

2012 Monitoring Summary



Fourmile Creek at Bibb County Road 10 (33.07702/-86.97035)

BACKGROUND

Fourmile Creek is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable condition” reference watershed for comparison with streams throughout the Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f) subcoregion. It is among the least-disturbed watersheds in ecoregion 67f, based on land use, road density, and population density. Fourmile Creek was also monitoring as part of the 2012 assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of this project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

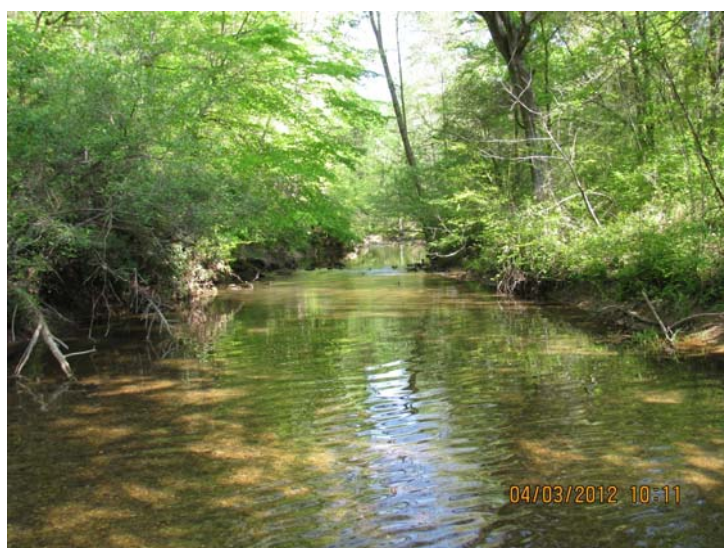


Figure 1. Fourmile Creek at FRMB-8, April 3, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Fourmile Creek at FRMB-8 is a *Fish & Wildlife (F&W)* stream that is a tributary to Little Cahaba River. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (72%) with some shrub/scrub. As of September 1, 2012, ADEM’s NPDES Management System database shows no permitted discharges within 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 and the quality and availability of habitat. Fourmile Creek at FRMB-8 is a riffle-run stream with a bottom substrate dominated by gravel and sand (Figure 1). Habitat quality and availability were rated *optimal* for supporting diverse aquatic macroinvertebrate communities.

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 individual metric scores. Metric results indicated the macroinvertebrate community at FRMB-8 to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics			
Basin	Cahaba River		
Drainage Area (mi²)	7		
Ecoregion^a	67f		
% Landuse			
Forest	Deciduous	16	
	Evergreen	50	
	Mixed	6	
Shrub/scrub	13		
Grassland/herbaceous	8		
Pasture/hay	<1		
Cultivated crops	<1		
Development	Open space	4	
Barren	1		
Population/km^{2b}	1		

a.Southern Limestone/Dolomite Valleys and Low Rolling Hills

b.2000 US Census

Table 2. Physical characteristics of Fourmile Creek at FRMB-8, April 25, 2012.

Physical Characteristics		
Width (ft)	15	
Canopy Cover	Shaded	
Depth (ft)		
	Riffle	0.3
	Run	1.0
	Pool	2.0
% of Reach		
	Riffle	25
	Run	30
	Pool	45
% Substrate		
	Bedrock	15
	Boulder	5
	Cobble	10
	Gravel	35
	Sand	25
	Organic Matter	10

Table 3. Results of the habitat assessment conducted on Fourmile Creek at FRMB-8, April 25, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	71	Optimal >70
Sediment Deposition	87	Optimal >70
Sinuosity	88	Optimal >84
Bank and Vegetative Stability	86	Optimal >74
Riparian Buffer	93	Optimal >89
Habitat Assessment Score	194	
% Maximum Score	81	Optimal >70

Table 4. Results of the macroinvertebrate bioassessment conducted in Four-mile Creek at FRMB-8, April 25, 2012.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
# EPT taxa	34	100
Shannon Diversity	3.79	51
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	12	25
% Non-insect taxa	10	61
Tolerance measures		
% Tolerant taxa	16	95
WMB-I Assessment Score	---	66
WMB-I Assessment Rating		Fair (47-69)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected monthly, April through November of 2012 to help identify any stressors to the biological communities. Flow ranged from an estimated <0.1 cfs in May to 7.7 cfs in August. Organics were not collected at FRMB-8. On October 9th, thallium exceeded *F&W* human health criterion.

