FINAL

Total Maximum Daily Load (TMDL)
for
Unnamed Tributary to Threemile Creek
Assessment Unit ID # AL03160204-0504-500
Pathogens (fecal coliform)

Alabama Department of Environmental Management
Water Quality Branch
Water Division
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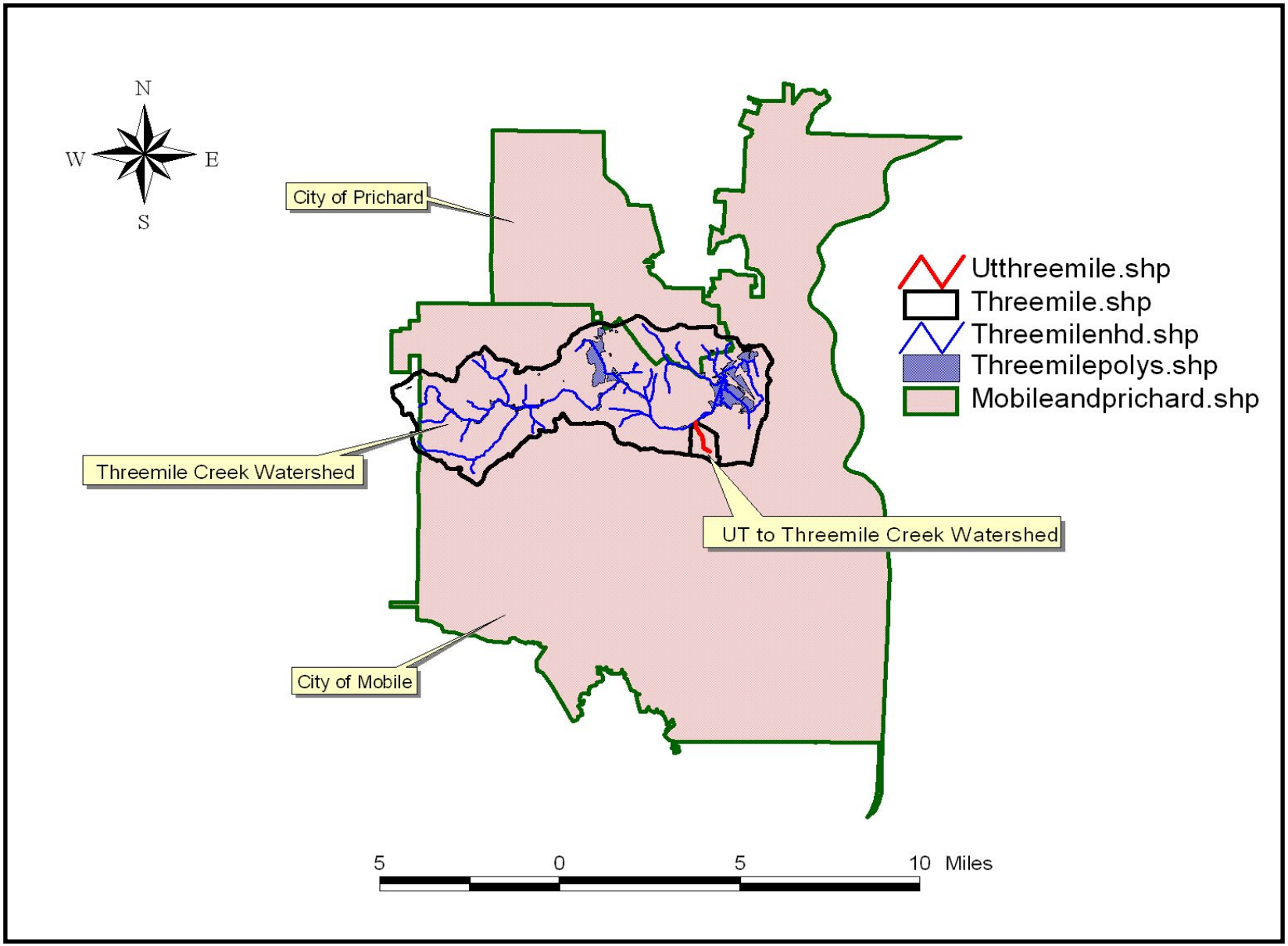
Figure I. Site Map of UT to Threemile Creek within the Threemile Creek Watershed



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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).

The unnamed tributary (UT) to Threemile Creek is a part of the Threemile Creek watershed in the city of Mobile and flows just east of the Mobile Infirmary hospital to Threemile Creek. Its source is just south of McGill-Toolen High School. From its source, it flows in a northerly direction across Spring Hill Avenue, then Center Street, ending at Threemile Creek approximately 0.1 mile upstream of St. Stephens Road (i.e., U.S. Highway 45) It has a length of 1.04 miles and total drainage area of 0.67 square miles. It has a use classification of Fish & Wildlife (F&W). Approximately half of the waterbody has been converted to a concrete, trapazoidal channel by the city of Mobile. All of its watershed is a part of Mobile's Phase I MS4 area.

