

2005 Monitoring Summary



Talladega Creek at AL Hwy 77 bridge in Talladega Co. (33.37839/-86.03025)

BACKGROUND

Talladega Creek is 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 Piedmont ecoregion.

Additionally, Talladega Creek was selected 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.

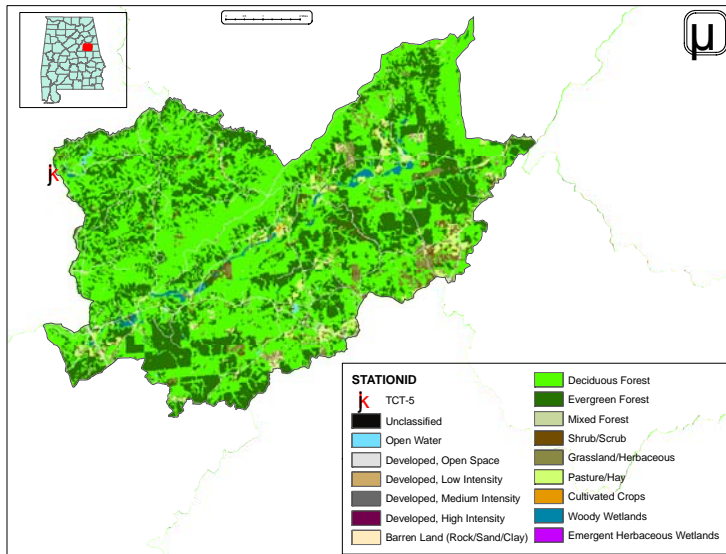


Figure 1. Sampling location and landuse within the Talladega Creek watershed at TCT-5.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Talladega Creek at TCT-5 is a second order, *Fish & Wildlife (F&W)* stream located in the Talladega Upland ecoregion within the Talladega National Forest (Fig.1). Land cover within the watershed is 89% forest interspersed with pasture and grasslands. Fifteen construction permits are located within the watershed area.

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. Talladega Creek at TCT-5 is a moderate-gradient, riffle-run stream characterized by bedrock, boulder, cobble, gravel and sandy substrates. Overall habitat quality was categorized as *sub-optimal*, with limited riffle habitat and a lack of riparian buffer to protect the stream from runoff.

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 all individual metric scores. The final score indicated the biological community to be in *good* condition (Table 4) and characteristic of forested reference reaches in the Piedmont ecoregion.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		74
Ecoregion ^a		45d
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	55
	Evergreen	32
	Mixed	1
Shrub/scrub		2
Grassland/herbaceous		3
Pasture/hay		3
Cultivated crops		<1
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km ^{2b}		14
# NPDES Permits ^c	TOTAL	12
	Construction Stormwater	5
	Mining General Permit (old)	7

a.Talladega Upland

b.2000 US Census data

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

Table 2. Physical characteristics of Talladega Creek at TCT-5, June 29, 2005.

Physical Characteristics		
Width (ft)		50
Canopy cover		Mostly Open
Depth (ft)	Riffle	0.4
	Run	1.5
	Pool	4.0
% of Reach	Riffle	5
	Run	35
	Pool	60
% Substrate	Bedrock	30
	Boulder	5
	Cobble	20
	Gravel	23
	Sand	15
	Silt	3
	Clay	2
	Organic Matter	2

Table 3. Results of the habitat assessment conducted on Talladega Creek at TCT-5, June 29, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	72	Optimal (> 70)
Sediment deposition	78	Optimal (> 70)
Sinuosity	45	Marginal (45-64)
Bank and vegetative stability	70	Sub-optimal (60-74)
Riparian buffer	53	Marginal (50-69)
Habitat assessment score	167	
% Maximum score	69	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Talladega Creek at TCT-5, June 29, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	11	92	Excellent (>85)
# Plecoptera (stonefly) genera	3	50	Good (50-75)
# Trichoptera (caddisfly) genera	13	100	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	6	74	Good (74.1-87.1)
% Non-insect organisms	8	79	Fair (62.7-93.9)
% Plecoptera	6	32	Good (19.7-59.8)
Tolerance measures			
Beck's community tolerance index	23	82	Excellent (>80.4)
WMB-I Assessment Score	---	73	Good (72-86)

WATER CHEMISTRY

Results of water chemistry 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. *In situ* parameters indicated that Talladega Creek at TCT-5 was meeting water quality criteria for its *Fish & Wildlife* use classification. Median concentrations of nutrients, total and dissolved sediments, and chlorides were within the expected range for Talladega Upland streams. Median concentrations of the metals that were detected (total aluminum, iron, manganese and dissolved iron) were below concentrations in 90% of verified ecoregional reference reach samples. Pesticides, and semi-volatile organics were not detected in the sample collected on 7/13/2005. Atrazine was also not detected in both the samples collected.

CONCLUSIONS

Talladega Creek at TCT-5 was typical of other streams in the Talladega Upland, which are generally medium to high-gradient riffle-run streams with bedrock, boulder, cobble, gravel and sandy substrates. Landuse, road density, and population density categorized Talladega Creek among the least-disturbed watersheds in the ACT basin group. Bioassessment results and water quality data indicated the reach to be in *good* condition. However, the habitat assessment was rated as *sub-optimal*, possibly due to forestry activities as reported previously.

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	Median	Avg	SD
Physical						
Temperature (°C)	8	10.0	25.0	21.0	19.4	6.0
Turbidity (NTU)	8	1.6	31.9	4.0	7.2	10.0
Total dissolved solids (mg/L)	7	30.0	83.0	42.0	48.1	18.9
Total suspended solids (mg/L)	7	3.0	44.0	5.0	10.1	15.0
Specific conductance (µmhos)	8	31.8	45.8	33.7	35.7	4.8
Hardness (mg/L)	5	8.2	15.6	11.8	11.8	3.0
Alkalinity (mg/L)	7	7.6	18.1	8.6	10.5	3.8
Stream Flow (cfs)	7	20.3	179	66.1	92.1	---
Chemical						
Dissolved oxygen (mg/L)	8	7.8	10.8	9.2	9.2	1.1
pH (su)	8	6.7	7.9	7.3	7.2	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.008	0.008	0.000
^J Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.069	0.044	0.031	0.028
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.239	0.075	0.098	0.062
Total nitrogen (mg/L)	7	0.076	0.291	0.119	0.129	0.076
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.018	0.004	0.008	0.007
^J Total phosphorus (mg/L)	7	0.004	0.047	0.030	0.025	0.018
CBOD-5 (mg/L)	7	< 1.0	2.1	1.5	1.2	0.7
COD (mg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0
^J Chlorides (mg/L)	7	3.7	4.2	3.7	3.8	0.2
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.069	0.039	0.039	0.0
Iron (mg/L)	4	0.3	0.45	0.38	0.378	0.1
Manganese (mg/L)	4	0.034	0.078	0.0395	0.048	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.0075	0.008	0.0
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	4	0.049	0.186	0.1335	0.1255	0.1
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.03	0.0038	0.010	0.0
^J Mercury (µg/L)	4	< 0.3	< 0.3	0.225	0.225	0.1
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	0.0
Thallium (µg/L)	4	< 1	< 1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
^J Chlorophyll a (µg/L)	7	0.53	3.20	1.07	1.37	0.9
^J Fecal Coliform (col/100 mL)	7	9	440	20	79	159

J=estimate; N= # samples

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