

2014 Monitoring Summary



Unnamed tributary to Halawakee Creek at Lee County Road 154 (32.65316/-85.30309)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the unnamed tributary of Halawakee Creek watershed for biological and water quality monitoring as part of the 2014 Assessment of the Southeast Alabama (SEAL) River Basin. The objectives of the SEAL Basin Assessments were to fully assess the biological, chemical, and physical conditions of each monitoring site and to estimate overall water quality within the basin.



Figure 1. Unnamed tributary to Halawakee Creek at UHAL-4, May 7, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. The unnamed tributary of Halawakee Creek is a *Fish & Wildlife (F&W)* stream located near Opelika in the Chattahoochee River basin. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (53%), development (23%), and pasture. As of April 1 2016, fifty-one outfalls are active in this watershed, including 13 industrial.

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.

The unnamed tributary of Halawakee Creek at UHAL-4 (Figure 1) is a low-gradient, cobble, gravel and sand bottomed stream in the Southern Outer Piedmont ecoregion. Instream habitat quality was rated as marginal for supporting aquatic macroinvertebrate communities. Sediment deposition was also 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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Chattahoochee R
Basin		15
Drainage Area (mi²)		45B
Ecoregion^a		
% Landuse^b		
Open water		1%
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	35%
	Evergreen	17%
	Mixed	1%
Shrub/scrub		6%
Grassland/herbaceous		3%
Pasture/hay		13%
Development	Open space	8%
	Low intensity	10%
	Moderate intensity	4%
	High intensity	1%
Barren		<1%
Population/km^{2c}		120
# NPDES Permits^d	TOTAL	51
	Construction	28
	Industrial General	12
	Industrial Individual	1
	Small Mining	1
	Underground Injection Control	9

a.Southern Outer Piedmont

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 the unnamed tributary of Halawakee Creek at UHAL-4, May 21, 2014.

Physical Characteristics	
Width (ft)	25
Canopy Cover	Mostly Shaded
Depth (ft)	
	Run 1.0
	Pool 1.5
% of Reach	
	Run 85
	Pool 15
% Substrate	
	Boulder 2
	Cobble 15
	Gravel 30
	Sand 43
	Silt 5
	Organic Matter 5

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Table 3. Results of the habitat assessment conducted on Halawakee Creek at UHAL-4, May 21, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	49	Marginal (31-<55)
Sediment Deposition	40	Marginal (31-<55)
Sinuosity	43	Marginal (31-<55)
Bank Vegetative Stability	66	Sub-Optimal (58-79)
Riparian Buffer	80	Sub-Optimal (60-84)
Habitat Assessment Score	105	
% of Maximum Score	61	Sub-Optimal (57-80)

Table 4. Results of the macroinvertebrate bioassessment conducted in the unnamed tributary of Halawakee Creek at UHAL-4, May 21, 2014.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
# EPT taxa	7	13
Shannon Diversity	2.77	3
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
% Non-insect taxa	7	78
Tolerance measures		
% Tolerant taxa	33	47
WMB-I Assessment Score	---	28
WMB-I Assessment Rating		Poor (23-46)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during March through October of 2014 to help identify any stressors to the biological communities.

The *F&W* hardness-adjusted aquatic life use criterion for copper was exceeded during the October sampling event. The *F&W E. coli* criterion was exceeded during the July sampling event.

Median specific conductance and hardness values were higher than the median concentration of all verified ecoregional reference reach data collected in ecoregion 45. Alkalinity, total dissolved solids, nutrients, chlorides, dissolved iron, and manganese values were greater than 90% of all verified ecoregional reference reach data collected in the Piedmont ecoregion.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Some water quality results were elevated as compared to data from ADEM's least-impaired reference reaches in ecoregion 45. The data presented in this report and all other available data will be reviewed to identify the causes and sources of the degraded biological conditions.

