

2010 Monitoring Summary



Ballplay Creek at Kershaw Quarters Road (Etowah County) (34.10629/-85.81111)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Ballplay Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of these monitoring activities were to assess the biological integrity of each sampling location and to estimate overall water quality within the ACT basins. However, due to extreme flow conditions, Ballplay Creek at BLPE-1 was only sampled in May of 2010.



Figure 1. Ballplay Creek at BLPE-1 on September 16, 2010, facing upstream.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Ballplay Creek is classified as a *Fish and Wildlife (F&W)* stream located in Etowah County near the town of Hokes Bluff. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (58%) with some agricultural (19%) areas. Three percent of the 65 square mile watershed is developed. The ADEM has issued nine NPDES permits in the Ballplay Creek watershed as of September 1, 2012.

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. Ballplay Creek at BPLE-1 is a low-gradient, glide-pool stream characterized primarily by hard pan clay, sand, and gravel substrates (Figure 1). Overall habitat quality was categorized as *marginal* due to poor channel morphology and bank and vegetative stability, and a lack of instream habitat.

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 in comparison to least-impaired reference reaches in the same ecoregion. 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		
Basin		Coosa River
Drainage Area (mi ²)		65
Ecoregion ^a		67g
% Landuse		
Open water		<1
Wetland	Woody	7
	Emergent herbaceous	<1
Forest	Deciduous	29
	Evergreen	17
	Mixed	12
Shrub/scrub		6
Grassland/herbaceous		5
Pasture/hay		15
Cultivated crops		4
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km ^{2b}		90
# NPDES Permits ^c		9
TOTAL		9
	Construction Stormwater	4
	Mining	2
	Industrial General	2
	Industrial Individual	1

a.Southern Shale Valleys

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Ball Play Creek at BLPE-1, May 27, 2010.

Physical Characteristics		
Width (ft)		30
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	1.5
	Pool	3.5
% of Reach		
	Run	50
	Pool	50
% Substrate		
	Hard Pan Clay	63
	Boulder	1
	Cobble	2
	Gravel	15
	Sand	15
	Silt	2
	Organic Matter	2

Table 3. Results of the habitat assessment conducted on Ballplay Creek at BLPE-1, May 27, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	52	Marginal (41-58)
Sediment Deposition	63	Sub-optimal (59-70)
Sinuosity	43	Poor <45
Bank and Vegetative Stability	19	Poor <35
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	122	
% Maximum Score	55	Marginal (41-58)

Table 4. Results of macroinvertebrate bioassessment conducted in Ballplay Creek at BLPE-1, May 27, 2010.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
# EPT taxa	11	30
Shannon Diversity	4	47
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	60	65
% Non-insect taxa	14	43
Tolerance measures		
% Tolerant taxa	34	43
WMB-I Assessment Score	---	46
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 generally collected bi-monthly during May-November 2010 to help identify any stressors to the biological communities. One set of in situ parameters and water chemistry samples was collected in early May, but stream flow could not be measured due to non-flowing conditions. A stream flow and a set of in situ parameters were measured during the macroinvertebrate assessment in late May. However, the reach was a series of disconnected pools and samples were not collected in July, September, and November.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was categorized as *marginal* due to poor sinuosity and bank and vegetative stability. However, Ballplay Creek at BLPE-1 was only sampled once for water chemistry during the sampling year due to no flow conditions. It is recommended that monitoring of Ballplay Creek at BLPE-1 be repeated in the future.

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Table 5. Summary of water quality data collected May, 2010. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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)	2	20.8	22.4	21.6	21.6	1.1	
Turbidity (NTU)	2	13.7	25.8	19.8	19.8	8.6	
Total Dissolved Solids (mg/L)	1				84.0		
Total Suspended Solids (mg/L)	1				16.0		
Specific Conductance (µmhos)	2	107.0	136.4	121.7	121.7	20.8	
Hardness (mg/L)	1				47.3		
Alkalinity (mg/L)	1				50.2		
Stream Flow (cfs)	1				16.5		
Chemical							
Dissolved Oxygen (mg/L)	2	5.9	6.0	5.9	5.9	0.0	
pH (su)	2	7.1	7.2	7.1	7.1	0.1	
Ammonia Nitrogen (mg/L)	1				0.075		
Nitrate+Nitrite Nitrogen (mg/L)	1				0.047		
Total Kjeldahl Nitrogen (mg/L)	1				0.894		
Total Nitrogen (mg/L)	1				0.941		
Dissolved Reactive Phosphorus (mg/L)	1				0.013		
Total Phosphorus (mg/L)	1				0.070		
CBOD-5 (mg/L)	1			<	2.0		
Chlorides (mg/L)	1				1.6		
Atrazine (µg/L)	1			<	0.02		
Total Metals							
Aluminum (mg/L)	1				0.519		
Iron (mg/L)	1				2.410		
Manganese (mg/L)	1				0.222		
Dissolved Metals							
^J Aluminum (mg/L)	1				0.062		
Antimony (µg/L)	1			<	1.9		
Arsenic (µg/L)	1			<	0.4		
Cadmium (mg/L)	1			<	0.003		
Chromium (mg/L)	1			<	0.013		
Copper (mg/L)	1			<	0.013		
Iron (mg/L)	1				0.831		
^J Lead (µg/L)	1				3.5 ^S		1
Manganese (mg/L)	1				0.145		
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 (µg/L)	1			<	0.10		
E. coli (col/100mL)	1				214		

^J=estimate; N=# samples; G=value greater than median concentration of all verified reference data collected in ecoregion 67g; S=*F&W* hardness-adjusted aquatic life use criterion exceeded; E=# samples exceed criterion.