Alabama Department of Environmental Management

Ambient Monitoring Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Poor

Little Cahaba River at Elliott Lane SW Jefferson County (33.52444, -86.57528)

BACKGROUND

The Little Cahaba River (LC-1) is one of a network of 94 ambient sites monitored annually by the Alabama Department of Environmental Management (ADEM) to identify long-term trends in water quality and to provide data for the development of Total Maximum Daily Loads (TMDL) and water quality criteria. In addition, LC-1 was part of the 2012 Black Warrior Cahaba Basin Assessment Monitoring.

Figure 1. The Little Cahaba River at LC-1, July 11, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Cahaba River at LC-1 is a Fish and Wildlife stream located in Jefferson County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is a mix of deciduous forest, agriculture and light development. As of September 1, 2012, 120 NPDES permit outfalls are located within 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. Little Cahaba River at LC-1 is a low gradient stream with predominantly gravel and cobbles substrate. The watershed lies within the Southern Limestone/Dolomite Valleys and Low Rolling Hills subecoregion. Overall habitat quality was categorized as *optimal*.

BIOASSESSMENT REULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community compositon, 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 indicate the macroinvertebrate community to be in *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		**Cahaba River**
Drainage Area (mi^2)		19
Ecoregion[a]		67f
% Landuse		
Wetland	Woody	1
Forest	Deciduous	33
	Evergreen	7
	Mixed	4
Shrub/scrub		3
Grassland/herbaceous		4
Pasture/hay		10
Cultivated crops		2
Development	Open space	17
	Low intensity	11
	Moderate intensity	4
	High intensity	1
Barren		<1
Population/km^2[b]		290
# NPDES Permits[c]	**TOTAL**	120
401 Water Quality Certification		1
Construction Stormwater		100
Mining		2
Industrial General		8
Industrial Individual		1
Municipal Individual		8

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database. September 1, 2012.

Table 2. Physical characteristics of Little Cahaba R at LC-1, May 01, 2012.

Physical Characteristics		
Canopy Cover		**Shaded**
Width (ft)		**28.0**
Depth (Ft)		
	Riffle	**0.0**
	Run	**2.0**
	Pool	**3.0**
% of Reach		
	Riffle	**0**
	Run	**60**
	Pool	**40**
% Substrate		
	Bedrock	**10**
	Boulder	**10**
	Clay	**0**
	Cobble	**18**
	Mud/Muck	**0**
	Gravel	**25**
	Hard Pan Clay	**0**
	Sand	**10**
	Silt	**2**
	Organic Matter	**25**

Table 3. Results of the habitat assessment conducted on Little Cahaba River at LC-1, May 1, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	73	Optimal >70
Sediment Deposition	75	Optimal >70
Sinuosity	58	Marginal (45-64)
Bank and Vegetative Stability	85	Optimal >74
Riparian Buffer	74	Sub-optimal (70-89)
Habitat Assessment	167	
% Maximum Score	76	Optimal >70

Table 4. Results of macroinvertebrate bioassessment conducted in Little Cahaba River at LC-1 on May 1, 2012.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
# EPT taxa	5	4
Shannon Diversity	4.20	70
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	6	11
% Non-insect taxa	18	24
Tolerance measures		
% Tolerant taxa	36	37
WMB-I Assessment Score	—	29
WMB-I Assessment Rating		Poor (23-46)

WATER CHEMISTRY RESULTS

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly and metals were collected quarterly through 2012 to help identify stressors to the biological community. Median values for some physical parameters, nutrients, chlorides, cadmium and copper were higher than values expected based on reference reach data collected in ecoregion 67f.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Water chemistry results indicated higher than expected concentrations of nutrients, chlorides, cadmium and copper.

Table 5. Summary of water quality data collected March-October, 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this values. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than

	Parameter	N		Min	Max	Med	Avg	SD
	Physical							
	Temperature (°C)	13		12 8	24.1	19.1	18.8	3 8
	Turbidity (NTU)	13		1.1	11.1	2.5	3.2	2.6
·	Total Dissolved Solids (mg/L)	12		218.0	260.0	244.0	240.8 M	13.9
·	Total Suspended Solids (mg/L)	12	<	1.0	41.0	3.5	6.4	11.1
	Specific Conductance (µmhos)	13		337 0	433.0	392.0	392.0 G	26 6
	Hardness (mg/L)	4		94 4	203 0	190.0	169.4 G	50 3
	Alkalinity (mg/L)	12		114.0	157.4	140.2	139.5 M	14 0
	Stream Flow (cfs)	13		4.8	50.0	11.0	16.3	12.8
	Chemical							
	Dissolved Oxygen (mg/L)	13		5.9	14.8	8.5	9.0	2.2
	pH (su)	13		7.2	8.1	7.8	7.8	0 2
·	Ammonia Nitrogen (mg/L)	12	<	0 010	0 500	0 014	0.058 M	0 140
·	Nitrate+Nitrite Nitrogen (mg/L)	12		1 770	4 790	3 015	3.055 M	1.140
	Total Kjeldahl Nitrogen (mg/L)	12		0.093	0.568	0.298	0.313	0.130
·	Total Nitrogen (mg/L)	12		2.060	5.150	3.231	3.368 M	1.149
	Dissolved Reactive Phosphorus (mg/L)	12		0.051	0.210	0.099	0.112 M	0.054
·	Total Phosphorus (mg/L)	12		0 053	0 201	0 111	0.116 M	0.051
·	CBOD-5 (mg/L)	12	<	1 0	2 0	1 0	0 8	0 2
·	Chlorides (mg/L)	11		4.9	12.3	7.2	8.1 M	2 4
	Total Metals							
·	Aluminum (mg/L)	4		0.048	0.077	0.064	0.064	0.015
	Iron (mg/L)	4	<	0.100	0.100	0.050	0.050	0.000
·	Manganese (mg/L)	4		0.009	0.016	0.013	0.013	0.003
	Dissolved Metals							
·	Aluminum (mg/L)	4	<	0 030	0 030	0 015	0.015	0 000
·	Antimony (µg/L)	4	<	0 8	0 8	0.6	0.6	0 2
·	Arsenic (µg/L)	4	<	1.0	1.0	0.5	0.5	0 0
·	Cadmium (µg/L)	4	<	0.090	0.112	0.045	0.062 M	0.034
	Chromium (mg/L)	4	<	0.005	0.005	0.002	0.002	0.000
	Copper (mg/L)	4	<	0 100	0 300	0 150	0.125 M	0.050
·	Iron (mg/L)	4	<	0 100	0 100	0 050	0.050	0 000
	Lead (µg/L)	4	<	1 6	1 6	0.8	0.8	0 0
·	Manganese (mg/L)	4		0.007	0.011	0.010	0.009	0.002
	Nickel (mg/L)	4	<	0.010	0.010	0.005	0.005	0.000
	Selenium (µg/L)	4	<	2.0	2.0	1.0	1.0	0.0
·	Silver (µg/L)	4	<	1 000	1 000	0 500	0.500	0 000
	Thallium (µg/L)	4	<	0 4	0 4	0 2	0 2	0 0
·	Zinc (mg/L)	4	<	0 020	0 020	0.010	0.010	0.000
	Biological							
·	Chlorophyll a (ug/L)	12	<	1.00	2.67	0.50	0.88	0.63
	E. coli (col/100mL)	12		28	435	77	109	118

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 67f; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 67f; N=# samples

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