

# Status of American Shad in the Delaware River

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### Distribution, Biology and Management

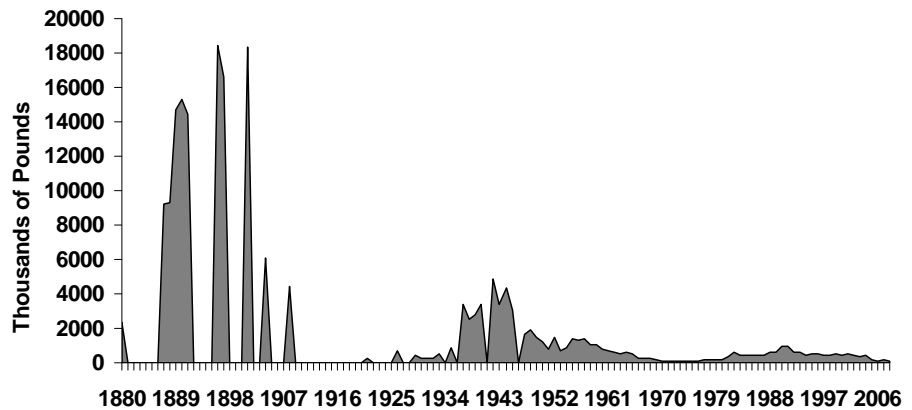
The Delaware River stretches for 330 miles from the East and West branches above Hancock, New York, to the mouth of Delaware Bay. The Delaware Drainage Basin includes the states of Delaware, New Jersey, New York, and Pennsylvania. States are responsible for fishery regulations in their own waters, however, the four Basin states cooperatively manage anadromous fish stocks that use the river.

American shad usually enter the Delaware River in mid-March and move past the tidal section below Trenton to the primary spawning reach from the Water Gap (I-80 crossing) up to the New York border by early April. In recent years it is suspected that some American shad may be spawning in the Philadelphia reach due to improved water quality.

### The Fisheries

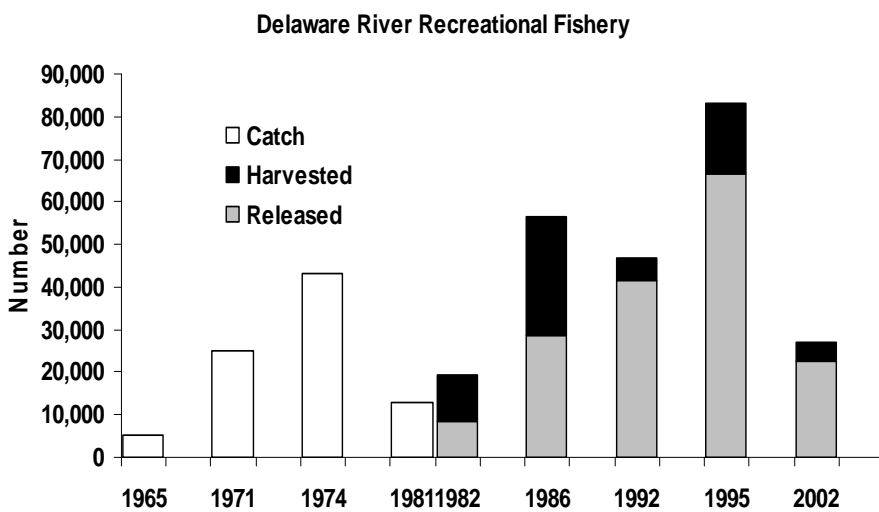
The Delaware River had the largest annual commercial shad harvest of any river on the Atlantic coast in the late 1890s with estimates ranging up to 19 million pounds in a year. The harvest declined rapidly as the stock collapsed in the early 1900s due to overfishing, water pollution, and dams on major tributaries. From the 1950s through the mid 1970's pollution in the Philadelphia reach essentially cut off fish use in nearly 40 mile of river miles. The pollution used up all the oxygen in the water beginning in late spring through the early fall, severely limiting fish movement in and out of the river.

**Historic Commercial Landings**



Beginning in the mid 1970s, the Clean Water Act aided in cleaning up pollution in the river. The Delaware River shad population showed signs of recovery from the late 1970s through the early 1990s. However, by the mid to late 1990s the stock began to decline again. Recent estimates of the adult stock have been well below the target of 750,000 fish identified in the 1982 Delaware River American shad Recovery Plan.

