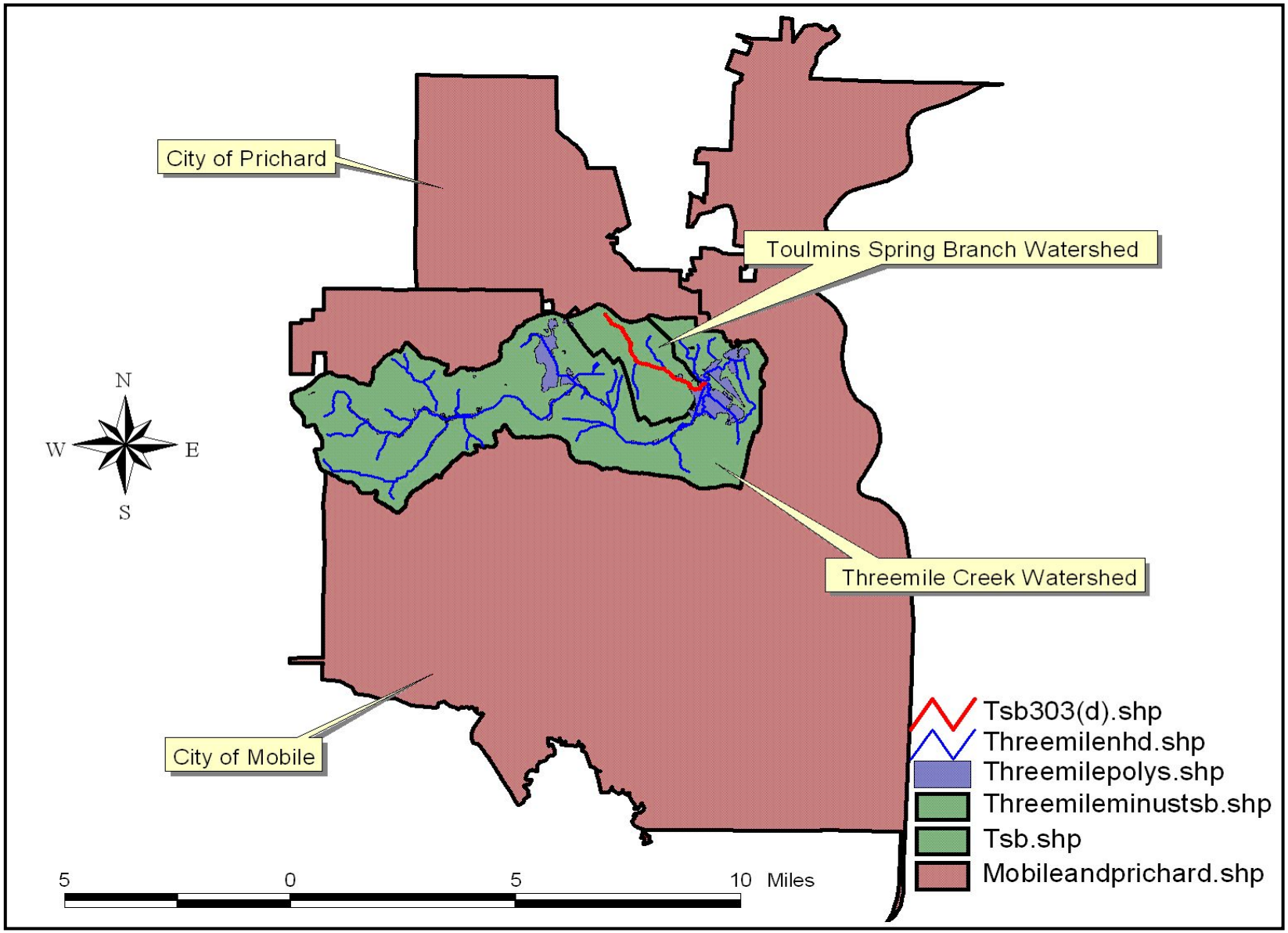
FINAL

Total Maximum Daily Load (TMDL)
for
Toulmins Spring Branch
Assessment Unit ID # AL03160204-0504-300
Pathogens (fecal coliform)

Alabama Department of Environmental Management
Water Quality Branch
Water Division
September 2009

Figure I. Site Map of Toulmins Spring Branch within the Threemile Creek Watershed



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1.0 Executive Summary

Section §303(d) of the Clean Water Act (CWA) and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop total maximum daily loads (TMDLs) for waterbodies that are not meeting designated uses under technology-based pollution controls. A TMDL is the maximum amount of pollutant a waterbody can assimilate while meeting water quality standards for the pollutant of concern. All TMDLs include a wasteload allocation (WLA) for all National Pollutant Discharge Elimination System (NPDES) regulated discharges, a load allocation (LA) for all nonpoint sources, and an explicit and/or implicit margin of safety (MOS).

Toulmins Spring Branch is a part of the Threemile Creek watershed in the cities of Mobile and Prichard. It has a length of 3.22 miles and total drainage area of 3.97 square miles. It has a use classification of Fish & Wildlife (F&W). It begins in southeastern Prichard and travels in a southeasterly direction until it merges with Threemile Creek just above Conception Street in Mobile. All of the watershed is a part of Mobile's Phase I MS4 area.

Toulmins Spring Branch was first placed on the State's §303(d) list for pathogens in 2004 as a result of fecal coliform data collected by the United States Geological Survey (USGS) in 2000 and 2001. Subsequent data collected by ADEM in 2006 and 2007 has confirmed the impairment.

Pathogen loadings are calculated as the product of concentration times flow times the appropriate conversion factor. Pathogen concentrations are directly proportional to pathogen loadings since the conversion factor and the flow do not change for a given situation. Hence, fecal coliform concentrations may be employed in lieu of loadings for a pathogen TMDL. A concentration approach was employed for calculating the pathogen Total Maximum Daily Load (TMDL) for Toulmins Spring Branch. The highest concentration measured in the field is utilized. This will result in the highest load reduction to the watershed, the rationale being that if the watershed can meet pathogen criteria under the highest load conditions, it should be able to meet the criteria under any other conditions. The highest value measured from field data was 51,000 col/100 mL at station TSBM-2 on 8/14/06. The allowable concentration is equal to the water quality criterion minus a 10% margin of safety (MOS). The fecal coliform single sample water quality criterion is 2,000 colonies/100 mL for F&W waterbodies. Incorporating a 10% MOS results in an allowable pathogen concentration of 1,800 colonies/100 mL. Shown in Table 1-1 below are the pathogen concentration associated with the exceedance event and the allowable concentration at station TSBM-2.

Table 1-1. 2006 Coliform Concentrations and Required Reductions

Source	Existing Concentration (col/100 mL)	Allowable Concentration (col/100 mL)	Required Reduction (col/100 mL)	% Reduction
NPS load	51,000	1,800	49,200	96%
Point Source	NA	NA	NA	NA

Shown in Table 1-2 below are the required TMDL pathogen concentrations under critical conditions for Toulmins Spring Branch.

