

2012 Monitoring Summary



Turkey Creek at Jefferson County Road 131 (33.72924/-86.73975)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Turkey Creek watershed for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior, Cahaba (BWC) River Basin. The objectives of the Black Warrior, Cahaba River Basin Assessments were to assess the biological integrity of each monitoring location and to estimate overall water quality within the BWC basin. Additionally, Turkey Creek was requested to be considered as a possible Outstanding Alabama Water (OAW) candidate.



Figure 1. Turkey Creek at TRKJ-2A on May 1, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Turkey Creek is a *Fish and Wildlife (F&W)* stream located northwest of the city of Pinson, Alabama. At TRKJ-2A, the stream drains approximately 33 square miles. Turkey Creek watershed has a high population density and < 27% of development. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (57%) areas. As of September 1, 2012, 20 NPDES permit outfalls were located 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. Turkey Creek at TRKJ-2A is a riffle-run stream characterized primarily by bedrock (Figure 1). Overall habitat quality was categorized as *optimal*.

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 individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Black Warrior River
Basin		
Drainage Area (mi²)		33
Ecoregion^a		68f
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	46
	Evergreen	7
	Mixed	4
Shrub/scrub		3
Grassland/herbaceous		5
Pasture/hay		6
Cultivated crops		1
Development	Open space	17
	Low intensity	8
	Moderate intensity	1
	High intensity	<1
Barren		1
Population/km^{2b}		296
# NPDES Permits^c		20
	Construction Stormwater	17
	Industrial General	3

a. Shale Hills

b. 2000 US Census

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

Table 2. Physical characteristics of Turkey Creek at TRKJ-2A, May 1, 2012.

Physical Characteristics		
Width (ft)		56
Canopy Cover		Estimate 50/50
Depth (ft)	Riffle	0.5
	Run	2.0
	Pool	1.0
% of Reach	Riffle	2
	Run	93
	Pool	5
% Substrate	Bedrock	60
	Boulder	10
	Clay	2
	Cobble	5
	Gravel	5
	Sand	10
	Silt	5
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Turkey Creek at TRKJ-2A, May 1, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	58	Marginal (41-58)
Sediment Deposition	79	Optimal (>70)
Sinuosity	70	Sub-optimal (65-84)
Bank and Vegetative Stability	76	Optimal (>74)
Riparian Buffer	63	Marginal (50-69)
Habitat Assessment Score	170	
% Maximum Score	71	Optimal >70

Table 4. Results of macroinvertebrate bioassessment conducted in Turkey Creek at TRKJ-2A, May 1, 2012.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness measures		
# EPT taxa	23	83
Taxonomic composition measures		
% Non-insect taxa	13	46
% Dominant taxon	21	74
% EPC taxa	28	53
Functional feeding group measures		
% Predators	7	23
Tolerance measures		
% Taxa as Tolerant	27	64
WMB-I Assessment Score	---	57
WMB-I Assessment Rating		Fair (39-58)

WATER CHEMISTRY

Results of water chemistry samples 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 April through November of 2012 to help identify any stressors to the biological communities. On May 1, 2012, pH did not meet the *F&W* criterion. Median concentrations of total dissolved solids, specific conductance, hardness, alkalinity, nitrate-nitrite nitrogen, total nitrogen, dissolved reactive phosphorus, and total phosphorus were higher than values expected based on data collected at reference reaches within the Shale Hills ecoregion (68f).

SUMMARY

Results of ADEM's 2012 macroinvertebrate bioassessment indicated the macroinvertebrate community to be in *fair* condition. Habitat condition within Turkey Creek at TRKJ-2A was rated as *optimal*. However, intensive water chemistry results indicated pH to be a parameter of concern within the reach. Median concentrations of water quality parameters suggested siltation and nutrient enrichment. Monitoring should continue to ensure that conditions remain stable.

