Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Good™

Mud Creek approx. one mile above confluence with Valley Creek in Jefferson County (33.48447/-87.18443)

BACKGROUND

The five mile segment of Mud Creek from Valley Creek to Big Branch has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 2002 for not meeting its *Fish and Wildlife* (*F&W*) water use classifications. It is listed for pH and siltation from unknown sources. ADEM monitored Mud Creek at MUDJ-100 downstream of the listed reach to investigate the extent of the impairment. Macroinvertebrate and habitat assessments were conducted to verify impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment. Results from these data may also be used in determination of Total Maximum Daily Load needs and priorities.

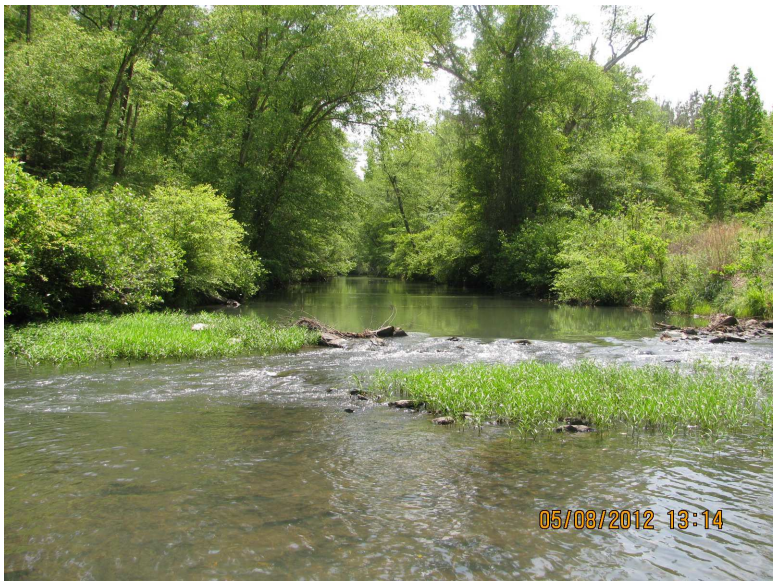

Figure 1. Mud Creek at MUDJ-100, May 8, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mud Creek at MUDJ-100 is a high gradient *Fish & Wildlife (F&W)* stream that drains through Jefferson County in the Shale Hills ecoregion (68f). Land use within the watershed is primarily forest (81%) with some grassland and shrub/scrub (Figure 1). As of September 1, 2012, ADEM has issued one NPDES permit 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. Mud Creek at MUDJ-100 is a stream with cobble, gravel, boulder, sand, and bedrock substrates. Overall habitat quality was rated as *sub-optimal* due to the availability of instream habitat.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		50
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	2
Forest	Deciduous	25
	Evergreen	47
	Mixed	9
Shrub/scrub		4
Grassland/herbaceous		8
Pasture/hay		1
Cultivated crops		<1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		1
Population/km^2[b]		9
# NPDES Permits[c]	**TOTAL**	1
Construction Stormwater		1

a.Shale Hills
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Mud Creek at MUDJ-100, May 8, 2012.

Physical Characteristics		
Canopy Cover		Mostly Open
Width (ft)		55
Depth (ft)		
	Riffle	0.5
	Run	2.0
	Pool	4.0
% of Reach		
	Riffle	5
	Run	70
	Pool	25
% Substrate		
	Bedrock	5
	Boulder	15
	Cobble	40
	Gravel	20
	Sand	12
	Silt	3
	Organic Matter	5

Table 3. Results of the habitat assessment conducted on Mud Creek at MUDJ-100, May 8, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	64	Sub-optimal (59-70)
Sediment Deposition	67	Sub-optimal (59-70)
Sinuosity	48	Marginal (45-64)
Bank and Vegetative Stability	75	Optimal >74
Riparian Buffer	51	Marginal (50-69)
Habitat Assessment Score	**156**	
% Maximum Score	**65**	**Sub-optimal (59-70)**

