

2014 Monitoring Summary



Halls Creek at the Intersection of Coffee County Roads 114 and 138 (31.51948/-85.87587)

BACKGROUND

The Upper Pea River was identified as a Strategic Habitat Unit (SHU) by the Alabama Rivers & Streams Network (ARSN). SHUs are recognized as high-quality habitats occupied by federally listed and state imperiled species. Halls Creek, a tributary of the Upper Pea River, was identified as a priority watershed due to potential impacts from bank erosion and a lack of riparian buffer. In cooperation with ARSN, the Alabama Department of Environmental Management (ADEM) conducted biological and water quality monitoring on Halls Creek as part of the 2014 Assessment of the Southeast Alabama (SEAL) River Basin. The objectives of this monitoring were to assess the biological integrity of the site, to estimate overall water quality within the SEAL River Basin group, and to provide data to support restoration efforts. A habitat and a macroinvertebrate assessment were conducted in Halls Creek at HALC-1 on May 20,



Figure 1. Halls Creek at HALC-1, May 20, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Halls Creek at HALC-1 is a *Fish & Wildlife (F&W)* stream located in Coffee County. Based on the 2011 National Land Cover Dataset, land use within the watershed is primarily forest (48%), with shrub/scrub, pasture, and cropland. As of April 1, 2016, no NPDES outfalls were 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 Creek at HALC-1 is a lightly tannic stream with shallow gravel and clay riffles (Figure 1). Bank vegetative stability was *marginal*. Sand deposits were noted within the reach.

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in south Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted at HALC-1 rated the site as a 4, or *fair*. Relative abundance of pollution-sensitive taxa were lower than expected, and a few taxa appear to dominate the macroinvertebrate community (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Choctawhatchee R	
Drainage Area (mi ²)	6	
Ecoregion ^a	65D	
% Landuse ^b		
Open water		1%
Wetland	Woody	3%
Forest	Deciduous	12%
	Evergreen	17%
	Mixed	19%
Shrub/scrub		15%
Grassland/herbaceous		1%
Pasture/hay		15%
Cultivated crops		12%
Development	Open space	5%
	Low intensity	<1%
	Moderate intensity	<1%
Population/km ^{2c}	11	

a.Southern Hilly Gulf Coastal Plain

b.2011 National Land Cover Dataset

c.2010 US Census

Table 2. Physical characteristics of Halls Creek at HALC-1 on May 20, 2014.

Physical Characteristics		
Width (ft)	20	
Canopy cover	Mostly Shaded	
Depth (ft)	Riffle	0.3
	Run	0.8
	Pool	1.5
% of Reach	Riffle	20
	Run	60
	Pool	20
% Substrate	Gravel	1
	Hard Pan Clay	35
	Sand	50
	Silt	5
	Organic Matter	9

Table 3. Results of the habitat assessment conducted in Halls Creek at HALC-1, May 20, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	51	Marginal (31-<55)
Sediment Deposition	88	Optimal (>79)
Riffle Frequency	75	Sub-Optimal (55-79)
Bank Vegetative Stability	40	Marginal (31-<58)
Riparian Buffer	60	Sub-Optimal (60-84)
Habitat Assessment Score	121	
% Maximum Score	60	Sub-Optimal (57-80)

Table 4. Results of the macroinvertebrate bioassessment conducted in Halls Creek at HALC-1, May 20, 2014.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		68
# EPT taxa		14
# Highly-sensitive and Specialized Taxa		0
Taxonomic composition measures		
% EPC taxa		28
% EPT minus Baetidae and Hydropsychidae		4
% Chironomidae Individuals		23
% Dominant Taxon		15
% Individuals in Dominant 5 Taxa		56
Functional feeding group		
# Collector Taxa		28
% Tolerant Filterer Taxa		13
Community tolerance		
# Sensitive EPT		2
% Sensitive taxa		9
% Nutrient Tolerant individuals		38
WMB-I Assessment Score		4
WMB-I Assessment Rating		Fair

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March through October of 2014 to help identify any stressors to the biological community. Organics were collected on April 16, 2014. The atrazine concentration was above the minimum detection limit (MDL) on that date. Specific conductance and hardness, total nitrogen, chlorides, and dissolved iron concentrations were higher than expected, based on reference reach data collected in the Southern Hilly Gulf Coastal Plain ecoregion (65d).

