Alabama Department of Environmental Management

NPS Intensive Montioring

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Good

Deadwater Creek at Milton Smith Road (Fayette County) (33.67107/-87.67313)

BACKGROUND

The Deadwater Creek watershed was selected for documenting baseline conditions before implementation of best management practices for existing sedimentation from clay mining. To capture sediment runoff before it enters the stream, Best Management Practices (BMPs) were also installed at some ditches and culverts along unpaved roads identified as at high risk to sedimentation. 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-3 on December 1, 2010, facing downstream.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		10
Ecoregion[a]		65i
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	44
	Evergreen	18
	Mixed	14
Shrub/scrub		11
Pasture/hay		3
Cultivated crops		4
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		15

a. Fall Line Hills

b. 2000 US Census

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 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (76%) areas. The ADEM does not have any NPDES permits issued in the Deadwater Creek watershed as of February 23, 2011.

Table 2. Physical characteristics of Deadwater Creek at DWCF-3, May 27, 2010.

Physical Characteristics		
Width (ft)		18
Canopy Cover		Shaded
Depth (ft)		
	Run	1.0
	Pool	3.5
% of Reach		
	Run	70
	Pool	30
% Substrate		
	Boulder	2
	Cobble	3
	Gravel	10
	Sand	70
	Silt	5
	Organic Matter	10

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 -3 is a low-gradient, glidepool stream characterized primarily by a sand substrate (Figure 1). Overall habitat quality was categorized as *sub-optimal* due to a lack of bank and vegetative buffers and instream habitat.

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

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	51	Marginal (40-52)
Sediment Deposition	69	Optimal (>65)
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	59	Marginal (35-59)
Riparian Buffer	80	Sub-optimal (70-89)
Habitat Assessment Score	**141**	
% Maximum Score	**64**	**Sub-optimal (53-65)**

Table 4. Results of macroinvertebrate bioassessment conducted in Deadwater Creek at DWCF-3, May 27, 2010.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures			
# EPT genera	13	52	Fair (38-56)
Taxonomic composition measures			
% Non-insect taxa	4	100.0	Excellent (>=96.4)
% Plecoptera	11	56.8	Excellent (>=52.9)
% Dominant taxa	23	67.1	Fair (47.1-70.5)
Functional composition measures			
% Predators	19	67.0	Good (45.3-72.1)
Tolerance measures			
Beck's community tolerance index	10	45.5	Good (31.9-65.9)
% Nutrient tolerant organisms	43	44.2	Poor (25.4-50.8)
WMB-I Assessment Score	**--**	**62**	**Good (57-78)**

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 exceeded the *F&W* criterion on August 10, 2010, September 15, 2010, and October 19, 2010. E. coli samples exceeded the summer geometric mean (126 col/100ml) with a geometric mean of 232 col/100ml, with stream flows ranging from 0.8-5.8 cfs. Organics that were collected resulted in less than the detection limits. Median hardness was higher than values expected based on data collected at reference reaches within the Fall Line Hills ecoregion (65i).

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Overall habitat quality was categorized as *sub-optimal* due to poor bank and vegetative buffers as well as limited instream habitat. Additionally, intensive water chemistry results indicated higher than expected concentrations of pH levels.

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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
Physical							
Temperature (°C)	8	7.3	26.7	19.7	18.5	5.8	
Turbidity (NTU)	9	3.6	14.2	5.1	6.1	3.5	
Total Dissolved Solids (mg/L)	8	2.0	40.0	22.0	23.0	12.9	
Total Suspended Solids (mg/L)	8	1.0	8.0	2.0	2.9	2.5	
Specific Conductance (µmhos)	8	23.5	30.1	25.8	26.6	2.4	
Hardness (mg/L)	4	4.7	8.9	7.8 G	7.3	1.8	
Alkalinity (mg/L)	8	4.4	10.2	6.4	6.4	1.9	
Stream Flow (cfs)	9	0.8	11.3	5.8	5.7	4.4	
Chemical							
Dissolved Oxygen (mg/L)	8	7.4	11.4	8.7	8.8	1.2	
pH (su)	8	5.7 C	6.7	6.5	6.2	0.4	3
Ammonia Nitrogen (mg/L)	8	< 0.021	< 0.021	0.010	0.010	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.002	0.268	0.086	0.106	0.088	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.080	0.315	0.190	0.170	0.117	
Total Nitrogen (mg/L)	8	< 0.041	0.409	0.322	0.276	0.124	
J Dissolved Reactive Phosphorus (mg/L)	8	0.004	0.015	0.010	0.009	0.003	
Total Phosphorus (mg/L)	8	0.010	0.039	0.017	0.022	0.011	
CBOD-5 (mg/L)	8	< 2.0	3.4	1.0	1.3	0.8	
Chlorides (mg/L)	8	1.5	2.2	2.0	1.9	0.3	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
J Aluminum (mg/L)	4	< 0.033	0.119	0.034	0.051	0.048	
Iron (mg/L)	4	0.578	0.959	0.668	0.718	0.176	
J Manganese (mg/L)	4	0.026	0.073	0.058	0.054	0.020	
Dissolved Metals							
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	
Arsenic (µg/L)	4	< 0.4	< 2.1	1.0	0.8	0.4	
J Cadmium (mg/L)	4	< 0.00001	< 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	
J Iron (mg/L)	4	< 0.026	0.260	0.168	0.152	0.126	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0	
J Manganese (mg/L)	4	< 0.001	0.056	0.037	0.033	0.027	
Mercury (µg/L)	4	< 0.080	< 0.080	0.040	0.040	0.000	
Nickel (mg/L)	4	< 0.019	< 0.019	0.010	0.010	0.000	
J Selenium (µg/L)	4	< 1.7	2.0	0.8	1.1	0.6	
Silver (mg/L)	4	< 0.00002	< 0.002	0.000	0.000	0.000	
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	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	1.07	0.52	0.53	0.45	
J E. coli (col/100mL)	8	81	2420 C	312	559	773	1

C=value exceeds established criteria for *F&W* water use classification; E=# samples that exceed criterion; G=value greater than median concentration of all verified reference data collected in ecoregion 65i; J=estimate; N=# samples.