Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Pennsylvania

Abandoned Mine Reclamation Passive Treatment System Removes Pollutants

Waterbody Improved

An abandoned mine discharged metals, primarily iron, into Pennsylvania's Semiconon Run, prompting the Pennsylvania Department of Environmental Protection (PADEP) to add it to the state's 2002 Clean Water Act section 303(d) list of impaired waters for metals. Construction of a passive treatment system collected and directed the acid mine drainage (AMD) to a settling pond, then to a wetland where it is treated by vegetation and organic matter. The treated flow is then discharged through a limestone spillway before entering Semiconon Run. As a result, iron levels declined, and PADEP removed Semiconon Run from the state's 2008 303(d) list for metals.

Problem

Semiconon Run flows south from northern Butler County to the Connoquenessing Creek and eventually empties into the Ohio River northwest of Pittsburgh. The Semiconon Run watershed was the site of coal mining activities from the 1870s to the 1970s. In 2002 PADEP placed 2.3 miles of the Semiconon Run mainstem on the state's 303(d) list of impaired waters for metals.

An abandoned mine generated an acidic discharge to a small channel that emptied directly into Semiconon Run, conveying elevated metal loads (Figure 1). The iron contributed to the stream was high, as compared to other AMD metals such as aluminum and manganese. Historic water sampling near this location pinpointed the source of the problem to an abandoned mine. According to a Statewide Surface Water Assessment Program Survey (SSWAP) conducted near the mouth of Semiconon Run in 1999, metals impaired the biological habitat. The SSWAP identified an abandoned deep mine upwelling as the source of impairment (Figure 2).

Project Highlights

The abandoned mine is on property owned by Camp Lutherlyn. The camp offered to sponsor a project to design and build a passive treatment system to remediate the contaminated source. Construction of the treatment system began in 2003 and was completed in 2004. The AMD is collected and directed to a settling pond, then to a wetland where it is treated by vegetation and organic matter (Figure 3). The treated flow is then discharged through a limestone spillway before entering Semiconon Run.

Photo courtesy of Camp Lutherlyn

Figure 1. The confluence of AMD and Semiconon Run (6/26/03).

Photo courtesy of Camp Lutherlyn

Figure 2. Deep abandoned mine upwelling.

Photo courtesy of Camp Lutherlyn

Figure 3. Volunteers planting in the constructed wetland, 8/22/03.

The treatment facility also serves as part of the Camp Lutherlyn Environmental Education Program. The program uses the facility to help teach camp attendees about the remediation of Semiconon Run. The project includes walking paths and a parking area. Since the project was completed in 2004, as many as 8,000 visitors per year have learned about AMD, how it can negatively affect streams, and what can be done about the problem.

Results

Data from a stream survey near the mouth of Semiconon Run in 2007 show that the stream habitat is no longer impaired. The stream survey used the Index of Biotic Integrity (IBI), a measure of the aquatic organisms living in the stream based on a variety of metrics. In 2007 Semiconon Run's IBI score was 68.6—an IBI greater than 63 indicates a healthy population of aquatic organisms.

Additionally, metal loads from the mine to the stream have declined significantly. The average iron load in Semiconon Run between 1983 and 2002 was 0.80 milligrams per liter (mg/L) upstream of the mine discharge, 8.54 mg/L at the mine discharge, and 3.54 mg/L downstream of the mine discharge. Samples taken by PADEP's Water Quality and Assessment Division near the mouth of Semiconon Run in the summer of 2007 show an average iron load of 0.69 mg/L (Figure 4). As a result of these reductions in metal concentrations and the improved biological community, PADEP removed Semiconon Run from the state's 2008 303(d) list.

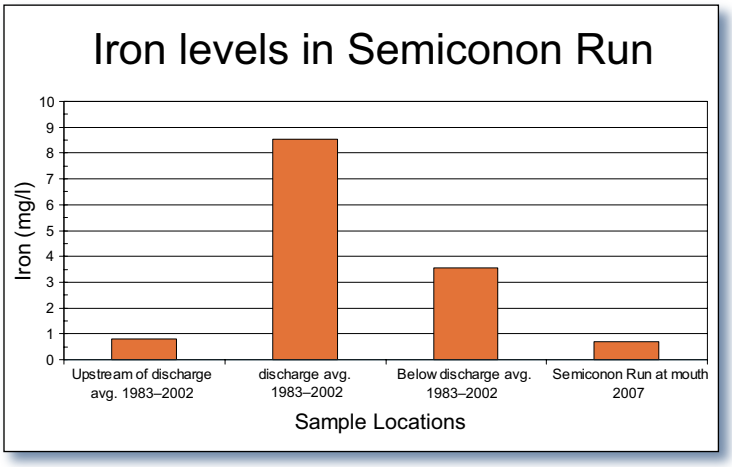

Figure 4. Measurements of iron concentrations.

Partners & Funding

In 2002 Camp Lutherlyn obtained a Growing Greener grant to design and construct the passive treatment system. Other project participants included the Butler County Conservation District, Connoquenessing Watershed Alliance, Western Pennsylvania Coalition of Abandoned Mine Reclamation, as well as a number of private consultants. While no Clean Water Act section 319 funds were used for the work in Semiconon Run, PADEP's Nonpoint Source Program provided $60,000 for a Growing Greener grant.

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