Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2013 Monitoring Summary

™

Fair

Cedar Creek at Alabama Highway 43 in Franklin County (34.46472/-87.75306)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Cedar Creek watershed for biological and water quality monitoring as part of the 2013 Assessment of the Tennessee (TN) River Basins. The objectives of the TN Basin Assessment were to assess biological conditions at each monitoring location, estimate overall water quality within the basin, identify impaired and reference reaches, and collect data for metric and criteria development.

Figure 1. Cedar Creek at CDRF-5, September 19, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cedar Creek at CDRF-5 is a *Fish and Wildlife (F&W)* stream located in Franklin County south of the town of Russellville, Alabama within the Eastern Highland Rim ecoregion (71g). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (63%) with some pasture/hay and shrub/scrub areas. Two NPDES permits have been issued to the Cedar Creek watershed as of May 13, 2013.

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. Cedar Creek at CDRF-5 is characterized primarily by sand and gravel substrates (Figure 1). Overall habitat quality was categorized as *marginal* for this stream type.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi^2)		30
Ecoregion[a]		71g
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	45
	Evergreen	11
	Mixed	7
Shrub/scrub		10
Grassland/herbaceous		5
Pasture/hay		17
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Barren		1
Population/km^2[b]		11
# NPDES Permits[c]	**TOTAL**	2
Construction Stormwater		1
Mining		1

a.Eastern Highland Rim

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of Cedar Creek at CDRF-5, June 25, 2013.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Estimate 50/50
Depth (ft)		
	Riffle	0.5
	Run	1.0
	Pool	2.0
% of Reach		
	Riffle	10
	Run	80
	Pool	10
% Substrate		
	Bedrock	5
	Boulder	1
	Cobble	5
	Gravel	15
	Sand	64
	Silt	5
	Organic Matter	5

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Table 3. Results of the habitat assessment conducted on Cedar Creek at CDRF-5, June 25, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	51	Marginal (41-58)
Sediment Deposition	43	Marginal (41-58)
Sinuosity	73	Sub-optimal (65-84)
Bank and Vegetative Stability	35	Marginal (35-59)
Riparian Buffer	53	Marginal (50-69)
Habitat Assessment Score	116	
% Maximum Score	48	Marginal (41-58)

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 north Alabama streams and rivers. Each score is based on a six-point scale, ranging from 1 or *natural*, to 6 or *highly altered*. The macroinvertebrate survey conducted in Cedar Creek at CDRF-5 rated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 4. Results of macroinvertebrate bioassessment conducted in Cedar Creek at CDRF-5, June 25, 2013.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	79
# EPT taxa	18
# Sensitive EPT	4
Shannon Diversity	3.95
# Highly-sensitive and Specialized Taxa	1
Taxonomic composition measures	
% EPT minus Baetidae and Hydropsychidae	9
% Non-insect taxa	13
Functional feeding group	
% Predator Individuals	5
Community tolerance	
% Sensitive taxa	29
% Tolerant taxa	20
WMB-I Assessment Score	**4**
WMB-I Assessment Rating	**Fair**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected March, May, July, and September, 2013 to help identify any stressors to the biological communities. Flow could not be measured during 3 of 5 sampling visits. Dissolved oxygen was violated was 3.19 mg/L in during September, when flow was too low to measure. Median concentrations of total dissolved solids, specific conductance, hardness, alkalinity, dissolved reactive phosphorus, chlorides, and total some metals were higher than expected, based on data collected at reference reaches within the Interior Plateau ecoregion (71).

