

# **Delaware River**

## **Monroe and Northampton Counties**

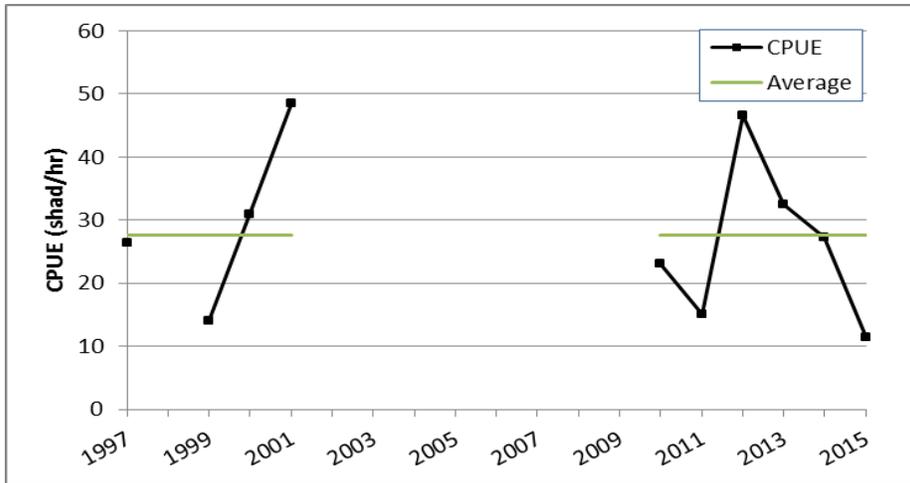
### **American Shad Monitoring, 2015**

Management of American Shad in the Delaware River is a collective effort undertaken by Delaware River Basin Fish and Wildlife Management Cooperative (Co-op) member agencies, under the direction of the Atlantic States Marine Fisheries Commission (ASMFC). The Pennsylvania Fish and Boat Commission (PFBC) is a member of both groups. In February 2012, the ASMFC accepted the Co-op's five-year (i.e., 2012 -2017) [American Shad Sustainable Fisheries Plan \(SFP\)](#). Under the SFP, the PFBC and partners are directed to maintain long-term monitoring programs that index abundance of the Delaware River adult American Shad spawning run, and index abundance of young-of-year (YOY) American Shad. The latter index was initiated and carried out by the New Jersey Division of Fish and Wildlife 1980-2007, within the non-tidal Delaware River. Currently, Co-op member agencies are in the process of collaboratively updating the American Shad SFP for the next five years, 2018 – 2023.

#### Raubsville Monitoring Effort

Day boat electrofishing on the Delaware River at Raubsville, PA (RM 178.9) in April and May provides an index of relative abundance as adults migrate to up-river spawning grounds. The overall Catch-per-unit-effort (CPUE) from the 2015 electrofishing effort was 11.3 shad/hour (Figure 1). The 2015 CPUE ranked 10<sup>th</sup>, representing the lowest estimated spawning run relative abundance over the time-series (1997-2001; 2010-2015). The highest catch occurred on 26 April; which consisted of 22 females and 48 males. Female and male shad sizes ranged from 19.5 to 22.8 inches and 15.7 to 23 inches in Total Length (TL), respectively. The respective mean average size was 20.9 inches TL for females, and 18.9 inches TL for males. The age structure present for both female and male shad represents a young population. Female ages present were Age 5 (45.5%), Age 6 (40.9%), and Age 7 (13.6%). The catch of male shad was dominated by five year olds (54.2), followed by Age 4 (22.9%), Age 6 (12.5%), Age 3 (6.3%), and Age 7 (2.1%) fish.

