NONPOINT SOURCE SUCCESS STORY

Maryland

Mitigating Acid Mine Drainage Improves pH Levels in Aaron Run

Waterbody Improved

Water flowing through abandoned coal mines contributed acid mine drainage (AMD) to Maryland's Aaron Run, causing the stream's pH level to fail to meet the state's water quality standard for pH. As a result, the Maryland Department of the Environment (MDE) added Aaron Run to Maryland's 2004 Clean Water Act (CWA) section 303(d) list of impaired waters for low pH. Watershed partners implemented numerous AMD mitigation projects, and pH levels increased. Aaron Run now meets the state water quality standard for pH and supports a population of brook trout. As a result, MDE has proposed removing Aaron Run from the state's list of impaired waters for pH impairment in 2014.

Problem

Western Maryland's Aaron Run (segment 021410060075) begins in Savage River State Forest in Garrett County. It flows about 3 miles to the Savage River, a tributary of the North Branch Potomac River in the Chesapeake Bay watershed (Figure 1).

About 102 acres of the 2,270-acre Aaron Run watershed are underlain by abandoned deep coal mines, and several hundred acres of the watershed are composed of reclaimed surface coal mines. Water flowing from these mined areas contributed AMD to the middle and upper watershed. Erosion of coal waste piles that had been dumped along stream banks also contributed acidity to the stream. As a result, pH levels in parts of Aaron Run fell to as low as 3.5—well below the state minimum of 6.5. MDE believed that the low pH levels caused brook trout to be unable to survive in Aaron Run even though similar Savage River tributary streams supported healthy native brook trout populations. Habitat degradation associated with the AMD sources (e.g., low pH and the associated iron sediments/precipitates clogging interstitial spaces in the streambed) was also observed in the Savage River near the Aaron Run confluence. Because of these problems, in 2004 MDE added Aaron Run to the CWA section 303(d) list for impairment by low pH and for failure to support its aquatic life and wildlife designated use.

In 2008 EPA approved MDE's pH total maximum daily load (TMDL) for Aaron Run. The TMDL requires that the state water quality standard for pH (6.5 to 8.5) be met at all times.

Figure 1. Aaron Run flows into the Savage River in eastern Garrett County, just upstream of the Savage River's confluence with the North Branch Potomac River.

Project Highlights

An assessment of AMD sources and impacts in 1987 concluded that mitigation of AMD in the Aaron Run watershed was feasible. Project funding for AMD mitigation was initially obtained in 2005. Project implementation, conducted by MDE's Abandoned Mine Land Division, occurred through 2011. The project included construction of one limestone doser, one limestone leach bed, two successive alkalinity-producing system cells, and one oxidizing pond (Figure 2). The project also created 1 acre of treatment wetlands and restored 600 linear

feet of eroding stream bank. In 2012 the Maryland Department of Natural Resources' Fisheries Service restocked Aaron Run with native brook trout.

Results

Water quality data collected from 2011 through 2013 in Aaron Run, after completion of the AMD mitigation projects, demonstrated that the water quality standard for pH (a minimum of 6.5) is being met and that the TMDL requirements for pH are being satisfied (Figure 3). On the basis of these data, MDE has proposed removing Aaron Run from the state's list of impaired waters for pH impairment in 2014. Aaron Run fully supports its aquatic life and wildlife designated use.

In addition, in-stream conditions had improved enough by August 2012 to allow the Fisheries Service to reintroduce native coldwater stream fish species, including brook trout, blacknose dace, longnose dace, fantailed darters, and Blue Ridge sculpins, into Aaron Run. In October 2013 the Fisheries Service assessed the stream's brook trout population and found adults and several smaller individuals. An additional year or more of assessment will be needed to verify whether a naturally reproducing brook trout population resides in Aaron Run.

Partners and Funding

MDE's Abandoned Mine Land Division conducted the project. In addition, MDE contracted with the Garrett Soil Conservation District to provide technical and management oversight services for the construction phase of the project. Funding from CWA section 319 in three consecutive years (fiscal years 2005–2007) aided in planning, design, and construction from late 2005 through late 2011. The total project cost was about $1.01 million, including about $812,000 reimbursed by the CWA section 319 grant. Other project funding was provided by the U.S. Department of the Interior's Office of Surface Mining Reclamation and Enforcement (about $124,000 in Title IV grant funds) and by the Eastern Brook Trout Joint Venture (about $75,000). The Fisheries Service provided fisheries management and related stream assessment services at no cost. MDE's Field Services Division provided some of the pre- and post-construction stream monitoring through a separate ongoing CWA section 319-funded nonpoint source monitoring and analysis project. Volunteers from the nonprofit Savage River Watershed Association assisted with water quality monitoring along Aaron Run.

Photograph by Connie Loucks, MDE Abandoned Mine Land Division.

Figure 2. The Owens South AMD mitigation site includes an oxidizing pond (foreground) and successive alkalinity-producing system cells (background).

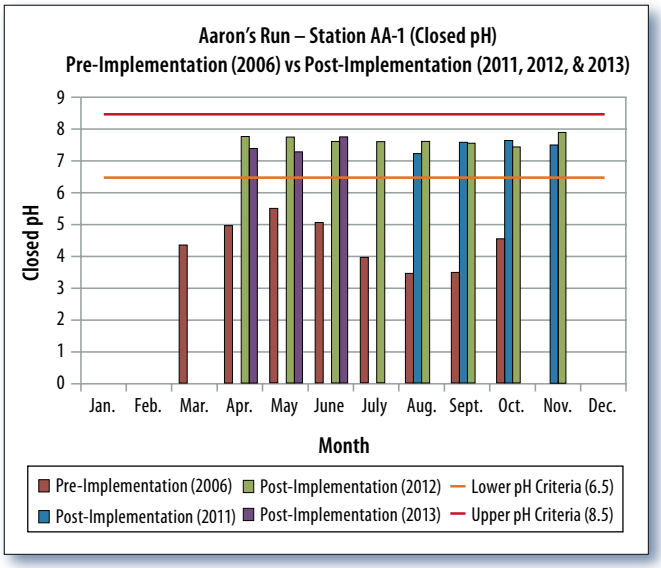

Figure 3. After restoration efforts, pH levels in Aaron Run increased; they now meet water quality standards.

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