Alabama Department of Environmental Management

Final
Total Maximum Daily Load (TMDL)
for the
Upper Paint Rock River Watershed

Assessment Unit ID Numbers:
AL06030002-0203-100 (Paint Rock River)
AL06030002-0101-100 (Hurricane Creek)
AL06030002-0203-401 (Cole Spring Branch)
AL06030002-0203-402 (Cole Spring Branch)
AL06030002-0203-403 (Cole Spring Branch)

Jackson County

Pathogens (*E. coli*)

Alabama Department of Environmental Management
Water Quality Branch
Water Division
April 2026

Figure 1 - Map of Upper Paint Rock River Watershed

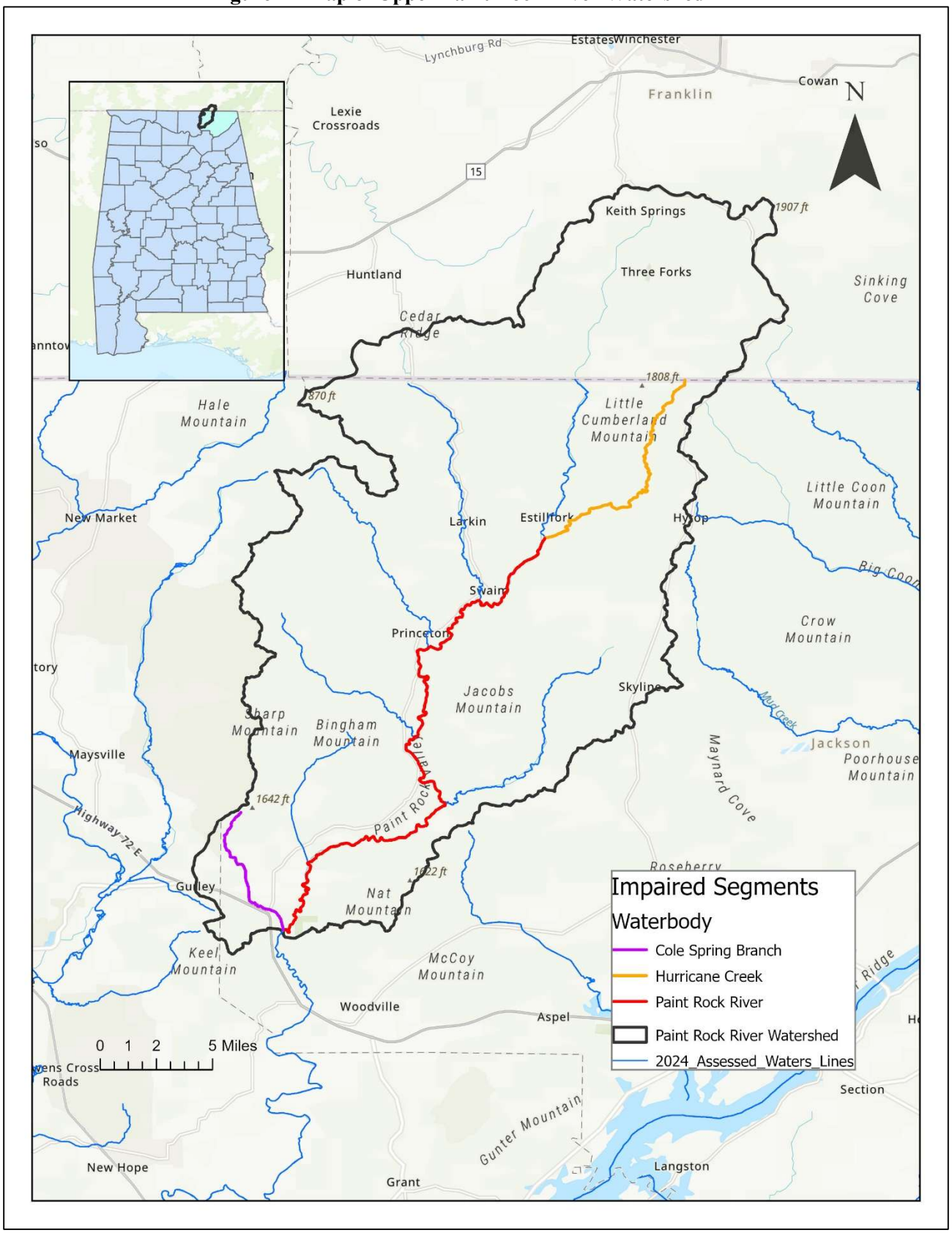


Table of Contents

List of Figures

List of Tables

List of Photos

1.0 Executive Summary

Section 303(d) of the Clean Water Act and the Environmental Protection Agency (EPA) 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 wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS).

