



Draft
Delisting Decision
for
Riley Maze Creek
and Tibb Creek

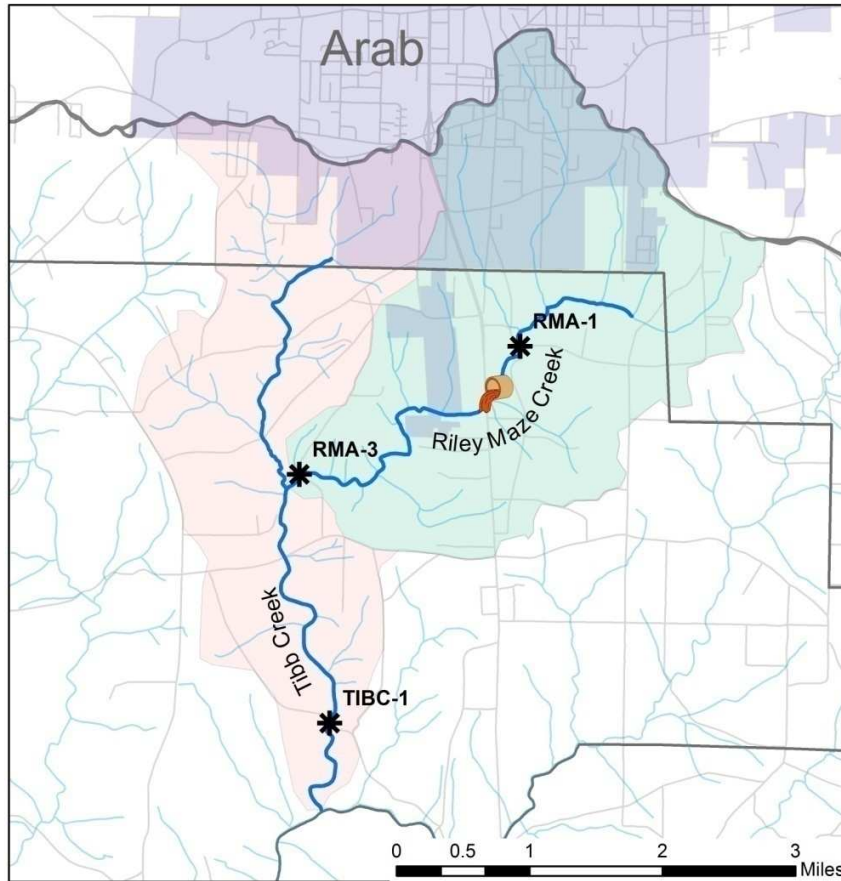
Siltation (habitat alteration)

Riley Maze Creek: Waterbody ID AL03160101-0101-150

Tibb Creek: Waterbody ID AL03160101-0101-600

Alabama Department of Environmental Management
Water Quality Branch
Water Division
February 2014

Riley Maze Creek and Tibb Creek Watershed Map in the Black Warrior River Basin



Legend

- * ADEM Stations
- Riley Maze WWTTP
- Watershed_RlyMzCk
- Watershed_TibbCk
- al_streets_gdt_nad83
- AL HUC-12 Digit



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1.0 Executive Summary

The Riley Maze Creek and Tibb Creek watersheds are located in the upper Black Warrior River Basin and reside on the Cullman County and Marshall County border. Riley Maze Creek originates just south of the City of Arab and flows southwest approximately four miles before intersecting Tibb Creek. Tibb Creek also originates south of Arab and flows south approximately five miles before intersecting the Mulberry Fork. The use classification of Riley Maze Creek and Tibb Creek is Fish and Wildlife (F&W).

The Department conducted an intensive water quality study on Riley Maze Creek and Tibb Creek in 1998 to assess the impact of wastewater from the Riley Maze WWTP on the instream macroinvertebrate community. Riley Maze Wastewater Treatment Plant treats wastewater from the City of Arab and discharges to Riley Maze Creek. The 1998 intensive study included sampling for physical parameters, chemical parameters, aquatic macroinvertebrate assessments, and toxicity testing.