The UT to Threemile Creek 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 has confirmed the impairment.

A mass balance approach was employed for calculating the pathogen Total Maximum Daily Load (TMDL) for the UT to Threemile Creek. The mass balance approach typically uses the highest concentration from the available data for the watershed and utilizes the conservation of mass principle. Loads can be calculated by multiplying fecal coliform concentrations times respective instream flows times a conversion factor. The highest pathogen loading to the UT to Threemile Creek watershed was calculated using a single sample exceedance concentration from station UTTM-1 on October 17, 2006, times the measured flow times a conversion factor. Employing the same flow for October 17, 2006, along with the allowable pathogen concentration results in the allowable load. 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 for F&W waterbodies is 2,000 colonies/100 mL. Incorporating a 10% MOS results in an allowable pathogen concentration of 1,800 colonies/100 mL. Shown in Table 1-1 below are the existing and allowable pathogen loadings associated with station UTTM-1.

Table 1-1. 2006 Coliform Loads and Required Reductions

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	Reduction %
NPS load	6.97E+12	2.20E+11	6.75E+12	97%
Point Source	NA	NA	NA	NA

Shown in Table 1.2 below are the required TMDL pathogen loadings under critical conditions for UTTM-1.

Table 1-2. Fecal Coliform TMDL for the UT to Threemile Creek Watershed

TMDL	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation(LA)	
		WWTPs[b]	MS4s[c]	Leaking Collection Systems[d]		
(colonies/day)	(colonies/day)	(colonies/day)	(% reduction)	(colonies/day)	(colonies/day)	(% reduction)
2.45E+11	2.45E+10	NA	97%	0	2.20E+11	97%

a. There are no CAFOs in the UT to Threemile Creek 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 are 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 UT to Threemile Creek watershed. As additional data and/or information becomes available, it may be 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 the UT to Threemile Creek 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:	UT to Threemile Creek from its mouth to its source
Waterbody Length:	1.04 miles
Waterbody Drainage Area:	0.67 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:
All of the UT to Threemile Creek 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 the UT to Threemile Creek 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 exceeded 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 exceeded 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 the UT to Threemile Creek at Center Street (#0247101495). Of seven samples collected over that time frame, five 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

Point Sources in the Threemile Creek Watershed

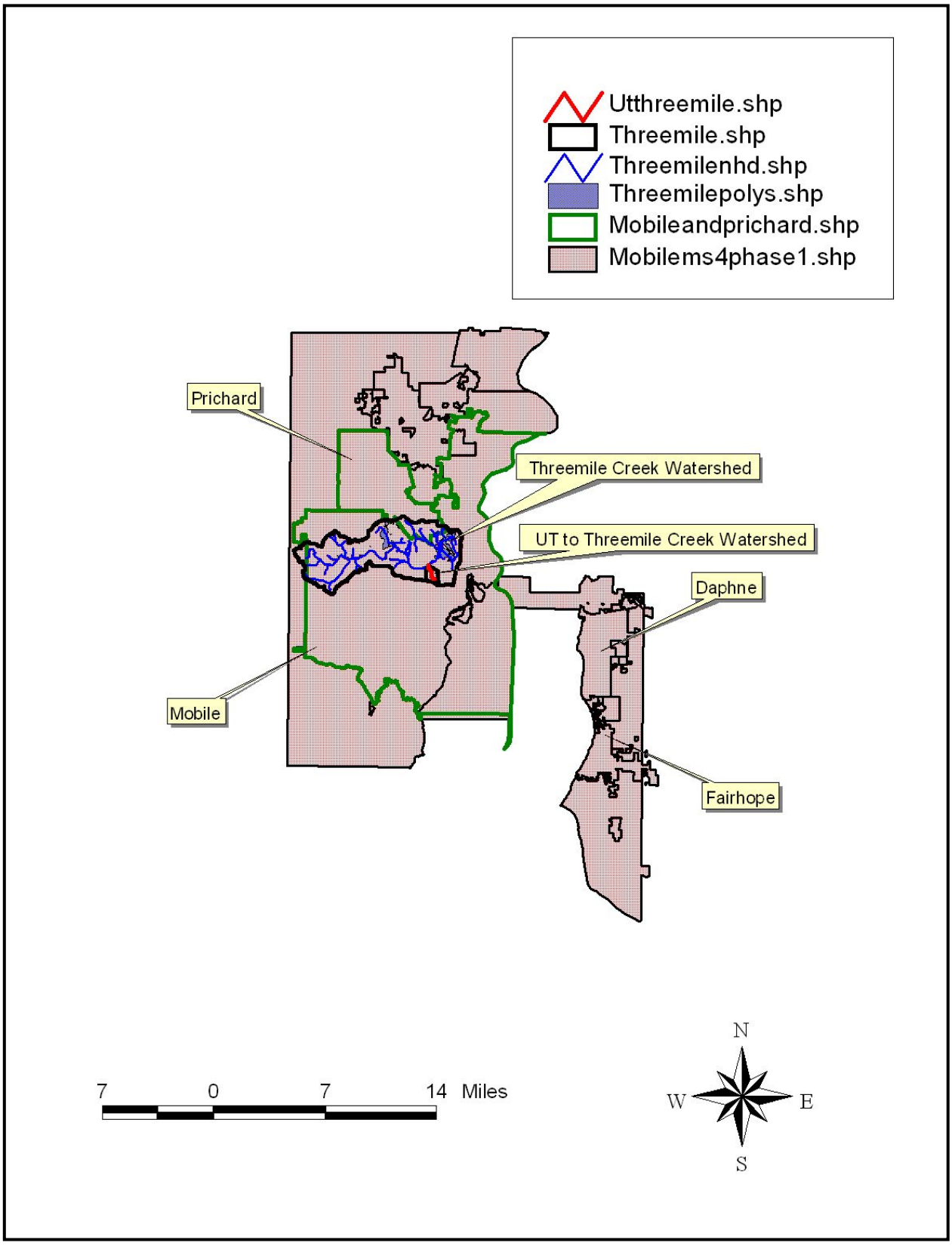
Continuous Point Sources
There are no continuous NPDES discharges located in the UT to Threemile Creek watershed. However, any future NPDES regulated discharges that are considered by the Department to be a pathogen source will be required to meet the instream water quality criteria for pathogens at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

