

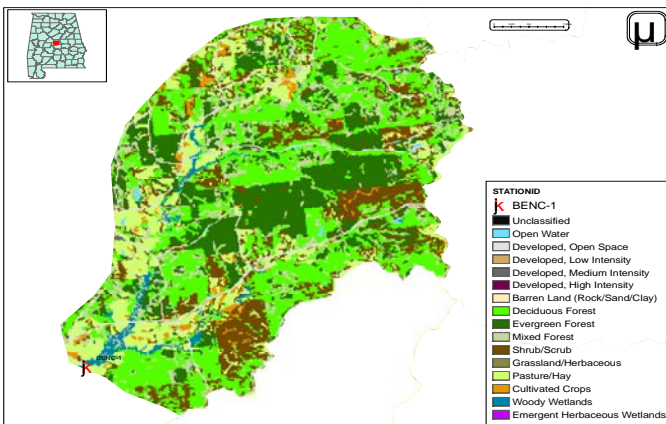
# 2005 Monitoring Summary



## Benson Creek at Chilton County Road 341 (32.79729/ -86.79767)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Benson 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 Benson Creek watershed at BENC-1.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Benson Creek is a small Fish & Wildlife (F&W), stream located near the city of Maplesville. This watershed falls within the Fall Line Hills ecoregion, usually characterized by relatively low to mid gradient streams with sand and gravel substrates. Landuse within the watershed is mixed forest (64%) with some areas of shrub/scrub and pasture and hay (Fig. 1).

### 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. Benson Creek at BENC-1 is a low-gradient, sand-bottomed stream in the Alabama River basin. The habitat assessment conducted on June 16, 2005, categorized the stream as *marginal*. However, most parameters fell into the *poor* category.

### 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> )	25
Ecoregion <sup>a</sup>	65i
% Landuse	
Open water	<1
Wetland	Woody 2
	Emergent herbaceous <1
Forest	Deciduous 33
	Evergreen 20
	Mixed 11
Shrub/scrub	16
Grassland/herbaceous	<1
Pasture/hay	13
Cultivated crops	2
Development	Open space 3
	Low intensity <1
	Moderate intensity <1
Population/km <sup>2</sup> <sup>b</sup>	37
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 5
	Construction Stormwater 4
	Mining General Permit (old) 1

a. Fall Line 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 BENC-1, June 16, 2005.

Physical Characteristics	
Width (ft)	27
Canopy cover	Mostly Shaded
Depth (ft)	
	Run 1.1
	Pool 3.0
% of Reach	
	Run 90
	Pool 10
% Substrate	
	Boulder 1
	Cobble 1
	Gravel 8
	Sand 70
	Silt 10
	Organic Matter 10

**Table 3.** Results of the habitat assessment conducted on Benson Creek at BENC-1, June 16, 2005.

Habitat Assessment (% Maximum Score)		Rating
Instream habitat quality	40	Poor (<40)
Sediment deposition	63	Sub-optimal (53-65)
Sinuosity	40	Poor (<45)
Bank and vegetative stability	28	Poor (<35)
Riparian buffer	40	Poor (<50)
Habitat assessment score	97	
<b>% Maximum score</b>	<b>44</b>	<b>Marginal (40-52)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Benson Creek at BENC-1, June 16, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
<b>Taxa richness measures</b>			
# EPT genera	14	56	Fair (37-56)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	9	81	Fair (61.8-92.7)
% Plecoptera	4	56	Excellent (>52.8)
% Dominant taxa	29	53	Fair (47.0-70.5)
<b>Functional composition measures</b>			
% Predators	15	39	Fair (30.1-45.2)
<b>Tolerance measures</b>			
Beck's community tolerance index	10	45	Good (31.8-65.9)
% Nutrient tolerant organisms	46	41	Poor (25.4-50.8)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>53</b>	<b>Fair (37-56)</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 biological oxygen demand and total suspended solids were above the value expected in this ecoregion, based on the 90th percentile of reference reach data collected in streams located in ecoregion 65i. Median values of other water quality parameters were as expected.

## CONCLUSIONS

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality was categorized as *marginal* due to sedimentation, bank erosion, limited riparian buffer and a lack of stable in-stream habitat, however, median biological demand and total suspended solids were slightly higher than expected.

**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	12.9	26.0	24.4	21.4	5.2
Turbidity (NTU)	8	7.5	54.2	10.5	17.0	15.9
Total dissolved solids (mg/L)	8	43.0	102.0	72.5	75.6	20.8
Total suspended solids (mg/L)	8	6.0	219.0	25.0 <sup>M</sup>	49.1	71.4
Specific conductance (µmhos)	8	30.0	60	45.6	46.4	10.3
Hardness (mg/L)	5	11.6	14.5	12.2	12.7	1.2
Alkalinity (mg/L)	8	2.8	14.0	8.8	8.6	3.2
Stream Flow (cfs)	6	15.5	34.8	22.0	23.1	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	8	6.9	10.8	8.3	8.6	1.3
pH (su)	8	6.1	8.2	7.7	7.3	0.7
Ammonia Nitrogen (mg/L)	8	< 0.015	0.030	0.015	0.017	0.010
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	8	0.054	0.167	0.134	0.123	0.042
Total Kjeldahl Nitrogen (mg/L)	8	< 0.150	1.090	0.075	0.257	0.351
Total nitrogen (mg/L)	8	0.129	1.165	0.236	0.380	0.337
Dissolved reactive phosphorus (mg/L)	8	< 0.004	0.077	0.014	0.025	0.029
Total phosphorus (mg/L)	8	< 0.004	0.103	0.055	0.053	0.030
CBOD-5 (mg/L)	8	1.0	5.2	2.0 <sup>M</sup>	2.4	1.5
Chlorides (mg/L)	8	4.6	9.2	5.1	5.5	1.5
Atrazine (µg/L)	2	0.05	0.05	0.03	0.03	0.00
<b>Total Metals</b>						
Aluminum (mg/L)	4	0.086	0.373	0.199	0.214	0.120
Iron (mg/L)	4	1.05	1.49	1.315	1.293	0.194
Manganese (mg/L)	4	0.079	0.166	0.119	0.121	0.044
<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)	4	< 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	0.063	0.223	0.191	0.167	0.072
Lead (µg/L)	4	< 2	< 2	1	1	0.0
Manganese (mg/L)	4	0.008	0.083	0.052	0.049	0.032
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	0.500	0.000
Zinc (mg/L)	4	< 0.006	< 0.006	0.003	0.003	0.000
<b>Biological</b>						
<sup>J</sup> Chlorophyll a (µg/L)	8	0.53	3.20	1.34	1.67	0.9
Fecal Coliform (col/100 mL)	8	19	1700	295	551	618

J=estimate; N=# samples; M=value > 90th percentile of all data collected within eco-region 65i.

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