

2005 Monitoring Summary



Cane Creek at US Hwy 431 in Calhoun County (33.72228/-85.92451)

BACKGROUND

The Alabama Department of Environmental (ADEM) selected the Cane Creek watershed for biological and water quality monitoring as part of the 2005 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 group

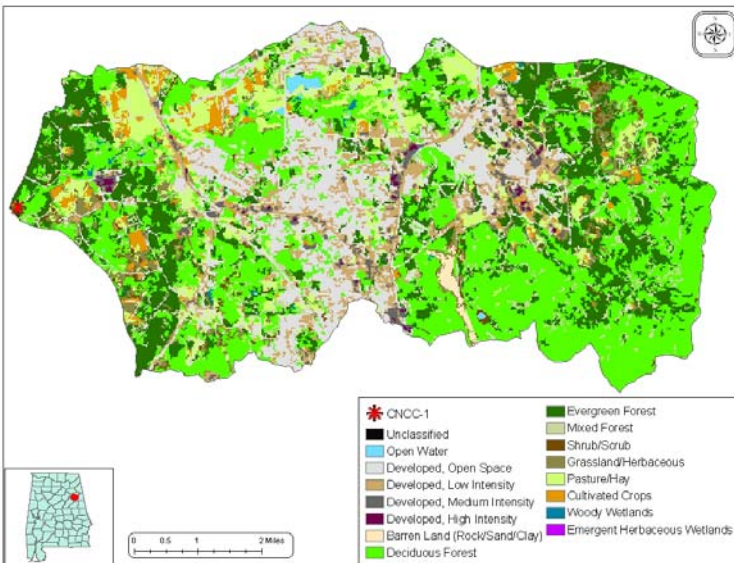


Figure 1. Sampling location and landuse within the Cane Creek watershed at CNCC-1.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cane Creek is a small *Fish & Wildlife (F&W)* stream downstream from the city of Anniston (Fig. 1). Landuse within the watershed is primarily forest (48%) and development (31%). There is a heavy point source influence on this stream with 77 permits issued for the watershed. Population density was also high.

REACH CHARACTERISTICS

General observations (Table 2) and habitat assessments (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 low-gradient, sand-bottomed stream in the Coosa River drainage. Overall habitat quality was categorized as *sub-optimal* due to a narrow riparian buffer, bank erosion, and a lack of stable in stream habitat.

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 an average of the score for each metric. Metric results indicated the macroinvertebrate community to be *poor* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		46
Ecoregion ^a		67f
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	27
	Evergreen	17
	Mixed	4
Shrub/scrub		1
Grassland/herbaceous		5
Pasture/hay		11
Cultivated crops		3
Development	Open space	20
	Low intensity	8
	Moderate intensity	2
	High intensity	<1
Barren		<1
Population/km ^{2b}		131
# NPDES Permits ^c	TOTAL	77
401 Water Quality Certification		1
Construction Stormwater		42
Mining General Permit (old)		23
Industrial General		5
Industrial Individual		3
Municipal Individual		3

a.Southern Limestone/Dolomite Valleys and Low Rolling Hills

b.2000 U.S. Census Data

c.#NPDES permits downloaded from ADEM's NPDES Management System database, 9 Jun 2008

Table 2. Physical characteristics at CNCC-1, May 3,

Physical Characteristics		
Width (ft)		35
Canopy cover		Est. 50/50
Depth (ft)	Riffle	0.5
	Run	1.5
	Pool	3.0
% Substrate	Bedrock	10
	Boulder	5
	Cobble	7
	Gravel	15
	Sand	55
	Silt	3
	Organic Matter	5

Table 3. Results of the habitat assessment conducted May 3, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	63	Sub-optimal (59-70)
Sediment deposition	55	Marginal (41-58)
Sinuosity	58	Marginal (45-64)
Bank and vegetative stability	75	Sub-optimal (60-74)
Riparian buffer	79	Sub-optimal (70-90)
Habitat assessment score	163	
% Maximum score	68	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted May 3, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	8	67	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	5	42	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	15	42	Poor (24.7-49.4)
% Non-insect organisms	15	61	Poor (31.3-62.7)
% Plecoptera	3	16	Fair (13.1-19.7)
Tolerance measures			
Beck's community tolerance index	7	25	Poor (20.2-40.7)
WMB-I Assessment Score	---	38	Poor (24-48)

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, herbicides (atrazine), and semi-volatile organics) during March through October of 2005 to help identify any stressors to the biological communities. Median concentrations of hardness, alkalinity and nitrate+nitrite-nitrogen were above values expected in this ecoregion.

CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Overall habitat quality was categorized as *sub-optimal* due to a narrow riparian buffer, bank erosion, and a lack of stable in stream habitat. Median nutrient (nitrate+nitrite-nitrogen, hardness, and alkalinity) concentrations were above values expected in this ecoregion.

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Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value for non-metals parameters. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value for non-metals parameters. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
Physical						
Temperature (°C)	9	9.8	25.0	17.5	18.1	5.3
Turbidity (NTU)	9	2.2	51.7	5.4	13.4	16.6
Total Dissolved Solids (mg/L)	7	76.0	146.0	93.0	110.0	30.0
Total Suspended Solids (mg/L)	7	4.0	36.0	10.0	14.7	11.0
Specific Conductance (µmhos)	9	109.6	310.7	194.7	199.4	68.6
Hardness (mg/L)	5	52.2	144.0	104.0 ^M	100.1	42.2
Alkalinity (mg/L)	7	44.6	145.6	83.7 ^M	86.8	38.6
Stream Flow (cfs)	8	4.0	155.7	39.9	56.7	---
Chemical						
Dissolved Oxygen (mg/L)	9	6.9	9.98	9.1	8.8	1.2
pH (su)	9	7.3	8.29	7.6	7.7	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.060	0.008	0.015	0.020
Nitrate+Nitrite Nitrogen (mg/L)	7	0.132	0.557	0.388 ^M	0.341	0.153
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.545	0.075	0.209	0.195
Total Nitrogen (mg/L)	7	< 0.463	0.718	0.513	0.550	0.093
Dissolved Reactive Phosphorus (mg/L)	7	0.009	0.042	0.023	0.023	0.013
Total Phosphorus (mg/L)	7	< 0.004	0.082	0.063	0.050	0.028
CBOD-5 (mg/L)	7	< 1.0	3.2	1.6	1.7	1.1
Chlorides (mg/L)	7	3.7	8.0	4.7	5.1	1.5
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	---
Total Metals						
Aluminum (mg/L)	4	< 0.015	0.679	0.068	0.206	0.317
Iron (mg/L)	4	0.101	0.809	0.1635	0.309	0.334
Manganese (mg/L)	4	0.017	0.083	0.040	0.045	0.030
Dissolved Metals						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000
Antimony (µg/L)	4	< 2	< 2	1	1	0
Arsenic (µg/L)	4	< 10	< 10	5	5	0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.000
Copper (mg/L)	4	< 0.005	< 0.005	0.003	0.003	0.000
Iron (mg/L)	4	< 0.005	0.024	0.01275	0.013	0.012
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	< 0.005	0.010	0.003	0.004	0.004
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.000
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Biological						
^J Chlorophyll a (µg/L)	7	0.27	4.01	0.71	1.28	1.35
^J Fecal Coliform (col/100 mL)	7	40	1100	97	275	388

^J = Reported value is an estimate; N=# samples; M=value > 90th percentile of all data collected within eco-region 67f