

# 2007 Monitoring Summary



## Little Yellow Creek at AL Hwy 69 in Tuscaloosa County (33.56672/-87.41025)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Little Yellow Creek watershed for biological and water quality monitoring as part of the [2007 Black Warrior/Cahaba \(BWC\) Basin Assessment Monitoring](#). The objectives of the BWC Basin Assessments were to assess each monitoring location and to estimate the overall water quality within the basin. These data were also used for metric and criteria development.

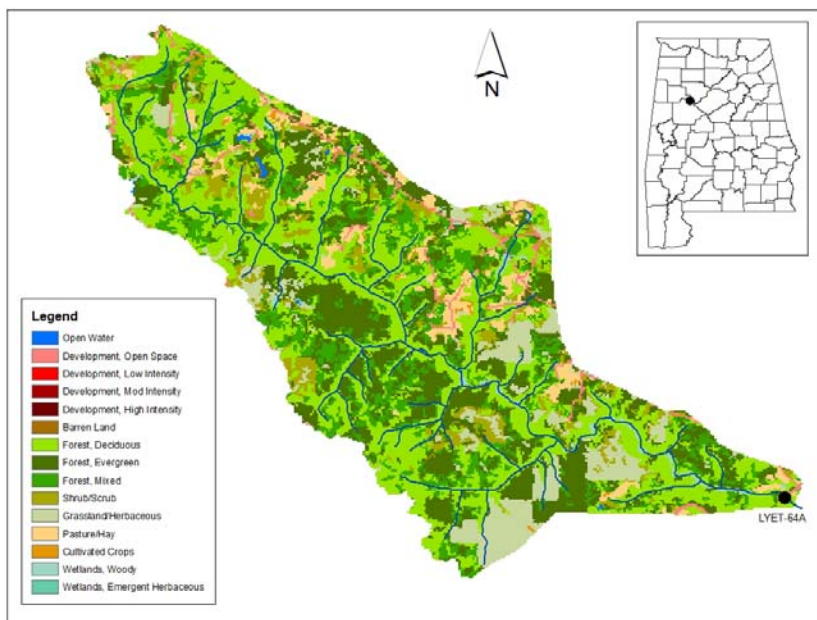


Figure 1. Watershed Characteristics of Little Yellow Creek at LYET-64A.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Yellow Creek is a [Fish & Wildlife \(F&W\)](#) stream located in Tuscaloosa County. Based on the 2000 National Land Cover Dataset, landuse within the watershed is primarily forest (76%) with some grassland, shrubs and pasture (Figure 1). Population density is relatively low in this area. As of February 23, 2011, six NPDES permits have been issued in this watershed, including five mining permits.

### REACH CHARACTERISTICS

[General observations](#) (Table 2) and a [habitat assessment](#) (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 Yellow Creek at LYET-64A is a low gradient stream characterized by a primarily bedrock substrate. This watershed lies in the Shale Hills sub ecoregion (68f). Overall habitat quality was categorized as *sub-optimal*. A lack of instream habitat was noted 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 the average of the scores for all individual metrics. Metric results indicated the macroinvertebrate community to be in *fair* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Black Warrior River
<b>Basin</b>		
<b>Drainage Area (mi<sup>2</sup>)</b>		15
<b>Ecoregion<sup>a</sup></b>		68f
<b>% Landuse</b>		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	38
	Evergreen	23
	Mixed	15
	Shrub/scrub	7
	Grassland/herbaceous	9
	Pasture/hay	5
	Cultivated crops	<1
	Development	Open space
	Barren	<1
<b>Population/km<sup>2</sup><sup>b</sup></b>		5
<b># NPDES Permits<sup>c</sup></b>	<b>TOTAL</b>	6
	Construction Stormwater	1
	Mining	5

a. Shale Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011.

Table 2. Physical Characteristics of Little Yellow Creek at LYET-64A, May 9, 2007.

Physical Characteristics	
<b>Width (ft)</b>	25
<b>Canopy Cover</b>	Mostly Shaded
<b>Depth (ft)</b>	
	Riffle
	Run
	Pool
<b>% of Reach</b>	
	Riffle
	Run
	Pool
<b>% Substrate</b>	
	Bedrock
	Boulder
	Cobble
	Gravel
	Sand
	Silt
	Organic Matter

**Table 3.** Results of the habitat assessment conducted on Little Yellow Creek at LYET-64A, May 9, 2007.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	47	Marginal (41-58)
Sediment Deposition	82	Optimal >70
Sinuosity	53	Marginal (45-64)
Bank and Vegetative Stability	65	Sub-optimal (60-74)
Riparian Buffer	70	Sub-optimal (70-89)
<b>Habitat Assessment Score</b>	<b>155</b>	
<b>% Maximum Score</b>	<b>65</b>	<b>Sub-optimal (59-70)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Little Yellow Creek at LYET-64A, May 9, 2007.

