

2013 Monitoring Summary



Bumpass Creek at Lauderdale County Road 14 (34.94544/-88.06445)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bumpass Creek watershed for biological and water quality monitoring as part of the 2013 Assessment of the Tennessee (TN) River Basin. The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site to estimate overall water quality within the TN basin.



Figure 1. Bumpass Creek at BMPL-2, July 9, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bumpass Creek is a *Fish & Wildlife (F&W)* stream located near Waterloo in the Tennessee River basin. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forested areas (72%). The ADEM has issued no NPDES discharge permits in this monitoring unit.

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.

Bumpass Creek at BMPL-2 (Figure 1) is a high-gradient, gravel and cobble substrate stream in the Transition Hills ecoregion. Overall habitat quality was categorized as *optimal*.

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 Bumpass Creek at BMPL-2 rated the site as *good-very good*.(Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Tennessee River
Basin		Tennessee River
Drainage Area (mi²)		16
Ecoregion^a		65j
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	57
	Evergreen	8
	Mixed	7
Shrub/scrub		12
Grassland/herbaceous		<1
Pasture/hay		3
Cultivated crops		8
Development	Open space	3
	Low intensity	<1
Population/km^{2b}		1

a. Transition Hills

b. 2000 US Census

Table 2. Physical characteristics of Bumpass Creek at BMPL-2, June 4, 2013.

Physical Characteristics		Estimate 50/50
Canopy Cover		Estimate 50/50
Width (ft)		25
Depth (ft)		
	Riffle	0.7
	Run	1.0
	Pool	1.0
% of Reach		
	Riffle	5
	Run	90
	Pool	5
% Substrate		
	Bedrock	2
	Cobble	20
	Gravel	50
	Sand	20
	Silt	5
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Bumpass Creek at BMPL-2, June 4, 2013.

Habitat Assessment	%Maximum Score	Rating
RR		
Instream Habitat Quality	63	Sub-optimal (53-65)
Sediment Deposition	57	Sub-optimal (53-65)
Sinuosity	58	Marginal (45-64)
Bank and Vegetative Stability	70	Sub-optimal (60-74)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	160	
% Maximum Score	66	Optimal >65

Table 4. Results of the macroinvertebrate bioassessment conducted in Bumpass Creek at BMPL-2, June 4, 2013.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	Total # Taxa	79
	# EPT taxa	28
	Shannon Diversity	4.26
	# Highly-sensitive and Specialized Taxa	9
Taxonomic composition measures		
	% EPT minus Baetidae and Hydropsychidae	12
	% Non-insect taxa	9
	% Individuals in Dominant 5 Taxa	53
Functional feeding group		
	% Predator Individuals	11
Community tolerance		
	# Sensitive EPT	16
	% Sensitive taxa	11
	% Tolerant taxa	22
	WMB-I Assessment Score	3+
	WMB-I Assessment Rating	Good-Very Good

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected during March, May, July and September of 2013 to help identify any stressors to the biological communities.

The *F&W* pH criterion for Bumpass Creek at BMPL-2 was exceeded during the March, May, July and September sampling events.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *good-very good* condition. Overall habitat quality was categorized as *optimal*. The *F&W* pH criterion for Bumpass Creek at BMPL-2 was exceeded during the March, May, July and September sampling events. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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Table 5. Summary of water quality data collected March, May, July & September, 2013. 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
Physical							
Temperature (°C)	5	8.7	22.9	19.9	17.1	5.7	
Turbidity (NTU)	5	2.0	5.4	3.4	3.4	1.3	
Total Dissolved Solids (mg/L)	4	<1.0	36.0	17.5	17.9	14.8	
Total Suspended Solids (mg/L)	4	1.0	16.0	2.5	5.5	7.0	
Specific Conductance (µmhos)	5	19.5	21.2	20.4	20.3	0.7	
Hardness (mg/L)	4	5.8	6.4	6.0	6.0	0.3	
^J Alkalinity (mg/L)	4	3.5	5.4	4.5	4.5	0.8	
Stream Flow (cfs)	5	13.4	53.5	17.4	29.2	19.2	
Chemical							
Dissolved Oxygen (mg/L)	5	8.2	11.4	8.6	9.3	1.3	
pH (su)	5	5.2 ^C	6.0	5.6	5.6	0.3	4
Ammonia Nitrogen (mg/L)	4	<0.008	0.034	0.009	0.014	0.014	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.136	0.153	0.140	0.142	0.007	
Total Kjeldahl Nitrogen (mg/L)	4	<0.065	0.182	0.092	0.100	0.078	
Total Nitrogen (mg/L)	4	<0.168	0.323	0.238	0.242	0.076	
^J Dissolved Reactive Phosphorus (mg/L)	4	0.004	0.007	0.004	0.005	0.001	
^J Total Phosphorus (mg/L)	4	0.006	0.020	0.006	0.010	0.007	
CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	1.1	1.3	1.2	1.2	0.1	
Total Metals							
^J Aluminum (mg/L)	4	<0.076	0.172	0.038	0.072	0.067	
^J Iron (mg/L)	4	0.063	0.252	0.067	0.112	0.093	
^J Manganese (mg/L)	4	<0.009	0.056	0.012	0.021	0.024	
Dissolved Metals							
Aluminum (mg/L)	4	<0.076	<0.076	0.038	0.038	0.000	
Antimony (µg/L)	4	<0.1	<2.6	0.7	0.7	0.7	
Arsenic (µg/L)	4	<0.2	<1.4	0.4	0.4	0.4	
Cadmium (µg/L)	4	<0.046	<0.170	0.054	0.054	0.036	
^J Chromium (mg/L)	4	0.0004	<0.032	0.008	0.008	0.009	
^J Copper (mg/L)	4	0.0002	<0.031	0.008	0.008	0.009	
Iron (mg/L)	4	<0.018	<0.018	0.009	0.009	0.000	
Lead (µg/L)	4	<0.1	<1.1	0.3	0.3	0.3	
^J Manganese (mg/L)	4	<0.009	0.022	0.004	0.009	0.009	
Mercury (µg/L)	2	<0.057	<0.057	0.028	0.028	0.000	
^J Nickel (mg/L)	4	0.0003	<0.016	0.004	0.004	0.004	
Selenium (µg/L)	4	<0.2	<1.4	0.4	0.4	0.3	
Silver (µg/L)	4	<0.215	<2.12	0.584	0.584	0.550	
Thallium (µg/L)	4	<0.1	<1.1	0.3	0.3	0.3	
^J Zinc (mg/L)	4	<0.003	<0.017	0.006	0.006	0.003	
Biological							
Chlorophyll a (ug/L)	4	<0.10	1.07	0.27	0.42	0.45	
^J E. coli (col/100mL)	4	36	1203	39	329	583	

C=*F&W* criterion violated; E=# samples that exceeded criteria; J=estimate; N=# samples.