Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Fair™

Blue Creek at Tuscaloosa County Road 47 (Old Watermelon Road) (33.45083/-87.41222)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Blue Creek 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.

Additionally, Blue Creek is being evaluated as a possible reference reach for sub-ecoregion 68f. Data collected at these reaches will be used as the basis of comparison for streams in the same ecoregion and to develop water quality criteria.

Figure 1. Blue Creek at BLUT-1, May 8, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Blue Creek is a *Fish & Wildlife (F&W)* stream located in the Shale Hills ecoregion (68f). At this location, Blue Creek drains thirty seven square miles in Tuscaloosa County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (77%) followed by shrub/scrub and grassland. Population density is relatively low.

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.

Blue Creek at BLUT-1 is a riffle-run stream with bedrock, cobble, boulder, gravel, silt and sand substrates (Figure 1). Overall habitat quality was categorized as *optimal* due to the habitat created by snags, leaf packs and root banks within the reach.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		37
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	35
	Evergreen	28
	Mixed	14
Shrub/scrub		12
Grassland/herbaceous		8
Pasture/hay		2
Cultivated crops		<1
Development	Open space	1
	Low intensity	<1
Barren		<1
Population/km^2[b]		2

a.Shale Hills
b.2000 US Census

Table 2. Physical characteristics of Blue Creek at BLUT-1, May 8, 2012.

Physical Characteristics	
Canopy Cover	Mostly Open
Width (ft)	60
Depth (ft)	
Riffle	1.0
Run	1.5
Pool	3.0
% of Reach	
Riffle	5
Run	60
Pool	35
% Substrate	
Bedrock	15
Boulder	5
Clay	3
Cobble	10
Gravel	10
Sand	35
Silt	10
Organic Matter	12

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

Table 3. Results of the habitat assessment conducted on Blue Creek at BLUT-1, May 8, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	67	Sub-optimal (59-70)
Sediment Deposition	73	Optimal >70
Sinuosity	75	Sub-optimal (65-84)
Bank and Vegetative Stability	73	Sub-optimal (60-74)
Riparian Buffer	89	Sub-optimal (70-89)
Habitat Assessment Score	**178**	
% Maximum Score	**74**	**Optimal >70**

Table 4. Results of the macroinvertebrate bioassessment conducted in Blue Creek at BLUT-1, May 8, 2012.

Macroinvertebrate Assessment	Results	Scores
Taxa richness measures		**(0-100)**
# EPT taxa	20	70
Taxonomic composition measures		
% Non-insect taxa	11	59
% Dominant taxon	48	0
% EPC taxa	30	56
Functional feeding group measures		
% Predators	9	33
Tolerance measures		
% Taxa as Tolerant	26	68
WMB-I Assessment Score	**---**	**47**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, and semi-monthly (metals) from April through November of 2012 to help identify any stressors to the biological communities. *In situ* parameters with the exception of specific conductance suggested that Blue Creek at BLUT-1 was meeting its *F&W* use classification. Median concentration of specific conductivity and hardness were higher than expected based on the median concentration of all verified reference reach data collected in ecoregion 68. Median concentration of total dissolved solids, alkalinity and chlorides were also higher than expected. Arsenic exceeded human health criteria for water and fish consumption in October.

Table 5. Summary of water quality data collected April-November, 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	12.1	26.6	20.8	20.3	4.4	
Turbidity (NTU)	9	0.8	18.3	1.6	4.2	5.9	
Total Dissolved Solids (mg/L)	8	148.0	928.0	419.0 M	469.0	266.9	
Total Suspended Solids (mg/L)	8	< 1.0	6.0	1.2	2.2	2.2	
Specific Conductance (µmhos)	9	221.9	979.9	551.9 G	588.0	272.6	
Hardness (mg/L)	4	88.0	541.0	218.0 G	266.2	211.0	
Alkalinity (mg/L)	8	26.0	107.0	63.0 M	64.2	29.5	
Stream Flow (cfs)	7	3.0	22.8	7.1	9.6	6.8	
Chemical							
Dissolved Oxygen (mg/L)	9	6.4	10.2	8.6	8.6	1.1	
pH (su)	9	7.0	7.8	7.5	7.5	0.3	
J Ammonia Nitrogen (mg/L)	8	< 0.007	0.017	0.004	0.006	0.005	
J Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.005	0.162	0.016	0.034	0.052	
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.342	0.029	0.078	0.110	
J Total Nitrogen (mg/L)	8	< 0.023	0.504	0.044	0.112	0.162	
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.005	0.003	0.004	0.001	
J Total Phosphorus (mg/L)	8	0.006	0.019	0.008	0.009	0.004	
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	4.7	11.3	6.4 M	7.1	2.5	
Total Metals							
J Aluminum (mg/L)	4	0.063	0.390	0.210	0.218	0.176	
J Iron (mg/L)	4	0.033	0.587	0.306	0.308	0.272	
J Manganese (mg/L)	4	0.016	0.028	0.024	0.023	0.005	
Dissolved Metals							
J Aluminum (mg/L)	4	< 0.043	0.119	0.034	0.052	0.046	
Antimony (µg/L)	4	< 3.6	< 3.6	1.8	1.8	0.0	
J Arsenic (µg/L)	4	< 1.8	1.9 H	0.9	1.1	0.5	1
Cadmium (µg/L)	4	< 0.022	0.046	0.017	0.017	0.007	
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	
J Iron (mg/L)	4	< 0.019	0.164	0.059	0.073	0.070	
Lead (µg/L)	4	< 0.9	< 0.9	0.4	0.4	0.0	
J Manganese (mg/L)	4	0.011	0.025	0.012	0.015	0.007	
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	
J Selenium (µg/L)	4	< 2.5	< 2.5	1.2	1.2	0.0	
Silver (µg/L)	4	< 0.015	0.215	0.058	0.058	0.058	
Thallium (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0	
J Zinc (mg/L)	4	< 0.012	0.017	0.006	0.009	0.006	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	0.80	0.16	0.31	0.32	
J E. coli (col/100mL)	8	37	166	63	80	52	

E=# samples that exceeded criteria; G=value > median concentration of all verified reference reach data collected in the ecoregion 68; H= *F&W* human health criterion exceeded; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 68; N=#

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report along with all other available data. Bioassessment results indicated the macroinvertebrate community to be in *fair* condition whereas, habitat quality and availability was assessed as *optimal* for supporting macroinvertebrate communities. Specific conductance, hardness, total dissolved solids, alakalinity, chlorides, and arsenic were higher than expected for this ecoregion. Monitoring should continue to ensure that water quality and biological conditions remain stable.

FOR MORE INFORMATION, CONTACT:
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