During the 1998 study, degradation to the instream macroinvertebrate community downstream of the Riley Maze WWTP discharge was observed, evidenced by low EPT taxa richness. The aquatic macroinvertebrate assessments conducted on both Riley Maze Creek and Tibb Creek were evaluated as “Poor” and were used as the primary basis for the original listing. According to the study, “the impairment is probably due to a combination of effluent toxicity and the presence of sewage solids on the streambed”. The findings from the 1998 study served as the Department’s basis for the addition of Riley Maze Creek and Tibb Creek to the 2006 Alabama 303(d) List of Impaired Waters, with Toxicity and Siltation considered the probable causes of impairment.

Table 1.1 2006 Alabama 303(d) List

Assessment Unit ID	Waterbody Name	Type	Rank	River Basin	County	Uses	Causes	Sources	Date of Data	Size	Downstream / Upstream Locations
AL03160109-0101-150	Riley Maze Creek	R	L	Black Warrior	Cullman Marshall	Fish & Wildlife	Toxicity Siltation	Municipal	1998	4.13 miles	Tibb Creek / Its source
AL03160109-0101-600	Tibb Creek	R	L	Black Warrior	Cullman Marshall	Fish & Wildlife	Toxicity Siltation	Municipal	1998	5.13 miles	Mulberry Fork / Its source

The following report provides the results of the delisting analysis of Riley Maze Creek and Tibb Creek for siltation only. Based upon the assessment of all the available physical, chemical and biological data for Riley Maze Creek and Tibb Creek, the Department has determined that a siltation impairment does not currently exist. Therefore, ADEM will not develop a TMDL for siltation due to “more recent or accurate data” which is just cause for delisting a waterbody according to Title 40 of the Code of Federal Regulations (CFR), Part 130.7(b)(6)(iv).

2.0 Basis for §303(d) Listing

Section 303(d) of the Clean Water Act (CWA) as amended by the Water Quality Act of 1987 and EPA's Water Quality Planning and Management Regulations [(Title 40 of the Code of Federal Regulations (CFR), Part 130)] requires states to identify waterbodies that are not meeting water quality standards applicable to their designated use classifications. The identified waters are prioritized based on severity of pollution with respect to designated use classifications, and listed on each state's 303(d) List of Impaired Waters.

The Department conducted an intensive water quality study on Riley Maze and Tibb Creek in 1998 to assess the impact of wastewater from the Riley Maze WWTP on the in-stream macroinvertebrate community. The Riley Maze Wastewater Treatment Plant treats wastewater from the City of Arab and discharges to Riley Maze Creek. The results of this study were summarized by the Department in June 1998 in a report titled "Water Quality Assessment Riley-Maze Creek Arab, Alabama Cullman County". The findings from this study, described in further detail below, served as the basis for adding Riley Maze and Tibb Creek to Alabama's 2006 303(d) list of Impaired Waters.

The following stations were sampled by the Department during the 1998 water quality assessment of Riley Maze Creek: RMA-1, RMA-2, RMA-3, RMA-4, and eco-reference station BLVC-1. This sampling effort included physical parameters, chemical parameters, aquatic macroinvertebrate assessments and toxicity testing. The results from the study indicate conductivity, total alkalinity, and chloride concentrations were elevated downstream of the WWTP discharge. Furthermore, aquatic macroinvertebrate assessments conducted at stations RMA-2, RMA-3, and RMA-4 were evaluated as severely impaired. The study cited degradation to the instream macroinvertebrate community downstream of the Riley Maze WWTP discharge, evidenced by low EPT taxa richness observed from the aquatic macroinvertebrate assessments.

Based upon these results, Riley Maze Creek below the Arab WWTP outfall was considered severely impaired. According to the study, "the impairment is probably due to a combination of effluent toxicity and the presence of sewage solids on the streambed". Therefore, Riley Maze Creek and Tibb Creek were added to the Alabama's 2006 303(d) list, with toxicity and siltation considered the causes of impairment. The listing for siltation was substantiated by the presence of sewage and sludge deposits at stations RMA-2 and RMA-3 witnessed during the 1998 study.

3.0 Technical Basis for Delisting Decision

3.1 Water Quality Target Identification

Siltation

ADEM’s Water Quality Regulations do not provide a numeric water quality criteria for siltation. Therefore, for the purpose of this delisting decision, the following information was used to arrive at an overall use support determination for siltation: a cumulative assessment of all the available surface water quality total suspended solid (TSS) and turbidity data, sediment deposition observed during the habitat assessments, and the substrate composition observed during the physical characteristic assessments.

