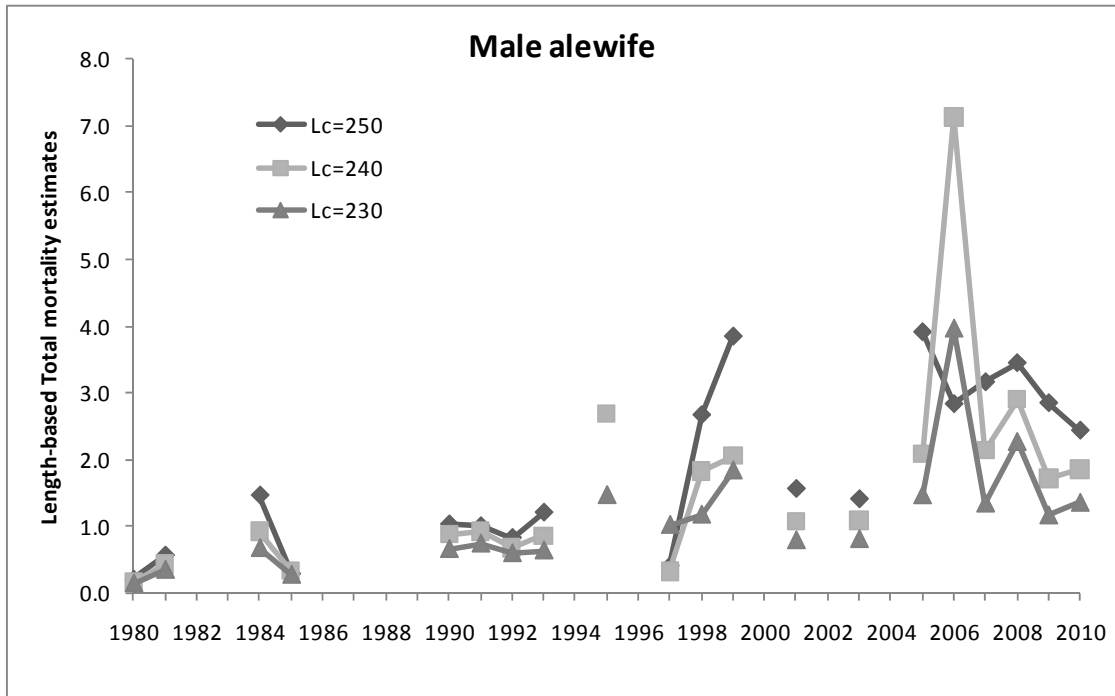


Figure 14. Length-based mortality estimates for Hudson River alewife. Lc =minimum length of fish caught in the sample gear.

