ADEM
Alabama Department of Environmental Management
Ambient Monitoring Site

Rivers and Streams Monitoring Program

2007 Monitoring Summary

TM

Fair

Hurricane Creek at Tuscaloosa County Road 88 near Peterson (33.22983/-87.46181)

BACKGROUND

Hurricane Creek at H-1 is one of a network of 94 ambient sites monitored annually by the Alabama Department of Environmental Management (ADEM) to identify long-term trends in water quality and to provide data for the development of Total Maximum Daily Loads (TMDL) and water quality criteria. Hurricane Creek was also selected 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. Hurricane Creek was placed on Alabama's §303 (d) list of impaired water bodies in 1996 for metals contamination, pH, siltation, and organic enrichment/low dissolved oxygen. Surface and subsurface mining, as well as tailings from milling and mining, were identified as potential sources of contamination. TMDLs were finalized by the Environmental Protection Agency (EPA) in 2004.

Figure 1. Hurricane Creek at H-1, June 8, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hurricane Creek is a Fish & Wildlife (F&W) stream in Tuscaloosa County. Based on the 2000 National Land Cover Dataset, landuse within the watershed is mainly forest (69%). As of February 23, 2011, ADEM has issued 270 NPDES permits in this watershed.

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. Hurricane Creek at H-1 is a medium gradient, gravel-bottomed stream (Figure 1). Overall habitat quality was categorized as *sub-optimal* for supporting macroinvertebrate populations. However, high sediment loads (loss of interstitial spaces) and unstable bank conditions were observed in the reach

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 macro-invertebrate community. Each metric is scored on a 100 point scale. The final score is the average of all metric scores. Metric results indicated the macroinvertebrate community in Hurricane Creek at H-1 to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		113
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	29
	Evergreen	26
	Mixed	14
Shrub/scrub		6
Grassland/herbaceous		4
Pasture/hay		5
Cultivated crops		1
Development	Open space	7
	Low intensity	2
	Moderate intensity	1
	High intensity	<1
Barren		1
Population/km^2[b]		56
# NPDES Permits[c]	**TOTAL**	270
Construction Stormwater		214
Mining		29
Industrial General		7
Industrial Individual		4
Municipal Individual		11
Underground Injection Control		5

a. Shale Hills
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Hurricane Creek at H-1, May 9, 2007.

Physical Characteristics	
Width (ft)	40
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	2.0
Run	3.0
Pool	3.0
% of Reach	
Riffle	25
Run	65
Pool	10
% Substrate	
Boulder	1
Cobble	2
Gravel	44
Sand	35
Silt	10
Organic Matter	8

Table 3. Results of the habitat assessment conducted in Hurricane Creek at H-1, May 9, 2007.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	64	Sub-optimal (59-70)
Sediment Deposition	49	Marginal (41-58)
Sinuosity	58	Marginal (45-64)
Bank and Vegetative Stability	59	Marginal (35-59)
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	**144**	
% Maximum Score	**60**	**Sub-optimal (59-70)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Hurricane Creek at H-1, May 9, 2007.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness measures		**(0-100)**
# EPT taxa	14	43
Taxonomic composition measures		
% Non-insect taxa	8	71
% Dominant taxon	31	44
% EPC taxa	24	44
Functional feeding group measures		
% Predators	8	29
Tolerance measures		
% Taxa as Tolerant	31	53
WMB-I Assessment Score	---	**47**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements were collected monthly during water sampling between March and October and during the macroinvertebrate assessment in May 2007 to help identify any stressors to the biological communities. The fecal coliform count did not meet *F&W* use classification criteria on April 26, 2007. Turbidity was also greater than 50 NTU above background levels on this date. However, field notes indicated it had rained before sampling. Flows were above normal. Specific conductance, hardness, and total dissolved solids concentrations were higher than expected for the ecoregion. Organics were collected once on September 26, 2007. All results

SUMMARY

Results for the 2007 bioassessment indicated the macroinvertebrate community to be in *fair* condition. Although Hurricane Creek at H-1 overall had a *sub-optimal* habitat quality score, sedimentation appears to be one of the main factors impacting biological communities. Habitat destruction during high flow events appears to be another factor. Concentrations of total dissolved solids, hardness, and specific conductance were elevated as compared to data from ADEM's least-impaired reference reaches. The data presented in this report and all other available data will be reviewed to identify the causes and sources of the degraded biological conditions.

Table 5. Summary of water quality data collected during 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)	9		16.7	28.4	23.1	22.7	4.2	
Turbidity (NTU)	9		1.0	203.0 T	2.7	25.5	66.6	
Total Dissolved Solids (mg/L)	8		67.0	2,258.0	237.0 M	469.8	726.2	
Total Suspended Solids (mg/L)	8		1.0	221.0	2.5	31.4	76.8	
Specific Conductance (μmhos)	9		259.7	1,218.0	420.0 G	498.9	293.9	
Hardness (mg/L)	6		99.4	180.0	145.0 G	142.6	32.0	
Alkalinity (mg/L)	8		25.0	47.8	35.4	35.6	9.0	
Stream Flow (cfs)	8		5.5	36.9	12.7	16.1	12.1	
Chemical								
Dissolved Oxygen (mg/L)	9		6.7	9.4	8.5	8.3	0.8	
pH (su)	9		6.9	8.1	7.6	7.5	0.4	
Ammonia Nitrogen (mg/L)	8	<	0.015	0.052	0.008	0.014	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	8		0.072	0.375	0.205	0.204	0.092	
Total Kjeldahl Nitrogen (mg/L)	8	<	0.150	0.607	0.246	0.248	0.183	
Total Nitrogen (mg/L)	8	<	0.207	0.757	0.444	0.452	0.187	
J Dissolved Reactive Phosphorus (mg/L)	8	<	0.004	0.047	0.010	0.013	0.014	
Total Phosphorus (mg/L)	8		0.016	0.055	0.018	0.023	0.013	
CBOD-5 (mg/L)	8	<	1.0	1.6	0.8	1.0	0.5	
J Chlorides (mg/L)	8		5.2	124.3	8.7 M	22.7	41.1	
Atrazine (μg/L)	1					0.08		
Total Metals								
Aluminum (mg/L)	3		0.053	0.330	0.170	0.184	0.139	
Iron (mg/L)	3		0.091	0.410	0.300	0.267	0.162	
Manganese (mg/L)	3		0.108	0.140	0.120	0.123	0.016	
Dissolved Metals								
Aluminum (mg/L)	1				<	0.200		
J Antimony (μg/L)	1					6.0		
Arsenic (μg/L)	1				<	5.0		
Cadmium (mg/L)	1				<	0.009		
Chromium (mg/L)	1				<	0.010		
Copper (mg/L)	1				<	0.010		
Iron (mg/L)	1				<	0.050		
J Lead (μg/L)	1					4.0		
Manganese (mg/L)	1					0.070		
Mercury (μg/L)	1				<	0.0		
Nickel (mg/L)	1				<	0.010		
Selenium (μg/L)	1				<	5.0		
Silver (mg/L)	1				<	0.009		
Thallium (μg/L)	1				<	9.0		
Zinc (mg/L)	1				<	0.010		
Biological								
J Chlorophyll a (ug/L)	8		0.10	20.03	1.74	3.76	6.68	
J Fecal Coliform (col/100 mL)	8		10	>3100 C	62	454	1,072	1

C=value exceeds established criterion for *F&W* water use classification; E= # samples that exceed criterion; G=value > median concentration of all verified reference data collected in ecoregion 68; J=estimate; N= # samples; M=value exceeds the 90th percentile of all verified reference data collected in ecoregion 68; T=value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 68.