

2006 Monitoring Summary



Miller Creek at Grand Bay Wilmer Road (30.60518/-88.35218)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Miller Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessment were to assess each monitoring site's biological integrity and to estimate overall water quality within the EMT basin group.

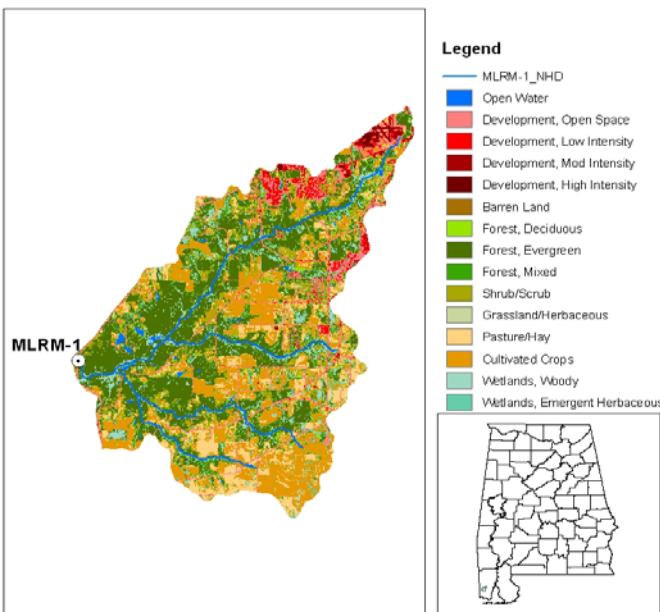


Figure 1. Land use map of Miller Creek at MLRM-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Miller Creek at MLRM-1 is a low-gradient *Fish & Wildlife (F&W)* stream in Mobile County. Land use within the watershed is forest (38%) mixed with cultivated crops, pasture, and wetlands (Figure 1). As of September 18, 2009, the Department has issued 77 NPDES permits in this 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. Miller Creek at MLRM-1 is a low gradient, sand-bottomed stream typical of the Southern Pine Plains and Hills sub-ecoregion (65f). Overall habitat quality was rated as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Escatawpa
Basin		Escatawpa
Drainage Area (mi ²)		37
Ecoregion ^a		65f
% Landuse		
Open water		1
Wetland	Woody	8
	Emergent herbaceous	1
Forest	Deciduous	2
	Evergreen	32
	Mixed	4
Shrub/scrub		13
Grassland/herbaceous		1
Pasture/hay		12
Cultivated crops		18
Development	Open space	7
	Low intensity	2
	Moderate intensity	1
	High intensity	<1
Population/km ^{2b}		114
# NPDES Permits ^c	TOTAL	77
	Construction Stormwater	66
	Mining	3
	Underground Injection Control	8

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 18 Sep 2009.

Table 2. Physical characteristics at Miller Creek at MLRM-1 on May 18, 2006

Physical Characteristics		
Width (ft)		30
Canopy cover		Mostly Open
Depth (ft)	Run	1.5
	Pool	4.0
% of Reach	Run	60
	Pool	40
% Substrate	Sand	87
	Silt	2
	Organic Matter	8
	Mud/Muck	3

Table 3. Results of the habitat assessment of Miller Creek at MLRM-1 on May 18, 2006.

Habitat Assessment	(% Maximum Score)	Rating
Instream habitat quality	52	Marginal (40-52)
Sediment deposition	80	Optimal (>65)
Sinuosity	35	Poor (<45)
Bank and vegetative stability	63	Sub-optimal (60-74)
Riparian buffer	54	Marginal (50-69)
Habitat assessment score	133	
% Maximum score	60	Sub-optimal (53-65)