Table 1-2. Fecal Coliform TMDL for Toulmins Spring Branch

TMDL	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	MS4s[c]	Leaking Collection Systems[d]		
(col/100 mL)	(col/100 mL)	(col/100 mL)	(% reduction)	(col/100 mL)	(col/100 mL)	(% reduction)
2,000	200	NA	96%	0	1,800	96%

a. There are no CAFOs in the Toulmins Spring Branch watershed. Future CAFOs will be assigned a waste load allocation (WLA) of zero.
b. WLAs for WWTPs are expressed as a daily maximum; NA = not applicable, no point sources. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas would be required to demonstrate consistency with the assumptions and requirements of this TMDL.
d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in fecal coliform loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for fecal coliform.

Compliance with the terms and conditions of existing and future NPDES sanitary and stormwater permits will effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL. Required load reductions in the LA portion of this TMDL can be implemented through voluntary measures and may be eligible for CWA §319 grants.

The Department recognizes that adaptive implementation of this TMDL will be needed to achieve applicable water quality criteria with a commitment to targeting the necessary load reductions to improve water quality in the Toulmins Spring Branch watershed. As additional data and/or information becomes available, it may become necessary to revise and/or modify the TMDL accordingly.

2.0 Basis for §303(d) Listing

2.1 Introduction

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)] require states to identify waterbodies which 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. Total maximum daily loads (TMDLs) for all pollutants causing violation of applicable water quality standards are established for each identified water. Such loads are established at levels necessary to implement the applicable water quality standards with seasonal variations and margins of safety. The TMDL process establishes the allowable loading of pollutants, or other quantifiable parameters for a waterbody, based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution from both point and non-point sources and restore and maintain the quality of their water resources (USEPA, 1991).

The State of Alabama has identified the whole length of Toulmins Spring Branch as being impaired by pathogens (fecal coliform). The §303(d) listing was originally reported on Alabama's 2004 List of Impaired Waters. The sources of the impairment are listed as urban runoff and storm sewers.

2.2 Problem Definition

Waterbody Impaired:	Toulmins Spring Branch from its mouth at Threemile Creek to its source
Waterbody Length:	3.22 miles
Waterbody Drainage Area:	3.97 square miles
Water Quality Standard Violation:	Fecal Coliform (single sample) Fecal Coliform (geometric mean)
Pollutant of Concern:	Pathogens (fecal coliform)
Water Use Classification:	Fish and Wildlife

Usage Related to Classification:
The impaired segment of Toulmins Spring Branch is classified as Fish and Wildlife. Usage of waters in this classification is described in ADEM Admin. Code R. 335-6-10-.09(5)(a), (b), (c), and (d).

(a) Best usage of waters: fishing, propagation of fish, aquatic life, and wildlife, and any other usage except for swimming and water-contact sports or as a source of water supply for drinking or food-processing purposes.

(b) Conditions related to best usage: the waters will be suitable for fish, aquatic life and wildlife propagation. The quality of salt and estuarine waters to which this classification is assigned will also be suitable for the propagation of shrimp and crabs.

(c) Other usage of waters: it is recognized that the waters may be used for incidental water contact and recreation during June through September, except that water contact is strongly discouraged in the vicinity of discharges or other conditions beyond the control of the Department or the Alabama Department of Public Health.

(d) Conditions related to other usage: the waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports.

Fecal Coliform Criteria:
Criteria for acceptable bacteria levels for the Fish and Wildlife use classification are described in ADEM Admin. Code R. 335-6-10-.09(5)(e)7(i) and (ii) as follows:

7. Bacteria:

(i) In non-coastal waters, bacteria of the fecal coliform group shall not exceed a geometric mean of 1,000 colonies/100 mL; nor exceed a maximum of 2,000 colonies/100 mL in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 mL in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

(ii) For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean fecal coliform organism density does not exceed 200 colonies/100 mL in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 mL nor exceed a maximum of 158 colonies/100 mL in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric bacterial coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports.

Criteria Exceeded:
Water quality data collected by the USGS in 2000 and 2001 was used for listing Toulmins Spring Branch on Alabama's 2004 §303(d) list. At the time of the listing, waters in which less than or equal to 10% of the samples collected over a five year period exceed the single-sample

maximum of 2000 colonies/100 mL were considered to comply with Alabama's water quality standard for fecal coliform bacteria. Geometric mean samples comprised of at least 5 samples collected over a thirty day period that were reported less than or equal to 200 colonies/100 mL (June-September) or 1000 colonies/100 mL (October-May) were considered to comply with Alabama's water quality standard for fecal coliform bacteria. Waters in which greater than 10% of the samples exceed the single-sample maximum criterion of 2000 colonies/100 mL or any geometric mean sample that exceeded the geometric mean criterion of 200 colonies/100 mL (June-September) or 1000 colonies/100 mL (October-May) were considered impaired and subsequently listed for pathogens (fecal coliform) on Alabama's §303(d) list.

USGS collected data on Toulmins Spring Branch at Graham Ave (#0247101550) in 2000 and 2001. Of seven samples collected over that period, four exceeded the single sample maximum criterion of 2,000 colonies/100 mL.

3.0 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

For the purpose of this TMDL, a single sample fecal coliform target of 1,800 colonies/100 mL will be used. This target was derived by using a 10% explicit margin of safety for the single sample criterion of 2,000 colonies/100 mL. This target should not allow the geometric mean of 200 colonies/100 mL or the single sample criterion of 2000 colonies/100 mL to be exceeded.

3.2 Source Assessment

3.2.1 Point Sources in the Toulmins Spring Branch Watershed

Continuous Point Sources
There are no continuous NPDES discharges located in the Toulmins Spring Branch watershed. However, any future NPDES regulated discharges that are considered by the Department to be a pathogen source will be required to meet the instream water quality criteria for pathogens at the point of discharge.

