

2012 Monitoring Summary



Reference Reach Site

South Sandy Creek at Talladega National Forest Road 731 in Bibb County (32.96906/-87.39776)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitors South Sandy Creek as a “best attainable condition” reference watershed, based on land use, road density, and population density for comparison with streams throughout the Fall Line Hills ecoregion. Data collected at these reaches are used as the basis of comparison for streams in same ecoregion and to develop water quality criteria.

Additionally, South Sandy Creek was selected for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of the BWC Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC basin group.



Figure 1. South Sandy Creek at SSB-1, May 1, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. South Sandy Creek is a small *Fish & Wildlife (F&W)* stream located in the Fall Line Hills ecoregion (65i) in the Talladega National Forest, Alabama. This creek drains eleven square miles in Bibb County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (95%). Based on the 2000 U.S. Census data there is no human inhabitation in the watershed. As of September 1, 2012, only one outfall is active 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. South Sandy Creek at SSB-1 is a low-gradient stream with sandy bottom (Figure 1). Overall habitat quality was categorized as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Black Warrior River	
Drainage Area (mi ²)	11	
Ecoregion ^a	65i	
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	27
	Evergreen	39
	Mixed	29
Shrub/scrub		1
Pasture/hay		<1
Cultivated crops		<1
Development	Open space	2
Population/km ^{2b}		<1
# NPDES Permits ^c	TOTAL	1
401 Water Quality Certification		1

a. Fall Line Hills

b. 2000 US Census

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

Table 2. Physical characteristics of South Sandy Creek at SSB-1, May 1, 2012.

Physical Characteristics		
Canopy Cover	Shaded	
Width (ft)	14	
Depth (ft)		
	Run	0.8
	Pool	2.0
% of Reach		
	Run	65
	Pool	35
% Substrate		
	Sand	77
	Silt	3
	Organic Matter	20

Table 3. Results of the habitat assessment conducted on South Sandy Creek at SSB-1, May 1, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	41	Marginal (40-52)
Sediment Deposition	70	Optimal >65
Sinuosity	68	Sub-optimal (65-84)
Bank and Vegetative Stability	44	Marginal (35-59)
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	134	
% Maximum Score	61	Sub-optimal (53-65)

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* community condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in South Sandy Creek at SSB-1, May 1, 2012.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
% EPC taxa	27	43
% Dominant Taxon	23	69
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	31	56
Functional feeding group		
# Collector Taxa	21	70
Community tolerance		
% Nutrient Tolerant individuals	27	66
WMB-I Assessment Score	---	61
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 monthly, and semi-monthly (metals) from April through November of 2012 to help identify any stressors to the biological communities. *In situ* parameters suggested that South Sandy Creek at SSB-1 was meeting its *F&W* use classification. However, pH was below the criterion in five of ten sampling events, but it is a natural phenomenon for Southeastern streams. Median concentration of total iron was also higher than expected. Dissolved Zinc exceeded hardness-adjusted aquatic life use criterion in June.

SUMMARY

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

Bioassessment results indicated the macroinvertebrate community to be in *good* condition where as, habitat quality and availability was assessed as *sub-optimal* for supporting macroinvertebrate communities. pH was below the criterion in some of the sampling events, but is natural in southeastern Alabamian streams. Total iron was higher than expected for this ecoregion. Dissolved Zinc exceeded aquatic life use criterion in June.

Table 5. Summary of water quality data collected April-November, 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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)	10	13.1	25.4	21.8	20.8	4.2	
Turbidity (NTU)	10	9.2	200.0	14.2	33.8	58.6	
J Total Dissolved Solids (mg/L)	8 <	1.0	118.0	47.0	48.8	35.1	
J Total Suspended Solids (mg/L)	8	3.0	81.0	5.5	16.5	26.5	
Specific Conductance (µmhos)	10	11.8	18.3	13.4	13.9	1.7	
Hardness (mg/L)	4	3.1	8.1	3.5	4.6	2.4	
J Alkalinity (mg/L)	8 <	0.8	2.8	2.6	2.3	0.8	
Stream Flow (cfs)	9	1.9	12.9	3.9	5.4	3.5	
Chemical							
Dissolved Oxygen (mg/L)	10	6.4	9.6	7.9	8.0	1.0	
pH (su)	10	5.2 ^C	7.3	5.9	6.0	0.5	5
J Ammonia Nitrogen (mg/L)	8 <	0.008	0.081	0.028	0.032	0.030	
J Nitrate+Nitrite Nitrogen (mg/L)	8 <	0.002	0.034	0.004	0.008	0.011	
J Total Kjeldahl Nitrogen (mg/L)	8	0.061	0.492	0.236	0.252	0.141	
J Total Nitrogen (mg/L)	8 <	0.064	0.526	0.240	0.259	0.150	
J Dissolved Reactive Phosphorus (mg/L)	8 <	0.004	0.016	0.005	0.006	0.005	
Total Phosphorus (mg/L)	8	0.015	0.053	0.024	0.027	0.013	
J CBOD-5 (mg/L)	8 <	2.0 <	2.0	1.0	1.0	0.0	
J COD (mg/L)	8	8.4	42.2	21.2	20.8	10.5	
TOC (mg/L)	8	3.9	7.7	4.8	5.0	1.2	
Chlorides (mg/L)	8	1.1	1.8	1.5	1.5	0.2	
Total Metals							
J Aluminum (mg/L)	4	0.127	0.313	0.137	0.178	0.090	
Iron (mg/L)	4	2.880	4.380	4.195 ^M	3.912	0.694	
Manganese (mg/L)	4	0.086	0.121	0.102	0.103	0.014	
Dissolved Metals							
Aluminum (mg/L)	4 <	0.043 <	0.043	0.022	0.022	0.000	
Antimony (µg/L)	4 <	3.6 <	3.6	1.8	1.8	0.0	
Arsenic (µg/L)	4 <	1.8 <	1.8	0.9	0.9	0.0	
Cadmium (µg/L)	4 <	0.022	0.046	0.017	0.017	0.007	
Chromium (mg/L)	4 <	0.009 <	0.009	0.004	0.004	0.000	
Copper (mg/L)	4 <	0.020 <	0.020	0.010	0.010	0.000	
Iron (mg/L)	4	0.201	0.437	0.231	0.275	0.109	
Lead (µg/L)	4 <	0.9 <	0.9	0.4	0.4	0.0	
Manganese (mg/L)	4	0.069	0.096	0.088	0.085	0.012	
Mercury (µg/L)	4 <	0.035 <	0.035	0.018	0.018	0.000	
Nickel (mg/L)	4 <	0.042 <	0.042	0.021	0.021	0.000	
Selenium (µg/L)	4 <	2.5 <	2.5	1.2	1.2	0.0	
Silver (µg/L)	4 <	0.015	0.215	0.058	0.058	0.058	
Thallium (µg/L)	4 <	1.4 <	1.4	0.7	0.7	0.0	
J Zinc (mg/L)	4 <	0.012	0.015 ^S	0.006	0.008	0.004	1
Biological							
Chlorophyll a (ug/L)	8 <	0.10	48.06	0.05	6.27	16.90	
J E. coli (col/100mL)	7	118	770	225	387	274	

C=(*F&W*) criterion violated; J=estimate; M=value >90% of all verified ecoregional reference reach data collected within ecoregion 65i; N=# samples; S=(*F&W*) hardness-adjusted aquatic life use criteria exceeded.

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