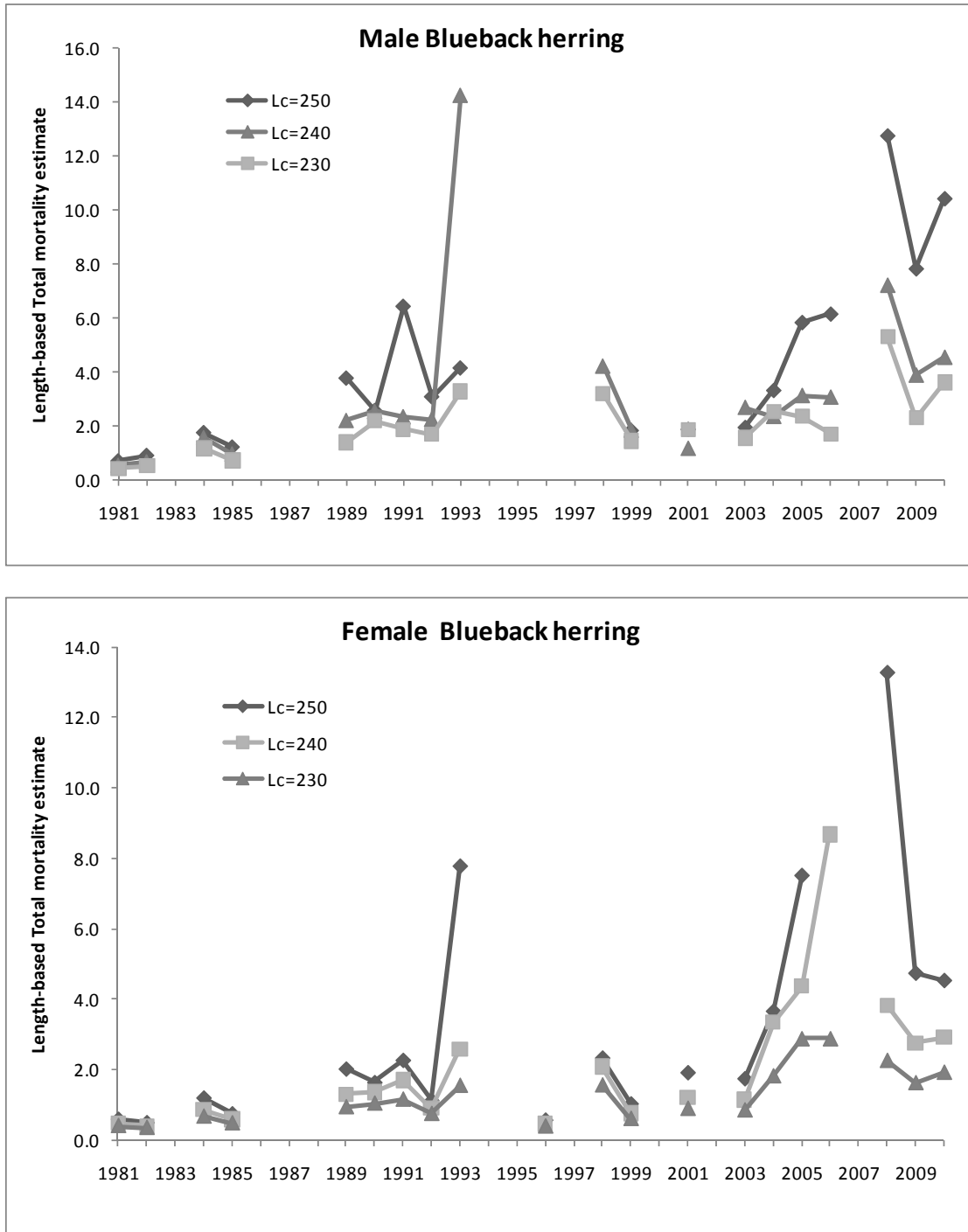


Figure 15 Length-based mortality estimates for Hudson River blueback herring. Lc =minimum length of fish caught in the sample gear.

