Final
Total Maximum Daily Load (TMDL)
for
Tallapoosa River

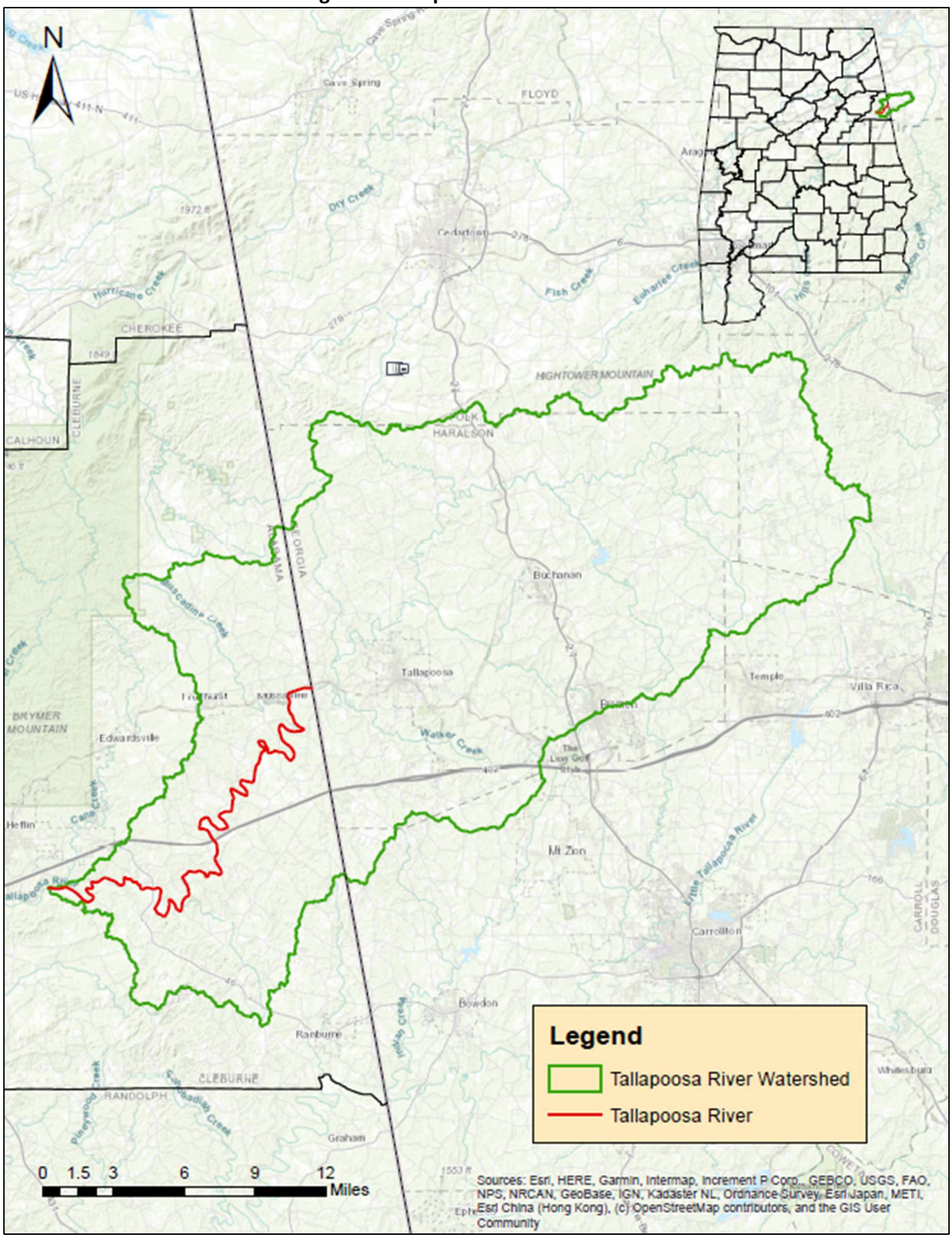
Assessment Unit ID # AL03150108-0405-102

Cleburne County

Pathogens (*E. coli*)

Alabama Department of Environmental Management
Water Quality Branch
Water Division
August 2024

Figure 1: Tallapoosa River Watershed



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1.0 Executive Summary

Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify waterbodies which are not meeting their designated uses and to determine the total maximum daily load (TMDL) for pollutants causing the use impairment. A TMDL is the sum of individual waste load allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS).

The Tallapoosa River is currently included on Alabama's §303(d) list as impaired for pathogens (*E. coli)*. The impaired segment (AL03150108-0405-102) stretches 31.6 miles from the Alabama-Georgia state line to Cane Creek, which is located southeast of the City of Heflin, Alabama and just south of Interstate 20. This segment of the Tallapoosa River has a use classification of Outstanding Alabama Water (OAW) and Fish & Wildlife (F&W).

The Tallapoosa River headwaters begin in Georgia forty miles west of Atlanta in Paulding County. It flows westward crossing the Haralson County, Georgia border into Cleburne County, Alabama. The drainage area for the impaired segment is approximately 455 square miles, with approximately 134 square miles located in Alabama. Approximately 29 percent of the drainage area is in Alabama.

The Tallapoosa River (AL03150108-0405-102) was first included on the §303(d) list for pathogens in 2016 based on data collected by the Alabama Department of Environmental Management (ADEM) from 2009-2014 at ADEM station TA-2. This data, which can be found in Table 3, indicated that stream was impaired for pathogens (*E. coli*).

Between 2018 and 2023, sampling studies were performed by ADEM at ADEM stations TA-2 and TLRC-1 on the Tallapoosa River to further assess the water quality of the impaired stream. A review of the *E. coli* data revealed that the listed segment of the Tallapoosa River was still not meeting the pathogen criteria applicable to its use classifications, OAW and F&W.

A mass balance approach was used for calculating the pathogen TMDL for the Tallapoosa River. The mass balance approach utilizes the conservation of mass principle. The TMDL was calculated using the single sample or geometric mean exceedance event that resulted in the highest percent reduction. Existing loads were calculated by multiplying the *E. coli* concentrations times the respective in-stream flows and a conversion factor. In the same manner as existing loads were calculated, allowable loads were calculated for the single sample *E. coli* target of 211.5 colonies/100 ml (235 colonies/100 ml – 10% Margin of Safety) and geometric mean *E. coli* target of 113.4 colonies/100 ml (126 colonies/100 ml – 10% Margin of Safety).

Table 1 is a summary of the estimated existing loads, allowable loads, and percent reductions for the single sample criterion and the geometric mean criterion. Table 2 lists the TMDL, defined as the maximum allowable *E. coli* loading under critical conditions for the Tallapoosa River.

Table 1: *E. coli* Loads and Required Reductions for AL03150108-0405-102 at TLRC-1

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample Load	1.29×10^{14}	5.64×10^{12}	1.23×10^{14}	96%
Geometric Mean Load	1.99×10^{12}	7.27×10^{11}	1.26×10^{12}	63%
Hardy WC WWTP	8.72×10^{5}	1.70×10^{8}	0	0%

Table 2: *E. coli* TMDL for Tallapoosa River (AL03150108-0405-102) at TLRC-1

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)[f]	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
6.27×10^{12}	6.27×10^{11}	1.70×10^{8}	NA	0	5.64×10^{12}	96%

Note: NA = not applicable

a. Existing and future AFOs/CAFOs will be assigned a waste load allocation (WLA) of zero.

b. Current and future WWTPs must meet the applicable in-stream water quality criteria for pathogens at the point of discharge.

c. Future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation and maintenance of BMPs on a case-by-case basis.

