Alabama Department of Environmental Management

§303(d)/TMDL

Rivers and Streams Monitoring Program

2008 Monitoring Summary

Poor

Dry Creek at Phillips Road (Blount County) (33.97256/-86.60826)

BACKGROUND

Dry Creek runs for approximately 12 miles from Locust Fork to its source. The stream has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1998 based on data collected in 1988 and 1991. It is listed for nutrients, ammonia, organic enrichment (CBOD, NBOD), and pathogens from pasture grazing. In 2008, ADEM monitored Dry Creek at DRYB-11 to investigate the extent of pathogen impairment within the watershed. The ADEM has collected water quality data on Dry Creek in previous years (2002, 2007) as part of the §303(d) Monitoring Program.

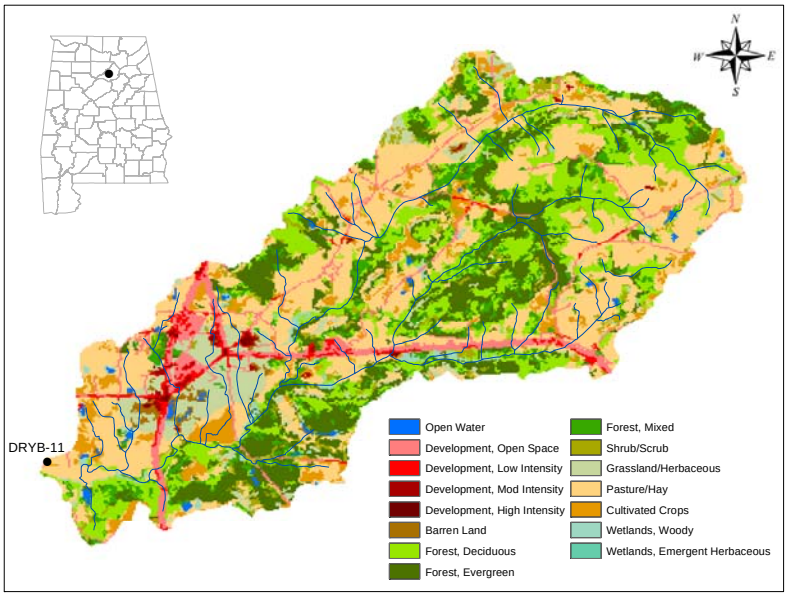

Figure 1. Sampling location and landuse within the Dry Creek watershed at DRYB-11.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Dry Creek at DRYB-11 is a *Fish and Wildlife (F&W)* stream located in the Black Warrior River basin within the Southern Table Plateaus ecoregion (68d). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily forest (40%) and agriculture (39%) (Figure 1). As of February 23, 2011, sixteen NPDES permits have 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. Dry Creek at DRYB-11 is a high-gradient stream with a primarily bedrock bottom, which naturally limits instream habitat and is susceptible to scouring during high flow events. Overall habitat quality was rated as *sub-optimal* for supporting a diverse biological community.

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* condition (Table 4).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi^2)		19
Ecoregion[a]		68d
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	18
	Evergreen	16
	Mixed	6
Shrub/scrub		4
Grassland/herbaceous		7
Pasture/hay		33
Cultivated crops		6
Development	Open space	6
	Low intensity	2
	Moderate intensity	1
	High intensity	<1
Barren		1
Population/km^2[b]		44
# NPDES Permits[c]	**TOTAL**	16
Construction Stormwater		8
Mining		2
Industrial General		2
Municipal Individual		4

a. Southern Table Plateaus
b. 2000 US Census
c. #NPDES permits downloaded from ADEM's NPDES Management System database, 23 Feb 2011

Table 2. Physical characteristics of Dry Creek at DRYB-11, June 11, 2008.

