Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Pennsylvania

Restoring Stream Channel and Riparian Areas Improves Pierceville Run

Waterbody Improved

Sediment in runoff from agricultural lands impaired Pennsylvania's Pierceville Run and its tributaries, prompting the Pennsylvania Department of Environmental Protection (PADEP) to add 9.71 miles of watershed streams to the state's Clean Water Act (CWA) section 303(d) list of impaired waters in 2002. In lower Pierceville Run, project partners stabilized a degraded portion of stream channel and restored riparian forest buffers while restricting livestock from the stream and riparian areas. Water quality improved in the restored section, allowing PADEP to remove a 1.65-mile-long segment of the Pierceville Run from the list of impaired waters in 2012.

Problem

Pierceville Run (Figure 1) is a headwater tributary within the 72-square-mile South Branch Codorus Creek watershed (South Branch) in York County. Originating just north of the Maryland-Pennsylvania border, Pierceville Run is designated for cold-water fishery support.

Agriculture is the primary land use in the watershed. Nonpoint source runoff from cropland and pastureland delivered high nutrient and sediment loads to Pierceville Run and the South Branch. Along the lower mainstem of Pierceville Run, the streambanks were damaged by livestock. They had been eroding at a rate of 1.5 feet per year, forming three- to four-foot-high, unstable vertical banks.

A stream survey conducted by the Izaak Walton League of America (IWLA) in 1999 indicated that the Pierceville Run watershed was a degraded aquatic ecosystem. PADEP performed a bioassessment at two stations on the stream that same year and confirmed that the stream was impaired by siltation and flow alterations. As a result, PADEP included all 9.71 stream miles of the Pierceville Run watershed on the state's CWA section 303(d) list of impaired waters in 2002 for not meeting the aquatic life designated use because of siltation from agricultural sources. The impaired waters included 5.81 miles of the mainstem of Pierceville Run as well as 3.9 miles of tributaries.

PADEP developed a total maximum daily load (TMDL) in 2003 to serve as a "pollution diet" for the entire South Branch watershed, including Pierceville Run. The TMDL set limits for the sediment and nutrient (total phosphorus) loads, which serve as goals for remediation. The 9.71 impaired stream miles of Pierceville Run required an 87 percent reduction in nutrients (2,857.61 pounds per year); and a 42 percent reduction in sediment (1,539,972.47 pounds per year) to meet the TMDL water quality goals.

Figure 1. Watershed partners restored this section of Pennsylvania's Pierceville Run by grading streambanks, planting a riparian forest buffer and installing fences to prevent cattle access.

In 2007 PADEP developed a Codorus Creek watershed implementation plan (WIP), which listed Pierceville Run as impaired because of streambank erosion. Recommended practices included stabilizing the streambanks, preventing livestock stream access and establishing riparian buffers.

Project Highlights

The IWLA, PADEP and the York County Conservation District partnered to address the water quality problems identified in the TMDL and the WIP. First, the partners designed and implemented a natural stream channel restoration plan in 2006 for Pierceville Run. They restored 2,272 linear feet of the stream channel along the WIP-identified targeted segment (see Figure 1). The project aimed to reduce sediment and nutrients while improving flow regimes and aquatic habitat. The partners installed in-stream rock structures and graded and stabilized streambanks to stop active erosion and to reconnect the stream to its floodplain.

Next, the partners planted an extensive riparian forest buffer along the project segment; it included grasses, forbs and 600 trees. To protect the restored streambanks and riparian forest buffer areas, the partners installed livestock exclusion fences. These restoration efforts were designed to remediate the WIP-targeted segment of Pierceville Run, as well as to improve water quality in downstream segments in the greater South Branch watershed by removing pollution sources.

Results

The restoration efforts helped to reduce sediment loads to Pierceville Run by an estimated 39 percent (1,400,000 pounds per year), nearly meeting the 42 percent sediment reduction goal called for in the TMDL. Restoration efforts have also led to progress in meeting the 87 percent total phosphorus loading reduction goal in the TMDL. As of 2011, total phosphorus loading was reduced by 39 percent (1,271 pounds per year).

In spring 2006, PADEP's Watershed Support Section began monitoring the project area for pebble counts, macroinvertebrates, habitat and water chemistry. Pebble count data for 2006 and 2009 showed that sediment size increased over time to include a greater percentage of larger gravel and cobbles, indicating habitat improvement (Figure 2). Before the restoration project in May 2006, the mid-station substrates were composed of 34 percent sand-silt, 62 percent gravel and 4 percent cobbles. By September 2009, the percentages had improved to 4 percent sand-silt, 81 percent gravel and 15 percent cobbles.

PADEP performed an aquatic habitat assessment in the restored section of Pierceville Run in 2011. The

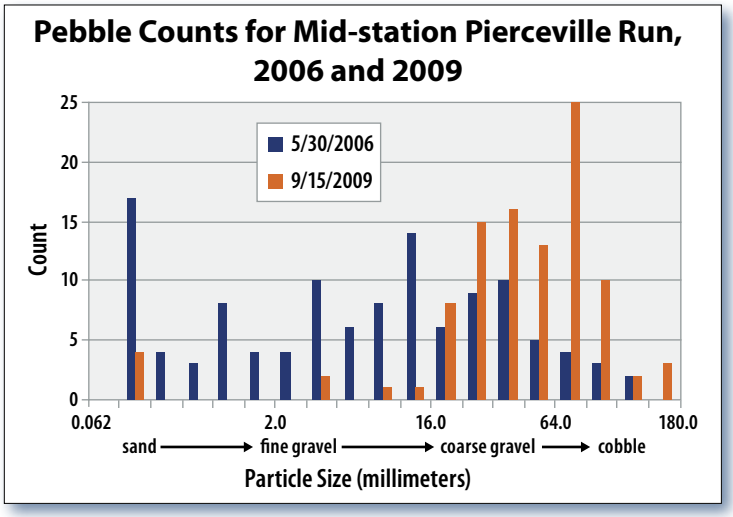

Figure 2. Pre- and post-project pebble counts for Pierceville Run show a trend toward coarser gravel and cobbles, an indication of improving conditions.

data showed an Index of Biotic Integrity (IBI) value of 71.3, exceeding the minimum IBI score of 63, which indicates a healthy and unimpaired aquatic ecosystem. On the basis of these data, PADEP removed a 1.65-mile-long segment of the lower mainstem of Pierceville Run (from Schuman Road to the confluence of Pierceville Run and Centerville Run) from the list of impaired waters. Project partners attribute the delisting of this segment to the stream restoration and riparian forest buffer establishment and associated protection efforts. Waterbodies upstream of the project site (4.16 miles of the mainstem and 3.9 miles of tributaries) remain listed as impaired.

Partners and Funding

IWLA used a $142,922 CWA section 319 grant in 1999 to assess the South Branch watershed. The IWLA then secured a $534,120 CWA section 319 grant in 2003 to begin restoring the South Branch watershed; $356,888 of these funds were used for the Pierceville Run restoration project. Approximately $25,000 of the riparian forest buffer work was funded by PADEP and the U.S. Department of Agriculture under the Conservation Reserve Enhancement Program; the York County Conservation District managed the work. Matching funds included $2,000 from IWLA and $52,000 from the Aquatic Resource Restoration Company. The Pennsylvania Department of Transportation provided $100,000 in matching funds to assist in work near roadways in the watershed.

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For additional information contact:

Scott N. Heidel
Water Program Specialist
Pennsylvania Department
of Environmental Protection
717-772-5647 • scheidel@state.pa.us