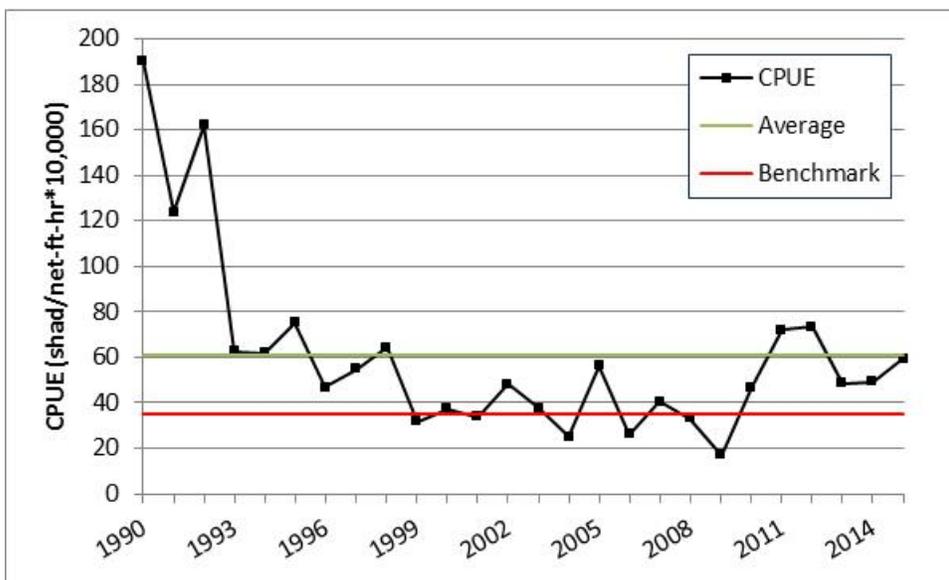
**Figure 1. Annual catch-per-unit-effort for American Shad in the Delaware River at Raubsville, PA by boat electro-fishing, 1997-2001, 2010-2015. No sampling occurred in 2002 to 2009.**



Smithfield Beach Spawning Effort

Nighttime gill netting during May at Smithfield Beach (RM 218.0) targets adult shad that are actively spawning within the pool. The 2015, CPUE was 59.2 shad/(net-hour\*10,000), which ranks 10<sup>th</sup> over the time-series (1990-2015; Figure 2). A total of 719 shad (547 females, 172 males) were collected. Mean total lengths were 21.1 inches for females and 19.4 inches for males. Shad sizes ranged from 18.2 to 24.8 inches TL for females, and 16.5 to 21.7 inches TL for males. The ages present in 2015, and prior years, characterize the age composition as that of a young spawning population. The majority of the catch was comprised chiefly of Age 5 (females: 33.0%, males: 66.7%) and Age 6 (females: 39.9%, males: 18.4%) shad. The remainder of the female shad catch was Age 7 (20.1%, Age 8 (3.7) and Age 4 (3.3%); with remaining male shad catch composed of Age 4 (7.8%), Age 7 (3.5%), and Age 2 (2.1%) fish.

**Figure 2. Annual catch-per-unit-effort for American shad from the Delaware River at Smithfield Beach during adult collection associated with the egg-take for fish culture operations, 1990 - 2015.**



The Delaware River Smithfield Beach gill net sample provides broodstock for egg collection in support of PFBC's Lehigh and Schuylkill River American Shad Restoration program. A total of 78 liters of eggs were harvested from the Delaware River shad, in 2015. These eggs were hatchery reared and chemically marked at PFBC's Van Dyke facility. A total of 247,649 and 198,855 fry were released into the Lehigh and Schuylkill rivers in support of enhancing American shad spawning runs into those river basins.

