NONPOINT SOURCE SUCCESS STORY

Maryland

Treating Acid Mine Drainage Improves Big Laurel Run pH Levels

Waterbody Improved

Acid mine drainage (AMD) from historic mining operations led to low pH levels in Maryland's Big Laurel Run, a tributary to the Casselman River. As a result, Maryland added the Casselman River watershed to its 1996 Clean Water Act (CWA) section 303(d) list for pH. AMD mitigation projects implemented in the watershed's headwaters from 2012 to 2014 increased pH levels. Due to this improvement, Maryland intends to remove the pH impairment from the Big Laurel Run segment of the Casselman River watershed in the 2016 integrated report.

Problem

Big Laurel Run is a tributary to the South Branch Casselman River in Garrett County. The river begins in Maryland's Savage River State Forest and flows across southwestern Pennsylvania toward the Ohio River (Figure 1). Before World War II, the Casselman River and its tributaries were high-quality waterways that supported native brook trout. During the following decades, water quality in these streams degraded due to AMD from the watershed's abandoned mines. The Casselman River watershed was listed for pH impairment in 1996 as a result of these acidic conditions.

Monitoring in 2011–2013 near the headwaters showed that in-stream pH ranged from 4.5 to 6.0, which failed to meet Maryland's water quality pH standard of 6.5 to 8.5. The low-pH waters flow about 6 miles to the South Branch Casselman River, which supports a healthy brook trout population and is designated as a Maryland Tier II high-quality water.

A 2004–2006 assessment of Maryland's Casselman River tributaries identified Big Laurel Run as a high priority for AMD mitigation. A 2008 Maryland Department of Natural Resource Fisheries Service assessment determined that improving pH in Big Laurel Run could expand the area available to native brook trout, despite the stream's sub-optimal physical habitat. A pH total maximum daily load was finalized in 2008.

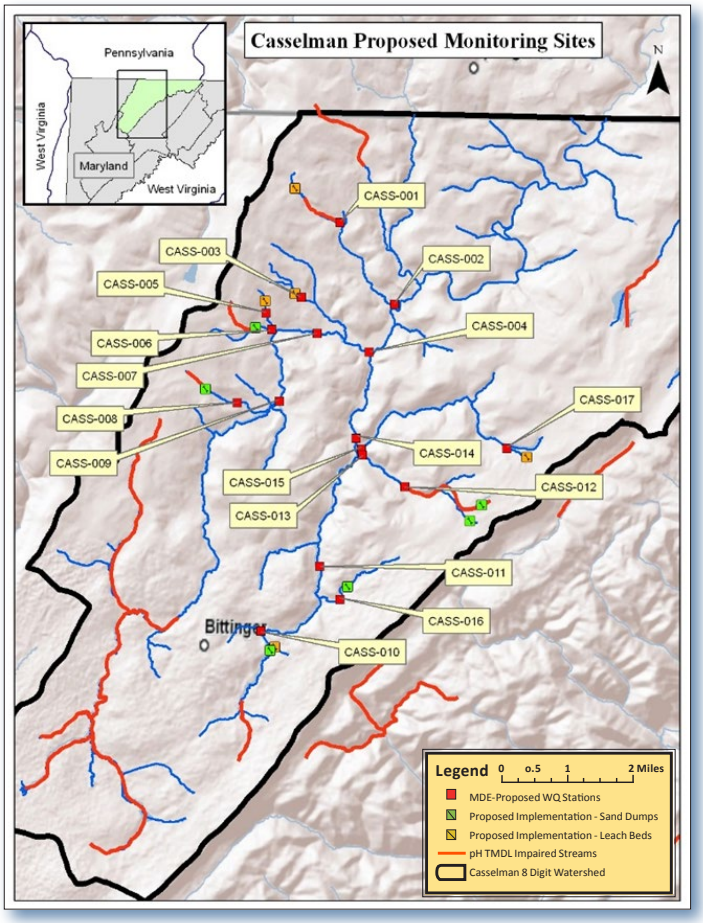

Figure 1. Northwest Maryland's Casselman River watershed was listed as impaired for pH in 1996. To address the impairment, partners developed a watershed plan that outlined proposed monitoring and project implementation site locations throughout the watershed, including in Big Laurel Run (near CASS-017 sampling site). Work is ongoing.

