

2010 Monitoring Summary



Paint Creek at Little Toms Rd (Coosa Co.; 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 comparison with streams throughout the Southern Inner Piedmont ecoregion (45a). It has been counted among the least-disturbed watersheds in ecoregion 45a, based on land use, road density, and population density. Paint Creek was also monitoring as part of the 2010 Alabama, Coosa, Tallapoosa (ACT) Basin Assessment project. The objectives of this project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin.



Figure 1. Paint Creek at PNTC-11, June 22, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Paint Creek is *Fish & Wildlife (F&W)* stream that is a tributary to the Coosa River. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (83%) with some grassland. Population is low in the area. As of September 1, 2012, there were no NPDES discharge permits issued within the 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.

Paint Creek at PNTC-11 is a high-gradient, riffle-run stream with a bottom substrate dominated by sand and gravel (Figure 1). Habitat quality and availability were rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities due to limited riffle habitat.

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 all individual metric scores. Metric results indicated the macroinvertebrate community to be characterized by pollution-intolerant taxa groups, indicating *good* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Coosa River	
Drainage Area (mi²)	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^{2b}	1	

a. Southern Inner Piedmont
b. 2000 US Census

Table 2. Physical characteristics of Paint Creek at PNTC-11, June 22, 2010.

Physical Characteristics		
Width (ft)	15	
Canopy Cover	Estimate 50/50	
Depth (ft)		
	Riffle	0.2
	Run	1.0
	Pool	2.0
% of Reach		
	Riffle	5
	Run	65
	Pool	30
% Substrate		
	Bedrock	5
	Boulder	5
	Cobble	5
	Gravel	25
	Sand	55
	Silt	2
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Paint Creek at PNTC-11, June 22, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	59	Sub-optimal (59-70)
Sediment Deposition	58	Marginal (41-58)
Sinuosity	43	Poor <45
Bank and Vegetative Stability	58	Marginal (35-59)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	144	
% Maximum Score	60	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted on Paint Creek at PNTC-11, June 22, 2010.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
# EPT taxa	28	100
Shannon Diversity	5.36	100
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	15	32
% Non-insect taxa	7	80
Tolerance measures		
% Tolerant taxa	26	65
WMB-I Assessment Score	---	75
WMB-I Assessment Rating		Good (70-85)

WATER CHEMISTRY

Results of water chemistry are presented in Table 5. In situ measurements and water samples were collected April through August of 2010 to help identify any stressors to the biological communities. Organics were collected on April 13th. Low concentrations of malathion were detected (0.02 µg/L). All other organic parameters were below detection limits. Median specific conductance, hardness, alkalinity, ammonia nitrogen, and concentrations of dissolved iron were higher than background levels for the Southern Inner Piedmont ecoregion.

SUMMARY

ADEM is currently monitoring Paint Creek at PNTC-11 as a “best attainable” condition reference watershed. Landuse, road density, and population density categorize Paint Creek among the least-disturbed watersheds in the Southern Inner Piedmont ecoregion. Bioassessment results indicated the macroinvertebrate community at PNTC-11 to be in *good* condition. Low concentrations of malathion were detected on April 13th. High conductivity, hardness, alkalinity, ammonia nitrogen, and dissolved iron may pose a potential concern for the biological communities of the reach.

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Table 5. Summary of water quality data collected April-August, 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
Physical						
Temperature (°C)	4	14.9	27.0	25.7	23.4	5.7
Turbidity (NTU)	4	5.3	15.5	7.8	9.1	4.5
Total Dissolved Solids (mg/L)	3	34.0	42.0	36.0	37.3	4.2
Total Suspended Solids (mg/L)	3	< 1.0	3.0	3.0	2.2	1.4
Specific Conductance (µmhos)	4	34.9	45.1	44.1 ^G	42.0	4.8
Hardness (mg/L)	3	8.3	14.8	13.6 ^G	12.2	3.4
Alkalinity (mg/L)	3	12.0	25.0	22.3 ^M	19.8	6.9
Stream Flow (cfs)	4	2.6	26.2	5.3	9.9	11.0
Chemical						
Dissolved Oxygen (mg/L)	4	6.8	9.8	7.9	8.1	1.3
pH (su)	4	6.6	7.2	6.9	6.9	0.3
Ammonia Nitrogen (mg/L)	3	< 0.021	< 0.021	0.010 ^M	0.010	0.000
^J Nitrate+Nitrite Nitrogen (mg/L)	3	0.003	0.061	0.043	0.036	0.030
Total Kjeldahl Nitrogen (mg/L)	3	< 0.080	0.402	0.160	0.201	0.184
^J Total Nitrogen (mg/L)	3	< 0.101	0.445	0.163	0.236	0.183
Dissolved Reactive Phosphorus (mg/L)	3	0.012	0.019	0.015	0.015	0.004
Total Phosphorus (mg/L)	3	0.014	0.022	0.021	0.019	0.004
CBOD-5 (mg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0
COD (mg/L)	2	8.8	11.0	9.9	9.9	1.6
^J TOC (mg/L)	3	1.2	3.4	1.4	2.0	1.2
Chlorides (mg/L)	3	1.3	1.6	1.6	1.5	0.2
Atrazine (µg/L)	1			<	0.02	
Total Metals						
^J Aluminum (mg/L)	3	< 0.033	0.253	0.101	0.124	0.120
Iron (mg/L)	3	0.368	0.782	0.752	0.634	0.231
^J Manganese (mg/L)	3	< 0.001	0.016	0.000	0.006	0.009
Dissolved Metals						
Aluminum (mg/L)	3	< 0.033	< 0.033	0.016	0.016	0.000
Antimony (µg/L)	3	< 0.7	< 1.9	0.9	0.8	0.3
Arsenic (µg/L)	3	< 0.4	< 2.1	1.0	0.8	0.5
Cadmium (mg/L)	3	< 0.000	< 0.014	0.002	0.003	0.004
Chromium (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000
Copper (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000
^J Iron (mg/L)	3	0.099	0.345	0.306 ^M	0.250	0.132
Lead (µg/L)	3	< 1.7	< 1.7	0.8	0.8	0.0
^J Manganese (mg/L)	3	< 0.001	0.005	0.000	0.002	0.003
Mercury (µg/L)	3	< 0.080	< 0.080	0.040	0.040	0.000
Nickel (mg/L)	3	< 0.019	< 0.019	0.010	0.010	0.000
Selenium (µg/L)	3	< 1.7	< 1.7	0.8	0.8	0.0
Silver (mg/L)	3	< 0.000	< 0.002	0.001	0.001	0.001
Thallium (µg/L)	3	< 0.6	< 0.6	0.3	0.3	0.0
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000
Biological						
Chlorophyll a (ug/L)	3	< 0.41	1.00	0.50	0.48	0.06
^J E. coli (col/100mL)	3	66	107	77	83	21

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 45a; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 45a; N=# samples.