

2005 Monitoring Summary



Soapstone Creek upstream of US Hwy 80 in Dallas Co.(32.32220/-86.90630)

BACKGROUND

Soapstone Creek is currently used by ADEM as a “best attainable” watershed for comparison with other streams in the Southeastern Plains ecoregion and Flatwoods/Blackland Prairie Margins sub-ecoregion. It displays instream and habitat conditions that could be described as least disturbed as compared to other stream in the region.

Additionally, Soapstone Creek was selected for biological and water quality monitoring as part of the 2005 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.



Figure 1. Soapstone Creek at SPD-1, April 14, 2010.

WATERSHED CHARACTERISTICS

Soapstone Creek is a small Fish and Wildlife (F&W) stream located in the Alabama River basin. It flows through the Flatwoods/Blackland Prairie Margins sub-ecoregion (65b) to the Alabama River. Based on the 2006 National Land Cover Dataset, land use within the watershed is primarily forest (59%) and shrub lands with some pasture/hay and crops. Based on land use, road density, and population density, Soapstone Creek is among the least disturbed watersheds in ecoregion 65b. Watershed characteristics are summarized in Table 1. As of September 1, 2012, ADEM’s NPDES Management System database showed one permitted discharge located 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 low-gradient stream characterized by sand, gravel, and clay substrates (Figure 1). Overall habitat quality was rated as *marginal* for supporting macroinvertebrate communities. Best attainable reference reaches must be typical of other streams in the ecoregion to be used for comparison with other streams. Soapstone Creek at SPD-1 is characteristic of the 65b ecoregion.

Table 1. Summary of watershed characteristics.

Watershed Characteristics			Alabama River
Basin			Alabama River
Drainage Area (mi²)			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
Population/km^{2b}			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.

Table 2. Physical characteristics of Soapstone Creek at SPD-1, May 27, 2005.

Physical Characteristics		
Canopy Cover	Estimate 50/50	
Width (ft)	35.0	
Depth (ft)		
	Run	1.1
	Pool	1.5
% of Reach		
	Run	85
	Pool	15
% Substrate		
	Boulder	5
	Cobble	10
	Gravel	15
	Sand	50
	Silt	15
	Organic Matter	5

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Table 3. Results of the habitat assessment conducted on Soapstone Creek at SPD-1, May 27, 2005.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (40-52)
Sediment Deposition	65	Sub-optimal (53-65)
Sinuosity	40	Poor <45
Bank and Vegetative Stability	49	Marginal (35-59)
Riparian Buffer	84	Sub-optimal (70-89)
Habitat Assessment Score	125	
% Maximum Score	52	Marginal (40-52)

Table 4. Results of macroinvertebrate assessment conducted in Soapstone Creek at SPD-1, 5/27/2005.

Macroinvertebrate Assessment			
	Result Scores		Rating
Taxa richness measures			
# EPT genera	10	40	Fair (38-56)
Taxonomic composition			
% Non-insect taxa	5	100	Excellent (>96.3)
% Plecoptera	0	0	Very Poor
% Dominant taxa	33	42	Poor (23.5-47.0)
Functional composition measures			
% Predators	8	28	Poor (15.1-30.1)
Tolerance measures			
Beck's community tolerance	4	18	Poor (10.6-21.2)
% Nutrient tolerant organisms	21	82	Good (76.3-88.1)
WMB-I Assessment Score	--	44	Fair (38-56)

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 an average of the score for each metric. Bioassessment results indicated the macroinvertebrate community in Soapstone Creek at SPD-1 to be in *fair* condition. (Table 4).

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, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities.

In May 2015, Soapstone Creek exceeded its 8.5 standard unit F&W pH criteria. Other than this event, *in situ* measurements suggest that Soapstone Creek at SPD-1 was meeting water quality criteria for its F&W use classification.