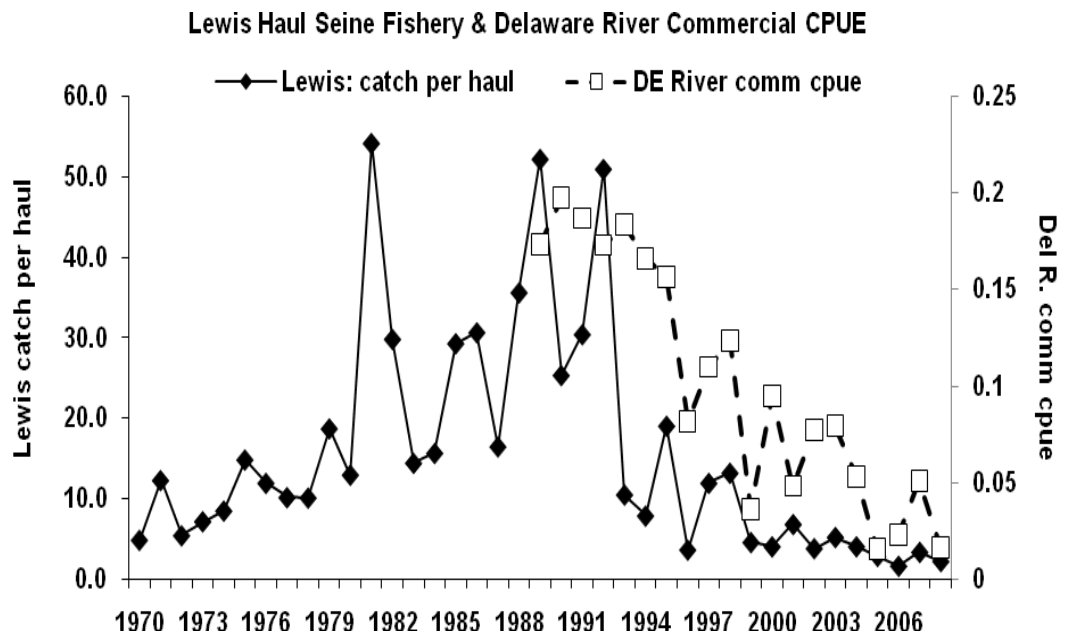
New Jersey and Delaware still have small commercial fisheries (with limited entry and gear limitations); Pennsylvania and New York do not permit commercial harvest in the Delaware River Basin. The commercial fishery for American shad occurs in the Delaware River during the spring spawning migration. Shad harvested in the Delaware River (defined as, above Liston Point DE to Mad Horse Creek NJ) or Upper Bay area, are considered to be Delaware stock. Shad harvested in the Lower Bay are of mixed stock origin. Tagging data indicates composition of this mixed fishery varies annually and can be made up of stocks from the St. Lawrence River, Canada to the Santee River SC.



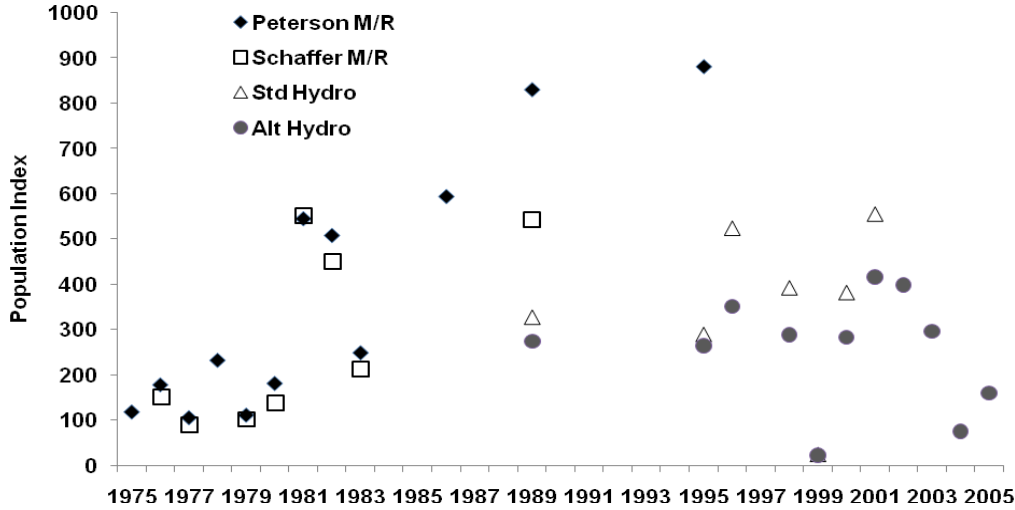
NY, PA and NJ enacted the six fish American shad recreational bag limit required by the Amendment 1 to the Atlantic States Marine Fisheries Commission Interstate Fisheries Management Plan (see [www.asmfmc.org](http://www.asmfmc.org)). The exception is the State of Delaware, which has a ten fish limit, combined for American and hickory shad. Several recreational creel surveys were conducted in the Delaware River since 1965. Recreational catch estimates have fluctuated with a peak in 1995. The most recent estimate occurred in 2002; 26,885 shad were caught with 4,314 fish harvested.

