Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Good™

Elliots Creek at Hale County Road 50 (32.98369/-87.57245)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Elliots Creek watershed for biological and water quality monitoring as part of the Assessment of the Black Warrior and Cahaba (BWC) River basins. The objectives of the Black Warrior and Cahaba River Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC River basin. Due to non-wadeable conditions of Elliots Creek at ELLH-1, a biological assessment could not be conducted. An alternative site (ELLH-47A) was selected for macroinvertebrate sampling and a habitat assessment given its proximity to ELLH-1 (approximately 3 miles downstream).

This site was also selected by ADEM as a potential candidate as a reference reach station. Streams designated as reference reach are among the best attainable and least-impacted waters when compared to other stream within the same ecoregion.

Figure 1. Elliots Creek at ELLH-1, April 25, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics for ELLH-1 are summarized in Table 1a. Elliots Creek at ELLH-1 is a moderately deep *Fish & Wildlife (F&W)* stream in Hale County near Greensboro (Figure 1). According to the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (81%) with very limited development. Population density is low. As of September 1, 2012, three outfalls are active in the watershed.

Watershed characteristics for ELLH-47A are summarized in Table 1b and Figure 2. Elliots Creek at ELLH-47A is a heavily forested (87%) *Fish & Wildlife* stream with very limited development and very low population density. There isn't any active outfalls in this watershed.

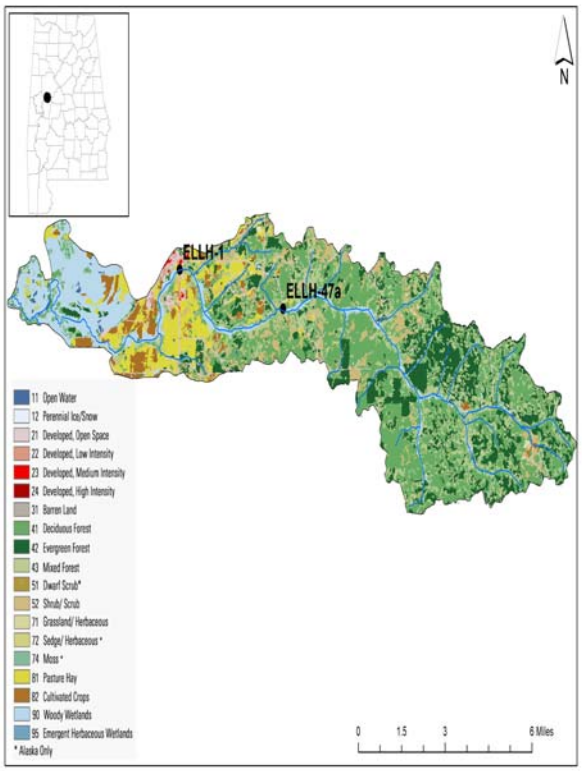

Figure 2. Sampling location and landuse within the Elliots Creek watershed at ELLH-1 and ELLH-47a..

Table 1a. Summary of watershed characteristics for ELLH-1

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		32
Ecoregion[a]		65p
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	39
	Evergreen	20
	Mixed	22
Shrub/scrub		9
Grassland/herbaceous		<1
Pasture/hay		3
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		10
# NPDES Permits[c]	**TOTAL**	3
Construction Stormwater		3

a.Southeastern Floodplains & Low Terraces

b.2000 US Census

c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 1b. Summary of watershed characteristics for ELLH-47A

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		24
Ecoregion[a]		65i
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	41
	Evergreen	22
	Mixed	24
Shrub/scrub		7
Grassland/herbaceous		<1
Pasture/hay		<1
Cultivated crops		<1
Development	Open space	1
	Low intensity	<1
Population/km^2[b]		
# NPDES Permits[c]	**TOTAL**	0

a.Fall Line Hills
b.2000 US Census
c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, September 1, 2012.

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. Elliots Creek at ELLH-47A is a sand and clay-bottomed stream with an *optimal* categorization for overall habitat quality and potential for supporting macroinvertebrate communities.

