

2010 Monitoring Summary



Basin Assessment Site

Bear Creek at Dallas County Road 21 (32.28938/-87.30493)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bear Creek watershed for biological and water quality monitoring as part of the 2010 Alabama, Coosa, and Tallapoosa (ACT) Basin Assessment. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

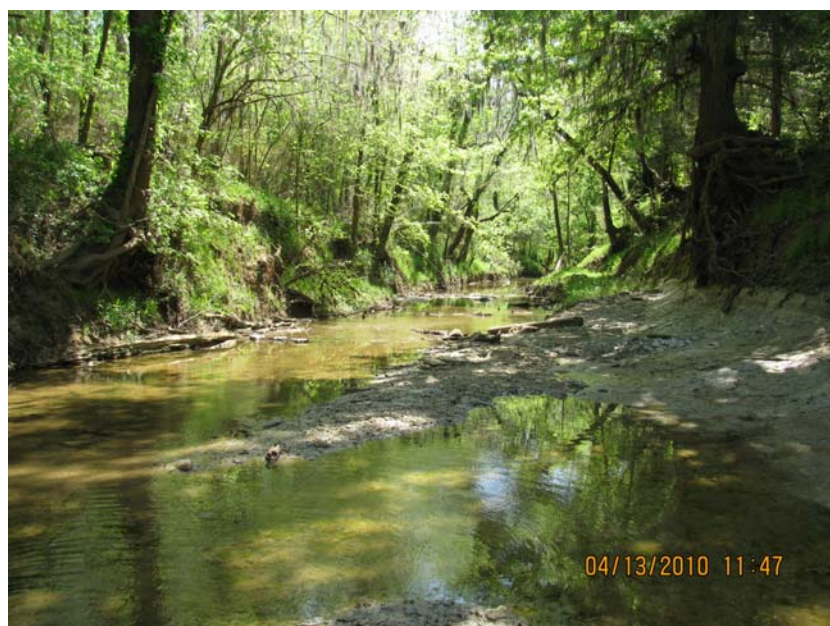


Figure 1. Bear Creek at BARD-1, April 13, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bear Creek is a *Fish & Wildlife (F&W)* stream located in Dallas County in the Blackland Prairie ecoregion (65a). Based on the 2000 National Land Cover Dataset, landuse within the watershed is composed of pasture/hay, woody wetland, forest (11%), cropland, and shrub/scrub. Population density is low in this area. As of February 23, 2011, two 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. Bear Creek at BARD-1 is a low gradient stream dominated by hardpan clay, and silt substrates (Figure 1). Overall habitat quality was categorized as *sub-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 coastal 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 Bear Creek at BARD-1 rated the site as *fair-poor*. Relative abundance and numbers of pollution-sensitive taxa are lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Alabama River
Basin		
Drainage Area (mi²)		28
Ecoregion^a		65a
% Landuse		
Open water		6
Wetland	Woody	14
	Emergent herbaceous	4
Forest	Deciduous	6
	Evergreen	3
	Mixed	2
Shrub/scrub		10
Grassland/herbaceous		<1
Pasture/hay		40
Cultivated crops		11
Development	Open space	4
	Low intensity	<1
Population/km^{2b}		3
# NPDES Permits^c	TOTAL	2
	Construction Stormwater	1
	Mining	1

a. Blackland Prairie

b. 2000 US Census

c. #NPDES outfalls downloaded from ADEM's NPDES Management System database, Feb 23, 2011.

Table 2. Physical Characteristics of Bear Creek at BARD-1, April 13, 2010.

Physical Characteristics	
Canopy Cover	Estimate 50/50
Width (ft)	20
Depth (ft)	
	Run 1.0
	Pool 1.5
% of Reach	
	Run 85
	Pool 15
% Substrate	
	Cobble 1
	Gravel 5
	Hard Pan Clay 70
	Sand 2
	Silt 20
	Organic Matter 2

Table 3. Results of the habitat assessment conducted on Bear Creek at BARD-1, April 13, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (40-52)
Sediment Deposition	65	Sub-optimal (53-65)
Sinuosity	53	Marginal (45-64)
Bank and Vegetative Stability	40	Marginal (35-59)
Riparian Buffer	73	Sub-optimal (70-89)
Habitat Assessment Score	118	
% Maximum Score	54	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Bear Creek at BARD-1, April 13, 2010.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
Total # Taxa		51
# EPT taxa		8
# Highly-sensitive and Specialized Taxa		0
Taxonomic composition measures		
% EPC taxa		21
% Trichoptera & Chironomidae Taxa		51
% EP Individuals		10
% Chironomidae Individuals		74
% Individuals in Dominant 5 Taxa		11
Functional feeding group		
% Collector-Filterer Individuals		10
% Tolerant Filterer Taxa		10
Community tolerance		
# Sensitive EPT		2
% Sensitive taxa		9.8
% Nutrient Tolerant individuals		17
WMB-I Assessment Score		4-
WMB-I Assessment Rating		Fair-Poor