Non-Continuous Point Sources
The UT to Threemile Creek 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 UT to Threemile Creek watershed will be allocated as an 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, there have been no reported SSOs in the watershed since 2003.

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



Nonpoint Sources in the UT to Threemile Creek 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 is 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 a 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

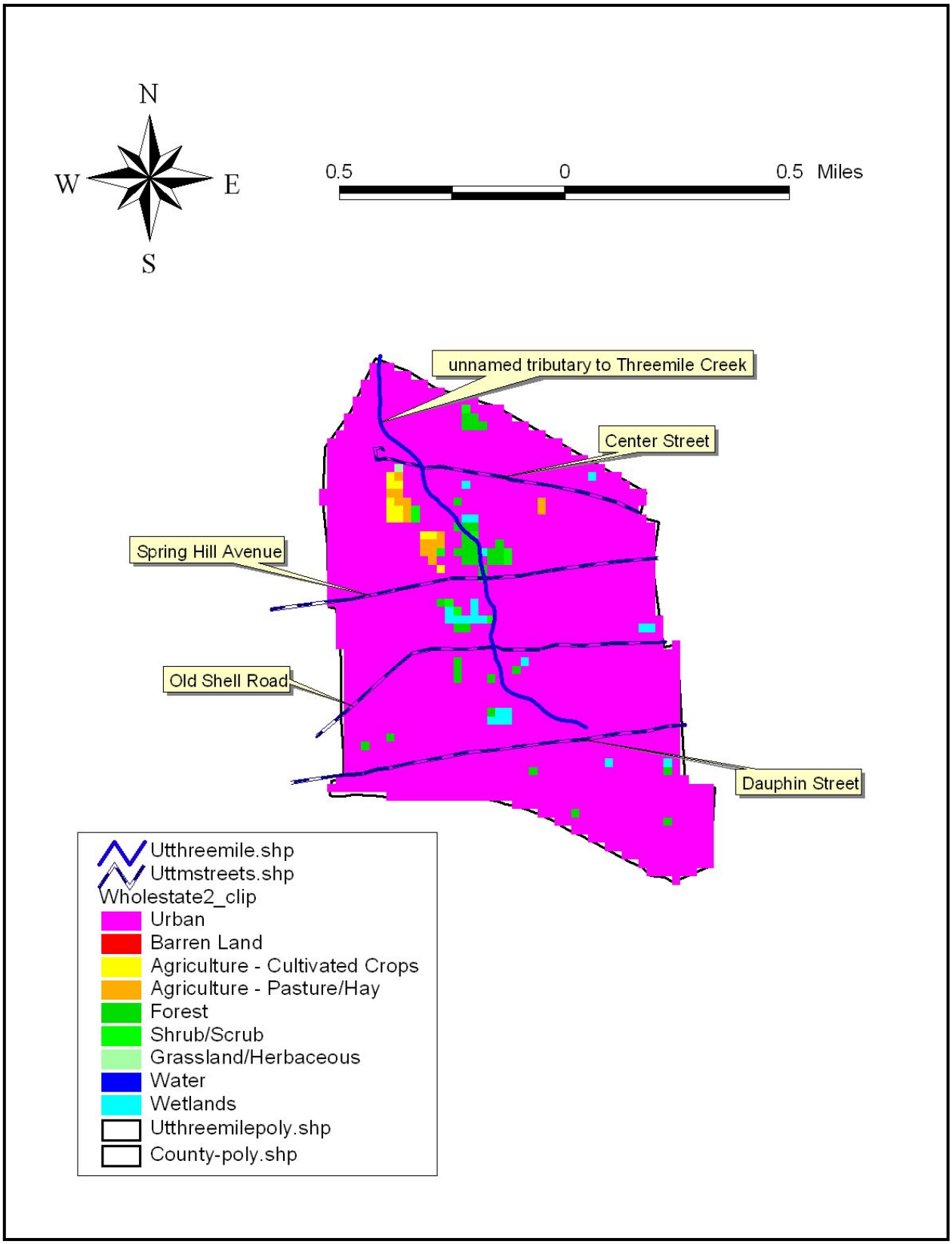
The UT to Threemile Creek watershed is a part of the larger Threemile Creek watershed. The 12-digit hydrologic unit code (HUC) for Threemile Creek is 031602040504. Shown in Table 3-1 are land uses in the UT to Threemile Creek watershed and their respective percentages. Land use for the UT to Threemile Creek 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 land use within the UT to Threemile Creek watershed.

