

2010 Monitoring Summary



Little Mulberry Creek at Autauga County Rd 8 (32.58247/-86.77757)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Little Mulberry Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group.



Figure 1. Little Mulberry Creek at LMBA-1, December 1, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Mulberry Creek is a *Fish & Wildlife (F&W)* stream in Autauga County in the Alabama River basin. According to the 2011 National Land Cover Data Set, landuse within the watershed is primarily forest (54%), with some shrub/scrub and pasture/hay areas. As of April 1, 2016, ADEM's NPDES Management System database showed thirty-two permitted discharges 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. Little Mulberry Creek (Figure 1) at LMBA-1 is a riffle-run stream, characterized by gravel and sand substrates. Overall habitat quality was categorized as *sub-optimal* for supporting macroinvertebrate communities.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in Alabama's coastal streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. The macroinvertebrate survey conducted in Little Mulberry Creek at LMBA-1 rated the site as *good* (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Alabama River	
Drainage Area (mi ²)	71	
Ecoregion ^a	65I	
% Landuse ^b		
Open water		<1%
Wetland	Woody	4%
	Emergent herbaceous	<1%
Forest	Deciduous	18%
	Evergreen	22%
	Mixed	14%
Shrub/scrub		20%
Grassland/herbaceous		3%
Pasture/hay		11%
Cultivated crops		4%
Development	Open space	3%
	Low intensity	1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km ^{2c}	9	
# NPDES Permits ^d	TOTAL	32
	Construction	31
	Industrial General	1

a.Fall Line Hills

b.2011 National Land Cover Dataset

c.2010 US Census

d.#NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Little Mulberry Creek at LMBA-1, May 11, 2010.

Physical Characteristics		
Width (ft)	46	
Canopy cover	Mostly Open	
Depth (ft)	Riffle	1.5
	Run	2.5
	Pool	1.5
% of Reach	Riffle	5
	Run	90
	Pool	5
% Substrate	Cobble	4
	Mud/Muck	1
	Gravel	50
	Sand	30
	Silt	1
	Organic Matter	14

Table 3. Results of the habitat assessment conducted in Little Mulberry Creek at LMBA-1, May 11, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	63	Sub Optimal (59-70)
Sediment Deposition	75	Optimal (>70)
Sinuosity	65	Sub-Optimal (65-<85)
Bank and Vegetative Stability	71	Sub-Optimal (60-<75)
Riparian Buffer	88	Sub-Optimal (70-90)
Habitat Assessment Score	144	
% Maximum Score	66	Sub-Optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Little Mulberry Creek at LMBA-1, May 11, 2010.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		58
# EPT taxa		26
# Highly-sensitive and Specialized Taxa		5
Taxonomic composition measures		
% EPC taxa		37
% EPT minus Baetidae and Hydropsychidae		37
% Chironomidae Individuals		37
% Dominant Taxon		17
% Individuals in Dominant 5 Taxa		49
Functional feeding group		
# Collector Taxa		21
% Tolerant Filterer Taxa		11
Community tolerance		
# Sensitive EPT		13
% Sensitive taxa		21
% Nutrient Tolerant individuals		23
WMB-I Assessment Score		3
WMB-I Assessment Rating		Good

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in May, July, October and December of 2010 to help identify any stressors to the biological communities. Stream pH within the reach did not meet water quality standards in December. Median values of specific conductance, hardness, and chloride were higher than the 90th percentile of data collected at reference reaches within ecoregion 65i.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. The results of the habitat assessment prove this site to be in *sub-optimal* condition. Water chemistry analyses indicated elevated specific conductance, hardness and chloride concentrations. Monitoring should continue to ensure stable conditions.

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Table 5. Summary of water quality data collected May, July, October, and December, 2010. 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	11.5	19.8	18.3	17.0	3.8	
Turbidity (NTU)	5	4.3	44.5	7.7	14.4	16.1	
Total Dissolved Solids (mg/L)	4	18.0	100.0	34.0	46.0	37.6	
Total Suspended Solids (mg/L)	4	1.0	32.0	7.0	11.8	14.4	
Specific Conductance (µmhos)	4	28.3	57.7	34.3 ^G	38.6	13.1	
Hardness (mg/L)	4	8.5	27.4	11.6 ^G	14.8	8.6	
Alkalinity (mg/L)	4	< 2.9	9.6	5.9	5.7	3.4	
Stream Flow (cfs)	2	18.5	78.9	48.7	48.7	42.7	
Chemical							
Dissolved Oxygen (mg/L)	4	8.3	9.3	8.8	8.8	0.5	
pH (su)	4	5.7 ^C	7.0	6.4	6.4	0.6	1
Ammonia Nitrogen (mg/L)	4	< 0.021	< 0.021	0.010	0.010	0.000	
^J Nitrate+Nitrite Nitrogen (mg/L)	4	0.014	0.328	0.215	0.193	0.152	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.585	0.284	0.293	0.224	
^J Total Nitrogen (mg/L)	4	< 0.054	0.684	0.603	0.486	0.296	
^J Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.012	0.008	0.009	0.003	
Total Phosphorus (mg/L)	4	0.030	0.080	0.039	0.047	0.023	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	2.9	18.0	4.4 ^M	7.7	7.6	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
^J Aluminum (mg/L)	4	< 0.033	0.795	0.175	0.280	0.355	
Iron (mg/L)	4	0.730	1.490	1.126	1.118	0.352	
^J Manganese (mg/L)	4	0.040	0.230	0.092	0.113	0.082	
Dissolved Metals							
^J Aluminum (mg/L)	4	< 0.033	0.131	0.019	0.046	0.056	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
Arsenic (µg/L)	4	< 2.1	< 2.1	1.0	1.0	0.0	
Cadmium (mg/L)	4	< 0.000	< 0.014	0.004	0.004	0.004	
Chromium (mg/L)	4	< 0.009	< 0.013	0.006	0.006	0.001	
Copper (mg/L)	4	< 0.013	< 0.020	0.008	0.008	0.002	
Iron (mg/L)	4	< 0.026	0.285	0.251	0.200	0.129	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0	
^J Manganese (mg/L)	4	0.024	0.136	0.063	0.072	0.047	
Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0	
Nickel (mg/L)	4	< 0.019	< 0.042	0.015	0.015	0.007	
^J Selenium (µg/L)	4	< 1.7	2.4	0.8	1.2	0.8	
Silver (mg/L)	4	< 0.000	< 0.002	0.000	0.000	0.000	
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	4	< 0.012	< 0.030	0.010	0.010	0.005	
Biological							
Chlorophyll a (µg/L)	4	< 0.10	2.14	0.82	0.98	1.07	
E. coli (col 100mL)	4	45	2420	276	754	1116	

C=F&W use classification criterion violated; E=# samples that exceeded criteria.; G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 65i; J=estimate; M=value > 90% of all data collected within ecoregion 65i; N=# samples.