

2005 Monitoring Summary



Terrapin Creek at Cleburne County Road 224 (33.8590/-85.41372)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the 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.

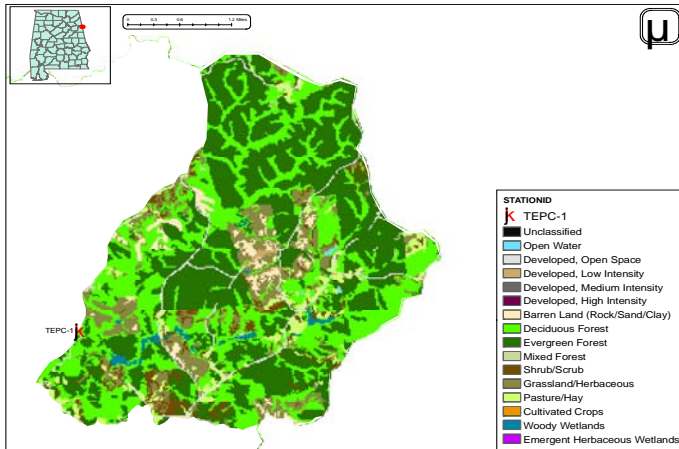


Figure 1. Sampling location and landuse within the Terrapin Creek watershed at TEPC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Terrapin Creek is a small *Fish & Wildlife (F&W)* stream that drains approximately 13 mi² in Cleburne County and part of the northeast corner of Haralson County, Georgia. (Fig. 1). Landuse within the watershed is a mix of forest (75%), grasslands, and pastures. It is part of the Talladega Upland (45d) ecoregion which contains the more mountainous terrain 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. Terrapin Creek at TEPC-1 is a high-gradient stream characterized by bedrock, boulder, and cobble substrates. Overall habitat quality was rated as *optimal*. However, the riparian buffer was rated *marginal*. Adequate bank and riparian vegetation prevent bank erosion and protect the stream from stormwater runoff from impervious surfaces.

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 (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi ²)	13
Ecoregion ^a	45d
% Landuse	
Open water	<1
Wetland	Woody 1
Forest	Deciduous 34
	Evergreen 41
	Mixed <1
Shrub/scrub	4
Grassland/herbaceous	11
Pasture/hay	4
Development	Open space 3
	Low intensity <1
Barren	2
Population/km ² b	2

a. Talladega Upland

b. 2000 US Census data

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

Physical Characteristics	
Width (ft)	18
Canopy cover	Mostly Open
Depth (ft)	Riffle 0.8
	Run 1.5
	Pool 2.0
% of Reach	Riffle 45
	Run 40
	Pool 15
% Substrate	Bedrock 42
	Boulder 20
	Cobble 20
	Gravel 9
	Sand 6
	Organic Matter 3

Table 3. Results of the habitat assessment conducted May 4, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	79	Optimal (> 70)
Sediment deposition	91	Optimal (> 70)
Sinuosity	85	Optimal (≥85)
Bank and vegetative stability	85	Optimal (≥75)
Riparian buffer	58	Marginal (50-69)
Habitat assessment score	193	
% Maximum score	80	Optimal (> 70)

Table 4. Results of the macroinvertebrate bioassessment conducted May 4, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	15	100	Excellent (>85)
# Plecoptera (stonefly) genera	5	83	Excellent (>75)
# Trichoptera (caddisfly) genera	11	92	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	6	74.3	Good (74.1-87.1)
% Non-insect organisms	4	89	Fair (62.7-93.9)
% Plecoptera	5	27	Good (19.7-59.8)
Tolerance measures			
Beck's community tolerance index	30	100	Excellent (>80.4)
WMB-I Assessment Score	---	81	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. Monthly water quality sampling showed median concentrations of all parameters to be similar to the 90th percentile of verified reference reach samples collected in the Talladega Upland ecoregion.

CONCLUSIONS

Overall bioassessment results indicated the macroinvertebrate community to be in *good* condition. A diminishing riparian buffer was the primary concern within Terrapin Creek at TEPC-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	13.0	26.0	18.5	19.6	4.9
Turbidity (NTU)	7	3.4	21.0	5.5	9.5	7.3
Total dissolved solids (mg/L)	6	16.0	139.0	49.5	63.8	45.1
Total suspended solids (mg/L)	6	5.0	51.0	7.5	18.2	19.4
Specific conductance (µmhos)	7	30.6	45	39.3	39.7	4.6
Hardness (mg/L)	4	7.6	13.2	12.0	11.2	2.5
Alkalinity (mg/L)	6	7.7	15.3	13.7	13.0	2.8
Stream Flow (cfs)	6	3.3	33.5	11.7	14.0	---
Chemical						
Dissolved oxygen (mg/L)	7	7.7	10.6	8.5	8.8	1.1
pH (su)	7	6.7	7.78	7.3	7.3	0.4
Ammonia Nitrogen (mg/L)	6	< 0.015	< 0.015	0.011	0.011	0.004
Nitrate+Nitrite Nitrogen (mg/L)	6	0.016	0.112	0.058	0.057	0.036
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.383	0.121	0.179	0.133
Total nitrogen (mg/L)	6	0.091	0.449	0.170	0.236	0.154
Dissolved reactive phosphorus (mg/L)	6	0.005	0.016	0.009	0.009	0.004
Total phosphorus (mg/L)	6	< 0.004	0.106	0.043	0.046	0.036
CBOD-5 (mg/L)	6	< 1.0	3.6	0.8	1.3	1.2
^J Chlorides (mg/L)	6	3.4	4.1	3.8	3.8	0.3
Atrazine (µg/L)	1				0.05	---
Total Metals						
Aluminum (mg/L)	3	< 0.015	0.118	0.064	0.063	0.055
Iron (mg/L)	3	0.56	1.24	0.83	0.877	0.342
Manganese (mg/L)	3	0.023	0.071	0.033	0.042	0.025
Dissolved Metals						
Aluminum (mg/L)	3	< 0.015	< 0.015	0.0075	0.008	0.0
Antimony (µg/L)	3	< 2	< 2	1	1	0
Arsenic (µg/L)	3	< 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	0.233	0.289	0.264	0.262	0.028
Lead (µg/L)	3	< 2	< 2	1	1	0
Manganese (mg/L)	3	0.005	0.01	0.0025	0.005	0.004
^J Mercury (µg/L)	3	0.3	0.3	0.15	0.2	0.087
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 <i>a</i> (µg/L)	6	0.71	2.14	1.21	1.37	0.5
^J Fecal Coliform (col/100 mL)	6	20	370	28	104	141

^J=estimate; N=# samples; M=value > 90th percentile of samples collected at (45d) eco-regional reference reaches.