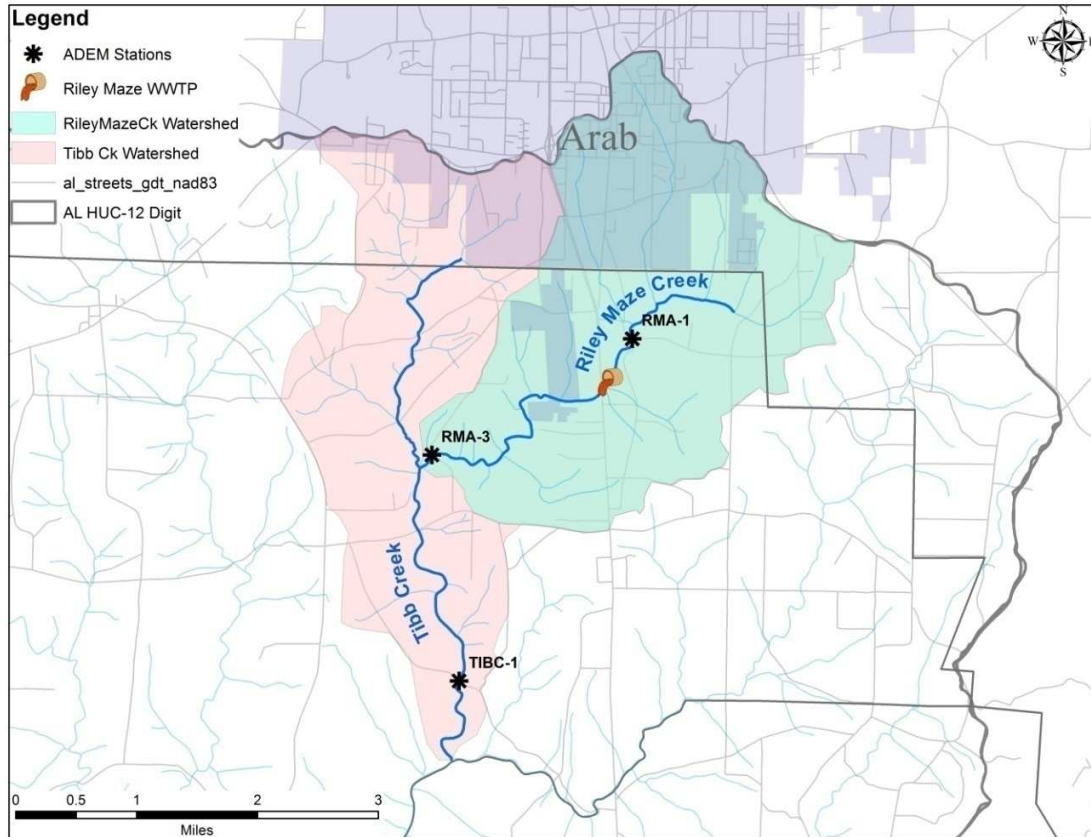
3.2 Data Availability and Analysis

The source of data utilized in this evaluation of Riley Maze Creek and Tibb Creek is from the Department’s 2012 303(d) water quality monitoring. Both physical and chemical data were collected at the following three sampling stations: RMA-1, RMA-3, and TIBC-1. Please refer to Table 3.2.1 below for location descriptions of all the aforementioned sampling stations and to Figure 3.2.1 below for a map depicting the sampling station locations.

