

River Herring Status: Research Holds the Key

By: Matthew Heyl, *Marine Fisheries Specialist*
Courtney Laws, *Hourly Fisheries Biologist*

River herring aren't as well-known recreationally as striped bass or fluke. In the past, anglers used them for bait, not realizing the importance of this species. Read on to learn more about these fish including their value, population decline and current research.

Importance of River Herring

From the same family as American shad, river herring (a collective term for alewife and blue-back herring) are anadromous fish that spend most of their adult lives at sea, returning to fresh-water in the spring to spawn. Most abundant in the mid-Atlantic and Northeast, river herring spawn in rivers, lakes and tributaries from northeastern Newfoundland to South Carolina.

River herring were once an important commercial fishery in New Jersey. Looking at landings dating back to 1950, commercial landings peaked around 42,000 pounds in 1990 and were the lowest in 2003 at around 200 pounds. Population declines and lack of data have contributed to the current regulations which prohibit the harvest or possession of river herring in all New Jersey waters.

Courtney Laws sets a 100-foot seine net on the Great Egg Harbor River. Common fish caught here include Atlantic silver-sides, bay anchovies, spottail shiners, blue crabs and mummichogs.



Chris Bartlett/Maine Sea Grant

The Decline of River Herring

The 2007 coast-wide stock assessment determined that river herring stocks were low and in need of recovery. Dams and other impediments that block spawning rivers, overfishing and habitat degradation have contributed to the river herring population decline. In response to the stock assessment, the Atlantic States Marine Fisheries Commission (ASMFC) passed an amendment prohibiting all recreational and commercial river herring harvest beginning January 1, 2013, unless a state had developed a sustainable fishery management plan approved by ASMFC. Since data was not available for New Jersey to develop a plan, the New Jersey Division of Fish and Wildlife began studying river herring in our waters.

Survey History

The key to finding ways to increase river herring populations is research. When funding was received in 2012, Fish and Wildlife's Bureau of Marine Fisheries (Marine Fisheries) began a three-year research project to collect biological data and determine indices for adult and juvenile river herring abundance on the Rancocas Creek and Maurice River watersheds.

During the first year of the program, staff performed test-sampling at numerous sites on both river systems with various sampling methods including gill netting, seining, fish ladder monitoring and electrofishing.

After three years, the project was evaluated and revised accordingly. The first change discontinued sampling at the Union Lake Dam since it was determined that few river herring were utilizing the fish ladder. The second change replaced the Rancocas Creek with the Great Egg Harbor River system. The decision to eliminate the Rancocas Creek was made due to the duplication of similar sampling during the Marine Fisheries' Striped Bass Recruitment Survey on the Delaware River. Both the Great Egg Harbor and Maurice Rivers contain a Denil-style fish ladder that allows biologists to view and study what species of fish pass into either Lake Lenape (Great Egg Harbor River) or Union Lake (Maurice River). In addition, the Great Egg Harbor River allows staff to survey and compare an Atlantic coastal drainage with a Delaware estuary drainage (Maurice River).

River Systems

The Rancocas Creek, a tributary of the Delaware River, has two branches that run through the Pine-lands National Reserve. The main stem of the river is 8.3 miles long; the north branch is 28.3 miles long and the south branch is 21.7 miles. Since 1975, spawning migrations of adult alewife and blueback herring have been confirmed in the main-stem as well as the north and south branches.

The Maurice River is the second longest and largest tributary to the Delaware Bay. It is 50 miles long and drains 386 square miles. Its mouth to the Delaware Bay is surrounded by salt marshes and serves as spawning and feeding grounds, nursery areas, and migratory routes for important recreational and commercial fish and invertebrates including alewife and blueback herring. Since 1977, Fish and Wildlife has confirmed

spawning migrations of adult alewife and blueback herring below the Union Lake Dam.

The Great Egg Harbor River is one of the major rivers traversing the Pinelands. It is 55 miles long and drains 308 square miles of wetlands into the Great Egg Harbor Bay and Atlantic Ocean. It serves as spawning and feeding grounds, nursery areas and migratory routes for important recreational and commercial fish and invertebrates including alewife.

Types of Sampling



A gill net is set by Hugh Carberry, Bill Maxwell and Courtney Laws below the Union Lake Dam on the Maurice River. Common catches include white perch, striped bass, channel and white catfish.