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 the individual metric scores. The metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment of Mud Creek at MUDJ-100, May 8, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness measures		**(0-100)**
# EPT taxa	19	65
Taxonomic composition measures		
% Non-insect taxa	13	51
% Dominant taxon	11	100
% EPC taxa	23	43
Functional feeding group measures		
% Predators	10	40
Tolerance measures		
% Taxa as Tolerant	30	56
WMB-I Assessment Score	**---**	**59**
WMB-I Assessment Rating		**Good (59-79)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, semi-monthly (metals) during April through November of 2012 to help identify any stressors to the biological communities. *In situ* parameters except specific conductivity suggested Mud Creek at MUDJ-100 was meeting its *F&W* water use classifications. However, median concentrations of total dissolved solids, alkalinity, and dissolved manganese were higher than expected based on the 90th percentile of reference reaches within ecoregion 68. Median values of specific conductance and hardness were also higher than expected.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment results indicated the macroinvertebrate community in Mud Creek at MUDJ-100 to be in *good* condition. Habitat quality has rated as *sub-optimal* as the stream reach had good instream habitats. However, total dissolved solids, alkalinity, specific conductance and hardness were higher than expected for this stream type. Monitoring should continue to ensure that biological conditions remain stable.

Table 5. Summary of water quality data collected March-October, 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
Physical						
Temperature (°C)	9	9.8	26.0	22.4	20.7	5.4
Turbidity (NTU)	9	1.0	17.8	2.7	4.4	5.2
J Total Dissolved Solids (mg/L)	8	341.0	699.0	538.5 M	536.5	133.6
J Total Suspended Solids (mg/L)	8 <	1.0	5.0	2.5	2.3	1.7
Specific Conductance (µmhos)	9	486.0	941.0	740.0 G	737.8	169.0
Hardness (mg/L)	4	214.0	409.0	296.0 G	303.8	87.8
Alkalinity (mg/L)	8	43.7	86.6	68.4 M	69.3	15.6
Stream Flow (cfs)	7	5.5	32.1	10.1	15.8	9.9
Chemical						
Dissolved Oxygen (mg/L)	9	6.4	10.5	8.0	8.2	1.3
pH (su)	9	7.2	8.2	7.7	7.7	0.3
J Ammonia Nitrogen (mg/L)	8 <	0.010	< 0.028	0.010	0.010	0.005
J Nitrate+Nitrite Nitrogen (mg/L)	8 <	0.006	0.125	0.034	0.047	0.040
J Total Kjeldahl Nitrogen (mg/L)	8	0.120	0.338	0.140	0.173	0.073
J Total Nitrogen (mg/L)	8 <	0.139	0.463	0.194	0.220	0.106
J Dissolved Reactive Phosphorus (mg/L)	8 <	0.004	0.008	0.005	0.005	0.002
J Total Phosphorus (mg/L)	8 <	0.007	0.015	0.008	0.008	0.004
J CBOD-5 (mg/L)	8 <	1.0	< 2.0	1.0	0.9	0.2
J Chlorides (mg/L)	8	2.3	5.4	3.2	3.4	1.0
Total Metals						
J Aluminum (mg/L)	4 <	0.030	0.289	0.026	0.089	0.134
J Iron (mg/L)	4 <	0.100	0.653	0.170	0.261	0.270
Manganese (mg/L)	4	0.066	0.117	0.098	0.094	0.022
Dissolved Metals						
J Aluminum (mg/L)	4 <	0.030	< 0.030	0.015	0.015	0.000
Antimony (µg/L)	4 <	0.8	< 0.8	0.4	0.4	0.0
J Arsenic (µg/L)	4 <	1.0	< 1.0	0.5	0.5	0.0
J 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
J Iron (mg/L)	4 <	0.100	< 0.100	0.050	0.050	0.000
Lead (µg/L)	4 <	1.6	< 1.6	0.8	0.8	0.0
Manganese (mg/L)	4	0.053	0.104	0.079 M	0.079	0.021
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
J 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
J Zinc (mg/L)	4 <	0.009	< 0.020	0.010	0.009	0.003
Biological						
Chlorophyll a (µg/L)	4 <	1.00	< 1.00	0.50	0.50	0.00
E. coli (col/100mL)	4	16	980	40	269	474

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.

FOR MORE INFORMATION, CONTACT:
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