

# 2005 Monitoring Summary



## Little Wills Creek near Hwy 211 (Etowah County) 34.07150/-86.03062

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected Little Wills Creek 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 assessments were to assess the biological integrity each monitoring site and to estimate overall water quality within the ACT basin.



**Figure 1.** Sampling location and land use within the Little Wills Creek watershed at LWCE-1.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1 and Fig. 1. Little Wills Creek at LWCE-1 is a *Fish and Wildlife (F&W)* stream located in Etowah County. With a drainage area of 21 square miles, it consists mostly of forest (64%), pasture, and development (10%). The watershed is located in the *Southern Limestone/Dolomite Valleys and Low Rolling Hills* sub-ecoregion (Table 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. Little Wills Creek at LWCE-1 is a relatively deep, low gradient stream characterized by a mixture of substrates. Habitat quality and availability were rated as *sub-optimal* for supporting diverse aquatic macroinvertebrates due to sediment deposition and poor bank stability.

### BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each score is based on a 100 point scale with the final score comprising of the average of each metric score. The 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> )	21
Ecoregion <sup>a</sup>	67f
% Landuse	
Open water	<1
Wetland	Woody <1
Forest	Deciduous 50
	Evergreen 6
	Mixed 8
Shrub/scrub	4
Grassland/herbaceous	2
Pasture/hay	19
Cultivated crops	2
Development	Open space 8
	Low intensity 1
	Moderate intensity <1
	High intensity <1
Barren	<1
Population/km <sup>2</sup> <sup>b</sup>	22
# NPDES Permits <sup>c</sup>	<b>TOTAL</b> 6
Construction Stormwater	2
Mining	1
Industrial General	1
Industrial Individual	2

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2005 Census Data

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

**Table 2.** Physical characteristics of Little Wills Creek at LWCE-1, May 19, 2005.

Physical Characteristics	
Width (ft)	30
Canopy cover	Mostly Shaded
Depth (ft)	
	Riffle 0.4
	Run 2.0
	Pool 3.5
% of Reach	
	Riffle 5
	Run 60
	Pool 35
% Substrate	
	Bedrock 10
	Boulder 5
	Cobble 25
	Clay 16
	Gravel 30
	Sand 10
	Organic Matter 4

**Table 3.** Results of habitat assessment of Little Wills Creek at LWCE-1, May 19, 2005.

Habitat Assessment Score)	(% Maximum	Rating
Instream habitat quality	72	Optimal (> 70)
Sediment deposition	55	Marginal (41-58)
Sinuosity	48	Marginal (45-64)
Bank and vegetative stability	31	Poor (<35)
Riparian buffer	85	Sub-optimal (70-90)
Habitat assessment score	154	
<b>% Maximum score</b>	<b>64</b>	<b>Sub-optimal (59-70)</b>

**Table 4.** Results of Macroinvertebrate Assessment of Little Wills Creek at LWCE-1, May 19, 2005.

Macroinvertebrate Assessment Results			
	Results	Scores	Rating
<b>Taxa richness measures</b>		<b>(0-100)</b>	
# Ephemeroptera (mayfly) genera	8	100	Excellent (>85)
# Plecoptera (stonefly) genera	3	17	Poor (16-31)
# Trichoptera (caddisfly) genera	6	100	Excellent (>83)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	8	71	Fair (49.4-74.1)
% Non-insect organisms	2	85	Fair (62.7-93.9)
% Plecoptera	0	4	Very Poor (<6.56)
<b>Tolerance measures</b>			
Beck's community tolerance index	7	71	Good (60.7-80.4)
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>64</b>	<b>Fair (48-72)</b>

## WATER CHEMISTRY

Results for 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 fecal coliform count was 2000 colonies/100mL after a high flow event in March. Median hardness, chloride, nitrate+nitrite nitrogen, and total nitrogen concentrations were higher than the 90th percentile of least-impaired reference data collected within the 67f subcoregion.

## CONCLUSIONS

Bioassessment results indicated that macroinvertebrate community to be in *fair* condition. Results of a habitat assessment and intensive water quality sampling suggested nutrient enrichment and sedimentation to be concerns within the reach.

### FOR MORE INFORMATION, CONTACT:

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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. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Median	Avg	SD
<b>Physical</b>						
Temperature (°C)	8	14.0	24.0	19.8	19.2	3.9
Turbidity (NTU)	8	2.0	155.0	5.0	24.7	52.8
Total dissolved solids (mg/L)	7	88.0	173.0	129.0	128.7	31.5
Total suspended solids (mg/L)	7	2.0	154.0	5.0	27.4	55.9
Specific conductance (µmhos)	8	125.5	278.2	224.1	215.3	52.0
Hardness (mg/L)	5	57.8	172.0	127.0 <sup>M</sup>	117.0	42.9
Alkalinity (mg/L)	7	53.5	138.8	95.4	96.3	28.9
Stream Flow (cfs)	8	3.4	71.6	13.9	25.6	---
<b>Chemical</b>						
Dissolved oxygen (mg/L)	8	7.9	9.7	8.7	8.7	0.7
pH (su)	8	7.3	8.1	7.6	7.6	0.3
Ammonia Nitrogen (mg/L)	7	< 0.015	0.196	0.008	0.037	0.070
Nitrate+Nitrite Nitrogen (mg/L)	7	0.310	0.710	0.613 <sup>M</sup>	0.548	0.161
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.811	0.075	0.203	0.275
Total nitrogen (mg/L)	7	0.385	1.139	0.719 <sup>M</sup>	0.751	0.237
Dissolved reactive phosphorus (mg/L)	7	0.008	0.031	0.017	0.017	0.008
Total phosphorus (mg/L)	7	0.031	0.144	0.049	0.064	0.041
CBOD-5 (mg/L)	7	1.3	4.8	2.0	2.3	1.1
COD (mg/L)	1	< 2.0	< 2.0	1.0	1.0	0
Chlorides (mg/L)	6	3.4	2.0	4.6 <sup>M</sup>	4.5	0.7
Atrazine (µg/L)	2	< 0.05	< 0.05	0.03	0.03	0
<b>Total Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.206	0.039	0.073	0.1
Iron (mg/L)	4	< 0.005	0.212	0.041	0.074	0.1
Manganese (mg/L)	4	< 0.005	0.013	0.007	0.007	0
<b>Dissolved Metals</b>						
Aluminum (mg/L)	4	< 0.015	0.015	0.008	0.008	0
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
Chromium (mg/L)	4	0.004	0.004	0.002	0.002	0
Copper (mg/L)	4	0.005	0.005	0.003	0.003	0
Iron (mg/L)	4	0.005	0.005	0.003	0.003	0
Lead (µg/L)	4	< 2	< 2	1	1	0
Manganese (mg/L)	4	0.005	0.007	0.003	0.004	0
Mercury (µg/L)	4	0.3	0.3	0.15	0.188	0.1
Nickel (mg/L)	4	0.006	0.006	0.003	0.003	0
Selenium (µg/L)	4	< 10	< 10	10	10	0
Silver (mg/L)	4	0.003	0.003	0.002	0.002	0
Thallium (µg/L)	4	1	1	0.5	0.500	0
Zinc (mg/L)	4	0.006	0.006	0.003	0.003	0
<b>Biological</b>						
<sup>J</sup> Chlorophyll a (µg/L)	6	0.53	14.95	1.07	4.09	5.8
<sup>J</sup> Fecal Coliform (col/100 mL)	7	9	2000	57	323	740

J= estimate; N= # of samples; M= value > 90th percentile of ecoregional reference reach data collected in ecoregion 67f.