

2008 Monitoring Summary



Mayo Mill Creek at Nalty Road in Escambia County (31.06273/-86.96919)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Mayo Mill Creek watershed for biological and water quality monitoring as part of the 1999 Basin-wide Screening Assessment of the South East Alabama (SE-AL) River Basins. The screening assessments were conducted at stream reaches where land use estimates and non-point source information from the local Soil and Water Conservation Districts indicated a moderate or high potential for impairment from nonpoint sources in non-urban areas. Results of the screening-level evaluation identified Mayo Mill Creek at MMCE-1 for further monitoring during the 2008 Basin Assessment of the South East Alabama (SE-AL) River Basins to more fully assess biological conditions at the site, as well as the extent and cause of any impairment.

Mayo Mill Creek was also selected for biological and water quality monitoring as part of the [2008 Assessment of South East Alabama \(SE-AL\) River Basins](#). The objectives of the SE-AL Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the SE-AL basin group.



Figure 1. Reach Characteristics of Mayo Mill watershed at MMCE-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Mayo Mill Creek is a small [Fish & Wildlife \(F&W\)](#) stream located in the Southern Pine Plains and Hills ecoregion (65f). It flows into Conecuh River approximately 1.5 stream miles downstream of the assessment location. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest, with some shrubs/scrubs, cultivated crops, and pasture areas. Silviculture was also prevalent in the area. As of February 23, 2011, no permits have been issued in the 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. Mayo Mill Creek at MMCE-1 is a low-gradient, sand bottomed stream reach (Figure 1). Habitat within the reach was rated as *marginal* for supporting biological communities due to a lack of in-stream habitat.

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 the average of all individual metric scores. The final score indicated the biological community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Perdido-Escambia River	
Drainage Area (mi ²)	8	
Ecoregion ^a	65f	
% Landuse		
Open water	<1	
Wetland	Woody	2
Forest	Emergent herbaceous	<1
	Deciduous	4
	Evergreen	50
Shrub/scrub	Mixed	8
		19
Grassland/herbaceous	<1	
Pasture/hay	5	
Cultivated crops	10	
Development	Open space	1
	Low intensity	<1
	Moderate intensity	<1
Population/km ² ^b	1	

a.Southern Pine Plains & Hills

b.2000 US Census

Table 2. Physical characteristics of Mayo Mill Creek at MMCE-1, May 20, 2008.

Physical Characteristics	
Width (ft)	25
Canopy Cover	Mostly Open
Depth (ft)	
	Run 0.5
	Pool 1.0
% of Reach	
	Run 90
	Pool 10
% Substrate	
	Cobble 1
	Gravel 10
	Sand 86
	Silt 1
	Organic Matter 2

Table 3. Results of the habitat assessment conducted on Mayo Mill Creek at MMCE-1, May 20, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	33	Poor <40
Sediment Deposition	58	Sub-optimal (53-65)
Sinuosity	40	Poor <45
Bank and Vegetative Stability	64	Sub-optimal (60-74)
Riparian Buffer	76	Sub-optimal (70-89)
Habitat Assessment Score	116	
% Maximum Score	53	Marginal (40-52)

Table 4. Results of the macroinvertebrate assessment conducted in Mayo Mill Creek at MMCE-1, May 20, 2008.

Macroinvertebrate Assessment			
	Results Scores		Rating
Taxa richness measures			
# EPT genera	6	24	Poor (19-37)
Taxonomic composition measures			
% Non-insect taxa	8	87	Fair (61.9-92.7)
% Plecoptera	11	54	Excellent (>52.8)
% Dominant taxa	35	39	Poor (23.5-47.0)
Functional composition measures			
% Predators	24	83	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance index	5	23	Fair (21.3-31.8)
% Nutrient tolerant organisms	42	47	Poor (25.4-50.8)
WMB-I Assessment Score	--	51	Fair (38-56)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. [In situ measurements](#) and [water samples](#) were collected in May, July and September (chemical analyses and metals) of 2008 to help identify any stressors to the biological communities. *In situ* parameters indicated Mayo Mill Creek at MMCE-1 to be meeting its [F&W](#) water use classification. But, stream pH was lower than the established criteria for [F&W](#) water use classification during all sampling events. Although streams in this ecoregion are naturally acidic, *in situ* pH was lower than expected based on ecoreference data. Metals (total and dissolved manganese, dissolved iron, total and dissolved aluminum) and specific conductance were higher than background levels based on reference reach data collected in ecoregion/subecoregion 65f.

