NONPOINT SOURCE SUCCESS STORY

Maryland

Limestone Application Treatments Improve Alexander Run

Waterbody Improved

Maryland's Alexander Run, a tributary to Casselman River in Garrett County, was impaired due to low pH caused by acid mine drainage (AMD). The entire Casselman River watershed, which included Alexander Run, was added to the Clean Water Act section 303(d) list for pH impairment in 1996. According to the *Casselman River Watershed Plan for pH Remediation* (January 2011), an assessment of AMD identified and ranked Alexander Run as one of its top priorities for mitigation in the watershed. Successfully implementing a passive AMD mitigation project brought the stream into compliance with Maryland's water quality standard for pH. The Maryland Department of the Environment delisted Alexander Run for pH impairment in Maryland's 2018 Integrated Report.

Problem

The Casselman River watershed, in Garrett County, Maryland, originates near the Savage River State Forest and flows approximately 20 miles to the Pennsylvania state line (Figure 1). In the early 1900s, the Casselman River and its tributaries were high-quality waterways that supported native brook trout. Since then, coal mining changed the local hydrology, resulting in AMD that caused pH decreases in many streams, including Alexander Run—a tributary to the North Branch Casselman River. Alexander Run's headwaters flow through a portion of the Savage River State Forest that is affected by AMD from abandoned deep coal mines. The associated land use is 71% forest and 19% agriculture.

The Casselman River watershed was listed for pH impairment in 1996. In 2005, water quality monitoring to support pH total maximum daily load (TMDL) development found that Alexander Run consistently fell below the lower threshold of the Maryland water quality standard for pH, which mandates a range of 6.5–8.5. In 2008, EPA approved the pH TMDL for Alexander Run and other pH-impaired streams in western Maryland.

Monitoring in 2010–2013 showed that in-stream pH was often less than 5. Maryland's 2014 Integrated Report clarified the pH conditions in the Casselman River watershed by separately listing each stream segment that had pH impairment and a pH TMDL, which included Alexander Run.

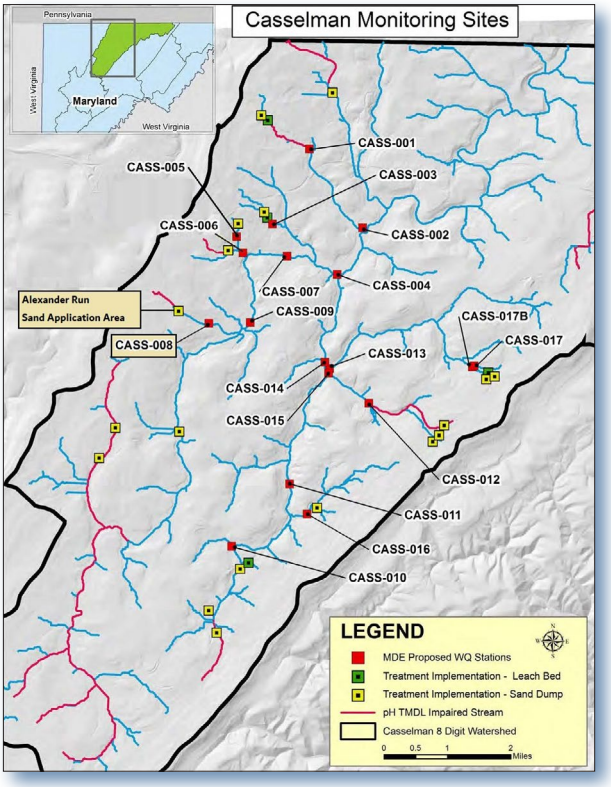

Figure 1. Casselman River is in northwest Maryland.

Story Highlights

In late 2008, the Maryland Department of the Environment (MDE) undertook comprehensive watershed restoration planning for the Casselman River focusing on nonpoint sources of acidity. The

Figure 2. Passive treatment/limestone sand dump area.

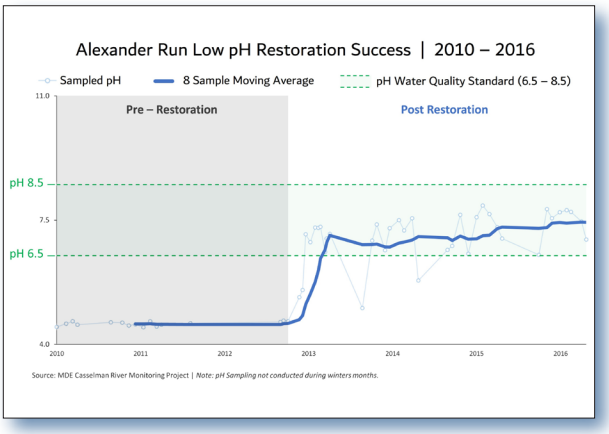

Figure 3. Alexander Run pH monitoring data.

planning process included assessing potential AMD mitigation sites, which identified Alexander Run as a priority stream. The plan also analyzed AMD mitigation technologies, and one of the low-cost/low-capital outlay technologies recommended for Alexander Run was limestone sand application, sometimes referred to as a limestone "sand dump." This technique involves constructing a driveway for a dump truck to pull up adjacent to the stream so that measured quantities of limestone sand are delivered directly to the stream's edge. Natural variation in stream flow then distributes the particles of limestone downstream. Most of the limestone sand particles dissolve in the stream over time, increasing alkalinity and acid-neutralizing capacity. The amount and timing of limestone sand application at each site is determined by periodic monitoring of in-stream pH.

In early 2011, the U.S. Environmental Protection Agency (EPA) accepted the *Casselman River Watershed Plan for pH Remediation* and approved CWA section 319(h) grant funds for a project to mitigate AMD-impacted areas in the watershed. Alexander Run was selected to be one of 11 Phase I projects for construction because the land was publicly owned, the site was accessible and permit requirements were attainable.

In-mid 2013, one limestone sand application site was constructed directly adjacent to Alexander Run (Figure 2). During its first year of operation, the Alexander Run site received 43.83 tons of limestone sand. Under this method, periodic replenishing of the limestone sand might be required as it dissipates.

Results

MDE's Abandoned Mine Land Division (AMLD) periodically monitored the pH and scheduled delivery of limestone sand to the application sites as needed. Following a period of adjustment in 2013–2014, water quality data collected in 2015–2016 showed that in-stream pH consistently met Maryland's water quality standard (Figure 3).

Partners and Funding

MDE's AMLD and MDE's Water Quality Protection and Restoration (WQPR) Program developed the watershed plan. AMLD used $55,000 from the 2008 CWA section 319(h) grant for their part of the planning effort. AMLD implemented the 11 Phase 1 Casselman River watershed AMD mitigation sites using $644,115 from the 2009 319(h) grant. The Garrett Soil Conservation District oversaw contractor hiring, construction management and project inspection. The capital cost of the 319 project included funds for the limestone sand application site at Alexander Run ($9,605). Since then, AMLD has continued to carry the cost of operating and maintaining the Alexander Run site. Other partners contributed in-kind efforts to the project. Watershed plan drafting by MDE WQPR staff was funded by the 319(h) grant through ongoing projects that support the state Nonpoint Source Management Program. Also, water quality monitoring efforts conducted by MDE's Field Services Program were funded by separate ongoing 319(h) grant projects. A Maryland Fisheries Service assessment and analysis was funded by the state.

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