

2010 Monitoring Summary



Hillabee Creek at Tallapoosa County Road 5 (Near Hackneyville) (33.06635/-85.87993)

BACKGROUND

Hillabee Creek is one of a network of 94 sites the Alabama Department of Environmental Management (ADEM) monitors annually to identify long-term trends in water quality and to provide data for the development of TMDLs and water quality criteria.

Hillabee Creek at HILT-2 was also selected for sampling during the 2010 Tallapoosa Nutrient Criteria project. Data collected will be used to develop and implement nutrient criteria in wadeable, flowing streams in the Tallapoosa River Basin, as well as statewide.



Figure 1. Hillabee Creek at HILT-2, July 13, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Hillabee Creek at HILT-2 is a *Fish & Wildlife (F&W)* stream located within the Tallapoosa River basin. According to the 2011 National Land Cover Dataset, land use within the watershed is primarily forest (72%). As of April 1, 2016, a total of 62 NPDES outfalls are active within the 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. Hillabee Creek is a wide, high-gradient, riffle-run stream characterized by gravel and sand substrates (Figure 1). Overall habitat was rated as *optimal* for supporting macroinvertebrate communities. The reach contains plentiful varieties of instream habitats, strong bank stability, and minimal riparian buffer interference.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were 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 north 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 in Hillabee Creek at HILT-2 rated the site as *good*. Relative abundance and numbers of pollution-sensitive taxa are higher, while relative abundance and numbers of pollution-tolerant taxa have decreased (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Tallapoosa R
Basin		Tallapoosa R
Drainage Area (mi²)		190
Ecoregion^a		45A
% Landuse^b		
Open water		<1%
Wetland	Woody	1%
	Emergent herbaceous	<1%
Forest	Deciduous	44%
	Evergreen	27%
	Mixed	1%
Shrub/scrub		7%
Grassland/herbaceous		8%
Pasture/hay		8%
Development	Open space	4%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Barren		<1%
Population/km^{2c}		10
# NPDES Permits^d	TOTAL	62
	Construction	50
	Industrial General	12

a.Southern Inner 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 Hillabee Creek at HILT-2, July 13, 2010.

Physical Characteristics	
Width (ft)	60
Canopy Cover	Mostly Open
Depth (ft)	
	Riffle
	Run
	Pool
% of Reach	
	Riffle
	Run
	Pool
% Substrate	
	Boulder
	Cobble
	Gravel
	Sand
	Silt
	Organic Matter

Table 3. Results of the habitat assessment conducted on Hillabee Creek at HILT-2, Jul 13, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	86	Optimal (>70)
Sediment Deposition	75	Optimal (>70)
Sinuosity	75	Sub-Optimal (65-<85)
Bank Vegetative Stability	73	Sub-Optimal (60-<75)
Riparian Buffer	90	Sub-Optimal (70-90)
Habitat Assessment Score	162	
% Maximum Score	74	Optimal (>70)

Table 4. Results of macroinvertebrate bioassessment conducted in Hillabee Creek at HILT-2, July 13, 2010.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		71
# EPT taxa		21
Shannon Diversity		4.21
# Highly-sensitive and Specialized Taxa		4
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae		10
% Non-insect taxa		8
Tolerance measures		
# Sensitive EPT		12
% Sensitive taxa		42
% Tolerant taxa		25
WMB-I Assessment Score		3
WMB-I Assessment Rating		Good

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly (except for metals) March through October of 2010 to identify any potential stressors to the biological communities. *E. coli* and ammonia nitrogen concentrations were higher than expected when compared to verified data of other reference reaches in the same ecoregion. Turbidity results were higher than expected although this might be due to the recent rain storm that occurred prior to the sampling event. All other parameters were within expected ranges of other streams located in the Southern Inner Piedmont ecoregion.

SUMMARY

Landuse, population density, and water quality data suggest Hillabee Creek at HILT-2 to be an appropriate waterbody selection for TMDL development for nutrients as well as a reference reach stream. The elevated ammonia nitrogen and *E. coli* concentrations may possibly be a concern.

Table 5. Summary of water quality data collected March-October, 2010. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value for non-metals parameters. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value for non-metals parameters.

Parameter	N	Min	Max	Med	Avg	SD Q
Physical						
Temperature (°C)	9	14.4	29.4	23.2	22.5	5.5
Turbidity (NTU)	8	5.4	272.0 ^T	7.8	53.4	92.9
Total Dissolved Solids (mg/L)	8 <	1.0	94.0	32.0	38.1	25.9
Total Suspended Solids (mg/L)	8	1.0	152.0	5.0	25.0	51.7
Specific Conductance (µmhos)	9	19.4	41.3	38.1	35.2	6.8
Hardness (mg/L)	1				10.6	
Alkalinity (mg/L)	8	3.9	17.9	13.7	11.9	5.4
Monthly Stream Flow (cfs)	9	13.0	8150.0	58.0	1004.0	2682.3
Stream Flow during Sample Collection (cfs)	9	13.0	8150.0	58.0	1004.0	2682.3
Chemical						
Dissolved Oxygen (mg/L)	9	6.6	9.5	7.8	8.0	1.0
pH (su)	9	6.0	7.1	6.7	6.6	0.4
Ammonia Nitrogen (mg/L)	8 <	0.021	<0.021	0.010 ^P	0.010	0.000
Nitrate+Nitrite Nitrogen (mg/L)	8	0.032	0.162	0.090	0.101	0.046
Total Kjeldahl Nitrogen (mg/L)	8 <	0.080	0.737	0.265	0.289	0.259
Total Nitrogen (mg/L)	8 <	0.072	0.828	0.337	0.390	0.274
Dissolved Reactive Phosphorus (mg/L)	8	0.004	0.015	0.010	0.010	0.004 J
Total Phosphorus (mg/L)	8	0.011	0.170	0.015	0.039	0.054
CBOD-5 (mg/L)	8 <	2.0	3.3	1.0	1.4	0.9
Chlorides (mg/L)	8	0.8	2.3	1.8	1.7	0.4
Total Metals						
Aluminum (mg/L)	1			<	0.033	
Iron (mg/L)	1				0.667	
Manganese (mg/L)	1			<	0.001	
Dissolved Metals						
Aluminum (mg/L)	1			<	0.033	
Antimony (µg/L)	1			<	1.9	
Arsenic (µg/L)	1			<	2.1	
Cadmium (mg/L)	1			<	0.014	
Chromium (mg/L)	1			<	0.013	
Copper (mg/L)	1			<	0.013	
Iron (mg/L)	1				0.229	
Lead (µg/L)	1			<	1.7	
Manganese (mg/L)	1			<	0.001	
Mercury (µg/L)	1			<	0.1	
Nickel (mg/L)	1			<	0.019	
Selenium (µg/L)	1			<	1.7	
Silver (mg/L)	1			<	0.002	
Thallium (µg/L)	1			<	0.6	
Zinc (mg/L)	1			<	0.030	
Biological						
Chlorophyll a (ug/L)	8 <	0.10	8.01	0.80	1.72	2.62
<i>E. coli</i> (col/100mL)	3	115	517	142 ^M	258	224 J

J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45a; N=# samples; P=pH and temperature-adjusted *F&W* criteria exceeded; T=value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 45a; Q=lab qualifier

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