

2012 Monitoring Summary



Tibb Creek at Cullman County Road 1823 (Cullman County) (34.26215/-86.51391)

BACKGROUND

The five mile segment of Tibb Creek from Riley Maze, upstream to its source, has been on Alabama's Clean Water Act (CWA) §303(d) list of impaired waters since 2006. Both Riley Maze and Tibbs Creek were listed for toxicity and siltation due to municipal runoff from Arab.

Additional monitoring was requested during 2012 to provide data for development of a Total Maximum Daily Load, and to assess habitat conditions at the site.



Figure 1. Tibb Creek at TIBC-1, May 16, 2012

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Tibb Creek at TIBC-1 is a *Fish & Wildlife (F&W)* stream located in Cullman County. Based on the 2006 National Land Cover Dataset, land use within the watershed is pasture, forest (24%) and development (18%). Population density is relatively high. As of September 1, 2012, a total of eight NPDES permit outfalls were located in the 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. Tibb Creek at TIBC-1 is a high gradient, riffle-run stream located in the Southern Table Plateaus sub ecoregion (68d). Benthic substrate consist primarily of boulder, gravel, and silt. Overall habitat quality was rated as *optimal* for supporting macroinvertebrate communities.

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Basin		Black Warrior River
Drainage Area (mi²)		9
Ecoregion^a		68d
% Landuse		
Open water		<1
Wetland	Woody	<1
Forest	Deciduous	16
	Evergreen	2
	Mixed	6
Shrub/scrub		6
Grassland/herbaceous		2
Pasture/hay		46
Cultivated crops		3
Development	Open space	8
	Low intensity	7
	Moderate intensity	2
	High intensity	1
Barren		<1
Population/km^{2b}		124
# NPDES Permits^c	TOTAL	8
	Construction Stormwater	3
	Industrial General	4
	Industrial Individual	1

a. Southern Table Plateaus

b. 2000 US Census

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

Table 2. Physical characteristics of Tibb Creek at TIBC-1, May 8, 2012.

Physical Characteristics		
Width (ft)		20.0
Canopy Cover		Estimate 50/50
Depth (ft)		
	Riffle	0.8
	Run	1.0
	Pool	1.0
% of Reach		
	Riffle	30
	Run	60
	Pool	10
% Substrate		
	Bedrock	7
	Boulder	40
	Cobble	10
	Gravel	15
	Sand	5
	Silt	15
	Organic Matter	8

Table 3. Results of the habitat assessment conducted on Tibb Creek at TIBC-1, May 8, 2012.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	70	Optimal >65
Sediment Deposition	69	Optimal >65
Sinuosity	83	Optimal >84
Bank and Vegetative Stability	81	Optimal >74
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	183	
% Maximum Score	76	Optimal >65

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. The final score is the average of the individual metric scores. The metric results indicated the macroinvertebrate community to be in *fair* condition (Table 4).

Table 4. Results of the macroinvertebrate bioassessment of Tibbs Creek at TIBC-1 on May 08, 2012.

Macroinvertebrate Assessment		
	Results	Scores (0-100)
Taxa richness measures		
# EPT taxa	12	35
Taxonomic composition measures		
% Non-insect taxa	12	55
% Dominant taxon	17	87
% EPC taxa	20	36
Functional feeding group measures		
% Predators	3	4
Tolerance measures		
% Taxa as Tolerant	40	25
WMB-I Assessment Score	---	40
WMB-I Assessment Rating		Fair (39-58)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples are collected monthly, semi-monthly (metals), or quarterly (pesticides, herbicides (atrazine), and semi-volatile organics) during April through November to help identify any stressors to the biological communities. Dissolved lead exceeded the criterion applicable to Tibb Creek's *F&W* use classification. Median concentrations of total dissolved solids, specific conductance, hardness, alkalinity, phosphorus, chlorides, and copper were higher than expected based on the 90th percentile of reference reaches within ecoregion 68d.

SUMMARY

Bioassessment results indicated the macroinvertebrate community in Tibb Creek at TIBC-1 to be in *fair* condition. Habitat assessment results were scored as *optimal*. Water chemistry analyses showed elevated total dissolved solids, conductivity, hardness, alkalinity, dissolved reactive phosphorus, total phosphorus, chlorides, and copper to be potential causes of stressors to the biological community in the Tibb Creek watershed. Dissolved lead was above the *F&W* criterion. The draft date for Total Maximum Daily Loads (TMDL) is set for 2014.