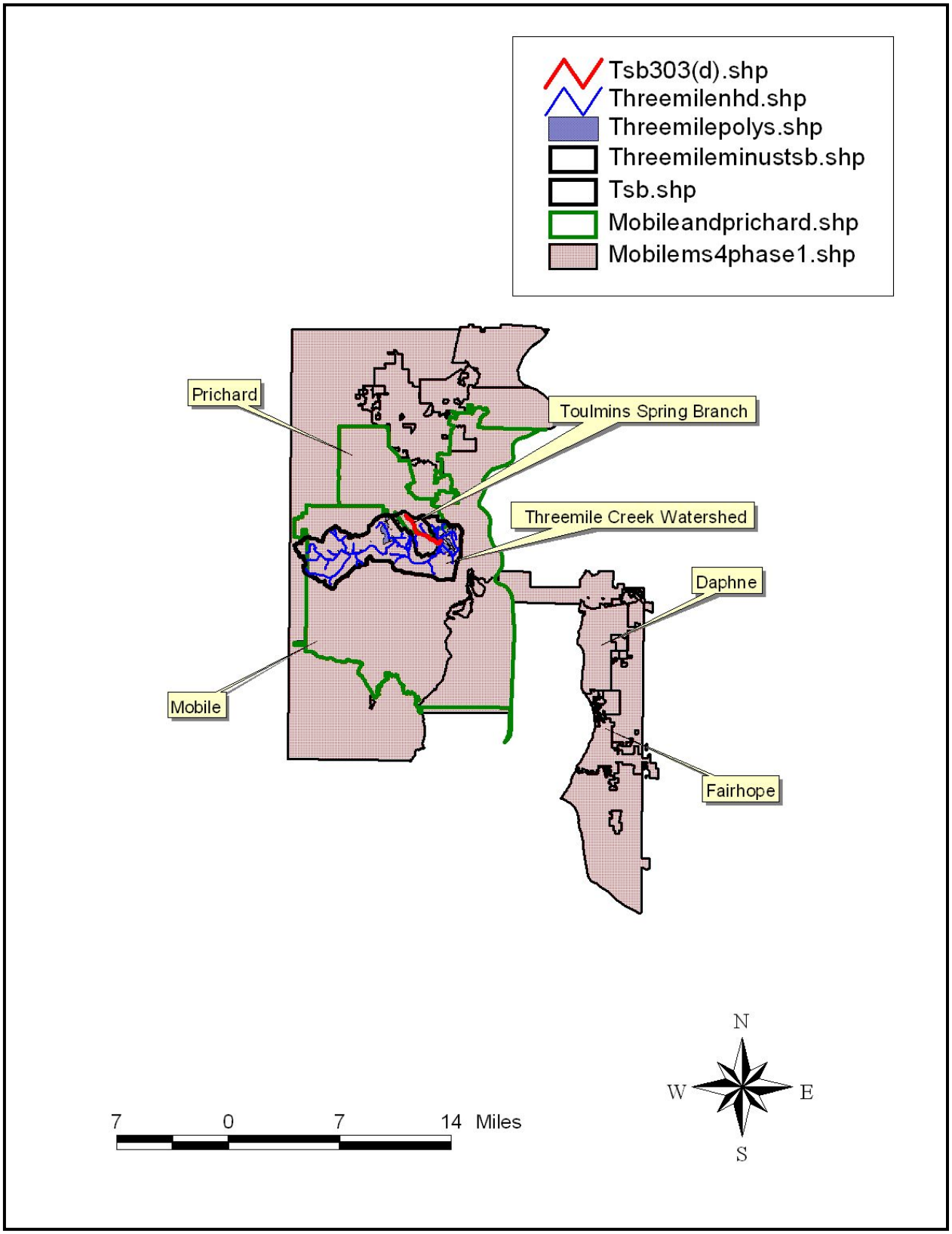
Non-Continuous Point Sources
The Toulmins Spring Branch watershed qualifies as a Municipal Separate Stormwater Sewer System (MS4) area and must be addressed in the TMDL as part of the Wasteload Allocation (WLA). The entire watershed is within the boundary of the Mobile Area Phase I MS4 (ALS000002). The entire Toulmins Spring Branch watershed will be allocated as MS4 WLA in the TMDL. Figure 3-1 shows the area of coverage of Mobile's MS4 system.

Sanitary sewer overflows (SSOs) have the potential to severely impact water quality and can often result in the violation of water quality standards. It is the responsibility of the NPDES wastewater discharger, or collection system operator for non-permitted "collection only" systems, to ensure that releases do not occur. Unfortunately releases to surface waters from SSOs are not always preventable or reported. From a review of ADEM's NPDES enforcement

database, it was determined that forty SSOs have occurred in the Toulmins Spring Branch watershed for the period from 3/17/03 through 8/25/08.

Future NPDES regulated stormwater discharges will be required to demonstrate consistency with the assumptions and requirements of this TMDL.

Figure 3-1. City of Mobile's MS4 Coverage



3.2.2 Nonpoint Sources in the Toulmins Spring Branch Watershed

Nonpoint sources of fecal coliform bacteria do not have a defined discharge point, but rather, occur over the entire length of a stream or waterbody. On the land surface, fecal coliform bacteria can accumulate over time in the soil and then are washed off during rain events. As the runoff transports the sediment over the land surface, more fecal coliform bacteria are collected and carried to the stream or waterbody. Therefore, there is some net loading of fecal coliform bacteria into the stream dictated by the watershed hydrology.

Agricultural land can be a source of fecal coliform bacteria. Runoff from pastures, confined animal feeding operations (CAFOs), improper land application of animal wastes, and animals with direct access to streams are all mechanisms that can contribute fecal coliform bacteria to waterbodies. To account for the potential influence from animals with direct access to stream reaches in the watershed, fecal coliform loads can be calculated as a direct source into the stream.

Fecal coliform bacteria can also originate from forested areas due to the presence of wild animals such as deer, raccoons, turkeys, waterfowl, etc. Wildlife deposit feces onto land surfaces where it can be transported during rainfall events to nearby streams. Control of these sources is usually limited to land management BMPs and may be impracticable in most cases. As a result, forested areas are not specifically targeted in this TMDL.

Fecal coliform loading from urban areas is potentially attributable to multiple sources including storm water runoff, illicit discharges of wastewater, runoff from improper disposal of waste materials, failing septic tanks, sewer overflows due to I&I (infiltration and inflow) and domestic animals. Septic systems are common in unincorporated portions of the watershed and may be direct or indirect sources of bacterial pollution via ground and surface waters. Onsite septic systems have the potential to deliver fecal coliform bacteria to surface waters due to system failure and malfunction.

3.3 Land Use Assessment

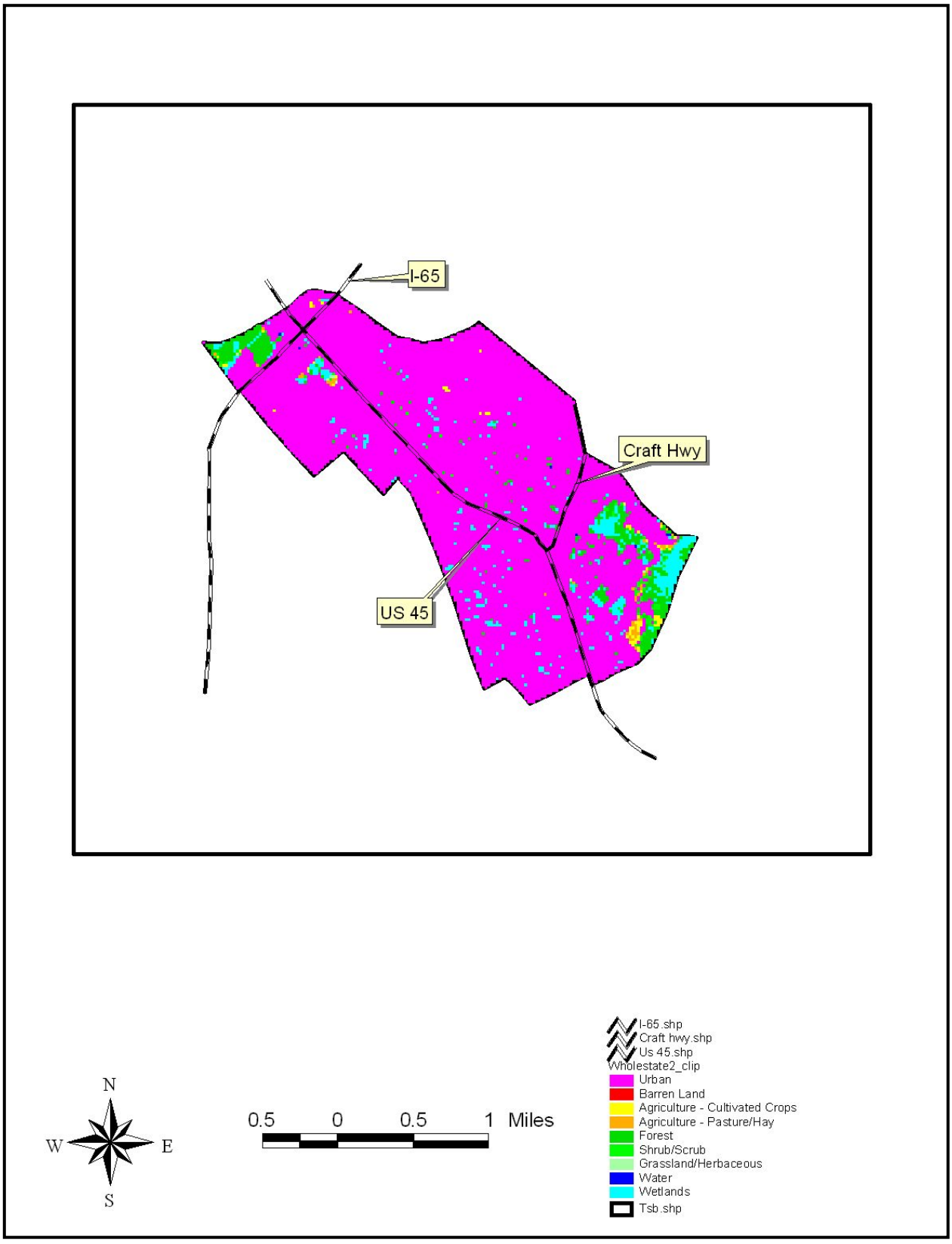
The Toulmins Spring Branch watershed is a part of the larger Threemile Creek watershed. The 12-digit hydrologic unit code (HUC) for Threemile Creek is 031602040504. Table 3-1 provides land use/cover in the Toulmins Spring Branch watershed and their respective percentages. Land use for the Toulmins Spring Branch watershed was determined using ArcView with land use information derived from the 2001 National Land Cover Dataset (NLCD). Figure 3-2 is a map of landuse within the Toulmins Spring Branch watershed.