SUMMARY

As part of the [assessment process](#), ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment results indicated the macroinvertebrate community in Mayo Mill Creek at MMCE-1 to be in *fair* condition. Metals and conductivity were higher than background levels based on reference reach data collected in ecoregion 65f. Stream pH measurements were lower than expected, based on reference data collected in ecoregion 65f. Instream habitat was also limited.

Table 5. Summary of water quality data collected March-October, 2008. 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	Q	E
Physical								
Temperature (°C)	4	21.8	28.5	26.3	25.8	2.8		
Turbidity (NTU)	4	2.0	6.3	3.0	3.6	1.9		
Total Dissolved Solids (mg/L)	3	< 1.0	54.0	22.0	25.5	26.9		
Total Suspended Solids (mg/L)	3	3.0	6.0	4.0	4.3	1.5		
Specific Conductance (µmhos)	4	61.4	73.6	71.7 ^G	69.6	5.6		
Hardness (mg/L)	3	3.0	5.0	4.9	4.3	1.1		
Alkalinity (mg/L)	3	< 1.0	1.0	0.5	0.5	0.0		
Stream Flow (cfs)	4	8.2	12.1	9.3	9.7	1.8		
Chemical								
Dissolved Oxygen (mg/L)	4	7.4	8.4	7.8	7.9	0.4		
pH (su)	4	3.6 ^C	4.3	3.8 ^M	3.9	0.3		4
Ammonia Nitrogen (mg/L)	3	< 0.015	< 0.015	0.008	0.008	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	3	0.036	0.057	0.053	0.049	0.011		
Total Kjeldahl Nitrogen (mg/L)	3	< 0.150	< 0.150	0.075	0.075	0.000		
Total Nitrogen (mg/L)	3	< 0.111	0.132	0.128	0.124	0.011		
Dissolved Reactive Phosphorus (mg/L)	3	0.009	0.013	0.012	0.011	0.002		
Total Phosphorus (mg/L)	3	< 0.013	0.024	0.006	0.012	0.010		
CBOD-5 (mg/L)	3	< 1.0	< 1.0	0.5	0.5	0.0		
Chlorides (mg/L)	3	1.8	2.6	2.0	2.2	0.4		
Total Metals								
Aluminum (mg/L)	3	0.443	0.627	0.553 ^M	0.541	0.093		
Iron (mg/L)	3	0.811	1.090	0.832	0.911	0.155		
Manganese (mg/L)	3	0.034	0.060	0.060 ^M	0.051	0.015		
Dissolved Metals								
Aluminum (mg/L)	3	0.306	0.502	0.501 ^M	0.436	0.113		
Antimony (µg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0		
Arsenic (µg/L)	3	< 2.2	< 2.2	1.1	1.1	0.0		
Cadmium (mg/L)	3	< 0.003	0.005	0.002	0.002	0.001		
Chromium (mg/L)	3	< 0.004	0.013	0.002	0.004	0.003		
Copper (mg/L)	3	< 0.005	0.013	0.002	0.004	0.002		
Iron (mg/L)	3	0.493	0.680	0.664 ^M	0.612	0.104		
Lead (µg/L)	3	< 1.5	< 1.5	0.7	0.7	0.0		
Manganese (mg/L)	3	0.032	0.060	0.058 ^M	0.050	0.016		
Mercury (µg/L)	3	< 0.0	< 0.0	0.0	0.0	0.0		
Nickel (mg/L)	3	< 0.004	0.006	0.003	0.003	0.001		
Selenium (µg/L)	3	< 1.5	1.6	0.8	0.8	0.0		
Silver (mg/L)	3	< 0.002	0.003	0.002	0.001	0.000		
Thallium (µg/L)	3	< 0.6	< 0.6	0.3	0.3	0.0		
Zinc (mg/L)	3	< 0.003	0.006	0.003	0.002	0.001		
Biological								
Chlorophyll a (ug/L)	3	0.53	2.14	0.53	1.07	0.93		
Fecal Coliform (col/100 mL)	3	3	6	4	4	2	J	

E= # samples exceeded criteria; J=estimate; N=# samples; Q=qualifier; M=value > 90% of all verified ecoregional reference data within ecoregion 65f; C=value > criteria established for *Fish & Wildlife* streams; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion (65f).

FOR MORE INFORMATION, CONTACT:
Sreeletha P. Kumar, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2782 skumar@adem.state.al.us