Alabama Department of Environmental Management

§303(d)/TMDL

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Fair-Good™

North River at Tuscaloosa County Road 38 (33.47980/-87.59681)

BACKGROUND

North River from Lake Tuscaloosa to Ellis Creek was placed on Alabama's Clean Water Act (CWA) 1998 and 2010 §303(d) list of impaired waters for not meeting its *Fish and Wildlife* (F&W) water use classification. In 1998 it was listed for nutrients and siltation caused by abandoned surface mining. In 2010 it was listed for Mercury caused by atmospheric deposition. The Alabama Department of Environmental Management (ADEM) monitored North River at NRRT-1 to support development of Total Maximum Daily Loads (TMDL) to address these impairments.

The Alabama Department of Environmental Management (ADEM) also selected North River watershed for biological and water quality monitoring as part of the 2012 Assessment of the Black Warrior and Cahaba (BWC) River Basins. The objectives of the project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.

Figure 1. North River at NRRT-1, December 4, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. North River at NRRT-1 is a large *Fish and Wildlife* (F&W) stream located within the Fall Line Hills ecoregion in Tuscaloosa County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (75%). As of June 6, 2013, ADEM's NPDES Management System database shows a total of 21 permitted discharges within the 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-1 is a high-gradient, riffle-run stream with a bottom substrate dominated by boulder, cobble, and gravel (Figure 1). Habitat quality and availability was rated as *optimal* for supporting diverse aquatic macroinvertebrate communities.

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-1 rated the site as *good-fair*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		223
Ecoregion[a]		65i
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	35
	Evergreen	26
	Mixed	14
Shrub/scrub		8
Grassland/herbaceous		3
Pasture/hay		5
Cultivated crops		2
Development	Open space	3
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		35
Population/km^2[b]		8
# NPDES Permits[c]	**TOTAL**	21
Construction Stormwater		11
Industrial General		1
Municipal Individual		2
Underground Injection Control		1

a. Fall Line Hills

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, June 6, 2013.

Table 2. Physical characteristics of North River at NRRT-1, May 2, 2012.

Physical Characteristics		
Canopy Cover		**Mostly Open**
Width (ft)		**55**
Depth (ft)		
	Riffle	**0.9**
	Run	**1.0**
	Pool	**2.0**
% of Reach		
	Riffle	**25**
	Run	**60**
	Pool	**15**
% Substrate		
	Bedrock	**5**
	Boulder	**20**
	Cobble	**22**
	Gravel	**20**
	Sand	**15**
	Silt	**10**
	Organic Matter	**8**

Table 3. Results of the habitat assessment conducted on North River at NRRT-1, May 2, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	74	Optimal >65
Sediment Deposition	81	Optimal >65
Sinuosity	90	Optimal >84
Bank and Vegetative Stability	73	Sub-optimal (60-74)
Riparian Buffer	90	Optimal >89
Habitat Assessment Score	**192**	
% Maximum Score	**80**	**Optimal >65**

Table 4. Results of the macroinvertebrate bioassessment conducted in North River at NRRT-1, May 2, 2012.

Macroinvertebrate Assessment	Results
Taxa richness and diversity measures	
Total # Taxa	69
# EPT taxa	23
# Sensitive EPT	9
# Highly-sensitive and Specialized Taxa	4
Taxonomic composition measures	
% EPC taxa	30
% EPT minus Bactidae and Hydropsychidae	31
% Chironomidae Individuals	
% Dominant Taxon	24
Functional feeding group	
# Collector Taxa	25
% Tolerant Filterer Taxa	12
Community tolerance	
% Sensitive taxa	19
% Nutrient Tolerant individuals	39
WMB-I Assessment Score	3-
WMB-I Assessment Rating	Good-fair

WATER CHEMISTRY

In situ measurements and water samples were collected monthly during April through December of 2012 to help identify any stressors to the biological communities. Water chemistry results are summarized in Table 5. Median total dissolved solids, conductivity, hardness, alkalinity, pH, and chloride concentrations were higher than background levels based on data from reference reaches in ecoregion 65i. Lead exceeded aquatic life used criteria on September 5th; however, concentrations were normal for the Fall Line Hills ecoregion

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data. Results from the 2012 bioassessment indicated the macroinvertebrate community in North River at NRRT-1 to be in *good-fair* condition. Monitoring should continue to ensure that water quality and biological conditions remain stable.