As can be seen from the land use table, the overwhelming majority of land in the UT to Threemile Creek watershed is classified as developed. Developed land includes both commercial and residential land uses.

Table 3-1. Land Use in the UT to Threemile Creek Watershed

Landuse in the UT to Threemile Creek Watershed		
Landuse	**Area (mi^2)**	**Percentage**
Developed, Open Space	0.190	28.5%
Developed, Low Intensity	0.251	37.6%
Developed, Medium Intensity	0.147	22.0%
Developed, High Intensity	0.044	6.6%
Deciduous Forest	0.002	0.3%
Evergreen Forest	0.011	1.6%
Mixed Forest	0.001	0.2%
Shrub/Scrub	0.003	0.5%
Grassland/Herbaceous	0.000	0.1%
Pasture/Hay	0.006	0.8%
Cultivated Crops	0.004	0.6%
Woody Wetlands	0.008	1.1%
Emergent Herbaceous Wetlands	0.000	0.1%
Total	**0.667**	**100.0%**
Aggregate Landuse		
Landuse	**Area (mi^2)**	**Percentage**
Developed	0.632	94.8%
Forest	0.014	2.0%
Shrub/Scrub	0.003	0.5%
Grassland	0.000	0.1%
Pasture	0.006	0.8%
Crops	0.004	0.6%
Wetlands	0.008	1.2%
Total	**0.667**	**100.0%**

Figure 3-2. Landuse Map of the UT to Threemile Creek Watershed



3.4 Linkage Between Numeric Targets and Sources

The UT to Threemile Creek watershed is highly developed with 94.8% 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 UT to Threemile Creek 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. The loadings and reductions will only be calculated as a single total nonpoint source load and reduction.

