

2013 Monitoring Summary



Little Dice Branch at Franklin County Rd 185 SW of Posey Mill (34.31920/-87.59839)

BACKGROUND

The 3.6 mile segment of Little Dice Branch from its source to Bear Creek has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 1998 for not meeting its *Fish and Wildlife (F&W)* water use classifications. It is listed for siltation from unknown sources. The Alabama Department of Environmental Management (ADEM) monitored Little Dice Branch at LDBF-1, downstream of the listed reach, to investigate the extent and source of the impairment. Little Dice Branch was also selected for biological and water quality monitoring as part of the 2013 Tennessee (TN) Basin Assessment. The objectives of the TN Basin Assessments were to assess the biological integrity of each monitoring site and to estimate overall water quality within the TN basin. Macroinvertebrate and habitat assessments were conducted to verify impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment. Results from these data may also be used in determination of Total Maximum Daily Load needs and priorities.



Figure 1. Little Dice Branch at LDBF-1, May 21, 2013.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Little Dice Branch at LDBF-1 is a small riffle-run stream that drains a three square mile watershed through the Dissected Plateau ecoregion (68e) in Franklin County. Based on the 2006 National Land Cover Dataset, land use within the watershed is composed of forest (39%), grassland, shrub/scrub, and pasture/hay (Figure 1). Population density is low, and less than 5% of the watershed area is developed. As of September 1, 2012, ADEM has issued only one NPDES permit 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. Stream bottom is characterized by sand, gravel, and silt substrates. Sediment deposition and bank stability were rated as "marginal."

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Tennessee River
Drainage Area (mi ²)		3
Ecoregion ^a		68e
% Landuse		
Open water		<1
Wetland	Woody	1
Forest	Deciduous	12
	Evergreen	18
	Mixed	9
Shrub/scrub		14
Grassland/herbaceous		29
Pasture/hay		11
Development	Open space	4
	Low intensity	<1
	Moderate intensity	<1
Barren		3
Population/km ^{2b}		7
# NPDES Permits ^c	TOTAL	1
Mining		1

a. Dissected Plateau

b. 2000 US Census

c. #NPDES permits downloaded from ADEM's NPDES Management

Table 2. Physical characteristics of Little Dice Branch at LDBF-1, May 21, 2013.

Physical Characteristics	
Canopy Cover	Mostly Open
Width (ft)	15
Depth (ft)	
	Riffle 0.3
	Run 1.0
	Pool 2.5
% of Reach	
	Riffle 3
	Run 10
	Pool 87
% Substrate	
	Cobble 5
	Mud/Muck 5
	Gravel 25
	Sand 40
	Silt 15
	Organic Matter 5

Table 3. Results of the habitat assessment conducted on Little Dice Branch at LDBF-1, May 21, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	55	Sub-optimal (55-79)
Sediment Deposition	36	Marginal (31-<55)
Riffle frequency	65	Sub-optimal (55-79)
Bank Vegetative Stability	54	Marginal (31-<58)
Riparian Buffer	83	Sub-optimal (60-84)
Habitat Assessment Score	115	
% Maximum Score	58	Sub-Optimal (57-80)

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). The WMB-I measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each score is based on a 100 point scale in comparison to least impaired reference reaches in the same ecoregion. The final score is the average of the individual metric scores. The metric results indicated the macroinvertebrate community to be in *poor* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment of little Dice Branch at LDBF-1, May 21, 2013.

Macroinvertebrate Assessment		
	Results	Scores
Taxa richness measures		(0-100)
# EPT taxa	6	9
Taxonomic composition measures		
% Non-insect taxa	15	39
% Dominant taxon	22	71
% EPC taxa	20	37
Functional feeding group measures		
% Predators	8	28
Tolerance measures		
% Taxa as Tolerant	41	23
WMB-I Assessment Score	---	34
WMB-I Assessment Rating		Poor (20-38)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. *In situ* measurements and water samples were collected monthly, from March through October of 2013, to help identify any stressors to the biological communities. Median concentrations of total dissolved solids, alkalinity, and chlorides were higher than expected based on the 90th percentile of reference reaches within ecoregion 68e. The median value of specific conductance was also higher than expected.

Table 5. Summary of water quality data collected March-October, 2013. 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)	9	11.0	24.5	20.9	18.7	5.1
Turbidity (NTU)	13	5.9	103.0	9.0	17.8	26.4
Total Dissolved Solids (mg/L)	8	79.0	412.0	277.5 ^M	247.2	116.9
Total Suspended Solids (mg/L)	8	< 1.0	33.0	9.0	10.7	10.1
Specific Conductance (µmhos)	9	315.0	746.2	472.4 ^G	488.4	136.2
Alkalinity (mg/L)	8	23.5	108.0	66.1 ^M	69.0	28.7
Stream Flow (cfs)	8	0.9	6.3	1.8	2.6	1.9
Chemical						
Dissolved Oxygen (mg/L)	9	6.8	10.3	7.6	8.3	1.4
pH (su)	9	6.8	7.2	7.0	7.0	0.1
Ammonia Nitrogen (mg/L)	8	< 0.008	0.095	0.009	0.022	0.031
Nitrate+Nitrite Nitrogen (mg/L)	8	0.126	0.648	0.158	0.224	0.174
Total Kjeldahl Nitrogen (mg/L)	8	0.176	1.450	0.450	0.530	0.402
Total Nitrogen (mg/L)	8	0.329	2.098	0.588	0.754	0.568
^J Dissolved Reactive Phosphorus (mg/L)	8	0.003	0.012	0.005	0.006	0.003
^J Total Phosphorus (mg/L)	8	0.007	0.096	0.012	0.031	0.034
CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0
Chlorides (mg/L)	8	< 0.0	3.6	3.0 ^M	2.6	1.2
Biological						
Chlorophyll a (ug/L)	8	< 0.10	16.02	1.16	3.21	5.40

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

SUMMARY

Little Dice Branch is on Alabama's CWA §303(d) list for siltation impacts from unknown sources. The ADEM monitored the stream at LDBF-1, downstream of the listed reach, to investigate the extent and source of the impairment. Bioassessment results indicated the macroinvertebrate community in Little Dice Branch at LDBF-1 to be in *poor* condition. Overall habitat quality was rated as *sub-optimal*, although sediment deposition and eroding banks were issues within the reach. Specific conductance, alkalinity, total dissolved solids, and chlorides were higher than expected based on data from least-impaired reference reaches within the ecoregion. As part of the assessment process, ADEM will review the monitoring information presented in this report, along with all other available data.

FOR MORE INFORMATION, CONTACT:
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