Gill Netting for adult river herring begins in March and runs through May. Alewife are the earliest to be netted as they are more tolerant of spawning in cooler water temperatures. A few weeks later blueback herring arrive. Gill nets are set weekly on each river system and are left in the water for one and a half hours on average. When pulling gill nets, biologists immediately put collected fish into a circular live well with a touch of salt. This minimizes the stress on the fish and greatly improves the chance of survival. River herring biological data collected includes fork and total length, sex and spawning stage. All other fish collected are measured and released. Common catches besides river herring are white perch, catfish and striped bass.



Marine fisheries staff retrieves a 100-foot seine net on the Great Egg Harbor River. Southern species caught during the survey have included gag grouper, mangrove snapper and Florida pompano.

Seine Netting for juvenile river herring begins in July and runs through October. Each river system has predetermined sites that range in

salinity from freshwater to saltwater and are sampled twice a month. The seine net is set and retrieved with a boat, creating a horseshoe loop in the net. All fish are identified to species and counted. A subsample of the catch is measured by fork length. Common catches besides river herring are Atlantic silversides, bay anchovies, spottail shiners, blue crabs and mummichogs.



An electrofishing survey of the Millstone River, conducted here by Fish and Wildlife seasonal staff Scott Catton (L) and Steve Tourto of the Stony Brook-Millstone Watershed Association, revealed the presence of blueback herring for the first time in spring of 2016.

Electrofishing by boat for juvenile river herring occurred on the Rancocas Creek during 2013 and 2014. Electrofishing is when electrical currents pass through positive and negative electrodes hung partially submerged in the water. As the boat moves, the electrical field travels through the water, temporarily stunning the fish. The lack of hard bottom made seine netting difficult on the northern and southern branches of the creek. Electrofishing is an extremely effective way of capturing and releasing juvenile river herring alive. Although electrofishing techniques were used on the Rancocas Creek until biologists ended sampling there, electrofishing equipment could not be used on other river systems due to the presence of salt water.

Data collected from all sampling methods listed above are similar. All fish caught are identified and counted; a sub-sample is measured. Other important data collected include water quality levels and atmospheric conditions which are recorded at each sampling site. Types of water quality information recorded are salinity, water temperature, dissolved oxygen and pH. Atmospheric conditions include air temperature, tide, weather conditions and moon phase.

River Herring Survey Results

Through 2017, Fish and Wildlife has completed five years of the River Herring Survey. For the gill net season, a total of 687 adult alewife and 13 adult blueback herring have been caught along with other species. For the seine season, a total of 4,305 juvenile alewife and 10,161 juvenile blueback herring have been caught. Percent frequencies and geometric means are calculated for both species.



These species caught during sampling are uncommon along New Jersey. Ladyfish are found in tropical or subtropical regions. The crevalle jack can grow quite large and frequents tropical to temperate waters.

A geometric mean is the average of a set of products. This calculation provides the catch-per-unit-effort which allows biologists to measure the abundance of a target species. When comparing geometric means from different years, changes in the values signify changes to the species' true abundance.

For both rivers, the 2016 gill netting produced the highest geometric means of river herring for the time series. The 2017 seining season, juvenile alewife index was above average on the Great Egg, while juvenile blueback herring index was above average for the Maurice River. The numbers of both the juvenile alewife seine-netted on the Great Egg and juvenile blueback herring seine-netted on the Maurice River were the highest recorded in both river systems since bi-weekly sampling began in 2016. More years of sampling will help provide a better estimate of population trends.

Common and Rare Catches

Marine biologists record data on all fish caught, just not river herring. Common catches include many types of bait and game fish common to New Jersey such as Atlantic silverside (22,204 sampled), striped bass (192) and winter flounder (28.) On occasion, some uncommon or tropical species not typically seen in New Jersey's marine waters are caught, primarily in late-August through September when water temperatures are at their highest. These species are native to the warmer waters of the southeast U.S. coast.

Sustainability and Restoration of River Herring

Over the past 20 years, there has been a severe decline in river herring populations. The River Herring Survey was designed to enhance current understanding of overall stock levels and to gain information specific to the New Jersey populations. Fishery surveys like these are the groundwork for the overall stock assessment process where data collected is used to better understand coast-wide population trends and harvest potential.

New Jersey Division of Fish and Wildlife plans to continue the survey with the goal of expanding sampling to all Delaware River tributaries and Atlantic Coast rivers, obtaining sufficient data to develop a sustainability plan and restoration targets for alewife and blueback herring. 