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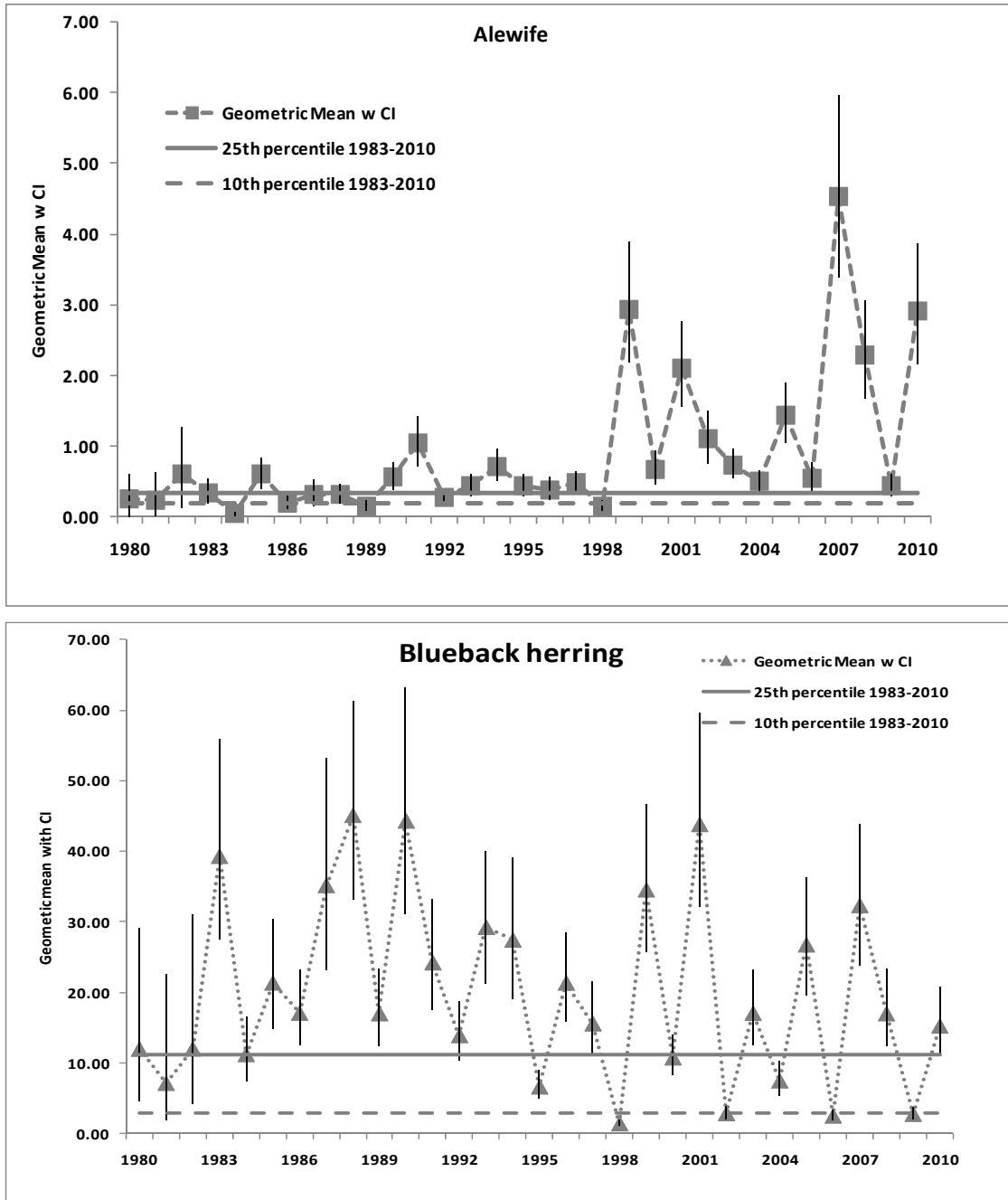


Figure 16. Annual young-of-the-year indices (with 95% CI) for alewife and blueback herring collected in the Hudson River Estuary.

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Table 1. Summary of available fishery-dependent river herring data in Hudson River and Marine District of New York.

Data Type	Time period/ Details	Description	Usefulness as index
Fishery Dependent - Commercial			
Harvest	Historic data: -1904-1994: NMFS -1994-present: Hudson (see below)- NYSDEC; Marine waters- VTR/dealer report since 2002 -1994- present: transfer of historic NMFS data to ACCSP, data available in confidential and non-confidential form	Provide catch and effort data - Not separated by area (river v marine) - River data reporting rate unknown	Gives historic perspective - Provides trend data for state as a whole, but does not separate river(s) from ocean until 1994.
Marine monitoring	River herring most likely occur as bycatch in variety of fisheries	No port sampling in NY for 'herring'	
Hudson River Mandatory reports	- Began in 1995 through the present - Enforcement of reports in 2000 - Catch and effort statistics - Licenses are open access with low fees, many recreational fishers purchase and use commercial gears to obtain bait	- Data from 2000 to present good - Reporting rate unknown - Data separated by gear used: - Fixed gill net below Bear Mountain Bridge (BMB); passive gear below spawning area; consistent manner of fishing; weekly sum of CPUE approximating "area under curve" method - In spawning area above BMB - Drift gill (main-stem HR only) - active gear - Fixed gill (main-stem HR only) - less effort than below BMB - Scap/lift net (main-stem HR and tributaries)	Emigration area CPUE - Fixed GN below BMB: o Good indicator of abundance o increasing trend Spawning area CPUE o Drift GN - variable o Scap - Flat o Fixed GN- increasing
Hudson R. Fishery Monitoring	- Began in 1999 through the present - Onboard monitoring - Catch and effort statistics - Catch subsample	- Number of annual trips are low; co-occurs & conflicts with FI sampling - Catch samples low - NEED improved sample size to be useful	- Characterize catch
Fishery Dependent - Recreational			
Harvest (primarily sought as bait for striped bass; some harvest for personal consumption)	Creel surveys: - 2001, river-wide, all year - 2005, spring only - 2007, state-wide angler survey; effort for striped bass	- 2001: provides point estimate of effort for striped bass, ancillary river herring (RH) data - 2005 provides point estimate of RH harvest & effort for striped bass	Combination of effort for striped bass and point estimate of RH harvest; combine with below CAP data to estimate magnitude of recreational harvest for 2005 to the present.
Cooperative Angler Program	Data 2006-present	Diary program for striped bass anglers; includes data for RH catch or purchase, use by trip	Good RH use per trip- used above with rec. harvest to estimate total recreational harvest

