

2012 Monitoring Summary



Mill Creek at the end of Eleanor Street in Tuscaloosa County (33.24412/-87.60317)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Mill Creek watershed for biological and water quality monitoring. The watershed was selected in response to concerns that sediment deposition may be increasing within the stream. The site was also incorporated into ADEM's assessment of the Black Warrior and Cahaba River Basins. Habitat and macroinvertebrate assessments were conducted on Mill Creek at MLCT-3 on May 2, 2012 to assess siltation impacts to biological communities. Monthly water quality sampling was also conducted, April through November, 2012.



Figure 1. Mill Creek at MLCT-3 on May 2, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mill Creek is a *Fish and Wildlife (F&W)* stream located near of the city of Northport, Alabama. At MLCT-3, the stream drains approximately 12 square miles to its source in the Black Warrior River. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (58%) areas. As of September 1, 2012, 19 NPDES permits have been issued 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. Mill Creek at MLCT-3 is a sand-bottomed stream characterized by small gravel riffles (Figure 1). Overall habitat quality was categorized as *marginal* due to siltation, limited instream habitat, and the lack of riparian buffers.

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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. The final index score of 32 indicated the macroinvertebrate community to be in *fair* condition (32-47; Table 4). However, low numbers of sensitive taxa and a relatively high percentage of tolerant taxa were present at the site.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Black Warrior River
Basin		
Drainage Area (mi²)		12
Ecoregion^a		65i
% Landuse		
Open water		1
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	38
	Evergreen	6
	Mixed	14
Shrub/scrub		14
Grassland/herbaceous		1
Pasture/hay		6
Cultivated crops		3
Development	Open space	11
	Low intensity	3
	Moderate intensity	1
	High intensity	<1
Barren		<1
Population/km^{2b}		81
# NPDES Permits^c	TOTAL	19
	401 Water Quality Certification	1
	Construction Stormwater	18

a. Fall Line Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Mill Creek at MLCT-3, May 2, 2012.

Physical Characteristics	
Width (ft)	5
Canopy Cover	Mostly Shaded
Depth (ft)	
	Riffle
	Run
	Pool
% of Reach	
	Riffle
	Run
	Pool
% Substrate	
	Boulder
	Cobble
	Gravel
	Sand
	Silt
	Organic Matter

Table 3. Results of the habitat assessment conducted on Mill Creek at MLCT-3, May 2, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	45	Marginal (40-52)
Sediment Deposition	56	Sub-optimal (53-65)
Sinuosity	48	Marginal (45-64)
Bank and Vegetative Stability	36	Marginal (35-59)
Riparian Buffer	36	Poor (<50)
Habitat Assessment Score	107	
% Maximum Score	45	Marginal (40-52)

Table 4. Results of macroinvertebrate bioassessment conducted in Mill Creek at MLCT-3, May 2, 2012.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
% EPT taxa	17	11
% Dominant Taxon	22	70
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	23	41
Functional feeding group		
# Collector Taxa	16	45
Community tolerance		
% Nutrient Tolerant individuals	44	36
WMB-I Assessment Score	---	32
WMB-I Assessment Rating		Fair (32-47)

WATER CHEMISTRY

Results of water chemistry samples are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during April through November of 2012 to help identify any stressors to the biological communities. *E. coli* exceeded the *F&W* summer criterion in August. Stream flow was 7.1 cfs during this sampling visit. Median concentrations of specific conductance and alkalinity were higher than values expected based on data collected at Fall Line Hills ecoregional reference reaches (65i).

Table 5. Summary of water quality data collected April-November, 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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)	8	14.1	24.1	21.3	20.5	3.5	
Turbidity (NTU)	8	7.6	51.4	16.3	19.2	14.1	
^J Total Dissolved Solids (mg/L)	8	48.0	86.0	63.0	64.2	11.1	
^J Total Suspended Solids (mg/L)	8	2.0	63.0	7.5	14.0	20.1	
Specific Conductance (µmhos)	8	59.9	98.3	73.4 ^G	73.8	11.8	
Alkalinity (mg/L)	8	12.1	28.7	24.4 ^M	23.4	5.2	
Stream Flow (cfs)	8	6.3	35.0	7.7	11.8	9.6	
Chemical							
Dissolved Oxygen (mg/L)	8	7.3	9.4	8.1	8.2	0.6	
pH (su)	8	6.3	7.0	6.5	6.6	0.3	
Ammonia Nitrogen (mg/L)	8	< 0.007	< 0.008	0.004	0.004	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.086	0.300	0.235	0.217	0.073	
^J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.468	0.118	0.159	0.158	
^J Total Nitrogen (mg/L)	8	< 0.154	0.681	0.337	0.376	0.159	
^J Dissolved Reactive Phosphorus (mg/L)	8	0.006	0.037	0.007	0.011	0.011	
Total Phosphorus (mg/L)	8	0.016	0.069	0.026	0.030	0.017	
^J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	2.4	4.6	3.4	3.4	0.6	
Biological							
^J <i>E. coli</i> (col/100mL)	8	166	1300 ^H	476	537	393	1

^J=estimate; N=# samples; H=*F&W* human health criterion exceeded; G=value greater than median concentration of all verified reference data collected in ecoregion 65i; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65i; E=# of samples that exceed criterion.

SUMMARY

Results of ADEM's 2012 macroinvertebrate bioassessment indicated the macroinvertebrate community to be in *fair* condition, although the community was characterized by low numbers of sensitive taxa and a relatively high percentage of tolerant taxa. Overall habitat quality was categorized as *marginal* due to siltation, limited instream habitat, and the lack of riparian buffers. *E. coli* exceeded the *F&W* summer criterion in August. Median concentrations of specific conductance and alkalinity were also higher than expected. Monitoring should continue to ensure that conditions remain stable within the reach.

FOR MORE INFORMATION, CONTACT:
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