

2013 Monitoring Summary



South Sauty Creek at Dekalb County Road 47 (34.49861/-85.92944)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored South Sauty Creek as part of the 2013 Assessment of the Tennessee River Basin (TN). The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the TN basin. South Sauty Creek was added to Alabama's §303(d) list of impaired water bodies in 1996 for water quality impairments caused by agricultural runoff and unknown sources. Parameters of concern were pesticides, organic enrichment, dissolved oxygen, pH, and sedimentation among others. South Sauty Creek remained listed for pH impairment until 2002. Intensive sampling in 2003 found no exceedances.

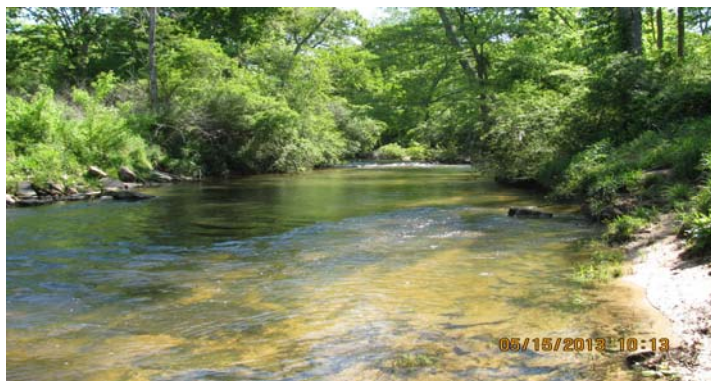


Figure 1. South Sauty Creek at SSTD-1, May 15, 2013.

WATERSHED CHARACTERISTICS

The South Sauty Creek watershed at SSTD-1 lies within the Southern Table Plateaus (68d) ecoregion. South Sauty Creek is a *Fish & Wildlife (F&W)* stream located near the town of Powell. Based on the 2006 National Land Cover Dataset, landuse in the watershed is primarily pasture and forest (Table 1). ADEM's NPDES Management System database shows a total of nine NPDES permits issued within this watershed as of May 13, 2013.

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 Sauty Creek at SSTD-1 is a riffle-run stream reach characterized by boulder, bedrock, cobble and gravel substrates (Figure 1). The presence of stable substrate and riffles within the stream reach categorized overall habitat quality as *optimal* for a Southern Table Plateaus stream.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Table 4 summarizes results of taxonomic richness, community composition, and community tolerance metrics. 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 in South Sauty Creek at SSTD-1 to be in *fair* condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Tennessee River
Basin		Tennessee River
Drainage Area (mi²)		44
Ecoregion^a		68d
% Landuse		
Open water		1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	15
	Evergreen	3
	Mixed	9
Shrub/scrub		5
Grassland/herbaceous		3
Pasture/hay		44
Cultivated crops		11
Development	Open space	6
	Low intensity	3
	Moderate intensity	1
	High intensity	<1
Barren		<1
Population/km^{2b}		52
# NPDES Permits^c	TOTAL	9
	Construction Stormwater	1
	Industrial General	8

a.Southern Table Plateaus

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of South Sauty Creek at SSTD-1, May 15, 2013.

Physical Characteristics	
Width (ft)	40
Canopy Cover	Estimate 50/50
Depth (ft)	
	Riffle 1.0
	Run 2.0
	Pool 3.0
% of Reach	
	Riffle 20
	Run 70
	Pool 10
% Substrate	
	Bedrock 15
	Boulder 45
	Cobble 10
	Gravel 10
	Sand 7
	Silt 5
	Organic Matter 8

Table 3. Results of the habitat assessment conducted in South Sauty Creek at SSTD-1, May 15, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	86	Optimal (>70)
Sediment Deposition	76	Optimal (>70)
Sinuosity	75	Sub-optimal (65-84)
Bank and Vegetative Stability	78	Optimal (>74)
Riparian Buffer	75	Sub-optimal (70-89)
Habitat Assessment Score	189	
% Maximum Score	79	Optimal (>70)

Table 4. Results of macroinvertebrate bioassessment conducted in South Sauty Creek at SSTD-1, May 15, 2013.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
# Ephemeroptera (mayfly) taxa		7
# Plecoptera (stonefly) taxa		2
# Trichoptera (caddisfly) taxa		8
Taxonomic composition measures		
% Non-insect taxa		14
% Plecoptera		2
% Non-insect organisms		2
Community tolerance		
Becks community tolerance index		13
WMB-I Assessment Score		51
WMB-I Assessment Rating		Fair (48-71)

