

2010 Monitoring Summary



Cane Creek at US Highway 431 (Calhoun County) (33.73579/-85.88107)

BACKGROUND

The Alabama Department of Environmental Management selected the Cane Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa (ACT) River Basins. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin.



Figure 1. Sampling location within the Cane Creek watershed at CNCC-1, August 5, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cane Creek at CNCC-1 is a *Fish & Wildlife (F&W)* stream located near the city of Anniston. According to the 2006 National Land Cover Dataset, landuse within the watershed is twenty-eight percent urban development from Anniston. This stream is in close proximity to the Anniston Army Depot and runs under Highway 431. As of September 1, 2012, ADEM has issued a total of 27 NPDES permits 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. Cane Creek is characterized by sand and gravel, with smaller amounts of organic matter, cobble, and silt (Figure 1). Riffle habitat and riparian buffer was limited within the reach.

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 in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi ²)		26
Ecoregion ^a		67f
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	38
	Evergreen	14
	Mixed	4
Shrub/scrub		1
Grassland/herbaceous		4
Pasture/hay		8
Cultivated crops		2
Development	Open space	18
	Low intensity	8
	Moderate intensity	2
	High intensity	<1
Barren		1
Population/km ^{2b}		233
# NPDES Permits ^c	TOTAL	27
	Construction Stormwater	23
	Industrial General	2
	Municipal Individual	2

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012

Table 2. Physical characteristics of Cane Creek at CNCC-1, June 16, 2010.

Physical Characteristics		
Width (ft)		37
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	1.0
	Run	1.5
	Pool	2.0
% of Reach		
	Riffle	10
	Run	80
	Pool	10
% Substrate		
	Bedrock	3
	Boulder	7
	Clay	3
	Cobble	10
	Gravel	20
	Sand	35
	Silt	10
	Organic Matter	12

Table 3. Results of the habitat assessment conducted in Cane Creek at CNCC-1, June 16, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	68	Sub-optimal (59-70)
Sediment Deposition	63	Sub-optimal (59-70)
Sinuosity	60	Marginal (45-64)
Bank and Vegetative Stability	61	Sub-optimal (60-74)
Riparian Buffer	54	Marginal (50-69)
Habitat Assessment Score	153	
% Maximum Score	64	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Cane Creek at CNCC-1, June 16, 2010.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness and diversity measures		
# EPT taxa	15	48
Shannon Diversity	4.08	64
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	78	85
% Non-insect taxa	13	48
Tolerance measures		
% Tolerant taxa	19	89
WMB-I Assessment Score	---	67
WMB-I Assessment Rating		Fair (47-69)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in April, June, August, and October of 2010 to identify any potential stressors to the biological communities. Dissolved arsenic exceeded Human Health criteria applicable to Cane Creek's *F&W* use classification during one sampling event. Median specific conductance, hardness, alkalinity, nitrogen, and phosphorus concentrations were higher than the verified data of reference reaches in the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion.

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *sub-optimal*. Intensive water quality sampling indicated higher than expected conductivity, hardness, alkalinity, and nutrient concentrations. Monitoring should continue to ensure that biological conditions remain stable.

Table 5. Summary of water quality data collected April, June, August, and October, 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	Q	E
Physical								
Temperature (°C)	6	16.1	25.4	23.0	21.4	4.3		
Turbidity (NTU)	6	3.1	6.7	5.4	5.2	1.4		
Total Dissolved Solids (mg/L)	4	138.0	168.0	154.0	153.5	13.2		
Total Suspended Solids (mg/L)	4	< 1.0	2.0	0.5	0.9	0.8		
Specific Conductance (µmhos)	6	249.6	299.7	290.8 ^G	284.9	18.5		
Hardness (mg/L)	4	129.0	143.0	136.5 ^G	136.2	5.8		
Alkalinity (mg/L)	4	120.0	147.0	143.0 ^M	138.2	12.3		
Stream Flow (cfs)	6	3.1	23.5	7.9	9.3	7.5		
Chemical								
Dissolved Oxygen (mg/L)	6	7.0	10.3	7.9	8.2	1.3		
pH (su)	6	7.6	7.9	7.8	7.8	0.1		
Ammonia Nitrogen (mg/L)	4	< 0.021	0.021	0.010	0.010	0.000		
Nitrate+Nitrite Nitrogen (mg/L)	4	0.377	0.543	0.408 ^M	0.434	0.076		
Total Kjeldahl Nitrogen (mg/L)	4	< 0.080	0.316	0.154	0.166	0.147		
Total Nitrogen (mg/L)	4	< 0.417	0.740	0.621	0.600	0.138		
Dissolved Reactive Phosphorus (mg/L)	4	0.022	0.073	0.051 ^M	0.049	0.026		
Total Phosphorus (mg/L)	4	0.033	0.085	0.056 ^M	0.058	0.027		
CBOD-5 (mg/L)	4	< 2.0	2.0	1.0	1.0	0.0		
Chlorides (mg/L)	4	3.4	6.3	4.3 ^M	4.6	1.2		
Atrazine (µg/L)	2	< 0.02	0.02	0.01	0.01	0.00		
Total Metals								
Aluminum (mg/L)	4	< 0.033	0.074	0.016	0.031	0.029	J	
Iron (mg/L)	4	< 0.026	0.182	0.052	0.075	0.080	J	
Manganese (mg/L)	4	< 0.001	0.052	0.014	0.020	0.025	J	
Dissolved Metals								
Aluminum (mg/L)	4	< 0.033	< 0.033	0.016	0.016	0.000		
Antimony (µg/L)	4	< 0.7	1.9	0.9	0.8	0.3		
Arsenic (µg/L)	4	< 0.8 ^H	2.1	1.0	1.0	0.1	J	1
Cadmium (mg/L)	4	< 0.000	0.014	0.001	0.002	0.003		
Chromium (mg/L)	4	< 0.013	< 0.013	0.006	0.006	0.000		
Copper (mg/L)	4	< 0.013	< 0.013	0.006	0.006	0.000		
Iron (mg/L)	4	< 0.026	0.088	0.024	0.037	0.035	J	
Lead (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Manganese (mg/L)	4	< 0.001	0.032	0.010	0.013	0.015	J	
Mercury (µg/L)	4	< 0.1	< 0.1	0.0	0.0	0.0		
Nickel (mg/L)	4	< 0.019	< 0.019	0.010	0.010	0.000		
Selenium (µg/L)	4	< 1.7	< 1.7	0.8	0.8	0.0		
Silver (mg/L)	4	< 0.000	0.002	0.000	0.000	0.001		
Thallium (µg/L)	4	< 0.6	< 0.6	0.3	0.3	0.0		
Zinc (mg/L)	4	< 0.030	< 0.030	0.015	0.015	0.000		
Biological								
Chlorophyll a (ug/L)	4	< 0.10	1.07	0.52	0.54	0.42		
E. coli (col/100mL)	4	91	194	144	142	57	J	

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 67F; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 67F; N=# samples; H=Human Health criteria for *F&W* exceeded

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