3.5 Data Availability and Analysis

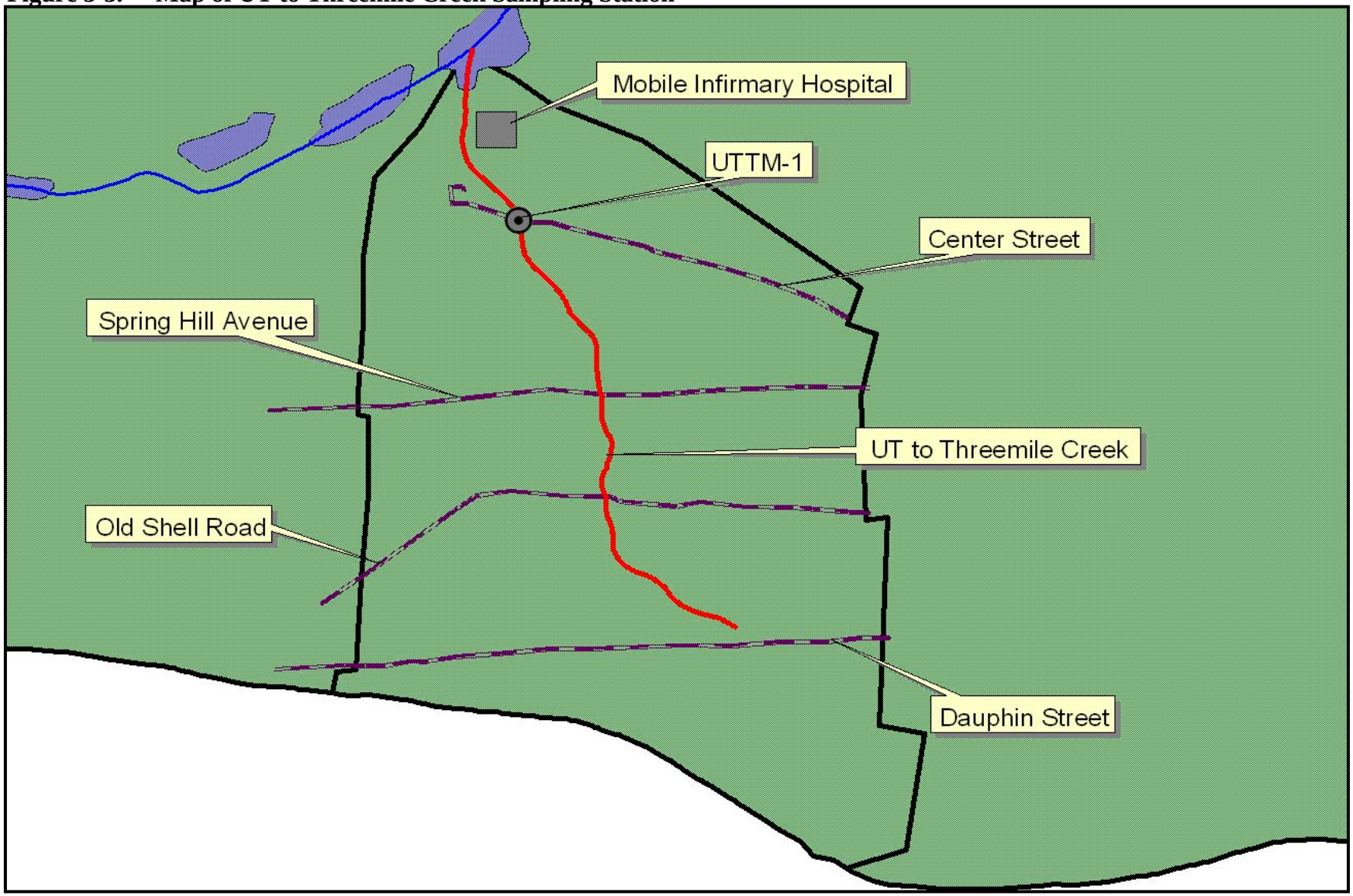
As indicated earlier in the document, data collected by the USGS in 2000 and 2001 resulted in placement of the UT to Threemile Creek on the State's 2004 §303(d) list. USGS listing data can be found in Appendix 7.2, Table 7-1. Since that time, additional data has been collected by ADEM in 2006 to assess use support. ADEM §303(d) data can be found in Appendix 7.2, Table 7-2. Of 14 samples collected from 3/22/06 through 10/17/06, five exceeded the single sample criterion of 2,000 colonies/100 mL for an exceedance rate of 36%. Both geometric mean samples exceeded the 200 colonies/100 mL criterion.

Shown below in Table 3-2 is a location description for the only sampling station in the watershed. Shown below in Figure 3-3 is a map of the station location in the watershed.

Table 3-2. ADEM Sampling Station in the UT to Threemile Creek Watershed

StationID	Agency	Station Description	Latitude	Longitude
UTTM-1	ADEM	UT Threemile Creek at Center St.	30.69658	-88.07722

Figure 3-3. Map of UT to Threemile Creek Sampling Station



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.

It was not possible to measure flows for all but one of the sampling events at UTTM-1 because they were too small. For that reason, surrogate flows were estimated using data from the USGS permanent record station on Chickasaw Creek near Kushla (gage #02471001). This gage is approximately 6.5 miles from UTTM-1 (i.e., the straight-line distance). Since all of the ADEM data was collected in 2006, average daily discharge data for 2006 was downloaded from the USGS web site for the Kushla gage. Surrogate flows were then calculated for UTTM-1 employing a ratio of drainage areas between the Kushla gage and the UTTM-1 station. It should be noted that a surrogate flow estimate was not necessary for the 10/17/06 sampling event. This is because enough flow was present during the event that it could easily be measured (there had been approximately 24 hours of rainfall prior to the event). The value measured for 10/17/06 was 5 cfs, and can be found in Table 7-2 under the column labeled Measured Flows.

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. It also reveals that all of the violation events, except one, are marginal in nature (i.e., all violations, except one, are only slightly above the single sample criterion of 2,000). The one significantly above the criterion occurs during a high-flow (i.e., storm) event. Figure 3-5 is a plot of ADEM geometric mean data versus stream flow. An inspection of this figure suggests that geometric mean exceedances occur in the low range of measured/calculated flows. Exceedances during high flow conditions are suggestive of storm event issues, such as sewer overflows and runoff from stormwater outfalls. Exceedances during low flows suggest a more chronic type of problem, such as a leaking sewer line or 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 57,000 colonies/100 mL with an average flow of 5.0 cfs (cubic feet per second) at UTTM-1 will be employed to estimate the TMDL pathogen loadings to the UT to Threemile Creek watershed.

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 loads. A margin of safety was applied to the TMDL by reducing the criterion concentration by ten percent and calculating a mass loading

target with measured flow data. The single sample criterion was reduced by ten percent to achieve the target concentration of 1,800 colonies/100 mL.

