

# 2010 Monitoring Summary



Basin Assessment Site

Byrd Creek at Parnell Ave. in Chilton County (32.78573/-86.87171)

## BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Byrd Creek watershed for biological and water quality monitoring as part of the 2010 Alabama, Coosa, and Tallapoosa (ACT) Basin Assessment Monitoring. 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 basin.

Byrd Creek was also monitored as a potential “best attainable condition” reference watershed for comparison with streams throughout the Fall Line Hills ecoregion. It is among the least-disturbed watersheds in the Alabama, Coosa, Tallapoosa (ACT) basin group based on landuse, road density, and population density. The objective of the study is to collect data to develop water quality criteria and TMDLs.

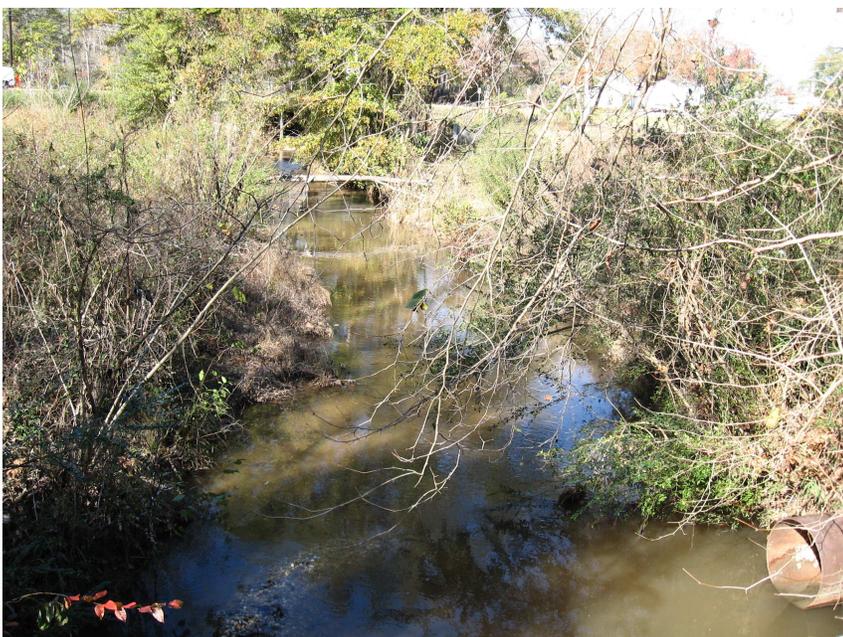


Figure 1. Byrd Creek at BYRC-1, May 13, 2010.

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Byrd Creek is a small *Fish & Wildlife* (F&W) stream that flows through Chilton County in the Fall Line Hills ecoregion (65i). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (84%) with some shrubs/scrubs. Population density is relatively low in this area. As of September 4, 2012, no 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. Byrd Creek at BYRC-1 is dominated by sand and gravel substrates. Hwy 22 bridge cuts through the reach and a small riffle habitat was created by the bridge. The stream is characterized by a narrow riparian buffer (Figure 1). Overall habitat quality was categorized as *marginal* for supporting macroinvertebrate communities.

## 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 in comparison to least-impaired reference reaches in the same ecoregion. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

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Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin	Alabama River	
Drainage Area (mi <sup>2</sup> )	6	
Ecoregion <sup>a</sup>	65i	
% Landuse		
Open water	<1	
Wetland	Woody <1	
Forest	Emergent herbaceous	
	Deciduous	22
	Evergreen	47
	Mixed	15
Shrub/scrub	8	
Pasture/hay	3	
Cultivated crops	1	
Development	Open space	3
	Low intensity	1
	Moderate intensity	<1
Population/km <sup>2</sup> <sup>b</sup>	16	

a. Fall Line Hills  
b. 2000 US Census

Table 2. Physical characteristics of Byrd Creek at BYRC-1, May 12, 2010.

Physical Characteristics		
Canopy Cover	Mostly Open	
Width (ft)	20	
Depth (ft)	Riffle	0.3
	Run	1.0
	Pool	3.0
% of Reach	Riffle	2
	Run	83
	Pool	15
% Substrate	Cobble	5
	Gravel	35
	Hard Pan Clay	1
	Sand	45
	Silt	10
	Organic Matter	4

**Table 3.** Results of the habitat assessment conducted on Byrd Creek at BYRC-1, May 12, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	60	Sub-optimal (53-65)
Sediment Deposition	34	Poor <40
Sinuosity	20	Poor <45
Bank and Vegetative Stability	39	Marginal (35-59)
Riparian Buffer	29	Poor <50
<b>Habitat Assessment Score</b>	<b>96</b>	
<b>% Maximum Score</b>	<b>40</b>	<b>Marginal (40-52)</b>

