Railroad Brook Fish Habitat Restoration Project

Success Stories

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Connecticut Department of Environmental Protection, 79 Elm Street, Hartford, CT 06106-5127 -
Arthur J. Rocque, Jr., Commissioner

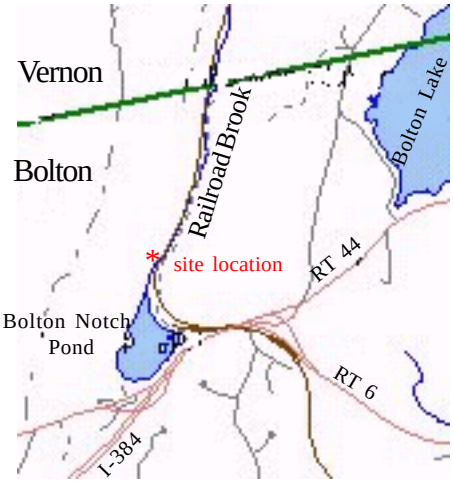
The Resource

Railroad Brook is a small stream in central Connecticut that flows for 2.8 miles in a northerly direction from the outlet of Bolton Notch Pond in Bolton to its confluence with the Tankerhoosen River in Vernon. The Tankerhoosen River flows into the Hockanum River, which in turn flows into the Connecticut River in East Hartford. The Tankerhoosen River, a portion of which is designated a Wild Trout Management Area, draws a good share of its water from Railroad Brook. Although the Railroad Brook watershed is primarily forested, there is some commercial development along a portion of the Interstate 384/State Route 44 corridor. Within the restoration project area, the brook flows along an abandoned railroad bed which is part of the state's "rails to trails" linear park system that links Bolton Notch State Park to Valley Falls Park in Vernon. Typical of most headwater streams in Connecticut, it supports two species of coldwater fish, native brook trout (*Salvelinus fontinalis*) and blacknose dace *(Rhinichthys atratulus*).

Environmental Problems

In the nineteenth century, a major railroad was built from Boston, Massachusetts to the Hudson River in New York. During the construction of the railroad through Bolton Notch, approximately 1200 feet of Railroad Brook was diverted into a narrow, excavated channel adjacent to the gravel railroad bed.

Although the railroad was abandoned in the 1960s, this physical disturbance to the brook continued to damage fish habitat and cause nonpoint source pollution (see **Nonpoint Source Pollution** sidebar). Aquatic habitat in the channel was a non-diverse and shallow, monotypic run with ledge and sand/gravel from the railroad bed forming most of the substrate. In-stream habitat for the resident fish and aquatic insect populations was poor. This stretch of brook also lacked a natural, vegetated riparian zone since the edge of the gravel railroad bed was contiguous with the edge of the stream.



Nonpoint Source Pollution

Nonpoint source (NPS) pollution is diffuse in nature, both in terms of its origin and in the manner in which it enters surface and ground waters. It results from a variety of human activities that take place over a wide geographic area. Pollutants usually find their way into waters in sudden surges, often in large quantities, and are associated with rainfall, thunderstorms, or snowmelt. NPS pollution generally results from land runoff, precipitation, atmospheric dry deposition, drainage, or seepage. Hydromodification - physical disturbances to a water resource caused by filling, draining, ditching, damming, or otherwise altering wetlands and stream courses - is also considered a nonpoint source problem.

Photo: Brian Murphy

Channelized stream prior to restoration

Channelization and improper channel configuration also caused the brook to regularly flood the abandoned railroad bed. Water running along and over the railroad bed washed fine sands and silts into the brook. Continual runoff of these NPS pollutants caused sedimentation and further degradation of aquatic habitat.

Results of stream surveys conducted by the Connecticut Department of Environmental Protection (CT DEP) Fisheries Division revealed a small population of brook trout with poor survival and growth characteristics. This reach of Railroad Brook was severely degraded compared to the natural, unaltered downstream reach of the brook.

The Solution

The goals of the Railroad Brook Fish Habitat Restoration Project, established by CT DEP fisheries biologists, were to restore aquatic habitat and water quality by: (1) returning the channel to a more natural, meandering configuration; (2) adding and enhancing in-stream habitat diversity; and (3) increasing streamside vegetation. The project included the following elements:

- In the upstream (southern) section of the project area, approximately 300 linear feet of new channel was created and diverted through existing wetlands based on historic evidence that the brook once flowed through these wetlands. The new channel now follows the more natural, winding path of the historic channel, which is intended to reduce flow velocities and the resulting erosion and sedimentation.