Figure 3-4. UTTM-1 Single Sample Data

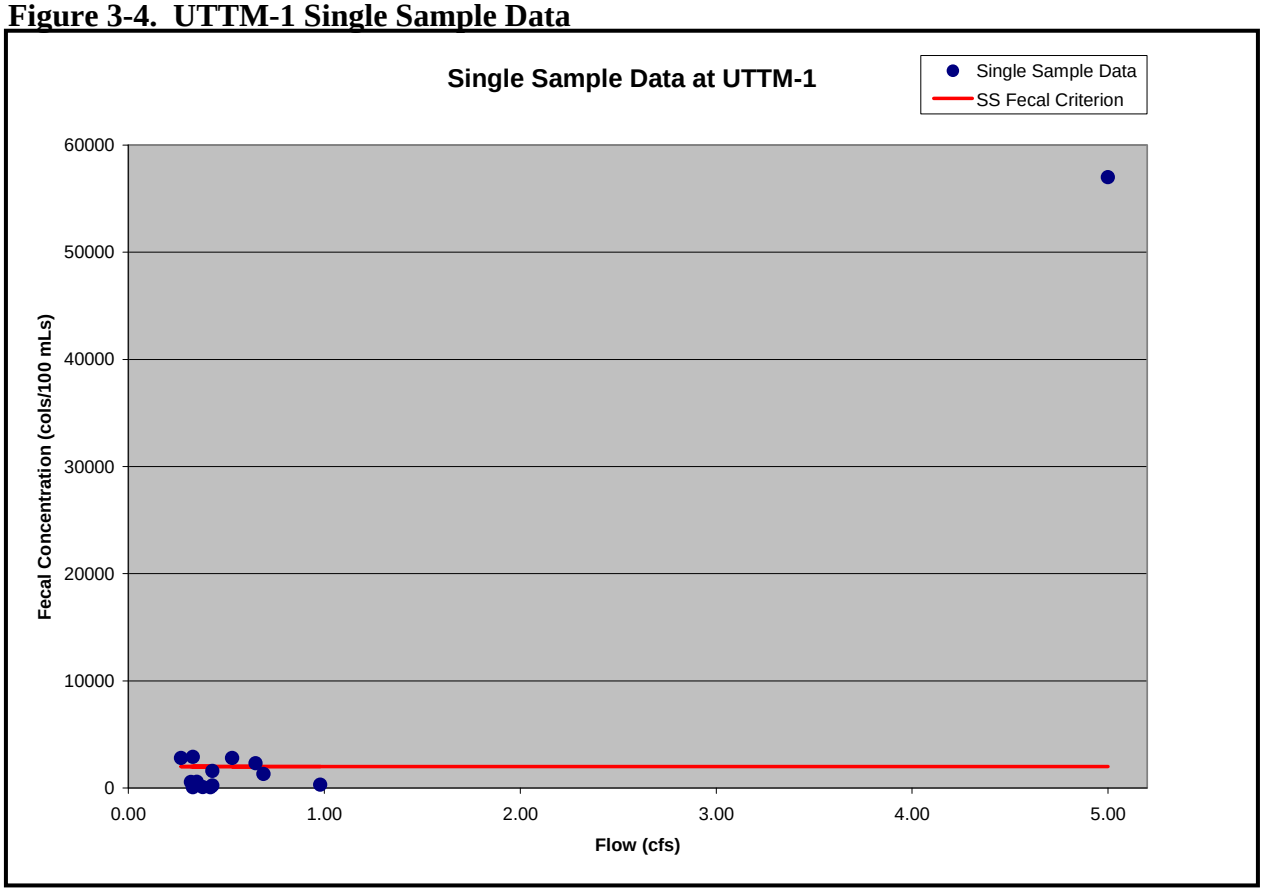
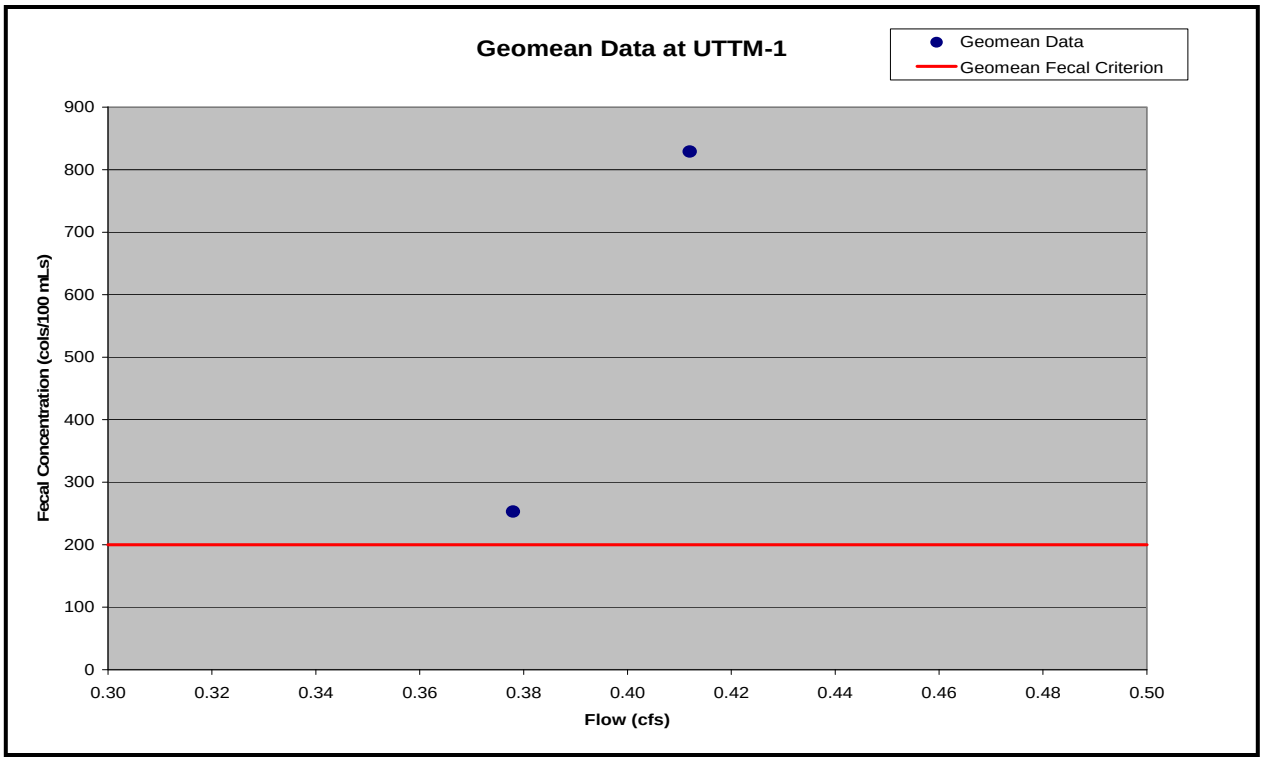


