

2011 Monitoring Summary



Basin Assessment Site

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

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Halls Mills Creek watershed for biological and water quality monitoring as part of the 2011 Assessment of the Escatawpa, Mobile, Lower 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 basins.



Figure 1. Halls Mill Creek at HALM-2, August 30, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Halls Mill Creek is a small *Fish & Wildlife (F&W)* stream located in the Southern Pine Plains & Hills ecoregion (65f) in Mobile County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily development (47%) and forest (43%). Population density is relatively high in this area. As of September 4, 2012, one hundred and thirty-three outfalls are active in 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.

Halls Mill Creek at HALM-2 is a low-gradient stream with sand, silt, and mud substrates. Overall habitat quality was categorized as *optimal* due to the habitat created by snags, leaf packs and root banks within the reach. However, the reach was characterized by relatively unstable stream banks, which puts it at risk for impacts from sedimentation and scouring (Figure 1).

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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be characterized mainly by pollution-tolerant taxa groups, indicating *poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Mobile River
Basin		22
Drainage Area (mi²)		65f
Ecoregion^a		
% Landuse		
Open water		1
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	1
	Evergreen	32
	Mixed	3
Shrub/scrub		7
Grassland/herbaceous		<1
Pasture/hay		2
Cultivated crops		2
Development	Open space	24
	Low intensity	16
	Moderate intensity	5
	High intensity	2
Barren		<1
Population/km²^b		530
# NPDES Permits^c	TOTAL	133
	Construction Stormwater	131
	Mining	1
	Industrial General	1

a.Southern Pine Plains & Hills

b.2000 US Census

c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, September 4, 2012.

Table 2. Physical characteristics of Halls Mill Creek at HALM-2, August 30, 2011.

Physical Characteristics	
Canopy Cover	Mostly Shaded
Width (ft)	21
Depth (ft)	
	Run 2.0
	Pool 3.0
% of Reach	
	Run 40
	Pool 60
% Substrate	
	Mud/Muck 4
	Sand 66
	Silt 10
	Organic Matter 20

Table 3. Results of the habitat assessment conducted on Halls Mill Creek at HALM-2, August 30, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	62	Sub-optimal (53-65)
Sediment Deposition	69	Optimal >65
Sinuosity	70	Sub-optimal (65-84)
Bank and Vegetative Stability	59	Marginal (35-59)
Riparian Buffer	88	Sub-optimal (70-89)
Habitat Assessment Score	152	
% Maximum Score	69	Optimal >65

Table 4. Results of the macroinvertebrate bioassessment conducted in Halls Mill Creek at HALM-2, August 30, 2011.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	5	20	Poor (19-37)
Taxonomic composition measures			
% Non-insect taxa	13	60.5	Poor (30.9-61.8)
% Plecoptera	0	0.5	Very Poor (<=1.85)
% Dominant taxa	36	36.2	Poor (23.5-47.0)
Functional composition measures			
% Predators	10	32.9	Fair (30.2-45.2)
Tolerance measures			
Beck's community tolerance index	4	18.2	Poor (10.6-21.2)
% Nutrient tolerant organisms	49	34.9	Poor (25.4-50.8)
WMB-I Assessment Score	--	29	Poor (19-37)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected in April, June, August and October of 2011 to help identify any stressors to the biological communities. Median value of total dissolved solids, alkalinity and chlorides were higher than expected based on verified reference reach data collected in ecoregion 65f. Median specific conductance and hardness were also higher than expected. Samples were collected in April and August for analysis of pesticides, semi-volatile organics and atrazine. All concentrations were below detection limits. Thallium exceeded Human Health (HH) criterion for water and fish consumption in April.

SUMMARY

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

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition; however, habitat quality and availability were assessed as *optimal* for supporting macroinvertebrate communities. Forty-seven percent of the watershed is developed and 131 construction/storm water permits are located upstream of the station. Specific conductance, hardness, total dissolved solids, alkalinity, and chlorides were higher than expected for this ecoregion.

Table 5. Summary of water quality data collected April-October, 2011. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	Q	E
Physical								
Temperature (°C)	5	17.4	25.5	23.8	22.1	3.4		
Turbidity (NTU)	4	2.8	3.3	3.0	3.0	0.2		
Total Dissolved Solids (mg/L)	4	40.0	66.0	61.0 ^M	57.0	11.8		
Total Suspended Solids (mg/L)	4	< 1.0	1.0	0.5	0.5	0.0		
Specific Conductance (µmhos)	5	75.6	78.6	76.9 ^G	77.0	1.1		
Hardness (mg/L)	4	20.8	25.0	23.4 ^G	23.2	1.9		
Alkalinity (mg/L)	4	22.9	24.9	24.2 ^M	24.0	0.8		
Stream Flow (cfs)	5	20.8	30.3	28.8	26.4	4.6		
Chemical								
Dissolved Oxygen (mg/L)	5	7.0	8.5	7.4	7.6	0.6		
pH (su)	5	6.6	7.0	6.7	6.8	0.1		
Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	4	0.192	0.250	0.230	0.225	0.025		
Total Kjeldahl Nitrogen (mg/L)	4	< 0.076	0.374	0.151	0.178	0.162		
Total Nitrogen (mg/L)	4	< 0.246	0.597	0.386	0.404	0.166		
Dissolved Reactive Phosphorus (mg/L)	4	0.005	0.007	0.006	0.006	0.001	J	
Total Phosphorus (mg/L)	4	0.006	0.009	0.007	0.007	0.001	J	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	J	
Chlorides (mg/L)	4	6.8	8.6	7.9 ^M	7.8	0.7		
Atrazine (µg/L)	2	< 0.02	0.05	0.03	0.03	0.03		
Total Metals								
Aluminum (mg/L)	4	< 0.043	0.059	0.022	0.031	0.019	J	
Iron (mg/L)	4	0.574	0.799	0.642	0.664	0.105		
Manganese (mg/L)	4	0.010	0.014	0.012	0.012	0.002	J	
Dissolved Metals								
Aluminum (mg/L)	4	< 0.043	< 0.043	0.022	0.022	0.000		
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0		
Arsenic (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0		
Cadmium (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000		
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000		
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000		
Iron (mg/L)	4	0.269	0.460	0.348	0.356	0.080		
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0		
Manganese (mg/L)	4	< 0.006	0.010	0.007	0.007	0.003	J	
Mercury (µg/L)	4	< 0.0	< 0.0	0.0	0.0	0.0		
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000		
Selenium (µg/L)	4	< 1.3	< 1.3	0.7	0.7	0.0		
Silver (mg/L)	4	< 0.000	< 0.000	0.000	0.000	0.000		
Thallium (µg/L)	4	< 1.1	1.2 ^H	0.5	0.7	0.3	J	1
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000		
Biological								
Chlorophyll a (ug/L)	4	< 0.10	0.53	0.05	0.17	0.24		
E. coli (col/100mL)	4	51	131	77	84	34	J	

E=samples that exceeded criteria; G=value > median concentration of all verified reference reach data collected in the ecoregion 65f; H=(F&W) human health criterion exceeded; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 65f; N=# samples; Q=qualifier.

FOR MORE INFORMATION, CONTACT:

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