

2005 Monitoring Summary



Holly Mill Creek at Monroe County Road 17 (31.61573/-87.4167)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Holly Mill 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. A habitat and macroinvertebrate assessment was conducted on Holly Mill Creek at HMLM-1 on May 24, 2005.

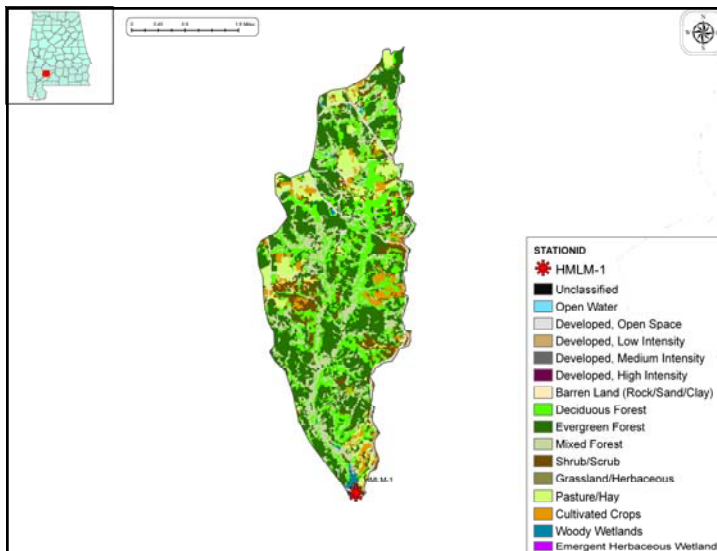


Figure 1. Sampling location and land use within the Holly Mill Creek watershed at HMLM-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Holly Mill Creek is a small *Fish and Wildlife (F&W)* stream located near the city of Monroeville, AL within the Burhstone/Lime Hills (65q) ecoregion. At HMLM-1, the stream drains approximately twelve square miles of countryside. Land use within the watershed is 73% forest, 9% pasture, and 5% cultivated crops. and State Highway 49 runs through the middle of the watershed. As of June 9,

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. Holly Mill Creek at HMLM-1 is a primarily medium-gradient stream characterized by sand and gravel substrate in the Alabama River basin. Overall habitat quality was categorized as *optimal*. However, sedimentation was noted as an issue within the reach.

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

Table 1. Summary of watershed characteristics.

Physical Characteristics		
Drainage Area (mi ²)		12
Ecoregion ^a		65q
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	22
	Evergreen	33
	Mixed	18
Shrub/scrub		9
Grassland/herbaceous		
Pasture/hay		9
Cultivated crops		5
Development	Open space	4
	Low intensity	<1
Population/km ²		10

a. Burhstone/Lime Hills
b. 2000 U S Census Data

Table 2. Summary of physical characteristics of Holly Mill Creek at HMLM-1

Physical Characteristics		
Width (ft)		25
Canopy cover		Est. 50/50
Depth (ft)		
	Riffle	0.3
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	35
	Run	35
	Pool	30
% Substrate		
	Boulder	2
	Cobble	10
	Gravel	35
	Sand	40
	Silt	5
	Clay	2
	Organic Matter	6

Table 3. Results of the habitat assessment conducted May 24, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	68	Optimal (>65)
Sediment deposition	50	Marginal (40-52)
Sinuosity	88	Optimal (≥85)
Bank and vegetative stability	68	Sub-optimal (60-74)
Riparian buffer	89	Sub-optimal (70-90)
Habitat assessment score	167	
% Maximum score	69	Optimal (>65)

Table 4. Results of the macroinvertebrate bioassessment conducted May 24,

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures	(0-100)		
# Ephemeroptera (mayfly) genera	15	100	Excellent (>85)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	3	25	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	5	81	Good (74.1-87.1)
% Non-insect organisms	0	99	Excellent (>97)
% Plecoptera	1	5	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	11	39	Poor (20.2-40.7)
WMB-I Assessment Score	---	55	Fair (48-72)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Minimum dissolved oxygen concentrations and pH values were lower than F&W Water use criteria on June 25, and June 2, 2005 respectively. These criteria violations could be attributed to rain events.

CONCLUSION

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Results of habitat assessment and intensive water quality study suggest that sedimentation and low flow may be contributing to the degraded biological condition. The low pH measured on June 2, 2005 may be attributed to the high percentage of attached algae observed within the reach.

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, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	7	19.6	28.0	22.0	22.6	2.8
Turbidity (NTU)	8	3.0	6.5	4.2	4.3	1.1
Total dissolved solids (mg/L)	7	25.0	86.0	39.0	53.7	25.7
Total suspended solids (mg/L)	7	3.0	11.0	5.0	5.7	3.1
Specific conductance (µmhos)	7	14.6	36.4	23.6	23.8	8.6
Hardness (mg/L)	4	4.9	6.8	5.9	5.9	0.8
Alkalinity (mg/L)	7	2.2	3.5	2.7	2.9	0.4
Stream Flow (cfs)	8	4.0	24.1	10.1	12.0	---
Chemical						
Dissolved oxygen (mg/L)	7	4.6 ^c	9.7	8.9	8.0	1.7
pH (su)	7	5.6 ^c	7.6	6.9	6.9	0.7
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	7	0.041	0.256	0.082	0.108	0.072
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.375	0.224	0.189	0.117
Total nitrogen (mg/L)	7	< 0.116	0.507	0.306	0.297	0.151
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.022	0.013	0.014	0.007
Total phosphorus (mg/L)	7	< 0.004	0.054	0.033	0.031	0.016
CBOD-5 (mg/L)	6	< 1.0	1.9	1.3	1.3	0.5
Chlorides (mg/L)	7	4.4	6.1	4.9	5.1	0.5
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.081	0.026	0.035	0.0
Iron (mg/L)	4	0.323	0.583	0.507	0.480	0.1
Manganese (mg/L)	4	< 0.005	0.019	0.003	0.007	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.083	0.008	0.026	0.0
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.0
Iron (mg/L)	4	0.022	0.135	0.07	0.074	0.0
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	< 0.015	0.003	0.006	0.0
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.0
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	7	0.53	3.20	1.60	1.63	1.1
^J Fecal Coliform (col/100 mL)	6	21	200	155	124	73

J=estimate; N=# samples; C=value exceeds established criteria for F&W water use classification

FOR MORE INFORMATION, CONTACT:
 Aaron L. Goar, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2755 agoar@adem.state.al.us