Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2013 Monitoring Summary

Good-Fair™

Bluff Creek at Lauderdale County Road 14 (34.88586/-87.90787)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bluff Creek watershed for biological and water quality monitoring as part of the 2013 Assessment of the Tennessee (TN) River Basin. The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site to estimate overall water quality within the TN basin.

Figure 1. Bluff Creek at BLFL-1, September 10, 2013.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi^2)		10
Ecoregion[a]		65j
% Landuse		
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	52
	Evergreen	6
	Mixed	3
Shrub/scrub		23
Grassland/herbaceous		<1
Pasture/hay		1
Cultivated crops		10
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		14

a.Transition Hills
b.2000 US Census

Table 2. Physical characteristics of Bluff Creek at BLFL-1, June 4, 2013.

Physical Characteristics		
Canopy Cover		Shaded
Width (ft)		23
Depth (ft)		
	Riffle	1.0
	Run	1.0
% of Reach		
	Riffle	10
	Run	90
% Substrate		
	Boulder	3
	Cobble	15
	Gravel	50
	Sand	25
	Silt	2
	Organic Matter	5

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bluff Creek is a *Fish & Wildlife (F&W)* stream located near the Natchez Trace Parkway in the Tennessee River basin. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forested areas (61%). The ADEM has issued no NPDES discharge permits in this monitoring unit.

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.

Bluff Creek at BLFL-1 (Figure 1) is a high-gradient, gravel and sand bottomed stream in the Transition Hills ecoregion. Overall habitat quality was categorized as *sub-optimal* due to sediment deposition, sinuosity, and lack of bank and vegetative stability.

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 in comparison to conditions expected in north Alabama streams and rivers. Each score is based on a six-point scale, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted in Bluff Creek at BLFL-1 rated the macroinvertebrate community to be in *good –fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Bluff Creek at BLFL-1, June 4, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	69	Optimal >65
Sediment Deposition	51	Marginal (40-52)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	54	Marginal (35-59)
Riparian Buffer	48	Poor <50
Habitat Assessment Score	**116**	
% Maximum Score	**61**	**Sub-optimal (59-70)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Bluff Creek at BLFL-1, June 4, 2013.

Macroinvertebrate Assessment	Results
Taxa richness and diversity measures	
Total # Taxa	51
# EPT taxa	15
# Sensitive EPT	8
Shannon Diversity	3.79
# Highly-sensitive and Specialized Taxa	4
Taxonomic composition measures	
% EPT minus Baetidae and Hydropsychidae	2
% Non-insect taxa	6
Functional feeding group	
% Predator Individuals	5
Community tolerance	
% Sensitive taxa	29
% Tolerant taxa	19
WMB-I Assessment Score	**3-**
WMB-I Assessment Rating	**Good-fair**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during March, May, July and September of 2013 to help identify any stressors to the biological communities.

The *F&W* Human Health criterion for arsenic in Bluff Creek at BLFL-1 was exceeded during the July and September sampling events.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good-fair* condition. Overall habitat quality was categorized as *sub-optimal* due to sedimentation, sinuosity, and lack of bank and vegetative stability. The *F&W* Human Health criterion was exceeded during the July and September sampling events. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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	E
Physical							
Temperature (°C)	5	7.9	24.0	18.4	16.8	6.3	
Turbidity (NTU)	5	1.7	4.4	2.3	2.7	1.0	
Total Dissolved Solids (mg/L)	4	<1.0	93.0	29.0	37.9	39.5	
Total Suspended Solids (mg/L)	4	2.0	6.0	4.5	4.2	1.7	
Specific Conductance (µmhos)	5	37.1	62.8	46.1	47.8	10.9	
Hardness (mg/L)	4	14.7	28.3	18.4	19.9	6.4	
Alkalinity (mg/L)	4	12.0	28.9	18.6	19.5	8.3	
Stream Flow (cfs)	5	2.4	37.1	6.9	15.4	14.9	
Chemical							
Dissolved Oxygen (mg/L)	5	8.0	11.6	8.8	9.3	1.5	
pH (su)	5	6.0	6.8	6.5	6.4	0.3	
Ammonia Nitrogen (mg/L)	4	<0.008	<0.018	0.009	0.008	0.002	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.043	0.256	0.168	0.159	0.093	
Total Kjeldahl Nitrogen (mg/L)	4	<0.065	0.422	0.032	0.130	0.195	
Total Nitrogen (mg/L)	4	<0.076	0.678	0.201	0.289	0.268	
[J]Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.015	0.012	0.011	0.004	
Total Phosphorus (mg/L)	4	0.013	0.021	0.017	0.017	0.003	
CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	1.2	1.3	1.2	1.2	0.1	
[J]Atrazine (µg/L)	1				0.08		
Total Metals							
[J]Aluminum (mg/L)	4	<0.076	0.142	0.079	0.084	0.054	
[J]Iron (mg/L)	4	0.084	0.152	0.103	0.110	0.029	
[J]Manganese (mg/L)	4	0.011	0.016	0.012	0.013	0.002	
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	0.2[H]	<1.4	0.4	0.4	0.3	2
[J]Cadmium (µg/L)	4	<0.046	<0.170	0.074	0.064	0.029	
[J]Chromium (mg/L)	4	<0.001	<0.032	0.008	0.008	0.009	
Copper (mg/L)	4	<0.0003	<0.031	0.008	0.008	0.009	
[J]Iron (mg/L)	4	<0.018	0.035	0.025	0.024	0.011	
Lead (µg/L)	4	<0.1	<1.1	0.3	0.3	0.3	
[J]Manganese (mg/L)	4	<0.009	0.010	0.004	0.006	0.003	
Mercury (µg/L)	2	<0.057	<0.057	0.028	0.028	0.000	
Nickel (mg/L)	4	<0.0002	<0.016	0.004	0.004	0.004	
Selenium (µg/L)	4	<0.2	<1.4	0.4	0.4	0.3	
Silver (µg/L)	4	<0.215	<2.12	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 (ug/L)	4	<0.10	1.87	0.53	0.74	0.78	
[J]E. coli (col/100mL)	4	308	1733	457	739	668	

E=# samples that exceeded criteria; H=*F&W* human health criterion exceeded; J=estimate; N=# samples.

FOR MORE INFORMATION, CONTACT:
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