Paint Rock River begins just south of Estillfork, Alabama, at the confluence of Estill Fork and Hurricane Creek in Jackson County. It flows south-southwest into the Tennessee River (Wheeler Lake). One segment of Paint Rock River (AL06030002-0203-100), from Cole Spring Branch to its source (27.09 miles), is currently included on Alabama's §303(d) list for pathogens (*E. coli*). Two tributaries to Paint Rock River are also included on Alabama's §303(d) list for pathogens (*E. coli*): Hurricane Creek (AL06030002-0101-100), from the Alabama-Tennessee state line to Paint Rock River (10.89 miles), and Cole Spring Branch (AL06030002-0203-401, AL06030002-0203-402, AL06030002-0203-403), from its source to Paint Rock River (6.08 miles). Paint Rock River and Cole Spring Branch have a use classification of Fish & Wildlife (F&W). Hurricane Creek has a use classification of Outstanding Alabama Water (OAW)/Fish & Wildlife (F&W).

Paint Rock River was first included on the §303(d) list for pathogens in 2020 based on ADEM monitoring data collected in 2017 at stations PRRJ-21 and PRRJ-4. Cole Spring Branch was first included on the §303(d) list for pathogens in 2020 based on ADEM monitoring data collected in 2013 and 2017 at stations CSPJ-69 and CSPJ-70. Paint Rock River and Cole Spring Branch have subsequently been listed for pathogens on the 2022 and 2024 §303(d) lists. Hurricane Creek was initially listed for pathogens in 2022 based on 2015-2020 data collected at station HURR-1 and has subsequently been included on the 2024 §303(d) list.

Additional data was collected by ADEM between 2020 and 2024 to further assess the water quality of the impaired segments of Paint Rock River, Hurricane Creek and Cole Spring Branch. According to the data collected, these waterbodies were not meeting the pathogen criteria applicable to their use classifications. 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. The bacterial data for the impaired waterbodies is listed in Tables 6, 7 and 8 for reference.

A mass balance approach was used for calculating the pathogen TMDLs for Paint Rock River, Hurricane Creek and Cole Spring Branch. The mass balance approach utilizes the conservation of mass principle. The TMDLs were calculated using the single sample or geometric mean sample exceedance events which resulted in the highest percent reductions. 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 based on the applicable use classifications. For Paint Rock River and Cole Spring Branch, the single sample *E. coli* target was 268.2 colonies/100 ml (298 colonies/100 ml – 10% Margin of Safety) and the geometric mean *E. coli* target was 113.4 colonies/100 ml (126 colonies/100 ml – 10% Margin of Safety). For Hurricane Creek, the single sample *E. coli* target was 211.5 colonies/100 ml (235 colonies/100 ml – 10% Margin of Safety), and the geometric mean *E. coli* target was 113.4 colonies/100 ml (126 colonies/100 ml – 10% Margin of Safety).

Tables 1, 2 and 3 list the TMDLs, defined as the maximum allowable *E. coli* loadings under critical conditions, for Paint Rock River, Hurricane Creek and Cole Spring Branch, respectively.

Table 1 - *E. coli* TMDL for Paint Rock River (AL06030002-0203-100)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[e]			Load Allocation (LA)	
		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)
5.80E+12	5.80E+11	NA	NA	0	5.22E+12	87%

Note: NA = not applicable
a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources will 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. Future CAFOs will be assigned a wasteload allocation (WLA) of zero.

Table 2 - *E. coli* TMDL for Hurricane Creek (AL06030002-0101-100)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[e]			Load Allocation (LA)	
		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)
2.07E+12	2.07E+11	NA	NA	0	1.86E+12	91%

Note: NA = not applicable
a. TMDL was established using the single sample criterion of 235 colonies/100ml.
b. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources will 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. Future CAFOs will be assigned a wasteload allocation (WLA) of zero.

Table 3 - *E. coli* TMDL for Cole Spring Branch (AL06030002-0203-401, AL06030002-0203-402, AL06030002-0203-403)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[e]			Load Allocation (LA)	
		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)
1.95E+10	1.95E+09	NA	NA	0	1.76E+10	79%

Note: NA = not applicable
a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources will 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. Current and future CAFOs will be assigned a wasteload allocation (WLA) of zero.

Compliance with the terms and conditions of existing and future National Pollutant Discharge Elimination System (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 Tennessee Department of Environment & Conservation (TDEC) to determine possible sources of *E. coli* in the watershed within Tennessee. Based on the results of this TMDL, the two agencies will work 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 upper Paint Rock River 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 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 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 instream 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 27.09 miles of Paint Rock River as impaired for pathogens. The §303(d) listing for pathogens was originally reported on Alabama's 2020 List of Impaired Waters based on 2017 ADEM monitoring data from stations PRRJ-4 and PRRJ-21 and was subsequently included on the

2022 and 2024 §303(d) lists. The potential source of the impairment on the 2024 §303(d) list is pasture grazing.

