

Big Spring Creek Habitat Enhancement Project

by Charles McGarrell
Pennsylvania Fish & Boat Commission
Regional Habitat Biologist



photo-courtesy of Big Spring Watershed Association

Piper Mill Dam and Pond

Big Spring Creek is a limestone spring trout stream located in western Cumberland County. Between the late 1700s and 1930s, six milldams along its 5.2-mile length impounded the creek. In the 1950s, an additional dam was constructed on the creek to provide water to a privately-owned fish hatchery. Historically, due to its abundant supply of cold, limestone spring water and its extensive areas of deep-water habitat in the impoundments created by the dams, Big Spring Creek supported a world-class wild brook trout fishery.

In the 1930s, as electricity was replacing water as the primary source of power, electric-powered mills started replacing water-powered mills. By the start of World War II, all but one of the Big Spring Creek mills had closed. As the mills were closing, a decline in the Big Spring trout fishery was observed and efforts to enhance trout habitat and fishing conditions were implemented. These efforts included the construction of a series of stone wing-walls through President Franklin Roosevelt's Works Progress Administration Program and the stocking of brook trout and eventually brown and rainbow trout.

Today, most of the remains of the former dams on the creek have been removed. However, the negative effects of these dams and past mill operation activities are still evident in many areas of the stream. Mill operations typically

included regular emptying and harrowing of the mill ponds to remove sediment and aquatic vegetation to increase the amount of water that could be stored upstream of the dams and the amount of power the mills could generate. With the termination of mill dam activities several decades ago and subsequent removal of the remains of the dams, the present physical habitat and biological conditions in many sections of the creek are dramatically different than they were years ago when the dams were actively impounding the creek. For example, many of the slow-flowing, deep-water areas that supported an abundance of wild brook trout are now over-widened and shallow with limited amounts of cover and few brook trout.

In October 2006, the Cumberland Valley Chapter Trout Unlimited (CVTU), the Big Spring Watershed Association (BSWA) and the Pennsylvania Fish & Boat Commission (PFBC) formed a partnership with the goal of improving brook trout habitat in Big Spring Creek. Shortly after the formation of the partnership, project partners started working on developing a plan of action, acquiring grant funds and identifying additional project partners. PFBC biologists used existing fishery information and conducted additional surveys to identify the specific reaches of the creek that still supported a relatively high abundance of brook trout and the reaches that supported few or no brook trout.

In addition, PFBC biologists collected additional physical habitat and fish cover information from these same reaches to compare the habitat conditions of the reaches that supported a high abundance of brook trout to those that supported very few brook trout. This information was used to identify the specific reaches of the creek in need of habitat enhancement work and a reach that would be used as a model for designing a habitat enhancement plan for the reaches with low brook trout abundance. PFBC biologists also reviewed published information about the habitat requirements of brook trout to confirm the appropriateness of using the proposed model reach as the foundation for the planned habitat enhancement work. Based on this information, the partnership identified the shallow, over-widened sections of the Big Spring Creek formerly impounded by the Piper Mill Dam and the Thomas

photo-Charles McGarrell



Remains of the Piper Mill Dam with a portion of the former impoundment in the foreground as it appeared in 2007.



Pennsylvania Fish & Boat Commission Fisheries biologists collecting fishery, physical habitat and fish cover data from Big Spring Creek.

Fish Hatchery Dam as the areas to be targeted for brook trout habitat enhancement work.

By mid-August 2010, all necessary funding had been secured, donated service and material agreements were in place, design and permitting work had been completed and required permits were in-hand. Project construction started in late-August and was completed by the end of September 2010.

Big Spring Creek Habitat Enhancement Project

The primary objective of the Big Spring Creek Habitat Enhancement Project was to improve habitat conditions for trout in the project area with a specific focus on enhancing habitat conditions for brook trout. More specifically, these efforts would focus on increasing depth, reducing velocity and providing additional cover for all life stages of brook trout.

Narrowing the channel and constructing log water staging devices increased water depth. The channel was narrowed by constructing approximately 0.75 acres of riparian shelf that consisted of a base layer of limestone rock covered with topsoil and seeded with a mix of annual erosion control and native perennial wetland plant species and covered with biodegradable matting. The shelves were also planted with more than 5,000 native herbaceous species plugs (28 species) and 100 native shrubs (8 species).

Six log water staging devices were constructed from a series of either five or eight logs. These devices were designed to control the stage (height) of the water in the channel, increasing water depth while allowing fish passage. In addition to controlling the height of the water in the channel, the devices influence the soil moisture conditions of the constructed riparian shelves, maintaining the soil moisture conditions necessary for the shelves

to develop into functional wetlands intended to provide habitat for wetland plant, reptile, amphibian, bird and mammal species.

In addition to the construction of the riparian shelves and log water staging devices, the project included the construction of ten modified mudsills and the placement of over 100 boulders and 19 additional logs to provide cover for fish and create a diversity of localized water velocity conditions within the channel.

PFBC biologists plan to monitor the fishery, physical habitat and fish cover conditions within the project area one, three, five and ten years after project implementation to document the short- and long-term effects of the project on the brook trout fishery.

Project partners

This project would not have been possible without the generous contributions of all partners involved in the project. Project partners worked together to leverage over \$394,000 in funding and donated services and materials. Partners included:

- Aqua-Niche Inc.
- Big Spring Watershed Association
- Cumberland County Environmental Initiative Program
- Cumberland Valley Chapter Trout Unlimited
- Gleim Environmental Group
- Kreider Excavating
- National Fish and Wildlife Foundation, More Fish Program
- North Newton Township
- Pennsy Supply Inc.
- Pennsylvania Department of Environmental Protection, Growing Greener Program
- Pennsylvania Fish & Boat Commission
- Rivers Unlimited Inc.
- U.S. Army Corps of Engineers
- West Pennsboro Township



Before



After

The upstream limit of the Big Spring Project area is shown immediately before and after the implementation of the Habitat Enhancement Project.