

2009 Monitoring Summary



Panther Creek at unnamed road off of Lauderdale Co Rd 105 (34.96110/-88.13780)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Panther Creek watershed for biological and water quality monitoring as part of the 2009 Assessment of the Tennessee (TN) River Basin. The objectives of these monitoring activities were to assess the biological integrity of each sampling location and to estimate overall water quality within the TN basin. Panther Creek at PNTL-1 is also monitored as a “best attainable” reference watershed for comparison to streams throughout the Transition Hills sub-ecoregion.



Figure 1. Panther Creek at PNTL-1, facing downstream.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Panther Creek is a small *Fish and Wildlife (F&W)* stream located in Lauderdale County. At PNTL-1, the stream drains approximately six square miles of countryside and has very little development. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (63%) with some shrub/scrub areas. The ADEM does not have any NPDES permits issued in the Panther Creek watershed, as of September 1, 2012.

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. Panther Creek at PNTL-1 is a moderate-gradient, riffle-run stream characterized primarily by gravel and cobble (Figure 1). Overall habitat quality was categorized as *optimal*.

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 the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tennessee River	
Drainage Area (mi²)	6	
Ecoregion^a	65j	
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	48
	Evergreen	8
	Mixed	7
Shrub/scrub		25
Grassland/herbaceous		<1
Pasture/hay		2
Cultivated crops		7
Development	Open space	2
	Low intensity	<1
Population/km^{2b}	<1	

a. Transition Hills
b. 2000 US Census

Table 2. Physical characteristics of Panther Creek at PNTL-1, June 24, 2009.

Physical Characteristics		
Width (ft)	22	
Canopy Cover	Mostly Shaded	
Depth (ft)	Riffle	0.4
	Run	1.0
	Pool	1.5
% of Reach	Riffle	35
	Run	45
	Pool	20
% Substrate	Bedrock	5
	Cobble	29
	Gravel	50
	Sand	5
	Silt	2
	Organic Matter	9

Table 3. Results of the habitat assessment conducted on Panther Creek at PNTL-1, June 24, 2009.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	68	Optimal >65
Sediment Deposition	83	Optimal >65
Sinuosity	88	Optimal >84
Bank and Vegetative Stability	79	Optimal >74
Riparian Buffer	76	Sub-optimal (70-89)
Habitat Assessment Score	180	
% Maximum Score	75	Optimal >65

Table 4. Results of the macroinvertebrate bioassessment conducted in Panther Creek at PNTL-1, June 24, 2009.

Macroinvertebrate Assessment			
	Results	Scores (0-100)	
Taxa richness and diversity measures			
# EPT taxa	20	70	
Shannon Diversity	4.55	86	
Taxonomic composition measures			
% EPT minus Baetidae and Hydropsychidae	5	9	
% Non-insect taxa	9	67	
Functional feeding group			
% Predator Individuals	23	99	
Community tolerance			
% Tolerant taxa	17	94	
WMB-I Assessment Score	---	71	
WMB-I Assessment Rating		Good (44-72)	

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, atrazine, and semi-volatile organics) during March through October of 2009 to help identify any stressors to the biological communities. Dissolved copper exceeded the chronic freshwater aquatic life use (ALU) criterion during a high flow event on October 14, 2009. However, the median concentration was similar to background levels, based on the 90th percentile of data collected at the reference reaches within ecoregion 65j. Stream pH did not meet the *F&W* use classification criterion, April 14, 2009.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Panther Creek at PNTL-1 to be in *good* condition. Overall habitat quality was categorized as *optimal* due to little sedimentation and the availability and diversity of stable habitats. Stream pH did not meet the *F&W* use classification criterion, April 14, 2009. Monitoring should continue to ensure that biological and chemical conditions remain stable.