The State of Alabama has also identified Hurricane Creek and all three segments of Cole Spring Branch, which are both tributaries to Paint Rock River, as impaired for pathogens. The §303(d) listing for Cole Spring Branch was originally reported on Alabama's 2020 List of Impaired Waters based on 2013 and 2017 ADEM monitoring data from stations CSPJ-69 and CSPJ-70 and was subsequently included on the 2022 and 2024 §303(d) lists. Hurricane Creek was initially listed in 2022 from data collected during 2015-2020 at station HURR-1 and was subsequently included on the 2024 §303(d) list. The potential source of the impairments on the 2024 §303(d) list for Cole Spring Branch and Hurricane Creek is pasture grazing.

2.2 Problem Definition

Waterbody Impaired:	**Paint Rock River** – from its source to Cole Spring Branch. **Hurricane Creek** – from the Alabama-Tennessee state line to Paint Rock River. **Cole Spring Branch** – from its source to Paint Rock River.
Impaired Reach Length:	**Paint Rock River** – 27.09 miles **Hurricane Creek** – 10.89 miles **Cole Spring Branch** – 6.08 miles
Impaired Drainage Area:	312 square miles
Water Quality Standard Violation:	Pathogens (single sample, geometric mean)
Pollutant of Concern:	Pathogens (*E. coli*)
Water Use Classification:	**Paint Rock River** – Fish & Wildlife **Hurricane Creek** – Outstanding Alabama Water; Fish & Wildlife **Cole Spring Branch** – Fish & Wildlife

Usage Related to Classification:
The impaired segments of Paint Rock River and Cole Spring Branch are classified as Fish & Wildlife (F&W). Hurricane Creek is classified as Outstanding Alabama Water (OAW) and F&W.

Usage of waters in the F&W 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.

Usage of waters in the OAW classification is described in ADEM Admin. Code R. 335-6-10-.09(1)(a) and (b).

(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).

E. coli Criteria:
Criteria for acceptable bacteria levels for the F&W use classification are described in ADEM Admin. Code R. 335-6-10-.09(5)(e)7(i) and (ii) as follows:

(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 for acceptable bacteria levels for the OAW 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 nor exceed a maximum of 104 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 Exceeded:
Paint Rock River was first included on the §303(d) list for pathogens in 2020 based on ADEM's 2017 *E. coli* data collected at stations PRRJ-4 and PRRJ-21. Three out of eight *E. coli* samples collected at station PRRJ-4 during 2017 violated the applicable single sample maximum criterion of 298 col/100 ml. In addition, three out of eight *E. coli* samples collected at station PRRJ-21 during 2017 violated the applicable single sample maximum criterion of 298 col/100 ml.

Hurricane Creek was first included on the §303(d) list for pathogens in 2022 based on ADEM's *E. coli* data collected during 2015 through 2020 at station HURR-1. The single sample *E. coli* criterion of 235 col/100 ml was exceeded at HURR-1 in 15 out of 36 samples.

Cole Spring Branch was first included on the §303(d) list for pathogens in 2020 based on ADEM's *E. coli* data collected during 2013 and 2017 at stations CSPJ-69 and CSPJ-70. Data on Cole Spring Branch showed that the single sample *E. coli* criterion of 298 col/100 ml was exceeded in four out of nine samples at CSPJ-69 and in four out of 12 samples at CSPJ-70.

The listing data for Paint Rock River, Hurricane Creek, and Cole Spring Branch can be found in Appendix 7.2, Tables 14, 15 and 16, respectively.

3.0 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

For the purpose of this TMDL, a single sample *E. coli* target of 268.2 colonies/100 ml will be used for Paint Rock River and Cole Spring Branch, and a single sample *E. coli* target of 211.5 colonies/100 ml will be used for Hurricane Creek. These targets were derived by using a 10% explicit margin of safety from the single sample maximum criteria of 298 colonies/100 ml for the Fish & Wildlife classification and 235 colonies/100 ml for the Outstanding Alabama Water classification. The targets are considered protective of water quality standards and should not allow the single sample maximum criteria to be exceeded. In addition, a geometric mean 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 geometric mean target was also derived by using a 10% explicit margin of safety from the geometric mean criterion of 126 colonies/100 ml (applicable for both use classifications). This target is considered protective of water quality standards and should not allow the geometric mean criterion to be exceeded.

3.2 Source Assessment

3.2.1 Point Sources in the Upper Paint Rock River Watershed

A point source can be defined as a discernable, 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 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.

There are currently two NPDES-regulated point sources (mining, lumber) in the upper Paint Rock River watershed in Alabama (located in the Cole Spring Branch watershed). These facilities are not required to monitor for *E. coli* and are not considered to be a source of pathogens due to the nature of their processes;

therefore, no *E. coli* loading to the watershed will be attributed to these facilities, and they will not receive an allocation in this TMDL. The upper Paint Rock River watershed in Alabama does not presently qualify as a municipal separate storm sewer system (MS4) area.

The upper Paint Rock River watershed in Alabama contains one permitted Concentrated Animal Feeding Operation (CAFO), while there are no Voluntary Animal Feeding Operations (AFOs). The CAFO operation is a cattle farm located in the Cole Spring Branch 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 point source 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.

