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## **The Return of American Shad: Successful Spawning in Maine River a Positive Sign**

### ***Dam removals, improved passage opening habitat***

Where have all the American shad gone? Like other diadromous fish species in New England whose annual spawning once numbered in the millions prior to their collapse in the last century, today's populations of American shad (*Alosa sapidissima*) are at historically low levels. But there are signs of a rebound and cause for optimism.

This food, sport, and prey fish native to the East Coast is being found in much larger numbers, although population estimates for juveniles or adults don't yet exist. While much of the historic shad spawning habitat has been inaccessible and no one has been sure where the few remaining shad came from, NOAA Fisheries researchers have found juvenile shad throughout the Penobscot River and estuary during the summer months.

"We don't know much about the stock size, structure or spawning locations of American shad in the Penobscot River system other than the fact that a small population exists," said Christine Lipsky, a researcher at the Northeast Fisheries Science Center's Maine Field Station in Orono and lead author of a new paper on shad published online in *Northeastern Naturalist*. "We first wanted to confirm that there is, in fact, a local stock."

For decades dams and other impediments to fish passage have blocked access to suitable fish spawning and rearing habitat for a number of species. The removal of the Edwards Dam on the Kennebec River, the Penobscot River Restoration Project (which has removed two dams and bypassed a third decommissioned dam), and other efforts throughout Maine are helping to reverse the decline by opening lower river habitat.

### **Spawning habitat improves**

Prior to the Penobscot River Restoration Project, fewer than 1,000 adult American shad were estimated to return to the river annually. These fish were largely limited to nine miles of spawning habitat downstream of the Veazie Dam. However, dam removal and improved upstream and downstream passage at the remaining dams could provide improved access to roughly 450 miles, about 93 percent of the shad's historic habitat in the Penobscot.

American shad, the largest member of the herring family, usually grow to between three and eight pounds. They spend most of their lives in saltwater before returning to freshwater rivers to spawn. Their offspring then remain in fresh water for a period of months to years before migrating to saltwater.

Newly hatched American shad, however, are extremely sensitive to changing salinity levels as they mature. They do best in salinity levels lower than 20 parts per thousands (ppt) and cannot tolerate salinities of 30 ppt. The ocean's average salinity is 35 ppt, while estuarine salinity levels range from 0.5 to 35 ppt.

### **Does a local stock exist?**

In order to determine if spawning is occurring in the Penobscot River, researchers conducted fish surveys in July 2012 to determine if juvenile American shad were present in the low salinity waters of the Penobscot estuary. They used beach seines, fyke nets, and surface trawls to collect fish and measured salinity from south of Verona Island near Bucksport to Bangor, Maine.

The results: One hundred juvenile shad were captured.

All of the young shad were caught at least 10 kilometers (six miles) upstream of salinity levels greater than 20 ppt, confirming that the American shad found in the lower Penobscot likely originated from successful upstream spawning events. It also demonstrated the presence of a local stock. That was a surprise, since American shad had a limited amount of spawning habitat, roughly nine miles, before the removal of the Veazie Dam in 2013.

"We found juvenile shad throughout the estuary during the summer," said Lipsky. "That supports the existence of a local stock, and that the population of American shad is successfully spawning in the Penobscot River."

### **Shad returns increase fivefold in one year**

Although current abundance levels are unknown, more than 1,500 American shad returns were documented at the Milford Dam, now the lowermost dam on the Penobscot River, in 2015. That number climbed to more than 7,800 in 2016.

The new evidence of a shad population will help managers weigh their options on how to best restore the population to sustainable levels. Lipsky and colleagues are optimistic that it can be done, but caution that attention needs to be paid to the remaining challenges to downstream passage for both juveniles and post-spawn adults.

The Penobscot River is the second longest river in Maine. Its watershed, encompassing approximately 22,000 square kilometers (roughly 8,500 square miles) lies entirely within the state of Maine. The river is home to 12 native diadromous fish species, including endangered Atlantic salmon and shortnose sturgeon.

### **Related Links**

[Northeastern Naturalist](#)

[NOAA Habitat Blueprint for the Penobscot River](#)

[Penobscot River Restoration Project](#)

[The Case of the Missing Shad](#)

[Return of the shad: Anglers target Penobscot after 150-year hiatus](#)

[Shad, river herring pouring into Penobscot](#)

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