

# 2005 Monitoring Summary



## Caty Creek at Chambers County Road 237 (32.45541/-85.49148)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Caty 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.

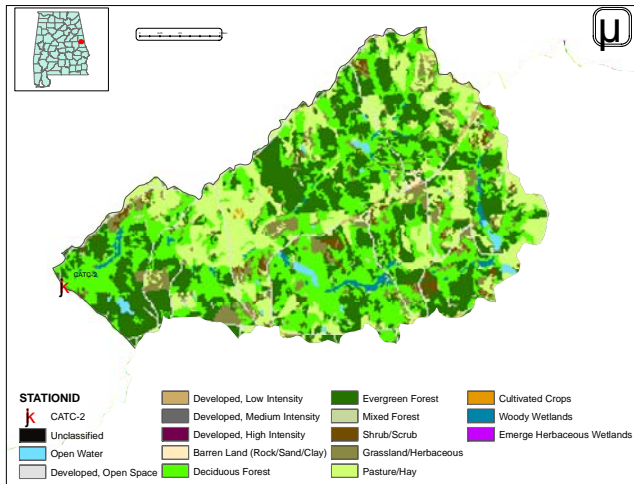


Figure 1. Sampling location and landuse within the Caty Creek watershed at CATC-2.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Caty Creek is a small *Fish & Wildlife (F&W)* stream located in the Piedmont Ecoregion near the city of Abanda (Fig. 1). Landuse within the watershed is primarily forest (60%) and pasture. The presence of mixed forests and plain lands are characteristic of streams in the Southern Inner Piedmont.

### 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. Caty Creek at CATC-2 is a medium-gradient, riffle-run stream characterized by diverse bottom substrates. Overall habitat quality was categorized as *optimal* despite slightly unstable banks and a relatively narrow riparian buffer on one bank.

### 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 in *fair* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics	
Drainage Area (mi <sup>2</sup> )	14
Ecoregion <sup>a</sup>	45a
% Landuse	
Open water	1
Wetland	Woody 1
Forest	Deciduous 32
	Evergreen 28
	Mixed 1
Shrub/scrub	2
Grassland/herbaceous	7
Pasture/hay	22
Cultivated crops	<1
Development	Open space 3
	Low intensity 1
	Moderate intensity <1
Barren	<1
Population/km <sup>2b</sup>	23
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 4
Construction Stormwater	4

a. Southern Inner Piedmont

b. 2000 US Census Data

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

Table 2. Physical characteristics at CATC-2, May 10, 2005.

Physical Characteristics	
Width (ft)	30
Canopy cover	Mostly Shaded
Depth (ft)	
	Riffle 0.45
	Run 1.4
	Pool 2.0
% of Reach	
	Riffle 25
	Run 60
	Pool 15
% Substrate	
	Bedrock 30
	Boulder 10
	Cobble 15
	Gravel 21
	Sand 15
	Silt 5
	Organic Matter 4

**Table 3.** Results of the habitat assessment conducted May 10, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	84	Optimal (> 70)
Sediment deposition	78	Optimal (> 70)
Sinuosity	85	Optimal (≥85)
Bank and vegetative stability	64	Sub-optimal (60-74)
Riparian buffer	70	Sub-optimal (70-90)
Habitat assessment score	187	
<b>% Maximum score</b>	<b>78</b>	<b>Optimal (&gt; 70)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted May 10, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
		(0-100)	
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	10	83	Good (72-86)
# Plecoptera (stonefly) genera	2	33	Poor (24-48)
# Trichoptera (caddisfly) genera	5	42	Poor (24-48)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	8	67	Fair (48-72)
% Non-insect organisms	8	79	Good (72-86)
% Plecoptera	10	49	Fair (48-72)
<b>Tolerance measures</b>			
Beck's community tolerance index	8	29	Poor (24-48)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>55</b>	<b>Fair (48-72)</b>

## 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 nutrient concentrations were similar to 90% of ecoregional reference reach samples. Total and dissolved aluminum, iron, and manganese concentrations were above values expected for this ecoregion.

## CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community at Caty Creek to be in *fair* condition. Intensive water quality sampling indicated nutrient enrichment, elevated metals concentrations, alkalinity, and hardness to be potential causes of stress to the biological community.

**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 calculated by multiplying the MDL by 0.5 when results were less than this value. Metals results were compared to ADEM's chronic aquatic life use criteria adjusted for hardness.

Parameter	N	Min	Max	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	8	16.0	27.0	21.6	21.4	4.0
Turbidity (NTU)	8	6.3	53.3	10.3	16.1	15.4
Total dissolved solids (mg/L)	7	28.0	72.0	42.0	48.4	18.9
Total suspended solids (mg/L)	7	4.0	43.0	9.0	15.0	14.3
Specific conductance (µmhos)	8	33.9	64.3	49.7	49.0	9.3
Hardness (mg/L)	4	10.8	20.7	15.4	15.6	4.3
Alkalinity (mg/L)	7	9.9	32.2	22.0	21.2	7.1
Stream Flow (cfs)	6	2.7	17.6	12.3	11.3	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	8	7.3	9.8	8.5	8.5	0.9
pH (su)	8	7.0	7.79	7.3	7.4	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.020	0.008	0.009	0.005
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	7	0.059	0.196	0.112	0.118	0.045
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.474	0.075	0.209	0.176
Total nitrogen (mg/L)	7	< 0.134	0.627	0.271	0.328	0.189
Dissolved reactive phosphorus (mg/L)	7	< 0.004	0.019	0.002	0.006	0.007
Total phosphorus (mg/L)	7	0.029	0.089	0.042	0.054	0.025
CBOD-5 (mg/L)	7	1.0	4.8	1.7	2.1	1.6
<sup>J</sup> Chlorides (mg/L)	7	3.8	8.5	4.3	4.9	1.7
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0.0
<b>Total Metals</b>						
Aluminum (mg/L)	4	0.028	0.252	0.0795 <sup>M</sup>	0.110	0.1
Iron (mg/L)	4	1.32	1.82	1.55 <sup>M</sup>	1.560	0.2
Manganese (mg/L)	4	0.025	0.166	0.104 <sup>M</sup>	0.100	0.1
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.172	0.0398 <sup>M</sup>	0.065	0.1
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic	4	< 10	< 10	5	5	0.0
Cadmium (mg/L)	4	< 0.005	< 0.005	0.0025	0.0025	0.0
Chromium (mg/L)	4	< 0.004	< 0.004	0.002	0.002	0.0
Copper (mg/L)	4	< 0.005	< 0.005	0.0025	0.003	0.0
Iron (mg/L)	4	0.319	1.02	0.6935 <sup>M</sup>	0.6815	0.3
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.105	0.068 <sup>M</sup>	0.061	0.048
Mercury (µg/L)	4	< 0.3	< 0.3	0.15	0.15	0.0
Nickel (mg/L)	4	< 0.006	0.011	0.003	0.005	0.04
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.0015	0.0015	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 a (µg/L)	6	0.53	5.77	1.07	2.35	2.2
<sup>J</sup> Fecal Coliform (col/100 mL)	7	30	370	130	140	116

<sup>J</sup>=estimate; N=# samples; M=value > 90th percentile of all data collected within ecoregion 45a

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