Any future NPDES-regulated discharger that is 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 several registered sites in the upper Paint Rock River watershed where land application of by-products for beneficial use is present. Beneficial use sites are regulated by ADEM's Land Division and are required to implement appropriate BMPs and agronomic application rates to protect the environment.

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 review of ADEM files, there have been no recent SSOs reported in the upper Paint Rock River watershed in Alabama.

3.2.2 Nonpoint Sources in the Paint Rock River Watershed

Nonpoint sources of *E. coli* bacteria do not have a defined discharge point but rather occur over the entire length of a stream or waterbody. On the land surface, *E. coli* 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 *E. coli* bacteria are collected and carried to the stream or waterbody. Therefore, there is some net loading of *E. coli* bacteria into the stream as dictated by the watershed hydrology.

Agricultural land can be 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 *E. coli* 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 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 urban 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, and domestic animals. Septic systems may be direct or indirect sources of bacterial pollution via ground and surface waters. Onsite septic systems have the potential to deliver *E. coli* bacteria to surface waters due to system failure and malfunction.

3.3 Land Use Assessment

Land use for the upper Paint Rock River watershed was determined using ArcGIS Pro with land use datasets derived from the 2021 National Land Cover Dataset (NLCD). The total drainage area of the impaired portion of the upper Paint Rock River watershed is 312 square miles, with approximately 248.64 square miles in Alabama. Table 4 and Figure 2 display the land use areas for the Alabama portion of the Paint Rock River watershed, while Figure 3 shows the primary land uses for the watershed in both Alabama and Tennessee.

The majority of the upper Paint Rock River watershed is forested/natural (86.97% total, 85% in Alabama). Other land uses include agriculture (11.02% total, 12.96% in Alabama) and developed land (1.95% total, 1.97% in Alabama). The remaining land area consists of open water. If not managed properly, agriculture can have significant nonpoint source impacts. Also, septic systems can be a main source of bacteria if not properly installed and maintained.

Table 4 - Land Use Areas in Alabama for the Upper Paint Rock River Watershed

Cumulative Land Use	Mi^2	Acres	Percent
Open Water	0.17	109.80	0.07%
Forested/Natural	211.35	135265.60	85.00%
Agriculture	32.23	20624.03	12.96%
Developed (cumulative)	4.89	3128.61	1.97%
Total	**248.64**	**159128.04**	**100.00%**