Table 5. Summary of water quality data collected March-October, 2009. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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	E
Physical							
Temperature (°C)	9	12.9	22.9	19.2	18.5	3.4	
Turbidity (NTU)	9	1.8	4.6	2.1	2.4	0.9	
^J Total Dissolved Solids (mg/L)	8	< 1.0	59.0	25.5	27.3	16.5	
Total Suspended Solids (mg/L)	8	< 0.3	28.0	0.8	4.4	9.6	
Specific Conductance (µmhos)	9	19.8	22.7	22.1	21.7	1.0	
Hardness (mg/L)	4	6.6	8.5	7.2	7.4	0.8	
Alkalinity (mg/L)	8	< 1.0	7.9	5.5	5.2	2.4	
Stream Flow (cfs)	9	0.6	12.7	2.9	3.9	3.8	
Chemical							
Dissolved Oxygen (mg/L)	9	7.5	10.1	8.4	8.6	0.9	
pH (su)	9	5.3 ^C	7.3	6.4	6.4	0.6	1
^B Ammonia Nitrogen (mg/L)	4	< 0.006	0.022	0.005	0.009	0.009	
^B Nitrate+Nitrite Nitrogen (mg/L)	6	0.003	0.469	0.057	0.116	0.023	
^B Total Kjeldahl Nitrogen (mg/L)	4	< 0.089	0.300	0.105	0.139	0.122	
^B Total Nitrogen (mg/L)	4	< 0.120	0.337	0.162	0.196	0.102	
^J Dissolved Reactive Phosphorus (mg/L)	8	0.008	0.091	0.012	0.033	0.001	
^B Total Phosphorus (mg/L)	4	< 0.005	< 0.008	0.004	0.004	0.002	
CBOD-5 (mg/L)	8	< 1.0	< 2.0	0.5	0.7	0.3	
Chlorides (mg/L)	8	1.0	7.1	2.1	2.9	2.2	
Atrazine (µg/L)	2	< 0.06	< 0.06	0.03	0.03	0.00	
Total Metals							
^J Aluminum (mg/L)	4	0.029	0.071	0.050	0.050	0.024	
^J Iron (mg/L)	4	0.044	0.149	0.100	0.098	0.043	
Manganese (mg/L)	4	< 0.001	< 0.009	0.004	0.004	0.002	
Dissolved Metals							
^J Aluminum (mg/L)	4	< 0.033	0.062	0.030	0.035	0.019	
Antimony (µg/L)	4	< 0.7	< 6.0	3.0	2.3	1.3	
Arsenic (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0	
Cadmium (mg/L)	4	< 0.002	< 0.003	0.001	0.001	0.000	
Chromium (mg/L)	4	< 0.007	< 0.013	0.004	0.004	0.002	
^J Copper (mg/L)	4	0.021 ^S	< 0.200	0.100	0.080	0.040	1
^J Iron (mg/L)	4	< 0.020	0.030	0.021	0.020	0.010	
Lead (µg/L)	4	< 1.0	< 1.5	0.8	0.7	0.1	
Manganese (mg/L)	4	< 0.001	< 0.009	0.004	0.004	0.002	
^B Mercury (µg/L)	2	< 0.080	< 0.080	0.040	0.040	0.0	
Nickel (mg/L)	4	< 0.008	< 0.019	0.004	0.005	0.003	
Selenium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0	
Silver (mg/L)	4	< 0.001	< 0.002	0.001	0.001	0.000	
Thallium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0	
Zinc (mg/L)	4	< 0.030	< 0.060	0.030	0.026	0.008	
Biological							
Chlorophyll a (µg/L)	8	0.27	< 1.00	0.50	0.45	0.11	
^J Fecal Coliform (col/100 mL)	8	7	232	45	59	72	

J=estimate; B=samples excluded due to laboratory QC concerns; N=# samples; C=*F&W* criterion exceeded; E=# samples that exceed criterion; S=*F&W* hardness-adjusted aquatic life use criterion exceeded.

FOR MORE INFORMATION, CONTACT:
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