Fisheries Research Fact Sheet

Status of North Carolina's Herring Population – 10 Years Post Moratorium

April 2017

The collapse of river herring stocks along the Atlantic seaboard has been well documented. Years of overfishing throughout its range coupled primarily with declines in water quality and blockages to spawning habitat resulted in successive years of poor recruitment that the population was not able to overcome. North Carolina is one of 10 Atlantic states with a moratorium on recreational and commercial herring harvest. Five other states allow limited take of herring from specific river systems that have a sustainable fisheries management plan.

The Biology:

Adult river herring (Blueback Herring and Alewife) migrate each spring from the Atlantic Ocean inland to spawn, with peak spawning observed at water temperatures near 59°F. Alewife typically arrive first, followed by Blueback Herring. Herring deposit adhesive eggs on shoreline structures in rivers and creeks. After hatching, the fry are transported downstream toward the sounds and estuaries. Juveniles leave North Carolina rivers and sounds each fall to winter off New England. Juveniles grow in the ocean and then return as adults to their natal rivers to spawn after age 3. Most herring are sexually mature at age 4 or age 5, with life expectancy 8 to 9 years.

History and Moratorium:

Commercial landings of river herring in North Carolina reached or exceeded 10 million pounds for many decades (Figure 1). Recruitment through much of the 1970s and early 1980s sustained NC's stocks of river herring despite very high fishing mortality. A succession of poor year-classes during the mid-1980s could not support the high fishing mortality at that time; subsequently the stock declined to historically low levels. Spawning Stock Biomass (defined as the number of pounds of spawning females) and recruitment of Blueback Herring and Alewife declined dramatically during the mid to late 1980s and have never recovered. North Carolina established a harvest moratorium in Inland waters in 2006 (Wildlife Resources Commission) and in Joint and Coastal waters in 2007 (Marine Fisheries Commission). The Atlantic States Marine Fisheries Commission established a federal coastwide moratorium in 2012, allowing only those states with approved sustainability plans to harvest herring.

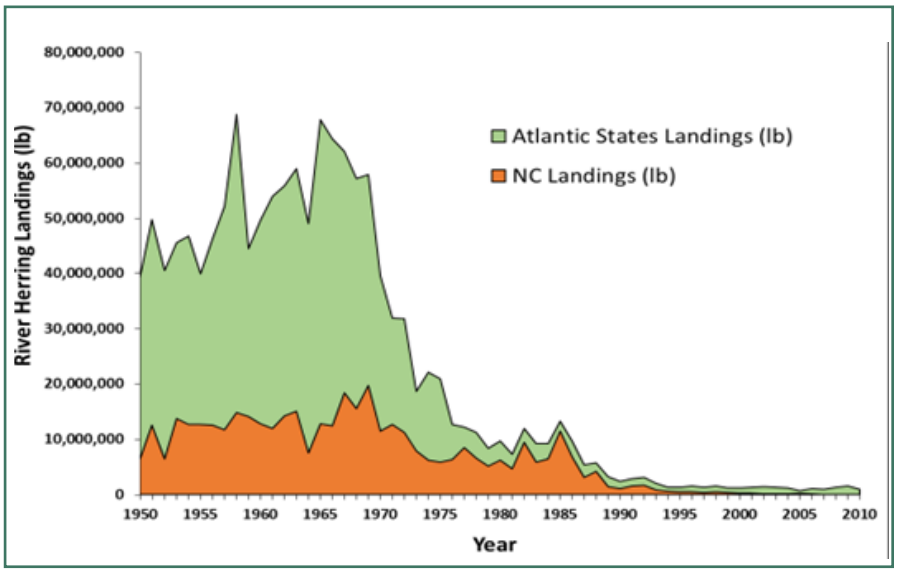

Figure 1: Commercial landings (pounds) of river herring from all Atlantic states combined (green) and for North Carolina (orange), 1950-2009. No commercial harvest has been allowed in North Carolina since 2006.

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Status:

The 2009 estimate of numbers of Blueback Herring age 3+ in the Chowan River system was 1.9 million fish (Figure 2). For comparison, in 1983 the estimate of age-3+ Blueback Herring was 103 million fish. While spawning runs of herring continue to occur throughout their range in North Carolina, abundance is still too low to allow for a sustainable harvest. An updated stock assessment using data through 2015 will be completed in 2017.

