NONPOINT SOURCE SUCCESS STORY

North Carolina

Stream Restoration Brings New Life to Naked Creek

Waterbody Improved

Naked Creek is in northwestern North Carolina and flows for 6 miles from the town of Jefferson to its confluence with the South Fork New River. Due to pollutants and hydrologic impacts from residential and agricultural areas, the North Carolina Division of Water Resources (NCDWR) added a 1.1-mile segment of the creek to the Clean Water Act (CWA) section 303(d) list of impaired waters in 2016 for poor benthic community conditions. Shortly thereafter, the New River Conservancy (NRC) conducted a holistic stream restoration that reconnected the stream to its floodplain, daylighted four culverted sections, replanted the riparian zone and stabilized the streambanks. The project also included a stormwater assessment and plan to address urban pollutants, which was completed in 2019. NCDWR removed the targeted section from the CWA section 303(d) list in 2020 after new in-stream benthic monitoring showed improved conditions.

Problem

Naked Creek is part of the New River Basin and flows for 6 miles in the mountainous northwest corner of North Carolina (Figure 1). The creek originates just north of the town of Jefferson in Ashe County. The first mile of the creek passes through tree farms before it reaches the town, where segments of the creek have historically been channelized and piped underground. In its final stretch, Naked Creek passes through farmland and Jefferson Landing, a residential area and golf course, before connecting with the South Fork New River. About 94% of the land within 300 feet of the creek is used for development or agriculture, leaving little riparian buffer. Consequently, surface runoff from these land uses combined with bottlenecks at stormwater pipe inlets increase stormwater velocities and contribute to water quality and flooding issues.

In 2016, NCDWR added a 1.1-mile segment of Naked Creek from the Little Naked Creek to the South Fork New River (assessment unit 10-1-32b2) to the CWA section 303(d) list of impaired waters due to a benthic community rating of *fair*. Benthic and fish community ratings are derived from information on the diversity, abundance, and pollution sensitivity of the organisms found in NCDWR surface water samples. This information is used to determine one of five bioclassifications (excellent, good, good-fair, fair, or poor) for the waterbody based on indices developed for each major ecoregion, and this provides an indication of overall water quality.

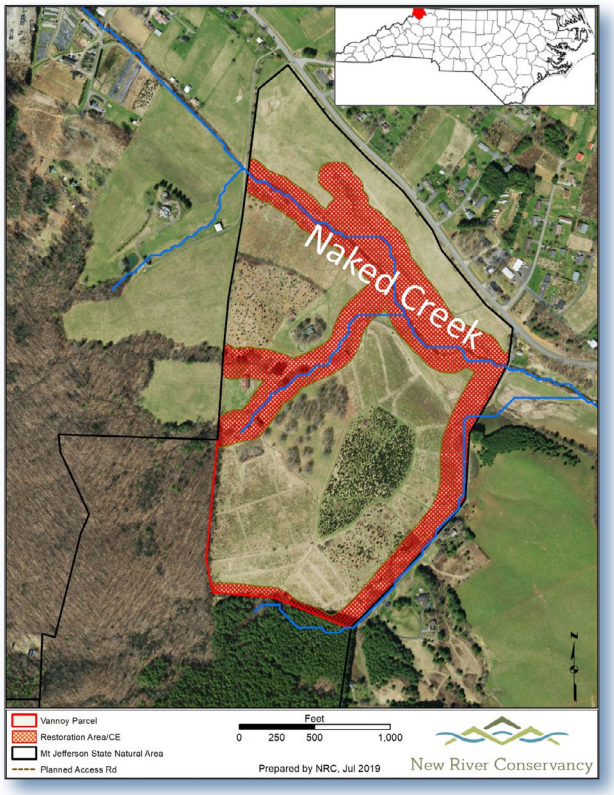

Figure 1. Naked Creek is in northwestern North Carolina.

Story Highlights

In 2015, the New River State Park (NRSP) acquired a 110-acre parcel of land a half-mile east of the town of Jefferson along Naked Creek. The property had historically been used for cattle production, and cattle had had complete access to the stream. In 2016, to address the newly recognized water quality impairment and capitalize on removal of the livestock, the NRC acquired funding from a CWA section 319 grant and a North Carolina Land and Water Fund grant and devised a holistic stream restoration project on the property.

NRC restored approximately 4,873 linear feet of stream using Natural Stream Channel Design best management practices (BMPs). BMPs included sloping streambanks to connect the stream to its floodplain, daylighting four culverted streams, restoring riparian zones with over 9,080 native shrubs and trees, and stabilizing streambanks with in-stream rock and log structures. In-channel bar deposits were altered or removed to relieve the stress of high-energy flow against the banks. The stream profile was modified by installing cross vanes, rock vanes and boulder clusters. The project included restoring aquatic habitat by adding riffle/pool sequences for benthic macroinvertebrate and fish habitat, and it provided safe fishing and recreational stream access (Figure 2).

Additionally, NRC completed a Naked Creek Watershed Stormwater Plan using GIS analysis. The plan modelled rainfall and surface runoff and identified eight sites for stormwater BMP implementation in the urban areas.

Results

Recent monitoring showed that Naked Creek's benthic rating improved from *fair* to *good-fair,* indicating that benthic macroinvertebrate species diversity and population had increased. As a result, NCDWR removed a 1.1-mile segment of Naked Creek from the 2020 CWA section 303(d) list. The in-stream structures improved fish and macroinvertebrate habitat. Riffle/pool sequences diversified the stream bed, improving aquatic biodiversity. Revegetation of the riparian zone significantly reduced the amount of nutrients and bacteria in the water by filtering all surface runoff, increasing infiltration, and shading the stream to decrease water temperature, which also increased dissolved oxygen. The value of restoring a creek, floodplain, and surrounding habitat on permanently protected land will only improve over time as the planted vegetation becomes more established.

Figure 2. A segment of Naked Creek before and after the stream restoration.

Beyond the ecological improvements, the community now has a safe recreational area in which to fish, hike and enjoy the natural beauty below Mount Jefferson State Natural Area. The site has already been used by NRSP for educational opportunities for young students to learn about ecology and to receive fishing lessons. The NRSP has long-term plans to create a summit trail to the peak of Mount Jefferson beginning at the Naked Creek site, which will bring more outdoor tourism to the area.

Partners and Funding

The NC Land and Water fund (formerly the NC Clean Water Management Trust Fund) contributed $989,000 to the land acquisition and $436,377 toward stream restoration. The U.S. Department of Interior's Land and Water Conservation Fund provided an additional $588,940 for land acquisition, along with administrative services provided by the NC Parks and Recreation Trust Fund. The CWA section 319 program granted $214,955 for the restoration project and stormwater plan. Foggy Mountain Nursery and Stream Restoration implemented the project. NRC worked with the landowner and utility agencies, including the Town of Jefferson's wastewater treatment plant and Blue Ridge Energy to develop a partnership agreement for vegetation and site management. Appalachian State University provided monitoring services.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-21-001X
November 2021

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