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 *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.

e. TMDL was established using the single sample maximum criterion of 235 colonies/100 ml.

f. The load allocation represents sources in both Alabama and Georgia. Alabama's single sample criterion of 235 colonies/100 ml should be met at the Alabama/Georgia state line.

Compliance with the terms and conditions of existing and future NPDES 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.

ADEM will work to verify the possible sources of *E. coli* located in the watershed within Alabama. ADEM will also need to coordinate with the Georgia Environmental Protection Division (GAEPD) to determine possible sources of *E. coli* in the Tallapoosa River watershed in Georgia. In 2004, GAEPD completed pathogens (fecal coliform) TMDLs for two segments of the Tallapoosa River. One of these segments is located immediately upstream of Alabama's §303(d) listed segment. Based on the results of this TMDL and the TMDLs completed by Georgia, the two agencies will need to generate a plan that can produce the needed reduction in *E. coli* using best management practices.

The Department recognizes that adaptive implementation of this TMDL will be needed to achieve applicable water quality criteria, and we are committed to targeting the load reductions to improve water quality in the Tallapoosa River watershed. As additional data and/or information become 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 and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify waterbodies which are not meeting their designated uses and to determine the total maximum daily load (TMDL) for pollutants causing use impairment. The TMDL process establishes the allowable loading of pollutants 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 and restore and maintain the quality of their water resources (USEPA, 1991).

The State of Alabama has identified 31.6 miles of the Tallapoosa River as impaired for pathogens. The §303(d) listing for the Tallapoosa River was originally reported on Alabama's 2016 List of Impaired Waters based on data collected from 2010-14 and has been included on all subsequent lists.

2.2 Problem Definition

Waterbody Impaired:	Tallapoosa River – AL-GA state line to Cane Creek
Impaired Reach Length:	31.6 miles
Impaired Drainage Area:	133.95 sq. miles
Water Quality Standard Violation:	Pathogens (Single Sample, Geometric Mean)
Pollutant of Concern:	Pathogens (*E. coli*)
Water Use Classification:	Outstanding Alabama Water and Fish & Wildlife

<u>Usage Related to Classification:</u>
The impaired segment of the Tallapoosa River is classified as Outstanding Alabama Water and Fish & Wildlife.

Usage of waters in the Outstanding Alabama Water classification is described in ADEM Admin. Code r. 335-6-10-.09(1).

(a) Best usage of waters: activities consistent with the natural characteristics of the waters.

(b) Conditions related to best usage:

1. High quality waters that constitute an outstanding Alabama resource, such as waters of state parks and wildlife refuges and waters of exceptional recreational or ecological significance, may be considered for classification as an Outstanding Alabama Water (OAW).

Usage of waters in the Fish and Wildlife 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.

(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 year-round and whole body water-contact recreation during the months of May through October, 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 areas and will be considered satisfactory for swimming and other whole body water-contact sports.

<u>*E. coli* Criteria</u>:
Criteria for acceptable bacteria levels for the Outstanding Alabama Water use classification are described in ADEM Admin. Code R. 335-6-10-.09(1)(c)7 as follows:

7. Bacteria: in non-coastal waters, bacteria of the E. coli group shall not exceed a geometric mean of 126 colonies/ 100 ml nor exceed a maximum of 235 colonies/ 100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 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.

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 E. coli group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 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 whole body water-contact recreation during the months of May through October, 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 E. coli organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 298 colonies/100 ml in any sample 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:

The Tallapoosa River was placed on the §303(d) list for pathogens in 2016 based on data collected during 2010-2014 at station TA-2. *E. coli* sampling showed that the applicable single sample criterion was exceeded in five out of 19 samples at station TA-2. At the time of listings, the source of pathogens was linked to pasture grazing and sources outside the state. The listing data is summarized in Table 3.

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Table 3: Data for §303(d) Listing- Ambient Monitoring

STATION_ID	VISIT_DATE	E. coli (col/100ml)	E. coli Detect Criteria
TA-2	6/16/2010	107.6	
TA-2	8/5/2010	52.9	
TA-2	10/7/2010	66.3	
TA-2	3/10/2011	3106.2	
TA-2	4/7/2011	171.5	
TA-2	5/26/2011	40.4	
TA-2	6/16/2011	686.7	
TA-2	7/18/2011	60.5	
TA-2	8/23/2011	90.5	
TA-2	9/28/2011	69.7	
TA-2	10/13/2011	35.5	
TA-2	6/11/2012	46	H
TA-2	8/7/2012	64.5	H
TA-2	10/9/2012	76.7	H
TA-2	6/5/2013	240	H
TA-2	8/12/2013	270.8	H
TA-2	10/7/2013	2419.6	GH
TA-2	6/25/2014	148.3	H
TA-2	8/18/2014	86.2	H

* G - The actual number was probably greater than the number reported;
H - The analytical holding times for analysis are exceeded.

3.0 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

For purposes of this TMDL, a single sample maximum *E. coli* target of 211.5 colonies/100 ml will be used. This target was derived by using a 10% explicit margin of safety from the single sample maximum criterion of 235 colonies/100 ml. This target is considered protective of water quality standards and should not allow the single sample maximum criterion to be exceeded. In addition, a geometric mean *E. coli* target of 113.4 colonies/100 ml will be used for a series of five samples taken at least 24 hours apart over the course of 30 days. This target was derived by using a 10% explicit margin of safety from the geometric mean maximum of 126 colonies/100 ml criterion. This target is considered protective of water quality standards and should not allow the geometric mean of 126 colonies/100 ml to be exceeded.

3.2 Source Assessment

A point source can be defined as a discernible, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point source contributions can typically be attributed to municipal wastewater facilities, illicit discharges, and leaking sewer systems in urban areas. Municipal wastewater treatment facilities are permitted through the National Pollutant Discharge Elimination System (NPDES) process administered by ADEM. In urban

settings, sewer lines typically run parallel to streams in the floodplain. If a leaking sewer line is present, high concentrations of bacteria can flow into the stream or leach into the groundwater. Illicit discharges are found at facilities that are discharging bacteria when not permitted, or when the pathogens criterion established in the issued NPDES permit is not being upheld.

3.2.1 Continuous Point Sources in the Tallapoosa River Watershed

Currently, there is one NPDES-regulated continuous point source discharge located within the Alabama portion of the Tallapoosa River (AL03150108-0405-102) watershed. The Hardy WC WWTP (AL0083097) discharges to Kemp Creek, which flows to the Tallapoosa River. Kemp Creek has a use classification of Fish & Wildlife. The current NPDES permit for Hardy WC WWTP includes *E. coli* limitations equivalent to the water quality criteria for Fish & Wildlife, as follows:

May – October (monthly average): 126 colonies/100mL
May – October (daily maximum): 298 colonies/100mL
November – April (monthly average): 548 colonies/100mL
November – April (daily maximum): 2507 colonies/100mL

Any future NPDES-regulated continuous discharges that are considered by the Department to be a pathogen source will be required to meet the in-stream water quality criteria for pathogens at the point of discharge. Figure 3 shows the point source and ADEM sampling stations located in the Tallapoosa River (AL03150108-0405-102) watershed.