Table 3.2.1 2012 Sampling Stations on Riley Maze Creek and Tibb Creek

Station	Latitude	Longitude	Drainage Area (mi²)	Station Location Description
RMA-1	34.296	-86.49322	2.71	Cullman CR 1843, approx 0.25 mi upstream of ARAB WWTP discharge
RMA-3	34.2845	-86.51719	5.09	New Harmony Rd Crossing, approx 1.25 mi downstream of ARAB WWTP discharge
TIBC-1	34.26215	-86.51391	9.11	Cullman CR 1823, approx 0.7 upstream of confluence with Mulberry Fork

Figure 3.2.1 2012 Sampling Locations for Riley Maze Creek and Tibb Creek



In order to assess whether a siltation impairment does currently exist on Riley Maze Creek and Tibb Creek, the Department has chosen to compare the available data collected during the 2012 sampling effort to similar “reference streams” located in Alabama. This approach is based on using ambient water quality data from candidate reference streams that are located in characteristically similar regions of Alabama known as ecoregions. An ecoregion is defined as a relatively homogeneous area defined by similar climate, landform, soil, potential natural vegetation, hydrology and other ecologically relevant variables (USEPA, 2000b). “Reference streams” are defined as waterbodies that have been relatively undisturbed or minimally-impacted that can serve as examples of the natural biological integrity of a particular ecoregion. These “reference streams” can be monitored over time to establish a baseline to which other waters can be compared. Reference streams are not necessarily pristine or undisturbed by humans, however they do represent waters within Alabama that are healthy and fully support their designated uses, to include protection of aquatic life.

The reference streams selected for a particular analysis depends primarily on the available number of reference streams and available data within a particular ecoregion. The Riley Maze Creek and Tibb Creek watersheds are entirely confined within the Level IV South Table Plateau Ecoregion 68d. Therefore, ambient water quality data collected at stations located on “reference streams” within this region will be utilized as a basis for comparison.

The monthly surface water quality field and chemical parameters collected on Riley Maze Creek and Tibb Creek as part of the Department's 2012 303(d) monitoring program have been provided in Appendix 6.2. The median value of the total suspended solid (TSS) concentrations and turbidity measurements collected at stations RMA-1, RMA-3, and TIBC-1 in 2012 are considerably less than the ambient water quality data from candidate reference streams that are located in the same South Table Plateau, Ecoregion 68d.

Turbidity and TSS measurements collected at station RMA-1 on July 31, 2012 yielded exceptionally high results. However, station visit comments for this particular sampling activity indicate a heavy rain occurred in the watershed prior to sample collection: "*Creek is very low and braided. It would probably be dry but for heavy rain this morning*". Site visit pictures taken at station RMA-1 in conjunction with the WQ sampling effort also illustrate brown, turbid water that is commonly associated with recent heavy rain events. The Department believes the outlier values for turbidity and TSS collected at station RMA-1 on July 31, 2012 are based entirely on a heavy rain event, and do not reflect the typical conditions.

In addition to the collection of instream water quality samples, habitat assessments and physical characteristic evaluations were also conducted on two separate occasions at stations RMA-3 and TIBC-1. The results from the habitat assessments conducted at these two stations indicate an overall habitat condition of "Optimal" when compared to a regional reference station or a guideline developed from reference station. More specifically, the sediment deposition component of the habitat assessment received a rating of either "Sub-optimal" or "Optimal", suggesting that very little sediment has accumulated in the stream bottom as a result of deposition. The results of the physical characteristic evaluation at stations RMA-3 and TIBC-1 also indicate a very low percentage of silts and clays as part of the total substrate composition. The habitat assessments and physical characteristic evaluations have been provided in Appendix 6.3.

The original siltation listing for Riley Maze Creek and Tibb Creek on the Department's 2006 303(d) list was based upon the presence of sewage and sludge deposits observed during the 1998 study at stations RMA-2 and RMA-3, downstream of the Riley Maze WWTP discharge. However, there were no sewage or sludge deposits observed on Riley Maze Creek or Tibb Creek at any time during the 2012 sampling effort.

Macroinvertebrate assessments were completed at stations RMA-3 and TIBC-1 during the Department's 2012 303(d) monitoring program. The final WMB-I assessment score from both stations RMA-3 and TIBC-1 rank the macroinvertebrate communities as "Poor". The Department believes that the "Poor" macroinvertebrate scores are not attributable to siltation based upon the previously mentioned evidence provided in the document.

The Department attributes the poor macroinvertebrate scores to elevated concentrations of total dissolved solids (TDS) observed at station RMA-1, RMA-3, and TIBC-1. The total dissolved solid (TDS) concentrations have been provided below in Appendix 6.2. Based upon the 2012 sampling data on Riley Maze Creek and Tibb Creek, the Department believes the previously listed “Toxicity” impairment should be changed to an impairment due to total dissolved solids (TDS).

