

2009 Monitoring Summary

Flat Creek at Lawrence County Road 87 (34.49610/-87.13190)

BACKGROUND

The 7.3 mile segment of Flat Creek from West Flint Creek to its source was placed on Alabama's 1998 Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Fish & Wildlife (F&W)* water use classification criteria. Water quality data collected in 1997 showed stream impairments caused by siltation, ammonia, nutrient, and organic enrichment/low dissolved oxygen concentrations (OE/DO) from pasture grazing.

In late 2003, the Alabama Department of Environmental Management (ADEM) developed Total Maximum Daily Loads (TMDLs) for each pollutant to minimize impairment. The TMDLs were approved and implemented by the US Environmental Protection Agency.

In 2009, the ADEM collected intensive water samples in Flat Creek at FLTL-1 (Figure 1) to document current water quality conditions prior to implementation of best management practices to address these impairments. A habitat and macroinvertebrate assessment were requested but could not be completed due to no flow conditions caused by a beaver-dam.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Flat Creek is a *Fish & Wildlife (F&W)* stream located north of the city of Five Points in Lawrence County. According to the 2006 National Land Cover Dataset, landuse within the watershed is primarily pasture/hay, with some forested areas (24%). As of September 1, 2012, ADEM has issued six NPDES permits in this watershed.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 2. When possible, in situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides, and semi-volatile organics) from March through October of 2009 to identify any stressors to the biological community. Dissolved oxygen exceeded Flat Creek's *F&W* use classification criterion on July 7, 2009. However, flow conditions during the sampling event were very low (2.7 cfs). It is uncertain if dissolved copper exceeded criteria applicable to *F&W* use classification. Median total phosphorus, chlorides, pH, and several dissolved and total metal concentrations were all higher than 90% of all verified ecoreference data collected in ecoregion 71.

SUMMARY

Water quality results indicated dissolved oxygen exceeded criteria applicable to Flat Creek's *F&W* use classification during one site visit. Median values of several other parameters were higher than expected when compared to the other streams located within the same ecoregion. Biological sampling could not be completed due to low flow conditions. As a result, further monitoring is needed to estimate overall water quality.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi ²)		9
Ecoregion ^a		71j
% Landuse		
Open water		<1
Wetland	Woody	3
Forest	Deciduous	19
	Evergreen	2
	Mixed	3
Shrub/scrub		6
Grassland/herbaceous		2
Pasture/hay		52
Cultivated crops		4
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Barren		19
Population/km ^{2b}		119
# NPDES Permits ^c	TOTAL	6

a. Little Mountain

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.



Figure 1. Flat Creek at FLTL-1, May 25, 2009.

Table 2. Summary of water quality data collected March-October, 2009. 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	Q	E
Physical								
Temperature (°C)	8	13.0	24.0	19.8	19.7	4.0		
Turbidity (NTU)	8	4.1	23.1	9.2	11.4	6.8		
^J Total Dissolved Solids (mg/L)	8	38.0	120.0	72.5	79.6	28.7		
^J Total Suspended Solids (mg/L)	8	< 1.0	12.0	8.0	6.9	4.1		
Specific Conductance (µmhos)	8	94.7	157.9	107.6	119.2	25.5		
Hardness (mg/L)	4	39.3	56.4	44.0	46.0	7.3		
Alkalinity (mg/L)	8	32.6	68.8	43.3	47.2	12.8		
Stream Flow (cfs)	7	2.7	42.0	20.0	17.3	15.0		
Chemical								
Dissolved Oxygen (mg/L)	8	4.9 ^C	10.4	8.1	8.0	1.8		1
pH (su)	8	7.2	7.9	7.2 ^M	7.4	0.2		
^B Ammonia Nitrogen (mg/L)	7	< 0.006	0.037	0.007	0.010	0.012		
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.015	0.388	0.232	0.238	0.113		
^B Total Kjeldahl Nitrogen (mg/L)	7	< 0.089	0.670	0.417	0.434	0.222		
^B Total Nitrogen (mg/L)	7	< 0.060	0.949	0.659	0.658	0.305		
^J Dissolved Reactive Phosphorus (mg/L)	8	0.010	0.051	0.018	0.026	0.015		
^B Total Phosphorus (mg/L)	7	0.035	0.086	0.046 ^M	0.057	0.020		
CBOD-5 (mg/L)	8	< 1.0	< 2.0	1.0	0.9	0.2		
Chlorides (mg/L)	8	3.0	5.2	3.7 ^M	3.8	0.7		
Atrazine (µg/L)	2	< 0.06	< 0.06	0.03	0.03	0.00		
Total Metals								
^J Aluminum (mg/L)	4	0.148	0.803	0.429 ^M	0.452	0.318		
Iron (mg/L)	4	0.753	1.000	0.942 ^M	0.909	0.110		
^J Manganese (mg/L)	4	< 0.001	0.055	0.034 ^M	0.031	0.023		
Dissolved Metals								
^J Aluminum (mg/L)	4	< 0.033	0.111	0.060 ^M	0.062	0.040		
Antimony (µg/L)	4	< 0.7	< 0.7	0.4	0.4	0.0		
Arsenic (µg/L)	4	< 0.4	< 1.6	0.2	0.4	0.3		
Cadmium (µg/L)	4	< 3.000	< 3.000	1.500	1.500	0.000		
Chromium (µg/L)	4	< 13.000	< 13.000	6.500	6.500	0.000		
^J Copper (mg/L)	4	< 0.013	0.023 ^S	0.006	0.011	0.008		1
^J Iron (mg/L)	4	0.134	0.532	0.372 ^M	0.353	0.170		
Lead (µg/L)	4	< 0.6	< 1.0	0.5	0.5	0.1		
^J Manganese (mg/L)	4	< 0.001	0.034	0.021	0.019	0.015		
Mercury (µg/L)	4	< 0.080	< 0.080	0.040	0.040	0.000		
Nickel (mg/L)	4	< 0.004	< 0.019	0.006	0.006	0.004		
Selenium (µg/L)	4	< 0.4	< 1.5	0.2	0.3	0.3		
Silver (µg/L)	4	< 2.000	< 2.000	1.000	1.000	0.000		
Thallium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0		
Zinc (mg/L)	4	< 0.003	< 0.030	0.002	0.005	0.007		
Biological								
Chlorophyll a (ug/L)	8	0.71	13.88	3.47	4.61	4.05		
^J Fecal Coliform (col/100 mL)	8	49	1600	405	511	484		

B=one or more samples excluded from calculations because they did not meet laboratory QC requirements; C=F&W criteria violated; E=# samples that exceeded criteria; J= Estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 71; N=# samples; Q=# of uncertain exceedences; S=F&W hardness-adjusted aquatic life use criteria exceeded

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