



NONPOINT SOURCE SUCCESS STORY

West Virginia

Implementing Mine Land Reclamation and Water Treatment Projects Improved Deckers Creek

Waterbody Improved

As early as 1951, acid mine drainage (AMD) from coal mines polluted Deckers Creek, a section of which is a well-known whitewater paddling destination. The West Virginia Department of Environmental Protection (WVDEP) added Deckers Creek to the Clean Water Act (CWA) section 303(d) list of impaired streams in 1996. Friends of Deckers Creek (FODC), a nonprofit organization, and several agencies partnered on land reclamation and water treatment projects in the watershed. Water quality has significantly improved in Deckers Creek—particularly for aluminum, iron and pH. Biological conditions have also improved; for example, stocked brown trout now survive year-round in the creek.

Problem

Deckers Creek flows into the Monongahela River in Morgantown, West Virginia (Figure 1). The watershed covers approximately 64 square miles and offers whitewater paddling and recreational fishing opportunities.

Coal mines abandoned before passage of the Surface Mining Control and Reclamation Act in 1977 discharge polluted water into Deckers Creek. Data collected in 1976 showed the creek violated standards for iron, manganese, aluminum and pH. WVDEP added Deckers Creek to the list of impaired streams in 1996. Fecal coliform bacteria and sediment pollution sources exist throughout the watershed.

The mines exploited the pyrite-rich Upper Freeport coal seam. When the pyrite is exposed to air and water, it generates iron and sulfuric acid. The acid also dissolves aluminum from nearby minerals. West Virginia's standards call for pH to remain between 6 and 9, and for dissolved aluminum and total iron to remain below 0.75 and 1.5 milligrams per liter (mg/L), respectively.

Low pH and high aluminum concentrations in Deckers Creek excluded fish from much of the mainstem and several tributaries for many years. Precipitation of iron on the bottom of the streams excluded all but the most tolerant of benthic invertebrates. The pollution is prodigious. One single mine adds up to two tons of acidity and 800 pounds per day of iron to the creek.

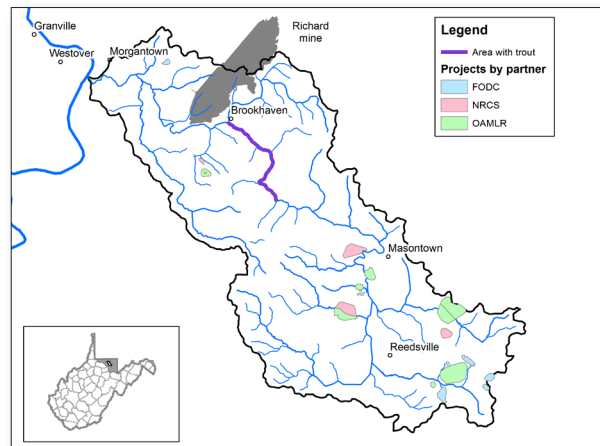


Figure 1. Multiple projects have been implemented in Deckers Creek in northern West Virginia.

Story Highlights

In the mid-1990s, FODC formed to improve the natural qualities of, increase public concern for, and promote the enjoyment of the Deckers Creek watershed. FODC published a water quality inventory for the Deckers Creek watershed in 1996. FODC also petitioned WVDEP to prioritize the total maximum daily load (TMDL) for Deckers Creek; WVDEP completed the TMDL in 2002. WVDEP and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) made an agreement to reclaim 13 of the mine sites, each pitching in \$5 million. Under that agreement the two agencies have implemented best management practices (BMPs) at nine of the 13 abandoned coal mine sites.

FODC completed a watershed-based plan in 2006 and used funding from CWA section 319 and the U.S. Office of Surface Mining, Reclamation, and Enforcement's (OSMRE's) Watershed Cooperative Agreement Program to install eight mine drainage treatment projects. FODC operates nine AMD treatment sites throughout the watershed, including five along the tributary of Kanes Creek (for more information on these projects see the 2015 NPS Success Story, *Treating Acid Mine Drainage Allows Aquatic Life to Rebound in Kanes Creek*.) Multiple BMPs have been implemented at the nine project sites, including sulfate-reducing bioreactors, water-powered lime dosing devices, limestone leachbeds, anaerobic vertical flow wetlands, and settling ponds (see Figure 1 for project locations). These projects have removed dissolved metals and neutralized the water's pH over the years. The WVDEP's Office of Abandoned Mine Lands and Reclamation (OAMLR) operates additional AMD treatment projects within the Deckers Creek watershed (see Figure 1) that are outside the scope of work described here.

FODC monitors 13 sites throughout the watershed through its Clean Creek Program, which is supplemented by data gathered by FODC's Citizen Scientist Program (more than tripling the amount of sites monitored overall). Citizen Scientists sample monthly for water quality and allow FODC to have eyes and ears on the ground, enabling early detection for issues in Deckers Creek. Citizen Scientist data is compiled and used to track trends.

Results

Since 2002 water quality has significantly improved in Deckers Creek. Average pH has increased from 6.5 to 7.19, iron has been reduced from 1.4 mg/L to 0.6 mg/L, and aluminum has decreased from 1.00 mg/L to 0.4 mg/L (Figure 2). Brown trout have been stocked in Deckers Creek since 2011, after monitoring in the mainstem showed steadily good water quality. Fish surveys found trout in 2012, 2014, 2016 and 2017. Different size classes of trout indicate survival through the entire year. The presence of other wildlife further illustrates improvement in the creek's health. Much of the improvement in Deckers Creek was caused by removing pollutant loads from its tributary Kanes Creek, which has undergone a visible transformation as its iron loads have decreased (Figure 3).

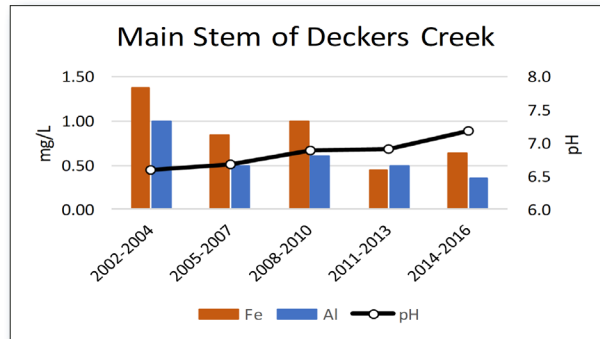


Figure 2. Decker Creek data show reductions in iron and aluminum and increases in pH levels.



Figure 3. Kanes Creek, before and after restoration.

Partners and Funding

Many agencies, organizations, and individuals have carried out the Deckers Creek restoration work. WVDEP has supplied \$2.77 million in CWA section 319 watershed project funding to FODC for their work. FODC has obtained \$1.28 million from OSMRE's Watershed Cooperative Agreement Program. The U.S. Environmental Protection Agency's Brownfields program funded the engineering design of three of FODC's AMD treatment projects. WVDEP and the USDA NRCS partnered in an agreement through Public Law 566 to restore the watershed through abandoned mine reclamation. WVDEP spent \$3.85 million through OAMLR, while NRCS spent \$2.26 million through its Public Law 566 Small Watershed Program.



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<https://deckerscreek.org/clean-creek-program/>