Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Poor

Big Flat Creek at River Ridge Road in Monroe County (31.71389/-87.31101)

BACKGROUND

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

Figure 1. Big Flat Creek at BFLM-1, October 19, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Big Flat Creek is a *Swimming/Fish & Wildlife (S/F&W)* stream located in the Southern Hilly Gulf Coastal Plain ecoregion. Based on the 2011 National Land Cover Dataset, landuse within the watershed is primarily forest (65%), mixed with wetland, and scrub/shrub. As of April 1, 2016, there are 13 NPDES permitted outfall 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. Big Flat Creek at BFLM-1 (Figure 1) is a sandy-bottomed, low-gradient stream. Overall habitat quality was categorized as *marginal* due to poor instream habitat quality, sediment deposition, low sinuosity, and poor bank and vegetative stability.

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 in comparison to conditions expected in Alabama Coastal Plain streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. Metric results indicated the macroinvertebrate community in Big Flat Creek at BFLM-1 to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Alabama River
Drainage Area (mi^2)		121
Ecoregion[a]		65D
% Landuse[b]		
Open water		<1%
Wetland	Woody	14%
	Emergent herbaceous	1%
Forest	Deciduous	26%
	Evergreen	34%
	Mixed	5%
Shrub/scrub		11%
Grassland/herbaceous		4%
Pasture/hay		2%
Cultivated crops		1%
Development	Open space	1%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	
Barren		<1%
Population/km^2[c]		1
# NPDES Permits[d]	**TOTAL**	13
Construction		13

a. Southern Hilly Gulf Coastal Plain

b. 2011 National Land Cover Dataset

c. 2010 US Census

d. #NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Big Flat Creek at BFLM-1, May 11, 2010.

Physical Characteristics		
Width (ft)		**30**
Canopy Cover		**Estimate 50/50**
Depth (ft)		
	Run	**2.0**
	Pool	**4.0**
% of Reach		
	Run	**60**
	Pool	**40**
% Substrate		
	Gravel	**3**
	Sand	**90**
	Silt	**2**
	Organic Matter	**5**

Table 3. Results of the habitat assessment conducted on Big Flat Creek at BFLM-1, May 11, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	33	Poor (<40)
Sediment Deposition	39	Poor (<40)
Sinuosity	35	Poor (<45)
Bank Vegetative Stability	20	Poor (<35)
Riparian Buffer	78	Sub-Optimal (70-90)
Habitat Assessment Score	***81***	
% of Maximum Score	***48***	**Marginal (40-<53)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Big Flat Creek at BFLM-1, May 11, 2010.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	38
# EPT taxa	9
# Highly-sensitive and Specialized Taxa	0
Taxonomic composition measures	
% EPC taxa	25
% EPT minus Baetidae and Hydropsychidae	3
% Chironomidae Individuals	72
% Dominant Taxon	50
% Individuals in Dominant 5 Taxa	80
Functional feeding group	
# Collector Taxa	15
% Tolerant Filterer Taxa	17
Community tolerance	
# Sensitive EPT	0
% Sensitive taxa	21
% Nutrient Tolerant individuals	62
WMB-I Assessment Score	**5**
WMB-I Assessment Rating	**Poor**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected four times per year, or biannually (pesticides, atrazine, and semi-volatile organics) during March through October to help identify any stressors to the biological communities.

Organics samples were collected at BFLM-1 on April 14 and Oct. 19, 2010 and results were less than detection limits with the exception of Atrazine. Stream pH was <low, but typical of values measured in Coastal Plain streams.

SUMMARY

The bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Habitat assessment results for Big Flat Creek at BFLM-1 were *marginal*. Monitoring should continue to ensure water quality standards are being met.

