

2010 Monitoring Summary



Weewoka Creek at Talladega County Rd. 139 Bridge (33.29050/-86.24700)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Weewoka Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin group. Weewoka Creek was chosen to be resampled due to a WMB-I assessment score of 47, or “*poor*” rating (24-48), in 2005.



Figure 1. Weewoka Creek at WWOT-37, May 19, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Weewoka Creek is a *Fish & Wildlife (F&W)* stream in Talladega County in the Coosa River basin. According to the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (59%), with some pasture/hay and cultivated crop areas. As of February 23, 2011, ADEM’s NPDES Management System database showed a total of ten 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. Weewoka Creek at WWOT-37 is a high-gradient, riffle-run stream characterized by a gravel, cobble and sand substrate (Figure 1). 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. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi²)		34
Ecoregion^a		67f
% Landuse		
Open water		<1
Wetland	Woody	2
Forest	Deciduous	36
	Evergreen	20
	Mixed	3
Shrub/scrub		1
Grassland/herbaceous		7
Pasture/hay		12
Cultivated crops		12
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km^{2b}		1
# NPDES Permits^c	TOTAL	10
	Construction Stormwater	9
	Municipal Individual	1

a.Southern Limestone/Dolomite Valleys and Low Rolling Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM’s NPDES Management System database, February 23, 2011

Table 2. Physical characteristics of Weewoka Creek at WWOT-37, May 19, 2010.

Physical Characteristics		
Width (ft)		30
Canopy cover		Estimate 50/50
Depth (ft)	Riffle	1.0
	Run	1.5
	Pool	2.0
% of Reach	Riffle	50
	Run	40
	Pool	10
% Substrate	Boulder	8
	Cobble	25
	Gravel	31
	Sand	25
	Silt	7
	Organic Matter	4

Table 3. Results of the habitat assessment conducted in Weewoka Creek at WWOT-37, May 19, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	88	Optimal (> 70)
Sediment Deposition	82	Optimal (> 70)
Sinuosity	88	Optimal (> 84)
Bank and Vegetative Stability	58	Marginal (35-59)
Riparian Buffer	70	Sub-optimal (70-89)
Habitat Assessment Score	184	
% Maximum score	77	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Weewoka Creek at WWOT-37, May 19, 2010.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		
		(0-100)
# EPT taxa	16	52
Shannon Diversity	3.84	53
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	89	98
% Non-insect taxa	9	66
Tolerance measures		
% Tolerant taxa	25	70
WMB-I Assessment Score	---	68
WMB-I Assessment Rating		Fair (47-69)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements included samples from every other month during macroinvertebrate sampling. Water samples were collected semi-monthly (metals), and quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during May through November of 2010 to help identify any stressors to the biological communities. The estimated copper concentration in September was higher than criteria applicable to Weewoka Creek's *F&W* use classification. Median values of specific conductance, hardness, alkalinity, nitrate+nitrite-nitrogen, total nitrogen, and dissolved reactive phosphorus were higher than expected when compared to verified data of other reference reaches in ecoregion.

SUMMARY

Results of ADEM's 2010 habitat assessment of Weewoka Creek at WWOT-37 indicated the habitat to be in *optimal* condition. The bioassessment indicated the macroinvertebrate community to be in *poor* condition. Concentrations of copper, specific conductance, hardness, alkalinity, nitrate+nitrite-nitrogen, total nitrogen and dissolved reactive phosphorus were higher than expected for the ecoregion. Further monitoring is needed to ensure that water quality and biological conditions in the reach remain stable.

FOR MORE INFORMATION, CONTACT:
 Rebekah Moore, ADEM Aquatic Assessment Unit
 1350 Coliseum Boulevard Montgomery, AL 36110
 (334) 260-2759 rcmoores@adem.state.al.us

Table 5. Summary of water quality data collected May-November, 2010. 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)	5	13.4	22.8	18.4	18.6	3.8	
Turbidity (NTU)	5	3.8	26.2	5.2	8.9	9.7	
Total Dissolved Solids (mg/L)	4	120.0	132.0	131.0	128.5	5.7	
Total Suspended Solids (mg/L)	4	3.0	9.0	7.0	6.5	2.5	
Specific Conductance (µmhos)	5	214.2	270.1	236.6 ^G	242.9	23.3	
Hardness (mg/L)	4	99.1	132.0	120.5 ^G	118.0	13.9	
Alkalinity (mg/L)	4	101.0	133.0	123.0 ^M	120.0	14.1	
Stream Flow (cfs)	4	5.6	20.2	14.9	13.9	6.4	
Chemical							
Dissolved Oxygen (mg/L)	5	8.0	9.3	8.4	8.6	0.6	
pH (su)	5	7.6	7.9	7.8	7.8	0.1	
Ammonia Nitrogen (mg/L)	4	< 0.021	< 0.021	0.010	0.010	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.607	1.200	1.002 ^M	0.952	0.259	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.274	0.154	0.155	0.133	
Total Nitrogen (mg/L)	4	< 0.647	1.474	1.155 ^M	1.108	0.343	
Dissolved Reactive Phosphorus (mg/L)	4	0.013	0.024	0.020 ^M	0.019	0.005	
Total Phosphorus (mg/L)	4	0.018	0.029	0.024	0.024	0.005	
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	2.7	3.2	2.9	2.9	0.2	
Atrazine (µg/L)	2	0.07	0.15	0.11	0.11	0.06	
Total Metals							
^J Aluminum (mg/L)	4	< 0.033	0.197	0.065	0.086	0.087	
^J Iron (mg/L)	4	< 0.026	0.226	0.104	0.112	0.093	
^J Manganese (mg/L)	4	< 0.001	0.077	0.030	0.034	0.032	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.033	< 0.043	0.016	0.018	0.002	
Antimony (µg/L)	4	< 1.9	< 1.9	0.9	0.9	0.0	
Arsenic (µg/L)	4	< 0.4	< 2.1	1.0	0.8	0.4	
Cadmium (mg/L)	4	< 0.000	< 0.014	0.001	0.002	0.003	
^J Chromium (mg/L)	4	< 0.009	0.023	0.006	0.010	0.009	
^J Copper (mg/L)	4	< 0.013	0.021 ^S	0.008	0.011	0.007	1
^J Iron (mg/L)	4	< 0.023	0.036	0.018	0.021	0.011	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0	
^J Manganese (mg/L)	4	< 0.001	0.025	0.014	0.013	0.010	
^J Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0	
Nickel (mg/L)	4	< 0.019	< 0.042	0.010	0.012	0.006	
^J Selenium (µg/L)	4	< 1.7	2.9	0.8	1.4	1.0	
Silver (mg/L)	4	< 0.000	< 0.002	0.000	0.000	0.001	
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	4	< 0.012	< 0.030	0.015	0.013	0.004	
Biological							
Chlorophyll a (µg/L)	4	< 0.10	1.07	0.53	0.54	0.42	
<i>E. coli</i> (col/100mL)	4	57	1986	95	558	952	

J=estimate; N=# samples; E=# of samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion; M=value > 90% of all data collected within ecoregion 67f; S=*F&W* hardness adjusted aquatic life use criterion exceeded.