Figure 2 - Land Use Graph in Alabama for the Upper Paint Rock River Watershed

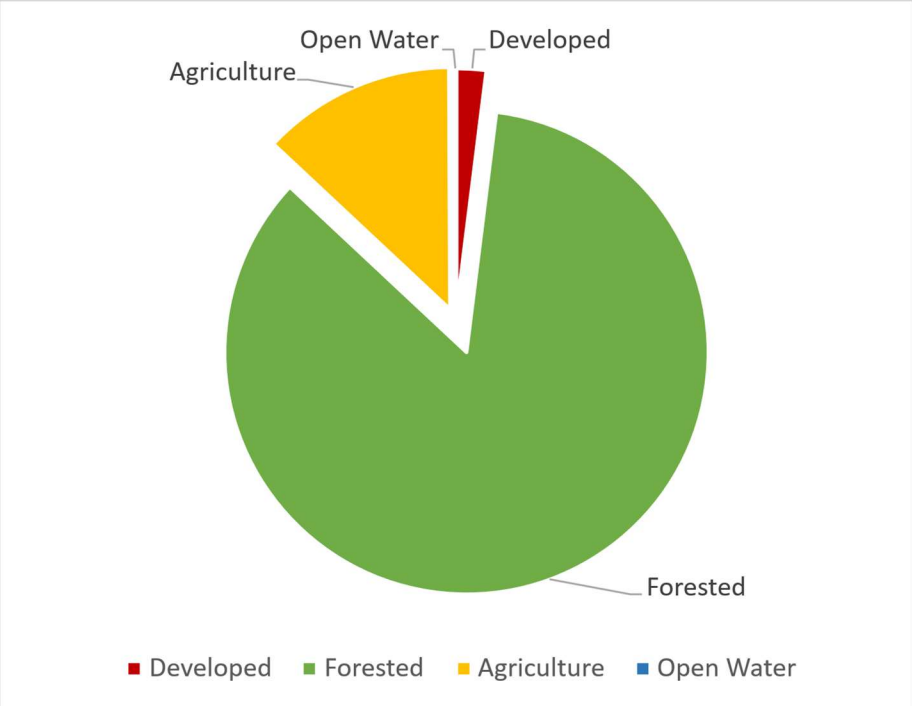
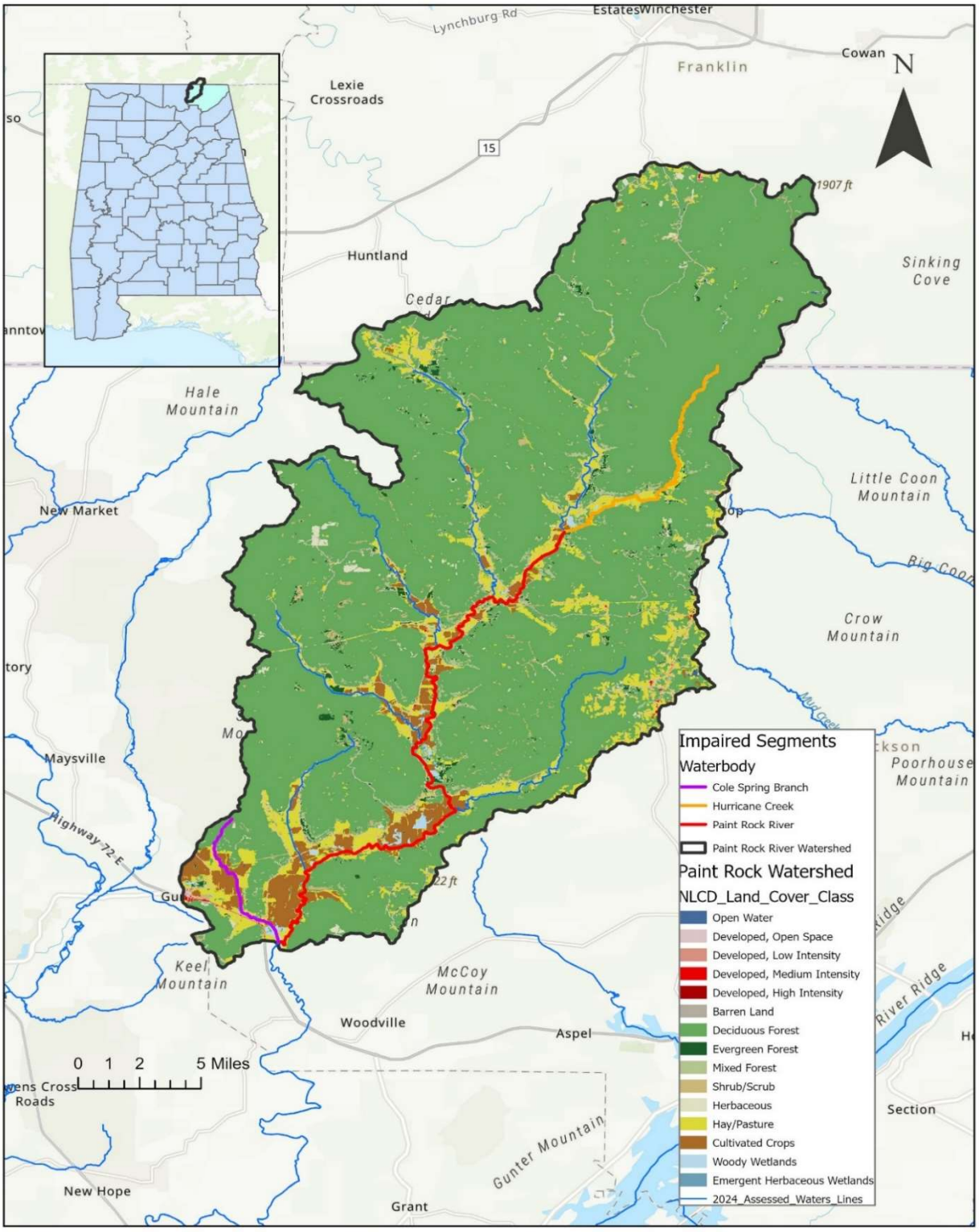


Figure 3 - Land Use Map for the Upper Paint Rock River Watershed



3.4 Linkage Between Numeric Targets and Sources

The majority of the upper Paint Rock River watershed's land use 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 are from the agricultural land uses 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 2020 and 2024, ADEM collected water quality data in the upper Paint Rock River watershed at six stations on the impaired waterbodies. The stations are listed below in Table 5, and the locations of the sampling stations are shown in Figure 4. The *E. coli* data from these stations is shown in Tables 6, 7 and 8 below. There were exceedances of the applicable single sample maximum criterion at each station. There were also exceedances of the applicable geometric mean criterion at stations PRJJ-4, HURR-1, CSPJ-69 and CSPJ-70.

