

# 2007 Monitoring Summary



## Lost Creek at Wire Road Below Dam (Walker County) (33.85279/-87.44661)

### BACKGROUND

Approximately seventeen miles of Lost Creek, from the mill dam at Cedrum downstream to Alabama Highway 69 at Oakman, 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-3 to verify and to document impairment from siltation and other habitat alterations. A macroinvertebrate and a habitat assessment were conducted to assess the biological communities in the reach. Monthly water chemistry samples were collected to identify the causes of impairment and to support TMDL development.



Figure 1. Lost Creek at LOSW-3, March 21, 2007.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Lost Creek at LOSW-3 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 (57%). As of February 23, 2011, ADEM has issued 67 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-3 is a high-gradient stream characterized by bedrock substrate (Figure 1). Overall habitat quality was rated as *sub-optimal* for supporting macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Black Warrior River
<b>Basin</b>		Black Warrior River
<b>Drainage Area (mi<sup>2</sup>)</b>		78
<b>Ecoregion<sup>a</sup></b>		68f
<b>% Landuse</b>		
Open water		1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	23
	Evergreen	24
	Mixed	10
Shrub/scrub		12
Grassland/herbaceous		9
Pasture/hay		14
Cultivated crops		1
Development	Open space	5
	Low intensity	1
	Moderate intensity	<1
	High intensity	<1
Barren		1
<b>Population/km<sup>2b</sup></b>		25
<b># NPDES Permits<sup>c</sup></b>	<b>TOTAL</b>	67
	Construction Stormwater	28
	Mining	32
	Industrial General	2
	Industrial Individual	3
	Municipal Individual	2

a. Shale Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011.

Table 2. Physical characteristics of Lost Creek at LOSW-3, June 5, 2007.

Physical Characteristics	
<b>Width (ft)</b>	60
<b>Canopy cover</b>	Open
<b>Depth (ft)</b>	
	Riffle
	Run
	Pool
<b>% of Reach</b>	
	Riffle
	Run
	Pool
<b>% Substrate</b>	
	Bedrock
	Boulder
	Cobble
	Gravel
	Sand
	Silt
	Organic Matter

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

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	62	Sub-optimal (59-70)
Sediment Deposition	78	Optimal (> 70)
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	81	Optimal (> 74)
Riparian Buffer	70	Sub-optimal (70-89)
<b>Habitat Assessment Score</b>	<b>168</b>	
<b>% Maximum score</b>	<b>70</b>	<b>Sub-optimal (59-70)</b>

### 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 due to the high number of pollutant-tolerant taxa and non-insect taxa found in the reach (Table 4).

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Lost Creek at LOSW-3, June 5, 2007.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness measures</b>		<b>(0-100)</b>
# EPT taxa	22	78
<b>Taxonomic composition measures</b>		
% Non-insect taxa	15	38
% Dominant taxon	21	73
% EPC taxa	27	51
<b>Functional feeding group measures</b>		
% Predators	15	62
<b>Tolerance measures</b>		
% Taxa as Tolerant	34	42
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>57</b>
<b>WMB-I Assessment Rating</b>		<b>Fair (39-58)</b>

### 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. Median values water temperature, total dissolved solids, specific conductance, and alkalinity were higher than expected when compared to verified data collected from reference reaches in ecoregion 68.

**Table 5.** Summary of LOSW-3 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
<b>Physical</b>						
Temperature (°C)	8	14.9	30.8	24.8 <sup>M</sup>	24.3	4.8
Turbidity (NTU)	8	2.3	6.3	4.0	4.1	1.5
<sup>J</sup> Total Dissolved Solids (mg/L)	7	255.0	502.0	331.0 <sup>M</sup>	352.0	95.0
<sup>J</sup> Total Suspended Solids (mg/L)	7	2.0	6.0	3.0	3.7	1.7
Specific Conductance (µmhos)	8	398.8	730.5	583.8 <sup>G</sup>	562.5	109.9
Alkalinity (mg/L)	7	110.7	223.2	176.7 <sup>M</sup>	170.4	40.9
Stream Flow (cfs)	8	3.0	44.5	8.2	15.7	15.0
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	8	7.0	10.0	8.4	8.4	1.0
pH (su)	8	7.6	8.0	7.8	7.8	0.1
Ammonia Nitrogen (mg/L)	7	< 0.015	0.030	0.008	0.014	0.011
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	7	0.016	0.204	0.067	0.080	0.067
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.359	0.280	0.245	0.121
<sup>J</sup> Total Nitrogen (mg/L)	7	< 0.093	0.553	0.375	0.326	0.165
Dissolved Reactive Phosphorus (mg/L)	7	0.009	0.038	0.016	0.020	0.011
<sup>J</sup> Total Phosphorus (mg/L)	6	0.015	0.039	0.024	0.025	0.008
CBOD-5 (mg/L)	7	< 1.0	2.3	0.5	1.0	0.7
<sup>J</sup> Chlorides (mg/L)	7	1.9	3.6	2.9	2.8	0.6

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

### SUMMARY

The elevated level of total dissolved solids support the continued inclusion of Lost Creek at LOSW-3 on the CWA 303(d) list for siltation. The TMDLs for these impairments are scheduled for completion by 2014.

The habitat assessment indicated LOSW-3 to be *sub-optimal* for supporting a diverse macroinvertebrate community. Macroinvertebrate sampling indicated the macroinvertebrate community to be in *fair* condition. Water chemistry analyses suggest the elevated temperature, total dissolved solids, specific conductance, and alkalinity concentrations might be impacting the macroinvertebrate communities.

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