

2005 Monitoring Summary



Mill Creek at Cherokee County Rd. 56 (34.32758/-85.50294)

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.

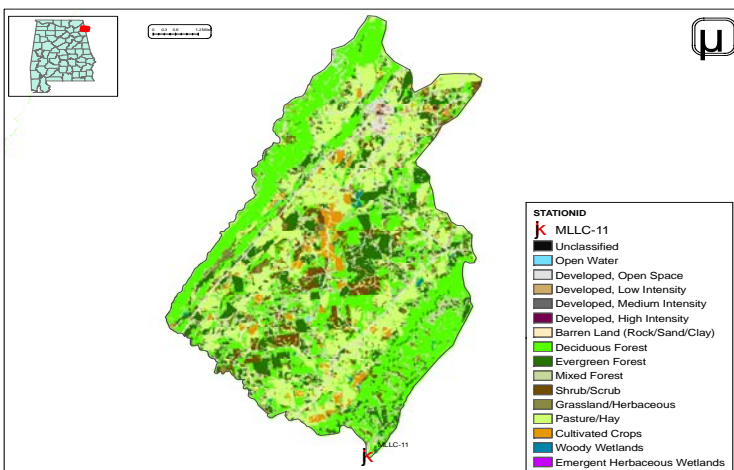


Figure 1. Sampling location and landuse within the Mill Creek watershed at MLLC-11.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mill Creek is a *Fish & Wildlife (F&W)* stream located near the city Gaylesville. Landuse within the watershed is primarily forest (59%), with some pasture areas. There are two permitted discharges located in the watershed (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. Mill Creek at MLLC-11 is a low-gradient stream with cobble and gravel substrates. It is located in Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion (67f). Overall habitat quality was categorized as *optimal*.

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 characterized by pollution-tolerant taxa groups, indicating *fair* community condition.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		66
Ecoregion ^a		67f
% Landuse		
Open water		<1
Wetland		<1
	Emergent herbaceous	<1
Forest	Deciduous	34
	Evergreen	13
	Mixed	12
Shrub/scrub		6
Grassland/herbaceous		2
Pasture/hay		23
Cultivated crops		3
Development	Open space	5
	Low Intensity	<1
	Moderate Intensity	<1
Barren		<1
Population/km ^{2b}		8
# NPDES Permits ^c	TOTAL	2
Construction Stormwater		1
Industrial General		1

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 U.S. Census Data

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

Table 2. Physical characteristics of Mills Creek at MLLC-11, May 19, 2005.

Physical characteristics	
Width (ft)	30
Canopy cover	Mostly Open
Depth (ft)	
	Riffle 0.5
	Run 2.5
	Pool 3.5
% of Reach	
	Riffle 10
	Run 80
	Pool 10
% Substrate	
	Bedrock 10
	Boulder 5
	Cobble 50
	Gravel 20
	Sand 12
	Organic Matter 3

Table 3. Results of the habitat assessment conducted on Mill Creek at MLLC-11 on May 19, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	86	Optimal (>65)
Sediment deposition	85	Optimal (>65)
Sinuosity	93	Optimal (≥85)
Bank and vegetative stability	54	Marginal (35-59)
Riparian buffer	78	Sub-optimal (70-90)
Habitat assessment score	193	
% Maximum score	80	Optimal (>65)

Table 4. Results of the macroinvertebrate bioassessment conducted on Mill Creek at MLLC-11 on May 19, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	11	92	Excellent (>85)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	9	75	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	12	52	Fair (49.4-74.1)
% Non-insect organisms	2	95	Good (93.9-97.0)
% Plecoptera	0	1	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	10	36	Poor (20.2-40.7)
WMB-I Assessment Score	---	52	Fair (48-72)

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 total nitrogen, nitrate+nitrite-nitrogen, chlorides and hardness concentrations were above values expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Nutrient, chlorides, and hardness concentration values appear elevated and may be contributing to the degraded biological condition.

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.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	8	11.7	22.1	17.6	17.3	4.0
Turbidity (NTU)	8	2.9	9.5	6.0	6.4	2.3
Total Dissolved Solids (mg/L)	7	109.0	155.0	129.0	129.0	17.2
Total Suspended Solids (mg/L)	7	5.0	30.0	9.0	11.4	8.6
Specific Conductance (µmhos)	8	187.9	285.7	251.3	244.9	31.9
Hardness (mg/L)	5	103.0	142.0	130.0 ^M	122.0	17.2
Alkalinity (mg/L)	7	94.7	122.9	119.3	114.9	9.8
Stream Flow (cfs)	8	15.6	102.8	39.3	46.8	---
Chemical						
Dissolved Oxygen (mg/L)	8	8.0	11.9	9.0	9.6	1.4
pH (su)	8	7.3	8.1	7.6	7.6	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.017	0.008	0.009	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	0.081	0.577	0.433 ^M	0.408	0.186
Total Kjeldahl Nitrogen (mg/L)	7	0.150	0.319	0.075	0.154	0.105
Total Nitrogen (mg/L)	7	0.156	0.883	0.508	0.563	0.275
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.016	0.008	0.008	0.006
Total Phosphorus (mg/L)	6	< 0.004	0.044	0.033	0.028	0.017
CBOD-5 (mg/L)	7	< 1.0	6.9	1.8	2.4	2.3
Chlorides (mg/L)	7	4.2	9.1	4.6 ^M	5.2	1.8
Atrazine (µg/L)	1	< 0.05	< 0.05	0.03	0.03	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.096	0.016	0.034	0.042
Iron (mg/L)	4	0.095	0.147	0.133	0.127	0.025
Manganese (mg/L)	4	< 0.005	0.02	0.016	0.013	0.008
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.143	0.008	0.041	0.068
Antimony (µg/L)	4	< 2	< 2	1	1	---
Arsenic (µg/L)	3	< 10	< 10	5	5	---
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	---
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	---
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	---
Iron (mg/L)	4	< 0.005	0.033	0.0073	0.013	0.014
Lead (µg/L)	4	< 2	< 2	1	1	---
Manganese (mg/L)	4	< 0.005	0.006	0.003	0.003	0.002
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	---
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	---
Selenium (µg/L)	4	< 10	< 10	5	5	---
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	---
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	---
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	---
Biological						
^J Chlorophyll a (µg/L)	7	0.53	5.34	1.07	1.64	1.66
^J Fecal Coliform (col/100 mL)	7	20	320	120	143	96

J=estimate; N=# samples; M=value > 90% of all verified ecoregional reference reach data collected in ecoregion 67f.

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