

2009 Monitoring Summary



Kash Creek at Alabama Highway 117 in Jackson County (34.79028/-85.72500)

BACKGROUND

The Alabama Department of Environmental Management (ADEM) selected the Kash Creek watershed for biological and water quality monitoring as part of the 2009 Assessment of the Tennessee (TN) River Basin. The objectives of the Tennessee River Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the Tennessee River basin. Habitat and macroinvertebrate assessments were conducted on Kash Creek at KASJ-1 on June 9, 2009.



Figure 1. Kash Creek at KASJ-1, November 1, 2008.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Kash Creek is a small *Fish & Wildlife (F&W)* stream located in Jackson County. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (60%), with some pasture and cropland. Clear-cutting and mining activities, including a gravel mine and an old settling pond, were noted in the area during biological assessments. Population density is low, and only 4% of the watershed is developed. As of September 1, 2012, ADEM's NPDES management system database shows a total of three 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. Kash Creek at KASJ-1 is a low-gradient stream located in the Southern Table Plateaus ecoregion (Figure 1). The benthic substrate consists mainly of boulders with some sand and silt. A beaver dam was located above the stream reach. Overall habitat quality was categorized as *marginal* for supporting diverse aquatic macroinvertebrate communities due to sedimentation, bank erosion, and a relatively straight stream channel.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee R
Drainage Area (mi ²)		6
Ecoregion ^a		68d
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	49
	Evergreen	5
	Mixed	6
Shrub/scrub		7
Grassland/herbaceous		3
Pasture/hay		16
Cultivated crops		9
Development	Open space	3
	Low intensity	1
Barren		<1
Population/km ^{2b}		1
# NPDES Permits ^c	TOTAL	3
	Construction Stormwater	1
	Mining	2

a. Southern Table Plateaus

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management System database, September 1, 2012.

Table 2. Physical characteristics of Kash Creek at KASJ-1, June 9, 2009.

Physical Characteristics		
Width (ft)		20
Canopy Cover		Mostly Shaded
Depth (ft)		
	Run	1.0
	Pool	2.5
% of Reach		
	Run	40
	Pool	60
% Substrate		
	Bedrock	2
	Boulder	50
	Cobble	5
	Gravel	5
	Sand	10
	Silt	25
	Organic Matter	3

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

Table 3. Results of the habitat assessment conducted on Kash Creek at KASJ-1, June 9, 2009.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	48	Marginal (41-58)
Sediment Deposition	59	Marginal (41-58)
Sinuosity	38	Poor <45
Bank and Vegetative Stability	59	Marginal (35-59)
Riparian Buffer	71	Sub-optimal (70-89)
Habitat Assessment	126	
% Maximum Score	57	Marginal (41-58)

Table 4. Results of the macroinvertebrate bioassessment conducted in Kash Creek at KASJ-1, June 9, 2009.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness measures		(0-100)
# EPT taxa	6	9
Taxonomic composition measures		
% Non-insect taxa	12	54
% Dominant taxon	28	52
% EPC taxa	8	6
Functional feeding group measures		
% Predators	11	42
Tolerance measures		
% Taxa as Tolerant	45	10
WMB-I Assessment Score	---	29
WMB-I Assessment Rating		Poor (20-38)

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, semi-volatile organics, and atrazine) during March through October of 2009 to help identify any stressors to the biological communities. Stream flows were 2 cfs in June, and dropped to <1 cfs, July-September. Dissolved copper and mercury concentrations were above criteria applicable to the stream's F&W use classification on Oct. 15th and June 10th, respectively. Turbidity was >50 NTU above background levels during a high flow event on May 6th. Several parameters were elevated as compared to reference data collected in ecoregion 68d.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Kash Creek at KASJ-1 to be in *poor* condition. Overall habitat quality was categorized as *marginal*, due to sedimentation, bank erosion, and a uniform stream channel. Nutrient, conductivity, hardness, and metals concentrations were elevated as compared to reference reach data collected in ecoregion 68. However, results may have been impacted by low stream flow conditions experienced during 2009.

