

# 2010 Monitoring Summary



Basin Assessment Site

Bailey's Creek at Monroe County Road 1 (31.37080/-87.59263)

## BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Bailey's 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 basin. Habitat and macroinvertebrate assessments were conducted on Bailey's Creek at BLYM-2 on May 10, 2010.



Figure 1. Bailey's Creek at BLYM-2, August 23, 2010.

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Bailey's Creek at BLYM-2 is a *Fish & Wildlife (F&W)* stream located in Monroe County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is 70% forest. Population density is very low. As of February 23, 2012, ADEM has issued no NPDES permits for 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. Bailey's Creek at BLYM-2 is a low-gradient stream typical of the Southern Pine Plains and Hills ecoregion (Figure 1). The benthic substrate consisted primarily of sand and organic matter. Sinuosity and instream habitat were categorized as marginal, while the overall habitat quality of this stream was categorized as *sub-optimal*.

## 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 all individual metric scores. Metric results indicated the biological community to be in *good* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Alabama River	
Drainage Area (mi <sup>2</sup> )	11	
Ecoregion <sup>a</sup>	65f	
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	8
	Evergreen	51
	Mixed	11
Shrub/scrub		17
Grassland/herbaceous		<1
Pasture/hay		3
Cultivated crops		8
Development	Open space	1
Population/km <sup>2b</sup>	1	

a. Southern Pine Plains & Hills

b. 2000 US Census

Table 2. Physical characteristics of Baileys Creek at BLYM-2, May 10, 2010.

Physical Characteristics		
Width (ft)	25	
Canopy Cover	Shaded	
Depth (ft)	Run	1.5
	Pool	4.0
% of Reach		
	Run	60
	Pool	40
% Substrate		
	Gravel	3
	Sand	75
	Silt	2
	Organic Matter	20

**Table 3.** Results of the habitat assessment conducted on Baileys Ck at BLYM-2, May 10, 2010.

Habitat Assessment	%Maximum Score	Rating
<b>GP</b>		
Instream Habitat Quality	46	Marginal (40-52)
Sediment Deposition	63	Sub-optimal (53-65)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	71	Sub-optimal (60-74)
Riparian Buffer	80	Sub-optimal (70-89)
<b>Habitat Assessment Score</b>	<b>138</b>	
<b>% Maximum Score</b>	<b>63</b>	Sub-optimal (53-65)

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Bailey's Creek at BLYM-2, May 10, 2010.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
<b>Taxa richness and diversity measures</b>		
% EPC taxa	29	48
% Trichoptera & Chironomidae Taxa	39	49
<b>Taxonomic composition measures</b>		
% EP Individuals	15	28
<b>Functional feeding group</b>		
% Collector-Filterer Individuals	5	100
<b>Community tolerance</b>		
% Nutrient Tolerant individuals	20	79
<b>WMB-I Assessment Score</b>	---	<b>61</b>
<b>WMB-I Assessment Rating</b>		<b>Good (46-73)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected four times per year, or biannually (pesticides, atrazine, and semi-volatile organics) during March through October to help identify any stressors to the biological communities.

Organics samples were collected at BLYM-2 on April 13 and Oct. 20, with no results above reporting limits. Although below reporting limits, dissolved arsenic was detected at a concentration above the human health criterion applicable to the stream's *F&W* use classification on August 23rd. On April 13th, dissolved mercury concentrations were below the reporting limit, but above aquatic life use and human health criteria. The median concentrations of specific conductance and nitrate+nitrite-nitrogen were higher than the expected for this stream type, based on the 90th percentile of data collected at reference reaches within the Southern Pine Plains and Hills ecoregion.

