

2005 Monitoring Summary



Paint Creek at unnamed Co. Rd off Coosa Co Rd 56 near Marble Valley (33.01838/-86.44741)

BACKGROUND

Paint Creek is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable condition” reference watershed for riffle-run streams throughout the Piedmont ecoregion.

The ADEM also selected the Paint 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.

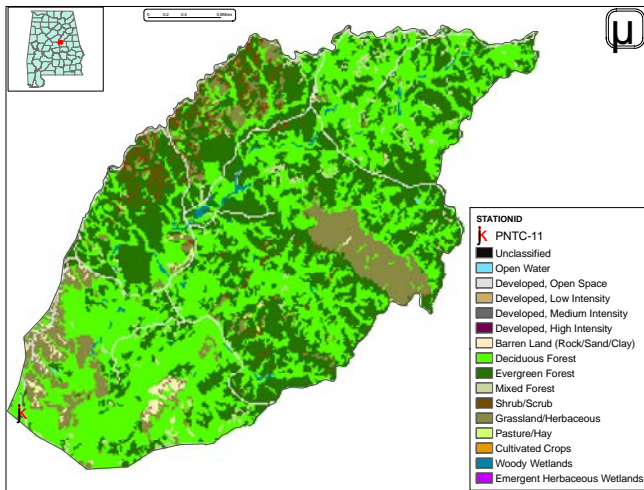


Figure 1. Sampling location and landuse within the Paint Creek watershed at PNTC-11.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Paint Creek is a small *Fish and Wildlife* (F&W) stream located in Coosa County near Marble Valley. Landuse within the watershed is primarily forest (83%), with some grassland areas. Silviculture was noted as common during a roadside reconnaissance conducted in February 2005. Population density is low in this area. As of June 9, 2008, ADEM’s NPDES Management System database did not show any permitted discharges located within the watershed.

Table 1. Summary of watershed characteristics.

Physical Characteristics	
Drainage Area (mi ²)	17
Ecoregion ^a	45a
% Landuse	
Open water	<1
Wetland	Woody 1
Forest	Deciduous 45
	Evergreen 36
	Mixed 2
Shrub/scrub	3
Grassland/herbaceous	10
Pasture/hay	<1
Development	Open space 3
Barren	1
Population/km ² ^b	5

a. Southern Inner Piedmont
b. 2000 US Census data

Table 2. Physical characteristics of Paint Creek at PNTC-11, June 23, 2005.

Physical Characterization	
Width (ft)	15
Canopy cover	Open
Depth (ft)	
	Riffle 0.5
	Run 1.3
	Pool 3.0
% of Reach	
	Riffle 20
	Run 65
	Pool 15
% Substrate	
	Boulder 2
	Cobble 3
	Gravel 30
	Sand 50
	Silt 5
	Clay 5
	Organic Matter 5

REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the macroinvertebrate assessment. In comparison to reference reaches in the same ecoregion, this information give an indication of physical conditions at the reach and the quality and availability of habitat. Paint Creek at PNTC-11 is a moderate-gradient, riffle-run stream reach located in the Southern Inner Piedmont ecoregion. The stream bottom was characterized by gravel and sand substrates, suggesting some slight sediment deposition impact (Table 2). Although boulder and cobble were present in small amounts, habitat quality and availability were rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities due to poor bank and vegetative stability (Table 3).

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 3. Results of habitat assessment conducted June 23, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	71	Optimal (> 70)
Sediment deposition	60	Sub-optimal (59-70)
Sinuosity	78	Sub-optimal (65-84)
Bank and vegetative stability	43	Marginal (35-59)
Riparian buffer	90	Sub-optimal (70-90)
Habitat assessment score	157	
% Maximum score	65	Sub-optimal (59-70)

Table 4. Results of macroinvertebrate assessment conducted June 23, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures	(0-100)		
# Ephemeroptera (mayfly) genera	15	100	Excellent (>85)
# Plecoptera (stonefly) genera	6	100	Excellent (>75)
# Trichoptera (caddisfly) genera	11	92	Excellent (>83)
Taxonomic composition measures			
% Non-insect taxa	3	86	Good (74.1-87.1)
% Non-insect organisms	2	96	Good (93.9-97.0)
% Plecoptera	4	18	Fair (13.1-19.7)
Tolerance measures			
Beck's community tolerance index	31	100	Excellent (>80.4)
WMB-I Assessment Score	---	85	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), semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. *In situ* measurements of temperature, pH, turbidity, and dissolved oxygen indicated that Paint Creek at PNTC-11 was meeting its F&W use classification. Median values of all other parameters were similar to concentrations expected at ADEM's verified least-impaired ecoregional reference reaches.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *good* condition. Water quality samples show Paint Creek to be in good condition and supporting the use of the site as a "best attainable condition" reference watershed for riffle-run streams throughout the Piedmont ecoregion. However, overall habitat quality was categorized as *sub-optimal* due to poor bank and vegetative stability. Additionally, high gravel and sand substrates suggested some sedimentation issues.

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

Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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)	8	13.5	24.0	19.0	18.8	4.3
Turbidity (NTU)	8	2.8	19.9	5.7	8.7	6.5
Total dissolved solids (mg/L)	7	16.0	80.0	41.0	45.6	21.7
Total suspended solids (mg/L)	7	4.0	23.0	9.0	11.0	6.9
Specific conductance (µmhos)	8	35.5	49.2	39.8	40.1	4.3
Hardness (mg/L)	5	6.7	15.0	9.2	9.9	3.2
Alkalinity (mg/L)	7	7.3	15.8	11.4	11.5	2.9
Stream Flow (cfs)	7	3.5	71.7	20.7	25.4	---
Chemical						
Dissolved oxygen (mg/L)	8	7.8	10.3	8.7	8.9	0.9
pH (su)	8	7.0	8	7.3	7.3	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	< 0.015	0.008	0.010	0.004
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.035	0.002	0.009	0.013
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.637	0.075	0.198	0.209
Total nitrogen (mg/L)	7	0.076	0.639	0.110	0.207	0.206
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.015	0.008	0.008	0.005
Total phosphorus (mg/L)	7	0.011	0.065	0.042	0.041	0.017
CBOD-5 (mg/L)	7	< 1.0	2.2	1.2	1.2	0.6
COD (mg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	6	3.7	2.0	4.1	4.1	0.3
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.00
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.126	0.0725	0.070	0.1
Iron (mg/L)	4	0.385	0.601	0.393	0.443	0.1
Manganese (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	0.142	0.0075	0.041	0.1
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	0.003	0.003	0.0
Chromium (mg/L)	3	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.0
Iron (mg/L)	4	0.023	0.292	0.0765	0.117	0.1
Lead (µg/L)	3	< 2	< 2	1	1	0
Manganese (mg/L)	3	< 0.005	< 0.005	0.003	0.003	0.0
Mercury (µg/L)	3	< 0.3	< 0.3	0.15	0.15	0.0
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	0.5	0
Zinc (mg/L)	3	< 0.006	< 0.006	0.003	0.003	0.0
Biological						
↓ Chlorophyll a (µg/L)	6	0.27	4.27	0.80	1.47	1.5
↓ Fecal Coliform (col/100 mL)	7	13	300	50	103	107

J=estimate; N=# samples