

2008 Monitoring Summary



Moores Creek at AL Hwy 50 in Chambers County (32.85285/-85.19823)

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 Southeastern 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 non-point sources in non-urban areas. Results of the 2004 screening-level evaluation identified Moores Creek at MOOC-2 for further monitoring during the 2008 Basin Assessment of the 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. Moores Creek at MOOC-2, July 14, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Moores Creek is a *Fish & Wildlife (F&W)* stream within the Southern Outer Piedmont ecoregion near the city of Lanett. It is located within the Chattahoochee River Basin. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (52%) and development (19%). As of February 23, 2011, ADEM has issued a total of eleven 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-2 is a glide-pool stream reach characterized by sand, gravel, and silt substrates (Figure 1). Overall habitat quality was categorized as *poor* for supporting aquatic macroinvertebrate communities due to sedimentation, channelization, and very limited riparian buffer zones, which may result in elevated stream water temperatures and inadequate protection against run-off.

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 each metric. Metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Chattahoochee River
Basin		Chattahoochee River
Drainage Area (mi²)		10
Ecoregion^a		45b
% Landuse		
Open water		<1
Wetland	Woody	4
Forest	Deciduous	25
	Evergreen	25
	Mixed	2
Shrub/scrub		1
Grassland/herbaceous		7
Pasture/hay		16
Development	Open space	10
	Low intensity	7
	Moderate intensity	1
	High intensity	<1
Barren		1
Population/km^{2b}		139
# NPDES Permits^c	TOTAL	11
	Construction Stormwater	7
	Industrial General	3
	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-2, June 10, 2008.

Physical Characteristics	
Width (ft)	20
Canopy Cover	Open
Depth (ft)	
	Run 0.5
	Pool 1.5
% of Reach	
	Run 5
	Pool 95
% Substrate	
	Cobble 3
	Mud/Muck 2
	Gravel 13
	Sand 70
	Silt 10
	Organic Matter 2

Table 3. Results of the habitat assessment conducted on Moores Creek at MOOC-2, June 10, 2008.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	37	Poor (<41)
Sediment Deposition	33	Poor (<41)
Sinuosity	30	Poor (<45)
Bank and Vegetative Stability	40	Marginal (35-59)
Riparian Buffer	18	Poor (<50)
Habitat Assessment Score	70	
% Maximum Score	32	Poor (<41)

Table 4. Results of the macroinvertebrate bioassessment conducted in Moores Creek at MOOC-2, June 10, 2008.

Macroinvertebrate Assessment				
	Results	Scores	Rating	
Taxa richness				
# EPT genera	5	20	Poor (19-37)	
Taxonomic composition				
% Non-insect taxa	26	0	Very Poor (<30.9)	
% Plecoptera	0	0	Very Poor (<1.86)	
% Dominant taxa	21	72	Good (70.6-85.2)	
Functional composition measures				
% Predators	12	42	Fair (30.2-45.2)	
Tolerance measures				
Beck's community	1	5	Very Poor (<10.6)	
% Nutrient tolerant	39	51	Fair (50.9-76.2)	
WMB-I Assessment Score	-	27	Poor (19-37)	

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In 2008, water samples were collected at Moores Creek at MOOC-2 in June, August, and October. In situ field measurements were also conducted at the time of each sampling event, as well as on June 10th 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 Aug. 7th. However, no stream flow measurements were recorded on this sampling day because the water was not flowing due to damming in the channel upstream of the sampling reach. Median specific conductance and hardness were higher than background levels for the Piedmont ecoregion. Median temperature, alkalinity, total dissolved solids, and concentrations of nitrate-nitrite-nitrogen, chlorides, and metals (total and dissolved iron, total and dissolved manganese) were also higher than expected for the ecoregion.

SUMMARY

The 2004 and 2008 bioassessment results indicated the macroinvertebrate community in Moores Creek at MOOC-2 to be in *poor* condition. Concentrations of nitrate-nitrite-nitrogen, chlorides, and metals were elevated as compared to data from ADEM's least-impaired reference reaches in ecoregion 45. Additionally, increased water temperature caused by very limited riparian buffer zones may also have affected the macroinvertebrate community. The data presented in this report and all other available data will be reviewed to identify the causes and sources of the degraded biological conditions.

Table 5. Summary of water quality data collected during 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	27.6	26.6 ^M	25.0	3.9	
Turbidity (NTU)	4	9.1	38.0	9.4	16.5	14.4	
Total Dissolved Solids (mg/L)	3	8.0	112.0	88.0 ^M	69.3	54.4	
Total Suspended Solids (mg/L)	3	< 1.0	2.0	2.0	1.5	0.9	
Specific Conductance (µmhos)	4	78.7	209.2	135.2 ^G	139.6	54.6	
Hardness (mg/L)	3	23.5	37.0	36.1 ^G	32.2	7.6	
Alkalinity (mg/L)	3	27.6	58.5	44.9 ^M	43.7	15.5	
Stream Flow (cfs)	2	0.8	4.5	2.6	2.6	2.7	
Chemical							
Dissolved Oxygen (mg/L)	4	3.3 ^C	7.4	5.8	5.6	1.8	1
pH (su)	4	6.6	6.8	6.8	6.7	0.1	
Ammonia Nitrogen (mg/L)	3	< 0.015	0.111	0.008	0.042	0.060	
Nitrate+Nitrite Nitrogen (mg/L)	3	0.003	0.164	0.161 ^M	0.109	0.092	
Total Kjeldahl Nitrogen (mg/L)	3	0.155	0.323	0.222	0.233	0.085	
Total Nitrogen (mg/L)	3	0.225	0.484	0.319	0.343	0.131	
Dissolved Reactive Phosphorus (mg/L)	3	0.015	0.017	0.015	0.016	0.001	
Total Phosphorus (mg/L)	3	0.032	0.040	0.035	0.036	0.004	
CBOD-5 (mg/L)	3	< 1.0	2.3	0.5	1.1	1.0	
Chlorides (mg/L)	3	4.0	16.8	5.6 ^M	8.8	7.0	
Total Metals							
Aluminum (mg/L)	3	0.029	0.742	0.119	0.297	0.388	
Iron (mg/L)	3	1.130	2.200	1.990 ^M	1.773	0.567	
Manganese (mg/L)	3	0.451	2.070	1.280 ^M	1.267	0.810	
Dissolved Metals							
Aluminum (mg/L)	3	< 0.015	0.019	0.008	0.011	0.007	
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	0.293	0.637	0.547 ^M	0.492	0.178	
Lead (µg/L)	3	< 1.5	< 1.5	0.7	0.7	0.0	
Manganese (mg/L)	3	0.363	2.190	1.220 ^M	1.258	0.914	
Mercury (µg/L)	3	< 0.03	< 0.03	0.02	0.02	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	< 0.6	< 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 (µg/L)	3	0.53	2.14	0.53	1.07	0.93	
Fecal Coliform (col/100 mL)	3	20	1,000	77	366	550	

C=*F&W* criterion exceeded; 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.

FOR MORE INFORMATION, CONTACT:

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