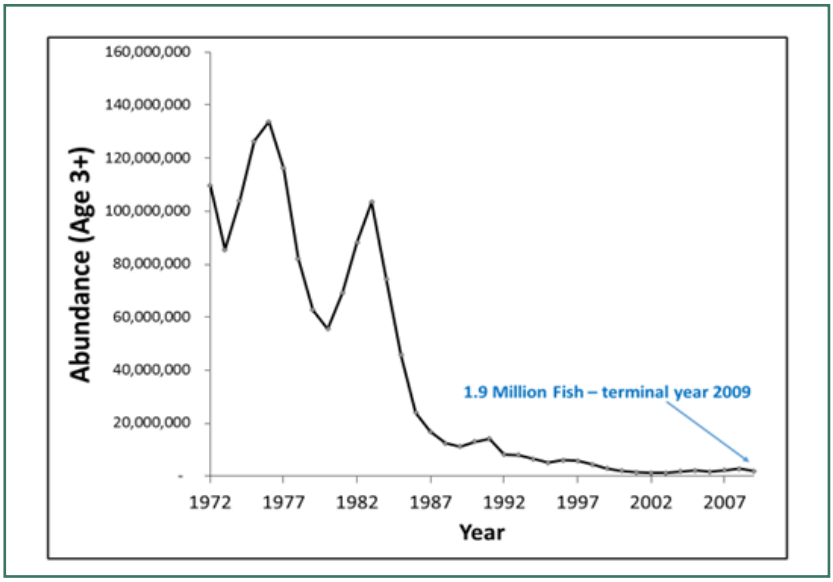

Figure 2. Estimated abundance of Age-3+ Blueback Herring from the Chowan River from 1972 through 2009. The most recent estimate (terminal year 2009) is 1.9 million fish.

Annual Indicators that Could Trigger Harvest Considerations:

There are two specific population targets (or indicators) outlined in the NC River Herring Fishery Management Plan (NCDMF, March 2015). These indicators are used to determine when the moratorium might be lifted, and involve annual sampling programs by the NC Division of Marine Fisheries.

- **Indicator Number 1: Juvenile Abundance Index**
  Target: 60 juveniles/net haul
  Current: 6.9 juveniles/net haul

The NC Division of Marine Fisheries has conducted surveys for juvenile Blueback Herring annually at 11 core stations in Albemarle Sound since 1972 (Figure 3). The target for number of juvenile Blueback Herring collected in this survey is 60 fish/net haul; the current 3-year running average of juvenile abundance in Albemarle Sound is 6.9 fish/net haul (2013-2015). This indicator was established to gauge annual recruitment.

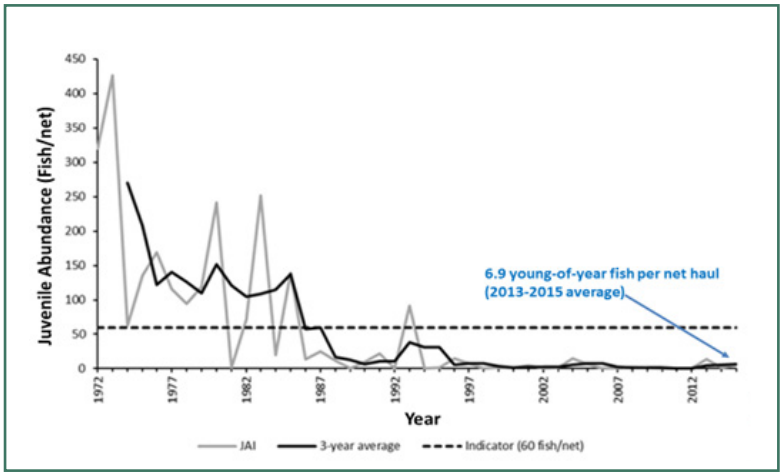

Figure 3. Juvenile abundance of river herring from NCDMF sampling, 1972-2015. The dashed line represents the 60 fish/net indicator. The most recent estimate (2015) is 6.9 fish/net.

