

2012 Monitoring Summary



Hendrick Mill Branch at Blount County Road 15 (33.87612/-86.56885)

BACKGROUND

Hendrick Mill Branch is among the least-disturbed watersheds in the BWC basin group based on land-use, road density, and population density. It has been monitored as a “best attainable” condition reference watershed by the Alabama Department of Environmental Management (ADEM) since 2000 for comparison with other streams in the Southern Limestone/ Dolomite Valleys and Low Rolling Hills (67f) ecoregion.

Additionally, the ADEM selected the Hendrick Mill Branch watershed for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of the BWC Basin Assessment were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC basin group.



Figure 1. Hendrick Mill Branch at HNMB-4, May 2, 2012

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hendrick Mill Branch is a *Fish and Wildlife (F&W)* stream located in the Black Warrior River Basin. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (91%). As of September 1, 2012, ADEM’s NPDES Management System database did not show any permitted discharges located within 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. Hendrick Mill Creek is a high-gradient, riffle-run stream characterized by cobble, gravel, bedrock, and boulder substrates (Figure 1). Overall habitat quality was rated as *optimal* for supporting macroinvertebrate communities.

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 at HNMB-4 to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Black Warrior River	
Drainage Area (mi²)	3	
Ecoregion^a	67f	
% Landuse		
Open water	<1	
Forest	Deciduous	80
	Evergreen	5
	Mixed	6
Shrub/scrub	1	
Grassland/herbaceous	2	
Pasture/hay	2	
Cultivated crops	2	
Development	Open space	1
	Low intensity	<1
Population/km^{2b}	1	

a. Southern Limestone/ Dolomite Valleys and Low Rolling Hills

b. 2000 US Census

Table 2. Physical characteristics of Hendrick Mill Branch at HNMB-4, May 2, 2012.

Physical Characteristics		
Width (ft)	15	
Canopy cover	Shaded	
Depth (ft)		
	Riffle	1.0
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	20
	Run	70
	Pool	10
% Substrate		
	Bedrock	10
	Boulder	10
	Cobble	30
	Gravel	30
	Sand	3
	Silt	2
	Organic Matter	15

Table 3. Results of habitat assessment conducted in Hendrick Mill Branch at HNMB-4, May 2, 2012.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	83	Optimal (> 70)
Sediment Deposition	85	Optimal (> 70)
Sinuosity	85	Optimal (>84)
Bank and Vegetative Stability	78	Optimal (>74)
Riparian Buffer	84	Sub-Optimal (70-89)
Habitat Assessment Score	197	
% Maximum score	82	Optimal (> 70)

Table 4. Results of macroinvertebrate assessment conducted in Hendrick Mill Branch at HNMB-4, May 2, 2012.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
		(0-100)	
Taxa richness measures			
# Ephemeroptera (mayfly) genera	9	75	Good (71-85)
# Plecoptera (stonefly) genera	3	50	Good (50-75)
# Trichoptera (caddisfly) genera	12	100	Excellent (>=84)
Taxonomic composition measures			
% Non-insect taxa	7	70.6	Fair (49.5-74.1)
% Non-insect organisms	3	93.3	Fair (62.8-93.9)
% Plecoptera	8	42.2	Good (19.8-59.8)
Tolerance measures			
Beck's community tolerance index	28	100.0	Excellent(>=80.5)
WMB-I Assessment Score	---	76	Good (73-86)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly and semi-monthly (metals) during April through November of 2012 to help identify any stressors to the biological communities. *In situ* parameters, which were measured during each site visit, suggested that Hendrick Mill Branch at HNMB-4 was meeting its *Fish & Wildlife* water use classification. Median concentrations for specific conductance, hardness, and aluminum were above ranges characteristic of the Southern Limestone/ Dolomite Valleys and Low Rolling Hills ecoregion.

