

2007 Monitoring Summary



Hines Creek on New Hope Road in Hale County (32.69181/-87.76383)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Hines Creek watershed for biological and water quality monitoring as part of the 2007 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.

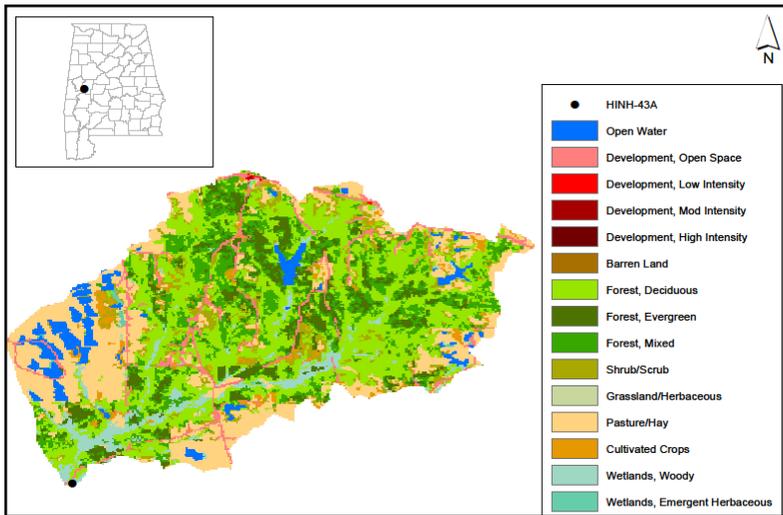


Figure 1. Sampling location and landuse within Hines Creek watershed at HINH-43A.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hines Creek at HINH-43A is a *Fish & Wildlife (F&W)* stream. It is located approximately ten miles west of the city of Greensboro in the Black Warrior River basin (Figure 1). According to the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (56%) and pasture/hay. As of February 23, 2011, ADEM's NPDES Management System database showed only one permitted discharge located within the watershed. Hines Creek from approximately 0.8 miles upstream of HINH-43A downstream to its confluence with the Black Warrior River is located in Southeastern Floodplains and Low Terraces ecoregion, 65p. The stream originates in Fall Line Hills ecoregion, 65i, and flows through the Blackland Prairie ecoregion, 65a, upstream.

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. Hines Creek at HINH-43A is a low-gradient stream, characterized by a sandy substrate. Overall habitat quality was categorized as *sub-optimal* as a result of poor instream habitat quality.

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* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Black Warrior River	
Drainage Area (mi ²)	14	
Ecoregion ^a	65p	
% Landuse		
Open water		<1
Wetland	Woody	5
	Emergent herbaceous	<1
	Deciduous	32
Forest	Evergreen	9
	Mixed	15
Shrub/scrub		7
Grassland/herbaceous		<1
Pasture/hay		21
Cultivated crops		2
	Open space	5
Development	Low intensity	<1
		<1
Barren		<1
Population/km ^{2b}	131	
# NPDES Permits ^c	TOTAL	1
Construction Stormwater		1

a. Southeastern Floodplains & Low Terraces

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011.

Table 2. Physical characteristics of Hines Creek at HINH-43A, May 2, 2007.

Physical Characteristics	
Canopy Cover	Mostly Shaded
Width (ft)	7
Depth (ft)	
Run	1.3
Pool	2.5
% of Reach	
Run	50
Pool	50
% Substrate	
Clay	2
Sand	80
Silt	5
Organic Matter	13

Table 3. Results of the habitat assessment conducted on Hines Creek at HINH-43A, May 2, 2007.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	29	Poor (<40)
Sediment Deposition	64	Sub-optimal (53-65)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	50	Marginal (35-59)
Riparian Buffer	75	Sub-optimal (70-89)
Habitat Assessment Score	117	
% Maximum score	53	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Hines Creek, May 2, 2007.

Macroinvertebrate Assessment				
	Results	Scores	Rating	
Taxa richness measures				
# EPT genera	10	40	Fair (38-56)	
Taxonomic composition measures				
% Non-insect taxa	16	47.4	Poor (30.9-61.8)	
% Plecoptera	0	1.6	Very Poor (<=1.85)	
% Dominant taxa	10	100.0	Excellent (>=85.3)	
Functional composition measures				
% Predators	15	50.1	Good (45.3-72.1)	
Tolerance measures				
Beck's community tolerance index	1	4.5	Very Poor (<=10.5)	
% Nutrient tolerant organisms	23	78.0	Good (76.3-88.1)	
WMB-I Assessment Score	--	46	Fair (38-56)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2007 to help identify any stressors to the biological communities. Due to extremely slow moving water, flow was only measurable in March, April, and early May. Dissolved oxygen values were below water quality criteria for the streams *F&W* use classification during the five sampling events that the flow was undetectable. Dissolved thallium exceeded the human health fish consumption criteria during one sampling event.

