

# 2010 Monitoring Summary



## Majors Creek in Baldwin County at AL Hwy 59 (31.12892/-87.81803)

### BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Majors Creek watershed for biological and water quality monitoring as part of the 2010 Assessment of the Alabama, Coosa, and Tallapoosa River Basins. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basins.

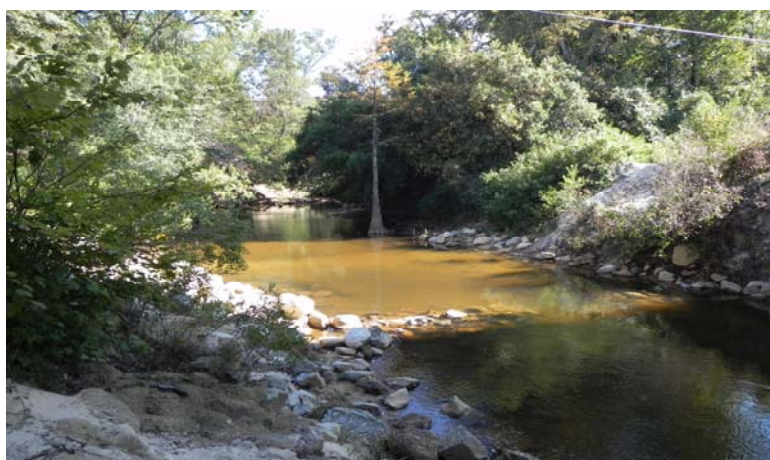


Figure 1. Majors Creek at MAJB-1, October 13, 2010.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Majors Creek is a *Fish & Wildlife (F&W)* stream located North of Stockton, Alabama. Based on the 2011 National Land Cover Dataset, landuse within the watershed is predominantly forested (47%) followed by shrubs/scrub and woody wetland. Population is low, with little development in the area. As of April 1, 2016, two outfalls are active 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. Majors Creek at MAJB-1 is a glide-pool stream with substrate composed primarily of sand (Figure 1). Overall habitat quality was rated as *sub-optimal* for supporting diverse aquatic macroinvertebrate communities.

### BIOASSESSMENT RESULTS

ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance are used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each site is placed in one of six levels, ranging from 1, or *natural* to 6, or *highly altered*. The macroinvertebrate survey conducted in Majors Creek at MAJB-1 rated the site as *fair*. Relative abundance and numbers of pollution-sensitive taxa are lower than expected, while relative abundance and numbers of pollution-tolerant taxa have increased (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		Alabama R
<b>Basin</b>		Alabama R
<b>Drainage Area (mi<sup>2</sup>)</b>		45
<b>Ecoregion<sup>a</sup></b>		65F
<b>% Landuse<sup>b</sup></b>		
Open water		<1%
Wetland	Woody	13%
	Emergent herbaceous	<1%
Forest	Deciduous	1%
	Evergreen	41%
	Mixed	5%
Shrub/scrub		26%
Grassland/herbaceous		12%
Pasture/hay		<1%
Cultivated crops		<1%
Development	Open space	1%
	Low intensity	<1%
Barren		<1%
<b>Population/km<sup>2c</sup></b>		3
<b># NPDES Permits<sup>d</sup></b>	<b>TOTAL</b>	2
Mining		2

a.Southern Pine Plains & Hills

b.2011 National Land Cover Dataset

c.2010 US Census

d.#NPDES outfalls downloaded from ADEM's NPDES Management System database, April 1, 2016.

Table 2. Physical characteristics of Majors Creek at MAJB-1, May 10, 2010.

Physical Characteristics	
<b>Width (ft)</b>	35
<b>Canopy Cover</b>	Estimate 50/50
<b>Depth (ft)</b>	
	Run 1.5
	Pool 4.0
<b>% of Reach</b>	
	Run 50
	Pool 50
<b>% Substrate</b>	
	Gravel 3
	Sand 75
	Silt 2
	Organic Matter 20

**Table 3.** Results of the habitat assessment conducted on Majors Creek at MAJB-1, May 10, 2010.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	38	Poor (<40)
Sediment Deposition	68	Optimal (>65)
Sinuosity	60	Marginal (45-<65)
Bank Vegetative Stability	54	Marginal (35-<59)
Riparian Buffer	88	Sub-Optimal (70-90)
<b>Habitat Assessment Score</b>	<b>120</b>	
<b>%f Maximum Score</b>	<b>55</b>	<b>Sub-Optimal (53-65)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Majors Creek at MAJB-1, May 10, 2010.

