



Bull Mountain Creek at Marion County Road 56 (34.26490/-88.13515)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bull Mountain 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 Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group. While water quality data were collected in 2006, drought conditions prevented the completion of habitat and macroinvertebrate assessments until 2007.

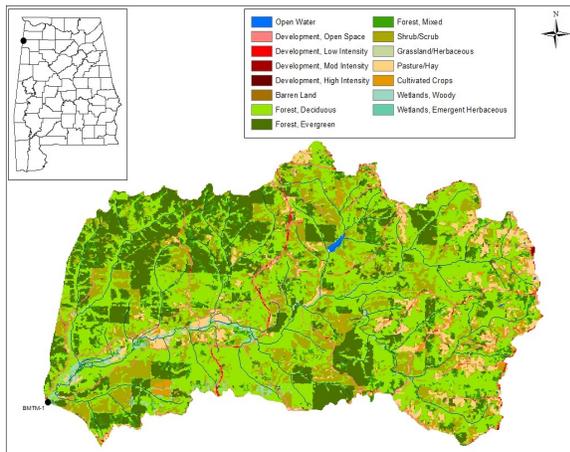


Figure 1. Sampling location and landuse within the Bull Mountain Creek watershed at BMTM-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bull Mountain Creek is a [Fish & Wildlife \(F&W\)](#) stream located in Marion County (Figure 1). Landuse within the watershed is primarily forest (71%), with some shrub/scrub. Population density is relatively low in this area. As of February 23, 2011, the ADEM has issued four 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. Bull Mountain Creek at BMTM-1 is a high-gradient, riffle-run stream characterized by mostly bedrock and sandy bottom substrates. Overall habitat and availability was rated as *optimal* for supporting aquatic macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombigbee
Drainage Area (mi²)		71
Ecoregion^a		65i
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	45
	Evergreen	20
	Mixed	6
Shrub/scrub		18
Grassland/herbaceous		<1
Pasture/hay		6
Cultivated crops		1
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Population/km^{2b}		6
# NPDES Permits^c	TOTAL	4
	Construction Stormwater	4

a.Fall Line Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Bull Mountain Creek at BMTM-1, June 7, 2007.

Physical Characteristics		
Width (ft)		35
Canopy Cover		Mostly Shaded
Depth (ft)	Riffle	1.0
	Run	2.0
	Pool	3.0
% of Reach	Riffle	5
	Run	75
	Pool	20
% Substrate	Bed rock	25
	Boulder	5
	Cobble	10
	Gravel	15
	Sand	25
	Silt	15
	Organic Matter	5

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 in Bull Mountain Creek at BMTM-1 to be in *fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Bull Mountain Creek at BMTM-1, June 7, 2007.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	64	Sub-optimal (53-65)
Sediment Deposition	63	Sub-optimal (53-65)
Sinuosity	55	Marginal (45-64)
Bank and Vegetative Stability	65	Sub-optimal (60-74)
Riparian Buffer	88	Sub-optimal (70-89)
Habitat Assessment Score	164	
% Maximum Score	68	Optimal >65

Table 4. Results of the macroinvertebrate bioassessment of Bull Mountain Creek on June 7, 2007.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	9	75	Good (71-85)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	11	92	Excellent (>=84)
Taxonomic composition measures			
% Non-insect taxa	7	71.4	Fair (49.5-74.1)
% Non-insect organisms	2	94.1	Good (94.0-97.0)
% Plecoptera	1	2.8	Very Poor (<=6.5)
Tolerance measures			
Beck's community tolerance index	13	46.4	Fair (40.8-60.7)
WMB-I Assessment Score	-	59	Fair (49-72)

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, atrazine and semi-volatile organics) during March through October of 2006 to help identify any stressors to the biological communities. Dissolved mercury concentrations exceeded human health and aquatic life use criteria during one sampling event. Selenium levels were higher than the median concentrations of all verified ecoregional reference reach data in the ecoregion 65i.

