Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Good

Soapstone Creek at United States Highway 80 in Dallas County (32.32220/-86.90630)

BACKGROUND

Soapstone Creek is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a "best attainable condition" reference watershed for comparison with streams throughout the Flatwoods/Blackland Prairie Margins (65b). It is among the least-disturbed watersheds in ecoregion 65b, based on land use, road density, and population density. Soapstone Creek was also monitored as part of the 2012 assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of this project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

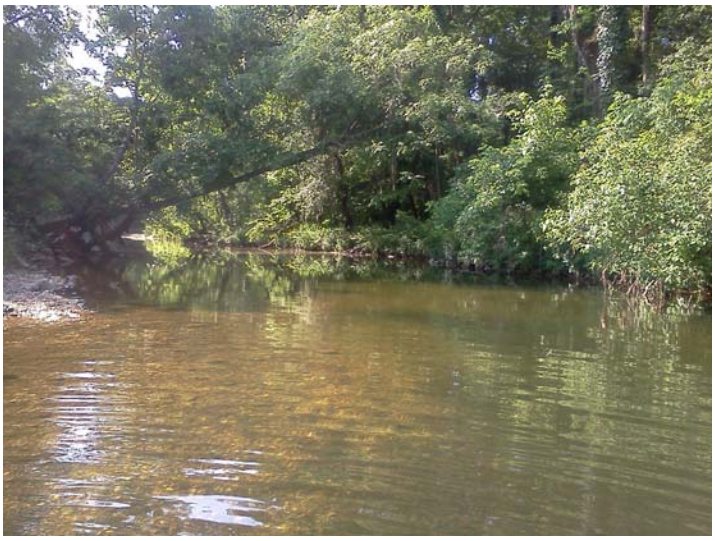

Figure 1. Soapstone Creek at SPD-1, May 8, 2012.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Alabama River
Drainage Area (mi^2)		21
Ecoregion[a]		65b
% Landuse		
Open water		<1
Wetland	Woody	9
	Emergent herbaceous	<1
Forest	Deciduous	31
	Evergreen	23
	Mixed	5
Shrub/scrub		11
Grassland/herbaceous		<1
Pasture/hay		10
Cultivated crops		5
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Population/km^2[b]		14
# NPDES Permits[c]	**TOTAL**	1
Municipal Individual		1

a.Flatwoods/Blackland Prairie Margins

b.2000 US Census

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

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Soapstone Creek at SPD -1 is a *Fish & Wildlife (F&W)* stream approximately 9.4 miles southeast of Selma. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (59%) with some wetlands, pasture, and crops. As of September 1, 2012, ADEM's NPDES Management System database shows one permitted discharge within 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. Soapstone Creek at SPD-1 is a riffle-run stream with a bottom substrate dominated by gravel and hardpan clay (Figure 1). Habitat quality and availability were rated *sub-optimal* for supporting diverse aquatic macroinvertebrate communities.

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 characterized by pollution-intolerant taxa groups, indicating *good* community condition (Table 4).

Table 2. Physical characteristics of Soapstone Creek at SPD-1, April 24, 2012.

Physical Characteristics		
Width (ft)		30
Canopy Cover		Estimate 50/50
Depth (ft)		
	Riffle	0.3
	Run	1.5
	Pool	3.5
% of Reach		
	Riffle	5
	Run	20
	Pool	75
% Substrate		
	Boulder	5
	Cobble	7
	Gravel	25
	Hard Pan Clay	30
	Sand	15
	Silt	2
	Organic Matter	16

Table 3. Results of the habitat assessment conducted on Soapstone Creek at SPD-1, April 24, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	54	Sub-optimal (53-65)
Sediment Deposition	58	Sub-optimal (53-65)
Sinuosity	55	Marginal (45-64)
Bank and Vegetative Stability	59	Marginal (35-59)
Riparian Buffer	76	Sub-optimal (70-89)
Habitat Assessment Score	**146**	
% Maximum Score	**61**	**Sub-optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Soapstone Creek at SPD-1, April 24, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	30	51
% Trichoptera & Chironomidae Taxa	41	44
Taxonomic composition measures		
% EP Individuals	19	37
Functional feeding group		
% Collector-Filterer Individuals	19	72
Community tolerance		
% Nutrient Tolerant individuals	44	36
WMB-I Assessment Score	**---**	**48**
WMB-I Assessment Rating		**Good (46-73)**

