Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Fair™

Little Bear Creek at First Avenue (Pickens County) (33.32163/-87.89309)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Little Bear Creek watershed 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 River basins.

Figure 1. Little Bear Creek at LBCP-1, March 22 , 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Bear Creek at LBCP-1 is a *Fish & Wildlife (F&W)* stream located in Reform, Alabama in the Fall Line Hills ecoregion (65i). Based on the 2006 National Land Cover Dataset, land cover within the watershed is mostly forest (57%), with some pasture/hay. There are no NPDES permits issued 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. Little Bear Creek at LBCP–1 is predominantly sand-bottomed stream, with some gravel, silt, and clay substrates (Figure 1). Overall habitat quality was categorized as *marginal* for supporting aquatic macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombigbee
Drainage Area (mi^2)		6
Ecoregion[a]		65i
% Landuse		
Open water		1
Wetland	Woody	3
Forest	Deciduous	32
	Evergreen	6
	Mixed	19
Shrub/scrub		10
Grassland/herbaceous		1
Pasture/hay		17
Cultivated crops		4
Development	Open space	6
	Low intensity	1
	Moderate intensity	<1
Population/km^2[b]		29

a.Fall Line Hills

b.2000 US Census

Table 2. Physical characteristics of Little Bear Creek at LBCP-1, June 01, 2011.

Physical Characteristics		
Width		15
Canopy Cover		Estimate 50/50
Depth (ft)		
	Pool	2.0
	Run	1.0
% of Reach		
	Pool	30
	Run	70
% Substrate		
	Mud/Muck	5
	Boulder	2
	Cobble	3
	Clay	10
	Gravel	10
	Sand	54
	Silt	10
	Organic Matter	6

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WBM-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. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community in Little Bear Creek at LBCP-1 to be characterized by non-insect taxa groups, indicating *fair* community condition (Table 4).

Table 3. Results of the habitat assessment conducted in Little Bear Creek at LBCP-1, June 1, 2011.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (40-52)
Sediment Deposition	56	Sub-optimal (53-65)
Sinuosity	35	Poor <45
Bank and Vegetative Stability	36	Marginal (35-59)
Riparian Buffer	33	Poor <50
Habitat Assessment Score	**96**	
% Maximum Score	**44**	**Marginal (40-52)**

Table 4. Results of the macroinvertebrate bioassessment of Little Bear Creek at LBCP-1 on June 1, 2011.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	19	19
% Dominant Taxon	22	70
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	2	2
Functional feeding group		
# Collector Taxa	23	80
Community tolerance		
% Nutrient Tolerant individuals	18	81
WMB-I Assessment Score	**---**	**50**
WMB-I Assessment Rating		**Fair (32-47)**

WATER CHEMISTRY

Water chemistry analyses are presented in Table 5. In situ measurements and water samples collected in March, May, July, and September of 2011 to help identify any stressors to the biological communities. In situ parameters were also measured in May during the macroinvertebrate assessment. Instream pH was typical of coastal plain streams. Although samples of total dissolved arsenic did exceed Human Health criteria in Little Bear Creek, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite – As III). Presently studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies Little Bear Creek will be reassessed for arsenic violations.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Little Bear Creek at LBCP-1 to be in *fair* condition and the habitat to be in *marginal* condition. Monitoring should continue to ensure that conditions remain stable.

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Table 5. Summary of water quality data collected March – October , 2011. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	17.2	25.3	22.2	21.8	2.9	
	Turbidity (NTU)	5	14.2	21.6	18.0	17.9	3.0	
	Total Dissolved Solids (mg/L)	4	56.0	80.0	76.0	72.0	10.8	
	Total Suspended Solids (mg/L)	4	< 1.0	9.0	1.0	2.9	4.1	
	Specific Conductance (µmhos)	5	51.8	82.6	57.2	62.8	12.8	
	Hardness (mg/L)	4	11.0	22.1	13.7	15.1	5.0	
	Alkalinity (mg/L)	4	8.7	13.7	10.0	10.6	2.2	
	Stream Flow (cfs)	5	1.0	8.1	3.4	3.7	2.7	
	Chemical							
	Dissolved Oxygen (mg/L)	5	6.6	8.1	6.9	7.0	0.6	
	pH (su)	5	5.6 c	6.5	5.9	6.0	0.4	3
J	Ammonia Nitrogen (mg/L)	4	< 0.005	0.172	0.065	0.076	0.087	
J	Nitrate+Nitrite Nitrogen (mg/L)	4	0.492	2.493	0.784	1.138	0.916	
	Total Kjeldahl Nitrogen (mg/L)	4	0.638	0.906	0.790	0.781	0.116	
J	Total Nitrogen (mg/L)	4	1.237	3.328	1.556	1.919	0.952	
J	Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.008	0.006	0.007	0.001	
	Total Phosphorus (mg/L)	4	0.051	0.087	0.067	0.068	0.015	
	CBOD-5 (mg/L)	4	< 2.0 <	2.0	1.0	1.0	0.0	
J	Chlorides (mg/L)	4	3.5	6.0	3.9	4.3	1.2	
	Atrazine (µg/L)	2	< 0.02 <	0.02	0.01	0.01	0.00	
	Total Metals							
	Aluminum (mg/L)	4	< 0.043	0.236	0.106	0.118	0.090	
	Iron (mg/L)	4	3.870	5.460	4.580	4.622	0.671	
	Manganese (mg/L)	4	0.370	0.658	0.512	0.513	0.125	
	Dissolved Metals							
	Aluminum (mg/L)	4	< 0.043 <	0.043	0.022	0.022	0.000	
	Antimony (µg/L)	4	< 1.9 <	1.9	0.9	0.9	0.0	
	Arsenic (µg/L)	4	< 1.4	1.7 H	0.7	1.0	0.5	
	Cadmium (µg/L)	4	< 0.022 <	0.022	0.011	0.011	0.000	
	Chromium (µg/L)	4	< 9.000 <	9.000	4.500	4.500	0.000	
	Copper (mg/L)	4	< 0.020 <	0.020	0.010	0.010	0.000	
	Iron (mg/L)	4	0.499	1.380	1.014	0.976	0.372	
	Lead (µg/L)	4	< 0.9 <	0.9	0.5	0.5	0.0	
	Manganese (mg/L)	4	0.321	0.592	0.476	0.466	0.116	
	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	
J	Selenium (µg/L)	4	< 1.3	2.5	0.7	1.1	0.9	
	Silver (µg/L)	4	< 0.015 <	0.015	0.008	0.008	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 (ug/L)	4	< 0.10	2.14	1.07	1.08	0.85	
J	E. coli (col/100mL)	4	81	436	209	234	152	

C=Use class criteria violated; H=Human Health Criteria violated; E=Exceedence; J=estimate; N=#of samples;