NONPOINT SOURCE SUCCESS STORY

North Carolina

Basinwide Efforts Improve the McDowell Creek Watershed

Waterbody Improved

McDowell Creek was listed as impaired by the North Carolina Division of Water Resources (NCDWR) in 1998 because of poor biological conditions. Since then, Mecklenburg County Storm Water Services (MCSWS) and the towns of Huntersville and Cornelius implemented programs to restore water quality. A low impact development (LID) ordinance was adopted by the Town of Huntersville in 2003 to mitigate the impact of new development. Nonpoint pollution sources continue to be addressed by implementing stream restoration projects and installing retrofit stormwater control measures (SCMs). These efforts have led to improved benthos populations, prompting a change in the water quality status of a 2.7-mile stretch upstream from the mouth of Mountain Island Lake from 4b (impaired, with management strategy in place) to 1b (meets water quality criteria, with management strategy in place) in 2020.

Problem

The McDowell Creek watershed is in northern Mecklenburg County, with 82% and 18% of the watershed in Huntersville and Cornelius, respectively (Figure 1). Approximately 80% of the watershed is regulated as a water supply watershed due to its proximity to Charlotte Water's drinking water intake. Urban sprawl in the 1990s and early 2000s led to increased stormwater runoff and deterioration of water quality in McDowell Creek. The pollution sources consisted mainly of sediment from construction sites, upstream bank erosion, and runoff from impervious areas, which resulted in poor instream habitat conditions.

In 1998, NCDWR added a 5-mile segment of McDowell Creek to the Clean Water Act (CWA) section 303(d) list of impaired waters due to a decline in the benthos population. Detailed analysis and water quality models developed in the early 2000s predicted increases in sediment and nutrient loading, peak flow rates, and runoff volumes with ongoing development. If left unmitigated, the increases could further degrade water quality and affect the downstream drinking water intake.

Story Highlights

MCSWS and the towns of Huntersville and Cornelius have partnered to implement watershed programs to protect and restore water quality. Efforts have focused on structural and management controls to treat stormwater runoff and stabilize the stream channels.

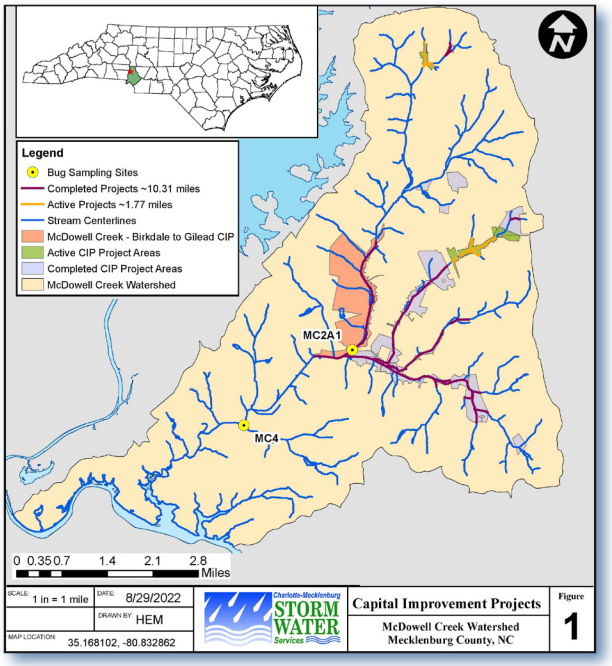

Figure 1. The McDowell Creek watershed is in southwestern North Carolina.

An LID ordinance adopted in 2003 by the Town of Huntersville placed strict stormwater runoff treatment requirements on all new development, beyond what is required by the water supply watershed requirements. As part of this ordinance, high-density developments must install LID SCMs that can achieve an average annual total suspended solid (TSS) removal of 85% from the first 1 inch of rainfall.

In 2008, MCSWS developed the McDowell Creek Watershed Management Plan to address pre-existing sources of pollution. The plan identified and prioritized areas for stream restoration and enhancement to improve water quality conditions. Restoration of more than 2.1 miles of the main stem of McDowell Creek, from Birkdale Village to Gilead Road, was completed in 2016 and encompassed habitat improvements in a severely eroded section of the stream (Figure 2). This project, similar to other restoration projects in the watershed, involved stabilizing stream banks and adding in-stream structures that provide diverse habitats for aquatic organisms. To date, a total of 10.3 stream miles have been restored in the watershed, with an additional 1.8 miles in active construction (Figure 1).

MCSWS' capital improvement program (CIP), with partial funding from the North Carolina Clean Water Management Trust Fund (now known as the North Carolina Land and Water Fund [NCLWF]) and the CWA section 319 program, has supported the installation of retrofit SCMs. More than 25 SCMs have been retrofitted into previously untreated areas through the CIP. In total, more than 550 individual SCMs have been constructed, mostly to comply with land development ordinances in Huntersville and Cornelius. Other initiatives, such as wetland restoration and targeted land acquisitions, have also been implemented.

Results

In 2017, NCDWR sampled the benthos in McDowell Creek. NCDWR used the presence of Ephemeroptera, Plecoptera and Trichoptera (EPT), which are pollution-sensitive benthos, to assess the condition of the stream. The abundance of EPT in 2017 was significantly higher than the value for the previous three assessments, leading to a jump in the bioclassification of the stream from *fair* to *good-fair* (Table 1). As a result of the *good-fair* rating, NCDWR removed the benthos impairment for a 2.7-mile stretch of McDowell Creek in 2020.

Table 1. McDowell Creek benthos data.

Year	EPT	EPT BI*	Bioclassification
2017	15	5.77	Good-Fair
2012	8	6.02	Fair
2007	8	5.78	Fair
2002	8	5.9	Fair

*BI = Biotic Index

Figure 2. McDowell Creek (Birkdale to Gilead) stream restoration project.

MCSWS also conducts annual benthic macroinvertebrate assessments at two monitoring locations (see Figure 1) on the main stem. Monitoring data from these sites, one of which coincides with the NCDWR sampling location, shows higher average EPT indices between 2017 and 2021 compared to the previous five years.

Water chemistry data also continues to show reduced sediment and nutrient loading. Long-term trend analysis indicates significant reductions in TSS (48%), total phosphorus (34%), and nitrate/nitrite (13%) between 2005 and 2021. Together, improvements in McDowell Creek indicate the effectiveness of the numerous watershed initiatives. Planned future stream restoration projects, SCMs, and ongoing implementation of LID practices will ensure the long-term restoration and protection of water quality.

Partners and Funding

Many watershed partners have contributed to restoration efforts. Work began in 2009, and projects have been directly funded by the towns of Cornelius and Huntersville, MCSWS, the City of Charlotte's Stream and Wetland Mitigation Bank, and private wetland mitigation bankers. Approximately $12 million in capital investment has come from MCSWS and funding partners. Funding has also been provided by the NCLWF, CWA Section 319 Grant Program, North Carolina Water Resources Development Grant Program, and the American Recovery and Reinvestment Act. MCSWS received a total of $1.1 million in section 319 grant money for several projects in the watershed.

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