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Table 2. Summary of available fishery-independent river herring data in Hudson River, New York.

Data type	Time period/Agency	Description	Usefulness as index	
Fishery Independent- Hudson River				
Spawning stock	1936: Biological Survey	Historic data, low sample size of 25 fish, species, sex, length & age	Indication of size change to present	
	1975-1985: NYSDEC contaminant sampling	Sample size low and extremely variable by year	Indication of size change to present	
	1989-1990 NYSDEC Hudson-Mohawk River.	Focused study, large sample size (1,100 fish): species, sex, length & age	Primarily blueback herring	
	1999-2001 Normandeau Assoc. Inc. (NAI)	- Contract to assess gears for spawning stock survey - Developed own age key; not clear how compares to method of other Atlantic coast states	Primary gear used was size selective gill nets; precludes use for length analyses; need adjustment for ages	
	2001 to present: NYSDEC spawning stock survey	Focused spawning stock survey; >300 fish collected most years; species, sex, length & scales (ageing not complete)	Sample design precludes use for catch-per-unit-effort data	
	<i>Overview of all above</i>	<i>Problems</i>		<i>Ok to use</i>
		Spotty adequate sample size in most years (>34 per species, sex) to provide trend for length and weight		Good sample size for data 1989-99, 2001,-03,-05, -08 to present
Ageing technique varies greatly from 1936, 1980s, NAI; techniques appear different from other Atlantic coast states - Mortality estimates from age structure (above) unusable as index		- Used ME, MA & MD age-length keys to estimate Hudson ages; - Results: a slight non-consistent bias of age difference, possibly attributed to ageing technique &/or growth differences (MD fish grow faster than MA) - Suggest use trend in mean age - Mortality estimates from age structure (above) unusable as index - Beverton-Holt length based too dependent on inputs (length at recruitment and age)		
Volunteer River herring surveys	- 2006 to present; documents presence/absence of river herring in Hudson tributaries and in some Long Island streams	- Not yet useful as index; provide a mechanism to improve future sampling for adult runs		
Young-of-year Indices	1980 to present: annual yoy sampling standardized since 1984;	- July-Oct sampling within nursery area - Geometric mean number per haul - Catchability may be affected by habitat change	- Both species index variable - Alewife increasing - Blueback slight decreasing trend	

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			Selected conservative target of 25 th percentile
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Table 3. Commercial river herring fishery monitoring data for the Hudson River Estuary.

On-board Observations on Commercial Trips																			
Year	N of trips	Alewife					Blueback herring					Unidentified "river herring"					Total	Percent	
		Number			Sex ratio		Number			Sex ratio		Number			Sex ratio			Alewife	Blueback
		M	F	U	M	F	M	F	U	M	F	M	F	U	M	F			
1996	1								43								43	0%	100%
1997	5	5	25	178	0.17	0.83											208	100%	0%
1998	1			114													114	100%	0%
1999	4			73									348				421	17%	0%
2000	6	19	18		0.51	0.49	3	32	480	0.09	0.91						552	7%	93%
2001	7	192	178	851	0.52	0.48											1221	100%	0%
2002	8			43			19	41	1225	0.32	0.68						1328	3%	97%
2003	2			171													171	100%	0%
2004	11	124	168	8	0.42	0.58	5	6		0.45	0.55	500	796	297	0.39	0.61	1904	16%	1%
2005	1			428										28			456	94%	0%
2006	3			1					246								247	0%	100%
2007	6			14					53					268			335	4%	16%
2008	1											44			0.50	0.50	44	0%	0%
2009	3	187	179	4	0.51	0.49	37	61		0.38	0.62						468	79%	21%
2010	1	80	42	2	0.66	0.34	33	70	6	0.32	0.68						233	53%	47%

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Table 4. Estimated recreational use and take of river herring by Hudson River anglers.