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Table 5. Summary of water quality data collected April-October 2010. 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	Q
Physical								
Temperature (°C)	5	15.2	26.9	19.7	21.0	5.2		
Turbidity (NTU)	5	9.2	24.0	18.0	16.3	6.4		
Total Dissolved Solids (mg/L)	4	68.0	91.0	83.0	81.2	9.9		
Total Suspended Solids (mg/L)	4	6.0	15.0	8.0	9.2	4.0		
Specific Conductance (µmhos)	5	82.0	102.0	88.0	89.6	7.5		
Hardness (mg/L)	4	26.7	36.4	27.0	29.3	4.8		
Alkalinity (mg/L)	4	26.0	34.0	28.5	29.2	3.9		
Monthly Stream Flow (cfs)	5	1.1	39.0	11.7	18.0	17.4		
Stream Flow at Sample Collection (cfs)	5	1.1	39.0	11.7	18.0	17.4		
Chemical								
Dissolved Oxygen (mg/L)	5	5.3	8.3	7.2	6.9	1.2		
pH (su)	5	5.8[C]	6.8	6.7	6.6	0.4	1	
Ammonia Nitrogen (mg/L)	4	< 0.029	0.070	0.014	0.028	0.028		
J Nitrate+Nitrite Nitrogen (mg/L)	4	0.006	0.219	0.096	0.104	0.091		
Total Kjeldahl Nitrogen (mg/L)	4	< 0.070	0.500	0.330	0.299	0.194		
J Total Nitrogen (mg/L)	4	< 0.041	0.569	0.502	0.403	0.249		
Dissolved Reactive Phosphorus (mg/L)	4	< 0.004	0.012	0.006	0.007	0.006		
Total Phosphorus (mg/L)	4	0.028	0.052	0.037	0.038	0.012		
CBOD-5 (mg/L)	4	< 1.0	1.2	0.5	0.7	0.4		
Chlorides (mg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0		
Atrazine (µg/L)	2	< 0.02	0.07	0.04	0.04	0.04		
Total Metals								
J Aluminum (mg/L)	4	0.047	0.615	0.390	0.361	0.237		
J Iron (mg/L)	4	1.470	2.420	1.930	1.938	0.540		
Manganese (mg/L)	4	0.055	0.165	0.118	0.114	0.046		
Dissolved Metals								
J Aluminum (mg/L)	4	< 0.033	0.173	0.092	0.093	0.089		
J Antimony (µg/L)	4	< 1.9	< 2.3	1.0	1.0	0.1		
J Arsenic (µg/L)	4	< 1.9	< 2.1	1.0	1.0	0.0		
Cadmium (µg/L)	4	< 0.014	< 0.060	0.018	0.018	0.013		
J Chromium (µg/L)	4	<13.000	< 15.000	7.000	7.000	0.577		
Copper (mg/L)	4	< 0.013	< 0.014	0.007	0.007	0.000		
Iron (mg/L)	4	0.544	0.858	0.627	0.664	0.135		
J Lead (µg/L)	4	< 1.7	< 2.6	1.1	1.1	0.3		
J Manganese (mg/L)	4	0.058	0.143	0.093	0.097	0.036		
J Mercury (µg/L)	4	< 0.080	0.231[AH]	0.046	0.091	0.094		1
J Nickel (mg/L)	4	< 0.009	< 0.019	0.007	0.007	0.003		
J Selenium (µg/L)	4	< 0.8	< 1.7	0.6	0.6	0.2		
Silver (µg/L)	4	< 0.015	< 0.200	0.054	0.054	0.053		
J Thallium (µg/L)	4	< 0.6	< 1.2	0.4	0.4	0.2		
J Zinc (mg/L)	4	< 0.002	< 0.030	0.008	0.008	0.008		
Biological								
Chlorophyll a (ug/L)	4	< 1.00	< 1.00	0.50	0.50	0.00		
J E. coli (col/100mL)	4	1	6	2	3	2		

A=*F&W* aquatic life use criterion exceeded; C= criterion violated; E=# samples that exceeded criteria; H=*F&W* human health criterion exceeded; J=estimate; N=# samples; Q=# exceedances that are uncertain.