

2010 Monitoring Summary



Basin Assessment Site

Yellow Creek at Dekalb County Road 295 (34.40308/-85.63685)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Yellow Creek watershed for biological and water quality monitoring as part of the 2010 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 basins. A habitat and macroinvertebrate assessment was conducted on Yellow Creek at YELD-1 on June 15, 2010.



Figure 1. Yellow Creek at YELD-1, November 18, 2010.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi²)		14
Ecoregion^a		68d
% Landuse		
Open water		<1
Wetland	Woody	<1
	Emergent herbaceous	<1
Forest	Deciduous	31
	Evergreen	5
	Mixed	20
Shrub/scrub		3
Grassland/herbaceous		2
Pasture/hay		30
Cultivated crops		2
Development	Open space	4
	Low intensity	1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km²^b		34
# NPDES Permits^c	TOTAL	3
	Construction Stormwater	3

a.Southern Table Plateaus

b.2000 US Census

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

Table 2. Physical characteristics of Yellow Creek at YELD-1, June 15, 2010.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Estimate 50/50
Depth (ft)		
	Riffle	0.4
	Run	1.5
	Pool	2.0
% of Reach		
	Riffle	10
	Run	80
	Pool	10
% Substrate		
	Bedrock	73
	Cobble	1
	Gravel	2
	Sand	1
	Silt	15
	Organic Matter	8

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Yellow Creek is a *Fish and Wildlife (F&W)* stream located near the city of Fort Payne, Alabama, in the Southern Table Plateau ecoregion (68d). At YELD-1, the stream drains approximately fourteen square miles of countryside. Based on the 2000 National Land Cover Dataset, land use within the watershed is primarily forest (56%) and pasture (30%). As of September 1, 2012, three NPDES permits have been issued in this watershed.

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. Habitat available for macroinvertebrate colonization in Yellow Creek at YELD-1 was naturally limited by the high percentage of bedrock substrate (Figure 1). Overall habitat quality was categorized as *sub-optimal*. However, sinuosity and riparian buffer were noted as an issue 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 average of all metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Yellow Creek at YELD-1, June 15, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	59	Sub-optimal (59-70)
Sediment Deposition	80	Optimal >70
Sinuosity	58	Marginal (45-64)
Bank and Vegetative Stability	81	Optimal >74
Riparian Buffer	51	Marginal (50-69)
Habitat Assessment Score	164	
% Maximum Score	68	Sub-optimal (59-70)

Table 4. Results of the macroinvertebrate bioassessment conducted in Yellow Creek at YELD-1, June 15, 2010.

Macroinvertebrate Assessment		Results
Taxa richness and diversity measures		
# Ephemeroptera (mayfly) taxa		8
# Plecoptera (stonefly) taxa		1
# Trichoptera (caddisfly) taxa		8
Taxonomic composition measures		
% Non-insect taxa		10
% Plecoptera		6
% Non-insect organisms		1
Community tolerance		
Becks community tolerance index		7
WMB-I Assessment Score		52
WMB-I Assessment Rating		Fair (48-71)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected semi-monthly, May through November of 2010 to help identify any stressors to the biological communities. However, the creek was dry on September 28, 2010, and samples could not be collected. Dissolved oxygen was <5.0 mg/L on June 15, 2010, and flow was 3.5 cfs during this sampling event. Median dissolved metals (copper and iron), total metals (aluminum and iron), and hardness were higher than the data collected at reference reaches within the Southern Table Plateaus ecoregion (68d).

SUMMARY

Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Intensive water chemistry results indicated higher than expected metals and hardness concentrations, as compared to data from least-impaired reference reaches in the same ecoregion. Additionally, flow conditions during the sampling period were low. Low-level metals sampling may be necessary to determine if the criteria exceedances are due to natural conditions or anthropogenic sources.

Table 5. Summary of water quality data collected May-November, 2010. 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	Med	Avg	SD	E
Physical							
Temperature (°C)	5	9.8	24.4	19.5	18.8	5.9	
Turbidity (NTU)	4	4.2	8.1	6.2	6.2	2.0	
Total Dissolved Solids (mg/L)	3	15.0	40.0	38.0	31.0	13.9	
Total Suspended Solids (mg/L)	3	1.0	5.0	1.0	2.3	2.3	
Specific Conductance (µmhos)	5	45.2	74.0	49.0	55.2	11.7	
Hardness (mg/L)	3	14.8	20.4	18.5 ^G	17.9	2.8	
Alkalinity (mg/L)	3	8.0	12.4	8.1	9.5	2.5	
Stream Flow (cfs)	4	2.7	8.9	3.4	4.6	2.9	
Chemical							
Dissolved Oxygen (mg/L)	5	4.6 ^C	8.3	6.6	6.5	1.5	1
pH (su)	5	6.2	7.0	6.7	6.6	0.4	
Nitrate+Nitrite Nitrogen (mg/L)	3	0.093	0.485	0.145	0.241	0.213	
^J Dissolved Reactive Phosphorus (mg/L)	3	< 0.003	0.004	0.002	0.002	0.001	
^J CBOD-5 (mg/L)	3	< 1.0	1.0	0.5	0.5	0.0	
Chlorides (mg/L)	3	1.9	3.6	2.1	2.5	0.9	
Atrazine (µg/L)	2	< 0.02	< 0.02	0.01	0.01	0.00	
Total Metals							
Aluminum (mg/L)	3	0.075	0.362	0.274 ^M	0.237	0.147	
Iron (mg/L)	3	0.623	1.340	0.721 ^M	0.895	0.389	
Manganese (mg/L)	3	0.103	0.236	0.184	0.174	0.067	
Dissolved Metals							
Aluminum (mg/L)	3	< 0.020	0.028	0.021	0.020	0.009	
Antimony (µg/L)	3	< 0.5	0.5	0.2	0.2	0.0	
Arsenic (µg/L)	3	< 1.0	< 1.0	0.5	0.5	0.0	
^J Cadmium (mg/L)	3	< 0.0004	< 0.0004	0.0004	0.0004	0.000	
Chromium (mg/L)	3	< 0.002	< 0.002	0.001	0.001	0.000	
Copper (mg/L)	3	< 0.200	< 0.200	0.100 ^M	0.100	0.000	
Iron (mg/L)	3	0.123	0.325	0.319 ^M	0.256	0.115	
^J Lead (µg/L)	3	< 2.0	< 2.0	1.0	1.0	0.0	
Manganese (mg/L)	3	0.090	0.186	0.112	0.129	0.050	
^{JB} Mercury (µg/L)	2	< 0.200	< 0.200	0.100	0.100	0.000	
Nickel (mg/L)	3	< 0.005	< 0.005	0.002	0.002	0.000	
Selenium (µg/L)	3	< 1.2	< 1.2	0.6	0.6	0.0	
Silver (mg/L)	3	< 0.001	< 0.001	0.000	0.000	0.000	
Thallium (µg/L)	3	< 0.7	< 0.7	0.4	0.4	0.0	
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000	
Biological							
Chlorophyll a (ug/L)	3	< 1.00	3.20	0.50	1.40	1.56	
^J E. coli (col/100mL)	3	102	435	117	218	188	

^B=samples excluded due to laboratory QC concerns; ^C=F&W aquatic life use criteria exceeded; ^E=# samples that exceeded criteria; ^G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 68d; ^J=estimate; ^M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68d; ^N=# samples.

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