Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2006 Monitoring Summary

Poor

Halls Mill Creek at Hillcrest Rd in Mobile County (30.61078/-88.19088)

BACKGROUND

The Alabama Department Environmental Management (ADEM) selected the Halls Mill Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.

Water sampling was conducted monthly at HALM-1 (30.60844/-88.16223) March through October 2006. Due to nonwadeable conditions, habitat and macroinvertebrate assessments were conducted at the next upstream bridge crossing at site HALM-2. A comparison of these two watersheds is provided below.

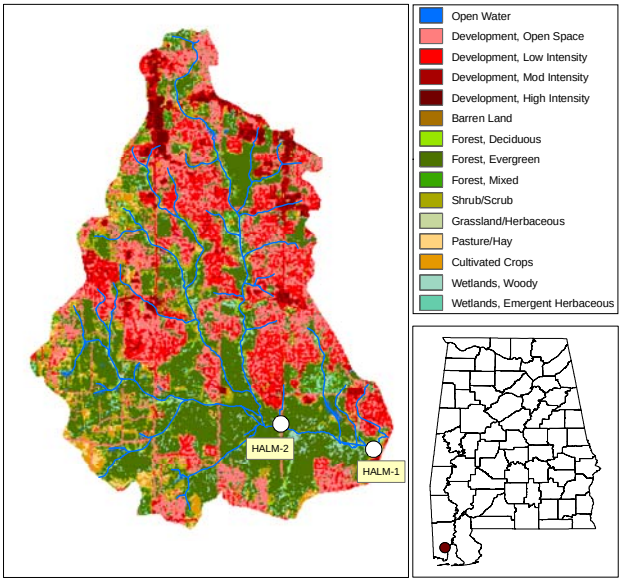

Figure 1. Sampling location and landuse within the Halls Mill Creek watershed at HALM-1 and HALM-2.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Halls Mill Creek is a *Fish & Wildlife* (*F&W)* stream located in the Southern Pine Plains and Hills ecoregion (Griffith et al. 2001). Landuse within the HALM-2 and HALM-1 watersheds was similar. Development activities accounted for 45% and 47% of the land cover in HALM-1 and HALM-2, respectively. Forest and wooded wetlands composed of 42% and 40% of land cover in the HALM-1 and HALM-2 watersheds, respectively (Fig.1).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		HALM-1	HALM-2
Basin		Mobile	Mobile
Drainage Area (mi^2)		27	22
Ecoregion[a]		65f	65f
% Landuse			
Open water		1	1
Wetland	Woody	5	4
	Emergent herbaceous	<1	<1
Forest	Deciduous	1	1
	Evergreen	33	32
	Mixed	3	3
Shrub/scrub		7	7
Grassland/herbaceous		<1	<1
Pasture/hay		2	2
Cultivated crops		2	2
Development	Open space	24	24
	Low intensity	16	16
	Moderate intensity	4	5
	High intensity	1	2
Barren		<1	<1
Population/km^2 [b]		538	530
# NPDES Permits[c]	**TOTAL**	144	133
Construction Stormwater		142	131
Mining		1	1
Industrial General		1	1

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2b. Physical characteristics of Halls Mill Creek at HALM-2, May 17, 2006.

Physical Characteristics		
Width (ft)		25
Canopy cover		Shaded
Depth (ft)	Run	2.5
	Pool	4.0
% of Reach	Run	70
	Pool	30
% Substrate	Sand	85
	Silt	2
	Organic Matter	13

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed at HALM-2 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. Halls Creek at HALM-2 is a low-gradient stream with sand substrate. The overall habitat quality was categorized as *optimal*, although instream habitat was somewhat limited.

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. The final score indicated the biological community in HALM-2 to be in *poor* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Halls Mill Creek at HALM-2, May 17, 2006.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	48	Marginal (40-52)
Sediment deposition	76	Optimal (>65)
Sinuosity	80	Sub-optimal (65-84)
Bank and vegetative stability	64	Sub-optimal (60-74)
Riparian buffer	85	Sub-optimal (70-90)
Habitat assessment score	151	
% Maximum score	**68**	**Optimal (>65)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Halls Mill Creek at HALM-2, May 17, 2006.

