

# 2006 Monitoring Summary



**Turkey Creek at US Hwy 84 in Choctaw County (31.77937/-88.23813)**

## BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Turkey Creek watershed for biological and water quality monitoring as part of the 2006 Assessment of the Escatawpa, Mobile, and Tombigbee (EMT) River Basins. The objectives of the EMT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the EMT basin group.

Additionally, Turkey Creek is among the least-disturbed watersheds in the EMT based on landuse, road density, and population density. These data will be used to evaluate the use of Turkey Creek as a "best attainable" condition reference watershed for comparison with other coastal plain streams.



**Figure 1.** Turkey Creek at TRKC-1, February 2, 2010.

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Turkey Creek is a *Fish & Wildlife* (F&W) stream located in Buhrstone/Lime Hills ecoregion (65q) (Griffith et al. 2001). Landuse within the watershed is primarily deciduous and evergreen forest with some shrub areas. Population density is low 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 TRKC-1 is a shallow stream with mostly sand substrate interspersed with small cobble-gravel riffles (Figure 1). The presence of a riparian buffer and stable bank vegetation categorized overall habitat quality as *sub-optimal*, although the availability of instream habitat was limited within the reach.

## 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. Metric results indicated the macroinvertebrate community to be characterized by both pollution-tolerant taxa groups and non-pollution tolerant taxa groups, indicating *fair* community condition (Table 4).

**Table 1.** Summary of watershed characteristics.

Watershed Characteristics		
Basin	Lower Tombigbee	
Drainage Area (mi <sup>2</sup> )	37	
Ecoregion <sup>a</sup>	65q	
% Landuse		
Open water	<1	
Wetland	Woody	4
	Emergent herbaceous	<1
Forest	Deciduous	19
	Evergreen	28
	Mixed	28
Shrub/scrub	15	
Grassland/herbaceous	<1	
Pasture/hay	2	
Cultivated crops	1	
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Barren	<1	
Population/km <sup>2b</sup>	6	
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	1
	Construction Stormwater	1

a. Buhrstone/Lime Hills

b. 2000 US Census

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

**Table 2.** Physical characteristics of Turkey Ck at TRKC-1, May 31, 2006.

Physical Characteristics		
<b>Canopy Cover</b>	Mostly Open	
<b>Depth (Ft)</b>		
	Riffle	0.3
	Run	1.0
	Pool	2.5
<b>% of Reach</b>		
	Riffle	5
	Run	80
	Pool	15
<b>% Substrate</b>		
	Cobble	2
	Gravel	10
	Sand	73
	Silt	10
	Organic Matter	5

**Table 3.** Results of the habitat assessment conducted on Turkey Ck at TRKC-1, May 31, 2006.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	40	Marginal (40-52)
Sediment Deposition	48	Marginal (40-52)
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	65	Sub-optimal (60-74)
Riparian Buffer	90	Optimal >89
<b>Habitat Assessment Score</b>	<b>136</b>	
<b>% Maximum Score</b>	<b>57</b>	<b>Sub-optimal (53-65)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted on May 31, 2006.

Macroinvertebrate Assessment			
	Result	Scores (0-100)	Rating
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly)	15	100	Excellent (>85)
# Plecoptera (stonefly) genera	4	67	Good (50-75)
# Trichoptera (caddisfly) genera	9	75	Good (67-83)
<b>Taxonomic composition</b>			
% Non-insect taxa	13	49	Poor (24.7-49.4)
% Non-insect organisms	23	40	Poor (31.3-62.7)
% Plecoptera	1	5	Very Poor
<b>Tolerance measures</b>			
Beck's community tolerance	21	75	Good (61.0-80.4)
<b>WMB-I Assessment Score</b>	<b>--</b>	<b>59</b>	<b>Fair (49-72)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides and herbicides), and semi-volatile organics) during March through October to help identify any stressors to the biological communities. Median concentrations of total dissolved solids, specific conductance and alkalinity were elevated based on the 90th percentile of reference reaches with in the Buhrstone/Lime Hills.

## 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 Turkey Creek at TRCK-1 to be in *fair* condition, most likely as a result of marginal instream habitat quality and sedimentation. A habitat assessment and monthly water quality sampling indicated sedimentation to be a potential cause of the deteriorated biological condition.

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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	Med	Avg	SD	Q
<b>Physical</b>							
Temperature (°C)	7	20.0	28.0	23.0	23.9	3.1	
Turbidity (NTU)	7	5.6	29.5	9.3	11.5	8.2	
Total Dissolved Solids (mg/L)	6	110.0	578.0	196.5 <sup>M</sup>	246.5	169.4	
Total Suspended Solids (mg/L)	6	< 1.0	10.0	4.5	5.2	3.6	
Specific Conductance (µmhos)	7	182.4	421.0	233.8 <sup>M</sup>	280.8	87.2	
Hardness (mg/L)	1				58.0		
Alkalinity (mg/L)	6	70.9	181.0	94.7 <sup>M</sup>	112.9	44.4	
Stream Flow (cfs)	6	0.3	27.6	4.1	7.7	10.2	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	7	5.1	9.6	7.4	7.6	1.6	
pH (su)	7	7.4	7.8	7.6	7.6	0.2	
Ammonia Nitrogen (mg/L)	6	< 0.010	0.053	0.006	0.014	0.019	
Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.003	0.428	0.002	0.078	0.172	
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.690	0.354	0.381	0.235	
Total Nitrogen (mg/L)	6	< 0.076	1.118	0.372	0.459	0.369	
Dissolved Reactive Phosphorus (mg/L)	6	< 0.004	0.028	0.016	0.016	0.009	
Total Phosphorus (mg/L)	6	< 0.004	0.110	0.066	0.056	0.046	
CBOD-5 (mg/L)	6	1.1	2.4	1.9	1.8	0.5	
Chlorides (mg/L)	6	< 1.5	8.3	6.9	5.8	2.8	
Atrazine (µg/L)	1			< 0.05			
<b>Total Metals</b>							
Aluminum (mg/L)	1				1.600		
Iron (mg/L)	1				2.240		
Manganese (mg/L)	1				0.069		
<b>Dissolved Metals</b>							
Aluminum (mg/L)	1				0.350		
Antimony (µg/L)	1			< 7.5			
Arsenic (µg/L)	1			< 5.0			
Cadmium (mg/L)	1			< 0.000			
Chromium (mg/L)	1			< 0.005			
Copper (mg/L)	1			< 0.005			
Iron (mg/L)	1			0.386			
Lead (µg/L)	1			< 5.0			
Manganese (mg/L)	1			0.044			
Mercury (µg/L)	1			< 0.5			
Nickel (mg/L)	1			0.020			
Selenium (µg/L)	1			< 7.5			
Silver (mg/L)	1			< 0.001			
Thallium (µg/L)	1			< 9.0			
Zinc (mg/L)	1			< 0.005			
<b>Biological</b>							
Chlorophyll a (ug/L)	6	1.00	3.56	2.14	1.99	1.32	
Fecal Coliform (col/100 mL)	3	10	300	52	121	157	J

J=estimate; N=# samples; M=value > 90% of all verified ecoregional reference reach data collected in ecoregion 65q.