Alabama Department of Environmental Management

Basin Assessment Site

Rivers and Streams Monitoring Program

2010 Monitoring Summary

Fair

Turkey Creek at Chilton County Road 48 (32.94441/-86.66283)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Turkey Creek watershed for biological and water quality monitoring as part of the 2010 Alabama, Coosa and Tallapoosa (ACT) Basin Assessment Monitoring. 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 basins.

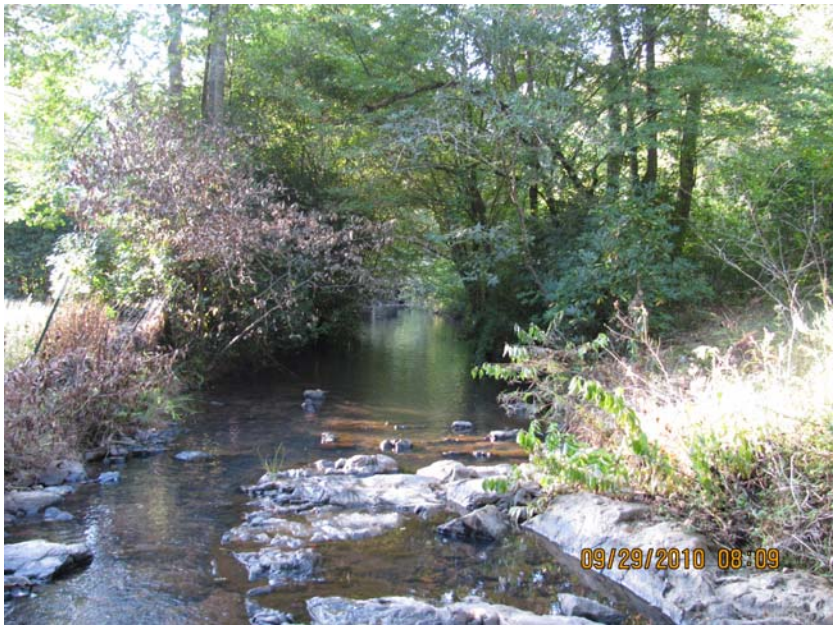

Figure 1. Reach characteristics of Turkey Creek at TURC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Turkey Creek is a small *Fish & Wildlife (F&W)* stream located in Chilton County on Southern Inner Piedmont ecoregion (45a). Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (49%), and agriculture (25%). Development accounted for 13% of the land cover. Population density is relatively low. As of February 23, 2011, seven outfalls are active 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 TURC-1 is characterized by boulder, cobble, sand, gravel, silt, and bedrock substrates (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. The final score is the average of scores for each individual metric. Metric results indicated the macroinvertebrate community to be in *fair* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi^2)		4
Ecoregion[a]		45a
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	36
	Evergreen	10
	Mixed	3
Shrub/scrub		4
Grassland/herbaceous		5
Pasture/hay		23
Cultivated crops		2
Development	Open space	8
	Low intensity	4
	Moderate intensity	1
	High intensity	<1
Barren		1
Population/km^2 [b]		1
# NPDES Permits[c]	**TOTAL**	7
Construction Stormwater		6
Industrial General		1

a.Southern Inner Piedmont
b.2000 US Census
c.#NPDES outfalls downloaded from ADEM's NPDES Management System database, February 23, 2011.

Table 2. Physical Characteristics of Turkey Creek at TURC-1, May 18, 2010.

Physical Characteristics		
Width (ft)		20
Canopy Cover		Shaded
Depth (ft)		
	Riffle	0.5
	Run	1.0
	Pool	1.8
% of Reach		
	Riffle	50
	Run	43
	Pool	7
% Substrate		
	Bedrock	5
	Boulder	31
	Cobble	30
	Gravel	8
	Sand	10
	Silt	12
	Organic Matter	4

Table 3. Results of the habitat assessment conducted on Turkey Creek at TURC-1, May 18, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	86	Optimal >70
Sediment Deposition	87	Optimal >70
Sinuosity	93	Optimal >84
Bank and Vegetative Stability	63	Sub-optimal (60-74)
Riparian Buffer	56	Marginal (50-69)
Habitat Assessment Score	**186**	
% Maximum Score	**78**	**Optimal >70**

Table 4. Results of the macroinvertebrate bioassessment conducted in Turkey Creek at TURC-1, May 18, 2010.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
# EPT taxa	12
Shannon Diversity	3.98
Taxonomic composition measures	
% EPT minus Baetidae and Hydropsychidae	30
% Non-insect taxa	5
Tolerance measures	
% Tolerant taxa	26
WMB-I Assessment Score	**66**
WMB-I Assessment Rating	**Fair (47-69)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in May, September, November, and December 2010 to help identify any stressors to the biological communities. Median values of specific conductance, hardness, alkalinity, ammonia nitrogen, and metals (total and dissolved manganese, dissolved iron) were higher than expected based on verified reference reach data collected in the ecoregion 45a. Samples collected in November and December for analyses of pesticides, semi-volatile organics and atrazine were below detection limits.

