



Using otolith microchemistry to infer early life histories of American shad and American eel habitat use in the Penobscot River, Maine

1. Using otolith microchemistry, we plan to infer early life histories of American shad and American eel habitat use (spatial and temporal patterns) in the Lower Penobscot River.
2. We plan to utilize microchemical data to provide a baseline for American shad and American eel early life histories in the Penobscot River prior to Veazie dam removal.

Removals of Veazie (2013) and Great Works (2012) Dams were completed in conjunction with three upstream fish passage modification projects on the Penobscot River in Maine as part of the Penobscot River Restoration Project. Prior to these fish passage modifications, upstream passage of American shad was negligible through the historic Veazie Dam and many believed American shad were largely absent from the river. Similarly, upstream passage of juvenile American eels is believed to have been repressed by these Dams. Understanding the degree to which these fish species persisted in the estuary prior to the removal of Veazie and Great Works Dams is important for their management and restoration.

In an attempt to provide a baseline for American shad and American eel early life histories in the Penobscot River prior to dam removal, we plan to analyze otolith (ear bones) microchemical structures (elemental ratios of Barium:Calcium, Strontium:Calcium, etc.), utilizing laser ablation inductively coupled plasma mass spectrometry. Resulting elemental ratios will afford us the opportunity to reconstruct early life histories of American shad and American eels through comparative analysis with surrounding water microchemistries.

We have removed, mounted, and are working to prepares more than 800 individual otoliths from

American shad and more than 120 American eels. Currently, we have processed American shad otoliths from Penobscot River shad between the years of 2011 and 2017 and Penobscot River eels between the years of 2013 and 2017. Additionally we have processed American eels from the Union River in Maine, and American shad from the Sheepscot river in Maine. The majority of samples were prepared for microchemical analysis and analyzed using laser ablation inductively coupled plasma mass spectrometry at the Woods Hole Oceanic Institute in 2017. The remaining samples will be run in early 2018.

Investigator: Kevin Job (MS)

Advisors: Joseph D. Zydlewski (Advisor)
Erik J. Blomberg
Jason Jeremy Schaffler

Duration: January 2016—October 2018

Cooperators:

The Nature Conservancy
U.S. Geological Survey – Maine Cooperative Fish and Wildlife Research Unit
U.S. Fish and Wildlife Service
University of Maine – Department of Wildlife, Fisheries, and Conservation Biology

