

2007 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. Monthly water chemistry samples were collected to identify the causes of impairment and support TMDL development.



Figure 1. Lost Creek at LOSW-5, February 8, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Lost Creek at LOSW-5 is a *Fish & Wildlife (F&W)* stream in Walker County. According to the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (65%). As of February 23, 2011, ADEM has issued 23 NPDES discharge 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. Lost Creek at LOSW-5 is characterized by bedrock and boulder substrates (Figure 1). Overall habitat quality was rated as *optimal* for streams in this ecoregion.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Black Warrior River
Basin		
Drainage Area (mi²)		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^{2b}		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 data-

Table 2. Physical characteristics of Lost Creek at LOSW-5, June 5, 2007.

Physical Characteristics	
Width (ft)	60
Canopy Cover	Mostly Shaded
Depth (ft)	
	Riffle 0.5
	Run 1.5
	Pool 3.5
% of Reach	
	Riffle 5
	Run 45
	Pool 50
% Substrate	
	Bedrock 31
	Boulder 20
	Clay 5
	Cobble 5
	Gravel 15
	Sand 10
	Silt 10
	Organic Matter 4

Table 3. Results of the habitat assessment conducted in Lost Creek at LOSW-5, June 5, 2007.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	63	Sub-optimal (59-70)
Sediment Deposition	75	Optimal (> 70)
Sinuosity	70	Sub-optimal (65-84)
Bank and Vegetative Stability	79	Optimal (> 74)
Riparian Buffer	80	Sub-optimal (70-89)
Habitat Assessment Score	173	
% Maximum score	72	Optimal (> 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 *poor* condition due the low number of pollutant-intolerant organisms found (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Lost Creek at LOSW-5, June 5, 2007.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
		(0-100)	
# Ephemeroptera (mayfly) genera	4	33	Poor (23-46)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	12	52.9	Fair (49.5-74.1)
% Non-insect organisms	2	95.7	Good (94.0-97.0)
% Plecoptera	0	1.3	Very Poor (<=6.5)
Tolerance measures			
Beck's community tolerance index	10	35.7	Poor (20.3-40.7)
WMB-I Assessment Score	-	44	Poor (24-48)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected monthly from March through October 2007 to help identify potential stressors to the biological communities. According to verified data of reference reaches in ecoregion 68, least impacted streams have median values of total dissolved solids to be 97.2, specific conductance to be 39.15, and alkalinity to be 42.2. As shown in Table 5, the median values of total dissolved solids, specific conductance, and alkalinity in LOSW-5 were higher than expected when compared to reference reaches in ecoregion 68.

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 *poor* condition. Water chemistry analyses suggested the elevated total dissolved solids, specific conductance, and alkalinity concentrations may be impacting macroinvertebrate communities.

Table 5. Summary of LOSW-5 water quality data collected from March-October, 2007. 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
Physical						
Temperature (°C)	8	17.1	28.0	23.0	22.6	3.5
Turbidity (NTU)	8	1.0	6.5	3.2	3.2	1.8
^J Total Dissolved Solids (mg/L)	8	361.0	719.0	542.0 ^M	542.1	118.6
^J Total Suspended Solids (mg/L)	8	1.0	8.0	4.5	4.2	2.6
Specific Conductance (µmhos)	8	613.4	1074.0	941.6 ^G	896.4	178.0
Alkalinity (mg/L)	8	189.6	378.5	290.2 ^M	284.9	56.1
Stream Flow (cfs)	5	0.5	11.4	2.1	4.3	4.8
Chemical						
Dissolved Oxygen (mg/L)	8	6.2	11.5	7.2	7.7	1.7
pH (su)	8	7.4	8.1	7.7	7.7	0.2
Ammonia Nitrogen (mg/L)	8	< 0.015	0.064	0.012	0.022	0.020
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.006	0.176	0.062	0.065	0.061
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.368	0.270	0.244	0.128
^J Total Nitrogen (mg/L)	8	< 0.081	0.482	0.363	0.309	0.143
Dissolved Reactive Phosphorus (mg/L)	8	0.011	0.060	0.016	0.026	0.020
^J Total Phosphorus (mg/L)	8	0.020	0.046	0.025	0.028	0.009
CBOD-5 (mg/L)	8	< 1.0	2.2	0.5	0.9	0.6
^J Chlorides (mg/L)	8	2.0	5.4	2.5	2.8	1.1

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68f; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68f; N=# samples.

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