

2013 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 2013 Use Support Assessment Monitoring. The objective of this assessment was to determine if Little Yellow Creek was meeting its *F&W* use classification. Water samples were collected monthly March through October. A habitat and macroinvertebrate assessment was also conducted on June 5, 2013.

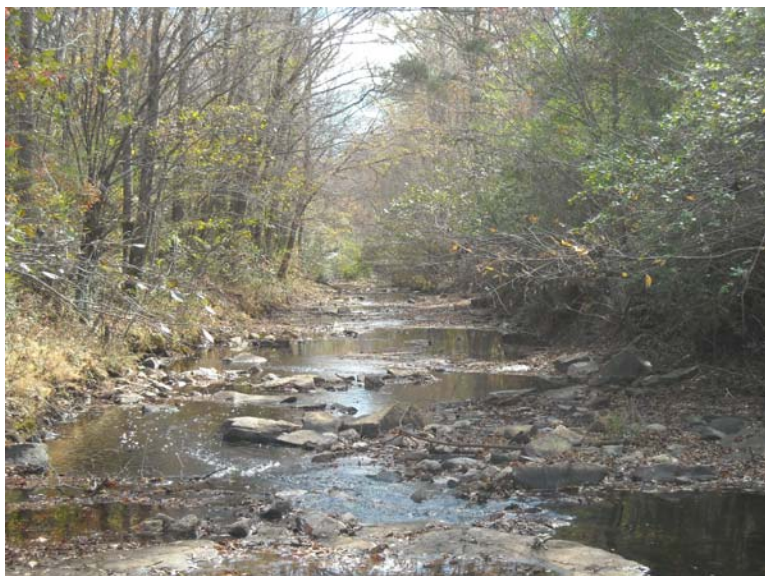


Figure 1. Little Yellow Creek at LYET-64A on November 19, 2013.

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 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (76%) with some grassland, shrubs and pasture. The forested area is composed of deciduous trees and evergreen trees. Population density is relatively low in this area. As of May 13, 2013, 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.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi²)		15
Ecoregion^a		68f
% Landuse		
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	2
Barren		<1
Population/km^{2b}		5
# NPDES Permits^c	TOTAL	6
Construction Stormwater		1
Mining		5

a. Shale Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of Little Yellow Creek at LYET-64A, June 5, 2013.

Physical Characteristics		
Width (ft)		25
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.2
	Run	1.0
	Pool	1.8
% of Reach		
	Riffle	3
	Run	40
	Pool	57
% Substrate		
	Bedrock	64
	Boulder	1
	Cobble	1
	Gravel	3
	Sand	15
	Silt	1
	Organic Matter	15

Table 3. Results of the habitat assessment conducted on Little Yellow Creek at LYET-64A, June 5, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	54	Marginal (41-58)
Sediment Deposition	65	Sub-optimal (59-70)
Sinuosity	58	Marginal (45-64)
Bank and Vegetative Stability	61	Sub-optimal (60-74)
Riparian Buffer	68	Marginal (50-69)
Habitat Assessment Score	151	
% Maximum Score	63	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Little Yellow Creek at LYET-64A, June 5, 2013.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
# Ephemeroptera (mayfly) taxa		10
# Plecoptera (stonefly) taxa		2
# Trichoptera (caddisfly) taxa		8
Taxonomic composition measures		
% Non-insect taxa		10
% Plecoptera		0
% Non-insect organisms		4
Community tolerance		
Becks community tolerance index		9
WMB-I Assessment Score		53
WMB-I Assessment Rating		Fair (48-71)

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).

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly during March through October of 2013 to help identify any stressors to the biological communities. Median concentrations of specific conductance and ammonia nitrogen were higher than expected based on the 90th percentile of all reference data collected in the ecoregion 68. In June 2013 water temperature was above values expected for streams in the ecoregion. Flow during this sampling event was 2.6 cfs. Measurements of pH were consistently lower than expected when compared to ecoregional values. In July 2013 turbidity was much higher than expected; this was due to thunderstorms prior to sampling.

Table 5. Summary of water quality data collected March-October, 2013. 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
Physical						
Temperature (°C)	9	8.9	25.0 ^C	19.4	18.7	5.8
Turbidity (NTU)	9	1.0	486.0 ^T	3.4	57.0	160.9
Total Dissolved Solids (mg/L)	8	44.0	167.0	79.0	81.9	38.1
^J Total Suspended Solids (mg/L)	8	< 1.0	487.0	2.0	62.6	171.5
Specific Conductance (µmhos)	9	63.0	148.0	107.4 ^G	102.0	30.7
Alkalinity (mg/L)	8	2.4	10.6	4.9	6.0	3.2
Stream Flow (cfs)	8	0.3	32.9	3.2	8.9	11.6
Chemical						
Dissolved Oxygen (mg/L)	9	7.6	12.1	8.5	9.1	1.4
pH (su)	9	6.4 ^C	7.5	6.8	6.9	0.4
^J Ammonia Nitrogen (mg/L)	8	< 0.015	0.029	0.011 ^M	0.011	0.004
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.003	0.081	0.036	0.035	0.031
Total Kjeldahl Nitrogen (mg/L)	8	< 0.050	2.650	0.202	0.502	0.873
Total Nitrogen (mg/L)	8	< 0.026	2.731	0.220	0.537	0.893
^J Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.007	0.004	0.004	0.001
^J Total Phosphorus (mg/L)	8	< 0.005	0.057	0.009	0.015	0.017
^J CBOD-5 (mg/L)	8	< 2.0	2.2	1.0	1.2	0.4
^J Chlorides (mg/L)	8	1.9	11.5	4.0	4.7	2.9
Biological						
Chlorophyll a (µg/L)	8	< 1.00	17.10	0.50	3.18	5.87

C= F& W criterion violated; G=value > median of all ecoregional reference reach data collected in ecoregion 68; J=estimate; N=# samples; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregion 68; T= value exceeds 50 NTU above the 90th percentile of all verified ecoregional reference reach data collected in the ecoregion 68.

SUMMARY

As part of the 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 instream habitat. Water chemistry analyses showed higher specific conductance and ammonia nitrogen, and lower pH than compared to reference data in the ecoregion. These levels could be potential causes of stressors to the biological community in the Little Yellow watershed.

Monitoring should continue to ensure that water quality and biological conditions remain stable.

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