

2012 Monitoring Summary



Cane Creek at AL Highway 69 near Oakman (Walker County) (33.70939/-87.39071)

BACKGROUND

A 7.38 mile segment of Cane Creek from its source to AL Highway 69 has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1998. In 1998, it was listed for metals (aluminum and iron), nutrients, pH, organic enrichment, and siltation caused by mining operations that are now abandoned. The 2012 data will be used to develop Total Maximum Daily Loads (TMDLs) for Cane Creek.

The Alabama Department of Environmental Management (ADEM) also selected the Cane Creek watershed for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of the BWC River Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC River basin group. A habitat and a macroinvertebrate assessment were conducted on Cane Creek at CANW-33 on May, 16, 2012.



Figure 1. Cane Creek at CANW-33 October 3, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cane Creek at CANW-33 is a *Fish & Wildlife (F&W)* stream located in Walker County. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (85%). As of June 6, 2013, no NPDES permits have been issued in the 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. Cane Creek at CANW-33 is a glide-pool stream located in the Shale Hills ecoregion (68f) (Figure 1). Benthic substrate consists primarily of sand with some gravel and clay. Overall habitat quality was rated as *sub-optimal* for supporting a diverse biological community.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each score is based 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 metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Black Warrior River	
Drainage Area (mi ²)	14	
Ecoregion ^a	68f	
% Landuse		
Open water		1
Wetland	Woody	3
	Emergent herbaceous	<1
	Mixed	11
Forest	Deciduous	36
	Evergreen	38
	Mixed	11
Shrub/scrub		5
Grassland/herbaceous		3
Pasture/hay		1
Cultivated crops		<1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km ^{2b}	12	

a. Shale Hills

b. 2000 US Census

Table 2. Physical characteristics of Cane Creek at CANW-33, May 16, 2012.

Physical Characteristics		
Canopy Cover	Mostly Shaded	
Width (ft)	20.0	
Depth (Ft)	Run	1.0
	Pool	3.0
% of Reach	Run	80
	Pool	20
% Substrate	Clay	15
	Cobble	3
	Gravel	20
	Sand	45
	Silt	7
	Organic Matter	10

Table 3. Results of the habitat assessment conducted on Cane Creek at CANW-33, May 16, 2012.

Habitat Assessment	%MaximumScore	Rating
Instream Habitat Quality	53	Marginal (41-58)
Sediment Deposition	68	Sub-optimal (59-70)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	56	Marginal (35-59)
Riparian Buffer	69	Marginal (50-69)
Habitat Assessment Score	133	
% Maximum Score	60	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Cane Creek at CANW-33, May 16, 2012.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness measures		(0-100)
# EPT taxa	9	22
Taxonomic composition measures		
% Non-insect taxa	11	57
% Dominant taxon	13	99
% EPC taxa	19	35
Functional feeding group measures		
% Predators	25	100
Tolerance measures		
% Taxa as Tolerant	32	48
WMB-I Assessment Score	---	60
WMB-I Assessment Rating		Good (59-79)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected monthly during April through November to help identify any stressors to the biological communities. Specific conductance, hardness, and alkalinity values were higher than median values for all verified ecoregional reference reach data for streams in ecoregion 68. Total dissolved solids, dissolved manganese, and dissolved silver concentrations were above 90 percent of data for streams in this ecoregion.

SUMMARY

Overall habitat quality was categorized as *sub-optimal* for supporting a diverse macroinvertebrate community. Bioassessment results indicated the macroinvertebrate community in Cane Creek at CANW-33 to be in *good* condition. Water chemistry analyses showed high conductivity, hardness and alkalinity. Also, total dissolved solids, dissolved manganese, and dissolved silver levels were higher than expected. These levels could be potential causes of stressors to the biological community in the Cane Creek watershed.

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Table 5. Summary of water quality data collected April-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	Median	Avg	SD
Physical						
Temperature (°C)	10	11.8	25.9	20.6	20.4	4.1
Turbidity (NTU)	11	1.2	9.1	2.7	3.5	2.7
Total Dissolved Solids (mg/L)	8	596.0	1174.0	1092.0 ^M	976.5	234.1
Total Suspended Solids (mg/L)	8	< 1.0	< 1.0	0.5	0.6	0.2
Specific Conductance (µmhos)	10	808.6	1521.0	1228.5 ^G	1211.2	260.2
Hardness (mg/L)	8	373.0	702.0	634.0 ^G	589.8	116.2
Alkalinity (mg/L)	8	115.0	216.0	180.5 ^G	177.6	31.8
Stream Flow (cfs)	8	1.4	9.7	3.7	4.6	2.8
Chemical						
Dissolved Oxygen (mg/L)	10	6.1	9.1	7.8	7.7	0.9
pH (su)	10	7.5	8.0	7.8	7.7	0.2
Ammonia Nitrogen (mg/L)	8	< 0.007	0.008	0.004	0.004	0.000
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.005	0.066	0.024	0.026	0.020
Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.534	0.130	0.170	0.158
Total Nitrogen (mg/L)	8	< 0.036	0.568	0.150	0.196	0.161
Dissolved Reactive Phosphorus (mg/L)	8	< 0.005	0.006	0.005	0.004	0.002
Total Phosphorus (mg/L)	8	0.007	0.018	0.008	0.010	0.004
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	1.1	2.0	1.7	1.6	0.3
Total Metals						
Aluminum (mg/L)	8	< 0.043	0.286	0.098	0.113	0.078
Iron (mg/L)	8	< 0.019	0.264	0.096	0.110	0.076
Manganese (mg/L)	8	0.052	0.090	0.061	0.065	0.012
Dissolved Metals						
^J Aluminum (mg/L)	8	< 0.043	0.078	0.052	0.049	0.019
Antimony (µg/L)	8	< 3.6	< 3.6	1.8	1.8	0.0
^J Arsenic (µg/L)	8	< 1.8	< 1.8	0.9	0.9	0.0
^J Cadmium (mg/L)	8	< 0.022	0.065	0.023	0.028	0.018
^J Chromium (mg/L)	8	< 0.009	0.014	0.004	0.007	0.004
Copper (mg/L)	8	< 0.020	< 0.020	0.010	0.010	0.000
^J Iron (mg/L)	8	< 0.019	0.040	0.010	0.015	0.011
Lead (µg/L)	8	< 0.9	< 0.9	0.4	0.4	0.0
^J Manganese (mg/L)	8	0.044	0.087	0.056 ^M	0.059	0.014
Mercury (µg/L)	8	< 0.035	< 0.035	0.018	0.018	0.000
Nickel (mg/L)	8	< 0.042	< 0.042	0.021	0.021	0.000
^J Selenium (µg/L)	8	< 2.5	2.7	1.2	1.4	0.5
Silver (mg/L)	8	< 0.015	0.215	0.108 ^M	0.070	0.052
Thallium (µg/L)	8	< 1.4	< 1.4	0.7	0.7	0.0
^J Zinc (mg/L)	8	< 0.012	0.019	0.006	0.009	0.005
Biological						
Chlorophyll a (µg/L)	8	< 0.10	1.07	0.40	0.42	0.38

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.