Table 5 - ADEM Sampling Stations in the Upper Paint Rock River Watershed

Station ID	Station Location	Latitude	Longitude
PRRJ-3A	Paint Rock River approximately 1.5 miles downstream of Hwy 146 bridge crossing.	34.861455	-86.208115
PRRJ-5	Paint Rock River on private property east of AL Hwy 65.	34.713250	-86.303330
PRRJ-4	Paint Rock River on Jones Farm	34.698614	-86.308087
HURR-1	Hurricane Creek just off Jackson Co. Rd. 9	34.917990	-86.133000
CSPJ-69	Cole Spring Branch downstream of Hwy 65 in the TNC Roy B. Whitaker Paint Rock River Preserve.	34.673800	-86.322500
CSPJ-70	Cole Spring Branch at AL 65 - Bridge at G.W. Jones' Farm	34.682800	-86.329700

Figure 4 - Map of ADEM Sampling Stations

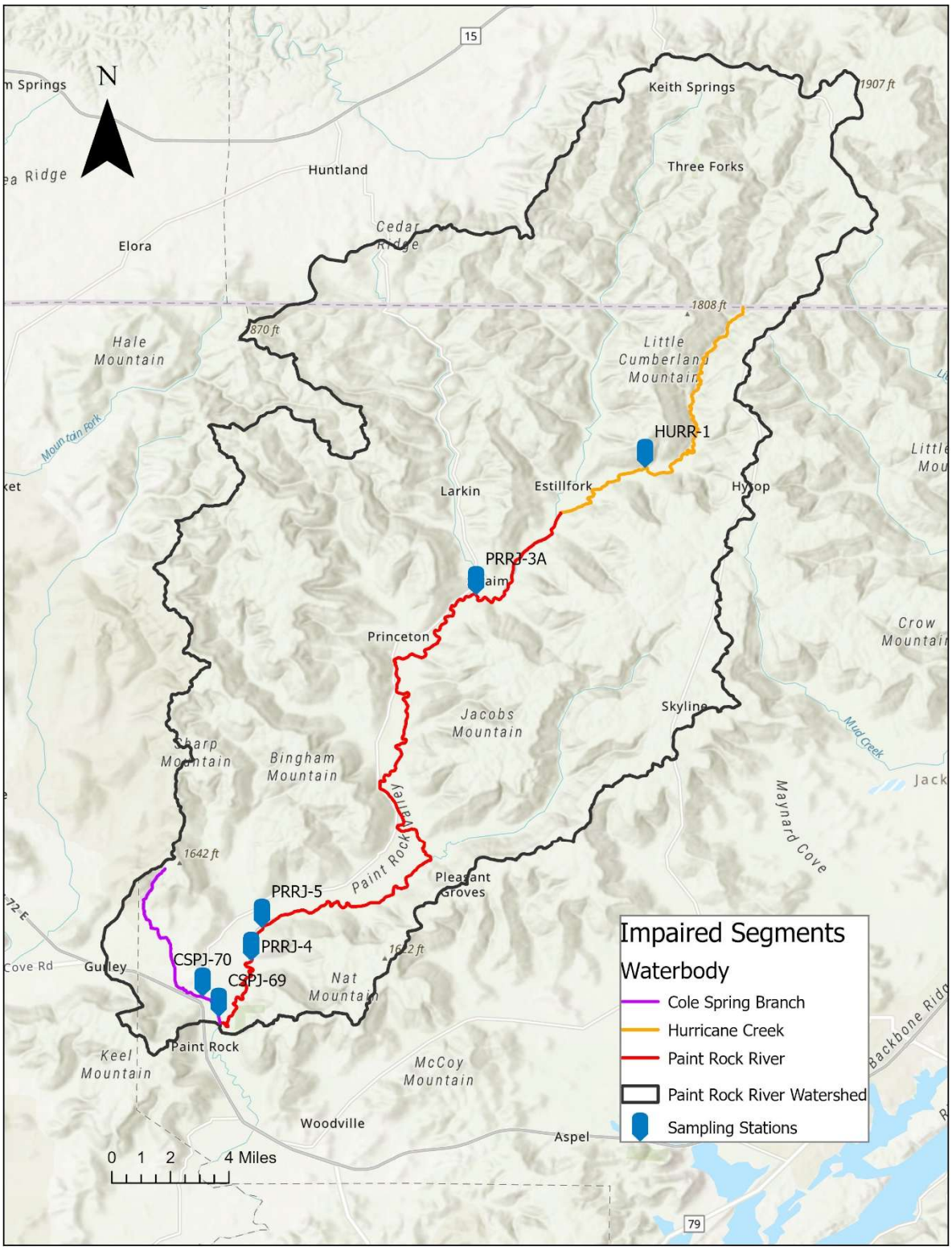


Table 6 - Paint Rock River (AL06030002-0203-100) *E. coli* data (2020-2024)

