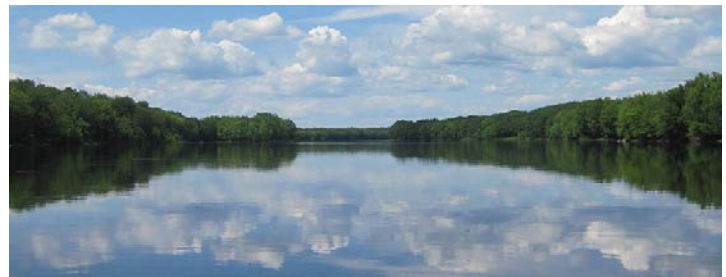




Penobscot River Habitat Focus Area 2016 Annual Report

The Penobscot River is New England's second largest river, draining nearly one-third of the state of Maine with a watershed area of 8,570 square miles not including tributaries to Penobscot Bay. The watershed is home to 11 migratory fish species, including three listed under the Endangered Species Act, and represents the largest run of Atlantic salmon in the United States. It has a rich cultural history of commercial, recreational, and sustenance fishing. It is also home to the Penobscot Indian Nation and includes the Katahdin Woods and Waters National Monument. The Penobscot HFA includes work in three areas:

- Habitat Protection & Restoration
- Research & Science
- Communications & Outreach



Habitat Protection & Restoration:

Mattaceunk Hydroelectric Project Relicensing

The Mattaceunk Project (Weldon Dam) relicensing was as a top priority action within the Penobscot Habitat Focus Area. The third dam on the mainstem Penobscot, this project is the gateway to high quality Atlantic salmon habitat. In addition, the habitat upriver from Mattaceunk Project could support 15% or more of the potential blueback herring and American shad production potential of the Penobscot River. Our collaboration with the Licensee, the Northeast Fisheries Science Center, U.S. Geological Survey and SUNY College at Oneonta, as well as our state, federal and tribe partners, resulted in a series of fish passage requirements that support the recovery of Atlantic salmon and restoration of American shad, blueback herring, alewife, and American eel.

Milford, Orono, Stillwater, and West Enfield Projects License Compliance

Starting in 2016, operation of the Milford, Orono, Stillwater, and the West Enfield Hydroelectric Projects was significantly modified by the Licensee to improve fish passage conditions for downstream migrating Atlantic salmon smolts and kelts in the lower Penobscot River. Spring river flows were diverted from the project turbines to spill over the dams to increase the survival of Atlantic salmon. Studies conducted in 2016 demonstrated that the survival of smolts significantly improved at several of the projects. Additional studies were conducted in the spring of 2017.

Feasibility Study at Frankfort Dam

The Frankfort dam sits at the head of tide on Marsh Stream, a tributary of the lower Penobscot River that once was home to numerous sea-run species including Atlantic salmon and river herring. With funding through the NOAA Habitat Blueprint, in 2016 The Nature Conservancy (TNC) continued working with the owner of dam (Town of Frankfort, Maine) on a feasibility study to examine options for improving fish passage at the site, including partial removals of the dam and different types of fishways, including nature-like bypasses and fish ladders. NOAA's interest in Marsh Stream dates back to 2010 when it provided funding for the removal of the West Winterport dam upstream. The study included reviews of documentation used to successfully list the dam on the National Register of Historic Places and addressed the dam's present-day use in providing water for firefighting in a town with scarce freshwater resources. As part of the feasibility study, the engineering firm Wright-Pierce presented at public meetings to the town's selectmen and dam committee, with hopes that consensus about fish passage improvements at the site can be found in 2017.



Atlantic Salmon below Frankfort Dam on Marsh Stream (Photo courtesy Randy Spencer)

Feasibility Study at Orland Village Dam

In 2016, the latest round of feasibility study for the Orland Village dam on the Orland River—a tributary of the lower Penobscot River—was concluded with a public informational meeting held in June. Outreach also included a World Fish Migration Day event at the site with smoked alewife food truck and guided tours to the river, dam and commercial alewife harvesting area. Maine Sea Grant



Orland Village Dam

populated a website with maps and historical information from the feasibility study, as well as fact sheets about the value of fisheries to coastal communities. Despite news that the timber dam was in poor condition and would be increasingly overtopped by rising sea levels, townspeople voted not to pursue dam removal at this time. It is likely that future issues with the dam--such as upstream flooding, declines in fish passage and the risks of storm damage--will eventually bring the Penobscot Habitat Focus Area back to the site, which still represents one of the largest intertidal and salt marsh restoration opportunities in the Northeast.