As can be seen from the landuse table, the overwhelming majority of land in the Toulmin Spring Branch watershed is classified as developed. Developed land includes both commercial and residential land uses.

Table 3-1. Land Use in the Toulmins Spring Branch Watershed

Landuse in the Toulmins Spring Branch Watershed		
Landuse	**Area (mi^2)**	**Percentage**
Open Water	0.002	0.1%
Developed, Open Space	1.506	38.0%
Developed, Low Intensity	1.509	38.1%
Developed, Medium Intensity	0.413	10.4%
Developed, High Intensity	0.089	2.2%
Deciduous Forest	0.019	0.5%
Evergreen Forest	0.133	3.4%
Mixed Forest	0.025	0.6%
Shrub/Scrub	0.032	0.8%
Grassland/Herbaceous	0.003	0.1%
Pasture/Hay	0.019	0.5%
Cultivated Crops	0.023	0.6%
Woody Wetlands	0.186	4.7%
Emergent Herbaceous Wetlands	0.006	0.1%
Total	**3.965**	**100.0%**
Aggregate Landuse		
Landuse	**Area (mi^2)**	**Percentage**
Open Water	0.002	0.1%
Developed	3.516	88.7%
Forest	0.178	4.5%
Shrub/Scrub	0.032	0.8%
Grassland	0.003	0.1%
Pasture	0.019	0.5%
Crops	0.023	0.6%
Wetlands	0.191	4.8%
Total	**3.965**	**100.0%**

Figure 3-2. Land Use Map of the Toulmins Spring Branch Watershed



3.4 Linkage Between Numeric Targets and Sources

The Toulmins Spring Branch watershed is highly developed with 88.7% of the drainage area classified as developed. Most of the remaining land uses are forest and wetlands. Fecal coliform loads from forests and wetlands tend to be low due to their filtering capabilities and are considered as natural or background conditions with respect to pollutant sources. Based on the highly urbanized nature of the watershed, it is believed that the most likely sources of pathogen loadings in Toulmins Spring Branch are from activities in the MS4 area. Such activities include leaking sewer pipes, illicit sewer connections, failing septic systems, urban runoff, and SSOs.

It is not considered practical to calculate individual components for nonpoint source loadings. Hence, there will not be individual loads or reductions calculated for different nonpoint sources such as commercial and residential land uses. The loadings and reductions will only be calculated as a single total nonpoint source load and reduction.

3.5 Data Availability and Analysis

Toulmins Spring Branch was first placed on the State's §303(d) list for pathogens in 2004 as a result of fecal coliform data collected by the United States Geological Survey (USGS) in 2000 and 2001. USGS collected data on Toulmins Spring Branch at Graham Ave (#0247101550). Of seven samples collected over that time frame, four exceeded the single sample maximum criterion of 2,000 colonies/100 mL.

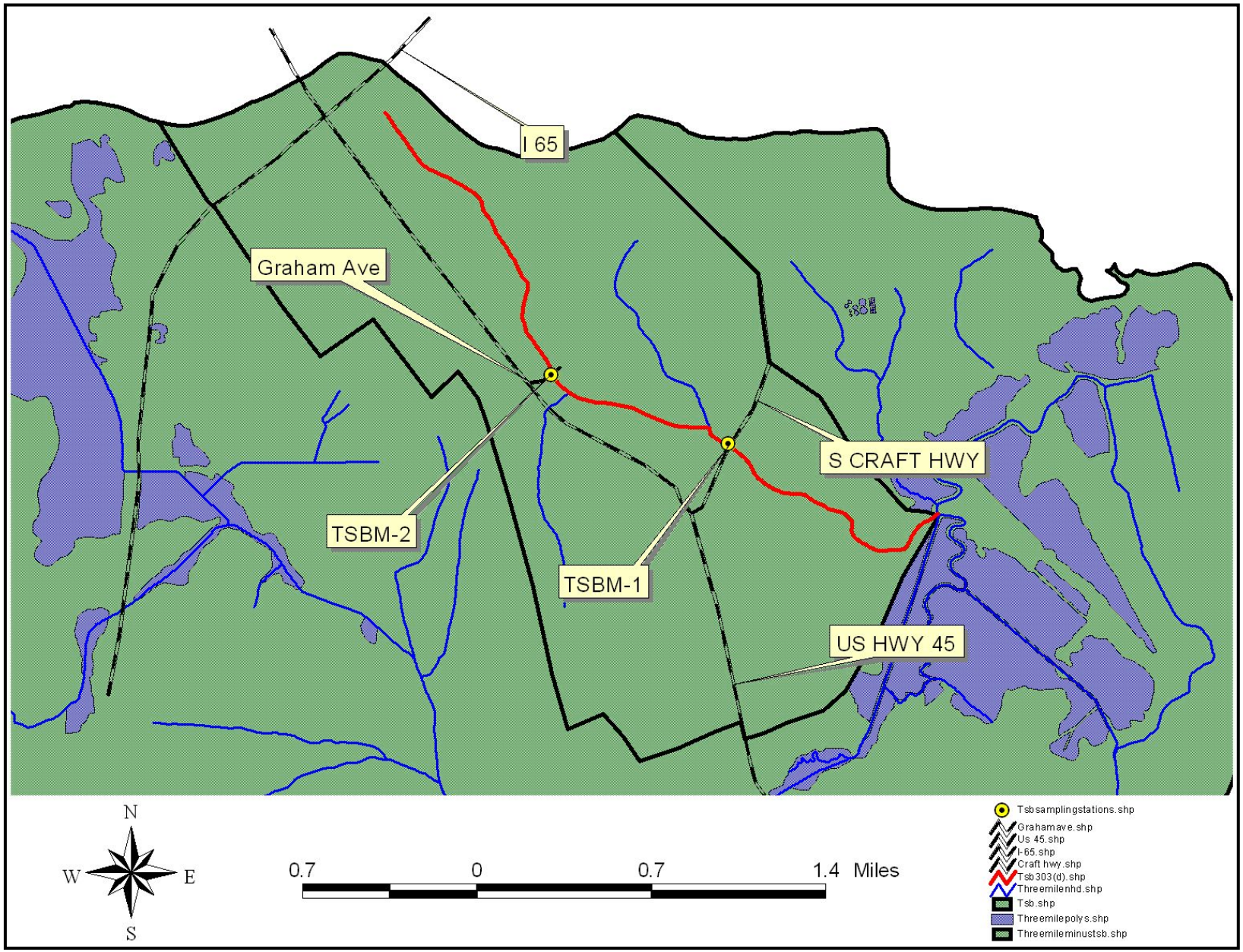
Subsequent data collected by ADEM in 2006 and 2007 has confirmed the impairment. ADEM's data indicated violations of both single sample and geometric mean criteria, as shown in Figures 3-4 and 3-5.

