Alabama Department of Environmental Management

Ecological Reference Reach

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Fair™

Little Buck Creek at Greene County Road 86 (32.99289/-87.76303)

BACKGROUND

Based on landuse data, the Alabama Department of Environmental Management (ADEM) monitored Little Buck Creek as a potential Ecoregional Reference Site. Reference sites represent best-attainable conditions, and provide background data used for comparison with other streams in the same ecoregion. Additionally, ADEM included the Little Buck Creek watershed for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of the BWC Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC basin group.

Figure 1. Little Buck Creek at LBUG-36A, April 25, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Buck Creek is a *Fish & Wildlife (F&W)* stream. Little Buck Creek at LBUG-36A is located within the *Southeastern Floodplains & Low Terraces (65p)*, however the majority of the 12 mi^2 drainage area lies within the *Fall Line Hills* sub-ecoregion in Greene County before its confluence with Buck Creek and the Black Warrior River. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (72%) and shrub. Population density is low, and less than 4% of the area is developed. As of September 1, 2012, one NPDES permit has been issued in this watershed. The 65p generally delineates large river floodplains. Stream flow within these reaches can be greatly affected by flows in the large rivers.

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 in Little Buck Creek at LBUG-36A. Instream substrates were dominated by sand, with abundant organic matter for macroinvertebrate colonization (Figure 1). Habitat quality and availability within the reach were rated *sub-optimal* for supporting macroinvertebrate communities.

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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. Low gradient metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		12
Ecoregion[a]		65p
% Landuse		
Open water		<1
Wetland	Woody	4
Forest	Deciduous	31
	Evergreen	20
	Mixed	21
Shrub/scrub		15
Grassland/herbaceous		4
Pasture/hay		1
Cultivated crops		1
Development	Open space	3
	Low intensity	<1
Population/km^2[b]		2
# NPDES Permits[c]	**TOTAL**	1
Construction Stormwater		1

a.Southeastern Plains & Low Terraces (65p)
b.2000 US Census
c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Little Buck Creek at LBUG-36A, April 25, 2012.

Physical Characteristics		
Width (ft)		20
Canopy cover		Mostly Shaded
Depth (ft)		
	Run	1.2
	Pool	2.5
% of Reach		
	Run	80
	Pool	20
% Substrate		
	Gravel	20
	Sand	60
	Silt	12
	Organic Matter	8

Table 3. Results of the habitat assessment conducted on Little Buck Creek at LBUG-36A, April 25, 2012.

(GP) Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	43	Marginal (40-52)
Sediment Deposition	63	Sub-optimal (53-65)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	46	Marginal (35-59)
Riparian Buffer	88	Sub-Optimal (70-89)
Habitat Assessment Score	**122**	
% Maximum Score	**55**	**Sub-Optimal (53-65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Little Buck Creek at LBUG-36A, April 25, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	29	48
% Dominant Taxon	26	58
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	2	3
Functional feeding group		
# Collector Taxa	18	55
Community tolerance		
% Nutrient Tolerant individuals	40	43
WMB-I Assessment Score	**---**	**41**
WMB-I Assessment Rating		**Fair (32-47)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, April through November of 2012, to help identify any stressors to the biological communities. Additionally, field parameters were collected during the macroinvertebrate assessment on April 25. The pH measurement taken on September 5, during high flow conditions, did not meet the *F&W* criterion of 6.0 (su), however, data collected from ADEM's established reference sites indicates that pH values as low as 5.8 (su) are not unusual for ecoregion 65i. Median specific conductance and median hardness were slightly higher than expected for streams in the Fall Line Hills sub-ecoregion. No organic samples were collected.

SUMMARY

The habitat at Little Buck Creek at LBUG-36A was assessed and found to be *sub-optimal* in its ability to support healthy and diverse aquatic macroinvertebrate communities. However, the overall macroinvertebrate community condition was rated as *fair*. Water chemistry and physical characteristics of the reach were typical for the ecoregion.

Monitoring of Little Buck Creek at LBUG-36A should continue to ensure that conditions remain stable at the site and to verify its status as a potential reference reach for ecoregion 65i.

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Table 5. Summary of water quality data collected April through 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	Median	Avg	SD	E
Physical							
Temperature (°C)	8	11.7	25.0	20.8	19.9	4.4	
Turbidity (NTU)	11	8.9	147.0T	26.0	40.4	40.2	
Total Dissolved Solids (mg/L)	8	32.0	82.0	52.0	52.8	18.3	
Total Suspended Solids (mg/L)	8	1.0	227.0	11.0	39.4	76.8	
Specific Conductance (µmhos)	8	24.0	35.7	30.2G	29.5	4.2	
Hardness (mg/L)	4	6.2	10.5	9.3G	8.8	1.9	
J Alkalinity (mg/L)	8	2.0	10.7	6.2	6.4	2.8	
Stream Flow (cfs)	10	2.3	58.4	8.1	12.0	16.6	
Chemical							
Dissolved Oxygen (mg/L)	8	7.3	10.0	8.4	8.5	0.9	
pH (su)	8	5.7C	6.8	6.5	6.5	0.3	1
J Ammonia Nitrogen (mg/L)	8	< 0.007	0.039	0.004	0.012	0.013	
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.005	0.066	0.035	0.036	0.026	
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.520	0.234	0.234	0.167	
J Total Nitrogen (mg/L)	8	< 0.023	0.575	0.268	0.270	0.189	
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.009	0.006	0.006	0.002	
Total Phosphorus (mg/L)	8	0.019	0.058	0.032	0.035	0.015	
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	1.7	2.9	2.1	2.2	0.4	
Total Metals							
J Aluminum (mg/L)	4	0.094	0.485	0.306	0.298	0.177	
Iron (mg/L)	4	2.170	3.590	2.820	2.850	0.581	
Manganese (mg/L)	4	0.061	0.072	0.066	0.066	0.005	
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	1.8	0.0	
Arsenic (µg/L)	4	< 1.8	< 1.8	0.9	0.9	0.0	
Cadmium (mg/L)	4	< 0.00002	< 0.00005	0.00003	0.00003	0.0000	
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	
Iron (mg/L)	4	0.378	0.585	0.514	0.498	0.098	
Lead (µg/L)	4	< 0.9	< 0.9	0.4	0.4	0.0	
J Manganese (mg/L)	4	0.042	0.059	0.055	0.053	0.008	
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 (mg/L)	4	< 0.00001	< 0.0002	0.0001	0.0001	0.000	
Thallium (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (mg/L)	8	< 0.10	3.81	0.56	1.37	1.60	
E. coli (col/100 mL)	7	214	921	328	436	250	

E=#samples that exceeded criteria; C=*F&W* criterion exceeded; J=estimate; G=value greater than median concentration of all verified reference reach data collected in ecoregion 65i; N=# of samples; T=value is greater than 50 NTU above the 90th percentile of all verified reference data collected in ecoregion 65i.