## SUMMARY

Bioassessment results indicated the macroinvertebrate community in Bailey's Creek at BLYM-2 to be in *good* condition. However, the concentrations of dissolved arsenic and dissolved mercury were slightly elevated and median concentrations of specific conductance and nitrate+nitrite 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	15.4	23.0	17.6	19.1	3.6
Turbidity (NTU)	5	4.0	15.3	8.5	8.9	4.4
Total Dissolved Solids (mg/L)	4	29.0	45.0	33.0	35.0	7.1
Total Suspended Solids (mg/L)	4 <	5.0	6.0	3.8	4.0	1.8
Specific Conductance (µmhos)	5	30.2	36.0	33.0 <sup>G</sup>	33.3	2.6
Hardness (mg/L)	4	10.3	10.9	10.8	10.7	0.3
<sup>J</sup> Alkalinity (mg/L)	4	8.0	9.0	9.0	8.8	0.5
Stream Flow (cfs)	5	6.2	24.3	15.4	16.2	7.1
<b>Chemical</b>						
Dissolved Oxygen (mg/L)	5	8.4	10.4	9.2	9.2	0.8
pH (su)	5	6.5	7.1	6.7	6.8	0.2
Ammonia Nitrogen (mg/L)	4 <	0.029 <	0.029	0.014	0.014	0.000
<sup>J</sup> Nitrate+Nitrite Nitrogen (mg/L)	4	0.245	0.476	0.369 <sup>M</sup>	0.365	0.095
Total Kjeldahl Nitrogen (mg/L)	4 <	0.070	0.320	0.160	0.169	0.119
<sup>J</sup> Total Nitrogen (mg/L)	4 <	0.397	0.696	0.520	0.534	0.141
<sup>J</sup> Dissolved Reactive Phosphorus (mg/L)	4	0.006	0.008	0.006	0.007	0.001
<sup>J</sup> Total Phosphorus (mg/L)	4	0.005	0.007	0.006	0.006	0.001
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)	2 <	0.02 <	0.02	0.01	0.01	0.00
<b>Total Metals</b>						
<sup>J</sup> Aluminum (mg/L)	4	0.056	0.199	0.100	0.114	0.063
<sup>J</sup> Iron (mg/L)	4	0.400	1.080	0.890	0.815	0.319
<sup>J</sup> Manganese (mg/L)	4	0.005	0.042	0.024	0.024	0.016
<b>Dissolved Metals</b>						
<sup>J</sup> Aluminum (mg/L)	4 <	0.033	0.145	0.038	0.060	0.060
<sup>J</sup> Antimony (µg/L)	4 <	1.9 <	2.3	0.9	1.0	0.1
<sup>J</sup> Arsenic (µg/L)	4 <	1.9	2.3 <sup>H</sup>	1.0	1.3	0.6 1
<sup>J</sup> Cadmium (µg/L)	4 <	0.014 <	0.060	0.012	0.016	0.011
Chromium (mg/L)	4 <	0.013 <	0.015	0.007	0.007	0.000
Copper (mg/L)	4 <	0.013 <	0.014	0.007	0.007	0.000
<sup>J</sup> Iron (mg/L)	4	0.073	0.140	0.112	0.110	0.033
<sup>J</sup> Lead (µg/L)	4 <	1.7 <	2.6	0.8	1.0	0.2
<sup>J</sup> Manganese (mg/L)	4	0.002	0.039	0.018	0.020	0.016
<sup>J</sup> Mercury (µg/L)	4 <	0.080	0.205 <sup>AH</sup>	0.046	0.084	0.081 1
<sup>J</sup> Nickel (mg/L)	4 <	0.009 <	0.019	0.007	0.007	0.003
Selenium (µg/L)	4 <	0.8 <	1.7	0.8	0.7	0.2
<sup>J</sup> Silver (µg/L)	4 <	0.015 <	0.200	0.054	0.054	0.053
<sup>J</sup> Thallium (µg/L)	4 <	0.6 <	1.2	0.3	0.4	0.2
Zinc (mg/L)	4 <	0.002 <	0.030	0.008	0.008	0.008
<b>Biological</b>						
Chlorophyll a (ug/L)	4 <	1.00 <	1.00	0.50	0.50	0.00
<sup>J</sup> E. coli (col/100mL)	4	2	22	10	11	9

A=*F&W* aquatic life use criterion exceeded; E=# samples that exceeded criteria; G= value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65f; H=*F&W* human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65f; N=# samples

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