

2008 Monitoring Summary



Dry Creek at US Highway 231 in Blount County (33.99046/-86.56606)

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 due to pasture grazing. In 2008, ADEM monitored Dry Creek at DRYB-10 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.

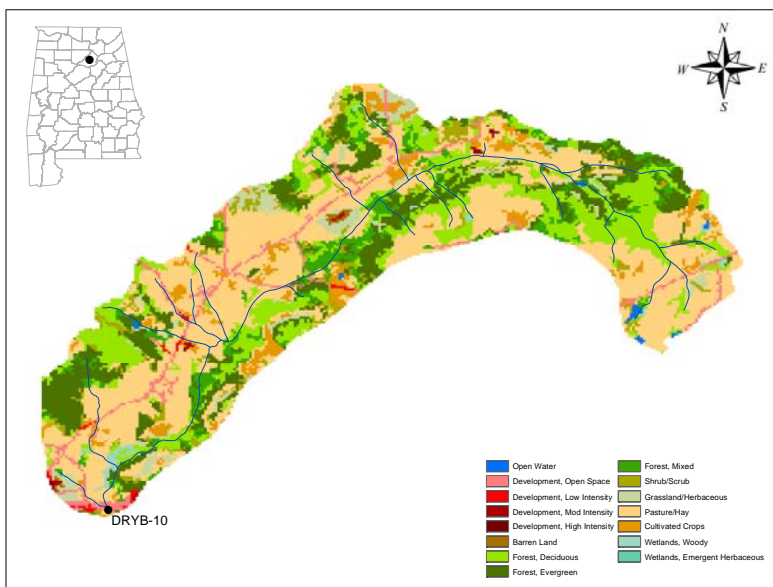


Figure 1. Sampling location and landuse within the Dry Creek watershed at DRYB-10.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Dry Creek is a *Fish and Wildlife (F&W)* stream located in the Black Warrior River basin near Cleveland (Figure 1). Based on the 2006 National Land Cover Dataset, landuse within the watershed is primarily agriculture (46%) and forest (40%). As of February 23, 2011, ADEM has issued four NPDES permits in the Dry Creek 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-10 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 (mi²)	7	
Ecoregion^a	68d	
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	19
	Evergreen	15
	Mixed	6
Shrub/scrub		4
Grassland/herbaceous		4
Pasture/hay		41
Cultivated crops		5
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
	High intensity	<1
Barren		<1
Population/km^{2b}	25	
# NPDES Permits^c	TOTAL	4
Mining		1
Industrial General		1
Municipal Individual		2

a. Southern Table Plateaus

b. 2000 US Census

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

Table 2. Physical characteristics of Dry Creek at DRYB-10, June 11, 2008.

Physical Characteristics		
Width (ft)	15	
Canopy Cover	Estimate 50/50	
Depth (ft)		
	Riffle	0.5
	Run	1.0
	Pool	1.0
% of Reach		
	Riffle	20
	Run	70
	Pool	10
% Substrate		
	Bedrock	78
	Boulder	8
	Cobble	4
	Gravel	3
	Sand	2
	Silt	3
	Organic Matter	2

Table 3. Results of the habitat assessment conducted on Dry Creek at DRYB-10, 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-10, June 11, 2008.

Macroinvertebrate Assessment		
	Results Scores (0-100)	Rating
Taxa richness measures		
# Ephemeroptera (mayfly) genera	7 58	Fair (47-70)
# Plecoptera (stonefly) genera	1 17	Poor (16-31)
# Trichoptera (caddisfly) genera	6 50	Fair (45-66)
Taxonomic composition measures		
% Non-insect taxa	9 64	Fair (49.5-74.1)
% Non-insect organisms	15 61	Poor (31.3-62.7)
% Plecoptera	4 18	Fair (13.2-19.7)
Tolerance measures		
Beck's community tolerance index	6 21	Poor (20.2-40.9)
WMB-I Assessment Score	-- 41	Poor (24-48)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected April through June of 2008 to help identify any stressors to the biological communities. Median total dissolved solids, specific conductance, and alkalinity 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 April-June, 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)	8	16.6	25.8	23.8	22.6	3.7
Turbidity (NTU)	8	2.9	7.0	4.8	4.8	1.3
Total Dissolved Solids (mg/L)	3	137.0	186.0	179.0 ^M	167.3	26.5
Total Suspended Solids (mg/L)	3	2.0	5.0	3.0	3.3	1.5
Specific Conductance (µmhos)	8	227.0	345.0	294.5 ^G	290.4	39.0
Alkalinity (mg/L)	3	41.0	58.6	45.5 ^M	48.4	9.1
Stream Flow (cfs)	7	0.9	7.0	2.1	2.9	2.3
Chemical						
Dissolved Oxygen (mg/L)	8	8.0	9.5	8.4	8.6	0.6
pH (su)	8	7.3	8.4	7.9	7.8	0.3
Ammonia Nitrogen (mg/L)	3	< 0.015	0.017	0.008	0.011	0.006
Nitrate+Nitrite Nitrogen (mg/L)	3	< 0.003	0.490	0.452	0.314	0.272
Total Kjeldahl Nitrogen (mg/L)	3	0.667	1.540	1.060	1.089	0.437
Total Nitrogen (mg/L)	3	< 1.062	2.030	1.119	1.404	0.543
Dissolved Reactive Phosphorus (mg/L)	3	0.006	0.013	0.008	0.009	0.004
Total Phosphorus (mg/L)	3	0.022	0.060	0.022	0.035	0.022
CBOD-5 (mg/L)	3	< 1.0	< 1.0	0.5	0.5	0.0
Chlorides (mg/L)	3	3.1	4.2	3.6	3.6	0.5
Biological						
^J Fecal Coliform (col/100 mL)	7	30	390	240	220	128

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

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 total dissolved solids, alkalinity, and specific conductance. Water quality data collected by ADEM in 2002 and 2007 on Dry Creek watershed confirmed pathogen impairment. The ADEM will continue to monitor Dry Creek for §303(d)/TMDL development.