

2005 Monitoring Summary



South Fork (S.F.) Terrapin Creek at Cleburne County Road 55 (33.86023/-85.52432)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the South Fork (S.F.) Terrapin 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 site and to estimate overall water quality within the ACT basin group.

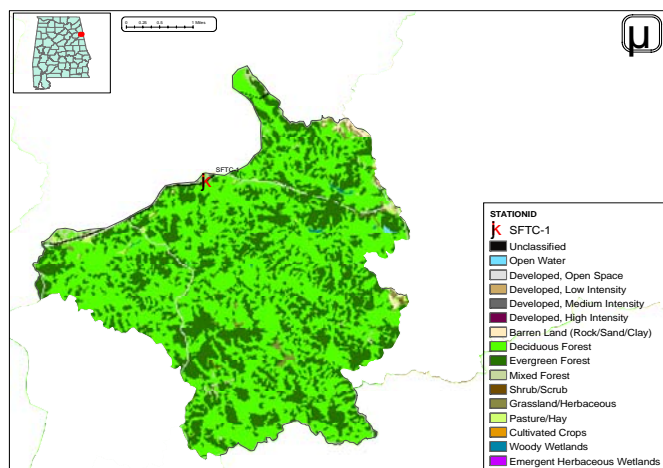


Figure 1. Sampling location and landuse within the S.F. Terrapin Creek watershed at SFTC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics of S.F. Terrapin Creek are summarized in Table 1. The creek is a small *Fish & Wildlife (F&W)* stream that drains approximately 18 mi² of the Talladega National Forest in Cleburne County (Fig. 1). Landuse within the watershed is primarily (96%) mixed forest. This watershed is part of the Talladega Upland (45d) sub-ecoregion, which contains the more mountainous parts of the Piedmont ecoregion and has a slightly wetter and cooler climate as compared to other areas of the Alabama-Georgia Piedmont. Additionally, as of June 9, 2008, ADEM's NPDES Management System database did not show any permitted discharge located within 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. The S.F. Terrapin Creek at SFTC-1 is a high-gradient stream characterized by bedrock with some boulder, cobble and gravel substrates. Overall habitat quality was rated *optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	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
Cultivated crops	
Development	Open space 1
	Low intensity <1
Barren	<1
Population/km ² ^b	5

a. Talladega Upland

b. 2000 US Census

Table 2. Physical characteristics at SFTC-1 on May 4, 2005.

Physical Characteristics	
Width (ft)	60
Canopy cover	Open
Depth (ft)	
	Riffle 0.8
	Run 1.3
	Pool 1.5
% of Reach	
	Riffle 60
	Run 30
	Pool 10
% Substrate	
	Bedrock 75
	Boulder 5
	Cobble 5
	Gravel 5
	Sand 5
	Silt 3
	Organic Matter 2

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 in *good* condition overall (Table 4).

Table 3. Results of the habitat assessment conducted at SFTC-1 on May 4, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	86	Optimal (> 70)
Sediment deposition	88	Optimal (> 70)
Sinuosity	88	Optimal (≥85)
Bank and vegetative stability	88	Optimal (≥75)
Riparian buffer	88	Sub-optimal (70-90)
Habitat assessment score	206	
% Maximum score	86	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment conducted at SFTC-1 on May 4, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	12	100	Excellent (>85)
# Plecoptera (stonefly) genera	8	100	Excellent (>75)
# Trichoptera (caddisfly) genera	11	92	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	11	57	Fair (49.4-74.1)
% Non-insect organisms	4	89	Fair (62.7-93.9)
% Plecoptera	10	48	Good (19.7-59.8)
Tolerance measures			
Beck's community tolerance index	29	100	Excellent (>80.4)
WMB-I Assessment Score	---	84	Good (72-86)

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. Intensive water quality sampling showed median values of all parameters to be similar to the 90th percentile of verified ecoregional reference site samples collected in the Talladega Upland ecoregion.

CONCLUSIONS

Landuse, road density, and population density categorized S.F. Terrapin Creek among the least-disturbed watersheds in the ACT basin group. Habitat and water quality data indicate the reach to be generally unaffected by the small residential, pasture, and silvicultural areas in the watershed. Bioassessment results indicated the macroinvertebrate community to be in *good* condition at SFTC-1.

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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. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	7	14.0	23.0	19.2	18.4	3.2
Turbidity (NTU)	7	2.0	22.9	3.6	6.5	7.5
Total dissolved solids (mg/L)	6	11.0	99.0	46.5	50.5	37.2
Total suspended solids (mg/L)	6	5.0	93.0	10.0	22.5	34.7
Specific conductance (µmhos)	7	32.6	66.6	43.8	46.9	12.8
Hardness (mg/L)	4	8.3	19.1	14.3	14.0	4.5
Alkalinity (mg/L)	6	7.9	23.4	14.4	14.4	5.8
Stream Flow (cfs)	6	11.2	131.5	21.9	43.8	---
Chemical						
Dissolved oxygen (mg/L)	7	6.7	10.7	8.7	8.7	1.4
pH (su)	7	6.8	7.63	7.0	7.1	0.3
Ammonia Nitrogen (mg/L)	6	< 0.015	0.036	0.011	0.015	0.011
Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.009	0.044	0.018	0.021	0.013
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.560	0.075	0.156	0.198
Total nitrogen (mg/L)	6	0.082	0.580	0.094	0.175	0.198
Dissolved reactive phosphorus (mg/L)	6	0.010	0.023	0.012	0.014	0.005
Total phosphorus (mg/L)	6	0.006	0.060	0.039	0.035	0.020
CBOD-5 (mg/L)	6	< 1.0	3.9	1.1	1.4	1.3
^J Chlorides (mg/L)	6	3.2	3.4	3.6	3.6	0.2
Atrazine (µg/L)	1				0.05	--
Total Metals						
Aluminum (mg/L)	3	< 0.015	0.049	0.0075	0.021	0.024
Iron (mg/L)	3	0.131	0.267	0.152	0.183	0.073
Manganese (mg/L)	3	< 0.005	0.068	0.0025	0.024	0.038
Dissolved Metals						
Aluminum (mg/L)	3	< 0.015	0.086	0.0075	0.034	0.045
Antimony (µg/L)	3	< 2	< 2	1	1	0
Arsenic (µg/L)	2	< 10	< 10	5	5	0
Cadmium (mg/L)	3	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	3	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	3	0.026	0.082	0.036	0.048	0.030
Lead (µg/L)	3	< 2	< 2	1	1	0
Manganese (mg/L)	3	< 0.005	< 0.005	0.0025	0.003	0.0
^J Mercury (µg/L)	3	< 0.3	< 0.3	0.15	0.2	0.1
Nickel (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	3	< 10	< 10	5	5	0
Silver (mg/L)	3	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	3	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	6	0.27	1.60	0.72	0.85	0.6
^J Fecal Coliform (col/100 mL)	6	6	200	15	50	76

^J=estimate; N=# samples; Min= minimum; Max= maximum.