Figure 3-5. UTTM-1 Geometric Mean Data



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).

4.2 Load Calculations

A mass balance approach was used to calculate the fecal coliform TMDL for UT to Threemile Creek. The mass balance approach utilizes the conservation of mass principle. Total existing mass loads were calculated by multiplying the fecal coliform concentration times the corresponding stream flow. Existing loads were calculated for the highest geometric mean sample exceedance and the highest single sample exceedance. In the same manner, allowable loads were calculated for both the single sample criterion of 2000 col/100ml and the geometric mean criterion of 200 col/100ml. The TMDL was based on the violation that produced the highest percent reduction of fecal coliform loads necessary to achieve applicable water quality criteria, whether it be the single sample or geometric mean criterion.

Existing Conditions

The first loading calculated was an estimate of the pathogen loading to the watershed during the most extreme violation event from the available data. It was done by multiplying a single sample exceedance concentration of 57,000 colonies/100 mL times the measured flow of 5.0 cfs for the 10/17/06 sampling event. The product of these two values and a conversion factor gives the total mass loading of fecal coliform to UTTM-1 under maximum exceedance conditions.

$$\frac{5.0\,\text{ft}^3}{\text{s}} \times \frac{57{,}000\,\text{colonies}}{100\,\text{mL}} \times \frac{24465755 \quad 100\,\text{mL} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{6.97 \times 10^{12}\,\text{colonies}}{\text{day}}$$

Allowable Conditions

The second load represents the allowable value to the watershed under the same hydraulic conditions as the first. This is done by taking the product of the flow used for the violation event

times the conversion factor times the allowable single sample fecal concentration of 1,800 colonies/100 mL. The allowable fecal coliform loading is:

$$\frac{5.0\,\text{ft}^3}{\text{s}} \times \frac{1800\ \text{colonies}}{100\,\text{mL}} \times \frac{24465755\quad 100\,\text{mL} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{2.20 \times 10^{11}\ \text{colonies}}{\text{day}}$$

The explicit margin of safety of 200 colonies/100 mL equals a daily loading of:

$$\frac{5.0\,\text{ft}^3}{\text{s}} \times \frac{200\ \text{colonies}}{100\,\text{mL}} \times \frac{24465755\quad 100\,\text{mL} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{2.45 \times 10^{10}\ \text{colonies}}{\text{day}}$$

The difference in the pathogen loading between the existing conditions (violation event) and the allowable conditions converted to a percentage represents the total load reduction needed to achieve the fecal coliform water quality criterion. The TMDL was calculated as the total daily fecal coliform load to the UT to Threemile Creek as evaluated at station UTTM-1. Table 4-1 shows the results of existing conditions and percent reductions employing the single sample criterion.

