



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Pennsylvania

Installing Active and Passive Treatment Systems Restores Water Quality

Waterbodies Improved

Abandoned Mine Drainage (AMD) caused high metal levels and low pH in Babb Creek, creating toxic conditions for trout and macroinvertebrates. The Pennsylvania Department of Environmental Protection (PADEP) added three segments of Babb Creek to the state's Clean Water Act (CWA) section 303(d) list in 1996 for impairments due to metals and in 2002 for impairments due to pH. PADEP also added one segment of Pine Creek to the impaired waters list in 1998. Stakeholders have worked to restore the creek for nearly two decades by installing active and passive AMD treatment systems. Water quality has improved and now meets standards, so PADEP plans to remove the three impaired segments of Babb Creek's mainstem from the state's 2010 CWA section 303(d) list for metals and pH. PADEP removed the impaired Pine Creek segment from the 303(d) list in 2002.

Problem

Babb Creek flows through north-central Pennsylvania and discharges into Pine Creek. The two streams converge where Pine Creek flows out of the Pine Creek Gorge. The 130-square-mile-watershed is heavily forested. Much of it is managed by the Pennsylvania Department of Conservation and Natural Resources (DCNR) and the Pennsylvania Game Commission. The history of coal mining in the Babb Creek watershed began with deep mining at the end of the Civil War. Underground mining reached a peak in the early 1900s and was largely done by the mid 20th century. Surface mining, while much more limited than underground mining, resurged in the 1970s and 80s. By 1990 active mining had ceased in the watershed, but AMD continued to degrade nearby waterbodies.

Babb Creek was declared biologically dead by the early 1900s after a prolonged absence of aquatic life. Iron and aluminum precipitate covered the streambed (Figure 1). PADEP added three segments of the creek to the CWA section 303(d) list of impaired waters in 1996 for elevated metal levels and in 2002 for pH. A total of 13.89 miles were included in the impaired classification. PADEP developed a total maximum daily load (TMDL) for Babb Creek and its tributaries in 2003.

A September 1998 report by a PADEP biologist documents that Babb Creek had "abundances and diversity lower than expected for a stream of this size, few individuals in sensitive taxa." Another PADEP biologist's August 1998 report on the conditions at a different location on the mainstem indicates that no mayflies were present in the

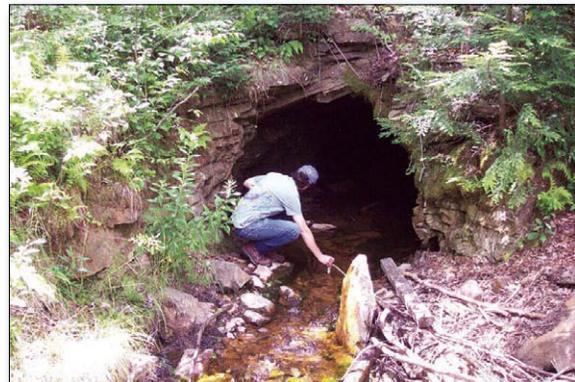


Photo provided by the DEP, Bureau of Watershed Management, TMDL Section

Figure 1. Iron and aluminum precipitate cover the bed of a mine discharge as it emerges from the Anna S. Mine Complex and eventually flows into Babb Creek.

stream, and that aluminum precipitate was found on the substrate. PADEP collected fish samples on July 30, 1990; data show that seven taxa of fish were found at a control location upstream of any AMD sources. PADEP biologists found no fish at each of four remaining sampling sites downstream of where they observed AMD impacts.

Project Highlights

In 1990 concerned citizens formed the Babb Creek Watershed Association (BCWA). Since then, the group has completed 16 projects throughout the watershed, including installing successive alkalinity producing systems and a lime treatment plant, re-grading and re-vegetating land areas, removing coal refuse, adding settling basins, creating wetlands, injecting limestone slurry into an underground mine, and installing a self-flushing limestone cell.



Figure 2. A portion of the Anna S. Passive Treatment System.