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected April through June, 2010 to help identify any stressors to the biological communities. Sampling could not be conducted after July because of no flow conditions. *In situ* parameters suggested that Bear Creek at BARD-1 was meeting *F&W* use classification. Median concentration of specific conductivity and hardness were higher than expected for streams in ecoregion 65a. Median values of total dissolved solids, alkalinity, and chlorides were higher than the 90th percentile of all reference reach data collected in the Blackland Prairie ecoregion. Arsenic and Thallium exceeded the Human Health criteria for water and fish consumption in April. Lead exceeded hardness adjusted criterion in May. Samples were collected in April and May for analyses of pesticides, semi-volatile organics and atrazine and all concentrations were below detection limits.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report along with all other available data.

Bioassessment results indicated the macroinvertebrate community to be in *fair-poor* condition. Water quality results suggested specific conductivity, alkalinity, hardness and chlorides were possible stressors to biological community.

Table 5. Summary of water quality data collected March-October, 2010. 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	Q	E
Physical								
Temperature (°C)	4	18.7	25.4	23.1	22.6	2.8		
Turbidity (NTU)	4	4.3	15.3	6.4	8.1	5.1		
Total Dissolved Solids (mg/L)	3	218.0	374.0	224.0 ^M	272.0	88.4	J	
Total Suspended Solids (mg/L)	3	2.0	24.0	10.0	12.0	11.1	J	
Specific Conductance (µmhos)	4	356.6	490.7	408.2 ^G	415.9	63.0		
Hardness (mg/L)	3	113.0	180.0	125.0 ^G	139.3	35.7		
Alkalinity (mg/L)	3	116.0	156.0	125.0 ^M	132.3	21.0		
Stream Flow (cfs)	4	0.4	1.1	0.4	0.6	0.4		
Chemical								
Dissolved Oxygen (mg/L)	4	8.3	9.2	8.6	8.7	0.4		
pH (su)	4	7.6	8.0	7.9	7.8	0.1		
Ammonia Nitrogen (mg/L)	3	< 0.021	< 0.021	0.010	0.010	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	3	0.009	0.158	0.016	0.061	0.084	J	
Total Kjeldahl Nitrogen (mg/L)	3	0.723	0.990	0.741	0.818	0.149		
Total Nitrogen (mg/L)	3	0.732	1.148	0.757	0.879	0.233	J	
Dissolved Reactive Phosphorus (mg/L)	3	0.007	0.013	0.012	0.011	0.003	J	
Total Phosphorus (mg/L)	3	0.041	0.068	0.060	0.056	0.014		
CBOD-5 (mg/L)	3	< 2.0	6.4	1.0	2.8	3.1		
Chlorides (mg/L)	3	14.9	25.6	18.9 ^M	19.8	5.4		
Atrazine (µg/L)	2	0.05	1.99	1.02	1.02	1.37		
Total Metals								
Aluminum (mg/L)	3	< 0.033	0.477	0.277	0.257	0.231		
Iron (mg/L)	3	< 0.026	0.556	0.309	0.293	0.272		
Manganese (mg/L)	3	< 0.001	0.067	0.000	0.023	0.038		
Dissolved Metals								
Aluminum (mg/L)	3	< 0.033	< 0.033	0.016	0.016	0.000		
Antimony (µg/L)	3	< 0.7	1.9	0.9	0.8	0.3		
Arsenic (µg/L)	3	< 1.4 ^H	2.1	1.0	1.2	0.2	J	1
Cadmium (mg/L)	3	< 0.003	0.014	0.002	0.003	0.003		
Chromium (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000		
Copper (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000		
Iron (mg/L)	3	< 0.026	0.036	0.013	0.021	0.013	J	
Lead (µg/L)	3	< 1.0	12.9 ^S	0.8	4.8	7.0	1	
Manganese (mg/L)	3	< 0.001	0.006	0.000	0.002	0.003	J	
Mercury (µg/L)	3	< 0.1	< 0.1	0.0	0.0	0.0	J	
Nickel (mg/L)	3	< 0.019	< 0.019	0.010	0.010	0.000		
Selenium (µg/L)	3	< 0.6	1.7	0.8	0.8	0.2	J	
Silver (mg/L)	3	< 0.002	< 0.002	0.001	0.001	0.000		
Thallium (µg/L)	3	< 0.6 ^H	< 0.6	0.3	0.4	0.2	J	1
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000		
Biological								
Chlorophyll a (ug/L)	3	0.53	2.37	1.07	1.32	0.95		
E. coli (col/100mL)	3	194	2420	365	993	1239	J	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65a; H=human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65a; N=# samples; S=*F&W* hardness-adjusted aquatic life use criteria exceeded; Q=qualifier.

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