



NONPOINT SOURCE SUCCESS STORY

Virginia

Implementing Best Management Practices on Mined Land Improves Aquatic Health of Dumps Creek

Waterbody Improved

Total dissolved solids (TDS) and suspended solids (TSS) from coal mine drainage led to the degradation of aquatic life in Dumps Creek. As a result, in 1994 the Virginia Department of Environmental Quality (DEQ) added a 3.54-mile segment of Dumps Creek to the Clean Water Act (CWA) section 303(d) list of impaired waters for benthic impairments. Reclaiming mined lands and restoring unmanaged forestlands in the Dumps Creek watershed helped reduce sediment transport to the creek. Subsequently, the segment was removed from Virginia's impaired waters list in the 2016 CWA section 305(b)/303(d) Water Quality Assessment Integrated Report.

Problem

Dumps Creek, which is just northwest of the town of Cleveland in Russell County, is the largest stream in the coalfields of southwest Virginia (Figure 1). Dumps Creek is a tributary to the Clinch River, which is part of the Tennessee/Big Sandy River Drainage Basin. The 3.54-mile impaired stream segment (VAS-P08R_DUM01A94) extends from the Hurricane Fork confluence downstream to the mouth where Dumps Creek flows into Clinch River at Carbo, near the Appalachian power plant.

Land use in the 20,300-acre Dumps Creek watershed includes forest (71%), permitted mining operation (14%), abandoned surface mine sites (4%), spoils/tailings (4%: mine waste discarded in fills, ponds or piles), reclaimed mine lands (3%), and disturbed mining land (1%). The remaining 3% of watershed area falls under agriculture, water/wetlands and urban/industrial land uses. Mining operations in the watershed have occurred in different locations over time. As a result, land uses transition between forest, active mining, and reclaimed areas.

The Dumps Creek watershed has a long history of mining activities, including several deep mines. The water flow from abandoned mine lands (AML) and acid mine drainage (AMD) areas have the potential to deliver sediment loads, limiting benthic health in Dumps Creek.

A biological assessment conducted by DEQ at a location near monitoring station 6BDUM001.09

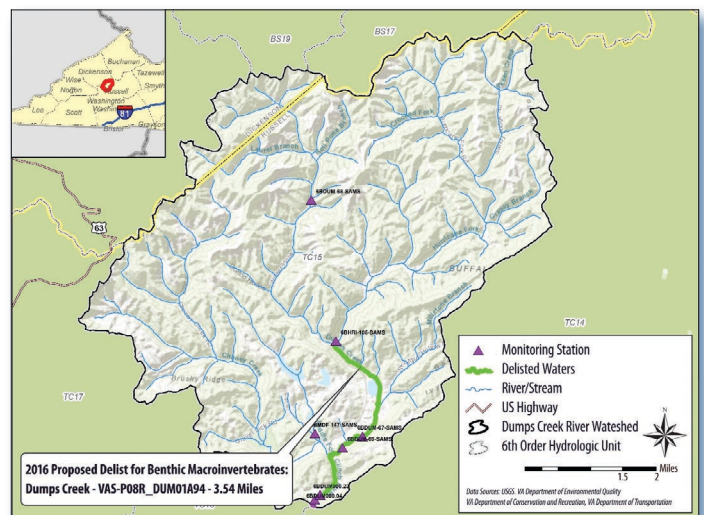


Figure 1. Locations of biological monitoring stations and the delisted segment in the Dumps Creek watershed.

indicated a *moderately impaired* (MI) status in waterbody; as a result, DEQ placed Dumps Creek on the Commonwealth of Virginia's 1994 CWA section 303(d) list of impaired waters for not supporting the state's aquatic life use.

A total maximum daily load (TMDL) developed by DEQ in 2004 indicated point sources and nonpoint sources as potential contributors, with TDS and TSS as primary stressors. The primary nonpoint sources were the drainage from AML areas, which include mine spoils, benches (abandoned surface mine sites leaving exposed high walls), and the disturbed mined areas.



Figure 2. After the Hurricane gob pile in the Dumps Creek watershed (inset photo) was removed, the area was revegetated.

Story Highlights

The Virginia Department of Mines, Mineral and Energy (DMME) and the coal industry implemented reclamation activities in 2010–2014, including:

- Stopped dewatering older underground mines at two outfalls, which reduced a major source of TDS loading to Dumps Creek and helped to meet TMDL targeted pollutant reductions for active mines. (Underground dewatering had been conducted to allow access to more underground coal reserves.)
- Cleaned about 21 miles of streams in the coalfield areas to improve stream flow conditions. An old pond used in the mining process was transformed into a wetland area that helped filter out silt and other particles in surface runoff.
- Planted trees to reclaim approximately 70 acres of coal-mined lands in the watershed. Additionally, restoring unmanaged forestlands in these areas helped reduce sediment transport within the Dumps Creek watershed.

Restoration efforts have continued. In 2015, a subsidiary company of Contura Energy, Inc., restored approximately 2,600 linear feet of Dumps Creek. Restoration activities included re-grading the near-bank floodplain and installing instream structures that provided grade control and sediment transport. About 1.5 million tons of gob pile (mixture of waste containing small amount of coal and shale from coal mining operations) was removed from Hurricane Fork,

an upstream tributary (Figure 2); part of the waste was shipped to the Dominion's Virginia City Hybrid Energy Center for fuel production.

Results

Ceasing dewatering of mines and implementing restoration activities reduced the total TDS waste load by 6,886,525 kilograms per year, leading to improvement of Dumps Creek. To assess aquatic life conditions, DEQ employed a Virginia Stream Condition Index (VSCI) based on a comprehensive biometrics analysis. A waterbody that achieves a rating score of 60 and above for an entire year is considered supportive of biological integrity, and, therefore, is considered to be attaining the aquatic life designated use.

Monitoring conducted at station 6BDUM000.23 showed a VSCI score of 67.5 in November 2012, up from a VSCI of 51.3 in April 2012. Monitoring in June and October 2014 showed scores of 64.86 and 72.83, respectively—remaining above the minimum threshold of 60. Benthic macroinvertebrate sampling conducted by the coal industry showed similarly high VSCI scores (65.51 in spring 2013, 63.11 in fall 2013, and 65.29 in spring 2014), which confirmed water quality standards attainment. As a result, the 3.54-mile segment of Dumps Creek was removed from Virginia's CWA section 305(b)/303(d) Water Quality Assessment Integrated Report for benthic impairment in 2016.

Partners and Funding

All reclamation projects were designed and administered by the DMME, with the cooperation of federal, state, and local officials and stakeholders. The projects were supported by approximately \$3.35 million in funding from the Federal AML Reclamation Program. Additional restoration funding was provided by coal mine permit holders operating in the watershed, primarily Alpha Natural Resources, as a requirement to meet TMDL targeted load reductions for active mine permits. These load reduction actions, at an estimated cost of approximately \$700,000, were used to reduce sedimentation from nearly 70 acres of AML and were over and above the reclamation required for their permitted operations. DEQ biologists conducted sampling and monitored the biological status of Dumps Creek to support the delisting.



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