

2013 Monitoring Summary



Brushy Creek at Lawrence County Road 73 (34.33070/-87.28620)

BACKGROUND

A segment of Brushy Creek within the Bankhead National Forest is one of the stream reaches that the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable condition” reference watershed for comparison with streams throughout the Dissected Plateau ecoregion (68e). Landuse, road density, and population density categorize Brushy Creek among the least-disturbed watersheds in ecoregion 68e.



Figure 1. Brushy Creek at BRSL-3, May 11, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Brushy Creek at BRSL-3 is a *Fish and Wildlife (F&W)* stream located in Lawrence County within the Bankhead National Forest. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forested (97%). No NPDES permits have been issued in the Brushy Creek 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. Brushy Creek at BRSL-3 is characterized primarily by boulder, cobble, and gravel substrates with some sand present (Figure 1). Overall habitat quality was categorized as *optimal* for this stream type.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Black Warrior River	
Drainage Area (mi ²)	9	
Ecoregion ^a	68e	
% Landuse		
Forest	Deciduous	56
	Evergreen	22
	Mixed	19
Shrub/scrub		1
Grassland/herbaceous		<1
Pasture/hay		1
Development	Open space	1
Population/km ^{2b}		1

a. Dissected Plateau

b. 2000 US Census

Table 2. Physical characteristics of Brushy Creek at BRSL-3, June 12, 2013.

Physical Characteristics		
Width (ft)	30	
Canopy Cover	Shaded	
Depth (ft)		
	Riffle	0.3
	Run	1.2
	Pool	2.5
% of Reach		
	Riffle	25
	Run	50
	Pool	25
% Substrate		
	Boulder	40
	Cobble	20
	Gravel	20
	Sand	10
	Silt	5
	Organic Matter	5

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 3. Results of the habitat assessment conducted on Brushy Creek at BRSL-3, June 12, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	84	Optimal (>70)
Sediment Deposition	84	Optimal (>70)
Sinuosity	90	Optimal (>84)
Bank and Vegetative Stability	46	Marginal (35-59)
Riparian Buffer	90	Optimal (>89)
Habitat Assessment Score	189	
% Maximum Score	79	Optimal (>70)

Table 4. Results of macroinvertebrate bioassessment conducted in Brushy Creek at BRSL-3, June 12, 2013.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness measures		
# EPT taxa	22	78
Taxonomic composition measures		
% Non-insect taxa	6	82
% Dominant taxon	19	80
% EPC taxa	33	62
Functional feeding group measures		
% Predators	12	48
Tolerance measures		
% Taxa as Tolerant	22	79
WMB-I Assessment Score	---	72
WMB-I Assessment Rating		Good (59-79)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected semi-monthly January through October of 2013 to help identify any stressors to the biological communities. *E. coli* collected at BRSL-3 exceeded the geometric mean human health criterion for its *Fish & Wildlife* use classification during the summer months; additionally, an *E. coli* sample collected on June 6, 2013 exceeded the summer single sample maximum criteria (1046 col/100mL). Median Chlorides were slightly higher than values expected based on data collected at reference reaches within the Dissected Plateau ecoregion (68e).

FOR MORE INFORMATION, CONTACT:
Lacey Genard, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2703 lacey.genard@adem.state.al.us

Table 5. Summary of water quality data collected January-October 2013. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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	5.4	22.2	10.3	13.3	6.5	
Turbidity (NTU)	9	2.8	12.7	4.5	5.6	3.3	
J Total Dissolved Solids (mg/L)	8 <	1.0	48.0	18.0	21.6	16.5	
Total Suspended Solids (mg/L)	8 <	1.0	2.0	0.5	0.9	0.7	
Specific Conductance (µmhos)	9	16.8	38.4	19.7	23.6	7.2	
Hardness (mg/L)	4	5.9	6.7	6.2	6.3	0.4	
J Alkalinity (mg/L)	8	2.3	10.2	4.3	5.2	2.7	
Stream Flow (cfs)	9	0.4	34.1	11.8	11.8	10.3	
Chemical							
Dissolved Oxygen (mg/L)	9	7.9	12.1	10.9	10.0	1.6	
pH (su)	9	6.5	7.6	7.1	7.0	0.3	
Ammonia Nitrogen (mg/L)	8 <	0.008 <	0.018	0.004	0.006	0.002	
J Nitrate+Nitrite Nitrogen (mg/L)	8 <	0.002	0.035	0.010	0.015	0.012	
J Total Kjeldahl Nitrogen (mg/L)	8 <	0.041	0.309	0.096	0.129	0.117	
J Total Nitrogen (mg/L)	8	0.028	0.341	0.105	0.144	0.128	
J Dissolved Reactive Phosphorus (mg/L)	4	0.003	0.006	0.004	0.004	0.001	
J Total Phosphorus (mg/L)	8	0.004	0.017	0.006	0.008	0.005	
CBOD-5 (mg/L)	4 <	2.0 <	2.0	1.0	1.0	0.0	
COD (mg/L)	4	13.6	21.4	16.4	17.0	3.6	
TOC (mg/L)	4	1.1	3.2	1.9	2.0	0.9	
Chlorides (mg/L)	8	0.9	1.2	1.09 ^M	1.1	0.1	
Total Metals							
J Aluminum (mg/L)	4	0.085	0.141	0.109	0.111	0.025	
J Iron (mg/L)	4	0.133	0.250	0.178	0.185	0.049	
J Manganese (mg/L)	4	0.011	0.017	0.015	0.014	0.003	
Dissolved Metals							
Arsenic (µg/L)	4 <	0.2 <	0.2	0.1	0.1	0.0	
Cadmium (µg/L)	4 <	0.046 <	0.046	0.023	0.023	0.000	
Chromium (µg/L)	4 <	32.000 <	32.000	16.000	16.000	0.000	
Copper (mg/L)	4 <	0.031 <	0.031	0.016	0.016	0.000	
Lead (µg/L)	4 <	1.1 <	1.1	0.5	0.5	0.0	
Nickel (mg/L)	4 <	0.016 <	0.016	0.008	0.008	0.000	
Silver (µg/L)	4 <	0.215 <	0.215	0.108	0.108	0.000	
Zinc (mg/L)	4 <	0.017 <	0.017	0.008	0.008	0.000	
Biological							
<i>E. coli</i> (col/100mL)	4	31	1046 ^H	181	360	470	2

E=# samples that exceeded criteria; H=F&W human health criterion exceeded; J=estimate; M=value>90% of all verified ecoregional reference reach data collected in the ecoregion 68e; N=# samples.

SUMMARY

ADEM is currently monitoring Brushy Creek at BRSL-3 as a "best attainable" condition reference watershed. Landuse, road density, and population density categorize Brushy Creek among the least-disturbed watersheds in the Dissected Plateau ecoregion (68e). Overall habitat quality for Brushy Creek at BRSL-3 was categorized as *optimal*. Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Water quality criteria were met for its *Fish & Wildlife* use classification except for two exceedances of the human health criterion for *E. coli* in the summer months. Median Chlorides were higher than values expected based on data collected at reference reaches within the Dissected Plateau ecoregion (68e). Further sampling may be required to get a representative assessment of *E. coli* and to ensure that water quality and biological conditions remain stable.