South Branch Lake and East Branch Lake Nature-like Fishways Completed

September 2016 marked the completion of two landmark fish passage projects in the Penobscot River Habitat Focus Area, at South Branch Lake and East Branch Lake. Both projects are on land owned by the Penobscot Indian Nation and included decrepit legacy dams at lake outlets that harked back to the Penobscot River watershed's history of log-driving and lumber mills. The dams were removed and



South Branch Lake Fishway



East Branch Lake Fishway

replaced with nature-like fishways constructed of natural materials (rock), restoring passage for sea-run fish including alewife, American eel and Atlantic salmon (a NOAA "Species in the Spotlight"). The benefits to alewife are expected to be substantial due to the large amount of spawning habitat in South Branch Lake (2,035 acres) and East Branch Lake (1,100 acres). At South Branch Lake, outmigrating juvenile alewife have already been seen leaving the lake through the restored channel.

The projects were constructed by Sargent Corporation, a local construction firm who previously worked with NOAA on the removal of the Veazie dam and related site restoration in 2013 – 2015. In addition to the Penobscot Indian Nation, other partners included the U.S. Fish & Wildlife Service and Natural Resources Conservation Service, who assisted with design, funding, and construction oversight. A Maine engineering company, Wright-Pierce, designed the South Branch Lake fish passage project and assisted with the specifications and bid-for-construction of the USFWS-designed East Branch Lake project. The NOAA Restoration Center provided funding through the Community-based Restoration Program (Atlantic Salmon Federation) and Habitat Blueprint (The Nature Conservancy). Both sites are expected to become venues for tribal cultural events and environmental education.

The Nature Conservancy Barrier Prioritization Tool

In 2016 The Nature Conservancy, in partnership with NOAA, debuted an aquatic barrier prioritization tool for the Penobscot River watershed (<http://maps.coastalresilience.org/maine/#>). The publicly accessible online tool can be used to identify dams and road crossings on the landscape in need of passage improvement, and prepare tables and maps of projects prioritized by size, location, fish species and amount of habitat. Throughout the development of the tool, TNC regularly convened a working group of state and federal agency personnel interested in stream connectivity who provided

up-to-date habitat data and refined functions. The next step is to roll out the tool to the general public and enhance the usefulness of the tool for restoration practitioners and barrier owners such as municipalities. TNC has committed to the long term maintenance of the online tool, including web hosting and changing project records as restoration projects (dam removals, culvert replacements) are completed. The tool is already being used by TNC and NOAA to shortlist projects that will benefit endangered Atlantic salmon and other sea-run species.

Bagaduce River Nature-like Fishways Designed

In 2016 final designs were completed for two nature-like fishways on tributaries to the Bagaduce River, which runs into the lower Penobscot River near Penobscot Bay. The rock fishways will replace decrepit dams at the outlets of Wight Pond and Pierce Pond, where local volunteers in the small farming and fishing town of Penobscot, Maine (population 1,263) have maintained the historic runs of alewives by netting and carrying fish around dams and debris jams for years. Environmental permitting is underway for the fishways with hopes for construction in the summer of 2017. Funding for design and permitting came from the NOAA Habitat Blueprint through a partnership with The Nature Conservancy, who is working with the Maine Coast Heritage Trust on project management and fundraising for the Bagaduce River fisheries restoration.

