Alabama Department of Environmental Management

NPS Intensive Montioring

Rivers and Streams Monitoring Program

2012 Monitoring Summary

Wolf Creek at Randolph County Road 532 (33.39169/-85.45549)

BACKGROUND

The Wolf Creek watershed, from the Little Tallapoosa River to its source, was placed on Alabama's 1998 §303(d) list of impaired waters. It was listed for ammonia, organic enrichment/low dissolved oxygen concentrations, and pathogens from intensive animal feedlot operations.

Intensive water quality data collected by ADEM in 2001 and 2002 showed no violations of ammonia or dissolved oxygen criteria. The stream was therefore delisted for these impairments on Alabama's 2002 §303(d) list. A Total Maximum Daily Load (TMDL) for pathogens was developed by ADEM. This TMDL was approved by USEPA on August 24, 2005.

In 2007, the Wolf Creek Watershed Management Plan (WMP) was developed, primarily to address the pathogen impairments. The WMP was implemented September 2008-September 2011. In 2012, the Alabama Department of Environmental Management (ADEM) monitored Wolf Creek to document post project conditions.

Additionally, the Wolf Creek watershed was selected as part of the Alabama, Coosa, and Tallapoosa (ACT) River Basins Assessment to assess biological integrity and to estimate overall water quality with the ACT river basins.

Figure 1. Wolf Creek at WOLF-3, May 7, 2012.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Wolf Creek at WOLF-3 is a *Fish and Wildlife (F&W)* stream located in Randolph County northeast of the town of Wedowee, Alabama. Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (>57%) and pasture/hay. No NPDES permits have been issued to the Wolf Creek watershed as of September 1, 2012. However, in April of 2012, a phosphoric acid spill occurred directly upstream of the Wolf Creek monitoring site.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tallapoosa River
Drainage Area (mi^2)		5
Ecoregion[a]		45a
% Landuse		
Open water		1
Wetland	Woody	<1
Forest	Deciduous	33
	Evergreen	24
	Mixed	<1
Shrub/scrub		6
Grassland/herbaceous		10
Pasture/hay		22
Development	Open space	4
	Low intensity	1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^2[b]		12

a. Southern Inner Piedmont
b. 2000 US Census

Table 2. Physical characteristics of Wolf Creek at WOLF-3, May 21, 2012.

Physical Characteristics		
Width (ft)		15
Canopy Cover		Mostly Shaded
Depth (ft)		
	Riffle	0.3
	Run	0.7
	Pool	1.5
% of Reach		
	Riffle	35
	Run	55
	Pool	10
% Substrate		
	Bedrock	35
	Boulder	5
	Cobble	5
	Gravel	10
	Sand	32
	Silt	7
	Organic Matter	6

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.

Wolf Creek at WOLF-3 is characterized primarily by bedrock, sand, and gravel substrates (Figure 1). Overall habitat quality was categorized as *sub-optimal* for this stream type, with some sedimentation issues noted within the stream reach.

Table 3. Results of the habitat assessment conducted on Wolf Creek at WOLF-3, May 21, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	62	Sub-optimal (59-70)
Sediment Deposition	55	Marginal (41-58)
Sinuosity	88	Optimal (>84)
Bank and Vegetative Stability	61	Sub-optimal (60-74)
Riparian Buffer	75	Sub-optimal (70-89)
Habitat Assessment Score	**155**	
% Maximum Score	**64**	**Sub-optimal (59-70)**

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.

The assessment of the macroinvertebrate community in Wolf Creek at WOLF-3 was conducted May 21, 2012. Metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

Table 4. Results of macroinvertebrate bioassessment conducted in Wolf Creek at WOLF-3, May 21, 2012.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
# EPT taxa	5	4
Shannon Diversity	2.69	0
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	0	0
% Non-insect taxa	3	99
Tolerance measures		
% Tolerant taxa	11	100
WMB-I Assessment Score	**---**	**41**
WMB-I Assessment Rating		**Poor (23-46)**

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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	E
Physical							
Temperature (°C)	8	11.2	25.0	18.4	18.4	4.6	
Turbidity (NTU)	9	0.7	4.4	2.5	2.8	1.2	
J Total Dissolved Solids (mg/L)	8	< 1.0	348.0	43.0	82.1	110.8	
Total Suspended Solids (mg/L)	8	< 1.0	< 1.0	0.5	0.5	0.0	
Specific Conductance (µmhos)	8	26.4	1730.0	28.1	245.6	599.9	
J Alkalinity (mg/L)	8	< 0.8	7.1	2.6	2.9	2.7	
Stream Flow (cfs)	9	0.5	4.7	1.2	1.9	1.4	
Chemical							
Dissolved Oxygen (mg/L)	8	8.3	10.5	9.0	9.2	0.8	
pH (su)	8	2.5 C	6.8	6.3	5.6	1.5	3
Ammonia Nitrogen (mg/L)	8	< 0.007	0.049	0.004	0.010	0.016	
Nitrate+Nitrite Nitrogen (mg/L)	8	0.058	0.373	0.332 M	0.270	0.118	
J Total Kjeldahl Nitrogen (mg/L)	8	< 0.041	0.734	0.210	0.238	0.225	
J Total Nitrogen (mg/L)	8	< 0.078	0.884	0.506	0.508	0.238	
J Dissolved Reactive Phosphorus (mg/L)	8	0.117	69.700	0.518 M	11.138	24.292	
J Total Phosphorus (mg/L)	8	0.156	73.500	0.770 M	11.866	25.582	
J CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0	
Chlorides (mg/L)	8	2.1	2.5	2.2	2.2	0.1	
Biological							
Chlorophyll a (µg/L)	8	< 0.10	3.56	0.76	1.08	1.22	
J E. coli (col/100mL)	8	1	1203 H	265	330	383	1

J=estimate; N=# samples; C=value exceeds established criteria for *F&W* water use classification; H=*F&W* human health criterion exceeded; M=value>90% of all verified ecoregional reference reach data collected in the ecoregion 45a; E=# samples that exceed criterion.

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.

E. coli exceeded the summer single criterion sample maximum criterion, on June 11, 2012. Flow was 2.2 cfs. Stream pH exceeded the *F&W* criterion on July 9, August 7, and September 11, 2012. Median nitrate+nitrite nitrogen, dissolved reactive phosphorus, and total phosphorus were higher than values expected based on data collected at reference reaches within the Southern Inner Piedmont ecoregion (45a).

SUMMARY

Wolf Creek was monitored at WOLF –3 during 2012 to evaluate the effectiveness of best management practices implemented primarily to address pathogen impairments. E. coli exceeded the summer single criterion sample maximum criterion, on June 11, 2012.

Wolf Creek at WOLF-3 had low pH values during the months of July through September, 2012. A phosphoric acid spill occurred directly upstream of the Wolf Creek monitoring site in April of that year. Watershed reconnaissance conducted by the ADEM in 2012 did not reveal any other obvious sources for these exceedances upstream of the monitoring location. Follow-up monitoring should be conducted.