

2011 Monitoring Summary



Ambient Monitoring Site

Satilpa Creek at U.S. Hwy 84, Clarke County (31.74444/-88.02133)

BACKGROUND

Satilpa Creek at LT-12 is one of a network of 94 ambient sites monitored annually by the Alabama Department of Environmental Management (ADEM) to identify long-term trends in water quality and to provide data for the development of Total Maximum Daily Loads (TMDL) and water quality criteria.

Satilpa Creek was also selected for biological and water quality monitoring as part of the 2011 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.



Figure 1. Satilpa Creek at LT-12, May 17, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Satilpa Creek is a *Swimming/Fish & Wildlife (S/F&W)* stream that drains a large portion of north-central Clarke County along Alabama Highway 154. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (64%) and shrub/scrub. Population density is low, although the communities of McEntyre and Chilton are located within the watershed. As of April 1, 2016, six NPDES permitted 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. Satilpa Creek at LT-12 is a low gradient, sand-bottomed stream (Figure 1). Overall habitat quality was categorized as *marginal* due to lack of instream habitat (e.g. root banks, submerged logs), a thin riparian buffer zone, unstable stream banks, and a relatively straight channel. Results were similar for the 2006 assessment.

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 in comparison to conditions expected in Alabama Coastal Plain streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. Metric results indicated the macroinvertebrate community in Satilpa Creek at LT-12 to be in *good* condition (Table 4). Overall, results were similar to those from the bioassessment conducted in 2006.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tombigbee River	
Drainage Area (mi ²)	163	
Ecoregion ^a	65Q	
% Landuse ^b		
Open water	<1%	
Wetland	Woody	6%
	Emergent herbaceous	<1%
Forest	Deciduous	7%
	Evergreen	42%
	Mixed	15%
	Shrub/scrub	15%
	Grassland/herbaceous	13%
	Pasture/hay	1%
	Cultivated crops	<1%
Development	Open space	2%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Barren	<1%	
Population/km ² ^c	2	
# NPDES Permits ^d	TOTAL	6
	Construction	6

^a-Buhrstone/Lime Hills

^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 Satilpa Creek at LT-12, May 17, 2011.

Physical Characteristics		
Width (ft)	30	
Canopy cover	Estimate 50/50	
Depth (ft)	Run	1.5
	Pool	3.5
% of Reach	Run	80
	Pool	20
% Substrate	Sand	85
	Silt	4
	Organic Matter	11

Table 3. Results of the habitat assessment conducted in Satilpa Creek at LT-12, May 17, 2011.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	37	Poor (<40)
Sediment Deposition	64	Sub-optimal (53-65)
Sinuosity	35	Poor (<45)
Bank and Vegetative Stability	45	Marginal (35-<59)
Riparian Buffer	60	Marginal (50-<70)
Habitat Assessment Score	98	
% Maximum Score	58	Sub-optimal (53-64)

Table 4. Results of the macroinvertebrate bioassessment conducted in Satilpa Creek at LT-12, May 17, 2011.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	Total # Taxa	59
	# EPT taxa	19
	# Highly-sensitive and Specialized Taxa	5
Taxonomic composition measures		
	% EPC taxa	37
	% EPT minus Baetidae and Hydropsychidae	25
	% Chironomidae Individuals	42
	% Dominant Taxon	26
	% Individuals in Dominant 5 Taxa	51
Functional feeding group		
	# Collector Taxa	19
	% Tolerant Filterer Taxa	14
Community tolerance		
	# Sensitive EPT	10
	% Sensitive taxa	25
	% Nutrient Tolerant individuals	47
	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 in April, June, August, and October of 2011 to help identify any stressors to the biological communities. Additionally, field parameters were collected during the macroinvertebrate assessment on May 17th. E. Coli concentrations exceeded S/F&W criteria in April. However, field notes indicated elevated flows due to heavy rains the previous day. Median concentrations for total dissolved solids, specific conductance, hardness, and alkalinity were higher than expected for streams in the Buhrstone/Lime Hills ecoregion. Organics were sampled twice (June and October), and results were all less than detection limits.

SUMMARY

Habitat and macroinvertebrate bioassessment results largely mirror results from the 2006 sampling season. Overall macroinvertebrate community health declined slightly but is still showing high richness and diversity and remaining in the *good* category.

Water chemistry analyses showed higher than expected median concentrations for dissolved solids, hardness, and alkalinity. Median specific conductance was also higher than expected. Post-thunderstorm E. coli samples exceeded S/F&W criteria in April. In 2006, only hardness was higher than expected.

Monitoring should continue to ensure that water quality and biological conditions meet current standards.

Table 5. Summary of water quality data collected April, June, August, and October 2011. 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)	5	16.7	27.7	19.5	21.7	5.3
Turbidity (NTU)	5	5.5	86.8	7.4	23.3	35.5
^J Total Dissolved Solids (mg/L)	4	90.0	122.0	110.0	^M 108.0	13.4
^J Total Suspended Solids (mg/L)	4	< 1.0	73.0	2.0	19.4	35.8
Specific Conductance (µmhos)	5	46.2	175.6	135.6	^G 125.1	47.6
Hardness (mg/L)	4	18.8	77.5	61.4	^G 54.8	25.5
Alkalinity (mg/L)	4	11.7	80.3	60.6	^M 53.3	29.3
Stream Flow (cfs)	5	5.7	927.0	18.0	198.7	407.3
Chemical						
Dissolved Oxygen (mg/L)	5	8.1	9.0	8.3	8.5	0.4
pH (su)	5	6.8	7.8	7.4	7.4	0.4
Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.007	0.002	0.003	0.000
Nitrate+Nitrite Nitrogen (mg/L)	4	0.033	0.069	0.044	0.048	0.017
Total Kjeldahl Nitrogen (mg/L)	4	< 0.076	0.647	0.146	0.244	0.284
Total Nitrogen (mg/L)	4	< 0.074	0.680	0.207	0.292	0.278
^J Dissolved Reactive Phosphorus (mg/L)	4	0.005	0.008	0.007	0.007	0.002
Total Phosphorus (mg/L)	4	0.010	0.026	0.012	0.015	0.007
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	4	2.2	3.1	2.8	2.8	0.4
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00
Total Metals						
^J Aluminum (mg/L)	4	0.098	0.384	0.120	0.180	0.136
Iron (mg/L)	4	1.050	1.410	1.155	1.192	0.160
^J Manganese (mg/L)	4	0.048	0.093	0.087	0.079	0.021
Dissolved Metals						
^J Aluminum (mg/L)	4	< 0.043	0.157	0.034	0.062	0.065
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	0.382	0.607	0.547	0.521	0.099
Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0
^J Manganese (mg/L)	4	0.041	0.079	0.066	0.063	0.018
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.000
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	< 1.1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000
Biological						
Chlorophyll a (µg/L)	4	< 0.10	1.07	0.29	0.42	0.49
^J E. coli (col/100 mL)	4	63	> 2420 ^C	97	668	1167

C=S/F&W criterion exceeded; G=value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 65q; J=estimate; M=value>90% of all verified ecoregional reference reach data collected in ecoregion 65q; N= # samples.

FOR MORE INFORMATION, CONTACT:

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