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Table 5. Summary of water quality data collected March through October 2014. 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	Q
Physical								
Temperature (°C)	9	13.3	24.3	20.7	20.1	3.7		
Turbidity (NTU)	8	4.6	11.3	7.4	7.4	2.0		
Total Dissolved Solids (mg/L)	8	61.0	142.0	98.0 ^M	101.8	34.9		
Total Suspended Solids (mg/L)	8	1.0	11.0	3.5	4.5	3.3		
Specific Conductance (µmhos)	9	84.8	286.0	117.7 ^G	154.8	69.9		
Hardness (mg/L)	4	30.9	52.9	35.8 ^G	38.9	10.2		
Alkalinity (mg/L)	8	34.2	50.9	39.0 ^M	40.8	6.4		
Stream Flow (cfs)	9	2.5	18.1	10.5	9.6	6.0		
Chemical								
Dissolved Oxygen (mg/L)	9	6.7	11.5	7.7	8.2	1.5		
pH (su)	9	7.0	7.5	7.1	7.2	0.2		
Ammonia Nitrogen (mg/L)	8	<0.006	0.118	0.022 ^M	0.042	0.047		
Nitrate+Nitrite Nitrogen (mg/L)	8	0.080	4.000	1.052 ^M	1.415	1.388		
Total Kjeldahl Nitrogen (mg/L)	8	0.254	0.682	0.460 ^M	0.454	0.132		
Total Nitrogen (mg/L)	8	0.334	4.682	1.512 ^M	1.869	1.480		
Dissolved Reactive Phosphorus (mg/L)	8	0.027	1.490	0.345 ^M	0.526	0.540		
Total Phosphorus (mg/L)	8	0.044	1.520	0.373 ^M	0.560	0.542		
CBOD-5 (mg/L)	8	<2.0	<2.0	1.0	1.0	0.0		
Chlorides (mg/L)	8	5.3	30.4	9.3 ^M	14.2	10.1		
Total Metals								
^J Aluminum (mg/L)	4	0.068	0.193	0.126	0.128	0.057		
Iron (mg/L)	4	0.431	1.020	0.653	0.689	0.257		
^J Manganese (mg/L)	4	0.011	0.081	0.049	0.048	0.029		
Dissolved Metals								
^J Aluminum (mg/L)	4	<0.050	0.071	0.040	0.044	0.023		
^J Antimony (µg/L)	4	<0.2	<0.4	0.1	0.1	0.1		
^J Arsenic (µg/L)	4	<0.2	0.5 ^H	0.3	0.3	0.2		2
Cadmium (µg/L)	4	<0.246	<0.390	0.124	0.142	0.036		
^J Chromium (µg/L)	4	0.527	0.710	0.546	0.582	0.086		
^J Copper (mg/L)	4	0.001	0.006 ^S	0.003	0.003	0.002	1	1
Iron (mg/L)	4	0.252	0.660	0.380 ^M	0.418	0.175		
Lead (µg/L)	4	<0.2	<0.5	0.1	0.2	0.1		
^J Manganese (mg/L)	4	0.008	0.068	0.043 ^M	0.040	0.025		
^J Nickel (mg/L)	4	0.004	0.025	0.011	0.013	0.010		
Selenium (µg/L)	4	<0.4	<0.5	0.2	0.2	0.0		
Silver (µg/L)	4	<0.252	<0.460	0.126	0.152	0.052		
Thallium (µg/L)	4	<0.2	<0.6	0.1	0.2	0.1		
Zinc (mg/L)	4	0.008	0.028	0.016	0.017	0.008		
Biological								
Chlorophyll a (ug/L)	8	<0.10	4.81	1.07	1.54	1.62		
^J E. coli (col/100mL)	8	79	2420 ^H	258 ^M	559	790	1	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45; H= *F&W* human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45; N=# samples; Q=# of uncertain criteria exceedances; S=*F&W* hardness-adjusted aquatic life use criteria exceeded.