



NONPOINT SOURCE SUCCESS STORY

Alabama

Community Partnerships Restore the Water Quality of Mill Creek

Waterbody Improved

In 2006, the Alabama Department of Environmental Management (ADEM) added Mill Creek to the Clean Water Act (CWA) section 303(d) list due to a poor macroinvertebrate assessment rating. In 2010, the listing was updated based on additional data that indicated Mill Creek did not fully support its use classification of fish and wildlife with respect to organic enrichment, low dissolved oxygen, and compromised macroinvertebrate community as a result of urban development and runoff. Partners implemented targeted best management practices (BMPs) to reduce nonpoint source (NPS) pollution using a watershed management plan (WMP) developed with stakeholder contributions. Water quality improved thanks to a series of CWA section 319(h) implementation grants and community support in the watershed, and ADEM removed the segment from the CWA section 303(d) list in 2018.

Problem

The headwaters for Mill Creek are in the city of Smiths Station in Lee County, Alabama. The stream flows for 9.93 miles through Lee County into Russell County and eventually discharges into the Chattahoochee River in Phenix City, Alabama (Figure 1). The basin is in the Southeastern Plains, Fall Line Hills Ecoregion (Ecoregion 65i), which is characterized by loamy and sandy sediments. In 2011 the watershed was comprised of approximately 60% urban development and 31% forested land. The Recovery Potential Screening Tool estimated that a 7.7% increase in urban development occurred between 2001 and 2011. This land use change contributed additional stress that threatened Mill Creek's water quality.

An NPS screening assessment of the Chattahoochee and Chipola river basins revealed the macroinvertebrate community was impaired. In 2006, ADEM listed Mill Creek on the CWA section 303(d) list with the cause and source of impairment both as unknown. In 2010, after further sampling, the CWA section 303(d) list was updated to signify the stream did not fully support its use classification of fish and wildlife. This impairment was attributed to a dissolved oxygen level of less than 5.0 milligrams per liter (mg/L) and organic enrichment that was elevated over the least-impaired reference reach data collected elsewhere in Ecoregion 65i. (When assessing impairment, ADEM's reference condition approach considers ambient water quality data from reference streams in the same ecoregion

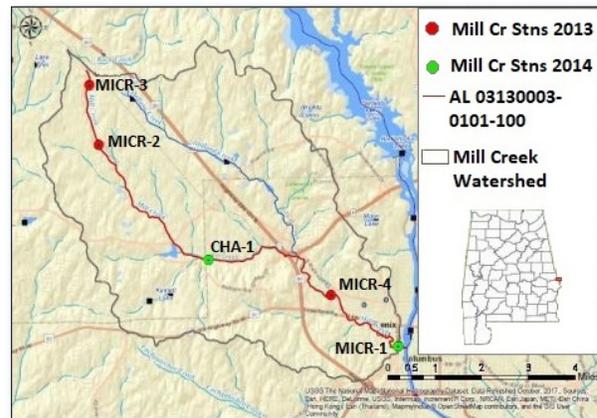


Figure 1. Monitoring stations along Mill Creek.

and having characteristically similar watersheds.) Riparian buffer loss combined with increased impervious surfaces and urban development/runoff in the watershed have been identified as a source of the excessive nutrients and sedimentation that resulted in decreased water quality and increased stormwater volume entering Mill Creek.

Story Highlights

In 2010, Alabama Cooperative Extension System (ACES), ADEM, and other local, private and public entities collaborated to assemble information for the Mill Creek WMP. The goal of the plan was to identify scientifically supported and economically effective restoration activities to improve the health and habitat

of Mill Creek. The objective of this plan was to address impairments to the creek with on-the-ground BMPs and education for the communities in the watershed.

Beginning in 2011, the first phase of the project involved installing bioretention cells, rain gardens, vegetated swales, constructed stormwater wetlands, stream restoration, sediment and erosion control practices, and a septic tank pump-out program. In addition, education/outreach activities included presentations at local schools and public meetings for landowners.

A second phase (2013–2016) focused on accelerating the removal of the waterbody from the CWA section 303(d) list and reducing excessive NPS pollutant loadings to the waterbody. The project targeted high-yielding pollution sites, partnering with local landowners to install BMPs to control NPS runoff, and providing education and outreach to the surrounding community. BMPs implemented included three stream restorations, a constructed stormwater wetland, a rain garden with cisterns, and streambank stabilization.

The low impact development practices such as bioretention cells, rain gardens, swales, and wetlands created during these projects allow for detention and infiltration of stormwater to reduce the volume of urban runoff. Nutrient uptake has been enhanced with the installation of additional vegetation with these practices, which reduces the abundance of organic enrichment entering the stream. The stream restoration regenerated habitat complexity with riffles, pools, runs, and woody/natural materials, which increased the abundance and diversity of macroinvertebrates in the stream. The structures placed in stream redirect the flow of water to the middle of the stream channel, which reduces stream bank erosion. Improved aeration occurs when air is drawn into the water as it flows over structures in the stream (Figure 2).

Results

In 2014, ADEM sampled station MICR-1 for indicators of excessive organic enrichment and dissolved oxygen. Water quality in parameters for organic enrichment were within the ecoreference level concentrations. Dissolved oxygen concentrations remained within normal levels during the sampling events and ranged between 5 and 10.5 mg/L. In 2014, eight EPT (Ephemeroptera, Plecoptera, and Trichoptera)



Figure 2. A boulder cross-vane redirects erosive flows.

taxa were also collected, an increase from samples collected in 1999 (one EPT) and 2008 (four EPT); the improved macroinvertebrate assessment rating is designated as fair. The ADEM assessment of water quality data collected following the implementation of numerous restoration activities in the watershed from 2011-2016, determined that Mill Creek fully supports its use classification and removed the segment from the 2018 CWA section 303(d) list.

Partners and Funding

ACES and Auburn University coordinated the Mill Creek watershed projects. Partnerships that developed and strengthened through the years contributed to the project success. Three CWA section 319(h) watershed implementation grants from fiscal years 2009, 2011, and 2012, which totaled \$534,963 in federal funding, was the principal funding source for restoration activities. Watershed partners provided \$433,092 in nonfederal match. The National Fish and Wildlife Foundation's Five Star Grant leveraged \$49,964 for the stream project and an outdoor classroom. Other partners include Smiths Station; Lee and Russell counties; Phenix City; Lee County Board of Education; University of Georgia Extension Services; Columbus Water Works; North State Environmental, LLC; Jennings Environmental, LLC; Zink Environmental, LLC; Alabama Water Watch; Chattahoochee River Warden; Phenix City Beautiful; Consolidated Resources; Phenix City Public Schools; Motz Enterprises, Inc; Erosion Pros; Alabama Power; Alabama Clean Water Partnership; and others.



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