ADEM
Alabama Department of Environmental Management

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Basin Assessment Site

™

Good

Goodwater Creek at Rigsby Road in Elmore County (32.44211/-86.00860)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Goodwater Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group.

A habitat and macroinvertebrate assessment was conducted on May 13, 2010.

Figure 1. Goodwater Creek at GDWE-1, May 25, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Goodwater Creek is a small *Fish & Wildlife (F&W)* stream located in the Fall Line Hills ecoregion (65i) of Elmore County. Based on the 2006 National Land Cover Dataset, the 11 square mile watershed is primarily forest (64%), with some shrub, pasture, and crop cover. As of September 1, 2012 , the ADEM has issued two NPDES construction stormwater outfalls 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. Goodwater Creek at GDWE-1 (Figure 1) is characterized by gravel, cobble and sand substrates. Overall habitat quality was categorized as *optimal*, although bank vegetative stability issues were noted.

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 in comparison to least-impaired reference reaches in the same ecoregion. 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 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tallapoosa River
Drainage Area (mi^2)		11
Ecoregion[a]		65i
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	27
	Evergreen	13
	Mixed	24
Shrub/scrub		15
Grassland/herbaceous		<1
Pasture/hay		11
Cultivated crops		6
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		19
# NPDES Permits[c]	**TOTAL**	2
Construction Stormwater		2

a. Fall Line Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012

Table 2. Physical Characteristics of Goodwater Creek at GDWE-1, May 13, 2010.

Physical Characteristics	
Width (ft)	15
Canopy Cover	Estimate 50/50
Depth (ft)	
Riffle	0.4
Run	1.0
Pool	2.5
% of Reach	
Riffle	20
Run	65
Pool	15
% Substrate	
Boulder	1
Clay	1
Cobble	20
Gravel	20
Sand	40
Silt	3
Organic Matter	18

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Table 3. Results of the habitat assessment conducted on Goodwater Creek at GDWE-1, May 13, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	77	Optimal >65
Sediment Deposition	69	Optimal >65
Sinuosity	88	Optimal >84
Bank and Vegetative Stability	29	Poor <35
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	**163**	
% Maximum Score	**68**	**Optimal >65**

Table 4. Results of the macroinvertebrate bioassessment conducted in Goodwater Creek at GDWE-1, May 13, 2010.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
% EPC taxa	32
% Dominant Taxon	20
Taxonomic composition measures	
% EPT minus Baetidae and Hydropsychidae	22
Functional feeding group	
# Collector Taxa	21
Community tolerance	
% Nutrient Tolerant individuals	26
WMB-I Assessment Score	**63**
WMB-I Assessment Rating	**Good (48-74)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during May, July, September and November of 2010 to help identify any stressors to the biological communities. Stream pH did not meet the *F&W* criterion during four of five sampling events, but not atypical for the Fall Line Hills ecoregion. Stream flows were also low during the sampling period. Median concentrations of all other parameters were within the range expected in the Fall Line Hills ecoregion.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Overall habitat quality was categorized as *optimal,* although bank vegetative stability issues were noted. Stream pH did not meet the *F&W* use class criterion during four of five sampling events, but were generally within the range of values measured at least impaired reference reaches located within the Fall Line Hills subecroregion. Median concentrations of all other water quality parameters were typical for this stream type.

Table 5. Summary of water quality data collected March-October, 2010. 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	E
Physical							
Temperature (°C)	5	12.8	23.6	20.3	19.4	4.2	
Turbidity (NTU)	5	4.3	11.6	5.8	7.3	3.0	
[J] Total Dissolved Solids (mg/L)	4	18.0	50.0	26.0	30.0	14.2	
[J] Total Suspended Solids (mg/L)	4	1.0	8.0	4.5	4.5	3.5	
Specific Conductance (µmhos)	5	22.8	27.3	24.6	24.7	1.7	
Hardness (mg/L)	4	5.1	6.6	5.8	5.9	0.6	
Alkalinity (mg/L)	4	<2.9	3.9	3.2	2.9	1.0	
Stream Flow (cfs)	5	0.3	8.4	1.8	3.3	3.5	
Chemical							
Dissolved Oxygen (mg/L)	5	7.1	9.5	8.5	8.4	0.9	
pH (su)	5	5.7[C]	6.0	5.8	5.8	0.1	4
Ammonia Nitrogen (mg/L)	4	<0.021	<0.021	0.010	0.010	0.000	
[J] Nitrate+Nitrite Nitrogen (mg/L)	4	0.005	0.247	0.079	0.102	0.103	
Total Kjeldahl Nitrogen (mg/L)	4	<0.080	0.189	0.114	0.114	0.086	
[J] Total Nitrogen (mg/L)	4	<0.103	0.435	0.164	0.217	0.150	
[J] Dissolved Reactive Phosphorus (mg/L)	4	0.005	0.013	0.006	0.008	0.004	
[J] Total Phosphorus (mg/L)	4	0.008	0.016	0.010	0.011	0.004	
[J] CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	3.2	4.1	3.7	3.7	0.4	
[J] Atrazine (µg/L)	2	<0.02	0.07	0.04	0.04	0.04	
Total Metals							
[J] Aluminum (mg/L)	4	0.058	0.330	0.188	0.191	0.130	
Iron (mg/L)	4	0.846	1.200	1.100	1.062	0.165	
[J] Manganese (mg/L)	4	<0.001	0.069	0.046	0.040	0.029	
Dissolved Metals							
[J] Aluminum (mg/L)	4	<0.033	0.055	0.019	0.027	0.019	
Antimony (µg/L)	4	<1.9	<1.9	0.9	0.9	0.0	
Arsenic (µg/L)	4	<2.1	<2.1	1.0	1.0	0.0	
Cadmium (mg/L)	4	<0.00001	0.014	0.004	0.004	0.004	
Chromium (mg/L)	4	<0.009	0.013	0.006	0.006	0.001	
Copper (mg/L)	4	<0.013	0.020	0.006	0.007	0.002	
[J] Iron (mg/L)	4	<0.026	0.182	0.046	0.072	0.080	
Lead (µg/L)	4	<1.7	<1.7	0.8	0.8	0.0	
[J] Manganese (mg/L)	4	<0.001	0.045	0.008	0.016	0.021	
Mercury (µg/L)	4	<0.1	<0.1	0.0	0.0	0.0	
Nickel (mg/L)	4	<0.019	0.042	0.010	0.012	0.006	
[J] Selenium (µg/L)	4	<1.7	2.0	0.8	1.1	0.6	
Silver (mg/L)	4	<0.00002	0.002	0.00002	0.0005	0.001	
Thallium (µg/L)	4	<0.6	<0.6	0.3	0.3	0.0	
Zinc (mg/L)	4	<0.012	0.030	0.015	0.013	0.004	
Biological							
Chlorophyll a (ug/L)	4	<0.10	2.14	1.07	1.08	0.85	
E. coli (col/100mL)	4	79	435	139	199	161	

J=estimate; N=# samples, C=*F&W* criteria violated, E=# samples that exceeded criteria.