Alabama Department of Environmental Management

§303(d)/TMDL Monitoring Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Fair™

Newfound Creek at County Road 112 in Jefferson County (33.64345, -86.91195)

BACKGROUND

Since 1998, Newfound Creek, from Five Mile Creek to impoundment (approximately 2.76 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. It was listed for siltation impairments from urban runoff/ storm sewers. The segment was listed as impaired based on data collected in 1986 and 2002.

The Alabama Department of Environmental Management (ADEM) monitored Newfound Creek at NFDJ-2 to verify and document impairment from siltation at this location. 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.

ADEM also selected the Newfound Creek watershed for biological and water quality monitoring as part of the 2012 Black Warrior and Cahaba (BWC) Basin Assessment Monitoring. The objectives of the BWC Basin Assessments were to assess each monitoring location and to estimate the overall water quality within the basin.

Figure 1. Newfound Creek at NFDJ-2, September 11, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Newfound Creek is a *Fish & Wildlife (F&W)* stream located in Jefferson County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (52%) with some open space development. Population density is relatively high in this area. As of September 1, 2012, 15 NPDES permits have been issued in this watershed, including 13 construction stormwater permits.

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. Newfound Creek at NFDJ-2 is a high-gradient, riffle-run stream characterized by a primarily cobble substrate (Figure 1). This watershed lies in the Shale Hills sub ecoregion (68f). Overall habitat quality was categorized as *optimal*.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		15
Ecoregion[a]		68f
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	36
	Evergreen	12
	Mixed	4
Shrub/scrub		6
Grassland/herbaceous		7
Pasture/hay		5
Cultivated crops		>1
Development	Open space	18
	Low intensity	9
	Moderate intensity	2
	High intensity	>1
Barren		>1
Population/km^2[b]		131
# NPDES Permits[c]	**TOTAL**	15
Construction Stormwater		13
Industrial General		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 Newfound Creek at NFJD-2, May 3, 2012.

Physical Characteristics		
Width (ft)		32
Canopy cover		Mostly Shaded
Depth (ft)		
	Riffle	0.5
	Run	1.2
	Pool	2.0
% of Reach		
	Riffle	30
	Run	55
	Pool	15
% Substrate		
	Bedrock	10
	Boulder	15
	Cobble	45
	Gravel	5
	Sand	2
	Silt	5
	Clay	5
	Organic Matter	8

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 the scores for all individual metrics. Metric results indicated the macroinvertebrate community to be in *fair* community condition (Table 4).

Table 3. Results of the habitat assessment conducted on Newfound Creek at NFDJ-2, May 3, 2012.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	75	Optimal (> 70)
Sediment Deposition	82	Optimal (> 70)
Sinuosity	85	Optimal (≥85)
Bank and Vegetative Stability	55	Marginal (35-59)
Riparian Buffer	89	Sub-optimal (70-89)
Habitat Assessment Score	**177**	
% Maximum score	**74**	**Optimal (> 70)**

Table 4. Results of the macroinvertebrate bioassessment conducted in Newfound Creek NFDJ-2, May 3, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness measures		**(0-100)**
# EPT taxa	11	30
Taxonomic composition measures		
% Non-insect taxa	6	81
% Dominant taxon	23	67
% EPC taxa	21	39
Functional feeding group measures		
% Predators	7	24
Tolerance measures		
% Taxa as Tolerant	32	49
WMB-I Assessment Score	**---**	**48**
WMB-I Assessment Rating		**Fair (39-58)**

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, or semi-monthly (metals), during April through November of 2012, to help identify any stressors to the biological communities. Median concentrations of total dissolved solids, specific conductance, hardness, alkalinity, and copper were higher than expected based on the 90th percentile of all reference data collected in the ecoregion 68f.

SUMMARY

Bioassesment results indicated the macroinvertebrate community in Newfound Creek at NFDJ-2 to be in *fair* condition. Habitat assessment results were scored as *optimal*. Intensive water quality sampling indicated elevated total dissolved solids, conductivity, hardness, alkalinity and copper concentrations within the reach. The TMDLs for these impairments are set to be drafted in 2019.

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Table 5. Summary of water quality data collected April-November, 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL). 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	9.4	26.4	20.4	19.8	5.1
Turbidity (NTU)	8	2.4	5.9	3.1	3.6	1.3
Total Dissolved Solids (mg/L)	8	137.0	206.0	167.5 M	170.6	21.3
Total Suspended Solids (mg/L)	8	1.0	7.0	2.0	2.5	2.0
Specific Conductance (µmhos)	9	212.0	414.0	295.0 G	291.2	56.6
Hardness (mg/L)	4	116.0	136.0	118.5 G	122.2	9.2
Alkalinity (mg/L)	8	41.6	56.2	49.4 M	49.7	4.3
Stream Flow (cfs)	7	1.6	16.3	3.6	5.5	5.1
Chemical						
Dissolved Oxygen (mg/L)	9	6.4	9.6	8.2	8.1	1.0
pH (su)	9	7.2	7.6	7.4	7.4	0.1
J Ammonia Nitrogen (mg/L)	8	< 0.010	0.028	0.014	0.011	0.005
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.037	0.295	0.154	0.162	0.090
J Total Kjeldahl Nitrogen (mg/L)	8	0.110	0.434	0.226	0.258	0.116
J Total Nitrogen (mg/L)	8	0.256	0.708	0.356	0.420	0.168
J Dissolved Reactive Phosphorus (mg/L)	8	< 0.005	0.007	0.006	0.005	0.002
J Total Phosphorus (mg/L)	8	< 0.006	0.059	0.014	0.017	0.018
J CBOD-5 (mg/L)	8	< 1.0	< 2.0	1.0	0.9	0.2
J Chlorides (mg/L)	8	2.2	3.8	2.6	2.7	0.5
Total Metals						
J Aluminum (mg/L)	4	0.068	0.184	0.082	0.104	0.054
J Iron (mg/L)	4	0.119	0.404	0.214	0.238	0.128
J Manganese (mg/L)	4	0.049	0.121	0.075	0.080	0.030
Dissolved Metals						
J Aluminum (mg/L)	4	< 0.030	0.055	0.032	0.034	0.022
Antimony (µg/L)	4	< 0.8	< 0.8	0.4	0.4	0.0
J Arsenic (µg/L)	4	< 1.0	< 1.0	0.5	0.5	0.0
J Cadmium (mg/L)	4	< 0.090	< 0.090	0.045	0.045	0.000
Chromium (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000
Copper (mg/L)	4	< 0.100	< 0.300	0.150 M	0.125	0.050
J Iron (mg/L)	4	< 0.100	< 0.100	0.050	0.050	0.000
Lead (µg/L)	4	< 1.6	< 1.6	0.8	0.8	0.0
J Manganese (mg/L)	4	0.039	0.095	0.066	0.067	0.023
Nickel (mg/L)	4	< 0.010	< 0.010	0.005	0.005	0.000
Selenium (µg/L)	4	< 2.0	< 2.0	1.0	1.0	0.0
Silver (mg/L)	4	< 0.001	< 0.001	0.000	0.000	0.000
Thallium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0
J Zinc (mg/L)	4	< 0.020	< 0.020	0.010	0.010	0.000
Biological						
Chlorophyll a (ug/L)	4	< 1.00	5.34	2.14	2.53	2.07
E. coli (col/100mL)	4	77	649	121	242	272

G=value > median of all ecoregional reference reach data collected in ecoregion 68; J=estimate; N=# samples; M=value > 90th percentile of all verified ecoregional reference reach data collected within ecoregions 68f