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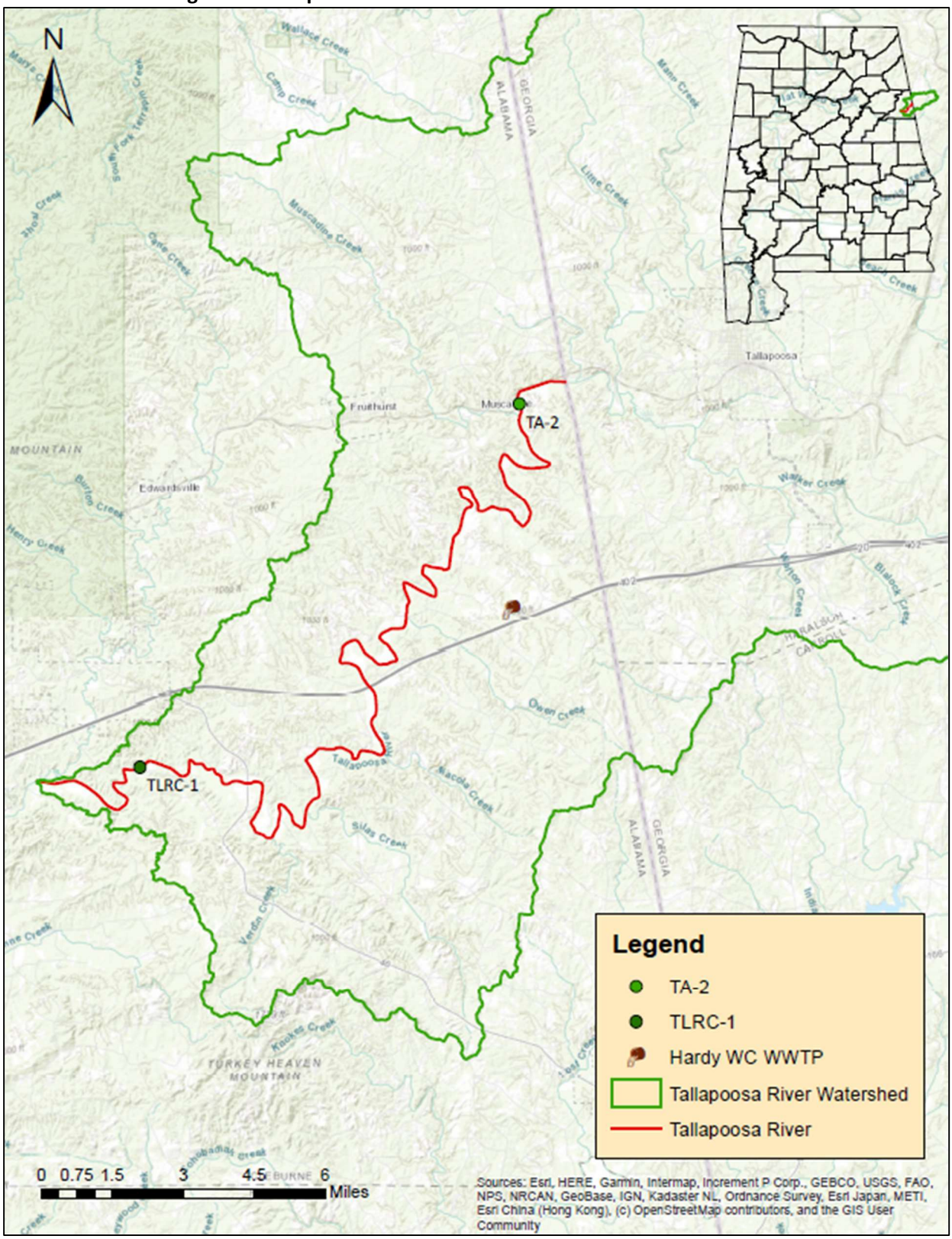
Figure 2: Tallapoosa River Watershed – Point Sources in Alabama



3.2.2 Non-Continuous Point Sources in the Tallapoosa River Watershed

There are currently no individual industrial or general NPDES discharge permits within the Tallapoosa River watershed. Any future NPDES-regulated non-continuous discharges that are considered by the Department to be a pathogen source will be required to demonstrate consistency with the assumptions and requirements of this TMDL.

There are currently six Animal Feeding Operations/Concentrated Animal Feeding Operations (AFOs/CAFOs) facilities located within the Alabama portion of the Tallapoosa River watershed. AFOs/CAFOs are required to implement and maintain effective best management practices (BMPs) that meet or exceed Natural Resources Conservation Service (NRCS) technical standards and guidelines, and the ADEM AFO/CAFO rules currently prohibit discharges of pollutants from these facilities and their associated land application activities. As a result, current and future AFOs/CAFOs will receive a waste load allocation of zero.

Urban areas designated as part of the Municipal Separate Storm Sewer System (MS4) program are regulated by NPDES, and as such, are considered to be point sources by EPA and receive waste load allocations (WLAs) in TMDLs. There are currently no MS4 areas within the Alabama portion of the Tallapoosa River watershed. Any future MS4 stormwater discharges will be required to demonstrate consistency with the assumptions and requirements of this TMDL.

3.2.3 Nonpoint Sources in the Tallapoosa River Watershed

Nonpoint sources of bacteria do not have a defined discharge point, but rather occur over the entire length of a stream or waterbody. On the land surface, bacteria can accumulate over time and be washed into streams or waterbodies during rain events. Therefore, there is some net loading of bacteria into streams as dictated by the watershed hydrology.

Agricultural land is commonly a source of *E. coli* bacteria. Runoff from pastures, animal feeding areas, improper land application of animal wastes, and animals with direct access to streams are all mechanisms that can contribute bacteria to waterbodies. To account for the potential influence from animals with direct access to stream reaches in the watershed, *E. coli* loads can be calculated as a direct source into the stream.

E. coli bacteria can also originate from forested areas due to the presence of wild animals such as deer, raccoons, turkey, waterfowl, etc. Wildlife will 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.

E. coli loading from developed areas is potentially attributable to multiple sources including storm water runoff, unpermitted discharges of wastewater, runoff from improper disposal of waste materials, failing septic tanks, sewer overflows, and domestic animals. On-site septic systems may

be direct or indirect sources of bacterial pollution via ground and surface waters due to system failures and malfunctions.

3.3 Land Use Assessment

Land use percentages for the Tallapoosa River watershed were determined from the 2021 National Land Cover Dataset (NLCD). The total drainage area of the Tallapoosa River watershed is approximately 454.76 square miles, and the watershed in Alabama is approximately 133.95 square miles. Table 4 lists the various land uses and their associated percentages for the Tallapoosa River watershed. A pie chart illustrating the major cumulative land use types for the Tallapoosa River watershed is shown in Figure 3.

Table 4: Tallapoosa River Watershed Land Use (2021 NLCD)

2021 NLCD Land Cover	**NLCD Legend**	**Area (square miles)**	**%**
Open Water	11	2.24758	0.49%
Developed, Open Space	21	22.99319	5.06%
Developed, Low Intensity	22	11.88527	2.61%
Developed, Medium Intensity	23	2.76951	0.61%
Developed, High Intensity	24	0.72244	0.16%
Barren Land	31	0.62757	0.14%
Deciduous Forest	41	149.95077	32.97%
Evergreen Forest	42	116.92305	25.71%
Mixed Forest	43	30.28601	6.66%
Shrub/Scrub	52	19.14159	4.21%
Herbaceuous	71	32.16490	7.07%
Hay/Pasture	81	55.69045	12.25%
Cultivated Crops	82	0.38155	0.08%
Woody Wetlands	90	8.70259	1.91%
Emergent Herbaceuous Wetlands	95	0.27278	0.06%
Total Land Use		**454.76**	**100.00%**
Cumalative Land Cover	**NLCD Legend**	**Area (square miles)**	**%**
Open Water	11	2.25	0.49%
Developed	21,22,23,24	38.37	8.44%
Barren Land	31	0.63	0.14%
Forested	41,42,43	297.16	65.34%
Grassland/Shrub	52,71	51.31	11.28%
Agriculture	81,82	56.07	12.33%
Wetlands	90,95	8.98	1.97%
Total Land Use		**454.76**	**100.00%**

