

# 2012 Monitoring Summary



Basin Assessment Site

## Rock Creek at Winston County Road 39 (34.22613/-87.14102)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Rock Creek watershed for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior/Cahaba (BWC) River Basins. The objectives of the BWC Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basins. As part of this project, a habitat and macroinvertebrate assessment was conducted on Rock Creek at Winston County Road 39 (ROCW-52) on May 9, 2012.

Downstream of this location, Rock Creek, from Blevens Creek to Smith Lake, was identified on Alabama's 1998 Clean Water Act §303(d) List of Impaired Waters. It was listed for impairments caused by organic enrichment/low dissolved oxygen and pathogens. The sources of impairments include pasture grazing and intensive animal feeding operations.

The Rock Creek Watershed Management Plan (WMP) was developed to address these impairments. As part of the WMP, several best management practices were implemented upstream and around ROCW-52.



Figure 1. Rock Creek at ROCW-52, April 10, 2012.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Rock Creek is a *Fish and Wildlife (F&W)* stream located near the city of Addison, Alabama in the Southern Table Plateau ecoregion (68d). At ROCW-52, the Rock Creek watershed is approximately seventeen square miles. Based on the 2006 National Land Cover Dataset, land use within the watershed is primarily forest (62%) and pasture/hay. Approximately 4% of the watershed is developed. No NPDES permits are located in this watershed.

### REACH CHARACTERISTICS

General observations (Table 2) 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. Rock Creek at ROCW-52 is bedrock and sand substrates (Figure 1). Riffle habitat was limited within the reach. Overall habitat quality was categorized as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
<b>Basin</b>	Black Warrior River
<b>Drainage Area (mi<sup>2</sup>)</b>	16
<b>Ecoregion<sup>a</sup></b>	68d
<b>% Landuse</b>	
Open water	<1
Wetland	Woody 1
	Emergent herbaceous <1
Forest	Deciduous 36
	Evergreen 11
	Mixed 15
Shrub/scrub	3
Grassland/herbaceous	1
Pasture/hay	29
Cultivated crops	1
Development	Open space 2
	Low intensity <1
	Moderate intensity <1
Barren	<1
<b>Population/km<sup>2b</sup></b>	9

a. Southern Table Plateaus

b. 2000 US Census

Table 2. Physical characteristics of Rock Creek at ROCW-52, May 9, 2012.

Physical Characteristics	
<b>Width (ft)</b>	14
<b>Canopy Cover</b>	Mostly Shaded
<b>Depth (ft)</b>	
	Riffle 0.5
	Run 1.0
	Pool 1.0
<b>% of Reach</b>	
	Riffle 15
	Run 80
	Pool 5
<b>% Substrate</b>	
	Bedrock 25
	Boulder 15
	Cobble 8
	Gravel 7
	Sand 25
	Silt 10
	Organic Matter 10

**Table 3.** Results of the habitat assessment conducted on Rock Creek at ROCW-52, May 9, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	66	Sub-optimal (59-70)
Sediment Deposition	66	Sub-optimal (59-70)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	64	Sub-optimal (60-74)
Riparian Buffer	88	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 *good* condition (Table 4).

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Rock Creek at ROCW-52, May 9, 2012.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness measures</b>		<b>(0-100)</b>
# EPT taxa	19	65
<b>Taxonomic composition measures</b>		
% Non-insect taxa	8	73
% Dominant taxon	31	44
% EPC taxa	30	57
<b>Functional feeding group measures</b>		
% Predators	10	38
<b>Tolerance measures</b>		
% Taxa as Tolerant	21	81
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>60</b>
<b>WMB-I Assessment Rating</b>		<b>Good (59-79)</b>

### WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected, April, June, August, and October of 2012, to identify any stressors to the biological community. Stream flows were low during the sampling period. Median dissolved copper concentrations was above reference reach data collected in ecoregion 68d. Median conductivity, hardness, and dissolved reactive phosphorus were slightly higher than expected for this ecoregion.

### SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good* condition, despite lower than normal stream flows, and a high percentage of bedrock substrate. Overall habitat was categorized as *sub-optimal*. Median conductivity, hardness, dissolved reactive phosphorus, and dissolved copper were slightly elevated. Monitoring should continue to ensure that biological and chemical conditions remain stable.

**Table 5.** Summary of water quality data collected bimonthly April-October, 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
<b>Physical</b>						
Temperature (°C)	5	11.6	21.9	20.1	17.7	4.8
Turbidity (NTU)	5	2.9	12.1	3.4	6.0	4.2
Total Dissolved Solids (mg/L)	4	33.0	52.0	44.5	43.5	10.0
Total Suspended Solids (mg/L)	4	< 1.0	6.0	3.0	3.1	2.4
Specific Conductance (µmhos)	5	53.1	73.0	68.0 <sup>G</sup>	65.2	7.6
Hardness (mg/L)	4	13.8	19.2	18.0 <sup>G</sup>	17.2	2.4
Alkalinity (mg/L)	4	8.8	15.9	13.3	12.8	3.3
Stream Flow (cfs)	5	0.8	8.9	3.9	4.6	3.5
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	5	7.3	10.7	8.5	8.9	1.6
pH (su)	5	7.1	8.0	7.8	7.6	0.4
<sup>J</sup> Ammonia Nitrogen (mg/L)	4	< 0.010	0.050	0.026	0.026	0.021
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	4	0.315	1.270	0.704	0.748	0.504
Total Kjeldahl Nitrogen (mg/L)	4	0.200	0.464	0.281	0.306	0.112
<sup>J</sup> Total Nitrogen (mg/L)	4	0.581	1.554	1.042	1.055	0.529
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	4	0.007	0.020	0.012 <sup>M</sup>	0.012	0.006
<sup>J</sup> Total Phosphorus (mg/L)	4	0.013	0.047	0.026	0.028	0.016
CBOD-5 (mg/L)	4	< 1.0	2.0	1.0	0.9	0.2
<sup>J</sup> Chlorides (mg/L)	4	2.6	5.1	3.0	3.4	1.1
<b>Total Metals</b>						
<sup>J</sup> Aluminum (mg/L)	4	0.041	0.221	0.106	0.119	0.085
Iron (mg/L)	4	0.184	0.664	0.436	0.430	0.206
<sup>J</sup> Manganese (mg/L)	4	0.014	0.076	0.041	0.043	0.029
<b>Dissolved Metals</b>						
<sup>J</sup> Aluminum (mg/L)	4	< 0.030	0.065	0.038	0.039	0.028
Antimony (µg/L)	4	< 0.8	< 0.8	0.4	0.4	0.0
<sup>J</sup> Arsenic (µg/L)	4	< 1.0	< 1.0	0.5	0.5	0.0
Cadmium (µg/L)	4	< 0.090	< 0.090	0.045	0.045	0.000
Chromium (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000
Copper (mg/L)	4	< 0.100	< 0.300	0.150	0.125	0.050
<sup>J</sup> Iron (mg/L)	4	0.104	0.374	0.213 <sup>M</sup>	0.226	0.118
Lead (µg/L)	4	< 1.6	< 1.6	0.8	0.8	0.0
<sup>J</sup> Manganese (mg/L)	4	0.010	0.065	0.035	0.036	0.026
Nickel (mg/L)	4	< 0.010	< 0.010	0.005	0.005	0.000
Selenium (µg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
<sup>J</sup> Silver (µg/L)	4	< 1.000	< 1.000	0.500	0.500	0.000
Thallium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0
<sup>J</sup> Zinc (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000
<b>Biological</b>						
<sup>J</sup> Chlorophyll a (ug/L)	4	< 1.00	4.54	0.50	1.51	2.02
<sup>J</sup> E. coli (col/100mL)	4	58	261	106	133	91

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

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