

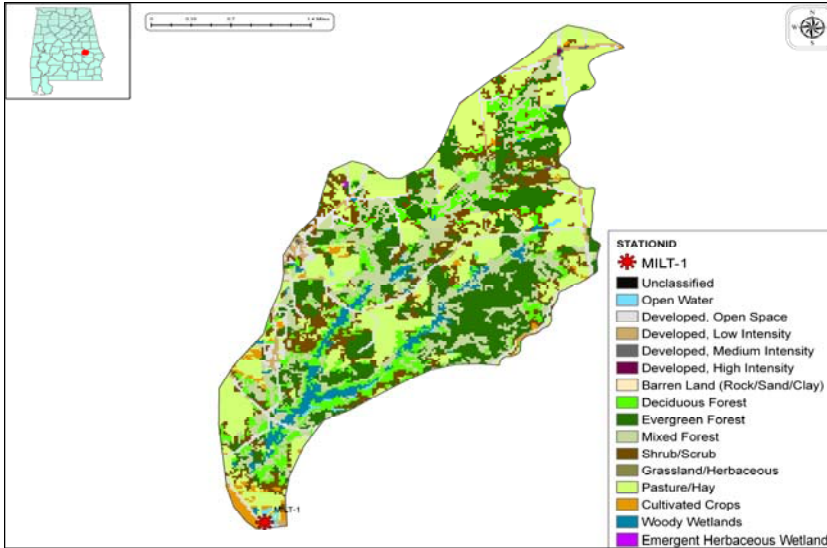
# 2005 Monitoring Summary



**Mill Creek at County Road 51 crossing near Tallapoosa/Macon Co. Line (32.49542 /-85.86883)**

## 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 land use within the Mill Creek watershed at MILT-1.

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mill Creek is a small *Fish and Wildlife (F&W)* stream located near the city of Tallassee (Fig. 1). Land use within the watershed is primarily forest (49%), with some agricultural (28%) and urban areas (9%). State Highway 14 runs through the upper reaches of the watershed. The presence of wetland and swamp areas are characteristic of streams in

## 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 MILT-1 is a low-gradient stream characterized by sand, gravel, and silt substrates in the Tallapoosa River basin. Overall habitat quality was categorized as *marginal*.

## 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* community condition (Table 4).

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

Watershed Characteristics	
Drainage Area (mi <sup>2</sup> )	8
Ecoregion <sup>a</sup>	65p
% Landuse	
Open water	1
Wetland	Woody 4
Emergent herbaceous	<
Forest	Deciduous 10
Evergreen	21
Mixed	18
Shrub/scrub	11
Pasture/hay	26
Cultivated crops	2
Development	Open space 6
Low intensity	2
Moderate intensity	<1
High intensity	<1
Barren	
Population/km <sup>2b</sup>	19
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 1
Mining	1

a. Southeastern Flood Plains and Low Terraces

b. 2000 US Census

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

**Table 2.** Physical characteristics of Mill Creek at MILT-1, June 22, 2005.

Physical Characteristics	
Width (ft)	20
Canopy cover	Mostly Open
Depth (ft)	
Riffle	0.5
Run	1.0
Pool	2.5
% of Reach	
Riffle	5
Run	45
Pool	50
% Substrate	
Cobble	5
Gravel	28
Sand	45
Silt	15
Organic Matter	7

**Table 3.** Results of the habitat assessment conducted on Mill Creek at MILT-1 June 22, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	51	Marginal (41-58)
Sediment deposition	41	Marginal (41-58)
Sinuosity	50	Marginal (45-64)
Bank and vegetative stability	38	Marginal (35-59)
Riparian buffer	38	Poor (<50)
Habitat assessment score	111	
<b>% Maximum score</b>	<b>46</b>	<b>Marginal (41-58)</b>

