Alabama Department of Environmental Management

Use Support Assessment Site

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Fair

Davis Creek north of Pegues Creek Road (Tuscaloosa County) (33.40089/-87.33790)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Davis Creek watershed for biological and water quality monitoring as part of the 2012 Basin-wide Screening Assessment of the Black Warrior and Cahaba (BWC) River Basins. The screening assessments were conducted at stream reaches where land use estimates and non-point source information from the local Soil and Water Conservation Districts indicated a moderate or high potential for impairment from non-point sources in non-urban areas.

The Davis Creek watershed was also sampled as part of the 2012 BWC River Basin Assessments. The objectives of these assessments were to determine the biological integrity of each monitoring location and to estimate overall water quality within the BWC basin.

Figure 1. Davis Creek at DAVT-5, September 13, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Davis Creek at DAVT-5 is a *Fish and Wildlife (F&W)* stream located in Tuscaloosa County north of the town of Brookwood, Alabama. At DAVT-5, the stream drains approximately 98 square miles and has <8% development. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forested (79%). As of September 1, 2012, ADEM's NPDES management system showed 25 permits issued in the Davis Creek 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. Davis Creek at DAVT-5 was characterized primarily by boulder and cobble substrates (Figure 1). Overall habitat quality was categorized as *optimal,* although the riparian buffer and riffle habitat were limited.

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

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		98
Ecoregion[a]		68f
% Landuse		
Open water		1
Wetland	Woody	2
	Emergent herbaceous	<1
Forest	Deciduous	30
	Evergreen	38
	Mixed	11
Shrub/scrub		5
Grassland/herbaceous		5
Pasture/hay		2
Cultivated crops		<1
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		1
Population/km^2[b]		22
# NPDES Permits[c]	**TOTAL**	25
Construction Stormwater		11
Mining		9
Industrial General		4
Underground Injection Control		1

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 Davis Creek at DAVT-5, May 7, 2012.

Physical Characteristics		
Width (ft)		70
Canopy Cover		Open
Depth (ft)		
	Riffle	1.0
	Run	2.0
	Pool	4.0
% of Reach		
	Riffle	10
	Run	40
	Pool	50
% Substrate		
	Bedrock	10
	Boulder	45
	Cobble	20
	Gravel	10
	Sand	5
	Silt	2
	Organic Matter	8

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Table 3. Results of the habitat assessment conducted on Davis Creek at DAVT-5, May 7, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	88	Optimal (>70)
Sediment Deposition	86	Optimal (>70)
Sinuosity	85	Optimal (>84)
Bank and Vegetative Stability	84	Optimal (>74)
Riparian Buffer	90	Optimal (>89)
Habitat Assessment Score	**208**	
% Maximum Score	**86**	**Optimal (>70)**

Table 4. Results of macroinvertebrate bioassessment conducted in Davis Creek at DAVT-5, May 7, 2012.

Macroinvertebrate Assessment		
	Results	**Scores (0-100)**
Taxa richness measures		
# EPT taxa	11	30
Taxonomic composition measures		
% Non-insect taxa	10	61
% Dominant taxon	17	86
% EPC taxa	21	38
Functional feeding group measures		
% Predators	9	31
Tolerance measures		
% Taxa as Tolerant	27	63
WMB-I Assessment Score	---	**52**
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, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during April through November of 2012 to help identify any stressors to the biological communities. Median specific conductance and hardness as well as temperature, total dissolved solids, alkalinity, chlorides, and dissolved cadmium and copper were higher than values expected based on data collected at reference reaches within the Shale Hills ecoregion (68f).

SUMMARY

While Davis Creek at DAVT-5 was rated *optimal* for supporting diverse biological communities, bioassessment results indicated the macroinvertebrate community to be in *fair* condition. Median values of hardness, specific conductance, hardness, temperature, total dissolved solids, alkalinity, chlorides, and dissolved metals were higher than expected based on reference reaches within the Shale Hills ecoregion.

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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 (Med), 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	10.8	25.9	24.1 M	21.7	5.1
Turbidity (NTU)	9	0.8	2.3	1.1	1.3	0.5
J Total Dissolved Solids (mg/L)	8	487.0	1530.0	921.5 M	1009.2	347.3
J Total Suspended Solids (mg/L)	8	< 1.0	2.0	1.0	1.1	0.6
Specific Conductance (µmhos)	9	686.0	1981.0	1,314.0 G	1303.8	387.9
Hardness (mg/L)	4	327.0	713.0	515.5 G	517.8	179.6
Alkalinity (mg/L)	8	61.8	184.6	119.4 M	126.7	43.9
Stream Flow (cfs)	9	25.2	92.3	37.4	42.1	21.2
Chemical						
Dissolved Oxygen (mg/L)	9	8.0	11.1	9.1	9.4	1.1
pH (su)	9	7.8	8.4	8.2	8.2	0.2
J Ammonia Nitrogen (mg/L)	8	< 0.010	0.091	0.014	0.020	0.029
J Nitrate+Nitrite Nitrogen (mg/L)	8	0.023	1.050	0.140	0.284	0.350
J Total Kjeldahl Nitrogen (mg/L)	8	0.122	0.338	0.256	0.234	0.082
J Total Nitrogen (mg/L)	8	0.249	1.388	0.384	0.519	0.381
J Dissolved Reactive Phosphorus (mg/L)	7	0.005	0.017	0.007	0.008	0.004
J Total Phosphorus (mg/L)	8	< 0.007	0.048	0.012	0.017	0.016
J CBOD-5 (mg/L)	8	< 1.0	< 2.0	1.0	0.9	0.2
J Chlorides (mg/L)	8	18.7	75.0	42.1 M	41.9	17.1
Total Metals						
J Aluminum (mg/L)	4	< 0.030	0.034	0.015	0.020	0.010
Iron (mg/L)	4	< 0.100	< 0.100	0.050	0.050	0.000
J Manganese (mg/L)	4	0.019	0.049	0.044	0.039	0.013
Dissolved Metals						
J Aluminum (mg/L)	4	< 0.030	< 0.030	0.015	0.015	0.000
J Antimony (µg/L)	4	< 0.8	1.9	1.1	1.1	0.6
Arsenic (µg/L)	4	< 1.0	< 1.0	0.5	0.5	0.0
J Cadmium (µg/L)	4	< 0.090	0.164	0.045 M	0.075	0.060
Chromium (mg/L)	4	< 0.005	< 0.005	0.002	0.002	0.000
Copper (mg/L)	4	< 0.100	< 0.300	0.100 M	0.100	0.058
Iron (mg/L)	4	< 0.100	< 0.100	0.050	0.050	0.000
J Lead (µg/L)	4	< 1.6	< 1.6	0.8	0.8	0.0
J Manganese (mg/L)	4	0.012	0.038	0.038	0.031	0.013
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
J Silver (µg/L)	4	< 1.000	< 1.000	0.500	0.500	0.000
Thallium (µg/L)	4	< 0.4	< 0.4	0.2	0.2	0.0
J Zinc (mg/L)	4	< 0.009	< 0.020	0.010	0.009	0.003
Biological						
Chlorophyll a (µg/L)	4	< 1.00	< 1.00	0.50	0.50	0.00
J E. coli (col/100mL)	7	4	57	20	22	16

J=estimate; N=# samples; G=value greater than median concentration of all verified reference data collected in ecoregion 68f; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 68f.