SUMMARY

ADEM is currently monitoring Fourmile Creek at FRMB-8 as a "best attainable" condition reference watershed. Landuse, road density, and population density categorize Fourmile Creek among the least-disturbed watersheds in the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion. However, bioassessment results indicated the macroinvertebrate community at FRMB-8 to be in *fair* condition. Monitoring should continue to ensure that water quality and biological conditions remain stable.

Table 5. Summary of water quality data collected April-November, 2012. 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)	9	11.1	23.5	20.0	18.5	4.6	
Turbidity (NTU)	9	0.8	28.8	2.4	5.2	8.9	
Total Dissolved Solids (mg/L)	8	42.0	168.0	72.0	92.2	47.8	
Total Suspended Solids (mg/L)	8	< 1.0	10.0	0.5	2.1	3.4	
Specific Conductance (µmhos)	9	61.3	317.7	99.9	153.1	99.6	
Hardness (mg/L)	4	23.1	93.7	42.0	50.2	30.4	
^J Alkalinity (mg/L)	8	26.2	176.0	47.4	75.8	53.1	
Stream Flow (cfs)	9	< 0.10	7.7	1.4	2.3	2.5	
Chemical							
Dissolved Oxygen (mg/L)	9	7.2	10.4	8.2	8.8	1.2	
pH (su)	9	7.2	7.9	7.5	7.5	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.007	< 0.008	0.004	0.004	0.000	
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.011	0.117	0.036	0.049	0.034	
^J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.230	0.104	0.099	0.077	
^J Total Nitrogen (mg/L)	8	< 0.032	0.347	0.134	0.148	0.108	
^J Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.006	0.005	0.005	0.001	
^J Total Phosphorus (mg/L)	8	0.004	0.014	0.008	0.008	0.003	
^J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
COD (mg/L)	8	< 2.4	20.8	11.0	10.5	7.0	
TOC (mg/L)	8	0.9	2.8	1.7	1.8	0.6	
Chlorides (mg/L)	8	1.5	4.7	2.4	2.5	1.0	
Total Metals							
^J Aluminum (mg/L)	4	< 0.043	0.680	0.084	0.217	0.310	
Iron (mg/L)	4	0.177	0.900	0.239	0.389	0.342	
^J Manganese (mg/L)	4	< 0.007	0.022	0.013	0.013	0.008	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.043	< 0.043	0.022	0.022	0.000	
Antimony (µg/L)	4	< 3.6	< 3.6	1.8	1.8	0.0	
Arsenic (µg/L)	4	< 1.8	< 1.8	0.9	0.9	0.0	
Cadmium (µg/L)	4	< 0.022	< 0.046	0.017	0.017	0.007	
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	0.073	0.096	0.088	0.086	0.010	
^J Lead (µg/L)	4	< 0.9	1.0	0.4	0.6	0.2	
^J Manganese (mg/L)	4	< 0.007	0.010	0.006	0.006	0.003	
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	
Selenium (µg/L)	4	< 2.5	< 2.5	1.2	1.2	0.0	
Silver (µg/L)	4	< 0.015	< 0.215	0.058	0.058	0.058	
^J Thallium (µg/L)	4	< 1.4	2.7 ^H	0.7	1.2	1.0	1
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	0.53	0.05	0.17	0.22	
E. coli (col/100mL)	8	26	921	215	257	291	

E=# samples that exceeded criteria; H=*F&W* human health criteria exceeded; J=estimate; N=# samples; Q=# of uncertain exceedances; S=*F&W* hardness-adjusted aquatic life use criterion exceeded.

FOR MORE INFORMATION, CONTACT:
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