The Department’s Draft 2014 303(d) List will reflect the following changes to Riley Maze Creek and Tibb Creek that are addressed in this report: removing the Siltation (habitat alteration) impairment and changing the currently listed Toxicity impairment to Total Dissolved Solids. Please consult the Department’s Draft 2014 303(d) Fact Sheet for further information substantiating this change.

4.0 Conclusion

From examination of all available data, ADEM has determined that a water quality impairment due to siltation does not currently exist for Riley Maze Creek and Tibb Creek. Therefore, ADEM will not develop a TMDL for siltation due to “more recent data” which is a just cause for delisting waterbodies according to Title 40 of the Code of Federal Regulations (CFR), Part 130.7(b)(6)(iv).

5.0 Public Participation

As part of the public participation process, this Delisting Decision (DD) will be placed on public notice and made available for review and comment. A public notice will be prepared and published in the major daily newspapers in Montgomery, Huntsville, Birmingham, and Mobile, as well as submitted to persons who have requested to be on ADEM’s postal and electronic mailing distributions. In addition, the public notice and subject DD will be made available on ADEM’s Website: www.adem.state.al.us. The public can also request hard or electronic copies of the DD by contacting Mr. Chris Johnson at 334-271-7827 or cljohnson@adem.state.al.us. The public will be given an opportunity to review the DD and submit comments to the Department in writing. At the end of the comment period, all written comments received during the public notice period will become part of the administrative record. ADEM will consider all comments received by the public prior to final completion of this DD and subsequent submission to EPA Region 4 for final approval.

Appendix 6.1

References

Alabama Department of Environmental Management. Administrative Code, 2002. Water Quality Program, Chapter 335-6-10, Water Quality Criteria, and Chapter 335-6-11 Use Classifications for Interstate and Intrastate Waters.

Alabama Department of Environmental Management, Water Division, - Field Operations Division. *Alabama's Surface Water Quality Monitoring Plan 2012*

Alabama Department of Environmental Management, Water Division – Water Quality Program. *Alabama's Water Quality Assessment and Listing Methodology*. 2012.

United States Environmental Protection Agency. 1991. Guidance for Water Quality-Based Decisions: The TMDL Process, Office of Water, EPA 440/4-91-001.

United States Environmental Protection Agency 2000b. Nutrient Criteria Technical Guidance Manual: River and Streams. United States. Environmental Protection Agency, Office of Water. EPA 822-B-00-002.

Appendix 6.2 Water Quality Data

Data from 2012 303(d) Monthly Sampling

Station ID	Visit Date	Flow CFS	T H2O C	Cond UMHOS	pH_SU	Turb NTU	Turb dc	TDS mgl	TDS dc	TSS mgl	TSS dc
RMA-1	4/24/2012		13.49	207	7.6	5.02	NTU	141	JH	6	JH
RMA-1	5/16/2012	0.1849	17.55	228	7.37	3.65	NTU	120		4	
RMA-1	6/14/2012		21.51	231	7.33	5.49	NTU	135		5	
RMA-1	7/31/2012		22.84	139	7.55	127	NTU	84		97	
RMA-1	8/21/2012		20.61	396	6.85	2.8	NTU	248	JQ1	3	
RMA-1	9/7/2012		22.71	298.3	6.89	5.74	NTU				
RMA-1	9/19/2012	1.6862	18.39	230	7.23	11.1	NTU	134		5	JQ
RMA-1	10/24/2012		15.27	295	7.08	1.9	NTU	162		3	
RMA-1	11/28/2012		8.54	170	7.14	2.02	NTU	140		3	
RMA-3	4/24/2012	1.2298	11.41	498	7.9	1.27	NTU	286	JH	3	JH
RMA-3	5/8/2012	1.282	19.25	373	7.53	1.38	NTU				
RMA-3	5/16/2012	1.2899	16.98	537	7.71	1.75	NTU	303		1	
RMA-3	6/14/2012	0.4191	20.22	357	7.79	0.96	NTU	259		1	
RMA-3	7/31/2012	14.0932	22.94	910	7.94	4.83	NTU	534		8	
RMA-3	8/21/2012	0.4989	19.52	949	7.85	1.36	NTU	558	JQ1	1	< MDL 1
RMA-3	9/7/2012	1.225	22.31	481.6	7.66	5.83	NTU				
RMA-3	9/19/2012	3.607	17.76	287	7.57	4.58	NTU	171		7	JQ
RMA-3	10/24/2012	1.5645	14.43	469	7.74	0.56	NTU	263		1	< MDL 1
RMA-3	11/28/2012	1.1717	8.28	435	7.84	0.59	NTU	251		1	< MDL 1
TIBC-1	4/24/2012	2.0168	12.6	395	8.37	0.95	NTU	242	JH	1	JH
TIBC-1	5/8/2012	2.034	20.9	285.5	7.85	1.82	NTU				
TIBC-1	5/16/2012	1.5077	17.35	472	7.83	1.49	NTU	271		2	
TIBC-1	6/14/2012		20.83	343	7.97	1.79	NTU	207		1	
TIBC-1	7/31/2012	1.8364	23.07	509	7.91	3.06	NTU	289		5	
TIBC-1	8/21/2012	0.721	20.3	611	8.01	2.05	NTU	358	JQ1	1	< MDL 1
TIBC-1	9/7/2012	1.3	22.51	277.4	7.63	1.59	NTU				
TIBC-1	9/19/2012	6.9407	18.35	224	7.7	4.3	NTU	140		1	< MDL 1, JQ
TIBC-1	10/24/2012	1.8317	13.91	368	7.79	0.79	NTU	211		1	< MDL 1
TIBC-1	11/28/2012	1.6705	9.29	325	8.31	0.78	NTU	203		1	

