

Winnicut River Dam Removal

COASTAL RESTORATION *at work*

Winnicut River Dam Removal and Fish Passage Project Greenland, New Hampshire

The Winnicut River Dam and its attached Canadian “step weir” fish ladder were built in 1957 by the New Hampshire Fish and Game Department at the head-of-tide, to create habitat for waterfowl and provide fish passage to freshwater habitat. Soon after construction, it became apparent that the design of the fish ladder was not appropriate for coastal fish species native to the Winnicut River. Partially as a consequence of the dam and its poorly performing fish ladder, populations of diadromous fish (those that migrate to and from the ocean) in the Winnicut River have dwindled.



The Winnicut River Dam in spring of 2009, before the project began.



A downstream view of the Winnicut River (photo simulation) after habitat restoration.

Why Dam Removal?

After a comprehensive feasibility study was completed in 2006, Fish and Game decided that removal of the Winnicut Dam and adjoining fish ladder was the best alternative to restore riverine habitat for spawning rainbow smelt, while also providing upstream and downstream passage for river herring (alewives and blueback herring), American eels and resident fish.

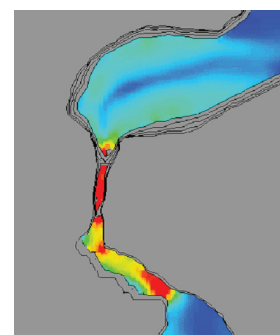
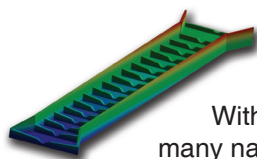
Additional project benefits include:

- Reconnect 39 miles of spawning and rearing habitat for migratory fish including river herring, smelt and American eel;
- Recover a portion of the 5,500 feet of riverine habitat that was lost through the creation of the impoundment;
- Restore 21,000 square feet of intertidal habitat;
- Eradicate a population of Japanese knotweed, a highly invasive plant now covering 6,000 square feet of the streambank;
- Create a car-top public boat access upstream of the Route 33 Bridge.

Innovative Fish Pass Design

Construction of the Rte. 33 Bridge over the Winnicut River in 1959 resulted in a quarter-acre of fill in the river, which severely constricted the channel.

With the dam removed, the water velocities beneath the bridge will be too swift for many native fish to navigate through (as shown in the figure on the right). To resolve the fish passage issues beneath the bridge, an innovative run-of-river fish pass structure (diagram at left) will be constructed. The modified “pool and weir” concrete fish pass will be 132 feet long and 20 feet wide, and will convey the total volume of the river, including flood flows. The design calls for a 6-inch elevation change between each of the 18 weirs, allowing for fish passage at low flow and low tide.



Water velocities beneath Route 33 are too swift for river herring to pass, as indicated by the red sections. Slower water velocities are shown in blue.

Winnicut River Dam Cam

Watch the Winnicut River Dam Removal Project online, with real-time pictures posted every fifteen minutes. (Photo at left taken on Oct. 1, 2009.)



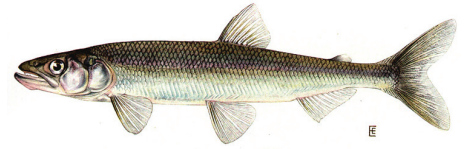
www.earthcam.com/winnicut

Fisheries in Peril

From 1957 to 1998, river herring could not pass upstream of the Winnicut Dam, except when Fish and Game employees would manually move them from below to above the dam. Modifications to the Winnicut River fish ladder in 1998 allowed river herring to pass through the fish ladder and their populations have gradually increased; however, diadromous fish populations such as river herring, rainbow smelt, and American eel in the Winnicut River remain significantly below historic populations. The new Winnicut run-of-river fish pass is designed to provide upstream and downstream passage to the multiple diadromous and resident fish species that utilize the Winnicut River system throughout their life cycle.

Rainbow Smelt (*Osmerus mordax*)

Rainbow smelt are anadromous, meaning they spend the majority of their adult life in the sea and return to freshwater streams to spawn. In the early spring, smelt move up from estuarine areas to their spawning grounds, which are characterized by rock, rubble, sand, and gravel substrates, and fast flowing freshwater. Smelt do not journey far above the extent of tide water and cannot ascend falls or other obstructions. Having a low tolerance for salinity, smelt eggs need freshwater to survive.



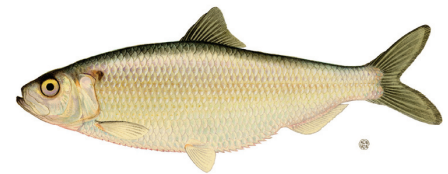
American Eel (*Anguilla rostrata*)

American eels are catadromous, meaning they live in freshwater but migrate to the ocean to breed. Eels can tolerate a wide range of temperatures and can be found in streams, rivers, lakes, tidal marshes, and estuaries. In the fall, mature adults stop feeding and begin their out-migration to the ocean. Migrating eels change colors from yellowish green to blackish (top) and white (bottom) and both their fins and eyes enlarge. By February, the normally solitary American eel congregates in the Sargasso Sea, near Bermuda, to spawn. Young elvers (baby eel) arrive to the Gulf of Maine in the early spring.



Blueback Herring (*Alosa aestivalis*)

The blueback herring, an anadromous fish, spends most of its life at sea, returning to freshwater to spawn in the late spring often undergoing extensive coastal migrations. Led by their sense of 'smell,' blueback herring spawn in the streams in which they were born. They prefer to spawn in swift flowing freshwater reaches over hard substrate; however, they can tolerate spawning in brackish water.



Alewife (*Alosa pseudoharengus*)

The alewife, also an anadromous fish and collectively with blueback herring referred to as "river herring," spend most of their life at sea before entering freshwater in the early spring to spawn. Alewives usually spawn in the quiet waters of ponds or in slow stretches of rivers above the influence of the tide. The eggs are not tolerant of salt or brackish water. Triggered by temperature, alewife spawning typically precedes that of blueback herring.



Text: Bigelow, H.B. and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. US Fish & Wildlife Serv., Fishery Bull. 74(53)101-107. Photos: Kraft, C.E., D.M. Carlson, and M. Carlson. 2006. Inland Fishes of New York (online), Version 4.0 Department of Natural Resources, Cornell University, and the New York Department of Environmental Conservation. (Used with permission.)

Coastal Restoration at Work!

The NH Coastal Program at the New Hampshire Department of Environmental Services received \$500,000 in stimulus funding for the Winnicut River Dam Removal Project from the National Oceanic and Atmospheric Administration. This project was one of 50 proposals selected out of a national pool of 814 proposals to receive American Recovery and Reinvestment Act funds for marine and coastal habitat restoration. The total cost of the project is \$1,094,075. Additional funding entities for this project include: USDA Natural Resources Conservation Services, NH Fish and Game Department, NH Charitable Foundation, NH Moose Plate Grant Program, and the Coastal Conservation Association. The "stimulus" funding will support the creation of 21 jobs over the project duration.

