

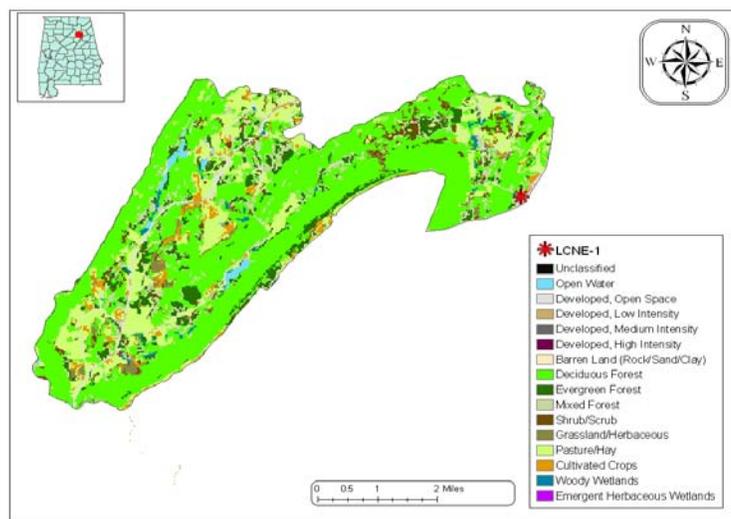
# 2005 Monitoring Summary



## Little Canoe Creek @ unnamed Etowah Co Rd off of AL Hwy 7 (33.97006/-86.17892)

### BACKGROUND

Little Canoe Creek was selected 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 land use within the Little Canoe Creek watershed at LCNE-1.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Canoe Creek at LCNE-1 is a small *Fish & Wildlife (F & W)* stream located in the Southern Limestone/Dolomite Valleys and Low Rolling Hills sub-ecoregion (67f) of the Ridge and Valley ecoregion (67) in Etowah County. Land cover within the watershed is approximately 70% forested with the rest being 17% pasture and 5% crop and grassland (Fig. 1). As of June 9, 2008, ADEM's NPDES Management System database shows only one permitted discharge located within the watershed.

### 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. Little Canoe Creek at LCNE-1 is a medium-gradient, riffle-run stream characterized by gravel and sand substrates. Overall habitat quality was categorized as *sub-optimal* for supporting macroinvertebrate communities. Silta-tion, unstable banks, and limited riffle habitat were issues 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. The final score is an average of the score for each metric. The low taxa richness of pollution intolerant organisms indicated the macroinvertebrate community in Little Canoe Creek to be in *fair* condition (Table 4).

**Table 1.** Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi <sup>2</sup> )		23
Ecoregion <sup>a</sup>		67f
% Landuse		
Open water		1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	54
	Evergreen	8
	Mixed	7
Shrub/scrub		3
Grassland/herbaceous		2
Pasture/hay		17
Cultivated crops		3
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
Barren		<1
Population/km <sup>2</sup> b		11
# NPDES Permits <sup>c</sup>	<b>TOTAL</b>	2
	Mining General Permit (old)	1
	Municipal Individual	1

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 US Census Data

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

**Table 2.** Physical characteristics at LCNE-1, May 19, 2005.

Physical characteristics		
Width (ft)		25
Canopy cover		Mostly Shaded
Depth (ft)	Riffle	0.8
	Run	1.0
	Pool	1.5
% of Reach	Riffle	10
	Run	85
	Pool	5
% Substrate	Cobble	10
	Gravel	60
	Sand	20
	Silt	5
	Organic Matter	5

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**Table 3.** Results of habitat assessment conducted at LCNE-1 on May 19, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	72	Optimal (>65)
Sediment deposition	43	Marginal (40-52)
Sinuosity	63	Marginal (45-64)
Bank and vegetative stability	28	Poor (<35)
Riparian buffer	88	Sub-optimal (70-90)
Habitat assessment score	150	
<b>% Maximum score</b>	<b>63</b>	<b>Sub-optimal (59-70)</b>

