



# Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Tennessee

## Installing Best Management Practices Abates Acid Mine Drainage in Crab Orchard Creek

### Waterbody Improved

Acid mine drainage (AMD) significantly diminished aquatic life in Morgan County, Tennessee's Crab Orchard Creek. As a result, the Tennessee Department of Environment and Conservation (TDEC) added Crab Orchard Creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters in 1998 for pH and siltation due to pollution from abandoned mines. Best management practices (BMPs) were installed in the watershed, including intensive restoration activities to abandoned mines. These abatement activities led to the attainment of water quality standards in a 2.3-mile segment of Crab Orchard Creek. The segment was removed from the state's CWA section 303(d) list of impaired waters in 2010.

### Problem

Crab Orchard Creek, a 28.9-mile-long tributary to the Emory River in upper east Tennessee drains a 47.3-square mile area that includes portions of Morgan and Cumberland counties (Figure 1). The watershed is mostly forested with areas of agriculture, pine plantations, and abandoned mines. Crab Orchard Creek's designated uses include support of fish and aquatic life, recreation, livestock watering/wildlife, and irrigation. It is listed on the Nationwide Rivers Inventory for exceptional scenic, recreational, geologic, and fish/wildlife values.

Coal mining operations in the Crab Orchard Creek watershed left open pits and acid-forming materials that created pockets of standing and flowing surface water with depressed pH, elevated mineral content, and minimal aquatic habitat. The main sources of these impairments were resource extraction and AMD.

Biological reconnaissance (biorecon) is one tool used to recognize stream impairment using species richness measures. The biorecon index is scored on a scale from 1 to 15, where 5 is considered *very poor*, and 10 is considered *good*. The principal metrics used are the total number of macroinvertebrate families found in a stream. In 1998, Crab Orchard Creek failed a biorecon study. At that time, the entire 28.9 miles of Crab Orchard Creek (Waterbody ID: TN06010208020-2000) was put on the 1998 CWA section 303(d) list for pH and siltation due to pollution from abandoned mines. In 1999 and 2000, a TMDL study confirmed that pH levels in

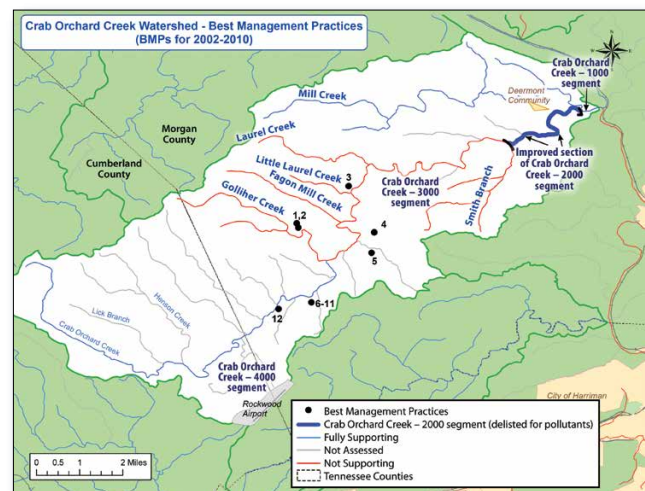


Figure 1. The Crab Orchard Creek watershed is in northeast Tennessee. Partners installed BMPs to address mining and agricultural runoff in several watershed locations.

the creek were low and failed to meet water quality standards.

### Project Highlights

To improve water quality within the Crab Orchard Creek watershed, 44 acres of land have been reclaimed. AMD treatments were installed and other remedial management measures were used to achieve nonpoint source pollution load reductions. Measures included limestone treatment ponds and systems, a constructed wetland, a settling pond, a backfill sediment pond and land revegetation (Figures 2 and 3). The Crab Orchard Creek Project



Figure 2.  
Gollieher Creek  
site, excavated  
cell, October  
2008.



Figure 3.  
Gollieher Creek  
site, post-  
reclamation,  
August 2009.

also involved constructing AMD treatment systems and reclaiming abandoned coal mines to improve the water quality in Mill, Gollieher, and Little Laurel Creeks (the three tributaries to Crab Orchard Creek). Four abandoned mine sites where AMD was significantly impacting receiving streams were prioritized and included approximately 185 acres of abandoned surface mines with two sediment ponds, 1,500 feet of highwalls, six identified seeps, and approximately 2,000 feet of exposed and eroding creek bank.

TDEC's Division of Water Pollution Control performed remedial management measures to help treat the creek with BMPs including land reclamation, toxic discharge control, limestone treatment ponds, constructed wetland, settling pond, backfill sediment pond, and stabilization with revegetation. From 2002 through 2010, the Agricultural Resources Conservation Fund (ARCF) funded the installation of agricultural BMPs including laying 969 feet of fencing, planting 16.5 acres of pasture and hay, 42 acres of cropland conservation, laying 1,905 feet of pipeline, construction of a pumping plant, creating two heavy-use areas, construction of four watering facilities, and the construction of a well.

In order to raise awareness among local citizens and recreational users about nonpoint source pollution, impacts from abandoned mines, and this restoration project, a series of four articles were written and submitted to the *Morgan County News*. This project

was also highlighted in the newsletters for the Emory River Watershed Association and Chota Canoe Club. Additionally, a series of public meetings were held to share information and updates about the project over the course of the implementation period. An informational brochure was developed as well as a display developed in 2006 showing the watershed. The display was used for special events such as the annual Morgan County Discovery Festival.

## Results

In 2006 TDEC collected a Semi-Quantitative Single Habitat Assessment (SQSH) test at mile 3.1 of Crab Orchard Creek. The habitat score indicated that this segment was in compliance with water quality standards and that the stream was of beneficial use for fish and aquatic life. In 2007, a biocon survey at this same station yielded a perfect score of 15, documenting 17 EPT families, 11 intolerant, and 31 total families. During a sampling in 2006, the stream met pH criteria and the biology had significantly improved. The CWA section 303(d) assessment for the 2010 list, now states that Crab Orchard Creek (TN06010208020-2000) fully supports its designated uses. The upstream section of Crab Orchard Creek remains on the 303(d) list for manganese and pH problems due to mining.

## Partners and Funding

Many federal and state agencies, local organizations, and individual landowners worked together to improve water quality in the Crab Orchard Creek watershed. The principle project partners were the Emory River Watershed Association, the Morgan County Soil Conservation District (SCD), TDEC, Marcum Excavating, the community of Oneida, and the Tennessee Valley Authority. In 2006, the U.S. Environmental Protection Agency, through the Tennessee Department of Agriculture, awarded a CWA section 319 grant of \$409,200 to TDEC's Abandoned Mine Land Reclamation program for the Crab Orchard Creek Watershed Plan. The grant's state project number was ID-06-08123-00 for the Crab Orchard Creek Watershed Plan. It began on March 1, 2006 and was completed on February 28, 2011. TDEC also provided \$290,800 in matching funds. The Agricultural Resources Conservation Fund (ARCF) spent \$15,293.35 through the Morgan County Soil Conservation District. U.S. Department of Agriculture Farm Bill funds also supported installation of practices from 2007 to 2011.



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

EPA 841-F-14-001DD  
May 2014

## For additional information contact:

**Sam Marshall**  
Tennessee Department of Agriculture  
615-837-5306 • [Sam.Marshall@tn.gov](mailto:Sam.Marshall@tn.gov)