USGS listing data can be found in Appendix 7.2, Table 7-1. ADEM §303(d) data can be found in Appendix 7.2, Table 7-2. Additionally, one other agency, MAWSS (Mobile Area Water and Sewer System), has collected data in the watershed. MAWSS' data was collected from 2003 through 2007 as a result of a consent decree with Mobile Baykeeper. MAWSS had one station in the watershed at Craft Highway. The ID in the MAWSS study was station 8. Hence, TSBM-1 and station 8 denote the same location – Toulmins Spring Branch at Craft Highway. MAWSS data can be found in Appendix 7.2, Table 7-3. Shown below in Table 3-2 are location descriptions for the Toulmins Spring Branch sampling stations. Shown below in Figure 3-3 is a map of the station locations in the watershed.

Table 3-2. ADEM Sampling Stations in the Toulmins Spring Branch Watershed

Station ID	Agency	Station Description	Latitude	Longitude	MAWSS ID
TSBM-1	ADEM	Toulmins Spring Br. at Craft Hwy.	30.72182	-88.08049	8
TSBM-2	ADEM	Toulmins Spring Br. at Graham Ave.	30.72574	-88.0925	

Figure 3-3. Map of Toulmins Spring Branch Sampling Stations



3.6 Critical Conditions

Critical conditions typically occur during the summer months. This can be explained by the nature of storm events in the summer versus the winter. Periods of dry weather interspersed with thunderstorms allow for the accumulation and washing off of fecal coliform bacteria into streams, resulting in spikes of fecal coliform bacteria counts. In winter, frequent low intensity rain events are more typical and do not allow for the build-up of fecal coliform bacteria on the land surface, resulting in a more uniform loading rate. Also, the summer fecal coliform criterion is more stringent than the winter criterion.

Figure 3-4 is a plot of ADEM single sample fecal coliform data versus stream flow. An inspection of the figure suggests that violation events occur over a wide range of flows. Figure 3-5 is a plot of ADEM geometric mean data versus stream flow. An inspection of this figure suggests the same thing. Exceedances during high flow conditions are suggestive of storm event issues, such as sewer overflows and runoff from stormwater outfalls. Exceedances during lower flows suggest a more chronic type of problem such as a leaking sewer line or an illicit discharge. The data in Figures 3-4 and 3-5 suggest that both issues may be at play in this watershed. The maximum single sample concentration of 51,000 col/100 mL at TSBM-2 will be employed to estimate the TMDL pathogen reduction to Toulmins Spring Branch.

3.7 Margin of Safety

There are two methods for incorporating a Margin of Safety (MOS) in the analysis: 1) implicitly incorporate the MOS using conservative model assumptions to develop allocations, or 2) by explicitly specifying a portion of the TMDL as the MOS and using the remainder for allocations.

An explicit MOS was incorporated in this TMDL. The explicit MOS includes the uncertainty of the fecal coliform data used in this analysis and the uncertainty of selecting an appropriate critical condition from the existing fecal coliform concentrations. A margin of safety was applied to the TMDL by reducing the single sample criterion concentration by ten percent to achieve a target concentration of 1,800 colonies/100 mL.

