



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Pennsylvania

## Stream Restoration and Dam Removal Restore Waterbodies

### Waterbody Improved

Many years of agricultural runoff had caused nutrient and dissolved oxygen impairments in Manatawny Creek and an unnamed tributary to the Manatawny. In addition, an orphaned dam on the creek had blocked migratory fish access and triggered sediment accumulation in the stagnant waters. By 1998 Pennsylvania had included approximately 22.3 miles of Manatawny Creek and its tributary on the state's 303(d) list, citing sediment, nutrients, low dissolved oxygen, and thermal impairments due to agriculture and hydromodification. To address these problems, project partners stabilized stream channels, restored riparian buffers, and removed the dam. Water quality improved as a result, allowing the state to delist both waters in 2004.

### Problem

The Manatawny Creek watershed covers 91.6 square miles and includes parts of two counties in southeastern Pennsylvania. The creek drains into the Schuylkill River at the town of Pottstown, approximately 40 miles northwest of Philadelphia.

Although urbanization is taking place throughout the watershed, much of the area remains in agricultural use. Nonpoint source runoff from agricultural fields and operations delivered high nutrient and sediment loads to Manatawny Creek and its tributaries. Algal blooms and low dissolved oxygen levels were pervasive issues.

An orphaned dam near the mouth of the creek compounded the upstream problems in both Manatawny Creek and an unnamed tributary to the Manatawny. The dam blocked migratory fish passage and caused stagnant flows, which allowed sediment to accumulate.

These circumstances prompted the Pennsylvania Department of Environmental Protection (PA DEP) to place approximately 20 miles of Manatawny Creek and 2.3 miles of the tributary on the state's 303(d) list of impaired waters for failing to meet aquatic life uses. The agency identified several causes of impairment, including

- Low dissolved oxygen concentrations triggered by nutrient-rich agricultural runoff



Restored riparian buffer along Manatawny Creek.

- Accumulated sediments from runoff and dam-caused streamflow stagnation
- Water temperature increases produced by stagnant waters

### Project Highlights

Project partners employed several approaches to address the water quality troubles. First, they removed the dam in 2000, restoring the flow of the Manatawny and the tributary. Next, they stabilized approximately 2,000 linear feet of stream channel to reduce erosion. Finally, to further deal with erosion and to

reduce nutrients entering the waterway, project partners restored nearly 2,000 linear feet of riparian buffers. These actions helped to reduce annual sediment loads to Manatawny Creek by an estimated 800 tons.

In addition to engineering approaches, project partners used public education throughout the project's duration. They conducted public meetings on the dam removal project, participated in formal meetings with borough officials and residents to discuss riparian vegetation management, and distributed project information through print and television media.

## Results

PA DEP reassessed Manatawny Creek and its tributaries in 2002. By that time, the state had changed its 303(d) listing and delisting methodologies. When Manatawny Creek had been listed in the mid-1990s for not meeting aquatic life uses, the state had based its decision on chemical parameters like nutrients and dissolved oxygen. Later, as part of programmatic changes in Pennsylvania's total maximum daily load (TMDL) program, the state revised its criteria to base them primarily on benthic macroinvertebrate data.

As shown in the accompanying table, state biologists found that Manatawny Creek's macroinvertebrate populations consisted largely of pollution-sensitive taxa comparable

to those found at reference locations. In addition, PA DEP showed that dissolved oxygen consistently remained above the state standard of 5 mg/L.

On the basis of these findings, Pennsylvania removed 20 miles of Manatawny Creek and 2.3 miles of the unnamed tributary from its 303(d) list of impaired waters. Project partners attribute the delisting of these waterbodies to the dam removal and stream restoration efforts.

## Partners and Funding

Using a \$90,000 section 319 grant, the Delaware Riverkeeper Network spearheaded efforts to stabilize streambanks and restore riparian areas. The Academy of Natural Sciences' Patrick Center for Environmental Research used a PA DEP Growing Greener grant to assess the effectiveness of dam removal as a river restoration method. The Pennsylvania Fish and Boat Commission oversaw the actual dam removal.

Additional partners included Greater Pottstown Watershed Alliance; Borough of Pottstown (Parks and Recreation); U.S. Fish and Wildlife Service; PA DEP; U.S. Environmental Protection Agency's Nonpoint Source Program; Montgomery County Conservation District; Pennsylvania Fish and Boat Commission; and Berks County Conservancy.

Sensitivity rating	Number of macroinvertebrate taxa						
	Station 1	Station 2	Station 3	Station 4	Station 5	Reference Station 1	Reference Station 2
Sensitive	5	7	7	7	7	7	5
Facultative	9	10	10	13	9	9	12
Tolerant	0	0	0	1	1	2	2

Macroinvertebrate data for Manatawny Creek in 2002 after stream restoration and dam removal. The table shows the number of pollution-sensitive, facultative, and pollution-tolerant taxa for five sampling stations and two reference sites. Taxa distribution in sampling stations compared favorably with that of reference sites. This finding, in part, led to the delisting of Manatawny Creek and an unnamed tributary.



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