Project Highlights

In late 2008 the Maryland Department of the Environment (MDE) initiated watershed planning to allow the Casselman River watershed to be eligible for

Figure 2. Limestone leach bed, installed in 2014 in the headwaters of Big Laurel Run.

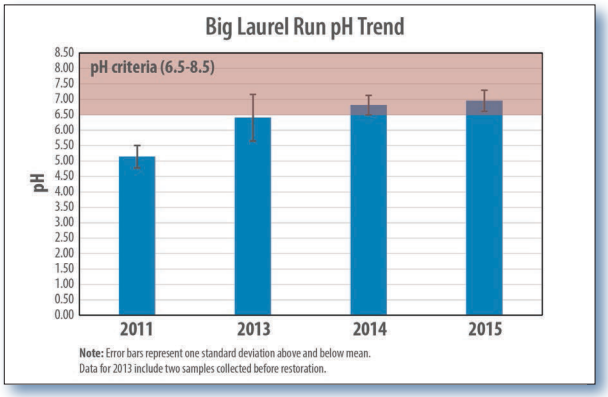

Figure 3. Data show pH improvements at the Casselman River sampling site CASS-017B (Big Laurel Run).

CWA section 319(h) grant implementation funds. The planning process included assessing potential AMD mitigation sites, including Big Laurel Run. The plan recommended particular AMD mitigation technologies, such as limestone leach beds and limestone sand application that would help keep capital and operation and maintenance costs low. In early 2011 EPA accepted the *Casselman River Watershed Plan for pH Remediation*. MDE selected the Big Laurel Run headwaters area project as one of the first for construction because the land was publicly owned, the site was accessible and permit requirements were attainable.

Construction occurred from late 2011 through early 2012 at Big Laurel Run to implement two technologies recommended by the watershed plan. A limestone leach bed (Figure 2) employs a siphon to draw low-pH water from the stream and feed the water through the leach bed, where gravity flow returns pH-adjusted water to the stream. In addition, two limestone sand application sites were constructed, one on each branch of the stream's headwaters. During 2013 and 2014, nearly 65 tons of limestone sand were delivered to these two sites.

Results

After completion of the AMD mitigation projects, data collected in 2013 and 2014 in Big Laurel Run demonstrated that the water quality standard for pH was being met (Figure 3). The average pH before the project was 5.4; the average after project implementation was 6.8. In addition, the average acid neutralizing capacity in Big Laurel Run increased from less than 10 microequivalents per liter (ueq/L) before AMD mitigation to more than 150 ueq/L after the project.

In addition, the Maryland Fisheries Service has identified limited fishery improvement. Juvenile native brook trout abundance in Big Laurel Run increased by a factor of 1.3 in 2014 compared to 2008 (before implementation). Maryland Fisheries Service found that adult population numbers and density remained about the same, and that most previously existing suboptimal habitat conditions persisted throughout the study period, indicating that full recovery of aquatic life will take time.

Partners and Funding

MDE's Abandoned Mine Land Division (AMLD) and Water Quality Protection and Restoration Program cooperated to write the watershed plan, using $55,000 in CWA section 319(h) funds through ongoing projects that support the state nonpoint source management program. AMLD led the project implementation at 11 Phase 1 Casselman River watershed AMD mitigation sites, using $644,115 in CWA section 319(h) grant funds. The Garrett Soil Conservation District oversaw contractor hiring, construction management and project inspection. Capital cost of the Big Laurel Run portion of the section 319 project included $8,000 for the two limestone sand application sites and $60,000 for the limestone leach bed and siphon system. Pre- and post-implementation water quality monitoring by MDE's Field Services Program was funded through separate ongoing section 319(h) grant projects. Maryland Fisheries Service assessment services work was independently funded by the state.

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