

2005 Monitoring Summary



Moore's Mill Creek at Chewacla Park Road (32.55689/-85.46994)

BACKGROUND

Moore's Mill Creek from Chewacla Creek to its source has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Swimming and Fish and Wildlife (S/F&W)* water use classifications since 2000. It is listed for siltation (habitat alteration) from land development and urban runoff/storm sewers and is scheduled for TMDL development by 2012.

Moore's Mill Creek was monitored at MMLT-1c to assess the biological integrity of the site and to document impairment from siltation. Moore's Mill Creek was also monitored upstream of MMLT-1c at MMCL-1. A macroinvertebrate survey and habitat assessment were conducted to verify impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment. Results from these data may also be used in determination of Total Maximum Daily Load needs and priorities.

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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. Moore's Mill Creek at MMLT-1c is a low gradient, sand bottomed stream in the Tallapoosa River watershed. Overall habitat quality was categorized as *marginal* due to *poor* sinuosity and *marginal* in-stream habitat, sediment deposition, and unstable banks.

These results support the findings of a stream walk survey conducted by ADEM and Tetra Tech, Inc. during the fall of 2005 (Tetra Tech, Inc. 2006). A lack of sinuosity and heavy sedimentation were noted. The sedimentation was attributed to the effect of a reservoir downstream slowing velocity and allowing the deposition of coarse material.

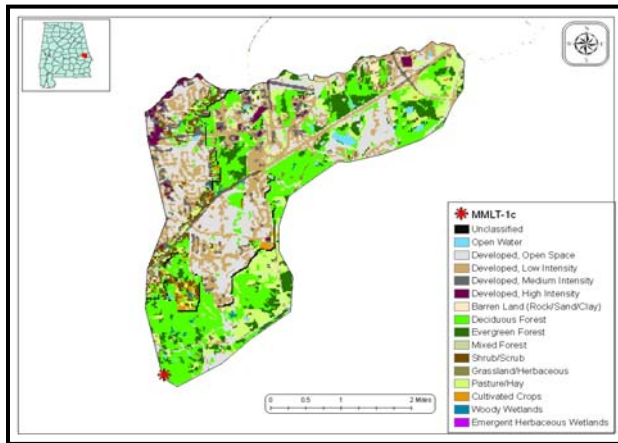


Figure 1. Sampling location and landuse within the Moore's Mill Creek watershed at MMLT-1c.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Moore's Mill Creek at Chewacla Park Road is a second order stream located near Auburn, AL within the Southern Lower Piedmont ecoregion. The southern Lower Piedmont is characterized by low to moderate gradient streams with cobble, gravel and sandy substrates (Griffith et al. 2001).

The Moore's Mill Creek watershed encompasses portions of the cities of Auburn and Opelika, AL. Landuse within the watershed is primarily development (46%) and forest (33%) (Figure 1).

Table 1. Summary of watershed characteristics at MMLT-1c, 2005.

Watershed Characteristics	
Drainage Area (mi ²)	11
Ecoregion ^a	45b
% Landuse	
Open water	1
Wetland	Woody <1
Forest	Deciduous 24
	Evergreen 9
	Mixed 1
Shrub/scrub	3
Grassland/herbaceous	1
Pasture/hay	11
Cultivated crops	1
Development	Open space 23
	Low intensity 17
	Moderate intensity 5
	High intensity 1
Barren	1
Population/km ^{2b}	324
# NPDES Permits ^c	TOTAL 146
401 Water Quality Certification	1
Construction Stormwater	144
Industrial General	1

a. Southeastern Flood Plains and Low Terraces

b. 2000 US Census data

c. # NPDES permits in ADEM's NPDES Management System database, 9 June 2008.

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 an average of the score for each metric. The macroinvertebrate community was rated *poor* (Table 4) due to *poor* ratings in # EPT and % Dominant Taxa and *very poor* rankings in % plecoptera, % predators and % nutrient tolerant organisms.

Table 2. Physical characteristics at MMLT-1c conducted June 15, 2005.

Physical characteristics	
Width (ft)	25
Canopy cover	Mostly Shaded
Depth (ft)	
	Run 0.8
	Pool 2.3
% of Reach	
	Run 75
	Pool 25
% Substrate	
	Gravel 10
	Sand 85
	Silt 3
	Organic Matter 2

Table 3. Habitat assessment results at MMLT-1c conducted June 15, 2005.