Figure 3: Tallapoosa River Watershed Cumulative Land Use

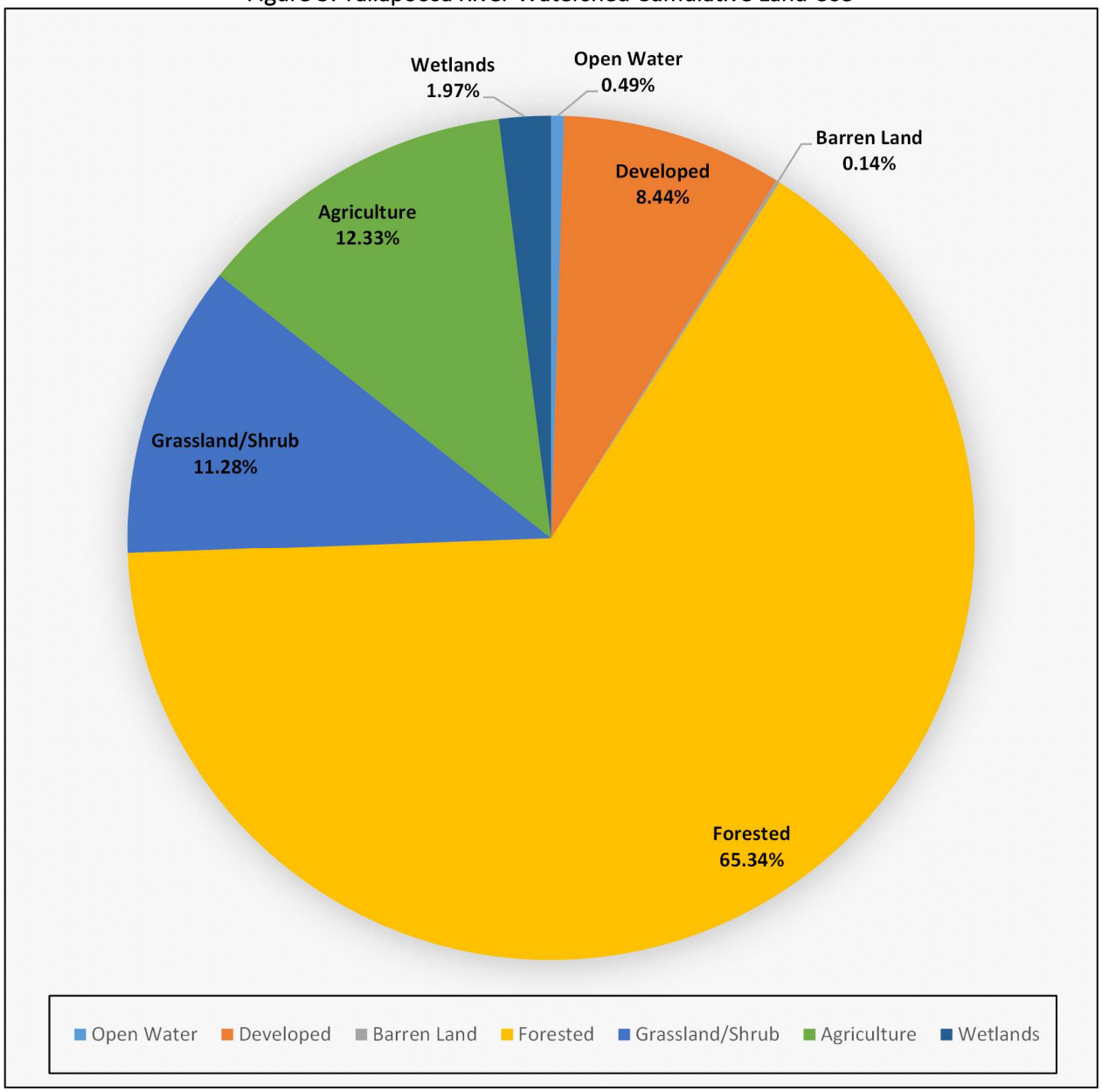


Table 5: Tallapoosa River Watershed Land Use in Alabama (2021 NLCD)

2021 Alabama NLCD Land Cover	NLCD Legend	Area (square miles)	%
Open Water	11	0.32664	0.24%
Developed, Open Space	21	5.22454	3.90%
Developed, Low Intensity	22	1.77985	1.33%
Developed, Medium Intensity	23	0.46286	0.35%
Developed, High Intensity	24	0.06741	0.05%
Barren Land	31	0.13517	0.10%
Deciduous Forest	41	42.39575	31.65%
Evergreen Forest	42	40.88486	30.52%
Mixed Forest	43	7.52772	5.62%
Shrub/Scrub	52	6.66698	4.98%
Herbaceuous	71	15.40536	11.50%
Hay/Pasture	81	12.50033	9.33%
Cultivated Crops	82	0.02224	0.02%
Woody Wetlands	90	0.51325	0.38%
Emergent Herbaceuous Wetlands	95	0.03544	0.03%
Total Land Use		**133.95**	**100.00%**
Cumalative Alabama Land Cover	**NLCD Legend**	**Area (square miles)**	**%**
Open Water	11	0.33	0.24%
Developed	21,22,23,24	7.53	5.63%
Barren Land	31	0.14	0.10%
Forested	41,42,43	90.81	67.79%
Grassland/Shrub	52,71	22.07	16.48%
Agriculture	81,82	12.52	9.35%
Wetlands	90,95	0.55	0.41%
Total Land Use		**133.95**	**100.00%**