Physical Characteristics		
Width (ft)		30
Canopy Cover		Open
Depth (ft)		
	Riffle	0.2
	Run	1.0
	Pool	1.5
% of Reach		
	Riffle	5
	Run	80
	Pool	15
% Substrate		
	Bedrock	72
	Boulder	5
	Cobble	5
	Gravel	5
	Sand	5
	Silt	5
	Organic Matter	3

Table 3. Results of the habitat assessment conducted on Dry Creek at DRYB -11, June 11, 2008.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	43	Marginal (41-58)
Sediment Deposition	83	Optimal >70
Sinuosity	88	Optimal >84
Bank and Vegetative Stability	76	Optimal >74
Riparian Buffer	75	Sub-optimal (70-89)
Habitat Assessment Score	**163**	
% Maximum Score	**68**	**Sub-optimal (59-70)**

Table 4. Results of macroinvertebrate bioassessment conducted in Dry Creek at DRYB-11, June 11, 2008.

Macroinvertebrate Assessment			
	Results	**Scores (0-100)**	**Rating**
Taxa richness measures			
# Ephemeroptera (mayfly) genera	6	50	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	3	25	Poor (22-44)
Taxonomic composition measures			
% Non-insect taxa	13	47	Poor (24.7-49.4)
% Non-insect organisms	13	67	Fair (62.8-93.9)
% Plecoptera	1	4	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	2	7	Very Poor (<20.2)
WMB-I Assessment Score	**--**	**31**	**Poor (24-48)**

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 March through October of 2008 to help identify any stressors to the biological communities. Median total dissolved solids, specific conductance, alkalinity, dissolved reactive phosphorus, and total phosphorus results were greater than 90% of all reference reach data collected in Southern Table Plateaus ecoregion (68d).

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Table 5. Summary of water quality data collected March-October, 2008. 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)	17	15.4	29.7	27.7	25.9	4.2
Turbidity (NTU)	17	1.2	11.4	5.3	6.0	3.0
Total Dissolved Solids (mg/L)	8	206.0	602.0	385.5 M	382.2	125.8
Total Suspended Solids (mg/L)	8	1.0	10.0	6.0	5.9	2.9
Specific Conductance (µmhos)	17	5.7	850.0	556.0 G	552.6	211.8
Alkalinity (mg/L)	8	59.4	173.5	107.8 M	114.9	43.0
Stream Flow (cfs)	8	0.8	20.1	5.0	8.3	7.2
Chemical						
Dissolved Oxygen (mg/L)	17	6.0	12.5	8.5	8.1	1.5
pH (su)	17	7.6	8.5	8.0	8.0	0.2
Ammonia Nitrogen (mg/L)	8	< 0.010	0.145	0.008	0.032	0.050
Nitrate+Nitrite Nitrogen (mg/L)	8	0.115	0.435	0.218	0.245	0.129
Total Kjeldahl Nitrogen (mg/L)	8	0.677	2.170	1.285	1.360	0.618
Total Nitrogen (mg/L)	8	0.900	2.468	1.486	1.605	0.568
Dissolved Reactive Phosphorus (mg/L)	8	0.008	0.437	0.090 M	0.129	0.141
Total Phosphorus (mg/L)	8	0.048	0.635	0.134 M	0.193	0.190
CBOD-5 (mg/L)	8	< 1.0	1.4	0.5	0.8	0.4
Chlorides (mg/L)	8	3.6	22.2	8.2	10.8	7.3
Biological						
J Fecal Coliform (col/100 mL)	16	25	660	201	230	203

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

SUMMARY

Results for the 2008 bioassessment indicated the macroinvertebrate community to be in *poor* condition. The high percent bedrock provides little protection for benthic macroinvertebrates during high flow events. However, intensive water chemistry results indicated higher than expected concentrations of dissolved reactive phosphorus, total phosphorus, total dissolved solids, alkalinity, and specific conductance. Water quality data collected by ADEM in 2002, 2007, and 2008 on Dry Creek at DRYB-11 confirmed pathogen impairment. The ADEM will continue to monitor Dry Creek for §303(d)/TMDL development.