Table 5. Summary of water quality data collected April-November, 2012. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. 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	O
Physical								
Temperature (°C)	11	9.3	23.1	20.3	18.3	4.6		
Turbidity (NTU)	10	0.8	4.3	1.7	1.9	1.1		
^J Total Dissolved Solids (mg/L)	8	140.0	358.0	226.5 ^M	240.1	66.1		
^J Total Suspended Solids (mg/L)	8	< 1.0	5.0	1.0	1.4	1.5		
Specific Conductance (µmhos)	10	0.3	611.0	355.5 ^G	353.3	167.8		
Hardness (mg/L)	8	58.2	99.5	73.0 ^G	73.3	12.7		
^J Alkalinity (mg/L)	8	36.0	148.8	99.0 ^M	97.9	33.1		
Stream Flow (cfs)	9	0.7	6.9	1.8	2.2	1.8		
Chemical								
Dissolved Oxygen (mg/L)	11	6.8	13.4	8.5	8.8	2.1		
pH (su)	11	7.6	8.4	7.8	7.9	0.2		
^J Ammonia Nitrogen (mg/L)	8	< 0.010	0.046	0.017	0.024	0.015		
^J Nitrate+Nitrite Nitrogen (mg/L)	8	0.412	2.720	1.068	1.308	0.761		
Total Kjeldahl Nitrogen (mg/L)	8	0.262	0.629	0.508	0.478	0.128		
^J Total Nitrogen (mg/L)	8	0.876	3.086	1.583	1.786	0.733		
^J Dissolved Reactive Phosphorus (mg/L)	8	0.155	0.920	0.254 ^M	0.376	0.266		
^J Total Phosphorus (mg/L)	8	0.187	0.942	0.272 ^M	0.411	0.279		
CBOD-5 (mg/L)	8	< 1.0	< 2.0	1.0	0.9	0.2		
^J Chlorides (mg/L)	8	11.8	45.8	32.9 ^M	31.0	12.2		
Total Metals								
^J Aluminum (mg/L)	8	< 0.029	0.152	0.022	0.054	0.054		
^J Iron (mg/L)	8	< 0.059	0.263	0.090	0.107	0.073		
^J Manganese (mg/L)	8	0.005	0.093	0.032	0.034	0.029		
Dissolved Metals								
^J Aluminum (mg/L)	8	< 0.030	0.139	0.015	0.030	0.044		
^J Antimony (µg/L)	8	< 0.8	1.4	0.4	0.5	0.4		
^J Arsenic (µg/L)	8	< 1.0	2.3 ^H	0.5	1.0	0.7	3	
^J Cadmium (µg/L)	8	< 0.090	< 0.090	0.045	0.045	0.000		
Chromium (mg/L)	8	< 0.005	< 0.005	0.002	0.002	0.000		
Copper (mg/L)	8	< 0.100	< 0.300	0.150 ^M	0.112	0.052		
^J Iron (mg/L)	8	< 0.100	0.159	0.050	0.064	0.038		
^J Lead (µg/L)	8	< 1.6	2.8 ^S	0.8	1.0	0.7	1	
^J Manganese (mg/L)	8	< 0.002	0.058	0.026	0.024	0.019		
Nickel (mg/L)	8	< 0.010	< 0.010	0.005	0.005	0.000		
^J Selenium (µg/L)	8	< 2.0	< 2.0	1.0	1.0	0.0		
^J Silver (µg/L)	8	< 1.000	< 1.000	0.500	0.500	0.000		
Thallium (µg/L)	8	< 0.4	< 0.4	0.2	0.2	0.0		
^J Zinc (mg/L)	8	< 0.009	< 0.020	0.010	0.009	0.002		
Biological								
Chlorophyll a (µg/L)	8	< 1.00	3.47	0.50	1.05	1.03		

E= # of samples that exceeded criteria; G= value > median of all ecoregional reference reach data collected in ecoregion 68d; H= Human Health criterion exceeded; J=estimate; M=value >90% of collected samples in ecoregion 68d; N= # samples; S= F&W hardness-adjusted aquatic life use criterion exceeded.

FOR MORE INFORMATION, CONTACT:

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