The Antrim Number One Mine Treatment Plant, which treats one of the principal sources of pollution to Babb Creek, has yielded the most significant water quality improvements. The discharge was abandoned in the mid-1900s. In 1982, the Antrim Mining Company began to surface mine on top of portions of the

abandoned underground mine. After compliance action by PADEP, a Consent Order and Agreement was issued in 1991 which required the Antrim Mining Company to build a treatment plant. The plant was turned over to the Antrim Treatment Trust when the Consent Order and Agreement with PADEP was amended in 1999. BCWA assumed operation and maintenance of the facility in 2001. The system has continually been upgraded over the years.

Another significant project in the watershed is the Anna S. Passive Treatment System (Figure 2). Constructed in 2004 and covering 20 acres, this is the largest passive treatment system in the world and treats the second largest source of AMD in the watershed.

Results

The new treatment systems allow Babb Creek to meet water quality standards for metals and pH (Table 1). Moreover, in a recent sampling survey, PADEP biologists documented a diversity of mayflies and other macroinvertebrates in Babb Creek. Data show that Index of Biotic Integrity (IBI) scores have improved significantly. An IBI score of 63 or greater supports removal of a stream from the impaired waters list. Four sites sampled in March 2009 had IBIs in the 80s and 90s, which are high enough to warrant delisting and to allow Babb Creek to be considered for a more stringent water quality classification. Additionally, in 1999 the Pennsylvania Fish and Boat Commission (PaFBC) documented the return of fish to three sampling locations where no fish had been found in 1990 (Figure 3).

On the basis of these data, PADEP has petitioned the U.S. Environmental Protection Agency (EPA)

Table 1. Data collected in 2006 show that Babb Creek meets water quality standards.

Pollutant	Water Quality Standard [in milligrams per liter (mg/L)]	Measured Value (mg/L)
Aluminum	< 0.75	0.37
Iron	< 1.5	0.19
Manganese	< 1.0	0.47
pH	> 6	6.41

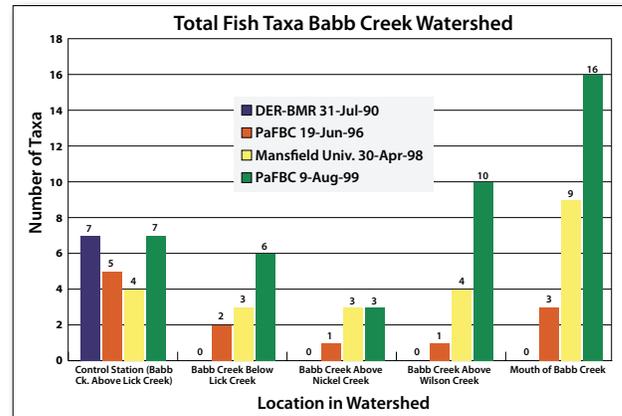


Figure 3. Fish have returned to the Babb Creek watershed after treatment. Data provided by PADEP's Moshannon District Mining Office.

to remove the three segments of Babb Creek from the impaired waters list in 2010. PADEP has already removed (in 2002) the segment of Pine Creek that was placed on the impaired waters list in 1998. Additionally, PaFBC has upgraded Babb Creek to a more stringent Wild Trout Stream waterbody classification.

Partners and Funding

Partners have spent approximately \$10 million on 16 projects that are directly related to the impaired stream segments in the watershed. Funding sources have included Pennsylvania's Growing Greener program, DCNR, the U.S. Department of the Interior's Office of Surface Mining, the Heinz Foundation, and EPA CWA section 104(b) and section 319 funding. Many other partners have contributed to the Babb Creek watershed efforts in the past 20 years. BCWA receives a tipping fee for waste deposited in a landfill as the result of a 1990 federal lawsuit. BCWA uses those funds to support restoration projects, including operating and maintaining the existing treatment systems.



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-09-001RR
December 2009

For additional information contact:

Joe Kelly, Pennsylvania Department of Environmental Protection
717-783-2404 • josephkel@state.pa.us

Michael W. Smith, Pennsylvania Department of Environmental Protection
814-342-8200 • michaesmit@state.pa.us