Habitat Assessment (% Maximum Score)	Rating
Instream habitat quality	49 Marginal (41-58)
Sediment deposition	58 Marginal (41-58)
Sinuosity	40 Poor (<45)
Bank and vegetative stability	49 Marginal (35-59)
Riparian buffer	79 Sub-optimal (70-90)
Habitat assessment score	123
% Maximum score	56 Marginal (41-58)

Table 4. The macroinvertebrate assessment results from MMLT-1c, June 15, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures	(0-100)		
# EPT genera	6	24	Poor (19-37)
Taxonomic composition measures			
% Non-insect taxa	3	100	Excellent (>96.34)
% Plecoptera	0	0	Very Poor (<1.86)
% Dominant taxa	37	33	Poor (23.5-47.0)
Functional composition measures			
% Predators	6	0	Very Poor (<15.1)
Tolerance measures			
Beck's community tolerance index	5	23	Fair (21.2-31.8)
% Nutrient tolerant organisms	57	21	Very Poor (<25.4)
WMB-I Assessment Score	---	29	Poor (19-37)

Table 5. Summary of water quality data collected March-October, 2005 at MMLT-1c. 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	Median	Avg	SD
Physical						
Temperature (°C)	7	17.0	29.0	25.0	23.0	4.9
Turbidity (NTU)	7	7.8	79.6	26.8 ^M	29.7	25.7
Total Dissolved Solids (mg/L)	7	22.0	115.0	86.5 ^M	79.0	32.4
Total Suspended Solids (mg/L)	7	5.0	66.0	20.5	25.5	21.8
Specific Conductance (µmhos)	7	76.6	120.4	105.2 ^M	104.6	14.8
Hardness (mg/L)	4	34.9	57.0	39.5 ^M	40.0	5.4
Alkalinity (mg/L)	7	5.8	53.8	41.5 ^M	34.8	15.1
Stream Flow (cfs)	7	10.8	111.3	14.7	30.1	---
Chemical						
Dissolved Oxygen (mg/L)	7	7.4	10.4	8.5	8.5	1.1
pH (su)	7	7.0	7.81	7.5	7.5	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.026	0.020	0.015	0.008
Nitrate+Nitrite Nitrogen (mg/L)	7	0.188	0.376	0.225 ^M	0.261	0.071
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	1.039	0.294 ^M	0.384	0.339
Total Nitrogen (mg/L)	7	0.300	1.227	0.589	0.645	0.314
Dissolved Reactive Phosphorus (mg/L)	6	< 0.004	0.019	0.008	0.011	0.006
Total Phosphorus (mg/L)	7	0.026	0.062	0.039	0.042	0.012
CBOD-5 (mg/L)	7	< 0.7	5.4	1.6	2.1	1.7
Chlorides (mg/L)	7	4.3	6.6	5.4 ^M	5.5	0.8
Biological						
Chlorophyll a (µg/L)	1				1.78	
Fecal Coliform (col/100 mL)	7	70	1600	205	575	690

N=# samples; M=value > 90th percentile of all data collected within eco-region 45.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly from March through October of 2005 to help identify any stressors to the biological communities. One of seven measures of turbidity, recorded during a high flow event, was >50 NTU higher than background levels in ecoregion 45 based on the 90th percentile of all least impaired reference reach data in ecoregion 45. Physical parameters whose median concentrations exceeded expected concentrations for ecoregion 45 include total dissolved solids, specific conductance, hardness and alkalinity. Chemical parameters whose median concentrations exceeded expected concentrations for ecoregion 45 include nitrate+nitrite-nitrogen, total Kjeldahl nitrogen, and chlorides (Table 5).

CONCLUSIONS

The bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was categorized as *marginal* due to *marginal* in-stream habitat, sedimentation, and bank and vegetative stability, and *poor* sinuosity. Median physical (turbidity, total dissolved solids, specific conductance, hardness and alkalinity) and chemical (nitrate+nitrite-nitrogen, total Kjeldahl nitrogen, and chlorides) concentrations were above values expected in this ecoregion. The *poor* bioassessment results and turbidity value exceeding the expected value for ecoregion 45 support the 303(d) listing of Moores Mill Creek.

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