Year	Herring Use*				Total RH use/trip	Estimated SB trips**	Trips using herring as bait**	Estimated Herring Use
	% of all CAP Trips using herring as bait	N-SB Trips using RH	N bought / trip	N caught / trip				
2001						53,988	39,500	93,157**
2005	89%				2.36	72,568	64,500	152,117**
<u>Cooperative Angler Program Data</u>								
2006	93%	263	1.47	2.57	4.04			
2007	70%	331	1.66	1.80	3.46	90,742	69,700	241,318***
2008	71%	445	0.86	1.64	2.50			
2009	77%	492	0.63	3.80	4.43			
2010	74%	527	0.67	4.80	5.48			

*Data from NYSDEC - HRFU Cooperative Angler Program (unpublished data)

**Creel survey data: NAI 2003, NAI 2007; 2001 estimated use modified using 2005 RH use per trip* 2001 trips using herring as bait

***Estimate calculated from overall average RH/trip (CAP) and Estimated SB trips from NYSDEC statewide angler survey

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Table 5. Current and proposed recreational fishery regulations for a river herring fishery in the Hudson River.

Regulation	Current 2010 Recreational	Proposed change- new
Season	All year	March 15 to June 15
Creel/ catch limits	None (any size, any number)	- 10 per day per angler or a maximum boat limit of 50 per day for a group of boat anglers (whichever is lower) - Charter boats: (see commercial fishing table)
Closed areas	- None below Troy Dam - Closure from Guard gate 2 to Lock 2 on the Mohawk River	- the River Herring conservation Area: No fishing within 825 ft (250m) of a man-made or natural barrier - Closure from Guard gate 2 to Lock 2 on Mohawk River
Gear restrictions	-Angling -Scap/lift net: 36 sq ft or smaller -Dip net: 14" round or 13"x13" square -Seine: 36 sq ft or smaller -Cast net; 10ft diameter	-All tributaries, including the Mohawk River above Troy: Angling only, no nets -Main river below Troy Dam: Angling or the use of nets to obtain bait for personal use only as follows: -Scap/lift net 16 sq ft or less -Dip net: 14" round or 13"x13" square -Seine 36 sq ft or smaller -Cast net 10 ft diameter
Escapement (no fishing days)	None	None
License	Marine Registry	Marine Registry
Reporting	None	New York angler diary on ACCSP website

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Table 6. Current and proposed commercial fishery regulations for a river herring fishery in the Hudson River.

