

# 2013 Monitoring Summary



## Anderson Creek at Lauderdale County Road 156 (34.90568/-87.26564)

### 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-9 to verify and document impairment caused by siltation. Macroinvertebrate and habitat assessments were conducted at the site to verify impairment to aquatic communities. The assessments were conducted on June 3, 2013.



Figure 1. Anderson Creek at ANDL-9, May 21, 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 (50%) and forest (26%). As of May 13, 2013, ADEM's NPDES Management System database shows two NPDES

### 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-9 is a wide, high-gradient stream characterized by bedrock, 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-9 rated the site as *fair* (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Tennessee River	
Drainage Area (mi <sup>2</sup> )	25	
Ecoregion <sup>a</sup>	71f	
% Landuse		
Open water		<1
Wetland	Woody	3
Forest	Deciduous	18
	Evergreen	5
	Mixed	3
Shrub/scrub		5
Grassland/herbaceous		1
Pasture/hay		50
Cultivated crops		8
Development	Open space	6
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km <sup>2b</sup>		17
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	2
	Construction Stormwater	1
	Industrial General	1

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-9, June 3, 2013.

Physical Characteristics		
Width (ft)	41	
Canopy Cover	Shaded	
Depth (ft)		
	Riffle	0.7
	Run	1.2
	Pool	1.0
% of Reach		
	Riffle	10
	Run	70
	Pool	20
% Substrate		
	Bedrock	70
	Boulder	3
	Cobble	10
	Gravel	10
	Sand	2
	Silt	2
	Organic Matter	3

**Table 3.** Results of the habitat assessment conducted on Anderson Creek at ANDL-9, 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)
<b>Habitat Assessment Score</b>	<b>172</b>	
<b>% Maximum Score</b>	<b>71</b>	<b>Optimal &gt;70</b>

**Table 4.** Results of macroinvertebrate bioassessment conducted in Anderson Creek at ANDL-9, June 3, 2013.

Macroinvertebrate Assessment		Results
<b>Taxa richness and diversity measures</b>		
	Total # Taxa	63
	# EPT taxa	12
	Shannon Diversity	2.98
	# Highly-sensitive and Specialized Taxa	2.00
<b>Taxonomic composition measures</b>		
	% EPT minus Baetidae and Hydropsychidae	1
	% Non-insect taxa	18
	% Individuals in Dominant 5 Taxa	77
<b>Functional feeding group</b>		
	% Predator Individuals	0
<b>Community tolerance</b>		
	# Sensitive EPT	5
	% Sensitive taxa	3
	% Tolerant taxa	30
	<b>WMB-I Assessment Score</b>	<b>4</b>
	<b>WMB-I Assessment Rating</b>	<b>Fair</b>

## 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-9 met water quality criteria for its *Fish & Wildlife* use classification throughout the sampling season. The median concentration of Specific Conductance, Nitrate + Nitrite Nitrogen, Total Nitrogen 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-9 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 Specific Conductance, Nitrate + Nitrite Nitrogen, Total Nitrogen 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
<b>Physical</b>						
Temperature (°C)	9	12.3	24.1	21.7	19.9	3.8
Turbidity (NTU)	9	0.8	22.8	1.8	4.2	7.0
<sup>J</sup> Total Dissolved Solids (mg/L)	8	63.0	94.0	76.5	75.2	10.0
Total Suspended Solids (mg/L)	8	2.0	11.0	2.5	3.5	3.1
Specific Conductance (µmhos)	9	91.0	140.0	116.0 <sup>G</sup>	117.6	17.5
<sup>J</sup> Alkalinity (mg/L)	8	13.5	51.6	34.4	33.2	13.0
Stream Flow (cfs)	8	8.4	55.9	20.6	25.1	16.7
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	9	8.0	11.6	9.5	9.6	1.1
pH (su)	9	7.4	8.0	7.8	7.8	0.2
<sup>J</sup> Ammonia Nitrogen (mg/L)	8	< 0.015	0.082	0.010	0.019	0.026
Nitrate+Nitrite Nitrogen (mg/L)	8	0.962	1.180	1.115 <sup>M</sup>	1.087	0.080
Total Kjeldahl Nitrogen (mg/L)	8	0.155	0.381	0.272	0.274	0.085
Total Nitrogen (mg/L)	8	1.117	1.539	1.348 <sup>M</sup>	1.361	0.132
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	8	< 0.007	0.044	0.015	0.019	0.014
<sup>J</sup> Total Phosphorus (mg/L)	8	0.013	0.057	0.028	0.032	0.015
<sup>J</sup> CBOD-5 (mg/L)	7	< 2.0	< 2.0	1.0	1.0	0.0
<sup>J</sup> Chlorides (mg/L)	8	2.6	4.5	2.8 <sup>M</sup>	3.2	0.7

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 71f; J=estimate; M=value > 90% of ADEM's verified reference reaches collected in ecoregion 71f; N=# samples.

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