Macroinvertebrate Assessment			
	Results	Scores	Rating
	(0-100)		
<b>Taxa richness measures</b>			
# Ephemeroptera (mayfly) genera	10	83	Good (75-85)
# Plecoptera (stonefly) genera	3	50	Good (50-75)
# Trichoptera (caddisfly) genera	3	25	Poor (22-44)
<b>Taxonomic composition measures</b>			
% Non-insect taxa	13	48	Poor (24.7-49.4)
% Non-insect organisms	6	84	Fair (62.8-93.9)
% Plecoptera	3	13	Fair (13.2-19.7)
<b>Tolerance measures</b>			
Beck's community tolerance index	10	36	Poor (20.2-40.9)
<b>WMB-I Assessment Score</b>	--	<b>48</b>	<b>Fair (49-72)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. [In situ measurements](#) and [water samples](#) were collected monthly, or semi-monthly (metals), during March through October of 2007, to help identify any stressors to the biological communities. The dissolved oxygen concentration was below [F&W](#) use classification criterion in July. Flow during this sampling event was 3.2 cfs. Median concentrations of specific conductance, hardness, chlorophyll *a* and dissolved manganese were higher than expected based on reference data collected in the ecoregion 68. Dissolved thallium exceeded the Human Health (HH) criterion for fish consumption on March 27, 2007.

## SUMMARY

As part of [assessment process](#), ADEM will review the monitoring information presented in this report along with all other available data.

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. The overall habitat assessment score was *sub-optimal*, although there was a lack of good in-stream habitat. Specific conductance and hardness were higher than expected as compared to data from ADEM's least-impaired reference reaches in ecoregion 68. Monitoring should continue to ensure that water quality and biological conditions remain stable.

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**Table 5.** Summary of water quality data collected March-October, 2007. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	Med	Avg	SD	Q	E
<b>Physical</b>								
Temperature (°C)	8	18.1	25.9	23.4	22.7		2.6	
Turbidity (NTU)	10	0.0	9.0	3.2	3.7		2.8	
Total Dissolved Solids (mg/L)	6	10.0	130.0	49.0	54.7		48.6	
Total Suspended Solids (mg/L)	6	2.0	18.0	10.0	9.8		6.6	
Specific Conductance (µmhos)	8	71.4	163.5	89.8 <sup>G</sup>	94.5		29.2	
Hardness (mg/L)	4	21.1	42.0	33.8 <sup>G</sup>	32.7		8.7	
Alkalinity (mg/L)	6	6.7	13.4	11.4	10.6		2.9	
Stream Flow (cfs)	7	0.1	4.2	0.4	1.4		1.6	
<b>Chemical</b>								
Dissolved Oxygen (mg/L)	8	0.3 <sup>C</sup>	9.4	7.6	6.9		3.0	1
pH (su)	8	6.6	7.4	6.8	6.9		0.3	
Ammonia Nitrogen (mg/L)	6	< 0.015	< 0.015	0.008	0.008		0.000	
Nitrate+Nitrite Nitrogen (mg/L)	6	< 0.003	0.076	0.019	0.027		0.028	J
Total Kjeldahl Nitrogen (mg/L)	6	< 0.150	0.559	0.284	0.279		0.187	
Total Nitrogen (mg/L)	6	< 0.076	0.597	0.325	0.306		0.197	J
Dissolved Reactive Phosphorus (mg/L)	6	0.005	0.062	0.011	0.018		0.022	
Total Phosphorus (mg/L)	6	0.020	0.057	0.024	0.030		0.014	J
CBOD-5 (mg/L)	6	< 1.0	< 1.0	0.5	0.6		0.2	
Chlorides (mg/L)	6	2.6	4.4	3.8	3.6		0.8	J
<b>Total Metals</b>								
Aluminum (mg/L)	5	0.052	0.380	0.095	0.148		0.132	J
Iron (mg/L)	5	0.220	0.980	0.419	0.481		0.291	J
Manganese (mg/L)	5	0.040	0.290	0.126	0.156		0.095	J
<b>Dissolved Metals</b>								
Aluminum (mg/L)	5	< 0.015	0.280	0.008	0.070		0.119	
Antimony (µg/L)	5	< 1.6	5.0	1.0	1.2		0.7	
Arsenic (µg/L)	3	< 0.5	< 5.0	1.1	1.3		1.1	
Cadmium (mg/L)	5	< 0.000	< 0.005	0.002	0.002		0.001	J
Chromium (mg/L)	5	< 0.003	0.010	0.002	0.003		0.001	
Copper (mg/L)	5	< 0.002	0.010	0.002	0.003		0.001	
Iron (mg/L)	5	0.070	0.201	0.180	0.151		0.058	J
Lead (µg/L)	5	< 1.1	5.0	0.7	1.0		0.8	
Manganese (mg/L)	5	0.040	0.173	0.080 <sup>M</sup>	0.089		0.050	J
Mercury (µg/L)	5	< 0.0	< 0.5	0.2	0.2		0.1	J
Nickel (mg/L)	5	< 0.004	0.010	0.003	0.003		0.001	
Selenium (µg/L)	5	< 1.6	5.0	0.8	1.2		0.8	
Silver (mg/L)	4	< 0.000	< 0.003	0.001	0.001		0.001	
Thallium (µg/L)	4	< 0.6	1.8 <sup>H</sup>	0.4	0.8		0.7	1
Zinc (mg/L)	5	< 0.002	0.010	0.003	0.003		0.001	
<b>Biological</b>								
Chlorophyll <i>a</i> (ug/L)	6	1.07	14.69	3.50 <sup>M</sup>	5.12		5.06	J
Fecal Coliform (col/100 mL)	6	10	230	57	74		82	J

C=value exceeds toxic criteria for F& W use classification; E=# samples that exceeded criteria; G=value > median of all ecoregional reference reach data collected in ecoregion 68; H=(F&W) human health criterion exceeded; J=estimate; N=# samples; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 68; Q=Laboratory qualifier codes.