Figure 3-4. TSBM-1 Single Sample Data

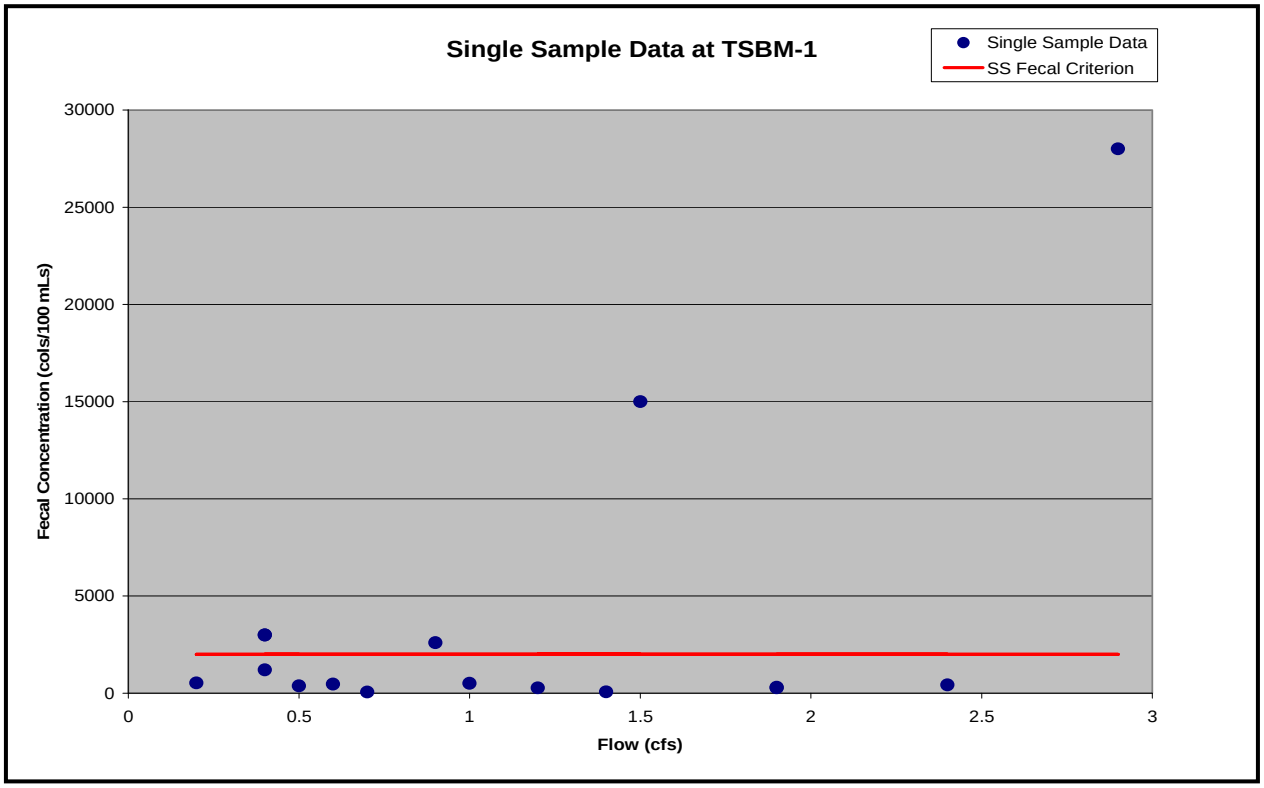
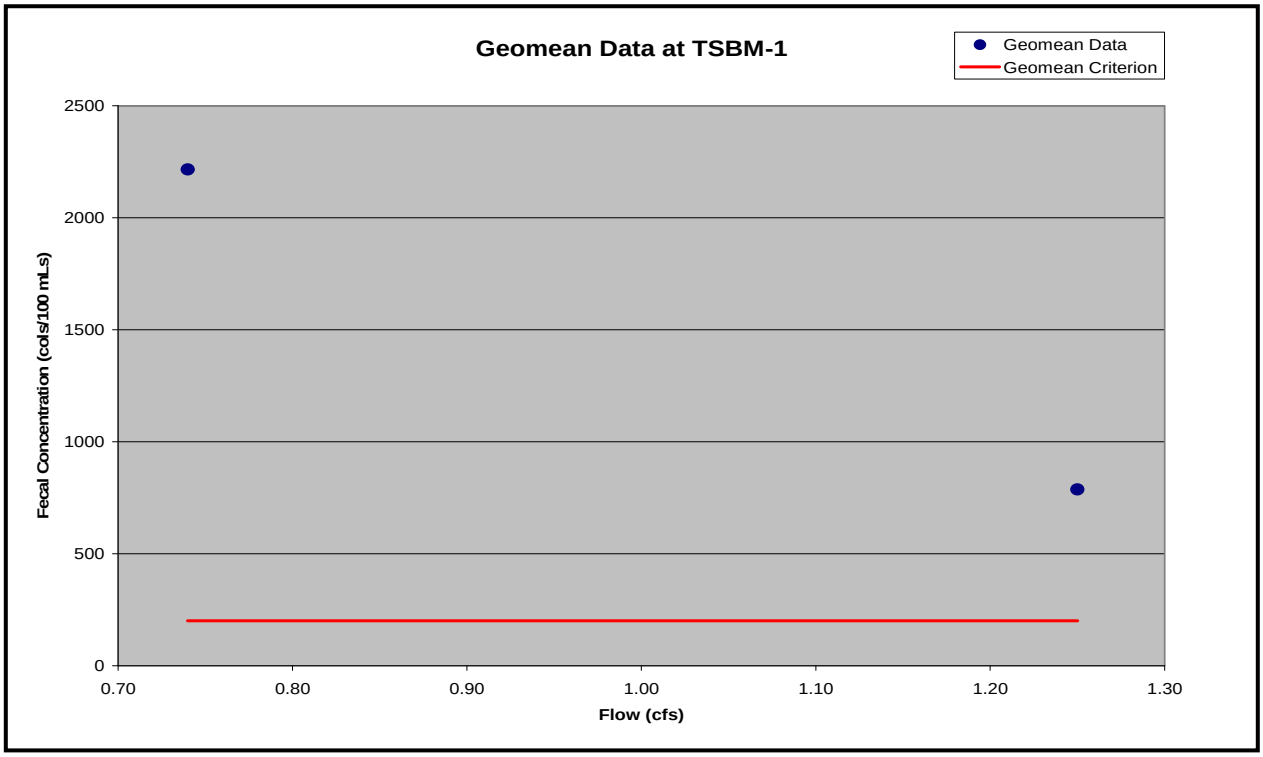


Figure 3-5. TSBM-1 Geometric Mean Data



4.0 TMDL Development

4.1 Definition of a TMDL

A total maximum daily load (TMDL) is the sum of individual wasteload allocations for point sources (WLAs), load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS). The margin of safety can be included either explicitly or implicitly and accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. As discussed earlier, the MOS is explicit in this TMDL. A TMDL can be denoted by the equation:

$$TMDL = \Sigma WLAs + \Sigma LAs + MOS$$

The TMDL is the total amount of pollutant that can be assimilated by the receiving waterbody while achieving water quality standards under critical conditions. For some pollutants, TMDLs are expressed on a mass loading basis (e.g. pounds per day). However, for pathogens, TMDL loads are typically expressed in terms of organism counts per day (colonies/day), in accordance with 40 CFR 130.2(i). As discussed in the Executive Summary, pathogen concentrations will be employed in lieu of loadings because of the direct proportionality between the two parameters.

4.2 Calculations

A concentration approach was employed to calculate the fecal coliform TMDL for Toulmins Spring Branch. The single sample fecal criterion for F&W waterbodies is 2,000 colonies/100 mL. Employing an MOS of 10% of the criterion results in an allowable concentration of 1,800 colonies/100 mL. The TMDL itself was based on the violation that produced the highest percent reduction of fecal coliform concentration necessary to achieve applicable water quality criteria.

Existing and Allowable Conditions

The highest concentration measured from the 2006 and 2007 field data was 51,000 colonies/100 mL at station TSBM-2 on 8/14/06. This is referred to as the existing conditions concentration. The allowable conditions concentration would be the criterion minus the 10% MOS, or 1,800 colonies/100 mL. The difference between the two values, 49,200 colonies/100 mL, is the required reduction to achieve water quality standards for pathogens. The difference between the two, converted to a percentage, is the required percent reduction to achieve water quality standards in the watershed, as assessed at TSBM-2. Table 4-1 shows the results of existing conditions and percent reductions employing the single sample criterion.

Table 4-1. 2006 Coliform Concentrations and Required Reductions

Source	Existing Concentration (col/100 mL)	Allowable Concentration (col/100 mL)	Required Reduction (col/100 mL)	% Reduction
NPS load	51,000	1,800	49,200	96%
Point Source	NA	NA	NA	NA

Shown in Table 1-2 below are the required TMDL pathogen concentrations under critical conditions for Toulmins Spring Branch.

Table 4-2. Fecal Coliform TMDL for Toulmins Spring Branch

TMDL	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	MS4s[c]	Leaking Collection Systems[d]		
(col/100 mL)	(col/100 mL)	(col/100 mL)	(% reduction)	(col/100 mL)	(col/100 mL)	(% reduction)
2,000	200	NA	96%	0	1,800	96%

a. There are no CAFOs in the Toulmins Spring Branch watershed. Future CAFOs will be assigned a waste load allocation (WLA) of zero.
b. WLAs for WWTPs are expressed as a daily maximum; NA = not applicable, no point sources. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas would be required to demonstrate consistency with the assumptions and requirements of this TMDL.
d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in fecal coliform loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for fecal coliform.

4.3 TMDL Summary

Toulmins Spring Branch was placed on Alabama's §303(d) list in 2004 based on data collected by USGS in 2000 and 2001. In 2006 and 2007, ADEM collected additional water quality data which confirmed the pathogen impairment and provided the basis for TMDL development.

