Alabama Department of Environmental Management

Use Support Assessment Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Carthage Branch at dirt road off Cherokee Bend Drive (Tuscaloosa County) (33.00681/-87.62212)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Carthage Branch watershed for biological and water quality monitoring in response to a complaint by a local stakeholder group to investigate the source of a silt plume that extended into the Black Warrior River.

Figure 1. Carthage Branch at CRTT-1 on October 25, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Carthage Branch at CRTT-1 is a *Fish and Wildlife (F&W)* stream located in Tuscaloosa County next to a biodiesel facility near the town of Moundville. The site is located in the Southeastern Floodplains and Low Terraces sub-ecoregion, and flows into the Black Warrior River. The majority of the watershed, however, is located in the Fall Line Hills sub-ecoregion.

Based on the 2006 National Land Cover Dataset, landuse within the watershed is pasture/hay areas. Development accounted for 12% of land cover within the watershed, but there was home construction activity within the watershed during the sampling period. As of September 1, 2012, one NPDES permit outfall is located 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. Carthage Branch at CRTT-1 was highly incised; the stream bottom was characterized primarily by sand and gravel substrates (Figure 1). Riffle habitat and the riparian buffer were limited.

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 *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		1
Ecoregion[a]		65p
% Landuse		
Open water		
Wetland	Woody	<1
Forest	Deciduous	11
	Evergreen	3
	Mixed	10
Shrub/scrub		6
Pasture/hay		49
Cultivated crops		6
Development	Open space	8
	Low intensity	4
	Moderate intensity	1
Barren		1
Population/km[2b]		122
# NPDES Permits[c]	TOTAL	1
Construction Stormwater		1

a. Southeastern Floodplains & Low Terraces
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Carthage Branch at CRTT-1, April 25, 2012.

Physical Characteristics		
Width (ft)		5
Canopy Cover		Open
Depth (ft)		
	Riffle	0.2
	Run	0.5
	Pool	1.0
% of Reach		
	Riffle	5
	Run	90
	Pool	5
% Substrate		
	Clay	1
	Gravel	30
	Sand	60
	Silt	2
	Organic Matter	7

Table 3. Results of the habitat assessment conducted on Carthage Branch at CRTT-1, April 25, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	51	Marginal (40-52)
Sediment Deposition	43	Marginal (40-52)
Sinuosity	55	Marginal (45-64)
Bank and Vegetative Stability	68	Sub-optimal (60-74)
Riparian Buffer	55	Marginal (50-69)
Habitat Assessment Score	**129**	
% Maximum Score	**54**	**Sub-optimal (53-65)**

Table 4. Results of macroinvertebrate bioassessment conducted in Carthage Branch at CRTT-1, April 25, 2012.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(6-100)
% EPC taxa	17	12
% Trichoptera & Chironomidae Taxa	49	15
Taxonomic composition measures		
% EP Individuals	4	5
Functional feeding group		
% Collector-Filterer Individuals	17	75
Community tolerance		
% Nutrient Tolerant individuals	60	8
WMB-I Assessment Score	—	23
WMB-I Assessment Rating		Poor (15-30)

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 November of 2012 to help identify any stressors to the biological communities. Median specific conductance and hardness, as well as nitrate+nitrite nitrogen, total nitrogen, and chlorides were 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 *poor* condition. Results of a habitat assessment indicated siltation, and limited riparian buffers. Median values of hardness, specific conductance, nitrogen, and chlorides were higher than expected based on reference reaches within the Fall Line Hills ecoregion.

FOR MORE INFORMATION, CONTACT:
Bonnie Coleman, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2737 bcoleman@adem.state.al.us

Table 5. Summary of water quality data collected April-November, 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)	8	11.7	22.6	19.8	19.2	3.6
Turbidity (NTU)	9	4.2	36.1	9.5	13.2	10.9
Total Dissolved Solids (mg/L)	8	18.0	98.0	61.0	58.8	25.1
Total Suspended Solids (mg/L)	8	< 1.0	34.0	3.2	7.8	11.5
Specific Conductance (µmhos)	8	56.8	73.4	63.8 G	63.4	5.8
Hardness (mg/L)	3	18.9	25.8	23.4 G	22.7	3.5
Alkalinity (mg/L)	8	11.3	22.1	16.0	15.6	3.5
Stream Flow (cfs)	9	0.6	2.1	1.2	1.3	0.4
Chemical						
Dissolved Oxygen (mg/L)	8	8.0	10.5	8.6	8.8	0.8
pH (su)	8	6.5	7.0	6.7	6.8	0.2
Ammonia Nitrogen (mg/L)	8	< 0.008	0.064	0.028	0.030	0.028
Nitrate+Nitrite Nitrogen (mg/L)	8	1.173	1.774	1.496 M	1.492	0.221
Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.282	0.097	0.114	0.099
Total Nitrogen (mg/L)	8	1.243	< 1.794	1.623 M	1.607	0.183
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.008	0.004	0.004	0.002
Total Phosphorus (mg/L)	8	0.010	0.038	0.020	0.021	0.010
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	3.5	4.8	4.4 M	4.3	0.4
Total Metals						
Aluminum (mg/L)	3	0.163	1.030	0.510	0.568	0.436
Iron (mg/L)	3	0.507	1.370	0.958	0.945	0.432
Manganese (mg/L)	3	0.035	0.146	0.070	0.084	0.057
Dissolved Metals						
Aluminum (mg/L)	3	< 0.043	< 0.043	0.022	0.022	0.000
Antimony (µg/L)	3	< 3.6	< 3.6	1.8	1.8	0.0
Arsenic (µg/L)	3	< 1.8	< 1.8	0.9	0.9	0.0
Cadmium (µg/L)	3	< 0.022	< 0.046	0.023	0.019	0.007
Chromium (mg/L)	3	< 0.009	< 0.009	0.004	0.004	0.000
Copper (mg/L)	3	< 0.020	< 0.020	0.010	0.010	0.000
Iron (mg/L)	3	0.120	0.190	0.130	0.147	0.038
Lead (µg/L)	3	< 0.9	< 0.9	0.4	0.4	0.0
Manganese (mg/L)	3	0.028	0.146	0.051	0.075	0.062
Mercury (µg/L)	3	< 0.035	< 0.035	0.018	0.018	0.000
Nickel (mg/L)	3	< 0.042	< 0.042	0.021	0.021	0.000
Selenium (µg/L)	3	< 2.5	< 2.5	1.2	1.2	0.0
Silver (µg/L)	3	< 0.015	< 0.215	0.108	0.074	0.058
Thallium (µg/L)	3	< 1.4	< 1.4	0.7	0.7	0.0
Zinc (mg/L)	3	< 0.012	< 0.012	0.006	0.006	0.000
Biological						
E. coli (col/100mL)	8	99	770	170	291	263

J=estimate; N=# samples; G=value greater than median concentration of all verified reference data collected in ecoregion 65i; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65i.