Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Fair

North River at Fayette County Road 30 (33.68073/-87.63150)

BACKGROUND

Since 1998, North River, from Lake Tuscaloosa to Ellis Creek (approximately 43 miles), has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for only partially meeting its *Fish and Wildlife (F&W)* water use classification. The segment was listed as impaired based on data collected in 1987 showing that abandoned surface mines had led to nutrients and siltation issues. Data collected in 2007 showed mercury from atmospheric deposition to be another cause of impairment.

The Alabama Department of Environmental Management (ADEM) monitored North River at NRRF-4 to verify and document impairment from nutrients, siltation and metals (mercury) at this site. A macroinvertebrate and habitat assessment were conducted to verify impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment. Results from these data may also be used in determination of Total Maximum Daily Load (TMDL) needs and priorities, which is set to be drafted in 2014.

Figure 1. North River at NRRF-4, May 3, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. North River at NRRF-4 is a *Fish & Wildlife (F&W)* stream located in Tuscaloosa County, approximately 27 miles north of Tuscaloosa. According to the 2006 National Land Cover Dataset, landuse within the watershed is approximately 80% forested. As of September 1, 2012, ADEM has issued two NPDES discharge 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. North River at NRRF-4 is a riffle-run stream characterized by a mixture of cobble, bedrock, gravel and sand substrates, typical of streams in the Shale Hills (68f) ecoregion (Figure 1). Overall habitat quality was rated as *optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		54
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	34
	Evergreen	32
	Mixed	14
Shrub/scrub		8
Grassland/herbaceous		5
Pasture/hay		3
Cultivated crops		<1
Development	Open space	2
	Low intensity	<1
	Moderate intensity	<1
Population/km^2[b]		4
# NPDES Permits[c]	**TOTAL**	2
401 Water Quality Certification		2

a.Shale Hills

b.2000 US Census

c.#NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of North River at NRRF-4, May 3, 2012.

Physical Characteristics		
Canopy cover		Mostly Open
Width (ft)		25
Depth (ft)		
	Riffle	1
	Run	1.5
	Pool	1.5
% of Reach		
	Riffle	30
	Run	60
	Pool	10
% Substrate		
	Bedrock	15
	Boulder	5
	Cobble	30
	Gravel	15
	Sand	15
	Silt	10
	Organic Matter	10

Table 3. Results of the habitat assessment conducted on North River at NRRF-4, May 3, 2012.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	68	Sub-optimal (59-70)
Sediment Deposition	78	Optimal (> 70)
Sinuosity	85	Optimal (> 84)
Bank and Vegetative Stability	64	Sub-optimal (60-74)
Riparian Buffer	58	Marginal (50-69)
Habitat Assessment Score	**170**	
% Maximum score	**71**	**Optimal (> 70)**

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 reference sites 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).

Table 4. Results of the macroinvertebrate bioassessment conducted at North River at NRRF-4, May 3, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness measures		**(0-100)**
# EPT taxa	17	57
Taxonomic composition measures		
% Non-insect taxa	10	61
% Dominant taxon	24	65
% EPC taxa	33	62
Functional feeding group measures		
% Predators	10	35
Tolerance measures		
% Taxa as Tolerant	30	55
WMB-I Assessment Score	**---**	**56**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected monthly from April through October 2012 to help identify potential stressors to the biological communities.

Stream flow ranged from 65.s cfs in April to 1.8 cfs in July. The lowest stream flows were experienced in July, August (3.5 cfs) and September (3.6 cfs). Dissolved oxygen concentrations did not meet the *F&W* use classification criterion of 5.0 mg/L during this three month period. Median values of specific conductance were higher than expected based on verified reference reach data collected in ecoregion 68.

Table 5. Summary of water quality data collected April-October, 2012. 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	E
Physical							
Temperature (°C)	11	11.1	26.6	22.1	21.9	4.4	
Turbidity (NTU)	11	4.6	45.3	10.5	14.6	12.0	
Total Dissolved Solids (mg/L)	8	58.0	114.0	95.0	91.0	17.8	
Total Suspended Solids (mg/L)	8	< 1.0	19.0	2.0	5.9	7.1	
Specific Conductance (µmhos)	11	71.1	158.3	122.5 M	112.4	30.5	
Alkalinity (mg/L)	8	9.5	45.8	18.8	22.0	12.3	
Stream Flow (cfs)	6	1.8	65.2	7.1	16.4	24.4	
Chemical							
Dissolved Oxygen (mg/L)	11	3.7 C	8.6	6.9	6.2	1.6	3
pH (su)	11	6.2	7.4	6.6	6.6	0.3	
Ammonia Nitrogen (mg/L)	8	< 0.007	0.051	0.004	0.010	0.017	
J Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.005	0.254	0.035	0.062	0.082	
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.350	0.171	0.163	0.124	
J Total Nitrogen (mg/L)	8	< 0.023	0.441	0.252	0.225	0.162	
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.006	0.005	0.004	0.002	
Total Phosphorus (mg/L)	8	0.011	0.065	0.017	0.024	0.017	
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	1.2	2.0	1.4	1.5	0.3	
Biological							
Chlorophyll a (ug/L)	8	< 0.10	2.14	0.05	0.50	0.76	

C= *F&W* criteria violated; E=# samples that exceeded criteria; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68; N=# samples;

SUMMARY

Since 1998, North River, from Lake Tuscaloosa to Ellis Creek has been on Alabama's CWA §303(d) list of impaired waters for only partially meeting its *F&W* water use classification. The segment was listed as impaired by nutrient enrichment and siltation/habitat degradation.

Macroinvertebrate sampling indicated the macroinvertebrate community to be in *fair* condition. Dissolved oxygen concentrations were low during July, August, and September when stream flows were at their lowest. Habitat assessment results indicated North River at NRRF-4 to be in *optimal* condition, with a mixture of stable substrates. Nutrient concentrations were similar to the 90th percentile of data collected at least-impaired reference reaches in ecoregion 68.

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