

# 2005 Monitoring Summary



## Hurricane Creek at Randolph County Road 26 (33.17546/-85.59829)

### BACKGROUND

Hurricane Creek is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable condition” reference watershed for comparison with streams throughout the Piedmont ecoregion. Silver Creek was selected for biological and water quality monitoring as part of the 2005 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each site and to estimate overall water quality within the ACT basin group.

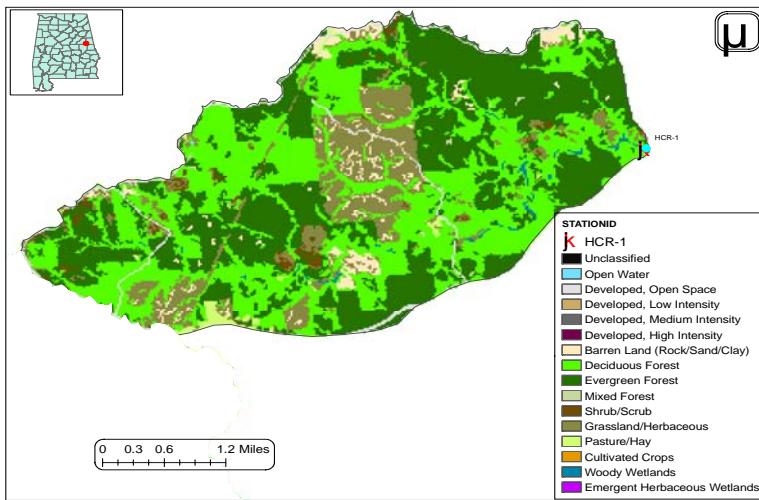


Figure 1. Sampling location and landuse within the Hurricane Creek watershed at HCR-1.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hurricane Creek is a small *Fish & Wildlife (F&W)* stream located near the city of Wadley in the Tallapoosa River basin (Fig. 1). Landuse within the watershed is primarily forest (79%), with some grassland areas. The presence of deciduous forest and evergreen forests are characteristic of streams in the Southern Inner Piedmont (Table 1).

### REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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 HCR-1 is a low-gradient, sand-bottomed stream. Overall habitat quality was categorized as *sub-optimal* due to low sinuosity and limited riparian buffers. Some sedimentation was also noted within 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 macroinvertebrate community. Each metric is scored on a 100 point scale. The final score is an average of the score for each metric. Metric results indicated the macroinvertebrate community to be in *excellent* (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi <sup>2</sup> )	14
Ecoregion <sup>a</sup>	45a
% Landuse	
Open water	<1
Wetland	Woody 1
Forest	Deciduous 40
	Evergreen 39
	Mixed <1
Shrub/scrub	1
Grassland/herbaceous	13
Pasture/hay	1
Development	Open space 2
	Low intensity <1
Barren	3
Population/km <sup>2b</sup>	8
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 2
Mining General Permit (old)	2

a. Southern Inner Piedmont

b. 2000 US Census Data

c. #NPDES permits downloaded from ADEM’s NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics at HCR-1, May 10, 2005.

Physical Characteristics	
Width (ft)	35
Canopy cover	Mostly Open
Depth (ft)	
	Riffle 0.5
	Run 1.3
	Pool 2.0
% of Reach	
	Riffle 10
	Run 85
	Pool 5
% Substrate	
	Boulder 2
	Cobble 10
	Gravel 25
	Sand 55
	Silt 4
	Organic Matter 4

**Table 3.** Results of the habitat assessment conducted May 10, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	73	Optimal (> 70)
Sediment deposition	65	Sub-optimal (59-70)
Sinuosity	58	Marginal (45-64)
Bank and vegetative stability	76	Optimal (≥75)
Riparian buffer	50	Marginal (50-69)
Habitat assessment score	165	
<b>% Maximum score</b>	<b>69</b>	<b>Sub-optimal (59-70)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted May 10, 2005.

Macroinvertebrate Assessment Results			
	Results Scores		Rating
	(0-100)		
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	14	100	Excellent (>85)
# Plecoptera (stonefly) genera	8	100	Excellent (>75)
# Trichoptera (caddisfly) genera	11	92	Excellent (>83)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	3	90	Excellent (>87.1)
% Non-insect organisms	0	99	Excellent (>97)
% Plecoptera	13	63	Excellent (>59.8)
<b>Tolerance measures</b>			
Beck's community tolerance index	33	100	Excellent (>80.4)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>92</b>	<b>Excellent (&gt;86)</b>

## 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 2005 to help identify any stressors to the biological communities. Median values of nitrate+nitrite-nitrogen, hardness, and alkalinity were above concentrations expected in this ecoregion.

## CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *excellent* condition. However, results of habitat and water sampling suggested the potential for sedimentation and nutrient enrichment to become issues at the site.

**Table 5.** Summary of water quality data collected March-October, 2005. 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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	9	12.0	23.0	21.4	19.6	3.9
Turbidity (NTU)	9	2.1	6.5	3.0	3.5	1.7
Total dissolved solids (mg/L)	7	29.0	145.0	68.0	70.6	38.0
Total suspended solids (mg/L)	7	5.0	70.0	14.0	23.6	22.5
Specific conductance (µmhos)	9	5.1	22.1	18.0	16.9	5.1
Hardness (mg/L)	5	5.3	101.0	45.8 <sup>M</sup>	52.9	41.0
Alkalinity (mg/L)	7	5.6	92.3	58.5 <sup>M</sup>	55.9	34.0
Stream Flow (cfs)	7	4.4	36.5	17.7	16.3	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	9	8.0	10.1	8.8	8.9	0.7
pH (su)	9	6.8	8.27	7.0	7.1	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	0.019	< 0.015	0.014	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	0.023	0.332	0.246 <sup>M</sup>	0.219	0.092
Total Kjeldahl Nitrogen (mg/L)	7	< 0.098	0.488	0.125	0.178	0.147
Total nitrogen (mg/L)	7	0.192	0.734	0.401	0.428	0.161
Dissolved reactive phosphorus (mg/L)	7	0.005	0.020	0.010	0.010	0.005
Total phosphorus (mg/L)	7	0.018	0.066	0.046	0.045	0.017
CBOD-5 (mg/L)	7	< 1.0	4.5	0.5	1.7	1.8
Chlorides (mg/L)	7	3.6	4.6	4.0	4.1	0.4
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
<b>Total Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.102	0.0235	0.039	0.0
Iron (mg/L)	4	0.141	0.355	0.3155	0.282	0.1
Manganese (mg/L)	4	0.005	0.115	0.06	0.059	0.0
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.0075	0.008	0.0
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	3	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	4	< 0.005	0.084	0.0705	0.0569	0.0
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.021	0.0053	0.009	0.0
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.1875	0.1
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
<b>Biological</b>						
Chlorophyll a (µg/L)	7	0.71	3.47	2.85	2.45	1.1
Fecal Coliform (col/100 mL)	7	5	510	150	208	174

J=estimate; N=# samples; M=value > 90% of all data collected within eco-region 45a

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