Figure 4: Tallapoosa River Watershed Cumulative Land Use in Alabama

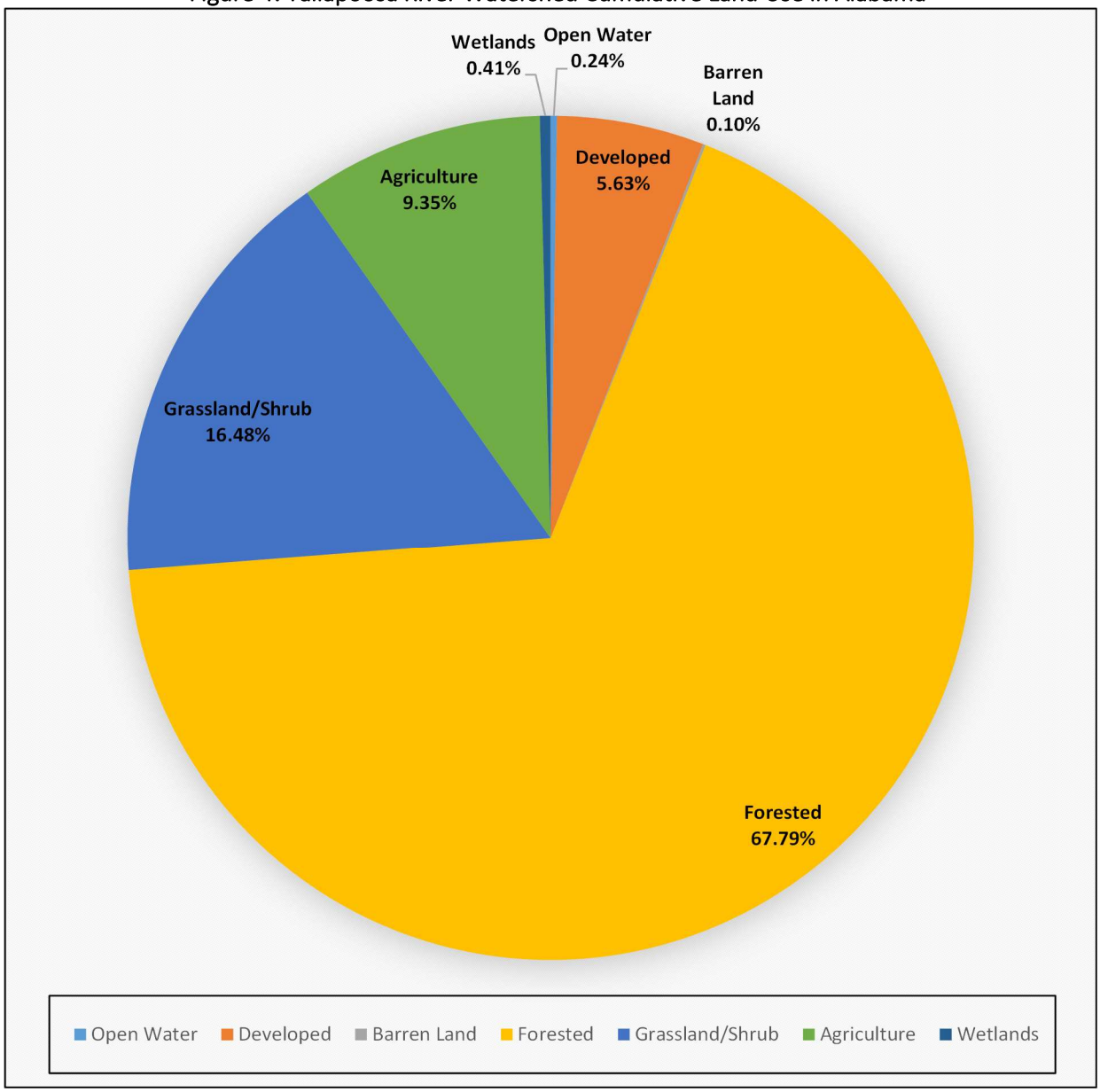
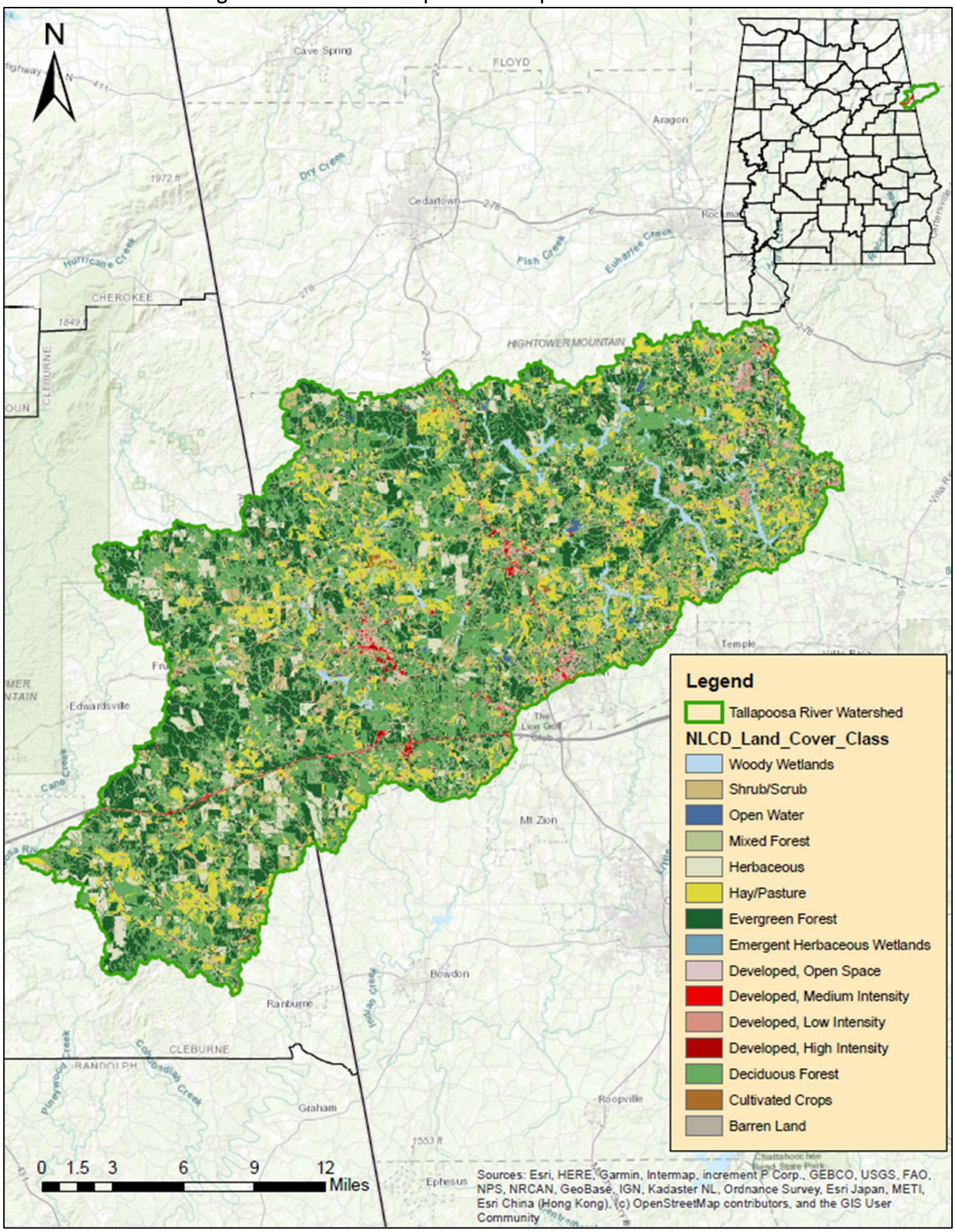


Figure 5: 2021 NLCD Map of the Tallapoosa River Watershed



As can be seen from an inspection of Table 4 above, forested land is the predominant land use in the watershed at 65 percent. Agriculture covers approximately 12 percent, and grassland/shrub covers approximately 11 percent of the watershed. Developed land, which covers approximately 8 percent of the watershed, represents both commercial and residential urbanized land uses, and includes the following individual land use categories: Developed – Open Space, Developed – Low Intensity, Developed – Medium Intensity, and Developed – High Intensity.

For the land cover in the State of Alabama, forested land is the predominant land use in the watershed at 68 percent. Grassland/shrub covers approximately 16 percent of the watershed and agriculture covers approximately 9 percent of the watershed. Developed land is approximately 6 percent of the watershed.

3.4 Linkage between Numeric Targets and Sources

The dominant land use coverage in the Tallapoosa River watershed is forested/natural, followed by agriculture and developed land. Pollutant loadings from forested areas tend to be low due to their filtering capabilities and will be considered as background conditions. The most likely sources of pathogen loadings in the Tallapoosa River watershed are from agriculture and failing septic systems. It is not considered a logical approach to calculate individual components for nonpoint source loadings. Hence, there will not be individual loads or reductions calculated for the various nonpoint sources. The loadings and reductions will only be calculated as a single total nonpoint source load and reduction.

3.5 Data Availability and Analysis

Between 2018 and 2023, ADEM collected data on the impaired segment of the Tallapoosa River at two stations, TA-2 and TLRC-1. For purposes of this TMDL, the 2018-2023 data at these stations will be used to assess the water quality of the Tallapoosa River. The 2024 edition of *Alabama's Water Quality Assessment and Listing Methodology*, prepared by ADEM, provides the rationale for the Department to use the most recent data to prepare a TMDL for an impaired waterbody. Table 6 and Figure 6 below detail the locations of the ADEM stations.

A total of 64 *E. coli* samples were collected at station TA-2 during 2018-2023, and nineteen of the samples exceeded the single sample maximum criterion of 235 colonies/100 ml. A total of 22 samples were collected at station TLRC-1 during 2018 and 2023, and six of the samples exceeded the single sample maximum criterion of 235 colonies/100 ml.

