

2008 Monitoring Summary



Moores Creek at Chambers County Road 208 (32.86257/-85.22134)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Moores Creek watershed for biological and water quality monitoring as part of the 2004 Basin-wide Screening Assessment of the Chattahoochee River Basin. 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 non-point sources in non-urban areas. In 2004, the macroinvertebrate community in Moores Creek at MOOC-1 was rated as poor using ADEM's Screening-Level Macroinvertebrate Bioassessment methods (WMB-EPT). In 2008, Moores Creek at MOOC-1 was monitored as part of the 2008 Basin Assessment of the Southeastern Alabama (SE-AL) River Basins to verify biological conditions, as well as the extent and cause of any impairment.



Figure 1. Moores Creek at MOOC-1, July 13, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Moores Creek is a *Fish & Wildlife (F&W)* stream located in the Southern Outer Piedmont ecoregion near the city of Lanett. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (60%) and pasture, and approximately 7% of the watershed is developed. As of February 23, 2011, ADEM has issued a total of five NPDES permits in the area.

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. Moores Creek at MOOC-1 is a glide-pool stream reach characterized by sand and silt substrates (Figure 1). This unconsolidated sediment often shifts on the stream bottom providing unstable instream habitat for many benthic macroinvertebrates. Numerous dirt roads were noted along the stream, and the riparian canopy was bulldozed to the bank at regular intervals along the reach, resulting in riparian buffer loss and the potential for increased run-off into the stream. As a result, overall habitat quality was categorized as *marginal* for supporting macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Chattahoochee River	
Drainage Area (mi²)	7	
Ecoregion^a	45b	
% Landuse		
Open water		1
Wetland	Woody	4
Forest	Deciduous	30
	Evergreen	28
	Mixed	2
Shrub/scrub		2
Grassland/herbaceous		9
Pasture/hay		17
Development	Open space	4
	Low intensity	2
	Moderate intensity	<1
Barren		1
Population/km^{2b}	54	
# NPDES Permits^c	TOTAL	5
	Construction Stormwater	3
	Industrial General	1
	Municipal Individual	1

a. Southern Outer Piedmont

b. 2000 US Census

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

Table 2. Physical characteristics of Moores Creek at MOOC-1, June 10, 2008.

Physical Characteristics		
Width (ft)	20	
Canopy Cover	Mostly Shaded	
Depth (ft)	Run	1.0
	Pool	2.0
% of Reach	Run	20
	Pool	80
% Substrate	Bedrock	1
	Boulder	1
	Cobble	2
	Mud/Muck	2
	Gravel	2
	Sand	70
	Silt	14
	Organic Matter	8

Table 3. Results of the habitat assessment conducted on Moores Creek at MOOC-1, June 10, 2008.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	34	Poor (<41)
Sediment Deposition	56	Marginal (41-58)
Sinuosity	38	Poor (<45)
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	43	Poor (<50)
Habitat Assessment Score	97	
% Maximum Score	44	Marginal (41-58)

Table 4. Results of the macroinvertebrate bioassessment conducted in Moores Creek at MOOC-1, June 5, 2008.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness			
# EPT genera	8	32	Poor (19-37)
Taxonomic composition			
% Non-insect taxa	17	42	Poor (30.9-61.8)
% Plecoptera	0	0	Very Poor (<1.86)
% Dominant taxa	21	73	Good (70.6-85.2)
Functional composition measures			
% Predators	42	100	Excellent (>72.1)
Tolerance measures			
Beck's community tolerance	3	14	Poor (10.6-21.2)
% Nutrient tolerant	8	100	Excellent (>88.1)
WMB-I Assessment Score	--	52	Fair (38-56)

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 metric is scored on a 100 point scale. The final score is the average of all individual metric scores. Metric results indicated that the biological community at MOOC-1 was in *fair* condition (Table 4).