A concentration approach was employed to calculate the fecal coliform TMDL for Toulmins Spring Branch. Based on the TMDL analysis, it was determined that a 96% reduction in fecal coliform concentration was necessary to achieve compliance with applicable water quality standards.

Compliance with the terms and conditions of existing and future NPDES sanitary and stormwater permits will effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL. Required load reductions in the LA portion of this TMDL can be implemented through voluntary measures and may be eligible for CWA §319 grants.

The Department recognizes that adaptive implementation of this TMDL will be needed to achieve applicable water quality criteria with a commitment to targeting the necessary load reductions to improve water quality in the Toulmins Spring Branch watershed. As additional data and/or information becomes available, it may be necessary to revise and/or modify the TMDL accordingly.

5.0 Follow Up Monitoring

ADEM has adopted a basin approach to water quality management; an approach that divides Alabama's fourteen major river basins into five groups. Each year, the ADEM water quality resources are concentrated in one of the five basin groups. One goal is to continue to monitor §303(d) listed waters. Monitoring will help further characterize water quality conditions resulting from the implementation of best management practices in the watershed. This monitoring will occur in each basin according the schedule shown in Table 5-1 below.

Table 5-1. §303(d) Follow Up Monitoring Schedule

River Basin Group	Year to be Monitored
Tennessee	2009
Alabama / Coosa / Tallapoosa	2010
Escatawpa / Mobile / Lower Tombigbee / Upper Tombigbee	2011
Black Warrior / Cahaba	2012
Chattahoochee / Chipola / Choctawhatchee / Perdido-Escambia	2013

6.0 Public Participation

As part of the public participation process, this TMDL was placed on public notice and made available for review and comment. The public notice was prepared and published in the four 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 TMDL was made available on ADEM's Website: www.adem.state.al.us. The public can also request paper or electronic copies of the TMDL by contacting Mr. Chris Johnson at 334-271-7827 or cljohnson@adem.state.al.us. The public was given an opportunity to review the TMDL and submit comments to the Department in writing. At the end of the public review period, all written comments received during the public notice period became part of the administrative record. ADEM considered all comments received by the public prior to finalization of this TMDL and subsequent submission to EPA Region 4 for final review and approval.

Appendix 7.1

References

ADEM Administrative Code, 2007. Water Division - Water Quality Program, Chapter 335-6-10, Water Quality Criteria.

ADEM Administrative Code, 2007. Water Division - Water Quality Program, Chapter 335-6-11, Use Classifications for Interstate and Intrastate Waters.

Alabama's §303(d) Monitoring Program. 2006 and 2007. ADEM.

Alabama's Ambient/Trend Monitoring Program. ADEM.

Alabama Department of Environmental Management (ADEM), Alabama's Water Quality Assessment and Listing Methodology, December 2005.

Alabama's §303(d) Lists. 2004, 2006, and 2008 §303(d) Lists. ADEM.

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

Appendix 7.2

Water Quality Data

Table 7-1. Listing Data Collected by USGS in 2000 and 2001

# P31625 - Fecal coliform, M-FC MF (0.7 micron) method, water, colonies per 100 milliliters									
# P31633 - Escherichia coli, m-TEC MF method, water, colonies per 100 milliliters									
# Data for the following sites are included:									
# USGS 0247101550 TOULMINS SPRING BRANCH AT GRAHAM AVE AT MOBILE, AL									
#									
agency_cd	site_no	sample_dt	sample_tm	sample_s	tm_da	coll_ent_cd	medium_cd	p31625	p31633
5s	15s	10d	4d	1s	1s	8s	1s	12s	12s
USGS	247101550	3/14/2000	14:00	CST	T	USGS-WRD	WS	8000	5300
USGS	247101550	4/26/2000	12:05	CDT	T	USGS-WRD	WS	E 2500	E 1200
USGS	247101550	7/24/2000	15:00	CDT	T	USGS-WRD	WS	< 10	E 20
USGS	247101550	9/13/2000	10:30	CDT	T	USGS-WRD	WS	2600	E 35
USGS	247101550	9/13/2000	11:48	CDT	T	USGS-WRD	BP		
USGS	247101550	11/15/2000	14:00	CST	T	USGS-WRD	WS	1100	920
USGS	247101550	2/12/2001	16:15	CST	T	USGS-WRD	WS	450	290
USGS	247101550	3/13/2001	9:30	CST	T	USGS-WRD	WS	6900	E 31000
USGS	247101550	10/31/2001	11:30	CST	T		WS	16000	20000

Table 7-2. Pathogen Data Collected by ADEM at Station TSBM-1 in 2006 and 2007

ADEM Fecal Data at TSBM-1											
Toulmins Spring Branch at Craft Hwy											
Agency	Date	Time	Fecal Coliform oor	Fecal Coliform (col/100ml)	Geomean	Date (Again)	Flow (cfs)	Meter	Avg Flow	SS Criterion	Geomean Criterion
ADEM	3/28/2006	1000		280		3/28/2006	1.9	Pygmy Meter		2000	
	4/13/2006	957		310		4/13/2006	1.9	Pygmy Meter		2000	
	5/17/2006	930		430		5/17/2006	2.4	Pygmy Meter		2000	
	6/13/2006	930		280		6/13/2006	1.2	Pygmy Meter		2000	
	6/15/2006	920		4000		6/15/2006					
	6/19/2006	935		96	274	6/19/2006					
	6/21/2006	825		110		6/21/2006					
	6/22/2006	915		130		6/22/2006					
	7/6/2006	930		68		7/6/2006	1.4	Pygmy Meter		2000	
	8/14/2006	1020		28000		8/14/2006	2.9	Pygmy Meter		2000	
	8/21/2006	1343		110		8/21/2006					
	8/28/2006	1015		510	787	8/28/2006	1	Pygmy Meter	1.25	2000	200
	9/5/2006	1005		64		9/5/2006	0.7	Pygmy Meter		2000	
	9/11/2006	955	G	3000		9/11/2006	0.4	Pygmy Meter		2000	
	9/21/2006	915		530		9/21/2006	0.2	Pygmy Meter		2000	
	10/3/2006	1025		470		10/3/2006	0.6	Pygmy Meter		2000	
	8/9/2007	1025		2600		8/9/2007	0.9	Pygmy Meter		2000	
	8/13/2007	1145		15000		8/13/2007	1.5	AA Meter		2000	
	8/23/2007	900		1200	2215	8/23/2007	0.4	AA Meter	0.74	2000	200
	8/30/2007	1020	G	3000		8/30/2007	0.4	Pygmy Meter		2000	
	9/5/2007	950		380		9/5/2007	0.5	Pygmy Meter		2000	