Table 4-1. 2006 Coliform Loads and Required Reductions

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	Reduction %
NPS load	6.97E+12	2.20E+11	6.75E+12	97%
Point Source	NA	NA	Na	NA

The TMDL, WLA, LA and MOS values necessary to achieve the applicable fecal coliform criteria are provided in Table 4-2 below.

Table 4-2. Fecal Coliform TMDL for the UT to Threemile Creek Watershed

TMDL	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation(LA)	
		WWTPs[b]	MS4s[c]	Leaking Collection Systems[d]		
(colonies/day)	(colonies/day)	(colonies/day)	(% reduction)	(colonies/day)	(colonies/day)	(% reduction)
2.45E+11	2.45E+10	NA	97%	0	2.20E+11	97%

a. There are no CAFOs in the UT to Threemile Creek 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

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

A mass balance approach was used to calculate the fecal coliform TMDL for the UT to Threemile Creek. Based on the TMDL analysis, it was determined that a 97% reduction in fecal coliform loading 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 UT to Threemile Creek 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, 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 below in Table 5-1.

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. 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							
# Description of remark_cd:							
# < - Less than.							
# E - Estimated.							
# M - Presence verified but not quantified.							
#							
# Data for the following sites are included:							
# USGS 0247101495 UNNAMED TR TO THREEMILE CR AT CENTER ST AT MOBILE							
#							
# WARNING: Some spreadsheet programs do not allow more than 256 columns. This retrieval							
# may not be imported into those programs without manually editing this file.							
#							
agency_cd	site_no	sample_dt	sample_tm	sample_st	coll_ent_cd	p31625	p31633
5s	15s	10d	4d	1s	8s	12s	12s
USGS	247101495	3/14/2000	10:00	CST	USGS-WRD	7300	4300
USGS	247101495	4/27/2000	12:15	CDT	USGS-WRD	E 13000	E 26000
USGS	247101495	7/24/2000	13:00	CDT	USGS-WRD	560	510
USGS	247101495	9/14/2000	13:03	CDT	USGS-WRD		
USGS	247101495	9/14/2000	13:30	CDT	USGS-WRD	1600	E 120
USGS	247101495	11/14/2000	14:45	CST	USGS-WRD	30000	24000
USGS	247101495	2/12/2001	13:30	CST	USGS-WRD	E 6700	1400
USGS	247101495	3/13/2001	8:00	CST	USGS-WRD	9800	5400
USGS	247101495	10/31/2001	13:45	CST		38	200

Table 7-2. Pathogen Data Collected by ADEM at Station UTTM-1 in 2006

ADEM Fecal Data at UTTM-1											
Unnamed Trib to Threemile Creek at Center St											
Station_ID	Date	Comments	Time (24hr)	Duplicate Sample	Duplicate Time (24hrs)	Fecal Coliform (col/100ml)	Rev Fecal Coliform (col/100ml)	Geomean	Measured Flow (cfs)	Surrogate Flow (cfs)	Avg Flow (cfs)
UTTM-1	3/22/2006		1010	FALSE		300	300			0.98	
UTTM-1	4/18/2006		930	FALSE		2800	2800			0.53	
UTTM-1	5/18/2006		955	FALSE		2300	2300			0.65	
UTTM-1	6/13/2006		955	FALSE		62	62			0.33	
UTTM-1	6/27/2006	*Second Fecal collected for Geo-Mean	1010	FALSE		1600	1600			0.43	
UTTM-1	6/29/2006	*Third Fecal collected for Geo-Mean.	925	FALSE		550	550			0.32	
UTTM-1	7/6/2006	*Fourth Fecal collected for Geo-Mean.	940	FALSE		86	86	253		0.38	0.38
UTTM-1	7/11/2006	*Field Dup.'s collected at this site.I *Fifth Fecal collected for Geo-Mean.	1011	TRUE		210	220			0.43	
UTTM-1	7/11/2006	*Field Dup.'s collected at this site.I *Fifth Fecal collected for Geo-Mean.	1010	FALSE	1011	230					
UTTM-1	8/15/2006	*First Fecal collected in set of five for Geo-Mean (Intensive Study) for August/September.	950	FALSE		580	580			0.35	
UTTM-1	8/22/2006	*Second Fecal collected in set of five for Geo-Mean (Intensive Study) for August/September.	950	FALSE		2900	2900			0.33	
UTTM-1	8/29/2006	*Third Fecal collected in set of five for Geo-Mean (Intensive Study) for August/September.	1000	FALSE		64	64	829		0.42	0.41
UTTM-1	9/6/2006	*Fourth Fecal collected in set of five for Geo-Mean (Intensive Study) for August/ September.	955	FALSE		2800	2800			0.27	
UTTM-1	9/12/2006	**Fifth Fecal collected in set of five for Geo-Mean (Intensive Study) for August/September.	955	FALSE		1300	1300			0.69	
UTTM-1	10/17/2006	*Heavy Rain past 24 hrs.	1135	FALSE		57000	57000		5.00		