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, May through November of 2012 to help identify any stressors to the biological communities. Median specific conductance, hardness, antimony, and thallium were higher than background levels for ecoregion 65b. On August 7th, arsenic exceeded *F&W* human health criteria; however, concentrations were normal for ecoregion 65b. Although samples of total dissolved arsenic did exceed human health criteria at SPD-1, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite – As III). Presently studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies Soapstone Creek will be reassessed for arsenic violations.

SUMMARY

ADEM is currently monitoring Soapstone Creek at SPD-1 as a "best attainable" condition reference watershed. Landuse, road density, and population density categorize Soapstone Creek among the least-disturbed watersheds in the Flatwoods/Blackland Prairie Margins ecoregion. Although conductivity, hardness, antimony, and thallium were higher than expected for streams in ecoregion 65b, bioassessment results indicated the macroinvertebrate community at SPD-1 to be in *good* condition. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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Table 5. Summary of water quality data collected May-November, 2012. 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)	6	13.0	27.6	20.5	20.1	5.6	
Turbidity (NTU)	7	1.1	4.2	1.8	2.0	1.0	
Total Dissolved Solids (mg/L)	6	86.0	148.0	111.0	113.3	20.8	
Total Suspended Solids (mg/L)	6	< 1.0	9.0	2.2	3.1	3.4	
Specific Conductance (µmhos)	6	162.7	189.5	183.4 G	180.8	9.9	
Hardness (mg/L)	4	72.4	86.8	80.0 G	79.8	6.0	
Alkalinity (mg/L)	6	69.4	78.0	74.9	74.3	3.4	
Stream Flow (cfs)	6	0.5	4.3	2.7	2.3	1.5	
Chemical							
Dissolved Oxygen (mg/L)	6	5.2	8.6	7.5	7.2	1.4	
pH (su)	6	7.1	7.8	7.5	7.4	0.2	
Ammonia Nitrogen (mg/L)	6	< 0.007	0.031	0.004	0.008	0.011	
J Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.005	0.109	0.007	0.023	0.042	
J Total Kjeldahl Nitrogen (mg/L)	6	< 0.041	0.303	0.110	0.117	0.100	
J Total Nitrogen (mg/L)	6	< 0.023	< 0.306	0.127	0.140	0.092	
J Dissolved Reactive Phosphorus (mg/L)	6	0.006	0.035	0.007	0.012	0.012	
Total Phosphorus (mg/L)	6	0.012	0.047	0.024	0.026	0.012	
J CBOD-5 (mg/L)	6	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	6	5.7	7.0	6.6	6.5	0.5	
Total Metals							
J Aluminum (mg/L)	4	< 0.043	0.072	0.034	0.040	0.024	
J Iron (mg/L)	4	0.049	0.164	0.096	0.102	0.049	
J Manganese (mg/L)	4	< 0.007	0.024	0.004	0.009	0.010	
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 M	1.8	0.0	
Arsenic (µg/L)	4	< 1.8	1.9 H	0.9	1.2	0.5	1
Cadmium (µg/L)	4	< 0.022	< 0.046	0.023	0.020	0.006	
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	
J Iron (mg/L)	4	< 0.019	0.061	0.024	0.030	0.025	
Lead (µg/L)	4	< 0.9	< 0.9	0.4	0.4	0.0	
J Manganese (mg/L)	4	< 0.007	0.015	0.004	0.006	0.006	
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	0.108	0.082	0.050	
Thallium (µg/L)	4	< 1.4	< 1.4	0.7 M	0.7	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (ug/L)	6	< 0.10	0.71	0.16	0.28	0.28	
J E. coli (col/100mL)	6	52	276	105	129	77	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65b; H=*F&W* human health criteria exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65b; N=# samples.