Intensive bacteria studies were conducted during the months of May and August in 2023 at station TLRC-1. Each intensive bacteria study consisted of collecting at least five *E. coli* bacteria samples over a thirty-day time window, with a minimum of 24 hours between each sample collection. A geometric mean was calculated from each intensive bacteria study. Both of the *E. coli* geometric means violated the geometric mean criterion of 126 colonies/100 ml.

A summary of the *E. coli* results at station TA-2 is provided below in Table 7, and a summary of the *E. coli* results at station TLRC-1 is provided in Table 8 below. All *E. coli* criteria exceedances are highlighted in red.

Table 6: TMDL Station Descriptions

Station	Agency	Latitude	Longitude	Description
TA-2	ADEM	33.732723	-85.372167	Tallapoosa River at bridge crossing east of Muscadine
TLRC-1	ADEM	33.62278	-85.51333	Tallapoosa River at Cleburne County Road 18

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Figure 6: ADEM TMDL Sampling Stations in Tallapoosa River Watershed

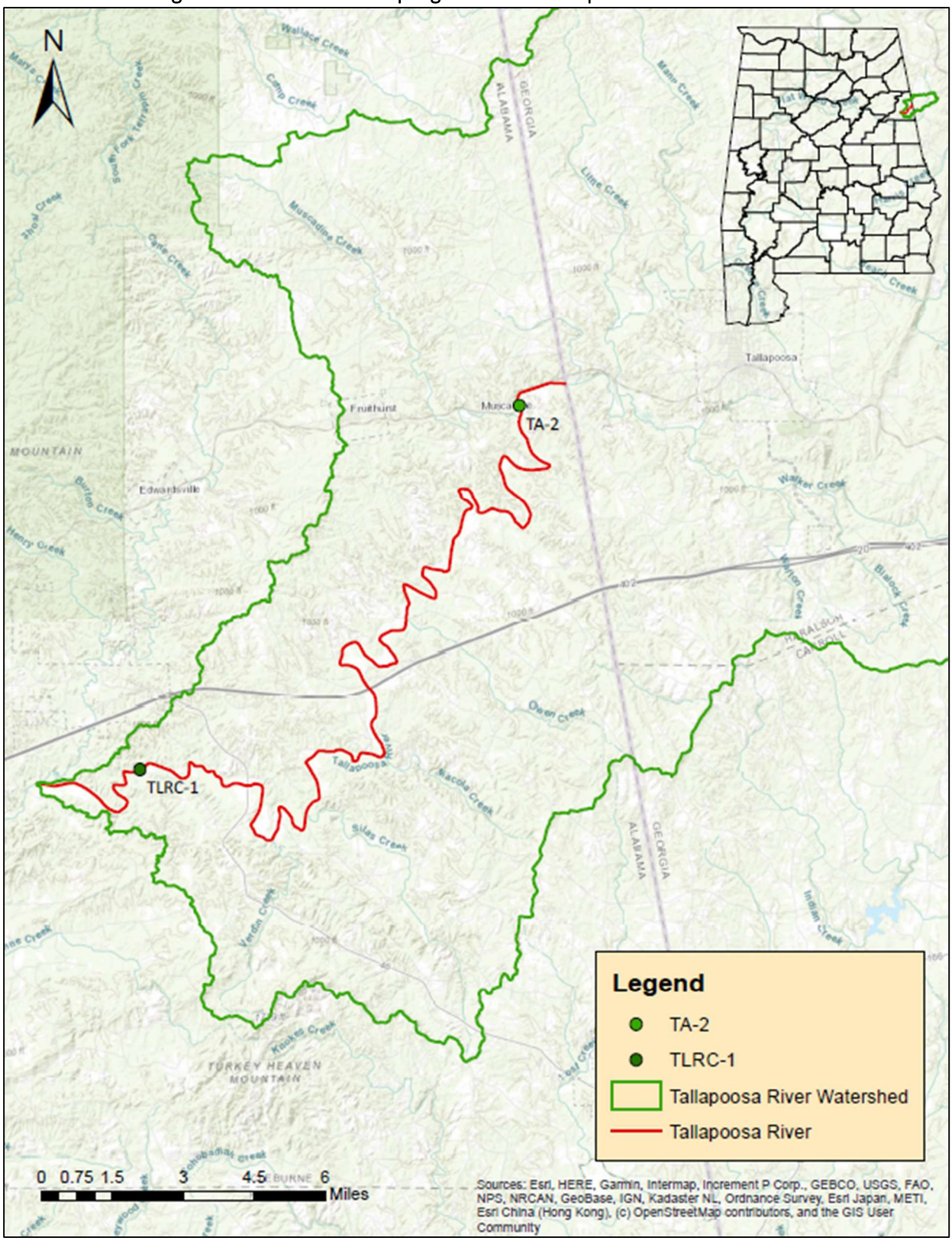

Table 7: 2018 - 2023 *E. coli* Data at Station TA-2

Station ID	Sample Date	E. coli (col/100ml)	E. coli Detect Criteria +	Single Sample Criteria (col/100ml)	Flow (cfs)	Flow Taken by ADEM?
TA-2	3/12/2018	1413.6	H	235	1604	NO*
TA-2	4/11/2018	81.3	H	235	300.4	YES
TA-2	5/9/2018	72.8	H	235	303	YES
TA-2	6/11/2018	137.4	H	235	200.2	YES
TA-2	7/9/2018	248.1	H	235	181.4	YES
TA-2	7/30/2018	88.2	H	235	141.6	YES
TA-2	9/26/2018	2419.6	H	235	725	NO*
TA-2	10/15/2018	248.9	H	235	243.7	YES
TA-2	11/13/2018	2419.6	G	235	3912	NO*
TA-2	12/6/2018	131.7		235	393.1	YES
TA-2	1/16/2019	85.5		235	416.5	YES
TA-2	2/6/2019	88.2		235	431.8	YES
TA-2	4/9/2019	81.3	H	235	668	NO*
TA-2	5/13/2019	146.7	H	235	452	NO*
TA-2	6/12/2019	648.8	H	235	597	NO*
TA-2	7/10/2019	104.6	H	235	126.4	YES
TA-2	8/13/2019	101.7	H	235	81.9	YES
TA-2	9/3/2019	98.8	H	235	48.5	YES
TA-2	10/2/2019	104.6	H	235	34	YES
TA-2	11/12/2019	285.1		235	6.9	YES
TA-2	12/10/2019	198.9		235	149.1	YES
TA-2	1/14/2020	2419.6	G	235	2406	NO*
TA-2	2/12/2020	1046.2		235	5157	NO*
TA-2	3/12/2020	104.6		235	844	NO*
TA-2	5/19/2020	275.5		235	475	NO*
TA-2	6/17/2020	83.6		235	214	NO*
TA-2	7/16/2020	65.7		235	114.9	YES
TA-2	8/12/2020	77.1		235	79	YES
TA-2	9/22/2020	172.2		235	167	NO*
TA-2	10/15/2020	75.4		235	202.4	YES
TA-2	11/4/2020	83.6		235	196.6	YES
TA-2	12/9/2020	191.8		235	223.9	YES
TA-2	1/20/2021	111.9		235	241.4	YES
TA-2	2/18/2021	1413.6		235	809	NO*
TA-2	3/3/2021	185	H	235	445	NO*
TA-2	4/13/2021	117.8		235	392	NO*
TA-2	5/12/2021	260.3	H	235	802	NO*
TA-2	6/24/2021	178.2		235	725	NO*
TA-2	7/15/2021	222.4		235	280	NO*
TA-2	8/5/2021	178.9		235	161	NO*
TA-2	9/15/2021	2419.6	G	235	246	NO*
TA-2	10/28/2021	193.5		235	141	NO*
TA-2	11/9/2021	122.3		235	131.2	YES
TA-2	1/12/2022	248.9		235	470	NO*
TA-2	2/8/2022	143.9		235	680	NO*
TA-2	3/15/2022	152.9		235	609	NO*
TA-2	4/6/2022	2419.6	GH	235	2772	NO*
TA-2	5/11/2022	77.1	H	235	262	NO*
TA-2	6/15/2022	127.4	H	235	185	NO*
TA-2	7/7/2022	137.6		235	288.2	YES
TA-2	8/24/2022	1553.1		235	225	NO*
TA-2	9/14/2022	187.2		235	258	NO*
TA-2	10/11/2022	101		235	52	NO*
TA-2	11/9/2022	47.3		235	92	NO*
TA-2	12/7/2022	2419.6		235	802	NO*
TA-2	1/12/2023	228.2		235	414	NO*
TA-2	2/9/2023	110.6		235	476	NO*
TA-2	3/30/2023	140.1		235	606	NO*
TA-2	5/11/2023	113.7		235	179.8	YES
TA-2	7/13/2023	93.3		235	177	YES
TA-2	9/14/2023	547.5		235	286	YES
TA-2	11/8/2023	133.4		235	26.1	YES
TA-2	12/7/2023	156.5		235	94	NO*
TA-2	1/11/2024	2419.6		235	2850	NO*

