

2009 Monitoring Summary



Cypress Creek at Lauderdale County Road 6 (34.90270/-87.77016)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Cypress Creek watershed for biological and water quality monitoring as part of the 2009 Assessment of the Tennessee (TN) River Basin. The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the TN basin.



Figure 1. Cypress Creek at CPSL-2, April 14, 2009.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cypress Creek is a *Fish & Wildlife (F&W)* stream in Lauderdale County northwest of Florence. It is a tributary of the Tennessee River. Based on the 2006 National Land Cover Dataset, land use within the watershed is primarily forest (43%) and pasture. As of September 1, 2012, ADEM has issued ten NPDES permits 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. Cypress Creek at CPSL-2 is a moderate gradient, riffle-run stream (Figure 1). Instream substrates are largely gravel, cobble, and sand. Overall habitat quality was categorized as *optimal* for supporting 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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all metric scores. Metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Tennessee River
Basin		Tennessee River
Drainage Area (mi²)		95
Ecoregion^a		71f
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	35
	Evergreen	6
	Mixed	2
Shrub/scrub		14
Grassland/herbaceous		<1
Pasture/hay		23
Cultivated crops		12
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Population/km^{2b}		37
# NPDES Permits^c	TOTAL	10
	Construction Stormwater	8
	Municipal Individual	2

a. Western Highland Rim

b. 2000 US Census

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

Table 2. Physical characteristics of Cypress Creek at CPSL-2, June 24, 2009.

Physical Characteristics		
Width (ft)		30
Canopy Cover		Mostly Shaded
Depth (ft)	Riffle	0.9
	Run	1.5
	Pool	2.0
% of Reach	Riffle	20
	Run	70
	Pool	10
% Substrate	Clay	1
	Cobble	20
	Mud/Muck	3
	Gravel	44
	Sand	18
	Silt	9
	Organic Matter	5

Table 3. Results of the habitat assessment conducted in Cypress Creek at CPSL-2, June 24, 2009.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	77	Optimal (>70)
Sediment Deposition	73	Optimal (>70)
Sinuosity	85	Optimal (>84)
Bank and Vegetative Stability	61	Sub-optimal (60-74)
Riparian Buffer	80	Sub-optimal (70-89)
Habitat Assessment Score	175	
% Maximum Score	73	Optimal (>70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Cypress Creek at CPSL-2, June 24, 2009.

Macroinvertebrate Assessment			
	Results	Scores	
Taxa richness and diversity measures		(0-100)	
# EPT taxa	28	100	
Shannon Diversity	4.43	80	
Taxonomic composition measures			
% EPT minus Baetidae and Hydropsychidae	52	100	
% Non-insect taxa	15	37	
Functional feeding group			
% Predator Individuals	5	15	
Community tolerance			
% Tolerant taxa	26	65	
WMB-I Assessment Score	---	66	
WMB-I Assessment Rating		Good (44-72)	

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, *in situ* measurements and water samples were collected monthly, semi-monthly, or quarterly during March through October of 2009 to help identify any stressors to the biological communities. The organic herbicide, atrazine, was detected in the one sample collected on May 14, 2009. Other organics results were less than the minimum detection limit. Median concentrations of dissolved reactive phosphorus, total and dissolved manganese, and dissolved aluminum were higher than expected based on the 90th percentile of reference reach data collected in ecoregion 71f.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Bioassessment results indicated the macroinvertebrate community in Cypress Creek at CPSL-2 to be in *good* condition. Water quality data suggest dissolved reactive phosphorus and some metals were above values expected for streams in the Western Highland Rim ecoregion. Monitoring should continue to ensure conditions continue to meet *F&W* standards

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Table 5. 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
Physical						
Temperature (°C)	9	12.5	25.2	19.8	19.0	4.0
Turbidity (NTU)	9	2.5	8.8	4.8	5.3	2.1
^J Total Dissolved Solids (mg/L)	8	32.0	78.0	64.0	57.0	19.9
^J Total Suspended Solids (mg/L)	8	2.0	11.0	6.0	5.8	2.9
Specific Conductance (µmhos)	9	60.4	128.8	91.0	89.6	24.3
Hardness (mg/L)	4	19.0	57.8	37.6	38.0	17.7
^J Alkalinity (mg/L)	8	21.2	58.8	31.4	35.2	14.5
Stream Flow (cfs)	5	8.7	52.5	14.9	21.0	17.1
Chemical						
Dissolved Oxygen (mg/L)	9	7.2	9.7	7.8	8.0	0.8
pH (su)	9	6.9	7.4	7.2	7.2	0.2
Ammonia Nitrogen (mg/L)	8	< 0.006	< 0.014	0.005	0.004	0.001
^J Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.003	1.920	0.466	0.662	0.739
Total Kjeldahl Nitrogen (mg/L)	8	0.230	1.423	0.406	0.604	0.490
^J Total Nitrogen (mg/L)	8	< 0.313	2.292	1.185	1.266	0.640
Dissolved Reactive Phosphorus (mg/L)	8	0.011	0.095	0.032 ^M	0.049	0.038
^J Total Phosphorus (mg/L)	8	< 0.002	0.067	0.025	0.025	0.021
CBOD-5 (mg/L)	8	< 1.0	< 2.0	0.5	0.7	0.3
Chlorides (mg/L)	8	1.3	9.8	2.2	3.4	3.0
Atrazine (µg/L)	1				0.39	
Total Metals						
^J Aluminum (mg/L)	4	0.076	0.244	0.140	0.150	0.085
^J Iron (mg/L)	4	0.113	0.324	0.142	0.180	0.099
^J Manganese (mg/L)	4	0.041	0.068	0.046 ^M	0.050	0.012
Dissolved Metals						
^J Aluminum (mg/L)	4	< 0.032	0.122	0.031 ^M	0.050	0.048
Antimony (µg/L)	4	< 0.7	< 6.0	2.0	1.8	1.4
Arsenic (µg/L)	4	< 0.4	< 1.6	0.2	0.4	0.3
Cadmium (mg/L)	4	< 0.002	< 0.003	0.001	0.001	0.000
Chromium (mg/L)	4	< 0.007	< 0.013	0.005	0.005	0.002
Copper (mg/L)	4	< 0.013	< 0.200	0.053	0.053	0.054
^J Iron (mg/L)	4	< 0.020	0.083	0.018	0.032	0.034
Lead (µg/L)	4	< 0.6	< 1.5	0.6	0.6	0.2
^J Manganese (mg/L)	4	0.032	0.045	0.034 ^M	0.036	0.006
^B Mercury (µg/L)	2	< 0.08	< 0.08	0.04	0.04	0.00
Nickel (mg/L)	4	< 0.004	< 0.019	0.004	0.005	0.003
Selenium (µg/L)	4	< 0.4	< 1.5	0.2	0.3	0.3
Silver (mg/L)	4	< 0.001	< 0.002	0.001	0.001	0.000
Thallium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0
Zinc (mg/L)	4	< 0.003	< 0.060	0.016	0.016	0.016
Biological						
Chlorophyll a (µg/L)	8	< 0.10	1.34	0.50	0.59	0.37
^J Fecal Coliform (col/100 mL)	8	5	290	82	110	103

^B=one or more samples excluded due to laboratory QC concerns; ^J=estimate; ^N=# samples; ^M=value > 90th percentile of all verified ecoregional reference reach data collected in ecoregion 71f.