Median		
Station	TSS (mg/L)	Turbidity (NTU)
RMA-1	4.50	5.02
RMA-3	1.00	1.39
TIBC-1	1.00	1.69
90th %ile		
Station	TSS (mg/L)	Turbidity (NTU)
Eco-reference 68(d) ^a	27.00	9.67

a. Southern Table Plateaus

Appendix 6.3 Habitat Assessment and Physical Characteristics

RMA-3 - May 8, 2012

Table 3. Results of the habitat assessment conducted on Riley Maze Ck at RMA-3, May 8, 2012.

Habitat Assessment	%Maximum Score	Rating
RR		
Instream Habitat Quality	69	Sub-optimal (59-70)
Sediment Deposition	65	Sub-optimal (59-70)
Sinuosity	63	Marginal (45-64)
Bank and Vegetative Stability	76	Optimal >74
Riparian Buffer	73	Sub-optimal (70-89)
Habitat Assessment Score	169	
% Maximum Score	70	Optimal >70

Table 2. Physical characteristics of Riley Maze Ck at RMA-3, May 08, 2012.

Physical Characteristics	
Canopy Cover	Mostly Shaded
Width (ft)	18.0
Depth (Ft)	
Riffle	0.7
Run	1.5
Pool	2.0
% of Reach	
Riffle	25
Run	60
Pool	15
% Substrate	
Bedrock	5
Boulder	35
Clay	0
Cobble	20
Mud/Muck	0
Gravel	10
Hard Pan Clay	0
Sand	7
Silt	15
Organic Matter	8

RMA-3 - August 16, 2012

Table 3. Results of the habitat assessment conducted on Riley Maze Ck at RMA-3, 08/16/2012.

Habitat Assessment	%Maximum Score	Rating
RR		
Instream Habitat Quality	72	Optimal >70
Sediment Deposition	74	Optimal >70
Sinuosity	70	Sub-optimal (65-84)
Bank and Vegetative Stability	69	Sub-optimal (60-74)
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	176	
% Maximum Score	73	Optimal >70

Table 2. Physical characteristics of Riley Maze Ck at RMA-3, August 16, 2012.

