

2005 Monitoring Summary



Limestone Creek (Monroe County) at Monroe Station Road (31.55470/-87.28358)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Limestone Creek watershed for biological and water quality monitoring as part of the 2005 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. Habitat and macroinvertebrate assessments were conducted on Limestone Creek at LIMM-1A on May 25, 2005.

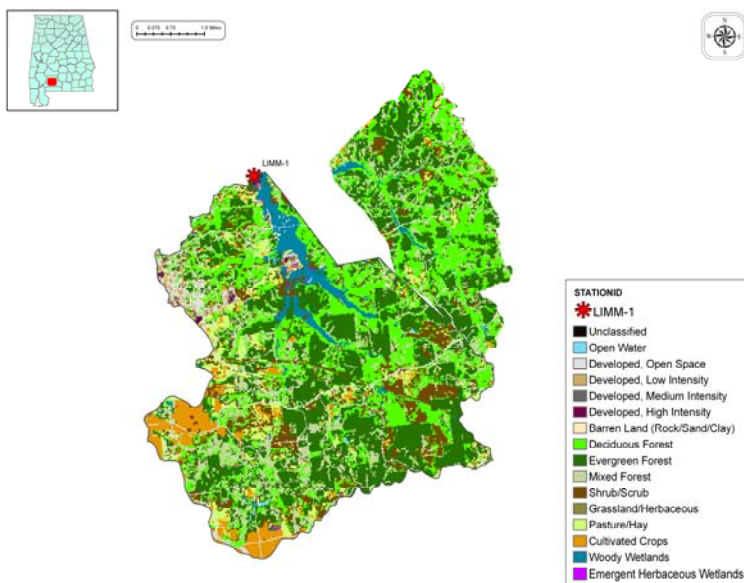


Figure 1. Sampling location and land use within the Limestone Creek watershed at LIMM-1A.

WATERSHED INFORMATION

Watershed characteristics are summarized in Table 1. Limestone Creek is a *Fish and Wildlife (F&W)* tributary of the Alabama River located near the city of Monroeville. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (66%), with some shrub/scrub in (Figure 1). As of February 23, 2011, the Department has issued 15 NPDES permits for this 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. Limestone Creek at LIMM-1A is dominated by the bottom substrate of sand, organic matter, and gravel substrates. Overall habitat quality was categorized as *sub-optimal*.

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 all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Alabama River
Basin		
Drainage Area (mi²)		35
Ecoregion^a		65q
% Landuse		
Open water		<1
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	22
	Evergreen	30
	Mixed	14
Shrub/scrub		12
Grassland/herbaceous		<1
Pasture/hay		7
Cultivated crops		6
Development	Open space	4
	Low intensity	1
	Moderate intensity	<1
	High intensity	<1
Population/km^{2b}		22
# NPDES Permits^c	TOTAL	15
Construction Stormwater		6
Mining		2
Industrial General		2
Industrial Individual		3
Municipal Individual		2

a. Buhrstone/Lime Hills

b. 2000 US Census

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

Table 2. Physical characteristics of Limestone Creek at LIMM-1A, May 25, 2005

Physical Characteristics	
Width (ft)	30.0
Canopy Cover	Mostly Shaded
Depth (ft)	
Run	1.3
Pool	3.5
% of Reach	
Run	80
Pool	20
% Substrate	
Gravel	25
Sand	44
Silt	5
Organic Matter	26

Table 3. Results of the habitat assessment conducted on Limestone Creek at LMM-1A, May 25, 2005.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	59	Sub-optimal (53-65)
Sediment Deposition	59	Sub-optimal (53-65)
Sinuosity	35	Poor <45
Bank and Vegetative Stability	50	Marginal (35-59)
Riparian Buffer	60	Marginal (50-69)
Habitat Assessment Score	127	
% Maximum Score	58	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment in Limestone Creek at LMM-1A conducted May 25, 2005.

