Alabama Department of Environmental Management

NPS Intensive Monitoring

Rivers and Streams Monitoring Program

2013 Monitoring Summary

Brier Fork at Meridianville Bottom Road in Madison County (34.85329/-86.54330)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Brier Fork of Flint River watershed for biological and water quality monitoring as part of the 2013 Assessment of the Tennessee River Basin. Brier Fork (AL0603002-0303-110), from the confluence of the Flint River, upstream to the Tennessee state line (21.89 mi.), was listed on the Clean Water Act 1998 §303(d) list for Alabama for siltation and unknown toxicity due to nonirrigated crop production and land development. The objectives of the Tennessee Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

Figure 1. Brier Fork Creek at BFFM-3A, June 20, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Brier Fork is a *Fish & Wildlife (F&W)* stream located in Madison County It is approximately 1.6 miles east of Meridianville, AL. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily cultivated crops and pasture. As of May 13, 2013, ADEM has issued eight NPDES permits 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. Brier Fork at BFFM-3A (Figure 1) is characterized mostly as having gravel substrate with frequent pool and run habitats. BFFM-3A is located in the Eastern Highland Rim ecoregion (Table 1). Overall habitat quality was categorized as *optimal* due to favorable instream habitat conditions with low amounts of sedimentation found within the reach. Gravel, which is considered a stable and suitable habitat for ecological diversity in streams, composed over half of the available habitat that was scored at the reach.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi^2)		53
Ecoregion[a]		71g
% Landuse		
Open water		<1
Wetland	Woody	6
	Emergent herbaceous	<1
Forest	Deciduous	9
	Evergreen	1
	Mixed	<1
Shrub/scrub		4
Grassland/herbaceous		1
Pasture/hay		33
Cultivated crops		36
Development	Open space	6
	Low intensity	2
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^2[b]		65
# NPDES Permits[c]	**TOTAL**	8
401 Water Quality Certification		1
Construction Stormwater		3
Industrial General		2
Industrial Individual		1
Underground Injection Control		1

a. Eastern Highland Rim

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, May 13, 2013.

Table 2. Physical characteristics of Brier Fork at BFFM-3A, June 20, 2013.

Physical Characteristics		
Width (ft)		40
Canopy Cover		Estimate 50/50
Depth (ft)		
	Riffle	0.5
	Run	2.0
	Pool	3.5
% of Reach		
	Riffle	5
	Run	55
	Pool	40
% Substrate		
	Clay	3
	Cobble	5
	Mud/Muck	5
	Gravel	55
	Sand	2
	Silt	8
	Organic Matter	22

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 *poor* condition (Table 4).

Table 3. Results of the habitat assessment conducted on Brier Fork at BFFM-3A, June 20, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	75	Optimal (>70)
Sediment Deposition	78	Optimal (>70)
Sinuosity	55	Marginal (45-64)
Bank and Vegetative Stability	51	Marginal (35-59)
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	**172**	
% Maximum Score	**71**	**Optimal (>70)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Brier Fork at BFFM-3A, June 20, 2013.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
# EPT taxa	10	26
Shannon Diversity	4.16	68
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	6	12
% Non-insect taxa	22	3
Functional feeding group		
% Predator Individuals	3	3
Community tolerance		
% Tolerant taxa	31	50
WMB-I Assessment Score	**---**	**27**
WMB-I Assessment Rating		**Poor (15-28)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during March through October to help identify any stressors to the biological communities. Atrazine was detected in the organics sample collected on June 12, 2013. Nitrate+nitrite, total nitrogen, pH, total kjeldahl nitrogen, dissolved reactive phosphorus, and chlorides were higher than expected based on reference reach data for the Highland Eastern Rim ecoregion. Further sampling may be required to get a representative assessment of the stream and to ensure that water quality and biological 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) when results were less than this value for non-metals parameters. 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		10.2	24.7	21.1		19.7	4.6
Turbidity (NTU)	9		1.6	17.0	6.2		7.8	5.3
Total Dissolved Solids (mg/L)	7		24.0	98.0	70.0		62.7	27.2
Total Suspended Solids (mg/L)	7	<	1.0	8.0	3.0		3.0	2.6
Specific Conductance (µmhos)	9		67.2	122.2	89.9		95.6	17.4
Alkalinity (mg/L)	7		15.4	46.4	28.3		30.4	10.8
Stream Flow (cfs)	7		10.6	69.3	26.7		35.0	25.3
Chemical								
Dissolved Oxygen (mg/L)	8		6.5	11.3	7.4		8.3	1.7
pH (su)	9		6.4	7.5	6.8	M	6.9	0.3
Ammonia Nitrogen (mg/L)	7	<	0.004	0.115	0.009		0.023	0.040
Nitrate+Nitrite Nitrogen (mg/L)	7		1.441	2.969	1.705	M	1.860	0.521
J Total Kjeldahl Nitrogen (mg/L)	7		0.102	1.070	0.532	M	0.571	0.326
J Total Nitrogen (mg/L)	7		1.833	3.831	2.181	M	2.430	0.681
Dissolved Reactive Phosphorus (mg/L)	7		0.013	0.046	0.027	M	0.027	0.012
Total Phosphorus (mg/L)	7		0.036	0.056	0.046		0.045	0.008
CBOD-5 (mg/L)	7	<	2.0	< 2.0	1.0		1.0	0.0
Chlorides (mg/L)	7		4.0	4.9	4.5	M	4.4	0.3
Atrazine (µg/L)	1						4.36	

J=estimate; M=value>90% of all verified ecoregional reference reach data collected in the ecoregion 71; N=# samples.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Chemical analysis shows pH, nitrate+nitrate nitrogen, total kjeldahl nitrogen, total nitrogen, dissolved reactive phosphorus, and chlorides to be higher than expected within ecoregion 71. The stream did meet its water designation use as a *Fish & Wildlife* stream throughout the sampling season. Further sampling may be required to get a representative rating of the stream and to ensure that water quality and biological conditions remain stable.

FOR MORE INFORMATION, CONTACT:
Cal C. Johnson, ADEM Field Operations Division
2715 Sandlin Road Decatur, Al 35603-1333
(256) 432-2162 cal.johnson@adem.state.al.us