

2010 Monitoring Summary



Unnamed Tributary to Dry Branch at Shelby County Road 103 (33.22680/-86.48350)

BACKGROUND

Since 1996, the Unnamed Tributary (UT) to Dry Branch, from Dry Branch to its source, has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its *Fish & Wildlife (F&W)* water use classification. It was listed for impairment caused by nutrients from municipal wastewaters and urban runoff/storm sewers.

The Alabama Department of Environmental Management (ADEM) monitored UT to Dry Creek at UTDS-1 to verify and document stream deterioration from nutrients at this site. Macroinvertebrate and habitat assessments were conducted to verify damage to aquatic communities. Monthly water chemistry samples were collected to identify the cause of impairment. Results from these data may also be used in the determination of Total Maximum Daily Load (TMDL) needs and priorities.



Figure 1. UT to Dry Branch at UTDS-1, May 18, 2010.

WATERSHED CHARACTERISTICS

The UT to Dry Branch watershed at UTDS-1 is located within the Southern Limestone/Dolomite Valley and Low Rolling Hills ecoregion (67f) in Shelby County. Based on the 2006 National Land Cover Dataset, landuse within the watershed was composed primarily of development (33%) forest (26%), pasture/hay and grassland (Table 1). As of September 1, 2012, seven NPDES outfalls are active 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. The UT to Dry Branch at UTDS-1 is a small, open canopy stream reach characterized by gravel and cobble substrates (Figure 1). The lack of riparian protection combined with marginal ratings in both sediment deposition and sinuosity within the reach categorized the overall habitat quality as *marginal* for supporting macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Coosa River
Drainage Area (mi ²)		1
Ecoregion ^a		67f
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	14
	Evergreen	5
	Mixed	7
Shrub/scrub		3
Grassland/herbaceous		10
Pasture/hay		17
Cultivated crops		1
Development	Open space	18
	Low intensity	11
	Moderate intensity	3
	High intensity	1
Barren		8
Population/km ^{2b}		1
# NPDES Permits ^c	TOTAL	7
	Construction Stormwater	5
	Municipal Individual	2

a.Southern Limestone/Dolomite Valleys and Low Rolling Hills

b.2000 US Census

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

Table 2. Physical characteristics of unnamed tributary to Dry Branch at UTDS-1, May 18, 2010.

Physical Characteristics		
Canopy Cover		Open
Width (ft)		6.0
Depth (Ft)	Riffle	0.2
	Run	0.4
	Pool	0.5
% of Reach	Riffle	5
	Run	93
	Pool	2
% Substrate	Bedrock	2
	Boulder	4
	Cobble	28
	Gravel	45
	Sand	5
	Silt	15
	Organic Matter	1

Table 3. Results of the habitat assessment conducted on the unnamed tributary to Dry Branch at UTDS-1, May 18, 2010.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	60	Sub-optimal (59-70)
Sediment Deposition	52	Marginal (41-58)
Sinuosity	45	Marginal (45-64)
Bank and Vegetative Stability	69	Sub-optimal (60-74)
Riparian Buffer	18	Poor <50
Habitat Assessment Score	123	
% Maximum Score	51	Marginal (41-58)

Table 4. Results of the macroinvertebrate bioassessment conducted on the unnamed tributary to Dry Branch at UTDS-1 on May 18, 2010.

Macroinvertebrate Assessment			
	Results	Scores (0-100)	Rating
Taxa richness and diversity measures			
# Ephemeroptera (mayfly) taxa	5	42	Poor (23-46)
# Plecoptera (stonefly) taxa	0	0	Very Poor (<=15)
# Trichoptera (caddisfly) taxa	1	8	Very Poor (<=21)
Taxonomic composition measures			
% Non-insect taxa	16	35.7	Poor (24.8-49.4)
% Plecoptera	0	0	Very Poor (<=6.5)
% Non-insect organisms	5	87.2	Fair (62.8-93.9)
Community tolerance			
Becks community tolerance index	3	10.7	Very Poor (<=20.2)
WMB-I Assessment Score		26	Poor (24-48)

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).

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. In situ measurements and water samples were collected monthly during April through November of 2010 to help identify any stressors in the biological communities. Water quality results at UT to Dry Branch at UTDS-1 indicate that this stream is not meeting its requirements for the *Fish & Wildlife (F&W)* water use classification. During July and August dissolved oxygen readings were below the set criterion of 5.0 mg/L for *F&W* streams. Also, median values for total dissolved solids, specific conductance, alkalinity, ammonia nitrogen, nitrate+nitrite nitrogen, dissolved reactive phosphorus, and chlorides were higher than expected based on data collected at reference reaches within the Southern Limestone/Dolomite Valley and Low Rolling Hills ecoregion.

SUMMARY

Results of the 2010 bioassessment indicated the macroinvertebrate community in UT to Dry Branch at UTDS-1 to be in *poor* condition. Intensive water quality data identified several parameters of concern at this site. Overall habitat quality was categorized as *marginal* due to lack of sinuosity, increased sediment deposition and a poor riparian buffer. These results support listing this segment on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters for not meeting criteria requirements for its *Fish & Wildlife (F&W)* water use classification. As part of the assessment process ADEM will review the monitoring information presented in this report, along with all other available data.

Table 5. Summary of water quality data collected April-November, 2010. 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)	12	15.6	29.9	25.2	24.4	4.0	
Turbidity (NTU)	9	1.4	9.7	3.2	4.1	2.6	
Total Dissolved Solids (mg/L)	8	310.0	426.0	368.0 ^M	370.1	38.2	
Total Suspended Solids (mg/L)	8	1.0	22.0	4.0	6.1	6.8	
Specific Conductance (µmhos)	12	198.0	659.0	545.0 ^G	514.7	137.7	
^J Alkalinity (mg/L)	8	116.0	148.5	134.3 ^M	133.2	11.5	
Stream Flow (cfs)	3	0.1	0.3	0.2	0.2	0.1	
Chemical							
Dissolved Oxygen (mg/L)	12	3.79 ^C	14.8	6.5	7.7	3.6	2
pH (su)	12	7.2	8.2	7.4	7.5	0.3	
^{JB} Ammonia Nitrogen (mg/L)	2	0.500	0.500	0.500 ^M	0.500	0.000	
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.973	7.850	2.187 ^M	3.148	2.328	
^B Total Kjeldahl Nitrogen (mg/L)	0						
^B Total Nitrogen (mg/L)	0						
^J Dissolved Reactive Phosphorus (mg/L)	8	< 0.003	0.272	0.038 ^M	0.074	0.093	
^B Total Phosphorus (mg/L)	0						
^J CBOD-5 (mg/L)	8	< 1.0	< 1.0	0.5	0.5	0.0	
Chlorides (mg/L)	8	13.9	40.4	24.4 ^M	26.6	8.5	
Biological							
Chlorophyll a (ug/L)	8	< 1.00	2.67	0.78	1.06	0.76	

C=F&W use criterion exceeded; B=samples excluded due to laboratory QC concerns; E= # samples that exceeded criteria; G=value higher than median concentration of all verified ecoregional reference reach data collected in the ecoregion 67f; J=estimate; N=# samples; M=value >90% of all verified ecoregional reference reach data collected in the ecoregion 67f.

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