

2013 Monitoring Summary



Anderson Creek at Snake Road Bridge in Lauderdale County (34.85150/-87.23610)

BACKGROUND

Anderson Creek from Snake Road bridge to its source (AL06030002-1101-101) has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 2008. It is listed for siltation from habitat alteration.

The Alabama Department of Environmental Management (ADEM) monitored Anderson Creek at ANDL-8 to verify and document impairment caused by siltation. A macroinvertebrate and habitat assessment was conducted at the site to verify impairment to aquatic communities. The assessments were conducted on June 3, 2013.



Figure 1. Anderson Creek at ANDL-8, April 24, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Anderson Creek lies within the Western Highland Rim (71f) ecoregion. It is classified as a *Fish and Wildlife (F&W)* stream located near the town of Anderson. Based on the 2006 National Land Cover Dataset, landuse within the watershed is largely comprised of pasture/hay (48%) and forest (29%). As of May 13, 2013, ADEM's NPDES Management System database shows nine NPDES permitted discharges located 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. Anderson Creek at ANDL-8 is a wide, high-gradient stream characterized by bedrock and cobble and gravel substrates. Overall habitat quality was categorized as *optimal* (Figure 1). The reach was also characterized by a relatively straight stream channel with high instream habitat quality and low sediment deposition.

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. The macroinvertebrate survey conducted in Anderson Creek at ANDL-8 rated the site as *fair-poor*.(Table 4). Relative abundance and numbers of pollution-sensitive taxa are lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi ²)		49
Ecoregion ^a		71f
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
	Deciduous	22
Forest	Evergreen	3
	Mixed	4
	Shrub/scrub	5
Grassland/herbaceous		1
Pasture/hay		48
Cultivated crops		9
Development	Open space	6
	Low intensity	<1
	Moderate intensity	<1
Population/km ^{2b}		17
# NPDES Permits ^c		
	TOTAL	9
	Construction Stormwater	3
	Industrial General	2
	Municipal Individual	4

a. Western Highland Rim

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of Anderson Creek at ANDL-8, June 3, 2013.

Physical Characteristics		
Width (ft)		64
Canopy Cover		Mostly Open
Depth (ft)	Riffle	0.3
	Run	0.7
	Pool	0.5
% of Reach	Riffle	10
	Run	45
	Pool	45
% Substrate	Bedrock	50
	Boulder	5
	Cobble	15
	Mud/Muck	2
	Gravel	15
	Sand	5
	Silt	5
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Anderson Creek at ANDL-8, June 3, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	72	Optimal >70
Sediment Deposition	78	Optimal >70
Sinuosity	65	Sub-optimal (65-84)
Bank and Vegetative Stability	65	Sub-optimal (60-74)
Riparian Buffer	76	Sub-optimal (70-89)
Habitat Assessment Score	172	
% Maximum Score	71	Optimal >70

Table 4. Results of macroinvertebrate bioassessment conducted in Anderson Creek at ANDL-8, June 3, 2013.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	Total # Taxa	57
	# EPT taxa	8
	Shannon Diversity	4.07
	# Highly-sensitive and Specialized Taxa	1
Taxonomic composition measures		
	% EPT minus Baetidae and Hydropsychidae	1
	% Non-insect taxa	14
	% Individuals in Dominant 5 Taxa	60
Functional feeding group		
	% Predator Individuals	9
Community tolerance		
	# Sensitive EPT	2
	% Sensitive taxa	5
	% Tolerant taxa	28
	WMB-I Assessment Score	4-
	WMB-I Assessment Rating	Fair-Poor

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, during March through October of 2013, to help identify any stressors to the biological communities. In situ parameters were measured during each site visit.

Anderson Creek at ANDL-8 met water quality criteria for its *Fish & Wildlife* use classification throughout the sampling season. The median concentration of Dissolved Reactive Phosphorus and Chlorides were above the 90th percentile of reference reach data collected within the Western Highland Rim ecoregion (71f).

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Anderson Creek at ANDL-8 to be in *fair* condition. Overall habitat quality was categorized as *optimal* with high amount of instream habitat quality and low amount of sediment deposition. Additionally, intensive water chemistry results indicated higher than expected concentrations of dissolved reactive phosphorus and chlorides when compared to the reference reaches in ecoregion 71f. Monitoring should continue to ensure that biological and water quality conditions remain stable.

Table 5. Summary of water quality data collected monthly March –October, 2013. 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.

Parameter	N	Min	Max	Med	Avg	SD
Physical						
Temperature (°C)	9	11.0	25.9	23.0	20.9	4.9
Turbidity (NTU)	13	1.2	7.6	2.7	3.3	2.0
J Total Dissolved Solids (mg/L)	8	37.0	244.0	65.0	86.6	65.5
Total Suspended Solids (mg/L)	8	1.0	4.0	3.0	2.9	1.1
Specific Conductance (µmhos)	9	67.0	135.0	109.0	101.9	22.3
J Alkalinity (mg/L)	8	14.8	52.8	29.4	31.0	14.0
Stream Flow (cfs)	12	10.4	103.1	33.2	38.8	25.6
Chemical						
Dissolved Oxygen (mg/L)	9	7.5	11.1	8.9	9.0	1.1
pH (su)	9	7.2	8.1	7.6	7.6	0.3
J Ammonia Nitrogen (mg/L)	8	< 0.015	0.082	0.010	0.024	0.028
Nitrate+Nitrite Nitrogen (mg/L)	8	0.623	1.000	0.921	0.900	0.120
Total Kjeldahl Nitrogen (mg/L)	8	< 0.071	0.610	0.341	0.331	0.195
Total Nitrogen (mg/L)	8	< 0.783	1.496	1.270	1.231	0.246
J Dissolved Reactive Phosphorus (mg/L)	8	0.009	0.106	0.020 ^M	0.031	0.032
J Total Phosphorus (mg/L)	8	0.014	0.114	0.032	0.043	0.032
J CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0
J Chlorides (mg/L)	8	1.4	8.3	2.8 ^M	3.4	2.1
Biological						
Chlorophyll a (ug/L)	8	< 1.00	1.87	1.20	1.12	0.56

J=estimate; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 71f; N=# samples.

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