

Needham Creek at US Hwy 43 in Greene County (32.69870/-87.90320)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Needham Creek watershed for biological and water quality monitoring as part of the [2007 Assessment of the Black Warrior and Cahaba \(BWC\) River Basins](#). The objectives of the BWC Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the BWC basin group. Drought conditions prevented the completion of habitat and macroinvertebrate assessments.

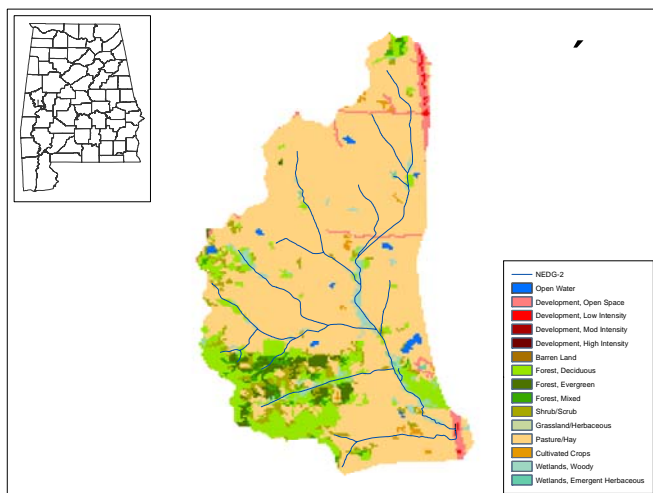


Figure 1. Sampling location and landuse within the Needham Creek watershed at NEDG-2.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi ²)		7
Ecoregion ^a		65a
% Landuse		
Open water		<1
Wetland	Woody	3
	Emergent herbaceous	<1
Forest	Deciduous	11
	Evergreen	2
	Mixed	1
Shrub/scrub		4
Pasture/hay		74
Cultivated crops		1
Development	Open space	2
	Low intensity	<1
Population/km ^{2b}		<1
# NPDES Permits ^c	TOTAL	1
	Construction Stormwater	1

a. Blackland Prairie

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, February 23, 2011

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Needham Creek is a [Fish & Wildlife \(F&W\)](#) stream located in Greene County (Figure 1). Landuse within the watershed is primarily pasture and croplands (75%), with some forested areas (14%). Population density is relatively low in this area. As of February 23, 2011, the ADEM has issued one construction stormwater NPDES permit in this watershed.

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 2. [In situ measurements](#) and [water samples](#) were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during March through October of 2007 to help identify any stressors to the biological communities.

Fecal coliform and ammonia nitrogen exceeded the F&W water use classification criteria. Median specific conductance, dissolved and suspended solids, hardness, alkalinity, nutrients (total Kjeldahl nitrogen, total nitrogen), chlorophyll-a and chlorides were higher than background levels based on reference reach data collected in this ecoregion. Additionally, several metals were present within the reach at concentrations exceeding established F&W criteria or background levels based on verified reference reach data collected in ecoregion 65a.

SUMMARY

Due to drought conditions in 2007, the habitat and macroinvertebrate assessments were not completed for Needham Creek at NEDG-2. Water quality results indicate that median specific conductance, dissolved and suspended solids, hardness, alkalinity, nutrients (total Kjeldahl nitrogen, total nitrogen) and chlorides, as well as several metals, were higher than background levels based on reference reach data collected in this ecoregion. Further sampling may be required to accurately assess the conditions of this watershed.

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Table 2. Summary of water quality data collected March-October, 2007. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. 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)	7	13.3	28.8	22.2	21.6	5.3	
Turbidity (NTU)	7	15.9	72.3	43.8	43.1	21.1	
^J Total Dissolved Solids (mg/L)	7	321.0	3,542.0	865.0 ^M	1,632.9	1,427.8	
^J Total Suspended Solids (mg/L)	7	31.0	193.0	107.0 ^M	103.3	61.1	
Specific Conductance (µmhos)	7	534.8	7,528.0	3981.0 ^G	4,102.3	3,146.9	
Hardness (mg/L)	2	179.0	414.0	296.5 ^G	296.5	166.2	
Alkalinity (mg/L)	7	108.4	250.4	210.0 ^M	202.3	46.5	
Stream Flow (cfs)	2	0.2	0.5	0.4	0.4	0.2	
Chemical							
Dissolved Oxygen (mg/L)	7	6.3	10.1	7.0	7.7	1.4	
pH (su)	7	7.1	8.1	7.7	7.6	0.3	
Ammonia Nitrogen (mg/L)	7	<0.015	2.650 ^P	0.022	0.402	0.992	1
^J Nitrate+Nitrite Nitrogen (mg/L)	7	<0.003	0.439	0.051	0.136	0.176	
Total Kjeldahl Nitrogen (mg/L)	7	<0.150	8.668	1.356 ^M	2.266	2.914	
^J Total Nitrogen (mg/L)	7	<0.093	9.107	1.436 ^M	2.402	3.038	
Dissolved Reactive Phosphorus (mg/L)	7	<0.004	0.115	0.018	0.040	0.043	
Total Phosphorus (mg/L)	7	0.066	0.193	0.127	0.129	0.049	
CBOD-5 (mg/L)	7	<1.0	7.0	1.3	2.5	2.5	
^J Chlorides (mg/L)	7	25.0	2,177.0	687.8 ^M	1,067.2	995.6	
Atrazine (µg/L)	1				<0.05		
Total Metals							
Aluminum (mg/L)	3	<0.500	5.600	1.380 ^M	2.410	2.820	
Iron (mg/L)	3	0.024	4.300	1.230	1.851	2.205	
Manganese (mg/L)	3	0.106	0.180	0.137	0.141	0.037	
Dissolved Metals							
Aluminum (mg/L)	3	<0.015	<0.500	0.230 ^M	0.162	0.135	
Antimony (µg/L)	3	<2.0	7.5	2.5 ^M	2.4	1.4	
Arsenic (µg/L)	3	<2.2	5.0	2.5	2.0	0.8	
Cadmium (mg/L)	3	<0.0003	<0.005	0.0003	0.001	0.001	
Chromium (mg/L)	3	<0.004	<0.010	0.002	0.003	0.002	
Copper (mg/L)	3	<0.005	<0.010	0.002	0.003	0.001	
^J Iron (mg/L)	3	0.020	<0.060	0.030	0.028	0.007	
Lead (µg/L)	3	<1.5	<5.0	2.5 ^M	1.9	1.0	
^J Manganese (mg/L)	3	0.038	0.180	0.087	0.102	0.072	
Mercury (µg/L)	3	<0.3	<0.5	0.2 ^M	0.2	0.1	
Nickel (mg/L)	3	<0.005	<0.010	0.003	0.004	0.001	
Selenium (µg/L)	3	<1.6	<7.5	2.5	2.4	1.5	
Silver (mg/L)	3	<0.0005	<0.003	0.0	0.001	0.001	
Thallium (µg/L)	3	<0.6	<9.0	1.2 ^M	2.0	2.2	
Zinc (mg/L)	3	<0.006	0.020	0.008	0.010	0.009	
Biological							
^J Chlorophyll a (ug/L)	7	4.30	218.94	21.36 ^M	48.98	75.98	
^J Fecal Coliform (col/100 mL)	7	60	4200 ^H	800	1,534	1,566	3

E=# samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 65a; H=F&W human health criterion exceeded; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 65a; N=# samples;