

2013 Monitoring Summary



Cane Creek at US Highway 431 in Anniston, Calhoun County. (33.73579/-85.88108)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) monitored Cane Creek at CNCC-1 as part of its 2005 and 2010 Basin Assessments of the Alabama, Coosa, and Tallapoosa River Basins. Monitoring of Cane Creek at CNCC-1 continued in 2013 to provide additional biological, chemical, and physical data to fully assess the use support status of Cane Creek for the 2016 Integrated Water Quality Report.



Figure 1. Cane Creek at CNCC-1, May 14, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cane Creek is a *Fish & Wildlife (F&W)* stream in Calhoun County. Based on the 2011 National Land Cover Dataset, land use within the watershed consists of primarily forest (55%) developed areas (~29%) and some pastureland. As of April 1, 2016, a total of 34 NPDES permitted outfalls are active in this 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. Cane Creek at CNCC-1 is a riffle-run stream located in the Southern Limestone/Dolomite Valley and Low Rolling Hills ecoregion (Figure 1). The study reach is characterized primarily by a sand, bedrock, and gravel substrate. Overall habitat quality was categorized as *sub-optimal*.

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's 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 Cane Creek at CNCC-1 rated the site as *fair* (Table 4). Although some sensitive taxa are still present at the site, these results indicate moderate changes in community structure due to replacement of some sensitive taxa by more tolerant taxa.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa R
Drainage Area (mi²)		26
Ecoregion^a		67F
% Landuse^b		
Open water		<1%
Wetland	Woody	<1%
	Emergent herbaceous	<1%
Forest	Deciduous	37%
	Evergreen	14%
	Mixed	4%
Shrub/scrub		2%
Grassland/herbaceous		4%
Pasture/hay		7%
Cultivated crops		1%
Development	Open space	17%
	Low intensity	8%
	Moderate intensity	3%
	High intensity	1%
Barren		1%
Population/km^{2c}		141
# NPDES Permits^d	TOTAL	34
	Construction	25
	Municipal	6
	Underground Injection Control	3

^a-Southern Limestone/Dolomite Valleys and Low Rolling Hills

^b-2011 National Land Cover Dataset

^c-2010 US Census

^d-#NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Cane Creek at CNCC-1, May 14, 2013.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Estimate 50/50
Depth (ft)	Riffle	1.0
	Run	1.5
	Pool	2.0
% of Reach	Riffle	10
	Run	85
	Pool	5
% Substrate	Bedrock	25
	Boulder	3
	Cobble	7
	Gravel	21
	Sand	35
	Silt	5
	Organic Matter	4

Table 3. Results of the habitat assessment conducted on Cane Creek at CNCC-1, May 14, 2013.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	73	Sub-Optimal (55-79)
Sediment Deposition	74	Sub-Optimal (55-79)
Riffle frequency	67.5	Sub-Optimal (55-79)
Bank Vegetative Stability	71	Sub-Optimal (58-79)
Riparian Buffer	68	Sub-Optimal (60-84)
Habitat Assessment Score	142	
% Maximum Score	71	Sub-Optimal (57-80)

Table 4. Results of the macroinvertebrate bioassessment conducted in Cane Creek at CNCC-1, May 14, 2013.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
	Total # taxa	53
	# EPT taxa	10
	Shannon Diversity	4.45
	# Highly-sensitive and Specialized taxa	1
Taxonomic composition measures		
	% EPT minus Baetidae and Hydropsychidae	9
	% Non-insect taxa	16
Tolerance measures		
	# Sensitive EPT	12
	% Sensitive taxa	18
	% Tolerant taxa	36
	WMB-I Assessment Score	4
	WMB-I Assessment Rating	Fair

Table 5. Summary of water quality data collected March-October, 2013. 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	E
Physical							
Temperature (°C)	9	15.2	22.5	19.2	19.4	2.7	
Turbidity (NTU)	9	3.8	22.6	6.5	9.2	6.0	
Total Dissolved Solids (mg/L)	8	96.0	174.0	144.5	140.5	28.0	
Total Suspended Solids (mg/L)	8	1.0	14.0	5.5	6.4	4.2	
Specific Conductance (µmhos)	9	150.0	296.0	242.8 ^G	231.8	47.9	
Alkalinity (mg/L)	8	53.3	132.7	99.8	96.0	26.6	
Stream Flow (cfs)	9	7.2	101.8	30.6	43.8	36.4	
Chemical							
Dissolved Oxygen (mg/L)	9	8.3	13.9	9.0	9.6	1.7	
pH (su)	9	7.6	8.6 ^C	7.9	7.9	0.3	1
^J Ammonia Nitrogen (mg/L)	8	< 0.015	0.056	0.011	0.016	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.253	0.646	0.377 ^M	0.399	0.134	
^J Total Kjeldahl Nitrogen (mg/L)	8	0.119	0.440	0.328	0.300	0.118	
^J Total Nitrogen (mg/L)	8	0.451	0.990	0.700 ^M	0.699	0.161	
^J Dissolved Reactive Phosphorus (mg/L)	8	0.007	0.105	0.018 ^M	0.033	0.034	
^J Total Phosphorus (mg/L)	8	0.018	0.118	0.024	0.040	0.034	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
^J Chlorides (mg/L)	8	2.6	5.9	3.5	3.6	1.0	
Biological							
Chlorophyll a (ug/L)	8	< 1.00	32.80	3.36 ^M	7.80	10.77	

C = F&W criterion exceeded; E = # of exceedances; G = value higher than median concentration of all verified ecoregional reference reach data collected in ecoregion 67f; J = estimate; M = value >90% of all verified ecoregional reference reach data collected in ecoregion 67f; N = # of samples.

WATER CHEMISTRY

Results of water chemistry analyses are summarized in Table 5. In situ measurements and water samples were collected monthly, during March through October 2013, to help identify any stressors to the biological communities. For Cane Creek at CNCC-1, the F&W water quality criterion for pH was exceeded in March (8.6 su). Furthermore, median specific conductance, nitrate+nitrite nitrogen, total nitrogen, dissolved reactive phosphorus, and chlorophyll a were higher than values expected based on data collected at reference reaches within the Southern Limestone/Dolomite Valley and Low Rolling Hills ecoregion (67f).

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. However, several water quality parameters (pH, conductivity, nitrate+nitrite nitrogen, total nitrogen, dissolved reactive phosphorus, and chlorophyll a) were found to be outside the expected range of results established by reference streams within the Southern Limestone/Dolomite Valley and Low Rolling Hills ecoregion (67f). Monitoring should continue to ensure that conditions in Cane Creek at CNCC-1 remain stable.

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