Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Lost Creek at US Highway 78 (Walker County) (33.88197/-87.51040)

BACKGROUND

Lost Creek, from US Highway 78 at Carbon Hill (upstream) to US Highway 78 North of Cedrum (approximately 6.53 miles), has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for only partially meeting its *Fish and Wildlife (F&W)* water use classification. It was listed for siltation due to abandoned surface mining. The segment was listed as impaired based on data collected in 1987. Development of a Total Maximum Daily Load (TMDL) is scheduled for 2014.

The Alabama Department of Environmental Management (ADEM) monitored Lost Creek at LOSW-5 to verify and document impairment from siltation and other habitat alterations. A macroinvertebrate assessment and a habitat assessment were conducted to verify impairment to aquatic communities. Water chemistry samples were collected in May, July, September and November 2012 to identify the causes of impairment and support TMDL development.

Figure 1. Lost Creek at LOSW-5, September 12, 2012.

WATERSHED CHARACTERISTICS

Watershed charatcteristics are summarized in Table 1. Lost Creek at LOSW-5 is a *Fish & Wildlife (F&W)* stream in Walker County. According to the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (65%). As of September 1, 2012, ADEM has issued 23 NPDES discharge permits in this watershed, eleven of which are mining permits.

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. Lost Creek at LOSW-5 is characterized by a bedrock substrate (Figure 1). Overall habitat quality was rated as *sub-optimal* due to inadequate habitat quality and bank stability.

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Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		28
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	29
	Evergreen	24
	Mixed	12
Shrub/scrub		9
Grassland/herbaceous		4
Pasture/hay		10
Cultivated crops		<1
Development	Open space	6
	Low intensity	1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^2[b]		34
# NPDES Permits[c]	**TOTAL**	23
Construction Stormwater		9
Mining		11
Industrial Individual		1
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 Lost Creek at LOSW-5, October 23, 2012.

Physical Characteristics	
Canopy Cover	Shaded
Width (ft)	45
Depth (ft)	
Riffle	0.5
Run	1.5
Pool	4.0
% of Reach	
Riffle	5
Run	10
Pool	85
% Substrate	
Bedrock	60
Boulder	2
Cobble	8
Mud/Muck	2
Gravel	5
Sand	5
Silt	5
Organic Matter	13

Table 3. Results of the habitat assessment conducted on Lost Creek at LOSW-5, October 23, 2012.

Habitat Assessment	%Maximum Score	Rating
RR		
Instream Habitat Quality	47	Marginal (41-58)
Sediment Deposition	68	Sub-optimal (59-70)
Sinuosity	68	Sub-optimal (65-84)
Bank and Vegetative Stability	55	Marginal (35-59)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	**153**	
% Maximum Score	**64**	**Sub-optimal (59-70)**

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).

Table 4. Results of the macroinvertebrate bioassessment conducted in Lost Creek at LOSW-5, October 23, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness measures		**(0-100)**
# EPT taxa	14	43
Taxonomic composition measures		
% Non-insect taxa	14	41
% Dominant taxon	17	86
% EPC taxa	20	37
Functional feeding group measures		
% Predators	5	13
Tolerance measures		
% Taxa as Tolerant	39	27
WMB-I Assessment Score	**---**	**41**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in May, July, September and November 2012 to help identify potential stressors to the biological communities.

The median values of total dissolved solids, specific conductance, hardness, alkalinity and manganese in LOSW-5 were higher than expected when compared to reference reaches in ecoregion 68. During the September sampling event, LOSW-5 exceeded the Human Health criteria for arsenic.

SUMMARY

The elevated level of total dissolved solids support the continued inclusion of Lost Creek at LOSW-5 on the CWA 303(d) list for siltation. The TMDLs for these impairments is set to be drafted in 2014.

Macroinvertebrate sampling indicated the macroinvertebrate community to be in *fair* condition. Water chemistry analyses suggested the elevated arsenic, manganese, total dissolved solids, specific conductance, hardness and alkalinity concentrations may be impacting macroinvertebrate communities.

Table 5. Summary of LOSW-5 water quality data collected from May, July, September and November 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when 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)	5	12.5	25.1	20.8	19.1	5.1	
Turbidity (NTU)	5	2.7	26.5	3.5	7.9	10.4	
Total Dissolved Solids (mg/L)	4	402.0	694.0	529.0[M]	538.5	121.4	
Total Suspended Solids (mg/L)	4	<1.0	25.0	0.8	6.8	12.2	
Specific Conductance (µmhos)	5	603.3	1056.0	807.3[G]	835.8	166.0	
Hardness (mg/L)	4	232.0	493.0	370.0[G]	366.2	107.0	
Alkalinity (mg/L)	4	191.0	313.0	280.5[M]	266.2	56.1	
Stream Flow (cfs)	2	8.5	58.0	33.2	33.2	35.0	
Chemical							
Dissolved Oxygen (mg/L)	5	5.5	7.7	7.3	7.0	0.9	
pH (su)	5	7.5	7.7	7.5	7.6	0.1	
[J]Ammonia Nitrogen (mg/L)	4	<0.008	0.083	0.040	0.042	0.040	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.099	0.634	0.181	0.274	0.245	
[J]Total Kjeldahl Nitrogen (mg/L)	4	0.088	0.120	0.108	0.106	0.016	
[J]Total Nitrogen (mg/L)	4	0.218	0.754	0.273	0.380	0.253	
[J]Dissolved Reactive Phosphorus (mg/L)	4	0.005	0.011	0.006	0.007	0.003	
Total Phosphorus (mg/L)	4	0.012	0.036	0.018	0.021	0.010	
[J]CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	2.2	2.8	2.4	2.5	0.2	
Total Metals							
[J]Aluminum (mg/L)	4	<0.043	0.764	0.038	0.216	0.366	
Iron (mg/L)	4	0.270	1.380	0.340	0.583	0.533	
[J]Manganese (mg/L)	4	0.047	0.163	0.092	0.098	0.048	
Dissolved Metals							
Aluminum (mg/L)	4	<0.043	<0.043	0.022	0.022	0.000	
Antimony (µg/L)	4	<3.6	<3.6	1.8	1.8	0.0	
Arsenic (µg/L)	4	<1.8	2.7[H]	0.9	1.3	0.9	1
[J]Cadmium (µg/L)	4	<0.022	<0.046	0.023	0.020	0.006	
Chromium (mg/L)	4	<0.009	<0.009	0.004	0.004	0.000	
Copper (mg/L)	4	<0.020	<0.020	0.010	0.010	0.000	
[J]Iron (mg/L)	4	<0.019	0.110	0.014	0.037	0.049	
Lead (µg/L)	4	<0.9	<0.9	0.4	0.4	0.0	
[J]Manganese (mg/L)	4	0.044	0.141	0.080[M]	0.086	0.040	
Mercury (µg/L)	4	<0.035	<0.035	0.018	0.018	0.000	
Nickel (mg/L)	4	<0.042	<0.042	0.021	0.021	0.000	
Selenium (µg/L)	4	<2.5	<2.5	1.2	1.2	0.0	
Silver (µg/L)	4	<0.015	<0.215	0.108	0.082	0.050	
Thallium (µg/L)	4	<1.4	<1.4	0.7	0.7	0.0	
Zinc (mg/L)	4	<0.012	<0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (ug/L)	4	<0.10	0.53	0.29	0.29	0.28	
[J]E. coli (col/100mL)	4	44	649	71	209	294	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68f; H= *F&W* human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68f; N=# samples.

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