

2012 Monitoring Summary



North River at Tuscaloosa County Road 63 “Gorgas Road” (33.56193/-

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 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 NRRT-2 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 needs and priorities.



Figure 1. North River at NRRT-2, May 3, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. North River at NRRT-2 is a *Fish & Wildlife (F&W)* stream located in Tuscaloosa County, approximately 27 miles north of Tuscaloosa. Based on the 2006 National Land Cover Dataset, landuse within the watershed is approximately 76% forested. As of September 1, 2012, ADEM has issued 38 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 NRRT-2 is a high-gradient stream with a bedrock substrate, 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		Black Warrior River
Basin		Black Warrior River
Drainage Area (mi²)		154
Ecoregion^a		68f
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	37
	Evergreen	24
	Mixed	15
Shrub/scrub		8
Grassland/herbaceous		3
Pasture/hay		4
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^{2b}		9
# NPDES Permits^c	TOTAL	38
	401 Water Quality Certification	4
	Construction Stormwater	19
	Mining	9
	Municipal Individual	4
	Underground Injection Control	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 NRRT-2, May 3, 2012.

Physical Characteristics	
Width (ft)	65
Canopy cover	Open
Depth (ft)	
	Riffle 0.8
	Run 2
	Pool 2
% of Reach	
	Riffle 20
	Run 60
	Pool 20
% Substrate	
	Bedrock 40
	Boulder 20
	Cobble 20
	Gravel 5
	Sand 10
	Silt 1
	Organic Matter 4

Table 3. Results of the habitat assessment conducted on North River at NRRT-2, May 3, 2012.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	74	Optimal (> 70)
Sediment Deposition	90	Optimal (> 70)
Sinuosity	83	Sub-optimal (65-84)
Bank and Vegetative Stability	70	Sub-optimal (60-74)
Riparian Buffer	90	Sub-optimal (70-89)
Habitat Assessment Score	196	
% Maximum score	82	Optimal (> 70)

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community in comparison to conditions expected in north Alabama streams and rivers. Each score is based on a six-point scale, ranging from 1, or *natural*, to 6, or *highly altered*. The macroinvertebrate survey conducted in North River at NRRT-2 rated the site as *good-fair*.

Table 4. Results of the macroinvertebrate bioassessment conducted at North River at NRRT-2, May 3, 2012..

Macroinvertebrate Assessment		Results
Taxa richness measures		
Total # Taxa		65
# EPT taxa		22
# Sensitive EPT		13
# Highly-sensitive and Specialized Taxa		5
Taxonomic composition measures		
% EPC taxa		29
% Non-insect taxa		11
% Dominant taxon		53
Functional feeding group measures		
% Predators		15
Tolerance measures		
% Sensitive taxa		32
% Taxa as Tolerant		20
WMB-I Assessment Score		3-
WMB-I Assessment Rating		Good-fair

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	31.4 ^C	22.9	22.9	5.1	
Turbidity (NTU)	11	4.3	136.0	8.9	21.5	38.5	
Total Dissolved Solids (mg/L)	8	44.0	366.0	110.0	153.0	114.7	
Total Suspended Solids (mg/L)	8	< 1.0	74.0	3.5	12.6	25.0	
Specific Conductance (µmhos)	11	75.7	595.0	167.0	213.3	172.3	
Alkalinity (mg/L)	8	11.1	132.0	28.8	47.0	42.9	
Stream Flow (cfs)	9	2.2	310.2	63.4	81.1	95.3	
Chemical							
Dissolved Oxygen (mg/L)	11	6.3	9.8	7.8	7.8	1.0	
pH (su)	11	3.5	7.5 ^C	7.1 ^M	6.8	1.1	1
Ammonia Nitrogen (mg/L)	8	< 0.007	0.018	0.004	0.006	0.005	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.032	0.216	0.080	0.089	0.058	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.382	0.186	0.186	0.123	
Total Nitrogen (mg/L)	8	< 0.052	0.468	0.300	0.277	0.150	
↓ Dissolved Reactive Phosphorus (mg/L)	8	< 0.004	0.007	0.006	0.005	0.002	
Total Phosphorus (mg/L)	8	0.013	0.029	0.020	0.021	0.006	
↓ CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	2.8	60.0	7.0	15.8	19.7	
Biological							
Chlorophyll a (µg/L)	8	< 0.10	1.78	0.53	0.81	0.88	

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

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. In stream pH exceeded criteria applicable to North River's F&W use classification on the June 13th station visit. Median values of pH were lower than expected based on verified reference reach data collected in ecoregion 68f.

SUMMARY

Though the habitat assessment indicated North River at NRRT-2 to be in *optimal* condition, the macroinvertebrate assessment indicated the biological communities to be in *good-fair* condition. Water chemistry analysis indicated the pH to exceed the criteria applicable to North River's F&W use classification during one station visit. Median values of pH were lower than expected based on verified reference reach data collected in ecoregion 68f.

FOR MORE INFORMATION, CONTACT:
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