

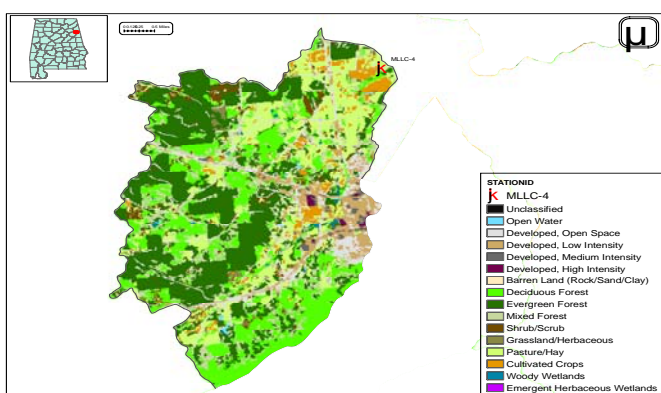
# 2005 Monitoring Summary



## Mill Creek at Cherokee County Road 2 (33.97058/-85.60120)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Mill Creek watershed 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 monitoring site and to estimate overall water quality within the ACT basin group.



**Figure 1.** Sampling location and landuse within the Mill Creek watershed at MLLC-4.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mill Creek at MLLC-4 is a small *Fish & Wildlife (F&W)* stream located near the city of Piedmont (Fig. 1). This watershed falls within the Southern Limestone ecoregion, usually characterized by mid to low gradient streams with bedrock substrates. Landuse within the watershed is primarily forest (62%) including many pine plantations and some areas of pasture and hay.

### 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. Mill Creek at MLLC-4 is a high-gradient, bedrock-bottomed stream in the Coosa River basin. The reach was characterized by a higher gradient than is typical for this ecoregion. Overall habitat quality was categorized as *optimal* due to good instream habitat quality and bank and vegetative stability.

### 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 *poor* condition (Table 4).

**Table 1.** Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi <sup>2</sup> )		23
Ecoregion <sup>a</sup>		67f
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	21
	Evergreen	30
	Mixed	11
Shrub/scrub		3
Grassland/herbaceous		2
Pasture/hay		16
Cultivated crops		3
Development	Open space	8
	Low intensity	5
	Moderate intensity	1
	High intensity	<1
Barren		<1
Population/km <sup>2b</sup>		40
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	7
	Construction Stormwater	3
	Mining General Permit (old)	3
	Underground Injection Control	1

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 US census data

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

**Table 2.** Physical characteristics at MLLC-4, May 4, 2005.

Physical Characteristics		
Width (ft)		25
Canopy cover		Est. 50/50
Depth (ft)	Riffle	0.55
	Run	1.0
	Pool	1.8
% of Reach	Riffle	15
	Run	75
	Pool	10
% Substrate	Bedrock	68
	Boulder	5
	Cobble	5
	Gravel	10
	Sand	1
	Silt	4
	Organic Matter	7

**Table 3.** Results of the habitat assessment conducted on Mill Creek at MLLC-4, May 4, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	88	Optimal (> 70)
Sediment deposition	88	Optimal (> 70)
Sinuosity	70	Sub-optimal (65-84)
Bank and vegetative stability	89	Optimal (≥75)
Riparian buffer	74	Sub-optimal (70-90)
Habitat assessment score	200	
<b>% Maximum score</b>	<b>83</b>	<b>Optimal (&gt; 70)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Mill Creek at MLLC-4, May 4, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
	(0-100)		
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	7	58	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	11	57	Fair (49.4-74.1)
% Non-insect organisms	7	82	Fair (62.7-93.9)
% Plecoptera	1	3	Very Poor (<6.56)
<b>Tolerance measures</b>			
Beck's community tolerance index	9	32	Poor (20.2-40.7)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>44</b>	<b>Poor (24-48)</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 concentrations of nitrate+nitrite-nitrogen, total phosphorus, and chlorides were above values expected in this ecoregion. Median concentrations of all other parameters, including pesticides and semi-volatiles, were similar to expected values.

## CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was categorized as *optimal* due to in stream habitat quality, lack of sediment deposition and bank and vegetative stability. Nutrients (nitrate+nitrite-nitrogen, total phosphorus) and chlorides were parameters of concern at this site.

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**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)	8	12.5	26.0	18.3	18.9	4.6
Turbidity (NTU)	8	5.8	71.4	9.5	18.9	22.4
Total dissolved solids (mg/L)	7	69.0	147.0	87.5	101.8	35.4
Total suspended solids (mg/L)	7	5.0	71.0	8.5	21.7	26.0
Specific conductance (µmhos)	8	126.8	248.4	183.9	186.7	38.6
Hardness (mg/L)	5	55.1	132.0	83.7	87.4	29.8
Alkalinity (mg/L)	7	45.6	128.3	81.9	78.8	23.7
Stream Flow (cfs)	7	4.0	55.4	15.4	20.5	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	8	6.3	9.9	8.4	8.2	1.5
pH (su)	8	7.0	8.08	7.6	7.5	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.011	0.011	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	0.132	0.394	0.243 <sup>M</sup>	0.252	0.088
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.564	0.075	0.222	0.230
Total nitrogen (mg/L)	7	0.284	0.854	0.402	0.474	0.222
Dissolved reactive phosphorus (mg/L)	7	0.004	0.019	0.010	0.011	0.005
Total phosphorus (mg/L)	7	0.018	0.082	0.065 <sup>M</sup>	0.058	0.025
<sup>J</sup> CBOD-5 (mg/L)	7	< 1.0	4.0	1.6	1.9	1.2
<sup>J</sup> Chlorides (mg/L)	6	4.3	5.4	4.4 <sup>M</sup>	4.7	0.5
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	
<b>Total Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.089	0.086	0.074	0.023
Iron (mg/L)	4	0.077	0.358	0.314	0.323	0.031
Manganese (mg/L)	4	0.032	0.124	0.04	0.065	0.051
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	< 0.005	0.092	0.079	0.058	0.048
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	0.012	0.044	0.013	0.019	0.012
<sup>J</sup> Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.2	0.1
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
<b>Biological</b>						
<sup>J</sup> Chlorophyll a (µg/L)	7	0.36	4.81	1.35	1.84	1.7
<sup>J</sup> Fecal Coliform (col/100 mL)	7	93	1700	495 <sup>M</sup>	636	635

J=estimate; N=# samples; M=value > 90th percentile of all data collected within eco-region  
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