SUMMARY

As part of assessment process, ADEM will review the monitoring information presented in this report along with all other available data.

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Habitat was assessed as *optimal* for supporting macroinvertebrate communities. Specific conductance, hardness, alkalinity, ammonia nitrogen, total manganese and dissolved iron and manganese were higher than expected for this ecoregion.

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Table 5. Summary of water quality data collected March-October, 2010. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	Q
Physical							
Temperature (°C)	5	10.0	20.7	16.8	16.0	3.9	
Turbidity (NTU)	5	3.1	11.8	8.8	7.6	4.0	
Total Dissolved Solids (mg/L)	4	30.0	66.0	40.0	44.0	16.2	
Total Suspended Solids (mg/L)	4	< 1.0	4.0	2.5	2.4	1.9	
Specific Conductance (µmhos)	5	60.7	81.1	72.3 G	70.6	8.2	
Hardness (mg/L)	4	23.9	29.6	28.0 G	27.4	2.8	
Alkalinity (mg/L)	4	5.1	30.0	23.5 M	20.5	10.8	
Stream Flow (cfs)	5	0.2	5.4	1.3	2.1	2.2	
Chemical							
Dissolved Oxygen (mg/L)	5	8.0	10.6	8.4	8.8	1.0	
pH (su)	5	6.6	7.0	6.8	6.8	0.1	
Ammonia Nitrogen (mg/L)	4	< 0.021	0.030	0.010 M	0.015	0.010	
Nitrate+Nitrite Nitrogen (mg/L)	4	0.064	0.192	0.120	0.124	0.058	
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.510	0.349	0.312	0.202	
Total Nitrogen (mg/L)	4	< 0.104	0.598	0.520	0.436	0.226	
Dissolved Reactive Phosphorus (mg/L)	4	0.004	0.010	0.004	0.006	0.003	J
Total Phosphorus (mg/L)	4	0.007	0.039	0.014	0.018	0.015	J
CBOD-5 (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	4	2.9	4.3	3.8	3.7	0.6	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
Aluminum (mg/L)	4	< 0.043	0.232	0.130	0.128	0.104	J
Iron (mg/L)	4	0.511	1.850	0.699	0.940	0.624	
Manganese (mg/L)	4	0.009	0.138	0.056 M	0.065	0.060	J
Dissolved Metals							
Aluminum (mg/L)	4	< 0.033	0.051	0.033	0.034	0.017	J
Antimony (µg/L)	4	< 1.9	3.6	0.9	1.6	1.3	J
Arsenic (µg/L)	4	< 0.4	< 2.1	1.0	0.8	0.4	
Cadmium (mg/L)	4	< 0.000	< 0.003	0.000	0.000	0.001	J
Chromium (mg/L)	4	< 0.009	< 0.013	0.006	0.006	0.001	
Copper (mg/L)	4	< 0.013	< 0.020	0.008	0.008	0.002	
Iron (mg/L)	4	0.282	0.382	0.302 M	0.317	0.047	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0	
Manganese (mg/L)	4	0.006	0.113	0.051 M	0.055	0.051	J
Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0	J
Nickel (mg/L)	4	< 0.019	< 0.042	0.015	0.015	0.007	
Selenium (µg/L)	4	< 1.7	2.5	0.8	1.3	0.8	J
Silver (mg/L)	4	< 0.000	< 0.002	0.000	0.000	0.000	
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	4	< 0.012	< 0.030	0.010	0.010	0.005	
Biological							
Chlorophyll a (ug/L)	4	< 0.10	1.60	0.67	0.75	0.72	
E. coli (col/100mL)	4	83	579	122	227	236	J

G=value > median concentration of all verified reference reach data collected in the ecoregion 45a; J=estimate; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 45a; N=# samples; Q=qualifier.