Station	Visit Date / Time	Flow (cfs)*	*E. coli* (col/100ml)	*E. coli* dc**	*E. coli* Criterion (col/100ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
PRRJ-3A	5/14/2020 11:45	131.22	104.6		298		
	6/25/2020 11:00	73.43	**517.2**		298		
	7/28/2020 11:50	48.03	**920.8**		298		
	8/26/2020 11:00	30.50	**517.2**		298		
	9/23/2020 11:30	6.51	137.2		298		
	10/20/2020 10:20	34.50	145.5		298		
	11/4/2020 11:30	92.90	151.5		298		
	11/30/2020 11:30	63.02	2419.6		298		
PRRJ-5	4/11/2023 9:02	780.24	72.2		2507		
	6/8/2023 9:03	65.19	69.1		298		
	8/7/2023 15:08	40.01	190.4	H	298		
	10/18/2023 16:33	7.30	248.9	H	298		
PRRJ-4	3/20/2024 10:12	683.85	73.3		2507		
	5/1/2024 15:29	2919.09	**1553.1**	H	298		
	5/28/2024 14:27	3437.44	**1413.6**	H	298		
	6/5/2024 11:50	795.70	**2092.4**		298		
	6/10/2024 11:20	213.70	129.6		298	**246.7**	126
	6/12/2024 10:20	161.92	59.8		298		
	6/21/2024 11:20	53.90	39.9		298		
	6/26/2024 9:56	38.84	32.3		298		
	6/26/2024 11:45	39.89	32.7		298		
	7/25/2024 9:52	64.05	156.5		298		
	8/1/2024 11:25	431.95	**547.5**		298		
	8/12/2024 11:40	22.24	23.3		298	84.2	126
	8/19/2024 11:30	15.24	27.5		298		
	8/22/2024 13:35	13.08	77.1		298		
	8/26/2024 10:55	9.39	10.9		298		
	8/28/2024 14:46	9.60	12.1	H	298		
	9/25/2024 14:01	5.77	290.9	H	298		
	10/30/2024 13:45	1.43	45.2	H	298		

*Flows highlighted in yellow were calculated using data from reference gauge USGS 03574500 for the same dates the samples were collected.
**H = The analytical holding times for analysis are exceeded.

Table 7 - Hurricane Creek (AL06030002-0101-100) *E. coli* Data (2020-2024)

Station	Visit Date / Time	Flow (cfs)*	*E. coli* (col/100ml)	*E. coli* dc**	*E. coli* Criterion (col/100ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
HURR-1	5/14/2020 9:45	48.45	91.0		235		
HURR-1	6/25/2020 9:30	21.81	**435.2**		235		
HURR-1	7/28/2020 10:30	80.97	**2419.6**	G	235		
HURR-1	8/26/2020 9:45	10.01	**235.9**		235		
HURR-1	9/23/2020 9:45	2.31	**488.4**		235		
HURR-1	10/20/2020 11:45	13.48	193.5		235		
HURR-1	11/4/2020 10:00	37.75	172.5		235		
HURR-1	11/30/2020 10:20	231.63	**1413.6**		235		
HURR-1	3/16/2021 14:15	360.09	**2419.6**	G	235		
HURR-1	4/12/2021 11:15	106.85	73.3		235		
HURR-1	5/3/2021 12:30	31.39	148.3		235		
HURR-1	6/1/2021 10:20	11.18	167.0		235		
HURR-1	7/12/2021 10:30	83.85	**920.8**		235		
HURR-1	8/4/2021 11:25	4.8	204.6		235		
HURR-1	9/14/2021 10:10	10.88	161.6		235		
HURR-1	10/13/2021 10:50	42.01	**260.3**		235		
HURR-1	3/8/2022 10:55	149.5	**328.2**	H	235		
HURR-1	4/27/2022 11:45	57.58	**2419.6**	G	235		
HURR-1	5/24/2022 10:50	21.31	146.7		235		
HURR-1	6/28/2022 9:45	3.79	131.7		235		
HURR-1	7/26/2022 11:50	1.98	67.7		235		
HURR-1	8/30/2022 11:45	2.87	**238.2**		235		
HURR-1	9/27/2022 13:00	3.13	178.5		235		
HURR-1	10/25/2022 11:35	1.83	53.8		235		
HURR-1	3/28/2023 10:35	146.04	135.4	H	235		
HURR-1	4/25/2023 10:25	31.63	90.8	H	235		
HURR-1	5/23/2023 9:30	48.69	195.6	H	235		
HURR-1	6/28/2023 10:20	26.19	**275.5**		235		
HURR-1	7/25/2023 10:25	31.2	**248.9**	H	235		
HURR-1	8/22/2023 10:40	13.48	178.5		235		
HURR-1	9/26/2023 11:00	2.41	135.4	H	235		
HURR-1	10/24/2023 10:25	1.30	16.0	H	235		
HURR-1	3/13/2024 9:45	87.84	95.9		235		
HURR-1	4/1/2024 12:30	80.6	93.4	H	235		
HURR-1	5/1/2024 11:30	111.34	**488.4**	H	235		
HURR-1	6/5/2024 9:30	99.96	**689.6**		235		
HURR-1	6/10/2024 10:05	29.08	172.3		235		
HURR-1	6/12/2024 9:00	18.64	81.3		235	**158.7**	126
HURR-1	6/21/2024 10:00	7.18	79.4		235		
HURR-1	6/26/2024 10:30	5	131.4		235		
HURR-1	7/1/2024 10:15	8.11	114.5	H	235		
HURR-1	8/1/2024 10:15	42.84	**727.0**		235		
HURR-1	8/5/2024 12:00	9.91	93.3	H	235		
HURR-1	8/12/2024 10:25	3.09	73.8		235	**134.8**	126
HURR-1	8/19/2024 10:20	8.67	79.4		235		
HURR-1	8/22/2024 12:20	2.16	111.9		235		
HURR-1	8/26/2024 12:00	1.65	58.3		235		
HURR-1	10/1/2024 10:30	19.26	**238.2**	H	235		

