

2010 Monitoring Summary



Basin Assessment Site

Brush Creek at US Hwy 80 in Dallas County (32.43883/-87.37375)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Brush Creek watershed for biological and water quality monitoring as part of the 2010 Alabama, Coosa, and Tallapoosa (ACT) Basin Assessment Monitoring. The objectives of the ACT Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the basin.



Figure 1. Brush Creek at BRSD-18, April 14, 2010.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Brush Creek is a *Fish & Wildlife (F&W)* stream located in Dallas County on Blackland Prairie ecoregion(65a). Based on the 2000 National Land Cover Dataset, landuse within the watershed is composed of pasture/hay, cultivated crops, and woody wetlands. Population density is relatively very low in this area. As of February 23, 2011, two outfalls are active in this watershed 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. Brush Creek at BRSD-18 is a low gradient stream dominated by clay and mud/muck substrates (Figure 1). Overall habitat quality was

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 *poor* community condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Alabama River
Drainage Area (mi²)		21
Ecoregion^a		65a
% Landuse		
Open water		<1
Wetland	Woody	11
	Emergent herbaceous	7
Forest	Deciduous	3
	Evergreen	3
	Mixed	1
Shrub/scrub		7
Grassland/herbaceous		<1
Pasture/hay		46
Cultivated crops		12
Development	Open space	6
	Low intensity	<1
	Moderate intensity	<1
Population/km²^b		4
# NPDES Permits^c	TOTAL	2
	Construction Stormwater	2

a.Blackland Prairie

b.2000 US Census

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

Table 2. Physical characteristics of Brush Creek at BRSD-18, April 14, 2010.

Physical Characteristics		
Canopy Cover		Estimate 50/50
Width (ft)		30
Depth (ft)		
	Pool	2.5
% of Reach		
	Pool	100
% Substrate		
	Clay	60
	Mud/Muck	25
	Gravel	2
	Sand	3
	Silt	5
	Organic Matter	5

Table 3. Results of the habitat assessment conducted on Brush Creek at BRSD-18, April 14, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	30	Poor <40
Sediment Deposition	56	Sub-optimal (53-65)
Sinuosity	38	Poor <45
Bank and Vegetative Stability	65	Sub-optimal (60-74)
Riparian Buffer	79	Sub-optimal (70-89)
Habitat Assessment Score	122	
% Maximum Score	55	Sub-optimal (53-65)

Table 4. Results of the macroinvertebrate bioassessment conducted in Brush Creek at BRSD-18, April 14, 2010.

Macroinvertebrate Assessment		
		Results
Taxa richness measures		
	# EPT genera	3
Taxonomic composition measures		
	% Non-insect taxa	25
	% Plecoptera	0
	% Dominant taxa	31
Functional composition measures		
	% Predators	17
Tolerance measures		
	Beck's community tolerance index	1
	% Nutrient tolerant organisms	12
WMB-I Assessment Score		31
WMB-I Assessment Rating		Poor

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected April through June (stream became disconnected pools with no flow for the rest of the collection period), 2010 to help identify any stressors to the biological communities. *In situ* parameters suggested that Brush Creek at BRSD-18 was meeting *F&W* use classification. However, the *E. coli* count was higher in April, and it could be due to heavy rain on the previous day. Median concentrations of specific conductance and hardness were higher than median concentrations of all ecoreference data collected from the Black Prairie (65a) ecoregion. Values of total dissolved solids, nutrients (ammonia nitrogen, nitrate+nitrite nitrogen, total Kjeldahl nitrogen and total nitrogen), and chlorides were higher than expected. Total metals (aluminum and iron) were also higher than background levels based on verified reference reach data collected in ecoregion 65a. The median Chlorophyll a value was also elevated. Arsenic and Thallium concentrations exceeded the Human Health criterion for water and fish consumption during April. Samples were collected for the analyses of pesticides, semi-volatile organics and atrazine in April and May. Atrazine was detected in both samples.

SUMMARY

As part of the assessment process, ADEM will review the monitoring information presented in this report along with all other available data.

Bioassessment results indicated the macroinvertebrate community to be in *poor* condition. Habitat was assessed as *sub-optimal* for supporting macroinvertebrate communities. Water quality data indicated nutrient enrichment from the pasture fields as causing threat to the biological communities. Atrazine, which is widely used as a herbicide in the United States, was detected in the water samples, indicating that it may be acting as a stressor to the biological communities. Aluminum, Iron, Arsenic, and Thallium are other metals of concern.