SUMMARY

Overall habitat quality and availability was rated as optimal. However, bioassessment results indicated the macroinvertebrate community in Bull Mountain Creek at BMTM-1 to be in *fair* condition. Dissolved mercury concentrations exceeded human health and aquatic life use criteria during one sampling event.

Table 5. Summary of water quality data collected March–July, 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.

Parameter	N	Min	Max	Med	Avg	SD	E
Physical							
Temperature (°C)	8	11.8	26.3	19.7	20.1	4.7	
Turbidity (NTU)	7	4.3	10.1	5.0	5.8	2.0	
Total Dissolved Solids (mg/L)	8	< 1.0	62.0	27.0	27.9	17.3	
Total Suspended Solids (mg/L)	8	2.0	11.0	5.0	5.5	2.7	
Specific Conductance (µmhos)	8	20.0	22.0	21.0	21.0	0.8	
Hardness (mg/L)	5	5.3	6.4	5.8	5.9	0.5	
Alkalinity (mg/L)	8	4.1	4.9	4.5	4.5	0.3	
Stream Flow (cfs)	8	12.1	91.4	27.4	42.3	31.2	
Chemical							
Dissolved Oxygen (mg/L)	8	7.4	11.4	8.7	8.9	1.4	
pH (su)	8	6.4	7.2	6.6	6.7	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.015	0.042	0.008	0.013	0.012	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.098	0.266	0.143	0.164	0.061	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.399	0.226	0.215	0.110	
Total Nitrogen (mg/L)	8	< 0.196	0.521	0.352	0.378	0.118	
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.011	0.003	0.004	0.003	
Total Phosphorus (mg/L)	8	< 0.100	0.100	0.050	0.050	0.000	
CBOD-5 (mg/L)	8	< 0.1	1.0	0.4	0.4	0.3	
Chlorides (mg/L)	8	1.1	1.6	1.3	1.4	0.2	
Atrazine (µg/L)	2	< 0.05	0.05	0.02	0.02	0.00	
Total Metals							
Aluminum (mg/L)	4	0.096	0.396	0.142	0.194	0.136	
Iron (mg/L)	4	0.578	0.881	0.777	0.753	0.131	
Manganese (mg/L)	4	0.053	0.074	0.066	0.065	0.010	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.050	0.050	0.025	0.025	0.000	
Antimony (µg/L)	4	< 10.0	10.0	5.0	5.0	0.0	
Arsenic (µg/L)	4	< 10.0	10.0	5.0	5.0	0.0	
Cadmium (mg/L)	4	< 0.015	0.015	0.008	0.008	0.000	
Chromium (mg/L)	4	< 0.050	0.050	0.025	0.025	0.000	
Copper (mg/L)	4	< 0.050	0.050	0.025	0.025	0.000	
Iron (mg/L)	4	0.087	0.231	0.185	0.172	0.063	
Lead (µg/L)	4	< 10.0	10.0	5.0	5.0	0.0	
Manganese (mg/L)	4	< 0.020	0.053	0.010	0.021	0.022	
Mercury (µg/L)	3	< 0.010	0.350 ^{AH}	0.150	0.168	0.173	1
Nickel (mg/L)	4	< 0.050	0.050	0.025	0.025	0.000	
Selenium (µg/L)	4	< 50.0	50.0	25.0 ^M	25.0	0.0	
Silver (mg/L)	3	< 0.050	0.050	0.025	0.025	0.000	
Thallium (µg/L)	3	< 10.0	10.0	5.0	5.0	0.0	
Zinc (mg/L)	4	< 0.050	0.050	0.025	0.025	0.000	
Biological							
Chlorophyll a (µg/L)	8	< 1.00	3.74	0.50	1.12	1.14	
^J Fecal Coliform (col/100 mL)	7	28	136	48	65	44	

A = ALU exceeded; E = Exceedance; H = Human Health Criterion exceeded; J = estimate; M = value higher than median concentration of all verified ecoregional reference data in the ecoregion 65i; N = # of samples.

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