

2010 Monitoring Summary



Basin Assessment Site

South Fork of Terrapin Creek at Cleburne County Road 55 (33.86023/-85.52432)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the South Fork of Terrapin 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. Additionally, it was selected for evaluation to become one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable condition” reference watershed for comparison with streams throughout the Talladega Upland ecoregion.

Habitat and macroinvertebrate assessments were conducted on May 27, 2010 to assess the biological integrity at this site.



Figure 1. South Fork of Terrapin Creek at SFTC-1, August 26, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. The South Fork of Terrapin Creek is a *Fish & Wildlife (F&W)* stream located in the Talladega Upland ecoregion (45d) of Cleburne County. Based on the 2006 National Land Cover Dataset, the 18 square mile watershed is primarily forest (95%). As of September 1, 2012, the ADEM has issued no NPDES permits 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. The South Fork of Terrapin Creek at SFTC-1 (Figure 1) is characterized by gravel, cobble and sand substrates, typical for the Talladega Upland ecoregion. Overall habitat quality was categorized as *sub-optimal*. However, sediment deposition and instream habitat quality were evaluated as *marginal* for a Piedmont stream.

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 the score for each metric. Metric results indicated the pollution tolerant macroinvertebrate community to be in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi²)		18
Ecoregion^a		45d
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	59
	Evergreen	36
	Mixed	1
Shrub/scrub		<1
Grassland/herbaceous		1
Pasture/hay		<1
Development	Open space	1
	Low intensity	<1
Barren		<1
Population/km^{2b}		1

a.Talladega Upland

b.2000 US Census

Table 2. Physical Characteristics of South Fork of Terrapin Creek at SFTC-1, May 27, 2010.

Physical Characteristics	
Width (ft)	50
Canopy Cover	Mostly Open
Depth (ft)	
Riffle	0.3
Run	1.0
Pool	4.0
% of Reach	
Riffle	5
Run	75
Pool	20
% Substrate	
Bedrock	5
Boulder	2
Clay	5
Cobble	20
Mud/Muck	5
Gravel	20
Sand	30
Silt	10
Organic Matter	3

Table 3. Results of the habitat assessment conducted on S Fk Terrapin Ck at SFTC-1, May 27, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	52	Marginal (41-58)
Sediment Deposition	45	Marginal (41-58)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	84	Optimal >74
Riparian Buffer	88	Sub-optimal (70-89)
Habitat Assessment Score	154	
% Maximum Score	64	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted on South Fork of Terrapin Creek at SFTC-1, May 27, 2010.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures (0-100)		
# EPT taxa	20	70
Shannon Diversity	4	61
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	13	13
% Non-insect taxa	9	68
Tolerance measures		
% Tolerant taxa	24	72
WMB-I Assessment Score	---	57
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 during May, July, September and November of 2010 to help identify any stressors to the biological communities. Results of water chemistry analyses are presented in Table 5. Stream flow was measured during five sampling events and averaged 11.9 cfs. Dissolved copper exceeded the hardness-adjusted aquatic life use criterion in September. Median conductivity, alkalinity, and hardness were higher than the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 45d.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *sub-optimal*. Copper concentrations were found to be in exceedance of the *F&W* hardness adjusted aquatic life use class criteria during one of four sampling events. Median values of conductivity, hardness and alkalinity were higher than reference reaches established in the Talladega Upland ecoregion.

These results suggest a slight decrease in water quality and biological conditions since the site was monitored in 2005. However, average stream flow was 43.8 cfs in 2005, and only 11.9 cfs in 2010, documenting the extremely low flows experienced in 2010. Monitoring should continue to ensure that water quality and biological condition remain stable.

Table 5. Summary of water quality data collected May, July, September and 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)	6	12.1	25.3	21.6	20.2	5.3	
Turbidity (NTU)	6	1.5	5.1	3.5	3.5	1.2	
Total Dissolved Solids (mg/L)	4	16.0	50.0	32.0	32.5	14.3	
Total Suspended Solids (mg/L)	4	<1.0	7.0	1.0	2.4	3.1	
Specific Conductance (µmhos)	6	36.9	62.6	57.4 ^G	53.2	9.5	
Hardness (mg/L)	4	12.0	21.9	19.1 ^G	18.0	4.3	
Alkalinity (mg/L)	4	12.7	31.5	29.0 ^M	25.6	8.8	
Stream Flow (cfs)	5	1.0	28.5	7.6	11.9	11.1	
Chemical							
Dissolved Oxygen (mg/L)	6	7.3	10.0	9.2	8.9	1.0	
pH (su)	6	6.9	7.8	7.1	7.2	0.4	
Ammonia Nitrogen (mg/L)	4	<0.021	<0.021	0.010	0.010	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	4	<0.002	0.055	0.032	0.030	0.022	
Total Kjeldahl Nitrogen (mg/L)	4	<0.080	<0.080	0.040	0.040	0.000	
Total Nitrogen (mg/L)	4	<0.041	0.095	0.072	0.070	0.022	
Dissolved Reactive Phosphorus (mg/L)	4	0.019	0.027	0.024	0.023	0.003	
Total Phosphorus (mg/L)	4	0.020	0.028	0.024	0.024	0.003	
CBOD-5 (mg/L)	4	<2.0	<2.0	1.0	1.0	0.0	
COD (mg/L)	4	<1.8	8.5	6.4	5.5	3.7	
^J TOC (mg/L)	4	0.6	2.7	0.9	1.3	1.0	
Chlorides (mg/L)	4	1.0	1.7	1.2	1.3	0.3	
Total Metals							
^J Aluminum (mg/L)	4	<0.033	0.060	0.019	0.029	0.021	
^J Iron (mg/L)	4	<0.026	0.160	0.126	0.106	0.064	
^J Manganese (mg/L)	4	<0.001	0.043	0.007	0.014	0.019	
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	<0.00001	0.014	0.001	0.002	0.003	
^J Chromium (mg/L)	4	<0.009	0.019	0.006	0.009	0.007	
^J Copper (mg/L)	4	<0.013	0.020 ^S	0.008	0.010	0.006	1
^J Iron (mg/L)	4	<0.026	0.081	0.071	0.059	0.031	
Lead (µg/L)	4	<1.7	<1.7	0.8	0.8	0.0	
^J Manganese (mg/L)	4	<0.001	0.028	0.003	0.009	0.013	
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	
Selenium (µg/L)	4	<1.7	<1.7	0.8	0.8	0.0	
Silver (mg/L)	4	<0.00002	0.002	0.00002	0.0005	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 (ug/L)	4	<0.10	1.07	0.16	0.36	0.48	
E. coli (col/100mL)	4	26	51	29	34	12	

J=estimate; N=# samples; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45d; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45d; S=F&W hardness-adjusted aquatic life use criteria exceeded.

FOR MORE INFORMATION, CONTACT:
Brien Diggs, ADEM Aquatic Assessment Unit
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2750 lod@adem.state.al.us