Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2011 Monitoring Summary

Bear Creek at AL Highway 171 in Fayette County (33.52381/-87.80222)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the 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 basin. Habitat and macroinvertebrate assessments were conducted on Bear Creek at BRCF-64 on June 1, 2011.

Figure 1. Bear Creek at BRCF-64, June 1, 2011.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bear Creek is a *Fish & Wildlife (F&W)* stream located in the Fall Line Hills ecoregion (65i). According to the 2006 National Land Cover Dataset, landuse within the watershed is mostly forest (82%), with some areas of shrub/scrub. Population density is low, and approximately 3% of the area is developed. As of February 23, 2011, ADEM has issued two NPDES permits in 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, as well as the quality and availability of habitat. Bear Creek at BRCF-64 is a low-gradient, glide-pool stream in the Upper Tombigbee River Basin (Figure 1). Benthic substrate consists primarily of hard pan clay and sand. Overall habitat quality was categorized as *sub-optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Upper Tombigbee River
Drainage Area (mi^2)		24
Ecoregion[a]		65i
% Landuse		
Open water		<1
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	39
	Evergreen	23
	Mixed	20
Shrub/scrub		9
Pasture/hay		1
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
Population/km^2[b]		4
# NPDES Permits[c]		2
Construction Stormwater		2

a. Fall Line Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Bear Creek at BRCF-64, June 1, 2011.

Physical Characteristics		
Width (ft)		25
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	1.0
	Pool	2.0
% of Reach		
	Run	80
	Pool	20
% Substrate		
	Gravel	10
	Hard Pan Clay	40
	Sand	30
	Silt	15
	Organic Matter	5

Table 3. Results of the habitat assessment conducted in Bear Creek at BRCF-64 on June 1, 2011.

Habitat Assessment	%Maximum Score	Rating
GP		
Instream Habitat Quality	42	Marginal (40-52)
Sediment Deposition	61	Sub-optimal (53-65)
Sinuosity	25	Poor (<45)
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	**120**	
% Maximum Score	**55**	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Bear Creek at BRCF-64 on June 1, 2011.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
% EPC taxa	19	18
% Dominant Taxon	23	69
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
Functional feeding group		
# Collector Taxa	12	25
Community tolerance		
% Nutrient Tolerant individuals	24	72
WMB-I Assessment Score	**---**	**37**
WMB-I Assessment Rating		**Fair (32-47)**

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. The final score is the average of all metric scores. Metric results indicated the macroinvertebrate community at BRCF-64 was in *fair* condition (Table 4).

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. When possible, in situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides, atrazine, and semi-volatile organics) during March through October 2011 to help identify any stressors to the biological communities. On three of five sampling events, pH values were below *F&W* use classification criterion of 6.0 and less than the 90th percentile (5.8) of data from least-impaired streams in the Fall Line Hills ecoregion (65i). All other parameters were within expected ranges for the ecoregion.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Bear Creek at BRCF-64 to be in *fair* condition. Overall habitat quality was categorized as *sub-optimal* for supporting the macroinvertebrate community. Water chemistry analyses showed pH values slightly below *F&W* use classification criterion.

Table 5. Summary of water quality data collected March-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	Med	Avg	SD	E
	Physical							
	Temperature (°C)	5	17.1	27.4	20.9	21.6	3.9	
	Turbidity (NTU)	5	14.6	31.5	16.2	19.7	7.0	
	Total Dissolved Solids (mg/L)	4	30.0	56.0	38.0	40.5	11.1	
	Total Suspended Solids (mg/L)	4	4.0	10.0	7.0	7.0	2.9	
	Specific Conductance (µmhos)	5	21.2	26.6	24.2	23.8	2.4	
	Hardness (mg/L)	4	4.4	7.1	5.1	5.4	1.2	
	Alkalinity (mg/L)	4	2.5	6.7	3.7	4.2	1.8	
	Stream Flow (cfs)	5	2.5	30.8	5.2	10.3	11.8	
	Chemical							
	Dissolved Oxygen (mg/L)	5	6.9	9.4	7.9	8.0	1.0	
	pH (su)	5	5.6 C	6.4	5.9	6.0	0.3	3
	Ammonia Nitrogen (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000	
	Nitrate+Nitrite Nitrogen (mg/L)	4	0.036	0.059	0.047	0.047	0.010	
	Total Kjeldahl Nitrogen (mg/L)	4	0.204	0.506	0.295	0.325	0.135	
	Total Nitrogen (mg/L)	4	0.254	0.565	0.335	0.372	0.139	
J	Dissolved Reactive Phosphorus (mg/L)	4	0.005	0.007	0.006	0.006	0.001	
	Total Phosphorus (mg/L)	4	0.016	0.020	0.018	0.018	0.002	
	CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
	Chlorides (mg/L)	4	1.5	1.7	1.6	1.6	0.1	
	Total Metals							
	Aluminum (mg/L)	4	0.294	0.781	0.440	0.489	0.229	
	Iron (mg/L)	4	1.300	2.300	1.775	1.788	0.487	
	Manganese (mg/L)	4	0.211	0.387	0.273	0.286	0.074	
	Dissolved Metals							
	Aluminum (mg/L)	4	< 0.043	< 0.043	0.022	0.022	0.000	
J	Antimony (µg/L)	4	< 1.9	2.8	0.9	1.4	0.9	
	Arsenic (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0	
J	Cadmium (mg/L)	4	< 0.001	< 0.001	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	
J	Iron (mg/L)	4	0.091	0.420	0.134	0.194	0.153	
	Lead (µg/L)	4	< 0.9	< 0.9	0.5	0.5	0.0	
	Manganese (mg/L)	4	0.186	0.356	0.248	0.259	0.074	
	Mercury (µg/L)	4	< 0.03	< 0.03	0.0	0.0	0.0	
	Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000	
J	Selenium (µg/L)	4	< 1.3	2.7	0.7	1.2	1.0	
	Silver (mg/L)	4	< 0.001	< 0.001	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 (ug/L)	4	< 0.10	< 0.10	0.05	0.05	0.00	
J	E. coli (col/100mL)	3	53	770	150	324	389	

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

FOR MORE INFORMATION, CONTACT:
Ashley Lockwood, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2766 alockwood@adem.state.al.us