Alabama Department of Environmental Management

303(d)/TMDL

Rivers and Streams Monitoring Program

2014 Monitoring Summary

Good-Fair

Barbour Creek at Barbour County Road 79 (31.89879/-85.34056)

BACKGROUND

The 27.23 mile segment of Barbour Creek, from its confluence with the Chattahoochee River upstream to its source, has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1998. It was listed for siltation/habitat alteration from agricultural runoff. The Alabama Department of Environmental Management (ADEM) monitored Barbour Creek at BRC-2 in 2014 to investigate the extent of the impairment. Macroinvertebrate and habitat assessments were conducted at the site, and monthly water chemistry samples were also collected. These data will be used to develop Total Maximum Daily Loads (TMDLs), which are targeted for completion in 2016.

The Barbour Creek watershed was also selected for biological and water quality monitoring as part of the 2014 Southeastern Alabama (SE AL) River Basin Assessment Monitoring Program. The objectives of the SE AL River Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

Figure 1. Barbour Creek at BRC-2, June 12, 2014.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Barbour Creek at BRC-2 is a *Fish & Wildlife* (*F&W*) stream located in Barbour County. Based on the 2011 National Land Cover Dataset, land use within the watershed is predominantly forest (75%), with little development (<6%). Population density is low. As of April 1, 2016, two NPDES outfalls were active in the watershed (ADEM NPDES Management System).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		**Chattahoochee R**
Drainage Area (mi^2)		**19**
Ecoregion[a]		**65D**
% Landuse[b]		
Open water		1%
Wetland	Woody	2%
	Emergent herbaceous	<1%
Forest	Deciduous	21%
	Evergreen	40%
	Mixed	14%
Shrub/scrub		13%
Grassland/herbaceous		2%
Pasture/hay		3%
Cultivated crops		1%
Development	Open space	3%
	Low intensity	<1%
	Moderate intensity	<1%
	High intensity	<1%
Population/km^2[c]		**6**
# NPDES Permits[d]	**TOTAL**	**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.

Table 2. Physical characteristics of Barbour Creek at BRC-2, June 30, 2014.

Physical Characteristics		
Width (ft)		**15**
Canopy Cover		**Mostly Shaded**
Depth (ft)		
	Run	0.5
	Pool	1.0
% of Reach		
	Run	85
	Pool	15
% Substrate		
	Sand	90
	Organic Matter	10

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. Barbour Creek at BRC-2 is a low gradient, glide-pool stream located in the Southern Hilly Gulf Coastal Plain ecoregion (65d) (Figure 1). Benthic substrate consists of sand and organic matter. Overall habitat quality was rated as *marginal* for supporting the macroinvertebrate community.

Table 3. Results of the habitat assessment conducted on Barbour Creek at BRC-2, June 30, 2014.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	46	Marginal (31-<55)
Sediment Deposition	68	Sub-Optimal (55-79)
Sinuosity	65	Sub-Optimal (55-79)
Bank Vegetative Stability	23	Poor (<31)
Riparian Buffer	85	Optimal (>84)
Habitat Assessment Score	*97*	
% Maximum Score	*54*	Marginal (31-<57)

BIOASSESSMENT RESULTS

The benthic macroinvertebrate community was sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). Measures of taxonomic richness, community composition, and community tolerance were used to assess the overall health of the macroinvertebrate community in comparison to conditions expected in south 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 at BRC-2 rated the site as a *3-*, or *Good-Fair* (Table 4).

Table 4. Results of the macroinvertebrate bioassessment conducted in Barbour Creek at BRC-2, June 30, 2014.

Macroinvertebrate Assessment	
	Results
Taxa richness and diversity measures	
Total # Taxa	47
# EPT taxa	13
# Highly-sensitive and Specialized Taxa	3
Taxonomic composition measures	
% EPC taxa	30
% EPT minus Baetidae and Hydropsychidae	27
% Chironomidae Individuals	39
% Dominant Taxon	12
% Individuals in Dominant 5 Taxa	49
Functional feeding group	
# Collector Taxa	14
% Tolerant Filterer Taxa	9
Community tolerance	
# Sensitive EPT	5
% Sensitive taxa	28
% Nutrient Tolerant individuals	21
WMB-I Assessment Score	3-
WMB-I Assessment Rating	Good-Fair

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
Physical						
Temperature (°C)	9	13.4	25.6	22.0	20.5	4.7
Turbidity (NTU)	9	15.0	61.4	19.6	23.3	14.4
Total Dissolved Solids (mg/L)	8	27.0	67.0	37.5	41.4	12.7
J Total Suspended Solids (mg/L)	8	7.0	26.0	12.5	13.2	5.6
Specific Conductance (µmhos)	9	34.0	43.4	37.7	38.3	3.5
Alkalinity (mg/L)	8	7.8	14.6	11.7	11.2	2.3
Stream Flow (cfs)	9	6.4	29.5	12.8	16.5	9.2
Chemical						
Dissolved Oxygen (mg/L)	9	7.7	10.0	8.4	8.6	0.9
pH (su)	9	6.5	7.1	6.7	6.8	0.2
Ammonia Nitrogen (mg/L)	8	< 0.006	< 0.010	0.003	0.004	0.001
Nitrate+Nitrite Nitrogen (mg/L)	8	0.042	0.075	0.069	0.064	0.012
J Total Kjeldahl Nitrogen (mg/L)	8	0.060	0.711	0.302	0.326	0.186
J Total Nitrogen (mg/L)	8	0.126	0.753	0.375	0.389	0.180
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.003	0.005	0.004	0.003	0.001
Total Phosphorus (mg/L)	8	0.013	0.026	0.016	0.017	0.004
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	2.8	3.2	2.9	2.9	0.2

J=estimate; N= # samples.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly from March-October of 2014 to help identify any stressors to the biological community. No metals or organic samples were collected. Water chemistry analyses revealed no exceedances of *F&W* use classification criteria. All measured parameters were found to be within the range of expected values for *F&W* streams in the Southern Hilly Gulf Coastal Plain ecoregion (65d).

SUMMARY

While habitat assessment results scored Barbour Creek at BRC-2 as *marginal* for supporting the macroinvertebrate community, bioassessment results indicated the community to be in *good-fair* condition. Water chemistry analyses revealed no exceedances of *F&W* use classification criteria. All parameters were found to be comparable to data from ADEM's least-impaired reference reaches in the Southern Hilly Gulf Coastal Plain ecoregion (65d). Monitoring should continue to ensure that water quality and biological conditions remain stable.

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