



NONPOINT SOURCE SUCCESS STORY

Alabama

Implementing Best Management Practices Decreases Aluminum Loading to Bear Creek

Waterbody Improved Historical surface mining activities resulted in high aluminum levels in Bear Creek that violated Alabama's water quality standards. As a result, a 3-mile segment of Bear Creek was placed on Alabama's 1998 Clean Water Act (CWA) section 303(d) list for aluminum impairment. Implementing numerous best management practices (BMPs) within the watershed, from 2000 to 2005, decreased aluminum loading in the watershed. This allowed the Alabama Department of Environmental Management (ADEM) to remove Bear Creek from its list of impaired waters in 2014 for aluminum impairment.

Problem

The 119-square-mile Bear Creek watershed is part of the larger Tennessee River Basin. Land use in the Bear Creek watershed consists of 52 percent forest, 27 percent agriculture, 11 percent grassland/shrubs, and a few surface mining areas. Historical surface mining activities in the watershed caused increased aluminum loading to Bear Creek.

ADEM's water quality regulations do not provide numeric water quality criteria for aluminum. To assess for an aluminum impairment in Bear Creek, ADEM used the U.S. Environmental Protection Agency's (EPA's) national recommended freshwater chronic concentration criterion of 0.087 milligram per liter (mg/L). Over 90 percent of samples collected from stations BEA-1 and BEA-2 in Bear Creek from 1992 to 1996 exceeded this concentration. On the basis of these data, ADEM placed Bear Creek on the 1998 CWA section 303(d) list for aluminum impairment. The impaired segment of Bear Creek (AL06030006-0103-103) is in Marion County and is approximately 3 miles long (Figure 1).

Project Highlights

Watershed partners launched a 5-year Bear Creek Watershed Project in August 2000. The overall goal of the project was to effectively focus federal, state, local and special interest group resources on solving the nonpoint source pollution problems in the Bear Creek watershed. Before the project, formal

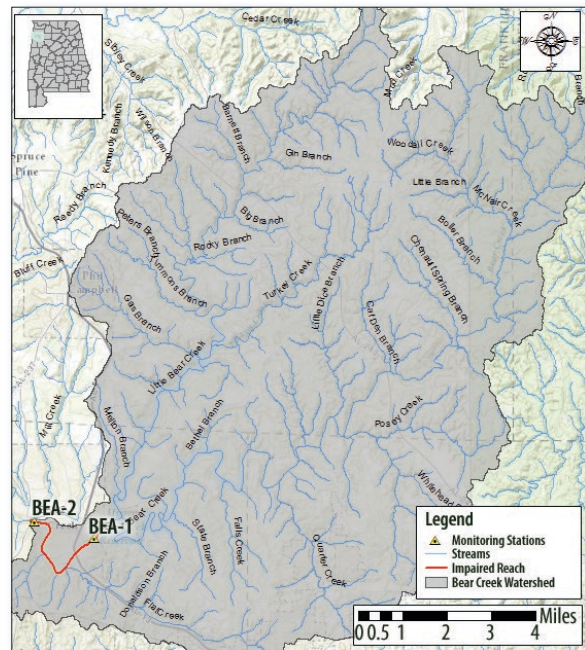


Figure 1. The impaired segment is at the base of northwest Alabama's Bear Creek watershed.

and informal discussions among citizens, landowners, special interest groups and agency representatives took place concerning actual and perceived pollution sources and impacts in the related subwatersheds. One primary concern identified during stakeholder discussions was accelerated erosion in the watershed. As a result, the Bear Creek

project required a focus on controlling erosion along different streambanks, pastures, croplands, abandoned surface mining land and timber harvest areas. Because aluminum is positively charged and bonds with the soil, efforts to reduce erosion in the watershed provides the added benefit of decreasing aluminum loading in Bear Creek. The BMPs that were implemented from 2000 to 2005 included filter strips, streambank protection, exclusion fencing and resource extraction area restoration.

Results

After restoration, ADEM collected samples in 2009 and 2012. Two of 16 samples collected at station BEA-1 exceeded the EPA-recommended aluminum criterion of 0.087 mg/L; five of 16 samples collected at station BEA-2 exceeded the criterion. However, in 2010 Alabama established an additional guideline in which the median value of a parameter is compared against the 90th percentile of that parameter for relatively undisturbed streams in different ecoregions. Stations BEA-1 and BEA-2 passed this guideline based on their 2009 and 2012 data, with the median values at both stations measuring below the 90th percentile ecoregional reference guideline for aluminum (Table 1). In addition, when examining prerestoration data, ADEM found that Bear Creek samples collected at both BEA-1 and BEA-2

had failed this new measure based on data from 1992–1996, further indicating that water quality has improved as a result of restoration efforts. Based on the lack of exceedances of the ecoregional criteria after restoration, and data showing a decrease in the number of exceedances of the EPA standard following restoration, ADEM removed Bear Creek from its 2014 list of impaired waters for its aluminum impairment.

Partners and Funding

This project was a cooperative nonpoint source pollution control endeavor involving at least four soil and water conservation districts (Colbert, Franklin, Marion and Winston), the Tennessee Valley Authority, the U.S. Department of Agriculture’s Natural Resources Conservation Service, ADEM, the Bear Creek Outdoor Environmental Education Center, Alabama Water Watch, Alabama Cooperative Extension System, Alabama Cattleman’s Association, Alabama Poultry and Egg Association, Southeastern Poultry and Egg Consortium, Gold Kist, and the Alabama Department of Industrial Relations. A total of \$336,947 in CWA section 319 funding was used, with an additional \$375,973 in matching funds provided by project partners for the restoration efforts.

Table 1. A comparison of Alabama Ecoregional Reference Guidelines for Aluminum (Al) against median values (in mg/L) of data collected at Bear Creek sampling stations

	Station BEA-1		Station BEA-2	
	Al Dissolved	Al Total	Al Dissolved	Al Total
Median Value	0.045	0.06	0.0505	0.0635
Ecoregional Reference 90 th Percentile Guideline	0.1	0.336	0.1	0.336
Is Median < Ecoregional 90 th Percentile Guideline?	yes	yes	yes	yes



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