**Table 4.** Results of the macroinvertebrate bioassessment conducted in Byrd Creek at BYRC-1, May 12, 2010.

Macroinvertebrate Assessment		
	Results	Scores
<b>Taxa richness and diversity measures</b>		<b>(0-100)</b>
% EPC taxa	29	50
% Dominant Taxon	62	0
<b>Taxonomic composition measures</b>		
% EPT minus Baetidae and Hydropsychidae	22	41
<b>Functional feeding group</b>		
# Collector Taxa	27	100
<b>Community tolerance</b>		
% Nutrient Tolerant individuals	85	0
<b>WMB-I Assessment Score</b>	<b>---</b>	<b>38</b>
<b>WMB-I Assessment Rating</b>		<b>Fair (32-47)</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected in May and December 2010 to help identify any stressors to the biological communities. The stream was dry in July and September, and samples could not be collected. *In situ* parameters suggested that Byrd Creek at BYRC-1 was meeting *F&W* use classification. Nutrients, total dissolved solids, and chlorides were within the range expected in the Fall Line Hills ecoregion. Almost all metals analyzed were below the detection limits and those detected were within the range typical of this ecoregion. Samples were collected on December 1, 2010 for analysis of pesticides, semi-volatile organics, and atrazine. All concentrations 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.

Habitat was assessed as *marginal* for supporting biological communities due to a lack of instream habitats, narrow riparian buffer, and unstable stream banks. Bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Sampling should be continued to determine the source of stressors to the macroinvertebrate community.

**Table 5.** Summary of water quality data collected May & December, 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	Q
<b>Physical</b>							
Temperature (°C)	3	10.3	19.9	18.3	16.2	5.1	
Turbidity (NTU)	3	7.4	17.1	7.6	10.7	5.5	
Total Dissolved Solids (mg/L)	2	6.0	8.0	7.0	7.0	1.4	
Total Suspended Solids (mg/L)	2	7.0	8.0	7.5	7.5	0.7	
Specific Conductance (µmhos)	3	25.6	33.8	26.7	28.7	4.4	
Hardness (mg/L)	2	8.3	9.7	9.0	9.0	1.0	
Alkalinity (mg/L)	2	4.1	5.6	4.8	4.8	1.0	
Stream Flow (cfs)	3	3.0	6.0	3.2	4.0	1.7	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	3	8.5	10.6	8.8	9.3	1.1	
pH (su)	3	6.3	6.6	6.3	6.4	0.1	
Ammonia Nitrogen (mg/L)	2	< 0.021	< 0.021	0.010	0.010	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	2	0.081	0.283	0.182	0.182	0.143	
Total Kjeldahl Nitrogen (mg/L)	2	0.272	0.357	0.314	0.314	0.060	
Total Nitrogen (mg/L)	2	0.438	0.555	0.496	0.496	0.083	
Dissolved Reactive Phosphorus (mg/L)	2	0.005	0.009	0.007	0.007	0.003	J
Total Phosphorus (mg/L)	2	0.021	0.034	0.028	0.028	0.009	
CBOD-5 (mg/L)	2	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	2	2.4	3.5	3.0	3.0	0.8	
Atrazine (µg/L)	1			<	0.02		
<b>Total Metals</b>							
Aluminum (mg/L)	2	0.353	0.369	0.361	0.361	0.011	J
Iron (mg/L)	2	0.555	0.880	0.718	0.718	0.230	
Manganese (mg/L)	2	0.084	0.101	0.092	0.092	0.012	
<b>Dissolved Metals</b>							
Aluminum (mg/L)	2	< 0.033	0.122	0.069	0.069	0.075	J
Antimony (µg/L)	2	< 1.9	< 1.9	0.9	0.9	0.0	
Arsenic (µg/L)	2	< 2.1	< 2.1	1.0	1.0	0.0	
Cadmium (mg/L)	2	< 0.000	0.014	0.004	0.004	0.005	
Chromium (mg/L)	2	< 0.009	0.013	0.006	0.006	0.001	
Copper (mg/L)	2	< 0.013	0.020	0.008	0.008	0.002	
Iron (mg/L)	2	< 0.026	0.214	0.114	0.114	0.142	
Lead (µg/L)	2	< 1.7	< 1.7	0.8	0.8	0.0	
Manganese (mg/L)	2	0.069	0.092	0.080	0.080	0.016	
Mercury (µg/L)	2	< 0.1	< 0.1	0.0	0.0	0.0	J
Nickel (mg/L)	2	< 0.019	0.042	0.015	0.015	0.008	
Selenium (µg/L)	2	< 1.7	< 1.7	0.8	0.8	0.0	
Silver (mg/L)	2	< 0.000	0.002	0.000	0.000	0.001	
Thallium (µg/L)	2	< 0.6	< 0.6	0.3	0.3	0.0	
Zinc (mg/L)	2	< 0.012	0.030	0.010	0.010	0.006	
<b>Biological</b>							
Chlorophyll a (ug/L)	2	1.07	1.34	1.20	1.20	0.19	
E. coli (col/100mL)	2	199	1046	623	623	599	J

G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65i; J=estimate; N=# samples; Q=qualifier.

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