Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2008 Monitoring Summary

Wolf Creek at State Highway 18 in Corona (Walker County)(33.70945/-87.47758)

BACKGROUND

Wolf Creek, from Lost Creek to Alabama Hwy 102, was placed on Alabama's 1998 Clean Water Act (CWA) 303d 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. Based on 1996 water quality data, Wolf Creek was de-listed for metals, pH and pathogens. 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-2 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 collected to identify the cause of impairment. Results from these data may also be used in the determination of Total Maximum Daily Load (TMDL) needs, which is scheduled to be completed in 2014.

Figure 1. Wolf Creek at WOFW-2, December 14, 2011.

WATERSHED CHARACTERISTICS

Wolf Creek at WOFW-2 is located within the Shale Hills ecoregion in Walker County. Based on the 2000 National Landcover Dataset (NLCD), landuse within the watershed was composed primarily of forested areas (84%), with some areas of shrub/scrub and pasture/hay (Table 1). Development activities accounted for approximately one percent of the watershed. As of September 1, 2012, the ADEM has issued 12 NPDES permits in the watershed.

REACH CHARACTERISTICS

General observations (Figure 1, 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-2 is a small shaded stream reach. This stream was characterized by a predominantly cobble/gravel substrate with sand and silt also abundant. Overall habitat quality was categorized as *marginal* due to excessive sedimentation, poor riparian vegetative protection and marginal in-stream habitat quality.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		45
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	44
	Evergreen	31
	Mixed	9
Shrub/scrub		5
Grassland/herbaceous		3
Pasture/hay		3
Cultivated crops		<1
Development	Open space	1
	Low intensity	<1
Population/km^2[b]		3
# NPDES Permits[c]	**TOTAL**	12
Construction Stormwater		4
Mining		6
Municipal Individual		2

a. Shale Hills
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

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

Physical Characteristics		
Width (ft)		25
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.5
	Run	1.5
	Pool	3.5
% of Reach		
	Riffle	2
	Run	63
	Pool	25
% Substrate		
	Clay	2
	Cobble	25
	Mud/Muck	5
	Gravel	25
	Sand	15
	Silt	20
	Organic Matter	8

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Table 3. Results of the habitat assessment conducted on Wolf Creek at WOFW-2, June 12, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	53	Marginal (41-58)
Sediment Deposition	50	Marginal (41-58)
Sinuosity	40	Poor (<45)
Bank and Vegetative Stability	19	Poor (<35)
Riparian Buffer	36	Poor (<50)
Habitat Assessment Score	**92**	
% Maximum Score	**42**	**Marginal (41-58)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Wolf Creek at WOFW-2, June 12, 2008.

Macroinvertebrate Assessment			
	Results	**Scores (0-100)**	**Rating**
Taxa richness measures			
# Ephemeroptera (mayfly)	5	42	Poor (23-46)
# Plecoptera (stonefly) genera	3	50	Good (50-75)
# Trichoptera (caddisfly) genera	2	17	Very Poor (<22)
Taxonomic composition			
% Non-insect taxa	22	13	Very Poor
% Non-insect organisms	14	64	Fair (62.8-93.9)
% Plecoptera	4	21	Good (19.8-59.8)
Tolerance measures			
Beck's community tolerance	3	11	Very Poor
WMB-I Assessment Score	**--**	**31**	**Poor (24-48)**

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 at WOFW-2 to be in *poor* condition (Table 4). Very few pollution-intolerant taxa were collected at the site.

WATER CHEMISTRY

In situ measurements and water samples were collected monthly, during June through December of 2008, to help identify any stressors to the biological communities. Water chemistry results are summarized in Table 5. Median total dissolved solids and alkalinity were higher than the 90th percentile of data collected at reference reaches in ecoregion 68. Median specific conductance values were greater than the median concentration of all verified reference data collected in ecoregion 68. During the November site visit, dissolved oxygen fell below established use class criteria for a *F&W* stream, possibly due to a stream flow of 0.4 cfs.

Table 5. Summary of water quality data collected June-December, 2008. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) whenever results were less than this value. Median, 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)	8	9.6	24.0	20.4	18.6	5.6	
Turbidity (NTU)	8	2.4	15.9	4.4	6.4	4.8	
Total Dissolved Solids (mg/L)	7	212.0	640.0	448.0 M	456.8	164.9	
Total Suspended Solids (mg/L)	7	< 1.0	19.0	4.0	6.9	6.4	
Specific Conductance (µmhos)	8	358.4	1009.0	701.4 G	716.0	221.0	
Alkalinity (mg/L)	7	32.2	126.0	82.0 M	80.4	30.7	
Stream Flow (cfs)	6	0.4	47.6	1.1	8.9	19.0	
Chemical							
Dissolved Oxygen (mg/L)	8	4.4 C	10.2	5.6	6.2	1.8	1
pH (su)	8	6.5	7.2	6.9	6.9	0.2	
Ammonia Nitrogen (mg/L)	7	< 0.014	< 0.015	0.008	0.007	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.074	0.009	0.023	0.028	
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.374	0.186	0.174	0.111	
Total Nitrogen (mg/L)	7	< 0.076	0.420	0.189	0.196	0.116	
J Dissolved Reactive Phosphorus (mg/L)	7	0.008	0.016	0.012	0.012	0.003	
Total Phosphorus (mg/L)	7	0.018	0.034	0.021	0.024	0.005	
CBOD-5 (mg/L)	7	< 1.0	2.0	0.5	0.8	0.3	
Chlorides (mg/L)	7	1.3	2.1	1.7	1.7	0.3	

J=estimate; N=# samples; E=# samples that exceeded criteria; G= Value greater than median concentration of all verified reference data collected in ecoregion 68; M=value >90% of all verified ecoregional reference reach data collected in ecoregion 68; C= value exceeds established criteria for

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 for metals, pH, siltation/habitat alteration, and pathogens due to unknown sources. Based on 1996 water quality data, Wolf Creek was de-listed for metals, pH and pathogens. It remains on the 2000-2008 §303(d) lists for siltation/habitat alteration due to abandoned surface mining.

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