SUMMARY

The condition of the macroinvertebrate community residing in Hendrick Mill Branch at HNMB-4 was rated as *good*, with a high number of pollution sensitive taxa represented. Although results show median levels for specific conductance, hardness, and aluminum are above the range expected within this ecoregion, the stream is in very good condition overall. This supports its continued use as an ADEM ecological reference site.

Table 5. Summary of water quality data collected April-November, 2012. 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
Physical						
Temperature (°C)	11	12.2	19.6	18.7	17.6	2.2
Turbidity (NTU)	10	1.2	20.4	3.6	7.5	6.9
↓ Total Dissolved Solids (mg/L)	8	102.0	184.0	133.5	140.6	30.8
Total Suspended Solids (mg/L)	8	< 1.0	24.0	7.5	9.2	8.7
Specific Conductance (µmhos)	10	0.2	241.1	221.4 ^G	201.0	70.9
Hardness (mg/L)	4	107.0	111.0	109.5 ^G	109.2	1.7
Alkalinity (mg/L)	8	117.0	122.0	120.0	119.6	1.5
Stream Flow (cfs)	8	0.5	1.7	0.9	1.0	0.4
Chemical						
Dissolved Oxygen (mg/L)	11	8.5	10.5	9.3	9.3	0.6
pH (su)	11	7.3	8.3	7.9	7.8	0.2
Ammonia Nitrogen (mg/L)	8	< 0.007	< 0.008	0.004	0.004	0.000
Nitrate+Nitrite Nitrogen (mg/L)	8	0.144	0.211	0.200	0.191	0.022
↓ Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.184	0.029	0.050	0.056
↓ Total Nitrogen (mg/L)	8	< 0.164	0.385	0.230	0.241	0.064
↓ Dissolved Reactive Phosphorus (mg/L)	8	0.006	0.011	0.010	0.009	0.002
Total Phosphorus (mg/L)	8	0.011	0.032	0.020	0.020	0.008
↓ CBOD-5 (mg/L)	8	< 2.0	4.7	1.0	1.5	1.3
COD (mg/L)	8	< 2.4	14.0	11.2	9.9	4.2
↓ TOC (mg/L)	8	< 0.4	0.8	0.4	0.4	0.2
Chlorides (mg/L)	8	1.2	1.3	1.2	1.2	0.0
Total Metals						
Aluminum (mg/L)	4	< 0.043	0.409	0.288 ^M	0.251	0.164
Iron (mg/L)	4	< 0.019	0.444	0.314	0.270	0.185
↓ Manganese (mg/L)	4	< 0.007	0.027	0.024	0.019	0.011
Dissolved Metals						
Aluminum (mg/L)	4	< 0.043	< 0.043	0.022	0.022	0.000
Antimony (µg/L)	4	< 3.6	< 3.6	1.8	1.8	0.0
Arsenic (µg/L)	4	< 1.8	< 1.8	0.9	0.9	0.0
Cadmium (µg/L)	4	< 0.022	< 0.046	0.017	0.017	0.007
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000
Iron (mg/L)	4	< 0.019	< 0.019	0.010	0.010	0.000
Lead (µg/L)	4	< 0.9	< 0.9	0.4	0.4	0.0
Manganese (mg/L)	4	< 0.007	< 0.007	0.004	0.004	0.000
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.000
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000
Selenium (µg/L)	4	< 2.5	< 2.5	1.2	1.2	0.0
Silver (µg/L)	4	< 0.015	< 0.215	0.058	0.058	0.058
Thallium (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000
Biological						
Chlorophyll a (ug/L)	8	< 0.10	1.07	0.40	0.49	0.40
↓ E. coli (col/100mL)	8	14	172	51	62	52

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 67f; J=estimate; N=number of samples; M=value > 90% of all verified ecoregional reference reach data collected in the ecoregion 67f.

FOR MORE INFORMATION, CONTACT:
 Preston Roberts, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2703 sproberts@adem.state.al.us