

2010 Monitoring Summary



Spring Creek at Cherokee County Road 41 (34.32250/-85.58705)

BACKGROUND

Spring Creek, from its confluence with Mud Creek to its source has been placed on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 2006. This 9.88 mile stretch of Spring Creek has been listed as impaired, based on data collected in 2002. The cause of impairment is listed as nutrients (nitrogen, phosphorus) from agricultural sources. In 2010, ADEM monitored Spring Creek at SPRC-2 to investigate the extent of nutrient impairment within the watershed. Total Maximum Daily Loads (TMDLs) are scheduled for completion by 2012.



Figure 1. Spring Creek at SPRC-2 on May 4, 2010, facing upstream.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Spring Creek is a *Fish and Wildlife (F&W)* stream located in the Coosa River basin within the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion (67f). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (66%), with some agricultural areas (17%). As of September 1, 2012, only one NPDES permit has been issued 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. Spring Creek at SPRC-2 is a low-gradient, glide pool stream characterized primarily by organic matter, gravel, and silt substrates (Figure 1). Overall habitat quality was categorized as *marginal* due to poor channel morphology and riparian buffers. A beaverdam was present within the reach.

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 in comparison to least-impaired reference reaches in the same ecoregion. 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	Coosa River	
Drainage Area (mi ²)	13	
Ecoregion ^a	67f	
% Landuse		
Open water	<1	
Forest	Deciduous	36
	Evergreen	17
	Mixed	13
Shrub/scrub	6	
Grassland/herbaceous	6	
Pasture/hay	13	
Cultivated crops	4	
Development	Open space	5
	Low intensity	<1
	Moderate intensity	<1
Barren	<1	
Population/km ^{2b}	12	
# NPDES Permits ^c	TOTAL	1
Mining	1	

a. Southern Limestone/Dolomite Valleys and Low Rolling Hills

b. 2000 US Census

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

Table 2. Physical characteristics of Spring Creek at SPRC-2, May 26, 2010.

Physical Characteristics		
Width (ft)	30	
Canopy Cover	Open	
Depth (ft)		
	Run	1.5
	Pool	2.5
% of Reach		
	Run	50
	Pool	50
% Substrate		
	Boulder	1
	Clay	3
	Cobble	4
	Mud/Muck	5
	Gravel	15
	Sand	5
	Silt	12
	Organic Matter	35

Table 3. Results of the habitat assessment conducted on Spring Creek at SPRC-2, May 26, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	54	Marginal (41-58)
Sediment Deposition	49	Marginal (41-58)
Sinuosity	43	Poor <45
Bank and Vegetative Stability	55	Marginal (35-59)
Riparian Buffer	34	Poor <50
Habitat Assessment Score	104	
% Maximum Score	47	Marginal (41-58)

Table 4. Results of the macroinvertebrate bioassessment conducted in Spring Creek at SPRC-2, May 26, 2010.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness and diversity measures		(0-100)
# EPT taxa	23	83
Shannon Diversity	5.15	100
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	28	30
% Non-insect taxa	11	58
Tolerance measures		
% Tolerant taxa	25	70
WMB-I Assessment Score	---	68
WMB-I Assessment Rating		Fair (47-69)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected April through November of 2010 to help identify any stressors to the biological communities. Two intensive *e. coli* studies were conducted over the summer. *E. coli* concentrations exceeded *F&W* criteria in June and August in both the single sample (488 and 517 colonies per 100 mL, respectively) and the geometric mean (341 and 288 colonies per 100 mL, respectively). Median alkalinity and specific conductance were higher than values expected based on data collected at reference reaches within the Southern Limestone/Dolomite Valleys and Low Rolling Hills ecoregion (67f). No metals or organic samples were collected.

Table 5. Summary of water quality data collected April-November, 2010. 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	E
Physical							
Temperature (°C)	19	13.8	22.7	19.2	19.1	2.4	
Turbidity (NTU)	19	3.4	23.1	4.6	6.4	4.6	
Total Dissolved Solids (mg/L)	8	38.0	148.0	128.0	121.5	35.3	
^J Total Suspended Solids (mg/L)	8	< 1.0	7.0	2.0	2.6	2.1	
Specific Conductance (µmhos)	19	146.0	277.0	256.0 ^G	246.4	31.3	
Alkalinity (mg/L)	8	110.0	145.0	139.9 ^M	131.6	15.4	
Stream Flow (cfs)	15	1.5	23.5	7.8	10.5	7.5	
Chemical							
Dissolved Oxygen (mg/L)	19	7.4	10.3	9.0	9.0	0.7	
pH (su)	19	7.2	8.0	7.8	7.7	0.2	
Ammonia Nitrogen (mg/L)	8	< 0.021	< 0.021	0.010	0.010	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.078	0.299	0.262 ^M	0.240	0.074	
Total Kjeldahl Nitrogen (mg/L)	8	< 0.080	0.543	0.122	0.206	0.200	
Total Nitrogen (mg/L)	8	< 0.118	0.809	0.384	0.446	0.236	
^J Dissolved Reactive Phosphorus (mg/L)	8	0.004	0.012	0.011	0.009	0.003	
^J Total Phosphorus (mg/L)	8	0.008	0.012	0.010	0.010	0.002	
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.1	0.4	
Chlorides (mg/L)	8	1.4	1.6	1.5	1.5	0.1	
Biological							
Chlorophyll a (µg/L)	8	< 0.10	< 1.00	0.27	0.40	0.27	
^J <i>E. coli</i> (col/100mL)	18	51	517 ^C	233	265	155	2

C=*F&W* criterion exceeded; E=# samples that exceed criterion; G=value greater than median concentration of all verified reference data collected in ecoregion 67f; J=estimate; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 67f; N=# samples.

SUMMARY

Results of ADEM's 2010 macroinvertebrate bioassessment indicated the macroinvertebrate community to be in *fair* condition. Concentrations of *e. coli*, alkalinity, and specific conductance were elevated as compared to data from ADEM's least-impaired reference reaches in ecoregion 67f. Based in part on the data collected at this site, ADEM developed a pathogen TMDL for Spring Creek from Mud Creek to Coosa River, which was approved by EPA in 2011. These water quality data and the macroinvertebrate bioassessment results supported the delisting of this reach for nutrients in 2010. Monitoring should continue to ensure that water quality and biological conditions remain stable.

FOR MORE INFORMATION, CONTACT:
Bonnie Coleman, ADEM Environmental Indicators Section
1350 Coliseum Boulevard Montgomery, AL 36110
(334) 260-2737 bcoleman@adem.state.al.us