*Flow was taken from USGS 02412000 Tallapoosa River at Helfin and the ratio method was used to calculate a flow at ADEM Station TA-2.
+G - The actual number was probably greater than the number reported; H - The analytical holding times for analysis are exceeded.

Table 8: 2018 - 2023 *E. coli* Data at Station TLRC-1

Station ID	Sample Date	E. coli (col/100ml)	E. coli Detect Criteria +	Single Sample Criteria (col/100ml)	Geomean Calculation	Flow (cfs)*
TLRC-1	3/12/2018	2419.6	GH	235		2280
TLRC-1	4/11/2018	55.8	H	235		471
TLRC-1	5/9/2018	77.1	H	235		334
TLRC-1	6/11/2018	191.8	H	235		307
TLRC-1	7/9/2018	155.3	H	235		393
TLRC-1	7/30/2018	204.6	H	235		279
TLRC-1	9/26/2018	4839.2	H	235		1090
TLRC-1	10/15/2018	181.6	H	235		390
TLRC-1	3/30/2023	178.5		235		874
TLRC-1	5/1/2023	770.1		235	147.4	874
TLRC-1	5/8/2023	65		235		424
TLRC-1	5/11/2023	387.3		235		456
TLRC-1	5/15/2023	80.9		235		352
TLRC-1	5/25/2023	98.5		235		366
TLRC-1	5/30/2023	66.3		235		266
TLRC-1	7/13/2023	160.7		235		256
TLRC-1	8/7/2023	2419.6	G	235	310.5	158
TLRC-1	8/14/2023	522.6		235		704
TLRC-1	8/17/2023	131.4		235		220
TLRC-1	8/21/2023	143.4		235		127
TLRC-1	8/24/2023	121.1		235		101
TLRC-1	9/14/2023	112.6		235		127

*Flow was taken from USGS 02412000 Tallapoosa River at Helfin which is located in the same location as station TLRC-1.
+G - The actual number was probably greater than the number reported; H - The analytical holding times for analysis are exceeded.

3.6 Critical Conditions/Seasonal Variation

The *E. coli* single sample maximum criterion of 235 colonies/100 ml and geometric mean criterion of 126 colonies/100 ml for the Outstanding Alabama Water use classification are applicable year-round. The critical condition for this pathogen TMDL was taken to be the one with the highest *E. coli* single sample exceedance value. A single sample maximum concentration of 4839.2 colonies/100 ml was collected on September 26, 2018, at station TLRC-1. The use of the highest exceedance to calculate the TMDL is expected to be protective of water quality in the Tallapoosa River year-round.

3.7 Margin of Safety

There are two methods for incorporating a Margin of Safety (MOS) in the TMDL analysis: 1) by implicitly incorporating 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.

The MOS accounts for the uncertainty associated with the limited availability of data used in this analysis. An explicit MOS was applied to this TMDL by reducing the appropriate target criterion concentration by ten percent and calculating a mass loading target with measured or calculated flow data. The single sample *E. coli* maximum value of 235 colonies/100 ml was reduced by 10%

to 211.5 colonies/100 ml, while the geometric mean criterion of 126 colonies/100 ml was also reduced by 10% to 113.4 colonies/100 ml.

4.0 TMDL Development

4.1 Definition of a TMDL

A total maximum daily load (TMDL) is the sum of individual waste load allocations (WLAs) for point sources, 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:

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

The TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while achieving water quality standards under critical conditions. Pathogen 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 pathogen TMDL for the Tallapoosa River. The mass balance approach utilizes the conservation of mass principle. Total mass loads can be calculated by multiplying the *E. coli* concentration times the in-stream flow times a conversion factor. Existing loads were calculated for the highest single sample exceedance and the highest geometric mean sample exceedance. In the same manner, allowable loads were calculated for both the single sample criterion of 235 colonies/100 ml and the geometric mean criterion of 126 colonies/100 ml. The TMDL was based on the violation that produced the highest percent reduction of *E. coli* loads necessary to achieve applicable water quality criteria, whether it be the single sample or geometric mean.

Existing Conditions

The **single sample** mass loading was calculated by multiplying the highest *E. coli* single sample exceedance concentration by the measured flow on the day of the exceedance. This calculation was based on the measurement at TLRC-1 on September 26, 2018. The product of the concentration, measured flow, and a conversion factor gives the total mass loading (colonies per day) of *E. coli* to Tallapoosa River under the single sample exceedance condition.

$$\frac{1090\ \text{ft}^3}{\text{s}} \times \frac{4839.2\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{1.29 \times 10^{14}\text{colonies}}{\text{day}}$$

The **geometric mean** mass loading was calculated by multiplying the highest geometric mean exceedance concentration of 310.5 colonies/100 ml times the average of the five measured stream flows. This concentration was calculated based on measurements at TLRC-1 between August 7, 2023, and August 24, 2023. The average stream flow was determined to be 262 cfs. The product of these two values times the conversion factor gives the total mass loading (colonies per day) of *E. coli* to the impaired portion of the Tallapoosa River under the geometric mean exceedance condition.

$$\frac{262\ \text{ft}^3}{\text{s}} \times \frac{310.5\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{1.99 \times 10^{12}\text{colonies}}{\text{day}}$$

The **point source** mass loading for the Hardy WC WWTP was calculated by taking the average discharge flow from the facility for the month of September 2018 (since that is when the highest exceedance occurred) and multiplying that by the facility's reported maximum daily *E. coli* value for the same month and the conversion factor. The flows and *E. coli* values were found in the September 2018 Discharge Monitoring Report (DMR) submitted by the facility.

$$0.0023\ \text{MGD} \times \frac{1.55\ \text{ft}^3}{\text{s} * \text{MGD}} \times \frac{10\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{8.72 \times 10^{5}\text{colonies}}{\text{day}}$$

Allowable Conditions

The allowable load to the watershed was calculated under the same physical conditions as discussed above for the single sample and geometric mean criteria. This was done by taking the product of the measured flow for the violation event, the allowable concentration, and the conversion factor.