### Stock Indices

The longest time series of commercial catch per unit of effort (number per haul) is the Lewis haul seine fishery in the non-tidal section of the Delaware River above Trenton, New Jersey. The fishery employs seine nets of different length depending on the water flow and depth. Although this may cause some variation, the long time series still gives a good indication of spawning run strength. The



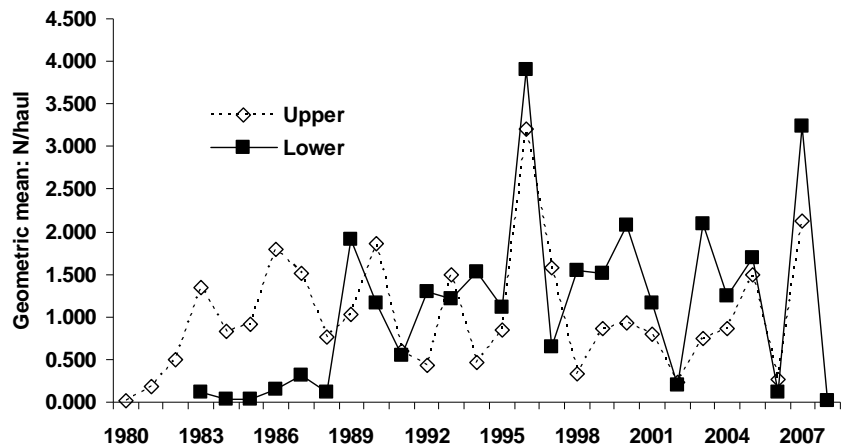
haul seine fishery CPUE began steadily increasing from 1970 to 1992 before dropping off significantly through recent years. Catch per unit effort (kg of shad caught per meters of net) from the commercial gill net fishery in the Delaware River also follows the same trend as the seine fishery. CPUE was high in the early 1990s, but then declined quickly until 2005. CPUE in this fishery remains low to the present.



Fishery independent adult abundance estimates are limited to population indices from mark-recapture (M/R) studies and a hydro-acoustic survey. The population indices show an increase in adult abundance through the 1980s, then a decline after the mid 1990s to 2005. The hydro-acoustic surveys ended in 2005, so no recent estimates are available.

Juvenile abundance data are collected in two surveys; one occurred in the non-tidal upper river from the Water Gap to Milford PA, and in the (lower) tidal river below Trenton during August, September, and October. Juvenile production has been fairly stable until the past few years.

Delaware River young of year abundance



**Other Theories on Loss**

Potential interactions with striped bass within the Delaware Estuary were examined to determine if the shad decline was a direct result of a predator-prey relationship. The analyses indicate that striped bass numbers fluctuate similar to American shad. While there is potential for striped bass to be a limiting factor to shad stock growth, there is no evidence that striped bass has caused a decline in the shad population.

## Summary

It is evident that the Delaware stock declined through the 1990s and remains at low levels.

After evaluating the data on the Delaware River shad stock, the 2007 coast-wide stock assessment conducted by the Atlantic States Marine Fisheries Commission recommended that no relaxation of current regulations take effect until the stock meets the following criteria:

- A minimum CPUE of 30 fish per haul is achieved in the Lewis haul seine fishery for three years, based on the average cpue from 1980 to 1992. This may require funding the current fishery or developing a program to ensure continuity.
- A reliable estimation of the shad population to be at least 750,000 fish throughout the entire spawning reach of the Delaware Basin for more than two consecutive years. This recommendation is dependent on the Delaware Basin States determination of a reliable estimator of the population.
- A more thorough investigation into predator-prey relationships to determine if predation on shad by striped bass or other predators is a significant problem affecting the shad population in the Delaware River .
- Fishing mortality on the Delaware stock from out of Basin activities including bycatch discard in other fisheries is determined.
- Investigations to ensure that habitat quality and suitability within the Delaware Basin is adequate for the first two criteria are initiated.

The Delaware River Fish and Wildlife Cooperative is currently working on a revision and update of the Delaware River American shad Recovery Plan. In the new plan, all recommendations listed above will be re-examined and a revised research agenda will be developed.