Macroinvertebrate Assessment				
	Results	Scores (0-100)	Rating	
Taxa richness measures				
# EPT genera	17	68	Good (57-78)	
Taxonomic composition measures				
% Non-insect taxa	13	58	Poor (30.9-61.8)	
% Plecoptera	2	9	Good (5.7-52.8)	
% Dominant taxa	12	96	Excellent (>85.2)	
Functional composition measures				
% Predators	11	38	Fair (30.2-45.2)	
Tolerance measures				
Beck's community tolerance index	8	36	Good (31.9-65.9)	
% Nutrient tolerant organisms	34	60	Fair (50.9-76.2)	
WMB-I Assessment Score	--	52	Fair (38-56)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. Samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during March through October of 2005. Fecal coliform count was 2000 colonies/100 mL on August 10, 2005. However, flow was above normal due to a recent rain event. The median concentrations of the nitrogen and phosphorus (nitrate-nitrite, total nitrogen), and (dissolved reactive phosphorus) levels were higher than expected based on data collected from the least impaired reference reach data collected in the Buhrstone/Lime Hills ecoregion (65q).

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Limestone Creek watershed at LMM-1A to be in *fair* condition. Overall habitat quality was categorized as *sub-optimal* due to poor sinuosity and a lack of bank and vegetative stability as well as limited riparian buffer.

Intensive water chemistry results indicated nutrient (nitrate-nitrite, total nitrogen, and dissolved reactive phosphorus) concentration levels were higher than expected for ecoregion 65q. The data presented in this reports is a part of the assessment process and all other available will reviewed

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Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median (Med), 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)	7	18.0	23.0	22.0	20.7	2.1	
Turbidity (NTU)	8	11.1	82.3	21.4	31.9	24.4	
Total Dissolved Solids (mg/L)	7	51.0	121.0	90.0	90.0	24.6	
Total Suspended Solids (mg/L)	7	6.0	69.0	22.0	27.4	20.6	
Specific Conductance (µmhos)	7	23.6	144.8	111.9	96.1	45.2	
Hardness (mg/L)	4	49.0	57.2	49.9	51.5	3.8	
Alkalinity (mg/L)	7	24.2	54.9	48.9	42.9	12.6	
Stream Flow (cfs)	4	29.1	75.6	42.4	47.4	19.9	
Chemical							
Dissolved Oxygen (mg/L)	7	5.5	9.0	7.6	7.6	1.2	
pH (su)	7	7.0	8.1	7.5	7.5	0.4	
Ammonia Nitrogen (mg/L)	7	< 0.015	0.049	0.008	0.013	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.525	0.204 ^M	0.249	0.184	
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.560	0.292	0.326	0.200	
Total Nitrogen (mg/L)	7	< 0.076	0.817	0.740 ^M	0.575	0.291	
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.364	0.058 ^M	0.113	0.130	
Total Phosphorus (mg/L)	7	0.033	0.321	0.065	0.111	0.104	
CBOD-5 (mg/L)	6	< 1.0	3.1	1.5	1.6	0.9	
^J Chlorides (mg/L)	7	4.4	6.6	6.0	5.7	0.9	
Atrazine (µg/L)	2	< 0.05	< 0.05	0.02	0.02	0.00	
Total Metals							
Aluminum (mg/L)	4	< 0.015	0.232	0.132	0.126	0.104	
Iron (mg/L)	4	0.883	1.690	1.250	1.268	0.358	
Manganese (mg/L)	4	0.125	0.295	0.178	0.194	0.083	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.015	0.058	0.008	0.020	0.025	
Antimony (µg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Arsenic (µg/L)	4	< 10.0	< 10.0	5.0	5.0	0.0	
Cadmium (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000	
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000	
Copper (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000	
Iron (mg/L)	4	0.119	0.386	0.128	0.190	0.131	
Lead (µg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Manganese (mg/L)	4	< 0.005	0.198	0.118	0.109	0.091	
Mercury (µg/L)	4	< 0.3	< 0.3	0.2	0.2	0.0	
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000	
^J Selenium (µg/L)	3	< 10.0	< 10.0	5.0	5.0	0.0	
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000	
Thallium (µg/L)	4	< 1.0	< 1.0	0.5	0.5	0.0	
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000	
Biological							
^J Chlorophyll a (µg/L)	7	0.53	5.34	1.60	2.14	1.57	
^J Fecal Coliform (col/100 mL)	6	110	2000 ^C	750	857	740	1

C=F&W criterion exceeded; E=# criterion exceeded; J=estimate; M=value >90% of collected samples in ecoregion 65q; N= # of samples.