- **Indicator No. 2: Percent of repeat-spawning adults**
  Target: 10%
  Current: 1%

The NC Division of Marine Fisheries has a long-standing pound net survey in the Chowan River that estimates the number of repeat Blueback Herring spawners each year. The target for percentage of repeat-spawning adults is 10%; the current estimate

of repeat spawners is 1% (N=199 fish sampled, 2014 data). This indicator relies on the annual analysis of the number of spawning marks on the scales of individual herring. When herring move from the high-salinity ocean to inland freshwater to spawn, an area of erosion occurs on the scales as evidence of a spawning excursion. Each spawning run can be documented as an individual ring on the scale of the fish. Presently, most fish aged are 2-3 years old and on their first spawning run (0 spawning marks). This indicator was established to evaluate expansion of the population age structure.

The Keys to Harvest:

Stock rebuilding is a lengthy process and is dependent on rates of mortality and recruitment. If the two population indicators are met, then a new stock assessment would be conducted to determine spawning stock biomass (number of pounds of spawning females). By default, stock assessments are conducted at a minimum of every 10 years. If the stock assessment estimated a minimum spawning stock biomass of 4 million pounds, some level of harvest could be considered and the moratorium relaxed. The current estimate of spawning stock biomass is 209,950 pounds (terminal year 2009) and represents only 5.2% of the minimum spawning stock biomass necessary to allow harvest (Figure 4). For comparison, in 1984 the estimate of spawning stock biomass was 6.5 million pounds.

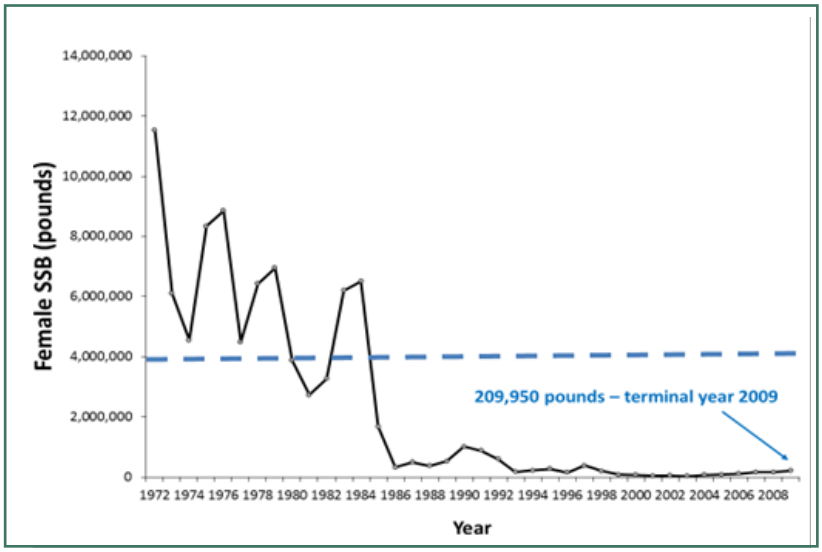

Figure 4. Estimate of female spawning stock biomass (SSB, pounds) from 1972-2009. The dashed line represents the minimum spawning stock biomass (4 million pounds) that would be needed to allow for consideration of herring harvest. The most recent estimate (terminal year 2009) is 209,950 pounds.

2017 Actions and Path Forward:

The most recent North Carolina River Herring Fishery Management Plan (Amendment 2) was approved by the Marine Fisheries Commission, with Wildlife Resources Commission collaborating, in 2015. The terminal year for data used in the plan was 2009. The Atlantic States Marine Fisheries Commission will be conducting a coastwide stock assessment in 2017, which will include an update of NC's stock assessment through terminal year 2015.

Staff biologists with the Wildlife Resources Commission continue to monitor trends in river herring abundance at keystone rivers and tributaries throughout the coast during spring sampling. Staff with NC Division of Marine Fisheries monitor presence and absence of herring throughout creeks in the Chowan River and Albemarle Sound as part of an extensive gill net survey and have contracted with North Carolina State University to have this data set analyzed and interpreted. Data collection programs to update the two primary indicators will also be continued by the NC Division of Marine Fisheries in 2017.

For more information, please contact:

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