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each score is based on a 100 point scale. The final score is the average of the scores for each metric. The metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment of Miller Creek at MLRM-1 on May 18, 2006.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	19	76	Good (57-78)
Taxonomic composition measures			
% Non-insect taxa	6	93	Good (92.8-96.3)
% Plecoptera	2	11	Good (5.7-52.8)
% Dominant taxa	27	58	Fair (47.1-70.5)
Functional composition measures			
% Predators	12	43	Fair (30.2-45.2)
Tolerance measures			
Beck's community tolerance index	17	77	Excellent (>65.9)
% Nutrient tolerant organisms	46	40	Poor (25.4-50.8)
WMB-I Assessment Score	---	57	Good (57-78)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October to help identify any stressors to the biological communities. Total nitrogen and nitrate+nitrite nitrogen concentrations were higher than expected based on the 90th percentile of reference data for ecoregion 65f. All other parameters were within the expected ranges for this subcoregion.

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 Miller Creek at MLRM-1 to be in *good* condition.

Table 5. Summary of water quality data collected March-October, 2006. 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
Physical						
Temperature (°C)	9	18.0	25.9	21.7	22.2	3.1
Turbidity (NTU)	9	2.1	15.3	2.6	4.2	4.2
Total Dissolved Solids (mg/L)	8	< 5.0	53.0	31.0	29.4	20.1
Total Suspended Solids (mg/L)	8	1.0	14.0	4.5	5.0	3.9
Specific Conductance (µmhos)	9	42.7	55.1	46.0	46.9	3.9
Hardness (mg/L)	3	15.0	35.0	31.0	27.0	10.6
Alkalinity (mg/L)	8	6.0	14.7	9.0	9.3	2.9
Stream Flow (cfs)	8	18.4	40.4	31.3	29.7	7.5
Chemical						
Dissolved Oxygen (mg/L)	9	6.5	8.9	7.5	7.5	0.7
pH (su)	9	6.2	8.6	6.3	6.4	0.2
Ammonia Nitrogen (mg/L)	8	< 0.010	0.030	0.008	0.014	0.011
Nitrate+Nitrite Nitrogen (mg/L)	8	0.113	0.526	0.431 ^M	0.410	0.132
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.670	0.301	0.362	0.191
Total Nitrogen (mg/L)	8	0.188	1.194	0.806 ^M	0.772	0.291
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.020	0.004	0.007	0.006
Total Phosphorus (mg/L)	8	0.006	0.081	0.018	0.029	0.026
CBOD-5 (mg/L)	8	< 1.0	2.4	0.8	1.1	0.8
Chlorides (mg/L)	8	1.6	9.0	6.8	6.1	2.8
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	3	< 0.050	0.150	0.150	0.108	0.072
Iron (mg/L)	3	0.681	0.947	0.887	0.838	0.140
Manganese (mg/L)	3	0.017	0.039	0.033	0.030	0.011
Dissolved Metals						
Aluminum (mg/L)	3	< 0.100	0.120	0.100	0.090	0.036
Antimony (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	< 5.00	< 5.00	2.5	2.5	0.0
Cadmium (mg/L)	3	< 0.000	< 0.000	0.000	0.000	0.0
Chromium (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.0
Copper (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.0
Iron (mg/L)	3	0.354	0.655	0.355	0.455	0.173
Lead (µg/L)	3	< 5.00	< 5.00	2.5	2.5	0.0
Manganese (mg/L)	3	0.016	0.022	0.020	0.019	0.003
Mercury (µg/L)	3	< 0.5	< 0.5	0.3	0.3	0.0
Nickel (mg/L)	3	< 0.005	0.011	0.003	0.005	0.005
Selenium (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Silver (mg/L)	3	< 0.001	< 0.001	0.000	0.000	0.0
Thallium (µg/L)	3	< 9.0	< 9.0	4.5	4.5	0.0
Zinc (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.0
Biological						
Chlorophyll a (µg/L)	8	0.53	10.68	1.04	2.45	3.55
Fecal Coliform (col/100 mL)	6	JH 10	H 1400	93	328	538

J=estimate; N= # of samples; M=value >90% of collected samples in ecoregion 65f; C=value exceeds established criteria for F&W water use classification.

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