Regulation	Current 2010 Commercial	Proposed change - new
Season	Mar 15 – Jun 15	Mar 15 – Jun 15
Creel/ catch limits	None	<i>Charter boats: 10 fish per day per paying customer or a maximum boat limit of 50 fish per day,(whichever is lower)*</i>
Closed areas	- No gill nets above I90-Castleton Bridge - No nets on Kingston Flats	- No gill nets above I90 - Castleton Bridge - No nets on Kingston Flats - <i>No nets in tributaries</i>
Gear restrictions	Allowed gears - Gill net o 600 ft or less o 3.5 in stretch mesh or smaller o No fishing at night in HR above Bear Mt Bridge - Seine >36 sq ft - No seine >100 ft allowed above I90 bridge - Scap/lift net no size - Fyke or trap net - Cast net not exceeding ten ft diameter	Allowed gears for river herring - Gill net o 600 ft or less o 3.5 in stretch mesh or smaller o No fishing at night in HR above Bear Mt Bridge o <i>No fixed gill nets above the Bear Mt Bridge</i> - Seine; no seine >100 ft allowed above I90-Castleton Bridge - <i>Scap/lift net 10 ft by 10 ft maximum</i> - Cast net not exceeding ten ft diameter
Escapement (no fishing days)	- 36 hr lift (applies only to gill nets allowed in the main river)	- 36 hr lift - <i>Applicable to all net gears</i>
Marine Permit	Marine Permit - Fees implemented in 1911 - Gill net \$0.05/foot - Scap net <10 sq ft \$1.00 - Scap net >10sq ft \$2.00 - Seine \$0.05/foot - Trap nets \$3 to \$10 - Fyke net \$1 to \$2 Bait license - Cast net \$10	- <i>Marine permit only license to take anadromous river herring, the only net gears allowed include drift and fixed gill net, scap/lift net, seine and cast net</i> - Fees updated to include any of the following: 1a. Gill or seine net - \$115; scap net \$25 1b. Gill or seine \$1 per foot 1c. Fishing vessel \$350 2. Create Hudson River commercial fish permit; includes use of gillnets, scap/lift nets, seines and cast nets with all other restrictions as listed in this table; qualifications needed (see Sec 6.1.2, page 26)
Charter* Boat License	None for Hudson above the Tappan Zee Bridge	Require existing Maine & Coastal District Party boat/ Charter license for tidal Hudson and its tributaries- \$250.00
Reporting	Mandatory daily catch& effort; one annual report	Mandatory daily catch& effort; <i>reports due monthly</i>

REVISED VERSION: September 2011, based on public comment received.

Appendix A. River herring streams of New York including tributaries of the Hudson River Estuary, and the Mohawk River; streams in the Bronx and Westchester Counties and on Long Island. (This list may not be complete).

Hudson River						
River Mile	County	Primary Tributary	Secondary Trib 1	Secondary Trib 2	M to barrier	Ft to barrier
18	Westchester	Saw Mill			100	328
24	Rockland	Sparkill Creek			1,620	5,315
25	Westchester	Wicker's Creek			240	787
28	Westchester	Pocantico River			950	3,117
33	Westchester	Sing-Sing			450	1,476
34	Westchester	Croton River			2,860	9,384
38	Westchester	Furnace Brook			820	2,690
38	Rockland	Minisceongo			2,100	6,890
39	Rockland	Cedar Pond Brook			4,500	14,765
43	Westchester	Dickey Brook			2,610	8,563
44	Westchester	Annsville Creek	Peekskill Hollow	Sprout Brook	1,140	3,740
44	Westchester	Annsville Creek	Peekskill Hollow		2,310	7,579
44	Westchester	Annsville Creek			3,000	9,843
46	Orange	Popolopen Creek			840	2,756
52	Putnam	Phillipse Brook			1,160	3,806
52	Putnam	Indian Brook			1,240	4,068
53	Putnam	Foundry Brook			880	2,887
55	Putnam	Breakneck Brook			160	525
57	Orange	Moodna Creek			4,740	15,552
58	Dutchess	Malzingah Brook (Gordon's Brook)			100	328
59	Dutchess	Fishkill Creek			980	3,215
67	Dutchess	Hunters Brook			180	591
67	Dutchess	Wappingers Creek	Hunters Brook		3,380	11,090
69	Ulster	Lattintown Creek	S. Lattintown		550	1,805
69	Ulster	South Lattintown			1,100	3,609
75	Dutchess	Falkill			100	328
76	Ulster	Twaalfskill	Highland Brook		400	1,312
78	Dutchess	Maritje Kill			190	623
81	Dutchess	Crum Elbow			270	886
84	Dutchess	Indian Kill			1,200	3,937
84	Ulster	Black Creek			1,670	5,479
87	Dutchess	Fallsburg Creek			2,000	6,562
87	Dutchess	Landsman Kill			2,100	6,890
91	Ulster	Roundout			3,820	12,533
98	Columbia	South Bay Creek			890	2,920
98	Dutchess	Saw Kill			970	3,183
100	Dutchess	Stony Creek			2,290	7,513
101	Ulster	Esopus Creek			1,850	6,070
105	Columbia	Cheviot Creek			380	1,247
110	Columbia	Roeliff Jansen Kill			9,320	30,579
112	Greene	Catskill Creek	Kaaterskill Creek		4,940	16,208
118	Greene	Murderers Creek			930	3,051
121	Columbia	Stockport Creek	Claverack Creek		1,250	4,101
121	Columbia	Stockport Creek	Claverack Creek	Kinderhook Cree	1,780	5,840
126	Greene	Coxsackie	Sickles Creek (dry)		1,270	4,167
128	Columbia	Mill Creek			1,870	6,135
131	Albany	Hannacroix			1,650	5,414
132	Albany	Coeymans			300	984
135	Renssalaer	Schodack	Muitzes Kill		10,900	35,763
136	Renssalaer	Vlockie Kill			1,880	6,168
137	Albany	Vloman Kill			1,130	3,708
137	Renssalaer	Papscanee	Moordener Kill		1,550	5,086
142	Albany	Normans Kill			2,970	9,745
144	Renssalaer	Mill Creek			210	689
149.5	Renssalaer	Wynants Kill			430	1,411
150	Renssalaer	Poesten Kill			310	1,017
Above Troy Dam		Mohawk River			183,000	600,423