Macroinvertebrate Assessment		Results
<b>Taxa richness and diversity measures</b>		
Total # Taxa		38
# EPT taxa		6
# Highly-sensitive and Specialized Taxa		2
<b>Taxonomic composition measures</b>		
% EPC taxa		24
% Trichoptera & Chironomidae Taxa		45
% EP Individuals		20
% Chironomidae Individuals		49
% Individuals in Dominant 5 Taxa		65
<b>Functional feeding group</b>		
% Collector-Filterer Individuals		23
% Tolerant Filterer Taxa		13
<b>Community tolerance</b>		
# Sensitive EPT		3
% Sensitive taxa		29
% Nutrient Tolerant individuals		20
<b>WMB-I Assessment Score</b>		<b>4</b>
<b>WMB-I Assessment Rating</b>		<b>Fair</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during April through October of 2010 to help identify any stressors to the biological communities. Stream pH, although low, was typical of the region. The median concentration of specific conductance and total nitrogen were higher than expected in comparison with data collected from least-impaired reference reaches in the same ecoregion.

Organics were collected at MAJB-1 on April 13th and October 13th, but all parameters except atrazine were below detection limits.

## 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 in Majors Creek at MAJB-1 indicated the macroinvertebrate community to be in *fair* condition. Overall habitat quality and availability was assessed as *sub-optimal* for supporting macroinvertebrate communities. Specific conductance and total nitrogen were higher than expected. Monitoring should continue to ensure that water quality and biological conditions remain stable.

**Table 5.** Summary of water quality data collected March-October, 2010. 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	E
<b>Physical</b>							
Temperature (°C)	5	15.8	25.8	19.6	20.2	3.9	
Turbidity (NTU)	5	4.0	10.3	8.1	7.9	2.5	
Total Dissolved Solids (mg/L)	4	24.0	30.0	28.0	27.5	2.6	
Total Suspended Solids (mg/L)	4 <	5.0	10.0	4.8	5.5	3.7	
Specific Conductance (µmhos)	5	19.0	24.0	21.0 <sup>3</sup>	21.2	2.0	
J Hardness (mg/L)	3	3.6	4.1	3.8	3.9	0.2	
J Alkalinity (mg/L)	4 <	4.0 <	4.0	2.0	2.0	0.0	
Stream Flow (cfs)	5	16.9	55.0	54.0	42.6	17.3	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	5	7.4	9.6	8.6	8.6	0.9	
pH (su)	5	5.1 <sup>C</sup>	6.1	5.6	5.6	0.4	4
Ammonia Nitrogen (mg/L)	4 <	0.029 <	0.029	0.014	0.014	0.000	
J Nitrate+Nitrite Nitrogen (mg/L)	4	0.109	0.591	0.190	0.270	0.217	
Total Kjeldahl Nitrogen (mg/L)	4 <	0.070	0.550	0.290	0.291	0.216	
J Total Nitrogen (mg/L)	4 <	0.144	0.821	0.840 <sup>M</sup>	0.562	0.303	
J Dissolved Reactive Phosphorus (mg/L)	4	0.007	0.015	0.008	0.010	0.004	
J Total Phosphorus (mg/L)	4	0.007	0.018	0.010	0.011	0.005	
CBOD-5 (mg/L)	4 <	1.0 <	1.0	0.5	0.5	0.0	
Chlorides (mg/L)	4 <	0.6 <	0.6	0.3	0.3	0.0	
Atrazine (µg/L)	3 <	0.02	0.08	0.01	0.03	0.04	
<b>Total Metals</b>							
J Aluminum (mg/L)	4	0.037	0.432	0.299	0.267	0.167	
J Iron (mg/L)	4	0.554	1.960	1.170	1.214	0.591	
J Manganese (mg/L)	4	0.003	0.041	0.013	0.018	0.018	
<b>Dissolved Metals</b>							
J Aluminum (mg/L)	4 <	0.033	0.233	0.116	0.120	0.100	
J Antimony (µg/L)	4 <	1.9 <	2.3	1.0	1.0	0.1	
J Arsenic (µg/L)	4 <	1.9 <	2.1	1.0	1.0	0.0	
J Cadmium (mg/L)	4 <	0.000014 <	0.00006	0.000	0.000	0.000	
Chromium (mg/L)	4 <	0.013 <	0.015	0.008	0.007	0.000	
Copper (mg/L)	4 <	0.013 <	0.014	0.007	0.007	0.000	
J Iron (mg/L)	4	0.108	0.400	0.198	0.228	0.124	
J Lead (µg/L)	4 <	1.7 <	2.6	1.1	1.1	0.3	
J Manganese (mg/L)	4	0.002	0.035	0.023	0.021	0.014	
J Mercury (µg/L)	3 <	0.1 <	0.100	0.0	0.0	0.0	
Nickel (mg/L)	4 <	0.009 <	0.019	0.004	0.006	0.002	
J Selenium (µg/L)	4 <	0.8	2.0	0.6	0.9	0.7	
Silver (mg/L)	4 <	0.000015 <	0.0002	0.000	0.000	0.000	
J Thallium (µg/L)	4 <	0.8 <	1.2	0.4	0.4	0.2	
Zinc (mg/L)	4 <	0.002 <	0.030	0.001	0.004	0.007	
<b>Biological</b>							
Chlorophyll a (µg/L)	4 <	1.00	3.80	0.85	1.50	1.57	
J E. coli (col/100mL)	4	4	100	11	31	45	

C=value exceeds criteria for F&W use classification; E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples.

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