For the **single sample** *E. coli* target concentration of 211.5 colonies/100 ml, the allowable *E. coli* loading for Tallapoosa River is:

$$\frac{1090\ \text{ft}^3}{\text{s}} \times \frac{211.5\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{5.64 \times 10^{12}\text{colonies}}{\text{day}}$$

The explicit margin of safety of 23.5 colonies/100 ml equals a daily loading of:

$$\frac{1090\ \text{ft}^3}{\text{s}} \times \frac{23.5\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{6.27 \times 10^{11}\text{colonies}}{\text{day}}$$

For the **geometric mean** *E. coli* target concentration of 113.4 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{262\ ft^3}{s} \times \frac{113.4\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100mL * s}{ft^3 * day} = \frac{7.27 \times 10^{11} colonies}{day}$$

The explicit margin of safety of 12.6 colonies/100 ml equals a daily loading of:

$$\frac{262\ ft^3}{s} \times \frac{12.6\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{8.08 \times 10^{10} colonies}{day}$$

The **point source** allowable loading for the Hardy WC WWTP was calculated by multiplying the design flow of the facility by the applicable daily maximum permit limit and the conversion factor. Since the Hardy WC WWTP discharges to a water with a F&W use classification, the summer single sample maximum criterion for the F&W use classification is applicable.

$$0.015\ \text{MGD} \times \frac{1.55\ \text{ft}^3}{\text{s} * \text{MGD}} \times \frac{298\ \text{colonies}}{100\ \text{ml}} \times \frac{24{,}465{,}755 * 100\ \text{ml} * \text{s}}{\text{ft}^3 * \text{day}} = \frac{1.70 \times 10^8 \text{colonies}}{\text{day}}$$

The difference between the existing conditions (violation event) and the allowable conditions converted to a percent reduction represents the total load reduction needed to achieve the *E. coli* water quality criteria. Table 9 below depicts the existing and allowable *E. coli* loads and required reductions for the Tallapoosa River.

Table 9: *E. coli* Loads and Required Reductions for AL03150108-0405-102 at TLRC-1

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample Load	1.29 x 10^{14}	5.64 x 10^{12}	1.23 x 10^{14}	96%
Geometric Mean Load	1.99 x 10^{12}	7.27 x 10^{11}	1.26 x 10^{12}	63%
Hardy WC WWTP	8.72 x 10^{5}	1.70 x 10^{8}	0	0%

The TMDL, WLA, LA and MOS values necessary to achieve the applicable *E. coli* criteria for each segment are provided in Table 10 on the following page.

Table 10: *E. coli* TMDL for Tallapoosa River (AL03150108-0405-102) at TLRC-1

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)[f]	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
6.27×10^{12}	6.27×10^{11}	1.70×10^{8}	NA	0	5.64×10^{12}	96%

Note: NA = not applicable
a. Existing and future AFOs/CAFOs will be assigned a waste load allocation (WLA) of zero.
b. Current and future WWTPs must meet the applicable in-stream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation and maintenance of BMPs on a case-by-case basis.
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 *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.
e. TMDL was established using the single sample maximum criterion of 235 colonies/100 ml.
f. The load allocation represents sources in both Alabama and Georgia. Alabama's single sample criterion of 235 colonies/100 ml should be met at the Alabama/Georgia state line.

4.3 TMDL Summary

Tallapoosa River was first included on the §303(d) list for pathogens in 2016 based on data collected by ADEM from 2009-2014 at ADEM station TA-2. Between 2018 and 2023, sampling studies were performed at ADEM stations TA-2 and TLRC-1 by ADEM on the Tallapoosa River to further assess the water quality of the impaired stream. This data confirmed the pathogen impairment and provided the basis for TMDL development.

A mass balance approach was used to calculate the *E. coli* TMDL for Tallapoosa River. Based on the TMDL analysis, it was determined that *E. coli* reduction of 96% for the Tallapoosa River was necessary to achieve compliance with applicable water quality standards.

Compliance with the terms and conditions of existing and future NPDES sanitary and storm water 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 will be implemented through voluntary measures/best management practices (BMPs). Cooperation and active participation by the general public and various other groups is critical to successful implementation of TMDLs. Local citizen-led and implemented management measures offer the most efficient and comprehensive avenue for reduction of loading rates from nonpoint sources. Therefore, TMDL implementation activities for nonpoint sources will be coordinated through interaction with local entities and may be eligible for CWA §319 grants through the Department's Nonpoint Source Unit.

ADEM will work to verify the possible sources of *E. coli* located in the watershed within Alabama. ADEM will also need to coordinate with the Georgia Environmental Protection Division (GAEPD)

to determine possible sources of *E. coli* in the Tallapoosa River watershed in Georgia. In 2004, GAEPD completed pathogens (fecal coliform) TMDLs for two segments of the Tallapoosa River. One of these segments is located immediately upstream of Alabama's §303(d) listed segment. Based on the results of this TMDL and the TMDLs completed by Georgia, the two agencies will need to generate a plan that can produce the needed reduction in *E. coli* using best management practices.

The Department recognizes that adaptive implementation of this TMDL will be needed to achieve applicable water quality criteria, and we are committed to targeting the load reductions to improve water quality in the Tallapoosa River watershed. As additional data and/or information become available, it may become necessary to revise and/or modify the TMDL accordingly.

5.0 Follow-up Monitoring

ADEM has adopted a basin approach to water quality monitoring, an approach that divides Alabama's sixteen major river basins into three groups. Each year, ADEM's water quality resources are concentrated in one of the three basin groups and are divided among multiple priorities including §303(d) listed waterbodies, waterbodies with active TMDLs, and other waterbodies as determined by the Department. Monitoring will help further characterize water quality conditions resulting from the implementation of best management practices and load reductions in the watershed. This monitoring will occur in each basin according to the schedule shown in Table 11.

Table 11: Follow-up Monitoring Schedule

River Basin Group	Years to be Monitored
Black Warrior, Blackwater, Chattahoochee, Chipola, Choctawhatchee, Escambia, Perdido, Tennessee (Wheeler), Yellow	2024/2027
Coosa, Escatawpa, Tennessee (Guntersville), Tombigbee	2025/2028
Alabama, Cahaba, Mobile, Tallapoosa, Tennessee (Pickwick and Wilson)	2026/2029

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 four newspapers in Montgomery, Huntsville, Birmingham, and Mobile, as well as submitted to persons who requested to be on ADEM's postal and electronic mailing distributions. In addition, the public notice and subject TMDL were made available on ADEM's Website: www.adem.alabama.gov. The public could also request paper or electronic copies of the TMDL by contacting Ms. Kimberly Minton at 334-271-7826 or kminton@adem.alabama.gov. 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 final completion of this TMDL and subsequent submission to EPA Region 4 for final approval.

7.0 Appendices

7.1 References

ADEM Administrative Code, 2021. Water Division - Water Quality Program, Chapter 335-6-10, Water Quality Criteria.

ADEM Administrative Code, 2021. Water Division - Water Quality Program, Chapter 335-6-11, Use Classifications for Interstate and Intrastate Waters.

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Alabama Department of Environmental Management (ADEM), *Alabama's Water Quality Assessment and Listing Methodology*, 2024.

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Alabama Department of Environmental Management (ADEM), Laboratory Data Qualification SOP #4910 Revision 7.2, 2022.

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

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7.2 Tallapoosa River Watershed Photos

Figure 7: At TA-2: Upstream View of Tallapoosa River (5/11/2023)

Figure 8: At TA-2: Downstream View of Tallapoosa River (5/11/2023)

Figure 9: At TLRC-1: Upstream View of Tallapoosa River (7/13/2023)

Figure 10: At TLRC-1: Downstream View of Tallapoosa River (7/13/2023)