**Table 4.** Results of the macroinvertebrate bioassessment in Mill Creek at MILT-1 conducted June 22, 2005.

Macroinvertebrate Assessment Results			
	Results Scores		Rating
	(0-100)		
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	5	42	Poor (23-46)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	6	50	Fair (45-66)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	15	39	Poor (24.7-49.4)
% Non-insect organisms	3	92	Fair (62.7-93.9)
% Plecoptera	1	3	Very Poor (<6.56)
<b>Tolerance measures</b>			
Beck's community tolerance index	4	14	Very Poor (<20.2)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>37</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 concentration of total dissolved and suspended solids, chlorides, CBOD-5, nutrients (total phosphorus, total nitrogen, nitrate + nitrite nitrogen, TKN, DRP), chlorophyll-a, and dissolved iron and manganese were higher than expected based on the 25th percentile of data collected in ecoregion 65p.

## CONCLUSIONS

Bioassessment results indicate the macroinvertebrate community in poor condition. Results of a habitat assessment and monthly water sampling suggest habitat degradation, sedimentation, nutrient enrichment and metals to be potential causes of the degraded biological condition.

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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.

Parameter	N	Min	Max	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	9	17.0	32.0	24.0	24.0	5.0
Turbidity (NTU)	9	6.8	15.6	10.4	10.2	2.8
Total dissolved solids (mg/L)	8	1.0	89.0	57.0 <sup>M</sup>	41.4	27.2
Total suspended solids (mg/L)	8	1.0	38.0	9.0 <sup>M</sup>	10.4	8.7
Specific conductance (µmhos)	9	30.9	48.6	42.1	41.6	4.7
Hardness (mg/L)	5	7.0	9.5	8.5	8.4	1.0
Alkalinity (mg/L)	8	1.0	9.1	7.9	6.4	3.2
Stream Flow (cfs)	9	3.6	15.1	6.9	8.2	0.0
<b>Chemical</b>						
Dissolved oxygen (mg/L)	9	6.9	9.2	7.8	7.8	0.8
pH (su)	9	6.3	7.11	6.6	6.7	0.2
Ammonia Nitrogen (mg/L)	8	< 0.015	< 0.015	0.008 <sup>M</sup>	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	8	0.003	0.448	0.199 <sup>M</sup>	0.231	0.151
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.784	0.231 <sup>M</sup>	0.368	0.261
Total nitrogen (mg/L)	8	0.308	0.969	0.511 <sup>M</sup>	0.579	0.261
Dissolved reactive phosphorus (mg/L)	8	< 0.004	0.019	0.008 <sup>M</sup>	0.007	0.005
Total phosphorus (mg/L)	8	0.014	0.076	0.048 <sup>M</sup>	0.045	0.025
CBOD-5 (mg/L)	8	< 1.0	2.5	1.4 <sup>M</sup>	1.4	0.8
<sup>J</sup> Chlorides (mg/L)	8	1.0	15.97	6.0 <sup>M</sup>	7.1	5.0
Atrazine (µg/L)	2	< 0.05	0.12	0.07	0.07	0.07
<b>Total Metals</b>						
Aluminum (mg/L)	4	0.015	0.164	0.055	0.070	0.1
Iron (mg/L)	4	2.16	3.26	2.42	2.565	0.5
Manganese (mg/L)	4	0.107	0.209	0.167	0.162	0.0
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.127	0.008	0.037	0.1
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	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.0
Iron (mg/L)	4	0.246	0.798	0.479 <sup>M</sup>	0.500	0.2
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	0.055	0.215	0.123 <sup>M</sup>	0.129	0.1
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.188	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	0.002	0.002	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	0.026	0.003	0.009	0.0
<b>Biological</b>						
<sup>J</sup> Chlorophyll a (µg/L)	8	0.27	13.35	3.89 <sup>M</sup>	4.90	4.4
<sup>J</sup> Fecal Coliform (col/100 mL)	7	40	790	140	257	309

<sup>J</sup> = estimate; N=# samples; M=value > 25th percentile of all data collected within ecoregion 65p