Table 5. Summary of water quality data collected March-September 2013. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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)	5	11.9	23.3	21.2	18.9	5.2	
Turbidity (NTU)	5	2.4	29.1	9.0	12.9	10.4	
Total Dissolved Solids (mg/L)	4	136.0	188.0	161.0 M	161.5	23.7	
Total Suspended Solids (mg/L)	4 <	1.0	20.0	8.0	9.1	8.2	
Specific Conductance (µmhos)	5	174.6	309.1	291.0 G	264.1	55.1	
Hardness (mg/L)	4	79.5	136.0	126.0 G	116.9	26.0	
Alkalinity (mg/L)	4	82.0	138.0	126.2 M	118.1	25.6	
Stream Flow (cfs)	2	4.8	8.6	6.7	6.7	2.7	
Chemical							
Dissolved Oxygen (mg/L)	5	3.19 C	10.2	6.7	7.0	2.9	1
pH (su)	5	6.8	7.7	7.3 M	7.3	0.4	
Ammonia Nitrogen (mg/L)	4 <	0.018	0.044	0.014	0.020	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.084	0.652	0.446	0.407	0.274	
J Total Kjeldahl Nitrogen (mg/L)	4	0.061	0.308	0.201	0.193	0.119	
J Total Nitrogen (mg/L)	4	0.392	0.739	0.634	0.600	0.161	
Dissolved Reactive Phosphorus (mg/L)	4	0.016	0.029	0.022 M	0.022	0.007	
Total Phosphorus (mg/L)	4	0.034	0.051	0.040	0.042	0.008	
CBOD-5 (mg/L)	4 <	2.0 <	2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	1.9	7.7	5.49 M	5.1	2.8	
Atrazine (µg/L)	1				0.10		
Total Metals							
Aluminum (mg/L)	4 <	0.076	0.738	0.340 M	0.364	0.303	
J Iron (mg/L)	4	0.154	0.818	0.439 M	0.462	0.289	
J Manganese (mg/L)	4	0.040	0.156	0.070 M	0.084	0.053	
Dissolved Metals							
Aluminum (mg/L)	4 <	0.076 <	0.076	0.038 M	0.038	0.000	
Antimony (µg/L)	4 <	0.1 <	2.6	0.7	0.7	0.7	
J Arsenic (µg/L)	4	0.7	1.9 A	0.9	1.0	0.7	3
Cadmium (µg/L)	4 <	0.046 <	0.170	0.054	0.054	0.036	
J Chromium (µg/L)	4	1.360 <	32.00 S	8.755	8.718	8.409	
J Copper (mg/L)	4 <	0.000325 <	0.031	0.008	0.008	0.009	
J Iron (mg/L)	4	0.049	0.087	0.064 M	0.066	0.017	
Lead (µg/L)	4 <	0.1 <	1.1	0.3	0.3	0.3	
J Manganese (mg/L)	4	0.014	0.145	0.057 M	0.068	0.057	
Mercury (µg/L)	2 <	0.057 <	0.057	0.028	0.028	0.000	
J Nickel (mg/L)	4	0.000302 <	0.016	0.004	0.004	0.004	
Selenium (µg/L)	4 <	0.2 <	1.4	0.4	0.4	0.3	
Silver (µg/L)	4 <	0.215 <	2.120	0.584	0.584	0.550	
Thallium (µg/L)	4 <	0.1 <	1.1	0.3	0.3	0.3	
J Zinc (mg/L)	4	0.002 <	0.017	0.006	0.005	0.004	
Biological							
Chlorophyll a (ug/L)	4 <	0.10	1.34	0.80	0.75	0.57	
J E. coli (col/100mL)	4	64	1046	351	453	421	

A = *F&W* aquatic life use criterion exceeded; C = *F&W* criterion violated; E = # samples that exceeded criterion; G = value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 71; H = *F&W* human health criterion exceeded; J = estimate; M = value >90% of all verified ecoregional reference reach data collected in ecoregion 71; N = # samples; Q = # uncertain exceedances; S = *F&W* hardness adjusted aquatic life use criteria exceeded.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. However, overall habitat quality for Cedar Creek at CDRF-5 was categorized as *marginal* for this stream type. Several water parameters were higher than expected based on data collected at reference reaches within the Interior Plateau ecoregion. Monitoring should continue to ensure that conditions remain stable.

FOR MORE INFORMATION, CONTACT:
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