

2010 Monitoring Summary



Deadwater Creek at Overhead Road (Fayette County) (33.65964/-87.65716)

**BACKGROUND**

Deadwater Creek is a small tributary of Clear Creek in the North River watershed. The Deadwater Creek watershed was selected for documenting baseline conditions before implementation of best management practices for sedimentation from clay mining. The Alabama Department of Environmental Management (ADEM) conducted monitoring activities to assess the biological integrity and to estimate overall water quality within the Deadwater Creek watershed.



Figure 1. Deadwater Creek at DWCF-2 on September 15, 2010, facing upstream.

**WATERSHED CHARACTERISTICS**

Watershed characteristics are summarized in Table 1. Deadwater Creek is a *Fish and Wildlife (F&W)* stream located in Fayette County near the town of Bankston. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (75%) areas. The ADEM does not have any NPDES permits issued in the Deadwater Creek watershed as of September 1, 2012.

**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. Deadwater Creek at DWCF-2 is a high-gradient, riffle/run stream characterized primarily by a sand substrate (Figure 1). Overall habitat quality was categorized as *marginal* due to a lack of stream sinuosity.

**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 (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Black Warrior River	
Drainage Area (mi <sup>2</sup> )	15	
Ecoregion <sup>a</sup>	68f	
% Landuse		
Open water	<1	
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	45
	Evergreen	16
	Mixed	14
Shrub/scrub	11	
Pasture/hay	2	
Cultivated crops	4	
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Population/km <sup>2b</sup>	13	

a. Shale Hills  
b. 2000 US Census

Table 2. Physical characteristics of Deadwater Creek at DWCF-2, May 27, 2010.

Physical Characteristics		
Width (ft)	20	
Canopy Cover	Mostly Shaded	
Depth (ft)		
	Riffle	0.2
	Run	1.0
	Pool	2.0
% of Reach		
	Riffle	2
	Run	85
	Pool	13
% Substrate		
	Clay	2
	Cobble	1
	Gravel	5
	Sand	76
	Silt	1
	Organic Matter	15

**Table 3.** Results of the habitat assessment conducted on Deadwater Creek at DWCF-2, May 27, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (41-58)
Sediment Deposition	51	Marginal (41-58)
Sinuosity	15	Poor (<45)
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	80	Sub-optimal (70-89)
<b>Habitat Assessment Score</b>	<b>122</b>	
<b>% Maximum Score</b>	<b>51</b>	<b>Marginal (41-58)</b>

**Table 4.** Results of macroinvertebrate bioassessment conducted in Deadwater Creek at DWCF-2, May 27, 2010.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxonomic composition measures</b>		<b>(0-100)</b>
# EPT taxa	10	26
<b>Taxonomic composition measures</b>		
% Non-insect taxa	13	51
% Dominant taxon	20	76
% EPC taxa	27	31
<b>Functional feeding group measures</b>		
% Predators	21	88
<b>Tolerance measures</b>		
% Taxa as Tolerant	40	26
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>50</b>
<b>WMB-I Assessment Rating</b>		<b>Fair (39-58)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during April through December of 2010 to help identify any stressors to the biological communities. Stream pH did not meet the *F&W* criterion during the low flows experienced in September and October. Arsenic exceeded the Human Health criterion in April and October. Organics that were collected measured below detection limits. Median concentrations of samples indicated that parameters were within the 90th percentile of data collected at the reference reaches within the Shale Hills ecoregion (68f).

## SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *marginal* due to poor stream sinuosity. Stream pH was <6.0 su in September and October. Arsenic exceeded the Human Health criterion in April and October. Additional low-level metals sampling may be necessary to determine if the arsenic criterion exceedance was due to natural conditions or anthropogenic sources.

**Table 5.** Summary of water quality data collected April-December, 2010. 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
<b>Physical</b>							
Temperature (°C)	8	6.7	28.0	19.7	18.9	6.3	
Turbidity (NTU)	9	2.8	15.3	4.7	6.0	3.9	
<sup>J</sup> Total Dissolved Solids (mg/L)	8	< 1.0	44.0	21.0	20.6	13.5	
Total Suspended Solids (mg/L)	8	< 1.0	7.0	1.5	2.0	2.1	
Specific Conductance (µmhos)	8	24.8	31.4	28.1	28.3	2.5	
Hardness (mg/L)	4	5.2	8.6	7.7	7.3	1.6	
Alkalinity (mg/L)	8	4.4	11.9	8.0	7.9	2.2	
Stream Flow (cfs)	9	0.4	16.8	8.0	7.8	6.7	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	8	7.5	11.7	8.9	8.1	1.3	
pH (su)	8	5.6 <sup>C</sup>	6.8	6.5	6.4	0.4	2
Ammonia Nitrogen (mg/L)	8	< 0.021	< 0.021	0.010	0.010	0.000	
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	8	0.002	0.296	0.088	0.099	0.094	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.080	0.488	0.114	0.154	0.155	
<sup>J</sup> Total Nitrogen (mg/L)	8	< 0.042	0.496	0.278	0.253	0.149	
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	8	0.005	0.037	0.010	0.012	0.010	
Total Phosphorus (mg/L)	8	0.011	0.105	0.016	0.036	0.036	
CBOD-5 (mg/L)	8	< 2.0	2.4	1.0	1.2	0.5	
Chlorides (mg/L)	8	1.6	2.3	2.0	2.0	0.3	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
<b>Total Metals</b>							
<sup>J</sup> Aluminum (mg/L)	4	< 0.033	0.067	0.032	0.037	0.025	
Iron (mg/L)	4	0.458	0.877	0.602	0.635	0.195	
<sup>J</sup> Manganese (mg/L)	4	0.022	0.067	0.058	0.052	0.020	
<b>Dissolved Metals</b>							
Aluminum (mg/L)	4	< 0.033	< 0.033	0.016	0.016	0.000	
Antimony (µg/L)	4	< 0.7	< 1.9	0.9	0.8	0.3	
<sup>J</sup> Arsenic (µg/L)	4	0.5 <sup>H</sup>	2.8 <sup>H</sup>	1.0	1.3	1.0	2
<sup>J</sup> Cadmium (mg/L)	4	< 0.001	< 0.014	0.001	0.002	0.003	
Chromium (mg/L)	4	< 0.013	< 0.013	0.006	0.006	0.000	
Copper (mg/L)	4	< 0.013	< 0.013	0.006	0.006	0.000	
Iron (mg/L)	4	< 0.026	0.314	0.164	0.164	0.139	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0	
<sup>J</sup> Manganese (mg/L)	4	< 0.001	0.055	0.034	0.031	0.024	
Mercury (µg/L)	4	< 0.09	< 0.09	0.04	0.04	0.00	
Nickel (mg/L)	4	< 0.019	< 0.019	0.010	0.010	0.000	
Selenium (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0	
Silver (mg/L)	4	< 0.001	< 0.002	< 0.001	< 0.001	0.001	
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	4	< 0.030	< 0.030	0.015	0.015	0.000	
<b>Biological</b>							
Chlorophyll a (µg/L)	8	< 0.10	2.14	0.53	0.74	0.68	
<sup>J</sup> E. coli (col/100mL)	8	37	488	158	198	170	

C=value exceeds established criteria for *F&W* water use classification; E=# samples that exceed criterion; H=*F&W* human health criterion exceeded; J=estimate; N=# samples.

FOR MORE INFORMATION, CONTACT:  
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