WATER CHEMISTRY RESULTS

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected in March, May, July and September of 2013 to help identify any stressors to the biological communities. Additional in situ data was collected during the macroinvertebrate assessment in May. Samples of total dissolved arsenic exceeded human health criteria in South Sauty Creek on July 17th and September 4th. 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 South Sauty Creek will be reassessed for arsenic violations. Median values of Specific Conductance and Hardness were higher than expected for the ecoregion as compared to all reference data. The median concentration of Dissolved Reactive Phosphorus was greater than expected, as compared to the 90th percentile of all reference data collected in ecoregion 68d. Organics were collected on July 17 and all results were less than Minimum Detection Limits (<MDL) except for Atrazine, a commonly used herbicide.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition despite *optimal* overall habitat conditions. Arsenic and Chromium criteria exceedances are uncertain. Dissolved Reactive Phosphorus, Specific Conductance, and Hardness values were greater than expected for ecoregion 68d. Monitoring of South Sauty Creek at SSTD-1 should continue to ensure that water quality and biological conditions meet current standards.

Table 5. Summary of water quality data collected March, May, July, and September 2013. 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	Q
Physical							
Temperature (°C)	5	8.4	22.1	15.8	16.5	5.4	
Turbidity (NTU)	5	1.5	6.3	2.2	2.8	2.0	
Total Dissolved Solids (mg/L)	4	< 1.0	100.0	68.0	59.1	44.4	
Total Suspended Solids (mg/L)	4	< 1.0	6.0	0.5	1.9	2.8	
Specific Conductance (µmhos)	5	67.5	137.0	88.9 ^G	92.4	27.2	
Hardness (mg/L)	4	22.1	35.1	27.4 ^G	28.0	5.8	
Alkalinity (mg/L)	4	12.3	27.2	18.4	19.0	7.1	
Stream Flow (cfs)	5	10.0	193.3	64.4	76.5	70.9	
Chemical							
Dissolved Oxygen (mg/L)	5	7.9	11.3	9.2	9.2	1.4	
pH (su)	5	6.8	7.3	7.1	7.1	0.2	
^J Ammonia Nitrogen (mg/L)	4	< 0.008	0.019	0.009	0.010	0.006	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.913	2.166	1.144	1.342	0.560	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.041	0.468	0.360	0.302	0.198	
Total Nitrogen (mg/L)	4	< 1.152	2.482	1.472	1.644	0.583	
Dissolved Reactive Phosphorus (mg/L)	4	< 0.004	0.061	0.022 ^M	0.026	0.025	
Total Phosphorus (mg/L)	4	0.013	0.073	0.044	0.044	0.024	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	3.2	13.3	4.9	6.6	4.6	
^J Atrazine (µg/L)	1				0.08		
Total Metals							
^J Aluminum (mg/L)	4	< 0.076	0.241	0.073	0.106	0.096	
^J Iron (mg/L)	4	0.146	0.389	0.268	0.268	0.139	
^J Manganese (mg/L)	4	0.015	0.045	0.024	0.027	0.014	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.076	< 0.076	0.038	0.038	0.000	
Antimony (µg/L)	4	< 0.1	< 2.6	0.7	0.7	0.7	
^J Arsenic (µg/L)	4	0.4 ^H	< 1.4	0.6	0.6	0.2	2
Cadmium (µg/L)	4	< 0.046	< 0.170	0.054	0.054	0.036	
^J Chromium (µg/L)	4	0.554 ^S	< 32.000	8.293	8.285	8.908	2
^J Copper (mg/L)	4	0.001	< 0.031	0.008	0.008	0.008	
^J Iron (mg/L)	4	0.048	0.282	0.143	0.154	0.102	
Lead (µg/L)	4	< 0.1	< 1.1	0.3	0.3	0.3	
^J Manganese (mg/L)	4	0.010	0.030	0.017	0.018	0.008	
Mercury (µg/L)	1				< 0.057		
^J Nickel (mg/L)	4	0.0004	< 0.016	0.005	0.004	0.004	
Selenium (µg/L)	4	< 0.2	< 1.4	0.4	0.4	0.3	
Silver (µg/L)	4	< 0.215	< 2.120	0.584	0.584	0.550	
Thallium (µg/L)	4	< 0.1	< 1.1	0.3	0.3	0.3	
^J Zinc (mg/L)	4	0.002	< 0.017	0.006	0.006	0.003	
Biological							
Chlorophyll a (µg/L)	4	< 0.10	1.07	1.07	0.82	0.51	
E. coli (col/100 mL)	4	36	365	61	131	157	

G=value > median concentration of all verified reference data collected in ecoregion 68d; H=exceeds F&W human health criterion; J=reported value is an estimate; M=values > 90th percentile of all verified reference data collected in ecoregion 68d; N=# samples; Q=#of uncertain criteria exceedances; S=exceeds hardness adjusted aquatic life criterion for F&W streams.

FOR MORE INFORMATION, CONTACT:
 Hugh Cox, ADEM Environmental Indicator Section
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2753 hec@adem.state.al.us