SUMMARY

Hines Creek is a low gradient, sandy bottomed stream that flows through Fall Line Hills, Blackland Prairie, and Southeastern Plains and Low Terraces ecoregions. The data presented in this report will be used to develop water quality criteria for Coastal Plain streams.

Results of the habitat assessment indicated the habitat of Hines Creek at HINH-43A to be in *sub-optimal* condition. However, bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Extremely low flows and low dissolved oxygen concentrations measured June through October are potential causes of the stressed biological conditions. Monitoring should continue to ensure that water quality and biological condition remain stable.

FOR MORE INFORMATION, CONTACT:
 Rebekah Moore, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2759 rcmoore@adem.state.al.us

Table 5. Summary of water quality data collected March-October, 2007. 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)	8	13.0	24.2	19.7	19.2	3.3	
Turbidity (NTU)	8	9.0	30.3	14.1	15.1	6.6	
Total Dissolved Solids (mg/L)	7	54.0	203.0	97.0	108.0	45.6	
Total Suspended Solids (mg/L)	7	6.0	14.0	8.0	9.3	3.4	
Specific Conductance (µmhos)	8	98.9	154.9	124.2	127.6	18.4	
Hardness (mg/L)	4	19.7	49.0	44.6	39.5	13.4	
Alkalinity (mg/L)	7	5.2	64.1	45.2	43.8	19.7	
Stream Flow (cfs)	3	1.5	4.4	1.7	2.5	1.6	
Chemical							
Dissolved Oxygen (mg/L)	8	2.2 ^C	8.3	4.7	5.2	2.2	5
pH (su)	8	6.3	7.2	6.7	6.7	0.4	
Ammonia Nitrogen (mg/L)	7	< 0.015	0.051	0.042	0.034	0.020	
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.115	0.043	0.052	0.036	
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	1.032	0.271	0.339	0.325	
Total Nitrogen (mg/L)	7	< 0.111	1.111	0.307	0.392	0.344	
Dissolved Reactive Phosphorus (mg/L)	7	0.016	0.104	0.021	0.039	0.033	
Total Phosphorus (mg/L)	7	0.078	0.143	0.130	0.116	0.028	
CBOD-5 (mg/L)	7	< 1.0	3.8	1.2	1.6	1.2	
^J Chlorides (mg/L)	7	4.7	10.6	6.0	6.6	1.9	
Atrazine (µg/L)	1	<	<	<	0.05		
Total Metals							
^J Aluminum (mg/L)	4	< 0.310	< 0.500	0.340	0.353	0.099	
Iron (mg/L)	4	1.600	5.560	1.720	2.650	1.943	
^J Manganese (mg/L)	4	0.355	1.870	0.650	0.882	0.674	
Dissolved Metals							
^J Aluminum (mg/L)	4	< 0.015	< 0.500	0.126	0.127	0.116	
Antimony (µg/L)	4	< 2.0	< 7.5	1.7	2.1	1.3	
Arsenic (µg/L)	4	< 2.2	< 5.0	1.8	1.8	0.8	
Cadmium (mg/L)	4	< 0.0002	< 0.005	0.001	0.001	0.001	
Chromium (mg/L)	4	< 0.004	< 0.010	0.002	0.003	0.001	
Copper (mg/L)	4	< 0.005	< 0.010	0.002	0.003	0.001	
^J Iron (mg/L)	4	0.150	0.640	0.366	0.380	0.211	
Lead (µg/L)	4	< 1.5	< 5.0	1.6	1.6	1.0	
^J Manganese (mg/L)	4	0.171	0.670	0.456	0.438	0.225	
Mercury (µg/L)	4	< 0.030	< 0.500	0.200	0.166	0.111	
Nickel (mg/L)	4	< 0.005	< 0.010	0.003	0.003	0.001	
Selenium (µg/L)	4	< 1.6	< 7.5	1.7	2.0	1.4	
Silver (mg/L)	4	< 0.001	< 0.003	0.001	0.001	0.001	
Thallium (µg/L)	4	< 0.6	< 9.0 ^H	1.4	1.9	2.0	1
Zinc (mg/L)	4	< 0.006	0.050	0.016	0.021	0.023	
Biological							
^J Chlorophyll a (ug/L)	7	1.53	17.55	2.29	5.13	5.74	
^J Fecal Coliform (col/100 mL)	7	47	> 890	110	256	310	

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