Macroinvertebrate Assessment			
	Results	**Scores**	**Rating**
Taxa richness measures			
# EPT genera	7	28	Poor (19-37)
Taxonomic composition measures			
% Non-insect taxa	19	28	Very Poor (<30.9)
% Plecoptera	2	11	Good (5.7-52.8)
% Dominant taxa	27	58	Fair (47.1-70.5)
Functional composition measures			
% Predators	9	29	Poor (15.1-30.1)
Tolerance measures			
Beck's community tolerance index	8	36	Good (31.9-65.9)
% Nutrient tolerant organisms	41	48	Poor (25.4-50.8)
WMB-I Assessment Score	---	**34**	**Poor (19-37)**

WATER CHEMISTRY

Water chemistry results of samples collected from HALM-1 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, 2006 to help identify any stressors to the biological communities. The neutral to slightly acidic pH is typical of streams in this ecoregion. Fecal coliform results were affected by heavy rains prior to sampling in August (4,400 colonies/100 mL sample) and September (11,000 colonies/100 mL sample).

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment reults indicated the macroinvertebrate community in Halls Mill Creek at HALM-2 to be in *poor* condition. Development accounted for 40% of land cover within this watershed. Based on the 2001 MRLC definitions, impervious surfaces composed six to seventeen percent of the watershed, which can severely alter stream hydrology. The reach was also characterized by limited instream habitat.

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Table 5. Summary of water quality data collected March-October, 2006. 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)	9	18.0	26.3	22.0	22.3	3.0
Turbidity (NTU)	9	2.4	27.6	5.4	9.5	9.1
Total Dissolved Solids (mg/L)	8	4.0	72.0	52.0	46.6	25.7
Total Suspended Solids (mg/L)	8	< 1.0	27.0	2.5	7.4	9.2
Specific Conductance (µmhos)	9	58.5	77.0	70.1	69.0	4.9
Hardness (mg/L)	3	25.0	46.0	33.0	34.7	10.6
Alkalinity (mg/L)	8	5.0	23.7	21.7	19.4	6.2
Stream Flow (cfs)	5	31.4	40.3	35.2	35.3	3.3
Chemical						
Dissolved Oxygen (mg/L)	9	5.6	8.8	7.3	7.3	0.9
pH (su)	9	5.9[C]	7.0	6.8	6.7	0.3
Ammonia Nitrogen (mg/L)	8	< 0.010	0.075	0.014	0.024	0.024
Nitrate+Nitrite Nitrogen (mg/L)	8	0.136	0.305	0.271	0.248	0.062
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	0.660	0.298	0.307	0.187
Total Nitrogen (mg/L)	8	0.211	0.951	0.535	0.555	0.214
Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.010	0.003	0.004	0.003
Total Phosphorus (mg/L)	8	< 0.004	0.054	0.015	0.021	0.018
CBOD-5 (mg/L)	8	< 1.0	3.0	1.0	1.3	1.0
Chlorides (mg/L)	8	1.6	9.6	6.2	6.1	3.0
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	3	< 0.05	0.95	0.380	0.452	0.467
Iron (mg/L)	3	0.542	1.71	1.1	1.117	0.584
Manganese (mg/L)	3	0.017	0.056	0.053	0.042	0.022
Dissolved Metals						
Aluminum (mg/L)	3	< 0.1	0.12	0.100	0.090	0.036
Antimony (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Arsenic (µg/L)	3	< 5	< 5	2.5	2.5	0.0
Cadmium (mg/L)	3	< 0.0003	< 0.0003	0.0001	0.0001	0.000
Chromium (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Copper (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	3	0.211	0.552	0.235	0.333	0.190
Lead (µg/L)	3	< 5	6.6	2.5	3.9	2.4
Manganese (mg/L)	3	0.016	0.02	0.017	0.018	0.002
Mercury (µg/L)	3	< 0.5	< 0.5	0.3	0.3	0.0
Nickel (mg/L)	3	< 0.005	0.008	0.0025	0.0043	0.003
Selenium (µg/L)	3	< 7.5	< 7.5	3.8	3.8	0.0
Silver (mg/L)	3	< 0.001	< 0.001	0.0004	0.0004	0.000
Thallium (µg/L)	3	< 9	< 9	4.5	4.5	0.0
Zinc (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.000
Biological						
Chlorophyll a (µg/L)	8	0.53	5.34	0.71	1.34	1.65
[J] Fecal Coliform (col/100 mL)	6	20	> 11000[C]	727	2821	4350

J=estimate; N= # of samples; C=value exceeds established criteria for *Fish & Wildlife* water use classification.