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Appendix Table A continued.

County	Stream
Bronx	Bronx River
	Hutchinson River
Westchester	Beaver Swamp Brook
	Blind Brook
	Byram River
	Mamaroneck River
	New Rochelle Creek
	Otter Creek

Long Island			
Shore	Stream &.or Pond with outlet	Tributary	Alewife Present?
South	Beaverdam Creek		Unknown
South	Browns River		Unknown
South	Carlls River		Confirmed
South	Carmans River		Confirmed
South	Connetquot River	Westbrook, Rattlesnake Creek	Unknown
South	Massapequa Creek		Confirmed
South	Mud Creek		Unknown
South	Patchogue River		Unknown
South	Penataquit Creek		Unknown
South	Swan River		Unknown
South	Champlin Creek		Unknown
South	Forge River		Unknown
South	Pipes Creek		Unknown
North	Beaver Brook		Unknown
North	Cold Spring Brook		Unknown
North	Fresh Pond/Baiting Hollow		Confirmed
North	Mill River, Oyster Bay		Unknown
North	Nissequogue River		Confirmed
North	Setauket Mill pond		Unknown
North	Stony Hollow Run, Ctrpt.		Unknown
North	Sunken Meadow Creek		Confirmed
North	Wading River		Unknown
East End	Alewife Brook		Confirmed
East End	Alewife Creek/Big Fresh Pond		Confirmed
East End	Big Reed Pond		Confirmed
East End	Ely Pond		Restoration stocking effort
East End	Gardiner Bay Creeks		Unknown
East End	Georgica Pond		Unknown
East End	Halsey's-Neck Pond		Unknown
East End	Hog Creek		Unknown
East End	Hook Pond		Unknown
East End	Ligonee Brook		Confirmed
East End	Mill Pond - Mecox Bay Ext.		Unknown
East End	Peconic River		Confirmed
East End	Sagaponack Pond - Jeremy's Hole		Unknown
East End	Scoy Pond		Restoration stocking effort
East End	Silver Lake/Moore's Drain		Unknown
East End	Stepping Stones Pond		Unknown

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Appendix Table B. Summary of current (2010) fishery regulations for alewife and blueback herring in New York State.

Fishery / Area

Commercial Harvest:

Inland waters

Hudson River Estuary: G. Washington Bridge north to Troy Dam (River kilometer 19-245)

- Season: 15 March through 15 June
- 36 hour Escapement period (Friday 6 am to Saturday 6pm, prevailing time)
- Net size restriction: limit of 600 ft, mesh size restriction: mesh <3.5 inch stretch mesh
- Net deployment restrictions (distance between fishing gear > 1500 ft)
- Area restrictions (drifted gears allowed in certain portions of the river)

Long Island: No restrictions, except for some towns which have restricted fishing within their township

Marine Waters: Hudson River - G. Washington Bridge south; and waters including NY Harbor and around Long Island

- No limits or season.

Delaware River: NY portion, north of Port Jervis

- No commercial fishery exists in this portion; no rules prohibit it

Baitfish harvest: Take of bait fish (including alewife and blueback herring) are allowed with Bait License in the Inland water of New York State. Allowed gears are seines (all Inland waters) and cast nets in the Hudson River only.

