

2008 Monitoring Summary



Bennett Mill Creek at Henry Co Rd 47 (31.52586/-85.07152)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bennett 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 1999 screening-level evaluation identified Bennett Mill Creek at BMCH-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.



Figure 1. Reach Characteristics of Bennett Mill Creek at BMCH-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bennett Mill Creek drains approximately seven square miles of countryside with a very low population density and less than 3% development. Based on the 2000 National Land Cover Dataset (NLCD), landuse within the watershed is mainly forest (61%), with some shrub/scrub and cultivated crops. It is located within the McRay Mill Creek sub-watershed of the Chattahoochee River basin. A watershed assessment conducted by the local Soil & Water Conservation District (SWCD) in 1998, suggested the main Non Point Source (NPS) concerns to be run off from crop lands, pasture, forest, and sedimentation. As of February 23, 2011, no NPDES permits have been issued in 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. Bennett Mill Creek at BMCH-1 is a medium gradient, sand bottomed stream typical of ecoregion 65d (Figure 1). Overall habitat quality was categorized as *sub-optimal*, but a lack of stream sinuosity and instream habitat were noted.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Chattahoochee River	
Drainage Area (mi²)	7	
Ecoregion^a	65d	
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	9
	Evergreen	27
	Mixed	25
Shrub/scrub		20
Pasture/hay		2
Cultivated crops		14
Development	Open space	2
	Low intensity	<1
Population/km²^b	1	

a.Southern Hilly Gulf Coastal Plain

b.2000 US Census

Table 2. Physical characteristics of Bennett Mill Creek at BMCH-1, June 4, 2008.

Physical Characteristics		
Width (ft)	15	
Canopy Cover	Shaded	
Depth (ft)		
	Run	0.5
% of Reach		
	Run	100
% Substrate		
	Clay	1
	Sand	93
	Silt	2
	Organic Matter	4

Table 3. Results of the habitat assessment conducted on Bennett Mill Creek at BMCH-1, June 4, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	25	Poor <40
Sediment Deposition	74	Optimal >65
Sinuosity	53	Marginal (45-64)
Bank and Vegetative Stability	70	Sub-optimal (60-74)
Riparian Buffer	88	Sub-optimal (70-89)
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 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 scores for each individual metric. The overall condition of macroinvertebrate community was rated as *poor* (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Bennett Mill Creek at BMCH-1, June 4, 2008.

Macroinvertebrate Assessment				
	Results		Scores	Rating
Taxa richness measures				
# EPT genera	12	48	Fair (38-56)	
Taxonomic composition measures				
% Non-insect taxa	2	100	Excellent (>96.34)	
% Plecoptera	2	9	Good (5.7-52.8)	
% Dominant taxa	58	0	Very Poor (<23.5)	
Functional composition measures				
% Predators	8	26	Poor (15.1-30.1)	
Tolerance measures				
Beck's community tolerance index	13	59	Good (31.9-65.9)	
% Nutrient tolerant organisms	59	18	Very Poor (<25.4)	
WMB-I Assessment Score	--	37	Poor (19-37)	

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. [In situ measurements](#) and [water samples](#) were collected during May, July and September (chemical analysis and metals), or two times (pesticides, atrazine, and semi-volatile organics) during 2008. *In situ* parameters were also measured during the macroinvertebrate bioassessment. Median nutrient concentrations (ammonia nitrogen and nitrate+nitrite nitrogen) were slightly higher than background levels based on the 90th percentile of all least impaired reference reach data in ecoregion 65d.

SUMMARY

Bioassessment results indicated an impaired macroinvertebrate community. Median concentrations of nitrogen were higher than expected based on 90th percentile of all reference reach data collected in ecoregion 65d. Based on the 2000 NLCD and the 1998 SWCD sub-watershed assessment, the main NPS concerns within the watershed were run off from crops, pastures and forestry. Additionally, results of the habitat assessment suggested that in-stream habitat may be limited by excessive sediment deposition. The habitat assessment also noted a lack of stream sinuosity which can contribute to scouring from sedimentation, and minimize habitat for aquatic communities.

Table 5. Summary of water quality data collected March-October, 2008. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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
Physical							
Temperature (°C)	4	20.1	24.8	23.5	23.0	2.2	
Turbidity (NTU)	4	3.2	4.9	3.9	4.0	0.8	
Total Dissolved Solids (mg/L)	3	< 1.0	44.0	6.0	16.8	23.7	
Total Suspended Solids (mg/L)	3	1.0	3.0	2.0	2.0	1.0	
Specific Conductance (µmhos)	4	54.2	56.9	55.2	55.4	1.1	
Hardness (mg/L)	3	16.0	21.6	20.2	19.3	2.9	
Alkalinity (mg/L)	3	12.4	13.4	12.6	12.8	0.5	
Stream Flow (cfs)	4	0.1	3.7	2.0	2.0	1.5	
Chemical							
Dissolved Oxygen (mg/L)	4	7.9	8.6	8.4	8.3	0.4	
pH (su)	4	6.6	7.2	7.2	7.0	0.3	
Ammonia Nitrogen (mg/L)	3	< 0.015	< 0.015	0.008 ^M	0.008	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	3	0.459	0.610	0.470 ^M	0.513	0.084	
Total Kjeldahl Nitrogen (mg/L)	3	< 0.150	0.169	0.075	0.106	0.054	
Total Nitrogen (mg/L)	3	< 0.534	0.779	0.545	0.619	0.138	
Dissolved Reactive Phosphorus (mg/L)	3	0.016	0.018	0.017	0.017	0.001	
Total Phosphorus (mg/L)	3	0.020	0.024	0.021	0.022	0.002	
CBOD-5 (mg/L)	3	< 1.0	< 1.0	0.5	0.5	0.0	
Chlorides (mg/L)	3	2.7	4.2	3.1	3.3	0.8	
Atrazine (µg/L)	2	< 0.05	< 0.05	0.02	0.02	0.00	
Total Metals							
Aluminum (mg/L)	3	0.021	0.201	0.073	0.098	0.093	
Iron (mg/L)	3	0.291	0.584	0.534	0.470	0.157	
Manganese (mg/L)	3	0.027	0.044	0.043	0.038	0.010	
Dissolved Metals							
Aluminum (mg/L)	3	< 0.015	0.019	0.008	0.008	0.001	
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	< 0.005	< 0.005	0.002	0.002	0.000	
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.000	
Copper (mg/L)	3	< 0.005	< 0.005	0.002	0.002	0.000	
Iron (mg/L)	3	0.126	0.183	0.134	0.148	0.031	
Lead (µg/L)	3	< 1.5	< 1.5	0.7	0.7	0.0	
Manganese (mg/L)	3	0.022	0.038	0.036	0.032	0.009	
Mercury (µg/L)	3	< 0.0	< 0.0	0.0	0.0	0.0	
Nickel (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.000	
Selenium (µg/L)	3	< 1.5	1.6	0.8	0.8	0.0	
Silver (mg/L)	3	< 0.003	< 0.003	0.002 ^M	0.002	0.000	
Thallium (µg/L)	3	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.000	
Biological							
Chlorophyll a (µg/L)	3	0.71	1.78	1.07	1.19	0.54	
Fecal Coliform (col/100 mL)	3	140	430	320	297	146	J

J=estimate; N=# samples; Q=qualifier; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion (65d).

FOR MORE INFORMATION, CONTACT:

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