

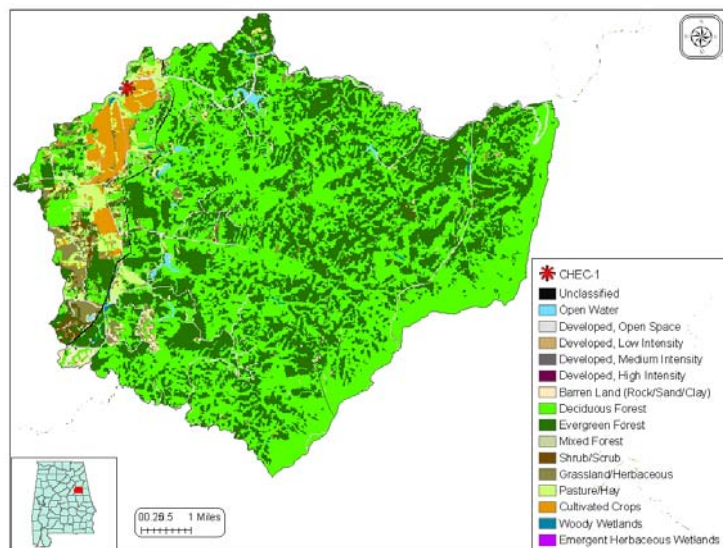
# 2005 Monitoring Summary



## Cheaha Creek at Talladega County Road 047 (33.48861/-85.95933)

### BACKGROUND

Alabama Department of Environmental Management's Environmental Indicators Section (EIS) selected the Cheaha 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 Cheaha Creek watershed at CHEC-1.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Cheaha Creek is a small *Fish & Wildlife (F&W)* stream located near the edge of the Talladega National Forest and just northeast of the city of Talladega (Fig. 1). Landuse within the watershed is primarily forest (81%), with some agricultural (8%). The watershed falls within the Talladega National Forest.

### 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. Cheaha Creek at CHEC-1 was a moderate-gradient, mixed substrate stream in the Coosa River drainage. Overall habitat quality was categorized as *sub-optimal* due to sedimentation, bank erosion, and a lack of stable in stream habitat and riparian buffer.

### 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 characterized by pollution-tolerant taxa groups, indicating *fair* community condition (Table 4).

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

Watershed Characteristics	
Drainage Area (mi <sup>2</sup> )	59
Ecoregion <sup>a</sup>	67f
% Landuse	
Open water	1
Wetland	Woody <1
Forest	Deciduous 46
	Evergreen 34
	Mixed 1
Shrub/scrub	1
Grassland/herbaceous	4
Pasture/hay	4
Cultivated crops	4
Development	Open space 3
	Low intensity <1
Barren	1
Population/km <sup>2</sup> <sup>b</sup>	7
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 2
Mining General Permit (old)	2

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 Census Data

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

**Table 2.** Physical characteristics at CHEC-1, June 28, 2005.

Physical Characteristics	
Canopy cover	Mostly Open
Depth (ft)	
	Riffle 0.4
	Run 1.1
	Pool 2
% of Reach	
	Riffle 25
	Run 45
	Pool 30
% Substrate	
	Boulder 5
	Cobble 25
	Gravel 10
	Sand 38
	Silt 10
	Clay 3
	Organic Matter 4
	Mud/Muck 5

**Table 3.** Results of the habitat assessment conducted June 28, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	69	Sub-optimal (59-70)
Sediment deposition	61	Sub-optimal (59-70)
Sinuosity	70	Sub-optimal (65-84)
Bank and vegetative stability	64	Sub-optimal (60-74)
Riparian buffer	54	Marginal (50-69)
Habitat assessment score	153	
<b>% Maximum score</b>	<b>64</b>	<b>Sub-optimal (59-70)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted June 28, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores (0-100)	Rating
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	8	67	Fair (48-72)
# Plecoptera (stonefly) genera	2	33	Poor (24-48)
# Trichoptera (caddisfly) genera	10	83	Good (72-86)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	13	49	Fair (48-72)
% Non-insect organisms	6	83	Good (72-86)
% Plecoptera	1	6	Very Poor (<24)
<b>Tolerance measures</b>			
Beck's community tolerance index	14	50	Fair (48-72)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>53</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. The median concentration of dissolved iron was higher than expected based on the 90th percentile of reference reach data collected in ecoregion 67f.

## CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Results of intensive water quality sampling and a habitat assessment suggest that sedimentation, bank erosion, and elevated metals could be potential causes of 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 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	13.3	29.0	21.0	21.3	5.3
Turbidity (NTU)	8	4.2	10.6	5.3	6.1	2.3
Total Dissolved Solids (mg/L)	6	14.0	74.0	58.0	47.7	26.5
Total Suspended Solids (mg/L)	6	3.0	49.0	11.0	15.8	16.8
Specific Conductance (µmhos)	8	28.1	39.7	32.3	32.9	3.7
Hardness (mg/L)	4	8.2	12.5	9.9	10.1	1.8
Alkalinity (mg/L)	6	3.4	14.2	10.1	9.4	3.6
Stream Flow (cfs)	8	3.1	163.8	39.4	64.9	---
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	8	6.8	10.5	8.4	8.5	1.3
pH (su)	8	6.3	7	6.7	6.7	0.2
Ammonia Nitrogen (mg/L)	6	< 0.015	< 0.015	0.008	0.008	0.000
Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.003	0.036	0.017	0.016	0.013
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.287	0.212	0.186	0.091
Total Nitrogen (mg/L)	6	< 0.076	0.288	0.236	0.202	0.094
Dissolved Reactive Phosphorus (mg/L)	6	< 0.004	0.034	0.015	0.016	0.011
Total Phosphorus (mg/L)	6	< 0.004	0.063	0.038	0.033	0.022
CBOD-5 (mg/L)	6	1.2	2.1	1.7	1.6	0.3
Chlorides (mg/L)	6	3.7	4.3	3.8	3.9	0.2
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	---
<b>Total Metals</b>						
Aluminum (mg/L)	4	0.029	0.111	0.053	0.061	0.039
Iron (mg/L)	4	0.303	1.16	0.636	0.684	0.360
Manganese (mg/L)	4	0.034	0.087	0.051	0.056	0.023
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	< 0.015	0.008	0.008	0.000
Antimony (µg/L)	4	< 2	< 2	1	1	0.0
Arsenic (µg/L)	3	< 10	< 10	5	5	0.0
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	0.067	0.827	0.295 <sup>M</sup>	0.371	0.332
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	< 0.005	0.04	0.012	0.017	0.018
Mercury (µg/L)	4	< 0.3	< 0.3	0.225	0.225	0.087
Nickel (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
Selenium (µg/L)	4	< 10	< 10	5	5	0.0
Silver (mg/L)	4	< 0.003	< 0.003	0.002	0.002	0.000
Thallium (µg/L)	4	< 1	< 1	0.5	0.5	0.0
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
<b>Biological</b>						
Chlorophyll a (µg/L)	6	0.53	2.40	1.07	1.16	0.65
Fecal Coliform (col/100 mL)	6	22	200	59	74	66

J=Reported value is an estimate; N=# samples; M=>90% of all verified ecoregional reference reach data collected in the sub-ecoregion 67f

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