Table 2. Physical characteristics of Elliot's Creek at ELLH-47A, June 27, 2012.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Mostly shaded
Depth (ft)		
	Run	1.5
	Pool	3.5
% of Reach		
	Run	65
	Pool	35
% Substrate		
	Sand	40
	Clay	30
	Silt	10
	Hard pan clay	5
	CPOM	15

Table 3. Results of the habitat assessment conducted on Elliot's Creek at ELLH-47A, June 27, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	73	Optimal >65
Sediment Deposition	79	Optimal >65
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	54	Marginal (35-59)
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	**161**	
% Maximum Score	**73**	**Optimal >65**

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 each individual metric score. Metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 4 Results of the macroinvertebrate bioassessment conducted in Elliot's Creek at ELLH-47A, June 27, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	22	27
% Dominant Taxon	42	15
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	8	14
Functional feeding group		
# Collector Taxa	24	85
Community tolerance		
% Nutrient Tolerant individuals	10	96
WMB-I Assessment Score	**---**	**48**
WMB-I Assessment Rating		**Good (48-74)**

WATER CHEMISTRY

Results of ELLH-1 water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly or semi-monthly (metals) April through November of 2012 to help identify any stressors to the biological communities. The September and November sampling resulted in exceedances of pH criteria applicable to Elliots Creek's *F&W* use classification designation. The flows in September (87 cfs) and November (19 cfs) were the highest and lowest measured during the entire sampling season respectively, possibly contributing to the violations. All other parameters were within expected ranges when compared to all other streams within the surrounding ecoregion (65i).

SUMMARY

Elliot's Creek at ELLH-1 is under consideration for reference reach designation due to the low Human Disturbance Gradient (HDG) score. The overall health of Elliots Creek at ELLH-1 cannot be accurately be determined due to incomplete macroinvertebrate and habitat assessments. However, water sampling results from the site and macroinvertebrate results from nearby ELLH-47A indicate Elliots Creek is meeting its *Fish & Wildlife* use classification designation.

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)	8	11.7	24.1	20.9	19.8	4.2	
Turbidity (NTU)	10	6.5	29.0	12.9	16.2	9.5	
Total Dissolved Solids (mg/L)	8	8.0	56.0	27.0	31.0	19.6	
Total Suspended Solids (mg/L)	8	< 1.0	13.0	5.0	5.4	4.9	
Specific Conductance (µmhos)	8	18.9	24.5	20.5	20.9	1.8	
Hardness (mg/L)	4	4.4	5.4	5.2	5.1	0.4	
[J] Alkalinity (mg/L)	8	0.9	4.9	3.9	3.7	1.3	
Stream Flow (cfs)	10	19.0	87.0	38.0	41.8	23.7	
Chemical							
Dissolved Oxygen (mg/L)	8	5.9	9.0	7.4	7.5	0.9	
pH (su)	8	5.4[C]	7.1	6.3	6.3	0.5	2
[J] Ammonia Nitrogen (mg/L)	8	< 0.008	0.062	0.004	0.018	0.023	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.067	0.179	0.132	0.123	0.038	
[J] Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.489	0.214	0.229	0.163	
[J] Total Nitrogen (mg/L)	8	< 0.151	0.668	0.350	0.352	0.187	
[J]Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.014	0.004	0.005	0.004	
Total Phosphorus (mg/L)	8	0.019	0.048	0.037	0.035	0.011	
[J] CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	1.6	2.4	2.2	2.1	0.3	
Total Metals							
[J] Aluminum (mg/L)	4	0.089	0.476	0.156	0.220	0.175	
Iron (mg/L)	4	2.140	3.940	2.195	2.618	0.882	
Manganese (mg/L)	4	0.171	0.434	0.246	0.274	0.113	
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 (ug/L)	4	< 0.022	< 0.046	0.017	0.017	0.007	
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.0	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.0	
Iron (mg/L)	4	0.278	0.560	0.295	0.357	0.136	
Lead (µg/L)	4	< 0.9	< 0.9	0.4	0.4	0.0	
Manganese (mg/L)	4	0.150	0.379	0.214	0.240	0.098	
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.0	
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.0	
Selenium (µg/L)	4	< 2.5	< 2.5	1.2	1.2	0.0	
Silver (ug/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	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.0	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	5.34	0.05	1.53	2.17	
[J] E. coli (col/100mL)	8	141	2420	309	578	764	

C=*F&W* use classification criterion violated; E=# samples that violated criteria; J=estimate; N=# samples.

FOR MORE INFORMATION, CONTACT:
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