Physical Characteristics	
Canopy Cover	Shaded
Width (ft)	25.0
Depth (Ft)	
Riffle	0.3
Run	1.0
Pool	2.0
% of Reach	
Riffle	30
Run	20
Pool	50
% Substrate	
Bedrock	40
Boulder	15
Clay	0
Cobble	20
Mud/Muck	0
Gravel	10
Hard Pan Clay	0
Sand	6
Silt	5
Organic Matter	4

TIBC-1 - May 8, 2012

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

Habitat Assessment	%Maximum Score	Rating
RR		
Instream Habitat Quality	70	Sub-optimal (59-70)
Sediment Deposition	69	Sub-optimal (59-70)
Sinuosity	83	Sub-optimal (65-84)
Bank and Vegetative Stability	81	Optimal >74
Riparian Buffer	85	Sub-optimal (70-89)
Habitat Assessment Score	183	
% Maximum Score	76	Optimal >70

Table 2. Physical characteristics of Tibb Ck at TIBC-1, May 08, 2012.

Physical Characteristics	
Canopy Cover	Estimate 50/50
Width (ft)	20.0
Depth (Ft)	
Riffle	0.8
Run	1.0
Pool	1.0
% of Reach	
Riffle	30
Run	60
Pool	10
% Substrate	
Bedrock	7
Boulder	40
Clay	0
Cobble	10
Mud/Muck	0
Gravel	15
Hard Pan Clay	0
Sand	5
Silt	15
Organic Matter	8

TIBC-1 - August 16, 2012

Table 3. Results of the habitat assessment conducted on Tibb Ck at TIBC-1, 08/16/2012.

Habitat Assessment	%Maximum Score	Rating
RR		
Instream Habitat Quality	68	Sub-optimal (59-70)
Sediment Deposition	85	Optimal >70
Sinuosity	85	Optimal >84
Bank and Vegetative Stability	76	Optimal >74
Riparian Buffer	88	Sub-optimal (70-89)
Habitat Assessment Score	185	
% Maximum Score	77	Optimal >70

Table 2. Physical characteristics of Tibb Ck at TIBC-1, August 16, 2012.

Physical Characteristics	
Canopy Cover	Shaded
Width (ft)	30.0
Depth (Ft)	
Riffle	0.3
Run	1.0
Pool	1.5
% of Reach	
Riffle	30
Run	40
Pool	30
% Substrate	
Bedrock	10
Boulder	40
Clay	0
Cobble	20
Mud/Muck	0
Gravel	15
Hard Pan Clay	0
Sand	5
Silt	6
Organic Matter	4

Appendix 6.4 Macroinvertebrate Reports

RMA-3 - May 8, 2012 12:55:00

Macroinvertebrate Assessment			
	Results	Scores (0-100)	Rating
Taxa richness measures			
# Ephemeroptera (mayfly) genera	2	17	Very Poor (<=22)
# Plecoptera (stonefly) genera	0	0	Very Poor (<=15)
# Trichoptera (caddisfly) genera	6	50	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	16	37.3	Poor (24.8-49.4)
% Non-insect organisms	6	85.4	Fair (62.8-93.9)
% Plecoptera	0	0.0	Very Poor (<=6.5)
Tolerance measures			
Beck's community tolerance index	1	3.6	Very Poor (<=20.2)
WMB-I Assessment Score	--	28	Poor (24-48)

