

Brier Creek, Kentucky

TMDL Fact Sheet

Project Name:	Brier Creek
Location:	Muhlenberg County, Kentucky
Scope/Size:	Brier Creek, watershed 2720 acres (4.25 mi ²)
Land Type:	Forest, agricultural, barren/spoil
Type of Activity:	Acid Mine Drainage (AMD) caused by Strip/Abandoned Mines
Pollutant(s):	H⁺ Ion mass , Sulfuric Acid
TMDL Issues:	Non-point sources
Data Sources:	KPDES Permit Historical Sampling Data, Murray State University Sampling Data
Control Measures:	Kentucky non-point source TMDL implementation plan, Kentucky Watershed Framework
Summary:	<p>Brier Creek was determined as not supporting the designated use of recreation and aquatic life. Therefore, the creek was placed on the 303(d) list for Total Maximum Daily Load (TMDL) development. The creek segment is characterized by a depressed pH, the result of acid mine drainage from strip and abandoned mining sites. The period of lowest pH is at low-flow conditions; however, the period of greatest hydrogen ion load is at peak-flow conditions. Peak flow conditions were chosen as critical because they generated maximum loads and reductions.</p>
TMDL Development:	<p>Total maximum daily loads in pounds H⁺ ions per day were computed based on the allowable minimum pH value (6.0) for creeks and streams for recreation and aquatic life. The TMDL was done for pounds of ions because the units for pH do not allow for the computation of a quantitatively useful load or reduction amount.</p>

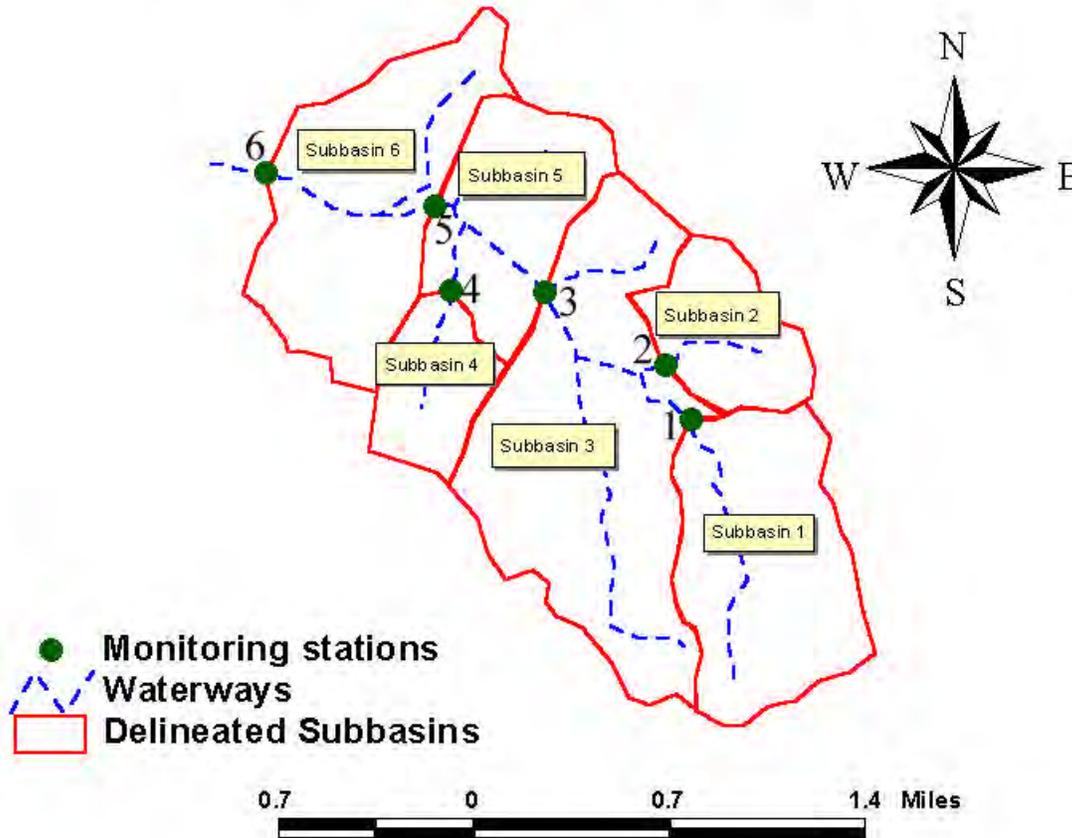
Implementation/Remediation

In response to the documented problems in the Brier Creek Watershed, the Kentucky Division of Abandoned Lands developed a remediation project designed to mitigate the pH impairment. Some of the remediation activities are considered experimental. The remediation project included reclamation of approximately 120 acres of barren or poorly vegetated areas affected by past strip mining. The restoration included construction of ditches and PVC coated gabion baskets utilized as velocity reducers and energy dissipators; bale silt checks and silt trap dug-outs were also utilized for sediment control. The reclamation project consisted of 67 acres of gradework to remove erosion gullies, redistribute sediment deposits, and prepare a surface to receive a soil cover. The area under consideration received a two foot soil cover layer, taken from 20 acres of watershed area designated for borrow. Gradework areas were treated with an application of agricultural limestone to neutralize acidic conditions and all areas were revegetated using a combination of seedbed preparation, agricultural limestone, fertilizer, seed, mulch, and crimping.

The reclamation activities focused on only a portion of the area within the watershed that exhibited significant water quality degradation. The total cost of the Brier Creek project was \$913,000 (i.e. \$7,600/acre). For 2000, the total federal allocation for Kentucky AML was approximately \$17 million. However, the bulk of these funds were used to support priority 1 (extreme danger of adverse effects to public health, safety, welfare, and property) and priority 2 (adverse effects to public health, safety, and welfare) projects.

The strategy employed in Brier Creek is similar in some respects to a remediation project that is underway on Rock Creek and a tributary, White Oak Creek in McCreary County Kentucky. This 12-acre project is a Clean Water Action Plan project and involves the removal of coal refuse from the banks of Rock Creek, the establishment of vegetative cover on the refuse areas in the watershed, and the application of limestone sand at selected locations to neutralize the effects of AMD. Limestone sand has also been used to neutralize acid mine drainage in West Virginia.

Brier Creek Watershed



Total TMDL for Brier Creek = 0.424 lbs H+ Ions/day

	Incremental Contributing Area (mi ²)	3-Year Incremental Flow Rate (cfs)	Incremental TMDL @pH=6 (lbs/day)	3-Year Incremental Load (lbs/day)	Incremental Reduction Needed (lbs/day)
Site 1	0.6048	13.8	0.084	0.158	0.074
Site 2	0.2531	5.8	0.035	0.015	0.000
Site 3	0.9719	22.2	0.133	15.825	15.692
Site 4	0.2070	4.7	0.029	55.570	55.541
Site 5	0.3891	8.9	0.054	63.411	63.357
Site 6	0.6453	14.7	0.089	46.696	46.607