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In 2008, water samples were collected at Moores Creek at MOOC-1 in June, August, and October. In situ field measurements were conducted at the time of each sampling event, as well as on June 5, 2008, during the habitat and macroinvertebrate assessments. The purpose of these water chemistry analyses was to help identify any stressors to the biological communities. Dissolved oxygen concentrations were below the stream's *F&W* water use classification criteria on June 10, 2008. Stream flow at the time of sampling was 0.3 cfs. Median specific conductance and hardness were higher than background levels for the Piedmont ecoregion. Median concentrations of nutrients (ammonia-nitrogen, nitrate-nitrite-nitrogen, and total nitrogen), metals (total aluminum, total and dissolved iron, and total and dissolved manganese), and alkalinity were also higher than expected for the area.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Moores Creek at MOOC-1 to be in *fair* condition. Results of other data collected at the site suggest habitat degradation, siltation, and loss of riparian buffer along the stream corridor. Additionally, water quality analyses indicated elevated conductivity, hardness, alkalinity, and nutrient and metals concentrations to be potential concerns for the biological communities. Monitoring should continue to ensure that water quality and biological conditions in the stream reach remain stable.

Table 5. Summary of water quality data collected in 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	E
Physical							
Temperature (°C)	4	19.2	26.0	23.6	23.1	3.0	
Turbidity (NTU)	4	10.2	38.2	31.7	28.0	12.9	
Total Dissolved Solids (mg/L)	3	8.0	80.0	54.0	47.3	36.5	
Total Suspended Solids (mg/L)	3	1.0	6.0	2.0	3.0	2.6	
Specific Conductance (µmhos)	4	63.4	103.7	93.8 ^G	88.7	18.1	
Hardness (mg/L)	3	18.9	31.9	20.6 ^G	23.8	7.1	
Alkalinity (mg/L)	3	22.0	46.2	37.5 ^M	35.2	12.3	
Stream Flow (cfs)	2	0.3	2.5	1.4	1.4	1.6	
Chemical							
Dissolved Oxygen (mg/L)	4	3.0 ^C	7.5	5.7	5.5	1.9	1
pH (su)	4	6.6	6.7	6.7	6.7	0.1	
Ammonia Nitrogen (mg/L)	3	< 0.015	0.096	0.039 ^M	0.048	0.045	
Nitrate+Nitrite Nitrogen (mg/L)	3	0.058	0.336	0.120 ^M	0.171	0.146	
Total Kjeldahl Nitrogen (mg/L)	3	0.171	0.295	0.221	0.229	0.062	
Total Nitrogen (mg/L)	3	0.279	0.507	0.415 ^M	0.400	0.115	
Dissolved Reactive Phosphorus (mg/L)	3	0.015	0.026	0.021	0.021	0.006	
^J Total Phosphorus (mg/L)	3	0.016	0.041	0.026	0.028	0.013	
CBOD-5 (mg/L)	3	< 1.0	1.6	0.5	0.9	0.6	
Chlorides (mg/L)	3	2.6	3.1	2.8	2.8	0.2	
Total Metals							
Aluminum (mg/L)	3	0.077	0.347	0.212 ^M	0.212	0.135	
Iron (mg/L)	3	1.510	2.460	2.150 ^M	2.040	0.484	
Manganese (mg/L)	3	0.306	1.240	0.934 ^M	0.827	0.476	
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	< 0.003	< 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	0.242	0.773	0.560 ^M	0.525	0.267	
Lead (µg/L)	3	< 1.5	< 1.5	0.7	0.7	0.0	
Manganese (mg/L)	3	0.259	1.200	0.768 ^M	0.742	0.471	
Mercury (µg/L)	3	< 0.01	< 0.01	0.01	0.01	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	< 0.5	< 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	< 0.10	0.67	0.05	0.26	0.36	
^J Fecal Coliform (col/100 mL)	3	5	1,300	400 ^M	568	664	

C=*F&W* criterion violated; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45; N=# samples.

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