Research & Science:

Penobscot Monitoring

In collaboration with the Nature Conservancy (and formerly the Penobscot River Restoration Trust), NOAA's National Marine Fisheries Service oversees a program consisting of nine individual studies evaluating the ecological effects of the Penobscot River Restoration Project. The program was initiated in 2009, to document baseline conditions and project outcomes using a before-after study design. The program focuses on the following parameters:

Hydrodynamics, Geomorphology and Sediment Transport

- Channel geometry (elevation surveys at monumented cross sections)
- Channel features (photographic monitoring at monumented cross sections)

Water Quality

- Continuous and discrete water quality parameters
- Continuous temperature
- Benthic invertebrate community structure (state water quality protocols)

Fish Monitoring

- Assessments of diadromous fish species in the estuary (hydroacoustics)
- Timing and success of up-migrating diadromous fish species at former dam/impoundment reaches, fish lifts, ladders and bypass channel (telemetry)
- Timing and success out-migrating salmon smolt (telemetry)
- Migration patterns, spawning habitat and population size of shortnose sturgeon (telemetry)
- Fish community structure throughout the project area (boat electrofishing)
- Food web interactions from nutrient transfers between marine and freshwater ecosystems

Wetland and Riparian Communities

- Native and Potential Invasive Vegetation monitoring (photographic monitoring and mapping)
- Vegetation monitoring (photographic monitoring at monumented cross sections)

Activities in 2016 build on past investments to further the NOAA-supported, multi-parameter scientific monitoring program of the Penobscot River. With the removal of the Great Works and Veazie dams, and completion of the nature-like fish bypass at Howland Dam, the Project is now in the post-treatment monitoring period. Recent highlights include the discovery of [shortnose sturgeon accessing prime spawning habitat](#) above the site of the former Veazie Dam for the first time in over 100 years.

Communications & Outreach:

Maine’s Fisherman Forum and Penobscot Watershed Conference

March 4, 2016 marked the rollout of the Penobscot HFA at the Maine Fishermen’s Forum in Rockport, Maine. Matt Bernier, from the NOAA Restoration Center and the coordinator for the HFA, highlighted the ambitious goals for the Penobscot River and bay watersheds, including rebuilding fish stocks through habitat protection and restoration activities such as barrier removals. The audience included commercial fishermen, non-governmental organizations, state agency staff, state lawmakers, Congressional staff and NOAA leadership from the regional office and Northeast Fisheries Science Center. In April, two further HFA presentations were given at the Penobscot Watershed Conference hosted by Maine Sea Grant, including an overview of HFA goals, ongoing work such as feasibility studies at dams in Orland and Frankfort, NOAA funding and opportunities for stakeholder participation. Attendance at the Saturday conference exceeded expectations with over 300 attendees, and suggested that improved water quality and the return of native sea run fish were leading a renaissance in citizen involvement in the watershed. Proceedings of the conference were published by Maine Sea Grant (<http://www.seagrants.umaine.edu/penobscot-watershed-conference>).

Restoration Website

Maine Sea Grant, working with The Nature Conservancy, began building an online summary of restoration projects for the Penobscot HFA, including culvert replacements, nature-like fishways and dam removals. The site will eventually have a clickable map portraying restoration projects and information such as before-and-after photos, habitat descriptions and project costs.

Fact Sheets

Maine Sea Grant released a fact sheet for the Penobscot HFA titled “Connecting Rivers for Healthy Ocean Fisheries” (<http://www.seagrants.umaine.edu/sites/default/files/pdf/cod-alewife-factsheet-508-042216.pdf>) and began work on a second fact sheet titled “Connecting Rivers for a Healthy Penobscot Watershed”. The series of fact sheets are anticipated to become important tools for public education about the broad-scale advantages of Penobscot fisheries restoration to the larger coastal community.

Feasibility Studies

Working with The Nature Conservancy and NOAA Restoration Center, Maine Sea Grant tested several outreach tools for the Orland Village dam feasibility study, including links to previous fact sheets about

mercury in the lower Penobscot River, feasibility study reports and maps, and “frequently asked questions” (FAQ). The Maine Sea Grant director, Paul Anderson, served as moderator for a public informational meeting held in Orland, Maine to discuss the fate of the dam and goals for expanded sea-run fish populations and habitat improvements. The experience in Orland was an opportunity for the Communications and Outreach Team to try different frames and messages, and to better understand local community perspectives on fish restoration. While the town elected not to move forward with a restoration project at this time, we are applying lessons learned to projects in other communities.