- In the downstream (northern) section, the restoration involved realigning the brook within an approximately 900 linear feet stretch of brook to a more sinuous and meandering pattern adjacent to the railroad bed. The elevation of the railroad bed was raised by an average of 1.5 feet, and the bed was graded toward the brook. The purpose of this design is to contain stream flows caused by most rain storms within the stream banks and prevent the stream from running over the railroad bed, which will reduce erosion and sedimentation.

- In-stream fish habitat features, including boulders, undercut banks, logs, rootwads, and pools, were installed throughout the entire stream reach within the project area. The structures are designed to imitate natural stream features, and will provide feeding locations and protection from predators. Gravel and stones were imported and placed in the stream bed to promote fish spawning and provide suitable habitat for aquatic insects.

- Native vegetation removed during the construction phase, including sweet pepperbush, eastern hemlock, white oak, red maple, mountain laurel, and yellow poplar, were replanted along the restored stream channel throughout the project area. Wetland seedlings, including silky dogwood and arrowwood, were obtained from the CT DEP Pachaug State Forest Nursery and planted along the streambank. Disturbed soils were stabilized with a "New England Wetlands Conservation/Wildlife" grass mix.

- Permanent educational signs were installed along the new stream channel to explain restoration techniques and methods, and to provide general information on water quality and fish habitat.

Photo: Brian Murphy

Construction of lunkers simulating undercut banks

Photo: Brian Murphy

Cross - log and rootward revetment with point bar

Collectively, these features were intended to recreate in-stream cover, variations in channel depths and flow patterns, and increase the availability of fish habitat. Typically, the more cover a stream contains, the greater number of fish it will support. Vegetation along the stream is intended to provide shade, which will help maintain cool water temperatures, and stabilizes soils, which reduces erosion and sedimentation. The educational signs are intended to educate the public about the project and fish habitat restoration in general.

Results

The restoration project was initiated on August 22, 2000 and completed by September 22, 2000. The restored stream already exhibits many characteristics normally associated with a natural stream system. For example:

- The stream channel has remained stable despite several major rain events, including one storm during which the stream overflowed its bank for about 150 feet. Despite these high flows, the channel has remained stable with no visible signs of bank erosion. The high flows washed most of the fine sediments resulting from construction activity downstream, exposing the restored gravel substrate, which is conducive to fish spawning. There was an infusion of small branches and woody debris, which improves stream productivity and habitat complexity.

- Stabilization of the stream channel and the abandoned railroad bed will reduce erosion and sedimentation, which is a major nonpoint source pollution problem in the Hockanum River watershed.

- Blacknose dace have already been observed colonizing the newly created channel. Adjacent to the railroad bed, juvenile native brook trout have been observed utilizing the newly created microhabitats such as the undercut banks and rootwads. Increased fish habitat in the headwaters of the Hockanum River will mean greater fish abundancy throughout the watershed.

Future Plans

The Railroad Brook Restoration Project site is certain to receive a high degree of public use and attention. Due to the presence of Valley Falls Park, which is located in Vernon about one mile downstream from the restoration site, and Freja Park, which is located on the west side of Bolton Notch Pond, it is anticipated that over 10,000 visitors will walk or bike past the restoration site annually. With the educational signs, the project area will in effect become an “interpretative” stream. In addition, this project will serve as a demonstration site to promote innovative stream restoration techniques and natural stream channel design approaches to the public and natural resource managers.

The CT DEP Fisheries Division will monitor fish populations for the next four years to evaluate the effect of restoration activities following an EPA approved Quality Assurance Project Plan. Post-project data will be compared to pre-project data collected from 1997-2000.

Photo: Brian Murphy

New stream channel showing lunker structures (undercut banks) and vegetative transplantes

Project Partners and Funding

Project partners include: CT DEP, U.S. Environmental Protection Agency (US EPA), Tolland County Soil and Water Conservation District (TCSWCD), Town of Bolton Conservation Commission, Milone & McBroom Engineering, and D & V Morin, Inc.

The CT DEP Fisheries Division provided overall project management including public information and education with assistants from the TCSWCD. Engineering designs and inspectional services were provided by Milone & McBroom, Inc. and construction was by D & V Morin, Inc. Contracts were administered and engineering technical assistance was provided by the CT DEP Inland Water Resources Division.

Total cost of the project was $122,100, which included:

Phase I Design and Engineering:

- $20,700 from Clean Water Act Section 319 funds

Phase II Construction:

- $60,000 from Clean Water Act Section 319 funds
- $41,400 from CT DEP River Restoration Grant Program

Section 319 of the Federal Clean Water act authorizes EPA to award grants to states and tribes to support their NPS management programs. The CTDEP passes through a portion of these funds to other state, regional and local government agency and non-government organization to implement programs and projects.

Contacts

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CT DEP and EPA websites
http://dep.state.ct.us
http://www.epa.gov/owow/nps/education.html

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