Table 7-3. Pathogen Data Collected by ADEM at Station TSBM-2 in 2006

ADEM Fecal Data at TSBM-2									
Toulmins Spring Branch at Graham Ave									
Station_ID	Date	Comments	Time (24hr)	Duplicate Sample	Duplicate Time (24hrs)	Fecal Coliform (col/100ml)	Fecal Coliform oor	Coliform Rev	Geomean
TSBM-2	3/28/2006		1050	FALSE		190		190	
TSBM-2	5/17/2006		1015	FALSE		230		230	
TSBM-2	6/13/2006	1st of 5 fecal geo means.	1020	FALSE		1200		1200	
TSBM-2	6/15/2006	2nd of 5 fecal geo means.	930	FALSE		2600		2600	
TSBM-2	6/19/2006	3rd of 5 fecal geo means.	950	FALSE		2600		2600	246
TSBM-2	6/21/2006	4th of 5 fecal geo means.	835	FALSE		4		4	
TSBM-2	6/22/2006	5th of 5 fecal geo means.	930	FALSE		28		28	
TSBM-2	7/6/2006		1015	FALSE		96		96	
TSBM-2	8/14/2006	First of 5 intensive fecal samples for geo means.	1057	FALSE		51000		51000	
TSBM-2	8/21/2006	Second of 5 intensive fecal samples for geo means.	1355	FALSE		8		8	
TSBM-2	8/28/2006	Third of 5 intensive fecal samples for geo means.	1025	FALSE		36		36	197
TSBM-2	9/5/2006	Fourth of 5 intensive fecal samples.	1020	FALSE		170		170	
TSBM-2	9/11/2006	Fifth of 5 fecal samples for geo mean.	1030	FALSE		120		120	
TSBM-2	9/21/2006		1010	FALSE		540		540	
TSBM-2	10/3/2006		1050	FALSE		3000	G	3000	

Table 7-4. Pathogen Data Collected by MAWSS at Station 8 from 2003 through 2007

MAWSS Fecal Data at TSBM-1 Toulmins Spring Branch at Craft Hwy				
Date	Fecal Coliforms Colonies/100 ml	Rev Fecal Coliform	Wet/Dry Classification	Comments
6/10/2003	27100	27100	W	
6/25/2003	1115	1115	W	
7/9/2003	870	870	W	
7/24/2003	7200	7200	W	
8/7/2003	1731	1731	W	
8/21/2003	4180	4180	D	
9/4/2003	2070	2070	D	
9/9/2003	3720	3720	D	
9/9/2003	2070	2070	D	
9/16/2003	2320	2320	D	
9/24/2003	2270	2270	D	
9/24/2003	1420	1420	D	
9/25/2003	1940	1940	D	
9/25/2003	1190	1190	D	
9/29/2003	1780	1780	D	
9/29/2003	410	410	D	
9/30/2003	520	520	D	
10/2/2003	760	760	D	
10/2/2003	610	610	D	
10/9/2003	500	500	D	
10/9/2003	880	880	D	
10/14/2003	2210	2210	D	
10/14/2003	2120	2120	D	
10/15/2003	1110	1110	D	
10/15/2003	580	580	D	
10/16/2003	1520	1520	D	
10/16/2003	590	590	D	
10/20/2003	460	460	D	
10/20/2003	400	400	D	
10/21/2003	1040	1040	D	
10/21/2003	240	240	D	
10/22/2003	410	410	D	
10/22/2003	70	70	D	
10/28/2003	3060	3060	D	
10/28/2003	2840	2840	D	
10/29/2003	2090	2090	D	
10/29/2003	1920	1920	D	

Table 7-4 (Cont). Pathogen Data Collected by MAWSS at Station 8 from 2003 through 2007

Date	Fecal Coliforms Colonies/100 ml	Rev Fecal Coliform	Wet/Dry Classification	Comments
11/11/2003	250	250	D	
11/25/2003	520	520	D	
12/11/2003	11460	11460	D	
1/6/2004	950	950	D	
1/20/2004	980	980	D	
2/3/2004	240	240	D	
2/17/2004	260	260	W	
3/2/2004	630	630	D	
3/16/2004	*TNC	2001	D	Assumed a value above the criterion
3/18/2004	*TNC	2001	D	Assumed a value above the criterion
3/31/2004	250	250	D	
4/14/2004	1900	1900	D	
4/27/2004	5970	5970	D	
5/11/2004	4690	4690	D	
5/26/2004	280	280	D	
6/8/2004	210	210	D	
6/24/2004	23130	23130	W	
7/20/2004	2830	2830	D	
8/3/2004	29520	29520	D	
8/17/2004	10620	10620	D	
9/2/2004	5280	5280	D	
9/23/2004	760	760	D	
10/7/2004	3160	3160	D	
10/19/2004	640	640	D	
11/2/2004	3860	3860	D	
11/16/2004	490	490	D	
11/29/2004	50	50	W	
12/14/2004	520	520	D	
12/29/2004	140	140	D	
1/11/2005	390	390	D	
1/25/2005	250	250	D	
2/9/2005	1150	1150	D	
2/22/2005	10320	10320	D	
3/8/2005	470	470	D	
3/23/2005	530	530	D	
4/5/2005	390	390	D	
4/20/2005	290	290	D	
5/5/2005	160	160	D	

Table 7-4 (Cont). Pathogen Data Collected by MAWSS at Station 8 from 2003 through 2007

Date	Fecal Coliforms Colonies/100 ml	Rev Fecal Coliform	Wet/Dry Classification	Comments
5/16/2005	6100	6100	D	
6/10/2005	430	430	D	
6/23/2005	1530	1530	D	
7/13/2005	9680	9680	W	
8/2/2005	1460	1460	W	
8/18/2005	90	90	D	
9/14/2005	160	160	D	
9/28/2005	1840	1840	D	
10/12/2005	250	250	D	
10/25/2005	110	110	D	
11/9/2005	50	50	D	
11/24/2005	100	100	D	
12/7/2005	1730	1730	D	
12/19/2005	180	180	D	
1/4/2006	20	20	D	
1/18/2006	490	490	D	
1/31/2006	95	95	D	
2/14/2006	30	30	D	
3/1/2006	420	420	D	
3/15/2006	20	20	D	
3/28/2006	140	140	D	
4/12/2006	500	500	D	
4/25/2006	760	760	D	
5/12/2006	2660	2660	W	
5/23/2006	10980	10980	D	
6/9/2006	3810	3810	D	
6/21/2009	640	640	D	
7/6/2006	1870	1870	D	
7/20/2006	2490	2490	D	
8/3/2006	3340	3340	D	
8/24/2006	0	0	D	
9/7/2006	80	80	D	
9/20/2006	2320	2320	D	
10/3/2006	1150	1150	D	
10/25/2006	470	470	D	
11/9/2006	2610	2610	D	
11/27/2006	5490	5490	D	
12/14/2006	13800	13800	D	
1/3/2007	2100	2100	D	
1/18/2007	5390	5390	D	

Table 7-4 (Cont). Pathogen Data Collected by MAWSS at Station 8 from 2003 through 2007

Date	Fecal Coliforms Colonies/100 ml	Rev Fecal Coliform	Wet/Dry Classification	Comments
1/30/2007	2880	2880	D	
2/15/2007	940	940	D	
2/28/2007	7580	7580	D	
3/13/2007	10980	10980	D	
3/30/2007	17080	17080	D	
4/13/2007	10980	10980	D	
4/25/2007	670	670	D	
5/10/2007	240	240	D	
5/25/2007	360	360	D	
6/5/2007	770	770	D	
6/25/2007	8720	8720	D	
7/19/2007	4860	4860	D	
8/3/2007	5320	5320	D	
8/16/2007	3435	3435	D	
8/31/2007	4720	4720	D	