

2005 Monitoring Summary



Weewoka Creek at Talladega County Road 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 2005 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 and to estimate overall water quality within the ACT basin group.

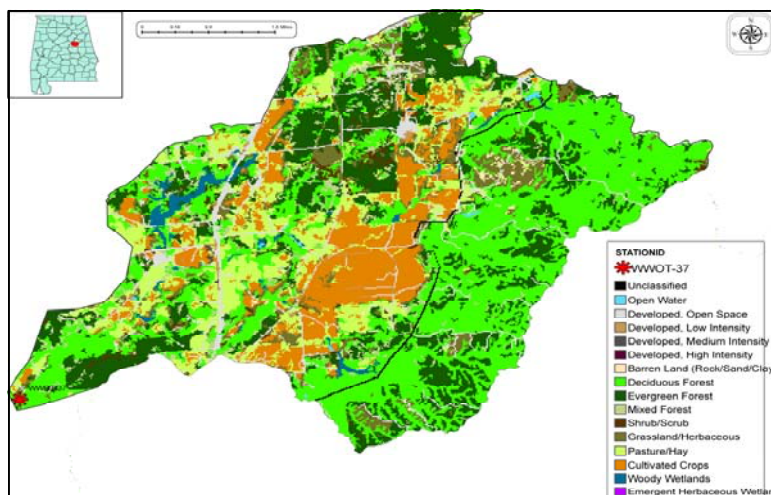


Figure 1. Sampling location and land use within the Weewoka Creek watershed at WWOT-37.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Weewoka Creek is a small *Fish & Wildlife (F&W)* stream located near the city of Talladega in the Coosa River basin (Fig. 1). Landuse within the watershed is primarily forest (61%), with some agriculture (24%) and development (5%). DeSoto Caverns Park is close to the creek as well. Weewoka Creek is located in the Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f) ecoregion. There are 13 permitted discharges along the watershed.

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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 medium gradient stream with a cobble, sand and gravel substrates. Overall habitat quality was categorized as *optimal* due to good instream habitat and little sediment deposition.

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 an average of the score for each metric. Metric results indicated the macroinvertebrate community to be characterized by pollution-tolerant taxa groups, indicating *poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	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}	16
# NPDES Permits ^c	TOTAL 13
	401 Water Quality Certification
	Construction Stormwater 7
	Mining General Permit (old) 4
	Municipal Individual 2

a.Southern Limestone/Dolomite Valleys and Low Rolling Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Summary of physical characteristics of Weewoka Creek at WWOT-37

Physical Characteristics	
Width (ft)	30
Canopy cover	Est. 50/50
Depth (ft)	
	Riffle 0.2
	Run 1.5
	Pool 3.5
% of Reach	
	Riffle 8
	Run 42
	Pool 50
% Substrate	
	Boulder 8
	Cobble 35
	Gravel 25
	Sand 22
	Silt 5
	Clay 2
	Organic Matter 3

Table 3. Results of the habitat assessment conducted on Weewoka Creek at WWOT-37, June 29, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	78	Optimal (>65)
Sediment deposition	69	Optimal (>65)
Sinuosity	83	Sub-optimal (65-84)
Bank and vegetative stability	51	Marginal (35-59)
Riparian buffer	76	Sub-optimal (70-90)
Habitat assessment score	172	
% Maximum score	72	Optimal (>65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Weewoka Creek at WWOT-37, June 29, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	6	50	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	9	75	Good (67-83)
Taxonomic composition measures			
% Non-insect taxa	7	71	Fair (49.4-74.1)
% Non-insect organisms	4	91	Fair (62.7-93.9)
% Plecoptera	0	0	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	7	25	Poor (20.2-40.7)
WMB-I Assessment Score	---	47	Poor (24-48)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Median concentrations of total dissolved solids, pH, CBOD-5, and chlorides, total nitrogen, and nitrate +nitrite nitrogen were above expected ranges for Southern Limestone/Dolomite Valleys and Low Rolling Hills (67f) ecoregion.

CONCLUSIONS

Bioassessment results indicate the macroinvertebrate community in *poor* condition. Results of monthly water samples and a habitat assessment suggest nutrient enrichment as a potential cause of the degraded biological condition. Total Dissolved Solids and Chlorides were also a parameter of concern.

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Table 5. Summary of water quality data collected March-October, 2005. 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	Median	Avg	SD
Physical						
Temperature (°C)	7	12.1	26.0	19.0	19.3	5.6
Turbidity (NTU)	8	3.2	22.8	10.0	11.1	5.7
Total Dissolved Solids (mg/L)	7	67.0	163.0	139.0 ^M	122.1	38.4
Total Suspended Solids (mg/L)	7	3.0	40.0	17.0	17.6	11.4
Specific Conductance (µmhos)	8	119.8	259.4	200.0	199.9	48.1
Hardness (mg/L)	5	61.2	142.0	84.7	93.5	32.3
Alkalinity (mg/L)	7	41.5	132.1	90.3	89.7	31.4
Stream Flow (cfs)	8	10.2	118.4	27.1	39.8	0.0
Chemical						
Dissolved Oxygen (mg/L)	8	7.1	10.44	8.7	8.8	1.2
pH (su)	8	7.2	8.1	7.7	7.7	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	0.022	0.008	0.010	0.005
Nitrate+Nitrite Nitrogen (mg/L)	7	0.546	1.310	0.917 ^M	0.914	0.266
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.392	0.173	0.166	0.113
Total Nitrogen (mg/L)	7	0.621	1.702	0.992 ^M	1.080	0.352
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.024	0.013	0.013	0.006
Total Phosphorus (mg/L)	7	< 0.004	0.074	0.041	0.046	0.025
CBOD-5 (mg/L)	7	1.2	4.4	2.1 ^M	2.2	1.1
Chlorides (mg/L)	7	4.4	6.1	5.2 ^M	5.2	0.6
Atrazine (µg/L)	2	0.09	0.14	0.12	0.12	0.0
Total Metals						
Aluminum (mg/L)	4	0.06	0.178	0.135	0.127	0.053
Iron (mg/L)	4	0.1	0.274	0.2555	0.221	0.083
Manganese (mg/L)	4	0.019	0.106	0.038	0.050	0.039
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	< 0.005	< 0.042	0.0148	0.019	0.019
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	< 0.012	0.006	0.007	0.005
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.000
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
^J Chlorophyll a (µg/L)	7	0.53	1.87	1.07	1.07	0.56
Fecal Coliform (col/100 mL)	7	4	270	120	109	84

J=estimate; N=# samples; M=value > 90th percentile of all data collected within eco-region 67f.