FOR MORE INFORMATION, CONTACT:
Bonnie Coleman, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2737 bcoleman@adem.state.al.us

Table 5. Summary of water quality data collected April-November, 2012. 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)	9	9.7	22.9	21.3	19.3	4.4	
Turbidity (NTU)	9	1.5	166.0	2.9	21.5	54.2	
Total Dissolved Solids (mg/L)	8	174.0	202.0	195.0 ^M	191.8	10.1	
Total Suspended Solids (mg/L)	8	< 1.0	130.0	2.5	17.8	45.3	
Specific Conductance (µmhos)	9	298.6	319.7	315.5 ^G	312.6	6.6	
Hardness (mg/L)	4	144.0	151.0	145.5 ^G	146.5	3.3	
Alkalinity (mg/L)	8	136.0	157.0	150.0 ^M	149.6	6.6	
Stream Flow (cfs)	8	17.0	31.9	20.2	22.4	5.8	
Chemical							
Dissolved Oxygen (mg/L)	9	8.5	12.0	9.3	9.8	1.2	
pH (su)	9	7.6	8.6 ^C	8.0	8.1	0.3	1
Ammonia Nitrogen (mg/L)	8	< 0.007	0.052	0.004	0.010	0.017	
Nitrate+Nitrite Nitrogen (mg/L)	8	1.516	2.044	1.696 ^M	1.695	0.173	
^J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.676	0.132	0.206	0.235	
^J Total Nitrogen (mg/L)	8	< 1.536	2.460	1.874 ^M	1.901	0.308	
Dissolved Reactive Phosphorus (mg/L)	8	0.044	0.107	0.074 ^M	0.072	0.021	
Total Phosphorus (mg/L)	8	0.052	0.191	0.090 ^M	0.096	0.044	
^J CBOD-5 (mg/L)	8	< 2.0	4.1	1.0	1.4	1.1	
Chlorides (mg/L)	8	4.4	5.5	4.7	4.8	0.4	
Total Metals							
^J Aluminum (mg/L)	4	0.070	0.083	0.076	0.076	0.007	
^J Iron (mg/L)	4	0.064	0.105	0.102	0.093	0.020	
^J Manganese (mg/L)	4	< 0.007	0.018	0.012	0.012	0.006	
Dissolved Metals							
Aluminum (mg/L)	4	< 0.043	< 0.043	0.022	0.022	0.000	
Antimony (µg/L)	4	< 3.6	< 3.6	1.8	1.8	0.0	
Arsenic (µg/L)	4	< 1.8	< 1.8	0.9	0.9	0.0	
Cadmium (µg/L)	4	< 0.022	< 0.046	0.017	0.017	0.007	
Chromium (mg/L)	4	< 0.009	< 0.009	0.004	0.004	0.000	
Copper (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000	
^J Iron (mg/L)	4	< 0.019	0.020	0.010	0.012	0.005	
Lead (µg/L)	4	< 0.9	< 0.9	0.4	0.4	0.0	
Manganese (mg/L)	4	< 0.007	< 0.007	0.004	0.004	0.000	
Mercury (µg/L)	4	< 0.035	< 0.035	0.018	0.018	0.000	
Nickel (mg/L)	4	< 0.042	< 0.042	0.021	0.021	0.000	
Selenium (µg/L)	4	< 2.5	< 2.5	1.2	1.2	0.0	
Silver (µg/L)	4	< 0.015	< 0.215	0.058	0.058	0.058	
Thallium (µg/L)	4	< 1.4	< 1.4	0.7	0.7	0.0	
Zinc (mg/L)	4	< 0.012	< 0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (µg/L)	4	< 0.10	0.53	0.29	0.29	0.28	
^J E. coli (col/100mL)	4	38	84	60	60	20	

^J=estimate; N=# samples; C=value exceeds established criteria for *F&W* water use classification; G=value greater than median concentration of all verified reference data collected in ecoregion 68f; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68f; E=# of samples that exceed criterion.