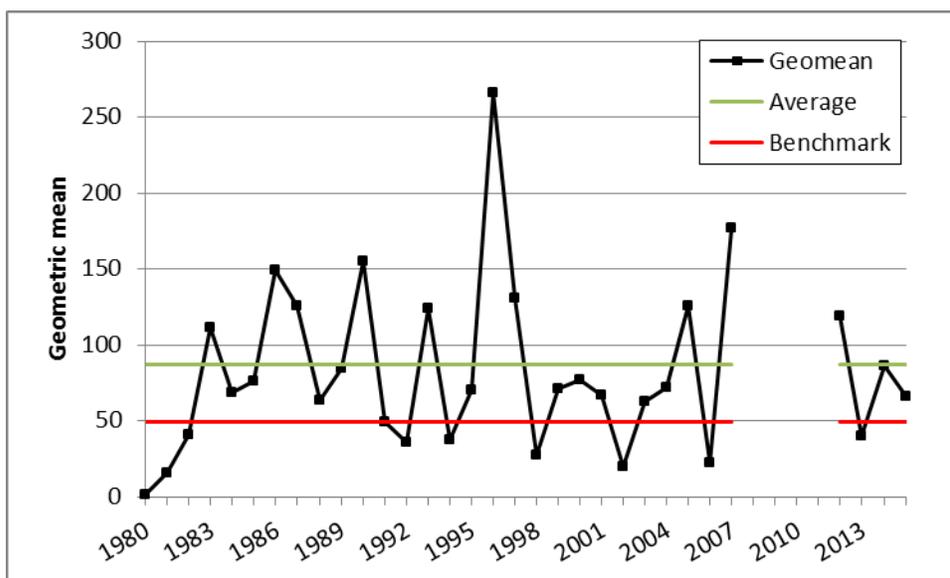
Overall Assessment of the 2015 Adult Spawning Run

The 2015 adult American Shad run in the Delaware River can be characterized as average. The estimate of relative abundance of spawning adults at Smithfield Beach was nearly the same as the time-series average; however the upward trend in the CPUE is encouraging. In contrast, the Delaware River relative abundance estimate at Raubsville was exceptionally poor. This effort may have under-estimated the 2015 spawning run. The 2014/15 winter was exceptionally cold, with a prolonged river ice period and low spring-time flows. These conditions may have delayed returning shad later into spring than typical. Unfortunately, the Raubsville sampling effort ceases in early May in accordance with the established data set and in order to initiate the Smithfield Beach collections. Thus, sampling efforts at Raubsville may have simply missed the tail end of the 2015 run.

Delaware River Non-Tidal Young-of-the-Year Monitoring

The Delaware River young-of-year (YOY) production is annually monitored jointly among Co-op members during August through October. Relative abundance (geometric mean) is estimated by beach seining (300 ft long by 12 ft deep net) at four historic sites: Trenton (RM 131), Phillipsburg (RM 183), Water Gap (RM 211), and Milford, PA (RM 256). The 2015 YOY production index yielded a geometric mean value of 66.1, which was below the time-series average but above the bench mark average (Figure 3). This represents a down turn from the 2014 geometric mean of 86.4.

**Figure 3. Annual geometric means of American Shad YOY Delaware River monitoring 1980 - 2007, 2010 – 2015. No sampling occurred in 2008 to 2009.**



## Overall American Shad Assessment for 2015

The Co-op American Shad SFP defines benchmarks intended to characterize the sustainability of the Delaware River American Shad population. The SFP benchmarks are based on a monitoring program's time-series annual relative abundance distributions. Three consecutive years that yield values lower than the benchmark are considered unsustainable, requiring initiation of appropriate corrective management action(s). Relative abundance benchmarks were developed for the adult Smithfield Beach survey and the YOY survey time-series survey (Figures 2 & 3). No abundance benchmark was developed for the adult Raubsville survey in the current SFP, as it is in the initial phase of operations to determine its utility in representing abundance trends. The intent of the Raubsville electrofishing survey was to develop a concurrent relative abundance time series for comparison to Smithfield Beach survey data. The relationship between these adult indices will be further examined by Co-op members during the revision of the American Shad SFP.

The 2015 spawning run and subsequent YOY production in the Delaware River can be characterized as sustainable. The Smithfield Beach (34.79 shad/net-ft-hr\*10,000) and YOY (49.4 geo. mean) benchmarks were both defined as at the 25<sup>th</sup> percentile of their respective time-series. Since both the Smithfield Beach and YOY 2015 estimates were above their respective benchmarks no additional management actions are required.

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