TIBC-1 - May 8, 2012 12:26:00

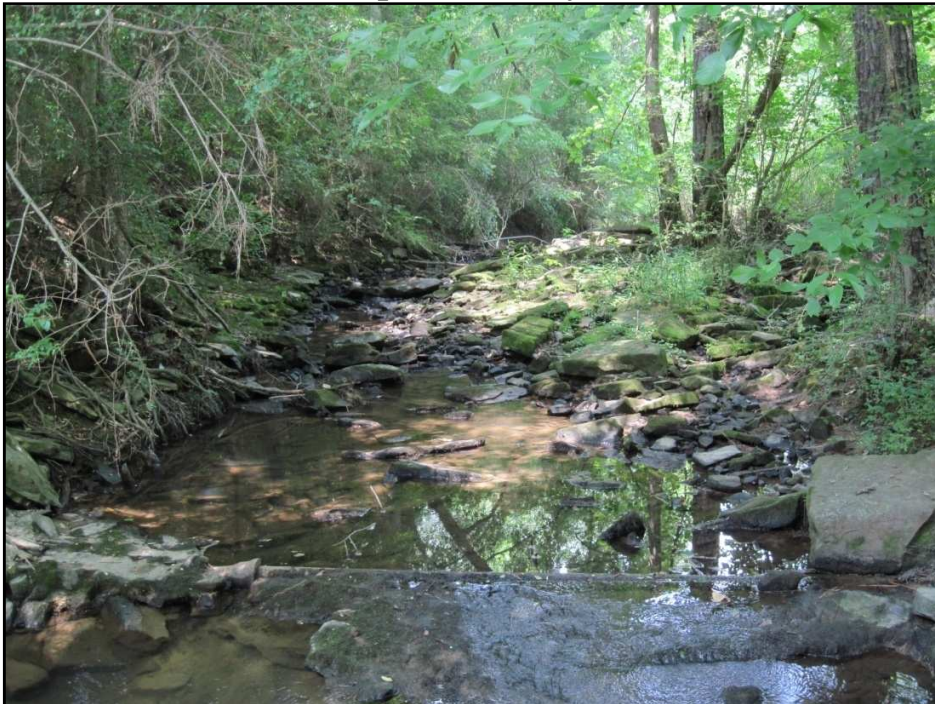
Macroinvertebrate Assessment			
	Results	Scores (0-100)	Rating
Taxa richness measures			
# Ephemeroptera (mayfly) genera	5	42	Poor (23-46)
# Plecoptera (stonefly) genera	0	0	Very Poor (<=15)
# Trichoptera (caddisfly) genera	7	58	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	12	53.3	Fair (49.5-74.1)
% Non-insect organisms	3	92.9	Fair (62.8-93.9)
% Plecoptera	0	0.0	Very Poor (<=6.5)
Tolerance measures			
Beck's community tolerance index	6	21.4	Poor (20.3-40.7)
WMB-I Assessment Score	--	38	Poor (24-48)

Appendix 6.5 Station Pictures

RMA-1 Downstream May 16, 2012



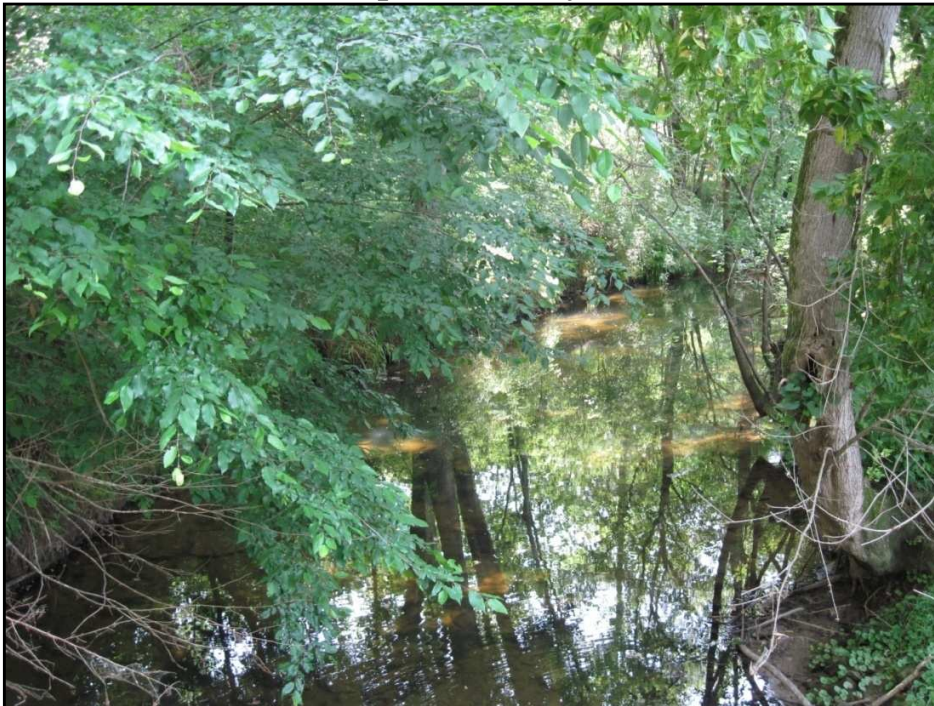
RMA-1 Upstream May 16, 2012



RMA-3 Downstream May 16, 2012



RMA-3 Upstream May 16, 2012



TIBC-1 Downstream May 16, 2012



TIBC-1 Upstream May 16, 2012