Table 5. Summary of water quality data collected April-December 2012. Minimum (Min) and maximum (Max) values were calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviation (SD) values were calculated by multiplying the MDL by 0.5 when results were less than

Parameter	N	Min	Max	Med	Avg	SD	Q
Physical							
Temperature (°C)	11	10.3	30.1	24.5	22.3	6.5	
Turbidity (NTU)	11	3.1	62 7	4 4	12 6	18.5	
- Total Dissolved Solids (mg/L)	9	98.0	1358 0	184 0 M	371 3	456 4	
- Total Suspended Solids (mg/L)	9	< 1.0	71.0	2.0	10.4	22.9	
Specific Conductance (µmhos)	11	121.7	2271.0	358.2 G	586.4	687.7	
Hardness (mg/L)	4	20.5	57.6	31.0 G	35.0	15.9	
- Alkalinity (mg/L)	9	22.2	548.0	53 7 M	144.5	185.8	
Stream Flow (cfs)	11	2 0	588 0	52 0	118 2	174 7	
Chemical							
Dissolved Oxygen (mg/L)	11	6.9	11.0	8.4	8.5	1.3	
pH (su)	11	6.9	8.4	7.4 M	7.6	0.6	
Ammonia Nitrogen (mg/L)	9	< 0.007 <	0 008	0.004	0 004	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	9	0.047	0 231	0 090	0 110	0 056	
- Total Kjeldahl Nitrogen (mg/L)	9	< 0.041	0 539	0 179	0 204	0 172	
- Total Nitrogen (mg/L)	9	< 0.076	0 657	0.309	0 315	0.192	
- Dissolved Reactive Phosphorus (mg/L)	9	< 0.004	0.007	0.006	0.005	0.002	
Total Phosphorus (mg/L)	9	0.012	0.037	0.016	0.020	0.009	
- CBOD-5 (mg/L)	9	< 2.0	3.0	1 0	1.2	0.7	
Chlorides (mg/L)	9	7 1	194 9	17 5 M	51 1	63 4	
Total Metals							
- Aluminum (mg/L)	4	< 0.043	0.798	0.086	0.248	0.368	
- Iron (mg/L)	4	0.070	1.340	0.606	0.656	0.524	
- Manganese (mg/L)	4	0.025	0 079	0.053	0 052	0.030	
Dissolved Metals							
- Aluminum (mg/L)	4	< 0.043	0 055	0 022	0 030	0 017	
Antimony (µg/L)	4	< 3.6 <	3.6	1.8	1.8	0.0	
Arsenic (µg/L)	4	< 1.8 <	1.8	0.9	0.9	0.0	
Cadmium (µg/L)	4	< 0.022 <	0.046	0.023	0.020	0.006	
Chromium (mg/L)	4	< 0.009 <	0 009	0 004	0 004	0 000	
Copper (mg/L)	4	< 0.020 <	0 020	0 010	0 010	0 000	
Iron (mg/L)	4	< 0.019	0 409	0.284	0 247	0.169	
- Lead (µg/L)	4	< 0.9	1.2 S	0.4	0.6	0.4	1
- Manganese (mg/L)	4	< 0.007	0.031	0.020	0.019	0.012	
Mercury (µg/L)	4	< 0.035 <	0 035	0.018	0 018	0.000	
Nickel (mg/L)	4	< 0 042 <	0 042	0 021	0 021	0 000	
Selenium (µg/L)	4	< 2.5 <	2.5	1 2	1.2	0.0	
Silver (µg/L)	4	< 0.015 <	0 215	0.108	0 082	0.050	
Thallium (µg/L)	4	< 1.4 <	1.4	0.7	0.7	0.0	
Zinc (mg/L)	4	< 0.012 <	0.012	0.006	0.006	0.000	
Biological							
Chlorophyll a (ug/L)	9	< 0 10	5 34	1.07	1 61	1 91	
- E. coli (col/100mL)	9	12	1733	39	227	565	

Q=# samples with uncertain criteria exceedances; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65i; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65i; N=# samples; S=*F&W* hardness adjusted aquatic life use criteria exceeded.

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