**Table 4.** Results of macroinvertebrate assessment conducted at LCNE-1, May 19, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
<b>Taxa richness measures (0-100)</b>			
# Ephemeroptera (mayfly) genera	7	58	Fair (47-70)
# Plecoptera (stonefly) genera	2	33	Fair (32-49)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	7	71	Fair (49.4-74.1)
% Non-insect organisms	3	92	Fair (62.7-93.9)
% Plecoptera	1	4	Very Poor (<6.56)
<b>Tolerance measures</b>			
Beck's community tolerance index	8	29	Poor (20.2-40.7)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>49</b>	<b>Fair (48-72)</b>

## WATER CHEMISTRY

Results of water chemistry 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 nutrients and total and dissolved solids were within the expected range of reference reach streams in the ecoregion 67. The median Chlorophyll *a* concentration was higher than expected.

## CONCLUSIONS

Bioassessment results show the macroinvertebrate community to be in *fair* condition. Habitat degradation and nutrient enrichment may contribute to the degraded biological condition.

**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. Median, average (Avg), and standard deviations (SD) values were

Parameter	N	Min	Max	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	9	11.0	25.0	22.0	19.6	4.8
Turbidity (NTU)	9	2.3	17.1	5.6	7.6	4.9
Total Dissolved Solids (mg/L)	6	47.0	147.0	80.5	88.3	40.8
Total Suspended Solids (mg/L)	6	3.0	30.0	6.5	10.0	10.0
Specific Conductance (µmhos)	9	92.8	205.9	157.9	152.6	41.6
Hardness (mg/L)	5	47.1	114.0	84.3	78.3	25.7
Alkalinity (mg/L)	6	39.8	103.4	71.8	70.8	21.6
Stream Flow (cfs)	7	3.2	80.6	12.5	24.2	---
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	9	7.2	9.7	8.9	8.7	0.9
pH (su)	9	6.9	8.1	7.7	7.7	0.4
Ammonia Nitrogen (mg/L)	7	< 0.015	0.133	0.008	0.031	0.047
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.235	0.117	0.126	0.071
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.224	0.160	0.146	0.070
Total Nitrogen (mg/L)	7	0.076	0.350	0.317	0.272	0.105
Dissolved Reactive Phosphorus (mg/L)	7	0.009	0.023	0.016	0.017	0.005
Total Phosphorus (mg/L)	7	0.039	0.085	0.051	0.059	0.018
CBOD-5 (mg/L)	6	< 1.0	1.7	1.5	1.3	0.5
COD (mg/L)	2	< 2.0	2.0	1.0	1.0	0.0
<sup>J</sup> Chlorides (mg/L)	6	3.9	4.5	4.1	4.2	0.2
Atrazine (µg/L)	2	< 0.05	0.05	0.03	0.03	---
<b>Total Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.182	0.065	0.080	0.1
Iron (mg/L)	4	0.102	0.329	0.2525	0.234	0.1
Manganese (mg/L)	4	0.029	0.056	0.051	0.047	0.0
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.015	0.008	0.008	0.0
Antimony (µg/L)	4	< 2	2	1	1	0.0
Arsenic (µg/L)	4	< 10	10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	0.005	0.003	0.003	0.0
Chromium (mg/L)	4	< 0.004	0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	0.005	0.003	0.003	0.0
Iron (mg/L)	4	< 0.005	0.056	0.029	0.029	0.0
Lead (µg/L)	4	< 2	2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.031	0.016	0.016	0.0
<sup>J</sup> Mercury (µg/L)	4	< 0.3	0.3	0.15	0.1875	0.1
Nickel (mg/L)	4	< 0.006	0.006	0.003	0.003	0.0
Selenium (µg/L)	4	< 10	10	5	5	0.0
Silver (mg/L)	4	< 0.003	0.003	0.002	0.002	0.0
Thallium (µg/L)	4	< 1	1	0.5	0.500	0.0
Zinc (mg/L)	4	< 0.006	0.006	0.003	0.003	0.0
<b>Biological</b>						
<sup>J</sup> Chlorophyll <i>a</i> (µg/L)	6	1.07	5.34	2.94 M	2.98	1.7
<sup>J</sup> Fecal Coliform (col/100 mL)	7	9	53	26	27	16

N=# samples; M=value >90% of all verified ecological reference reach data collected in the ecoregion/subecoregion 67f; J= estimate

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