

# 2013 Monitoring Summary



## Beaver Creek at AL Hwy 41 (Monroe County) (31.74144 -87.41965)

### BACKGROUND

Beaver Creek at BRRM-1 is one of the streams the Alabama Department of Environmental Management (ADEM) monitors as a “best attainable” condition reference watershed for comparison with streams throughout the Southern Hilly Gulf Coastal Plain (65d) ecoregion. Landuse, road density, and population density categorize Beaver Creek among the least-disturbed watersheds in ecoregion 65d.



Figure 1. Beaver Creek at BRRM-1 on May 13, 2013.

### WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Beaver Creek at BRRM-1 is a *Fish and Wildlife (F&W)* stream located in Monroe County near the town of Franklin. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forested. As of September 1, 2012, ADEM’s NPDES management system shows no permits issued in the Beaver Creek 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. Beaver Creek at BRRM-1 was characterized primarily by sand, gravel and cobble substrates (Figure 1). Overall habitat quality was categorized as *optimal* 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. The final score is the average of all individual metric scores. Metric results indicated the macroinvertebrate 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> )	7	
Ecoregion <sup>a</sup>	65d	
% Landuse		
Open water	<1	
Wetland	Woody	<1
Forest	Deciduous	56
	Evergreen	26
	Mixed	13
Shrub/scrub	5	
Grassland/herbaceous	<1	
Pasture/hay	<1	
Cultivated crops	<1	
Development	Open space	<1
Population/km <sup>2b</sup>	<1	

a. Southern Hilly Gulf Coastal Plain

b. 2000 US Census

Table 2. Physical characteristics of Beaver Creek at BRRM-1, May 13, 2013.

Physical Characteristics		
Width (ft)	18	
Canopy Cover	Mostly Shaded	
Depth (ft)	Riffle	0.5
	Run	1.0
	Pool	2.0
% of Reach		
	Riffle	10
	Run	60
	Pool	30
% Substrate		
	Boulder	7
	Cobble	13
	Gravel	21
	Sand	50
	Silt	3
	Organic Matter	6

**Table 3. Results of the habitat assessment conducted on Beaver Creek at BRRM-1, May 13, 2013.**

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	75	Optimal (>65)
Sediment Deposition	73	Optimal (>65)
Shoosity	90	Optimal (>84)
Bank and Vegetative Stability	80	Optimal (>74)
Riparian Buffer	90	Optimal (>89)
<b>Habitat Assessment Score</b>	<b>189</b>	
<b>% Maximum Score</b>	<b>79</b>	<b>Optimal (&gt;65)</b>

**Table 4. Results of macroinvertebrate bioassessment conducted in Beaver Creek at BRRM-1, May 13, 2013.**

Macroinvertebrate Assessment		
	Results	Scores
		(0-100)
<b>Taxa richness and diversity measures</b>		
% EPC taxa	44	96
% Dominant Taxon	19	80
<b>Taxonomic composition measures</b>		
% EPT minus Baetidae and Hydropsychidae	16	28
<b>Functional feeding group</b>		
# Collector Taxa	26	95
<b>Community tolerance</b>		
% Nutrient Tolerant individuals	36	49
<b>WMB-I Assessment Score</b>	---	70
<b>WMB-I Assessment Rating</b>		Good (48-75)

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during March through October of 2013 to help identify any stressors to the biological communities. Arsenic, chromium and nickel had values produced uncertain exceedances. Although samples of total dissolved arsenic did exceed human health criteria in Beaver Creek, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite – As III). Presently studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies Beaver Creek will be reassessed for arsenic violations.

## SUMMARY

Landuse, road density, and population density categorized Beaver Creek at BRRM-1 as among the least-disturbed watersheds of the Southern Hilly Gulf Coast sub-ecoregion. Like other streams in the region, it is a low-gradient, sand-bottomed stream. Habitat and bioassessment results indicate the reach to be in *good* condition. Water quality data suggested elevated concentrations of some metals. Monitoring should continue to ensure that conditions remain stable.

**Table 5. Summary of water quality data collected March –October, 2013. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). Median (Med), 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)	9	6.8	24.4	17.8	18.3	5.8	
Turbidity (NTU)	13	2.7	30.6	4.1	7.2	7.7	
Total Dissolved Solids (mg/L)	8	76.0	144.0	97.5	103.0	22.9	
Total Suspended Solids (mg/L)	8	< 1.0	62.0	4.0	13.4	21.5	
Specific Conductance (µmhos)	9	79.8	100.4	91.1	91.8	6.7	
Hardness (mg/L)	5	28.6	38.0	33.7	33.4	3.3	
Alkalinity (mg/L)	8	11.3	25.0	14.0	16.8	5.5	
Stream Flow (cfs)	12	0.5	8.4	4.0	4.1	2.7	
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	9	8.1	11.9	8.5	9.2	1.3	
pH (su)	9	6.6	7.2	7.0	7.0	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.008	< 0.018	0.009	0.008	0.002	
Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.004	0.019	0.010	0.008	0.006	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.725	0.106	0.213	0.240	
Total Nitrogen (mg/L)	8	< 0.022	< 0.727	0.120	0.221	0.236	
Dissolved Reactive Phosphorus (mg/L)	8	0.007	0.016	0.014	0.012	0.003	
Total Phosphorus (mg/L)	8	0.014	0.031	0.028	0.024	0.007	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	2.7	3.7	3.2	3.2	0.3	
<b>Total Metals</b>							
Aluminum (mg/L)	5	0.099	1.670	0.187	0.468	0.676	
Iron (mg/L)	5	0.267	7.320	0.397	1.801	3.091	
Manganese (mg/L)	5	< 0.009	0.041	0.014	0.016	0.015	
<b>Dissolved Metals</b>							
Aluminum (mg/L)	5	< 0.078	< 0.076	0.038	0.038	0.000	
Antimony (µg/L)	5	< 0.1	2.6	1.3	0.8	0.7	
Arsenic (µg/L)	5	0.5	< 1.4	<sup>H</sup> 0.7	0.7	0.1	2
Cadmium (µg/L)	5	< 0.048	< 0.170	0.023	0.048	0.034	
Chromium (µg/L)	5	0.548	< 32.000	<sup>S</sup> 16.000	9.840	8.438	2
Copper (mg/L)	5	0.0004	< 0.031	0.016	0.009	0.008	
Iron (mg/L)	5	0.088	0.408	0.117	0.197	0.143	
Lead (µg/L)	5	< 0.1	< 1.1	0.5	0.3	0.3	
Manganese (mg/L)	5	< 0.009	0.016	0.004	0.008	0.006	
Mercury (µg/L)	3	< 0.057	< 0.057	0.028	0.028	0.000	
Nickel (mg/L)	5	< 0.001	0.027	<sup>S</sup> 0.008	0.012	0.012	2
Selenium (µg/L)	5	< 0.2	< 1.4	0.7	0.5	0.3	
Silver (µg/L)	5	< 0.215	< 2.120	0.108	0.488	0.522	
Thallium (µg/L)	5	< 0.1	< 1.1	0.6	0.4	0.3	
Zinc (mg/L)	5	0.002	< 0.017	0.008	0.006	0.003	
<b>Biological</b>							
Chlorophyll a (ug/L)	8	< 0.10	3.20	0.28	0.62	1.07	
E. coli (col/100mL)	8	88	649	125	200	188	

J=estimate; N=# samples; H= F&W human health criterion exceeded; S= F&W hardness– adjusted aquatic life use criteria exceeded.

FOR MORE INFORMATION, CONTACT:  
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