Recreational Harvest:

- No daily limit
- No season
- Harvest can be by hook and line, and some net gears: dip nets (14inches round), scoop nets (13 x 13 inches square), cast net (maximum of 10 feet in diameter) and seine and scap / lift nets 36 square feet or less. Anglers must be registered with the New York Recreational Marine Registry.

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Appendix C. Current regulations for river herring fisheries in the Hudson River watershed, and public suggestions for change summarized from meetings held in April, 2010. Published in the NYSDEC website: <http://www.dec.ny.gov/animals/57672.html>

Regulation	Current 2010 Commercial	Public suggestions for change
Season	Mar 15 – Jun 15	
Creel/ catch limits	None	<ul style="list-style-type: none"> - Possession limit of 24 fish for charter boats* - Have a 100 fish daily limit - Have some kind of quota
Closed areas	<ul style="list-style-type: none"> - No gill nets above I90 Bridge - No nets on Kingston Flats 	<ul style="list-style-type: none"> - Add: Close tributaries to nets
Gear restrictions	<ul style="list-style-type: none"> - Gill net <ul style="list-style-type: none"> o 600 ft or less o 3.5 in stretch mesh or smaller o No fishing at night in HR above Bear Mt Bridge - Seine >36 sq ft - No seine >100 ft above I90 bridge 	<ul style="list-style-type: none"> - Gill net <ul style="list-style-type: none"> o Shorten length to 100 or 200 ft o Add mesh size restriction o Limit net size - Allow no nets
Escapement (no fishing days)	<ul style="list-style-type: none"> - 36 hr lift (no gill nets allowed in the main river) - does not apply to scap nets in tributaries 	<ul style="list-style-type: none"> - 36 to 72 hr closure - Stay away from the weekend (higher demand for bait)
License	Marine Permit <ul style="list-style-type: none"> - Varies by gear \$1 to \$30 	<ul style="list-style-type: none"> - *require a charter boat license - Raise the price of a permit - Increase fee to \$75 to \$200 Include cast nets as commercial Marine Permit (currently need a bait license) <ul style="list-style-type: none"> - Make a lottery for obtaining marine permit
Reporting	Mandatory daily catch& effort	

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Regulation	Current 2010 Recreational	Public suggestions for change
Season	All year	<ul style="list-style-type: none"> - Be more restrictive - Choose a season to protect alewife - Choose closure (season) based on water temperature
Creel/ catch limits	None (any size, any number)	<ul style="list-style-type: none"> - 5 to 10 a day - Allow a special limit for Charter boats: 24 /day - Need to know difference between creel and possession limit? - Make a slot size &/or size limit
Closed areas	None	<ul style="list-style-type: none"> - Close all the tributaries to fishing - Close the Mohawk to herring fishing - Have rotating tributary closures (changes every 3 years) - Close parts of tributaries
Gear restrictions	<ul style="list-style-type: none"> - Angling - 36 sq ft scap or smaller - 14" round or 13"x13" dip net - 36 sq ft seine - Maximum 10 ft diam. Cast net* 	<ul style="list-style-type: none"> - No nets, angling only - No nets in tributaries - No nets or smaller gear
Escapement (no fishing days)	None	<ul style="list-style-type: none"> - Close fishing 3 or 4 days a week - Allow herring harvest either on odd or even days of the week - Close the run during peak of spawning - Time closures (hours during the day or night) - Opposed to day closures - Make no-fishing days enough to protect spawning - Have sliding closures during the week, i.e. "lure" days
License	Marine License \$10	
Reporting	None	<ul style="list-style-type: none"> - Have a call-in number for harvest (like a HIP #) to get better information - Create a website for anglers to input what they catch

Other issues (other than a fishery) that are creating problems for river herring

- Chlorine discharge problems
- Ocean harvest is the problem- not the river fishery
- Increased silt (covers eggs)

Long Island streams: The lack of data means that no fishery will be allowed under the "sustainable" definition in the ASMFC Amendment 2 . Information on habitat and passage issues will be gathered.