

# 2014 Monitoring Summary



**Barbour Creek** at Private Drive East of Barbour Lane Road in Barbour County (31.89627, -85.20527)

## BACKGROUND

In 1998, Barbour Creek from Walter F. George Lake to its source was placed on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Fish and Wildlife* (F&W) water use classification due to siltation (habitat alteration). In 2014, the Alabama Department of Environmental Management (ADEM) monitored Barbour Creek at BRC-3 to provide data to develop the Total Maximum Daily Load to address the siltation impacts, and to assess current conditions.



**Figure 1.** Barbour Creek at BRC-3, May 5, 2014.

**Table 1.** Summary of watershed characteristics.

Watershed Characteristics			Chattahoochee R
<b>Basin</b>			87
<b>Drainage Area (mi<sup>2</sup>)</b>			65D
<b>Ecoregion<sup>a</sup></b>			
<b>% Landuse<sup>b</sup></b>			
Open water			<1%
Wetland	Woody		1%
	Emergent herbaceous		<1%
Forest	Deciduous		22%
	Evergreen		41%
	Mixed		12%
Shrub/scrub			17%
Grassland/herbaceous			2%
Pasture/hay			1%
Cultivated crops			<1%
Development	Open space		2%
	Low intensity		<1%
	Moderate intensity		<1%
	High intensity		<1%
<b>Population/km<sup>2c</sup></b>			3
<b># NPDES Permits<sup>d</sup></b>	<b>TOTAL</b>		2
Industrial General			2

a. Southern Hilly Gulf Coastal Plain

b. 2011 National Land Cover Dataset

c. 2010 US Census

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

## WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Barbour Creek is a *Fish & Wildlife* (F&W) stream located in the Southern Hilly Gulf Coastal Plain (65d) ecoregion. Based on the 2011 National Land Cover Dataset, landuse within the watershed is predominantly forest (75%) with some shrub/scrub areas. As of April 1, 2016, two NPDES industrial outfalls have been issued within this watershed.

## REACH CHARACTERISTICS

General observations (Table 2) and a habitat assessment (Table 3) were completed during the fish community 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. Barbour Creek at BRC-3 is a glide-pool stream with substrate composed primarily of sand with some mud/muck and organic matter (Figure 1). Overall habitat quality and availability was rated as *sub-optimal* for supporting diverse aquatic communities.

**Table 2.** Physical characteristics of Barbour Creek at BRC-3, July 30, 2014.

Physical Characteristics		
<b>Width (ft)</b>		80
<b>Canopy Cover</b>		Open
<b>Depth (ft)</b>		
	Pool	4.0
<b>% of Reach</b>		
	Pool	100
<b>% Substrate</b>		
	Mud/Muck	10
	Sand	75
	Silt	5
	Organic Matter	10

**Table 3.** Results of the habitat assessment conducted on Barbour Creek at BRC-3, July 30, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	39	Marginal (31-<55)
Sediment Deposition	50	Marginal (31-<55)
Sinuosity	53	Marginal (31-<55)
Bank Vegetative Stability	59	Sub-Optimal (58-79)
Riparian Buffer	78	Sub-Optimal (60-84)
<b>Habitat Assessment Score</b>	<b>99</b>	
<b>% of Maximum Score</b>	<b>58</b>	<b>Sub-Optimal (57-80)</b>

## BIOASSESSMENT RESULTS

The fish community in Barbour Creek at BRC-3 was sampled using Alabama's Fish Community Index of Biotic Integrity (AL-IBI), developed through a multi-agency (GSA, ADCNR, ADEM) project to establish a comprehensive fish community bioassessment tool for Wadeable streams and rivers across the State. The data collected during this survey were used to score the overall health of the fish community, based on conditions expected for Wadeable streams and rivers in the *Southern Plains* Ichthyoregion. The AL-IBI uses twelve measures of species richness and diversity, tolerance/intolerance, and abundance, condition, and reproduction to assess the overall health of the fish community. The final IBI score is the sum of all individual metrics on a 60 point scale. The IBI score for Barbour Creek at BRC-3 was 28, indicating the fish community to be in *poor* condition (Table 4).

**Table 4.** Results of the fish community bioassessment conducted in Barbour Creek at BRC-3, July 30, 2014.

Fish Community Assessment		
	Results	Score
<b>Species Richness &amp; Diversity</b>		
Total native species	15	3
Number shiner species	4	3
Number of sucker species	0	1
Number of centrarchid species	5	3
Number of darter+madtom species	1	1
<b>Tolerance &amp; Intolerance Measures</b>		
Percent of tolerant species	30	1
Percent Green Sunfish & Yellow Bullhead	0	5
<b>Trophic Measures</b>		
Percent insectivorous cyprinids	54.44	3
Percent invertivores	28.89	3
Percent top carnivores	2.22	3
<b>Abundance, Condition &amp; Reproductive Measures</b>		
Percent DELT+hybrids	2.22	1
Number of lithophilic spawners	8	1
<b>IBI Assessment Score</b>		<b>28</b>
<b>Condition</b>		<b>Poor</b>

## WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly March through October of 2014 to help identify any stressors to the biological communities. For Barbour Creek at BRC-3, the *F&W* use class criterion for dissolved oxygen (5.0 mg/L) was violated in September (4.6 mg/L). Specific conductance was also higher than expected based on data collected at reference reaches within the Southern Hilly Gulf Coastal Plain (65d) ecoregion.

**Table 5.** Summary of water quality data collected March-October, 2014. 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
<b>Physical</b>							
Temperature (°C)	9	13.2	26.3	24.5	22.4	4.8	
Turbidity (NTU)	9	20.1	72.9	45.2	43.2	19.4	
Total Dissolved Solids (mg/L)	8	46.0	98.0	74.0	73.4	17.0	
Total Suspended Solids (mg/L)	8	7.0	34.0	22.5	22.0	8.6	
Specific Conductance (µmhos)	9	49.7	81.1	81.4 <sup>C</sup>	78.8	12.2	
Alkalinity (mg/L)	8	11.0	33.7	30.0	27.4	7.4	
Monthly Stream Flow (cfs)	2	0.1	112.2	56.2	56.2	79.3	
Stream Flow during Sample Collection (cfs)	1				112.2		
<b>Chemical</b>							
Dissolved Oxygen (mg/L)	9	4.6 <sup>C</sup>	10.0	6.7	7.0	1.7	1
pH (su)	9	6.5	7.1	6.9	6.9	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.006	0.041	0.016	0.016	0.013	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.038	0.149	0.072	0.081	0.034	
Total Kjeldahl Nitrogen (mg/L)	8	0.237	0.522	0.340	0.371	0.098	
Total Nitrogen (mg/L)	8	0.339	0.597	0.436	0.452	0.083	
Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.005	0.004	0.004	0.001	
Total Phosphorus (mg/L)	8	0.018	0.045	0.024	0.027	0.009	
GBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	2.8	3.1	3.0	3.0	0.1	

C = *F&W* use class criterion violated; E = # samples that exceeded criteria; J = estimate; G = value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion (65d); N = # of samples.

## SUMMARY

The overall habitat quality for Barbour Creek at BRC-3 was categorized as *sub-optimal* for this stream type. Bioassessment results indicated the fish community to be in *poor* condition. Furthermore, dissolved oxygen exceeded the *F&W* use class criterion in September. Specific conductance was also higher than expected based on data collected at reference reaches within the ecoregion (65d). ADEM will review the monitoring information presented in this report, along with all other available data, to establish Total Maximum Daily Load (TMDL) needs and priorities.

FOR MORE INFORMATION, CONTACT:  
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