Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2008 Monitoring Summary

Fair™

Wolf Creek at Alabama Highway 102 in Walker County (33.78929/-87.52267)

BACKGROUND

Wolf Creek, from Lost Creek to Alabama Hwy 102, was placed on Alabama's Clean Water Act (CWA) 1998 §303(d) list of impaired waters for not meeting its *Fish and Wildlife* (*F&W*) water use classification. It was listed for metals, pH, siltation/habitat alteration, and pathogens due to unknown sources. It remains on the 2000-2008 §303(d) lists for siltation/habitat alteration due to abandoned surface mining.

The Alabama Department of Environmental Management (ADEM) monitored Wolf Creek at WOFW-3 in 2008 to further investigate impairment resulting from abandoned surface mining. Macroinvertebrate and habitat assessments were conducted to verify impairment to aquatic communities. Monthly water chemistry samples were also collected to identify the cause of impairment. These data will be used to develop the Siltation Total Maximum Daily Load (TMDL), which is scheduled to be completed in 2014.

Figure 1. Wolf Creek at WOFW-3, December 14, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Wolf Creek at WOFW-3 is a *Fish and Wildlife* (*F&W*) stream, located within the Shale Hills ecoregion in Walker County. Based on the 2006 National Landcover Dataset, landuse within the watershed was composed primarily of forested areas (87%), with some areas of shrub/scrub (Table 1). As of September 1, 2012, the ADEM has issued 5 NPDES permits in this watershed.

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate assessment. In comparison with reference reaches in the same ecoregion, they give an indication of the physical condition of the site and the quality and availability of habitat. Wolf Creek at WOFW-3 is a small, open canopy stream reach. This stream was characterized by a predominantly sand substrate along with bedrock, cobble, gravel, and silt (Figure 1). Overall habitat quality was categorized as *poor* for this stream type.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		10
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	43
	Evergreen	37
	Mixed	7
Shrub/scrub		6
Grassland/herbaceous		<1
Pasture/hay		1
Cultivated crops		<1
Development	Open space	2
Population/km^2[b]		2
# NPDES Permits[c]	**TOTAL**	5
Construction Stormwater		2
Mining		1
Municipal Individual		2

a. Shale Hills
b. 2006 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database February 23,2011

Table 2. Physical characteristics of Wolf Creek at WOFW-3, June 12, 2008.

Physical Characteristics		
Width (ft)		22
Canopy Cover		Open
Depth (ft)		
	Run	0.2
	Pool	2.5
% of Reach		
	Run	10
	Pool	90
% Substrate		
	Bedrock	15
	Cobble	10
	Mud/Muck	3
	Gravel	15
	Sand	44
	Silt	10
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Wolf Creek at WOFW-3, June 12, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	38	Poor (<41)
Sediment Deposition	55	Marginal (41-58)
Sinuosity	35	Poor (<45)
Bank and Vegetative Stability	36	Marginal (35-59)
Riparian Buffer	53	Marginal (50-69)
Habitat Assessment Score	**93**	
% Maximum Score	**39**	**Poor (<41)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Wolf Creek at WOFW-3, June 12, 2008.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures			
# EPT genera	13	52	Fair (38-56)
Taxonomic composition			
% Non-insect taxa	10	77	Fair (61.9-92.7)
% Plecoptera	1	3	Poor (1.86-3.7)
% Dominant taxa	30	49	Fair (47.1-70.5)
Functional composition measures			
% Predators	13	46	Good (45.3-72.1)
Tolerance measures			
Beck's community tolerance	4	18	Poor (10.6-21.2)
% Nutrient tolerant organisms	12	97	Excellent (>88.1)
WMB-I Assessment Score	**--**	**49**	**Fair (38-56)**

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

WATER CHEMISTRY

In situ measurements and water samples were collected monthly, during March through October of 2008 to help identify any stressors to the biological communities. Water chemistry results are summarized in Table 5. Median specific conductance was higher than the 90th percentile of data collected at reference reaches in ecoregion 68. Dissolved oxygen fell below *F&W* use class criteria during the July 2, 2008 site visit when flow was visible but not detectable. Dissolved oxygen also fell below criteria on the September 9, 2008 site visit.

Table 5. Summary of water quality data collected March-October, 2008. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median (Med), average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Med	Avg	SD	E
Physical							
Temperature (°C)	7	9.8	26.4	22.6	19.5	6.2	
Turbidity (NTU)	7	4.2	20.6	8.4	9.8	5.4	
Total Dissolved Solids (mg/L)	6	< 1.0	66.0	34.0	34.8	23.4	
Total Suspended Solids (mg/L)	6	< 1.0	9.0	1.5	3.3	3.7	
Specific Conductance (µmhos)	7	46.8	100.0	76.4 G	77.7	19.9	
Alkalinity (mg/L)	6	8.9	33.5	23.8	22.4	10.0	
Stream Flow (cfs)	2	0.4	9.5	5.0	5.0	6.4	
Chemical							
Dissolved Oxygen (mg/L)	7	4.0 C	10.4	6.5	6.6	2.1	2
pH (su)	7	6.2	6.6	6.5	6.5	0.1	
Ammonia Nitrogen (mg/L)	6	< 0.014	< 0.015	0.008	0.007	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.003	0.018	0.003	0.006	0.007	
Total Kjeldahl Nitrogen (mg/L)	6	< 0.141	< 0.150	0.075	0.074	0.002	
Total Nitrogen (mg/L)	6	< 0.074	< 0.088	0.077	0.080	0.006	
J Dissolved Reactive Phosphorus (mg/L)	6	0.005	0.012	0.012	0.010	0.003	
Total Phosphorus (mg/L)	6	0.018	0.034	0.026	0.026	0.007	
CBOD-5 (mg/L)	6	< 1.0	< 2.0	0.5	0.7	0.2	
Chlorides (mg/L)	6	< 1.0	1.8	1.4	1.3	0.4	

J=estimate; N=# samples; C=value exceeds established criteria for *F&W* water use classification in ecoregion 68; G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 68; E=# samples that exceeded criterion.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Wolf Creek was placed on Alabama's Clean Water Act (CWA) 1998 §303(d) list of impaired waters for not meeting its *Fish and Wildlife* (F&W) water use classification. It was listed for siltation and other habitat alteration due to abandoned surface mining. Results of the 2008 bioassessment indicated the macroinvertebrate community in Wolf Creek at WOFW-3 to be in *fair* condition. The data collected will be used to develop the Siltation Total Maximum Daily Load (TMDL), which is scheduled to be completed in 2014.

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