SUMMARY

The condition of the macroinvertebrate community residing in Soapstone Creek at SPD-1 was rated as *fair*, with both pollution sensitive and pollution tolerant taxa represented. Results of intensive water quality sampling do not suggest impairment. However, the degraded biological condition caused by landuse and stream morphology characteristic of this ecoregion suggest that a separate index for this ecoregion may be needed.

Table 5. Summary of water quality data collected March-October, 2005. 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)	9	15.0	28.0	23.8	21.2	5.0	
Turbidity (NTU)	9	1.8	39.8	3.7	8.8	12.1	
Total Dissolved Solids (mg/L)	7	54.0	124.0	97.0	90.7	22.0	
Total Suspended Solids (mg/L)	7	2.0	63.0	16.0	23.6	22.1	
Specific Conductance (µmhos)	9	64.1	129.6	116.3	104.6	24.9	
Hardness (mg/L)	4	26.6	50.1	34.2	36.3	10.0	
Alkalinity (mg/L)	7	23.3	41.9	29.7	32.4	7.2	
Stream Flow (cfs)	9	4.9	127.0	12.4	27.1	39.1	
Chemical							
Dissolved Oxygen (mg/L)	9	7.9	10.5	8.6	8.8	1.0	
pH (su)	9	6.6	8.6 ^C	7.8	7.7	0.6	1
Ammonia Nitrogen (mg/L)	7	<0.015	<0.015	0.008	0.008	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	7	<0.003	0.207	0.115	0.124	0.071	
Total Kjeldahl Nitrogen (mg/L)	7	<0.150	0.606	0.301	0.322	0.212	
Total Nitrogen (mg/L)	7	<0.076	0.734	0.508	0.446	0.234	
Dissolved Reactive Phosphorus (mg/L)	7	<0.004	0.015	0.005	0.007	0.005	
Total Phosphorus (mg/L)	7	<0.004	0.126	0.053	0.055	0.037	
CBOD-5 (mg/L)	7	<1.0	3.6	2.0	1.9	1.0	
COD (mg/L)	3	<2.0	<2.0	1.0	1.0	0.0	
⁻² Chlorides (mg/L)	7	5.0	8.8	6.2	6.8	1.4	
Atrazine (µg/L)	2	<0.05	<0.05	0.02	0.02	0.00	
Total Metals							
Aluminum (mg/L)	4	<0.015	0.155	0.068	0.074	0.078	
Iron (mg/L)	4	0.233	1.270	0.480	0.616	0.460	
Manganese (mg/L)	4	<0.005	0.024	0.009	0.011	0.011	
Dissolved Metals							
Aluminum (mg/L)	4	<0.015	0.112	0.008	0.034	0.052	
Antimony (µg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Arsenic (µg/L)	4	<10.0	<10.0	5.0	5.0	0.0	
Cadmium (µg/L)	4	<5.0	<5.0	2.500	2.500	0.000	
Chromium (µg/L)	4	<4.0	<4.0	2.000	2.000	0.000	
Copper (mg/L)	4	<0.005	<0.005	0.002	0.002	0.000	
Iron (mg/L)	4	0.128	0.240	0.148	0.166	0.052	
Lead (µg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Manganese (mg/L)	4	<0.005	0.013	0.002	0.005	0.005	
⁻¹ Mercury (µg/L)	4	<0.3	<0.3	0.150	0.150	0.000	
Nickel (mg/L)	4	<0.006	<0.006	0.003	0.003	0.000	
Selenium (µg/L)	4	<10.0	<10.0	5.0	5.0	0.0	
Silver (µg/L)	4	<3.0	<3.0	1.500	1.500	0.000	
Thallium (µg/L)	4	<1.0	<1.0	0.5	0.5	0.0	
Zinc (mg/L)	4	<0.006	<0.006	0.003	0.003	0.000	
Biological							
⁻¹ Chlorophyll a (ug/L)	7	0.53	3.56	1.60	1.96	1.18	
⁻¹ Fecal Coliform (col/100 mL)	7	34	1380	160	301	481	

C= value exceeds established criteria for F&W water use classification; J=estimate; N=# samples.

FOR MORE INFORMATION, CONTACT:

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