SUMMARY

Bioassessment results indicated the macroinvertebrate community in the reach to be in *fair* condition. While the habitat assessment conducted in Halls Creek at HALC-1 indicated the reach to be *sub-optimal* for supporting a diverse biological community, bank stability was rating as marginal and sand deposits were noted in the reach. Results of water chemistry analyses showed that atrazine concentrations were above the MDL in one sample collected in April. Specific conductance and hardness, total nitrogen, chlorides, and dissolved iron concentrations were higher than expected based on reference reach data collected in the Southern Hilly Gulf Coastal Plain ecoregion (65d).

Table 5. Summary of water quality data collected March-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	Q
Physical							
Temperature (°C)	10	13.4	26.7	19.7	19.8	5.3	
Turbidity (NTU)	10	8.8	30.3	16.4	17.3	6.8	
Total Dissolved Solids (mg/L)	8	49.0	81.0	73.5	69.0	13.6	
Total Suspended Solids (mg/L)	8	2.0	18.0	10.0	8.6	5.4	
Specific Conductance (µmhos/cm@25C)	10	44.5	97.8	59.1 ^G	67.4	20.0	
Hardness (mg/L)	4	16.0	33.2	24.0 ^G	24.3	9.4	
Alkalinity (mg/L)	8	8.1	35.0	18.2	20.4	11.0	
Monthly Stream Flow (cfs)	8	0.1	31.2	4.4	7.0	10.2	
Stream Flow during Sample Collection (cfs)	6	1.5	31.2	6.8	9.3	11.0	
Chemical							
Dissolved Oxygen (mg/L)	9	6.8	10.7	8.5	8.4	1.4	
pH (su)	10	6.7	7.0	6.9	6.9	0.1	
^J Ammonia Nitrogen (mg/L)	8	< 0.006	0.061	0.004	0.016	0.021	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.199	0.517	0.417	0.386	0.127	
Total Kjeldahl Nitrogen (mg/L)	8	0.411	1.090	0.561	0.603	0.212	
Total Nitrogen	8	0.662	1.527	0.980 ^M	0.989	0.255	
^J Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.007	0.005	0.005	0.001	
Total Phosphorus (mg/L)	8	0.018	0.047	0.032	0.032	0.008	
^J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	3.4	7.1	5.6 ^M	5.5	1.2	
Atrazine (µg/L)	1				0.23		
Total Metals							
^J Aluminum (mg/L)	4	0.098	0.310	0.208	0.206	0.090	
Iron (mg/L)	4	1.850	1.960	1.865	1.885	0.051	
Manganese (mg/L)	4	0.059	0.118	0.084	0.086	0.029	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.050	< 0.050	0.025	0.025	0.000	
Antimony (µg/L)	4	< 0.2	< 0.4	0.1	0.1	0.1	
^J Arsenic (µg/L)	4	0.6	1.3 ^H	0.9	0.9	0.3	4
Cadmium (µg/L)	4	< 0.246	< 0.390	0.123	0.141	0.036	
^J Chromium (mg/L)	4	0.001	0.001	0.001	0.001	0.000	
^J Copper (mg/L)	4	0.0005	0.001	0.0005	0.0005	0.000	
Iron (mg/L)	4	0.946	1.570	1.100 ^M	1.179	0.280	
Lead (µg/L)	4	< 0.2	< 0.5	0.1	0.2	0.1	
Manganese (mg/L)	4	0.052	0.103	0.074	0.076	0.024	
^J Nickel (mg/L)	4	0.001	0.001	0.001	0.001	0.000	
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	
^J Zinc (mg/L)	4	0.003	0.004	0.004	0.004	0.001	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	8.90	2.85	3.20	3.03	
E. coli (MPN/DL)	8	145	1633	323	591	584	

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65d; H=F&W human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65d; N=# of samples; Q=# of uncertain exceedances.

FOR MORE INFORMATION, CONTACT:
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