Although samples of total dissolved arsenic were above expected values in Brush Creek, ADEM criteria for arsenic are expressed as dissolved trivalent arsenic (arsenite—As III). Presently, studies are being conducted in order to provide a better understanding of the prevalence and areal distribution of dissolved trivalent arsenic to total arsenic in the State of Alabama. Upon conclusion of the studies, Brush Creek will be reassessed for potential arsenic violations.

Table 5. Summary of water quality data collected April-June, 2010. 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	Q	E
Physical								
Temperature (°C)	4	18.2	25.9	20.7	21.4	3.4		
Turbidity (NTU)	4	23.1	317.0 ^T	45.2	107.6	140.5		
Total Dissolved Solids (mg/L)	3	142.0	376.0	174.0 ^M	230.7	126.9	J	
Total Suspended Solids (mg/L)	3	41.0	293.0	188.0	174.0	126.6		
Specific Conductance (µmhos)	4	181.3	457.9	236.5 ^G	278.0	123.0		
Hardness (mg/L)	3	73.3	137.0	82.9 ^G	97.7	34.3		
Alkalinity (mg/L)	3	31.1	61.3	51.6	48.0	15.4		
Stream Flow (cfs)	2	0.2	14.1	7.2	7.2	9.8		
Chemical								
Dissolved Oxygen (mg/L)	4	6.9	7.8	7.0	7.2	0.4		
pH (su)	4	6.6	7.4	7.2	7.1	0.3		
Ammonia Nitrogen (mg/L)	3	< 0.021	9.820	0.082 ^M	3.304	5.643		
Nitrate+Nitrite Nitrogen (mg/L)	3	0.639	25.457	1.590 ^M	9.229	14.062		
Total Kjeldahl Nitrogen (mg/L)	3	0.791	43.368	1.585 ^M	15.248	24.356		
Total Nitrogen (mg/L)	3	1.430	68.825	3.175 ^M	24.477	38.417		
Dissolved Reactive Phosphorus (mg/L)	3	0.010	0.485	0.015	0.170	0.273		
Total Phosphorus (mg/L)	3	0.057	0.853	0.133	0.348	0.439		
CBOD-5 (mg/L)	3	< 2.0	4.6	1.0	2.2	2.1		
Chlorides (mg/L)	3	11.0	41.2	19.2 ^M	23.8	15.6		
Atrazine (µg/L)	2	0.17	23.10	11.64	11.64	16.21		
Total Metals								
Aluminum (mg/L)	3	0.873	5.130	4.080 ^M	3.361	2.218		
Iron (mg/L)	3	0.637	4.380	2.940 ^M	2.652	1.888		
Manganese (mg/L)	3	< 0.001	0.185	0.087	0.091	0.092		
Dissolved Metals								
Aluminum (mg/L)	3	< 0.033	0.043	0.016	0.025	0.015	J	
Antimony (µg/L)	3	< 0.7	< 1.9	0.9	0.8	0.3		
Arsenic (µg/L)	3	< 1.2 ^H	2.1	1.0	1.1	0.1	J	1
Cadmium (mg/L)	3	< 0.003	< 0.014	0.002	0.003	0.003		
Chromium (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000		
Copper (mg/L)	3	< 0.013	< 0.013	0.006	0.006	0.000		
Iron (mg/L)	3	< 0.026	0.094	0.013	0.040	0.047	J	
Lead (µg/L)	3	< 1.0	< 1.7	0.8	0.7	0.2		
Manganese (mg/L)	3	< 0.001	0.119	0.016	0.045	0.064	J	
Mercury (µg/L)	3	< 0.1	< 0.1	0.0	0.0	0.0	J	
Nickel (mg/L)	3	< 0.019	< 0.019	0.010	0.010	0.000		
Selenium (µg/L)	3	< 0.4	< 1.7	0.8	0.6	0.4		
Silver (mg/L)	3	< 0.002	< 0.002	0.001	0.001	0.000		
Thallium (µg/L)	3	< 0.6	0.8 ^H	0.3	0.5	0.3	J	1
Zinc (mg/L)	3	< 0.030	< 0.030	0.015	0.015	0.000		
Biological								
Chlorophyll a (ug/L)	3	5.34	7.12	5.34 ^M	5.93	1.03		
<i>E. coli</i> (col/100mL)	3	5	> 2420 ^C	34	820	1386	J	

C=(*F&W*) criterion exceeded; 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; Q=qualifier; T=value exceeds 50 NTU above the 90th percentile of all verified reference data collected in ecoregion 65a.

FOR MORE INFORMATION, CONTACT:

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