Table 5. Summary of water quality data collected March-October, 2009. 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	E
Physical							
Temperature (°C)	10	12.0	26.2	19.7	19.0	5.2	
Turbidity (NTU)	10	5.7	94.1 ^T	17.8	22.8	25.8	
J Total Dissolved Solids (mg/L)	8	51.0	130.0	80.5	83.9	26.7	
J Total Suspended Solids (mg/L)	8	< 1.0	121.0	6.0	21.4	40.5	
Specific Conductance (µmhos)	10	48.6	160.5	85.2 ^G	91.0	39.0	
Hardness (mg/L)	4	20.3	60.9	49.4 ^G	45.0	18.8	
Alkalinity (mg/L)	8	5.4	54.8	19.7	26.8	20.8	
Stream Flow (cfs)	9	0.2	30.1	2.8	8.0	10.2	
Chemical							
Dissolved Oxygen (mg/L)	10	5.9	9.5	6.9	7.4	1.4	
pH (su)	10	6.1	6.9	6.5	6.5	0.2	
J Ammonia Nitrogen (mg/L)	8	< 0.006	0.210	0.006	0.053	0.079	
J Nitrate+Nitrite Nitrogen (mg/L)	8	< 0.003	1.098	0.137	0.249	0.362	
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.089	2.503	0.610	0.948	0.848	
J Total Nitrogen (mg/L)	8	< 0.078	2.861	0.631	1.197	1.089	
J Dissolved Reactive Phosphorus (mg/L)	8	0.006	0.091	0.018 ^{JM}	0.041	0.040	
J Total Phosphorus (mg/L)	8	0.009	0.233	0.018	0.052	0.076	
CBOD-5 (mg/L)	8	< 1.0	< 2.0	0.5	0.7	0.3	
Chlorides (mg/L)	8	1.6	21.8	2.2	4.6	7.0	
Atrazine (µg/L)	2	< 0.06	< 0.06	0.03	0.03	0.00	
Total Metals							
J Aluminum (mg/L)	4	< 0.060	0.336	0.103	0.143	0.134	
Iron (mg/L)	4	0.879	3.490	1.980 ^M	2.082	1.082	
Manganese (mg/L)	4	0.272	2.670	0.831 ^M	1.151	1.135	
Dissolved Metals							
J Aluminum (mg/L)	4	< 0.022	< 0.060	0.026	0.025	0.007	
Antimony (µg/L)	4	< 0.7	< 6.0	1.7	1.7	1.5	
Arsenic (µg/L)	4	< 0.4	< 1.6	0.2	0.4	0.3	
Cadmium (mg/L)	4	< 0.002	< 0.003	0.001	0.001	0.000	
Chromium (mg/L)	4	< 0.007	< 0.013	0.005	0.005	0.002	
J Copper (mg/L)	4	< 0.013	< 0.200 ^S	0.060	0.057	0.050	1
J Iron (mg/L)	4	0.127	0.919	0.275 ^M	0.399	0.355	
Lead (µg/L)	4	< 0.6	< 1.5	0.6	0.6	0.2	
Manganese (mg/L)	4	0.264	2.460	0.863 ^M	1.112	1.060	
Mercury (µg/L)	3	< 0.1	0.6 ^{AH}	0.0	0.2	0.3	1
Nickel (mg/L)	4	< 0.004	< 0.019	0.004	0.005	0.003	
Selenium (µg/L)	4	< 0.4	< 1.5	0.2	0.3	0.3	
Silver (mg/L)	4	< 0.001	< 0.002	0.001	0.001	0.000	
Thallium (µg/L)	4	< 0.4	< 0.5	0.2	0.2	0.0	
Zinc (mg/L)	4	< 0.003	< 0.060	0.022	0.019	0.014	
Biological							
Chlorophyll a (ug/L)	8	< 1.00	3.20	1.66	1.70	0.85	
J Fecal Coliform (col/100 mL)	8	6	470	49	140	194	

A=F&W aquatic life use criterion exceeded; E=# samples exceeding criteria; G=value higher than median concentration of ecoregional reference reach data collected in the ecoregion 68d; H=F&W human health criterion exceeded; J=estimate; M=value >90% of ecoregional reference reach data collected in the ecoregion 68d; N=# samples; S=F&W hardness-adjusted aquatic life use criteria exceeded; T=value exceeds 50 NTU above the 90th percentile of ecoregional reference reach data collected in the ecoregion 68d.

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