*Flows highlighted in yellow were calculated using data from reference gauge USGS 03574500 for the same dates the samples were collected.
**G = The actual number was probably greater than the number reported. H = The analytical holding times for analysis are exceeded.

Table 8 - Cole Spring Branch (AL06030002-0203-401, AL06030002-0203-402, AL06030002-0203-403) *E. coli* Data (2024)

Station	Visit Date / Time	Flow (cfs)*	*E. coli* (col/100ml)	*E. coli* dc**	*E. coli* Criterion (col/100ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
CSPJ-69	3/19/2024 15:28	24.25	83.6	H	2507		
	5/2/2024 9:08	26.28	**435.2**		298		
	5/29/2024 9:32	66.33	**313**		298		
	6/5/2024 13:00	15.77	**325.5**		298		
	6/10/2024 12:20	10.58	204.6		298	**216.0**	126
	6/12/2024 11:45	7.77	166.4		298		
	6/21/2024 12:55	3.12	135.4		298		
	6/25/2024 13:44	1.28	65	H	298		
	6/26/2024 12:40	1.28	58.6		298		
	7/24/2024 14:06	7.53	**547.5**	H	298		
	8/1/2024 12:05	4.66	**488.4**		298		
	8/12/2024 12:25	1.72	193.5		298	**251.2**	126
	8/19/2024 12:30	1.31	98.8		298		
	8/22/2024 14:30	1.07	195.6		298		
	8/26/2024 10:05	0.5	201.4		298		
	8/28/2024 15:50	0.57	117.8	H	298		
	9/25/2024 15:15	1.56	**648.8**	H	298		
	10/30/2024 14:33	0.57	108.1	H	298		
CSPJ-70	3/19/2024 16:46	34.05	65	H	2507		
	5/2/2024 10:12	119.63	410.6		298		
	5/29/2024 8:50	112.88	160.7		298		
	6/5/2024 12:20	32.48	**307.6**		298		
	6/10/2024 11:50	9.38	113.7		298		
	6/12/2024 11:15	7.13	68.9		298	**286.2**	126
	6/21/2024 12:35	2.68	**1299.7**		298		
	6/25/2024 13:11	1.94	**613.1**	H	298		
	6/26/2024 12:20	1.71	160.7		298		
	7/24/2024 14:53	8.06	**325.5**	H	298		
	8/1/2024 11:45	17.55	209.8		298		
	8/19/2024 12:15	0.97	107.6		298		
	8/22/2024 14:05	1.07	107.6		298	98.4	126
	8/26/2024 10:40	0.62	104.3		298		
	8/28/2024 15:18	0.57	36.4	H	298		
	9/25/2024 14:36	0.73	118.7	H	298		
	10/30/2024 13:17	0.57	49.7	H	298		

*Flows highlighted in yellow were calculated using data from reference gauge USGS 03574500 for the same dates the samples were collected.
**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 OAW use classification are applicable year-round, while the single sample maximum criterion of 298 colonies/100 ml and geometric mean criterion of 126 colonies/100 ml for the F&W use classification are applicable during the summer months. The critical condition for each impaired segment was taken to be the one with the highest *E. coli* single sample exceedance value. The use of the highest exceedance to calculate the TMDL is expected to be protective of water quality in Paint Rock River, Hurricane Creek, and Cole Spring Branch year-round.

3.7 Margin of Safety

There are two methods for incorporating a Margin of Safety (MOS) in the 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 *E. coli* data used in this analysis. An explicit MOS was applied to the TMDL by reducing the appropriate target criterion concentration by ten percent and calculating a mass loading target with measured or estimated flow data. The single sample *E. coli* maximum value of 298 colonies/100 ml was reduced by 10% to 268.2 colonies/100 ml for the F&W segments, while the single sample *E. coli* maximum value of 235 colonies/100 ml was reduced by 10% to 211.5 colonies/100 ml for the OAW segment. The geometric mean criterion of 126 colonies/ml was also reduced ten percent to 113.4 colonies/100 ml.

4.0 TMDL Development

4.1 Definition of a TMDL

A TMDL is the sum of individual wasteload 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:

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

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 pathogen TMDLs for Paint Rock River, Hurricane Creek and Cole Spring Branch. The mass balance approach utilizes the conservation of mass principle. Total mass loads can be calculated by multiplying the *E. coli* concentrations times the instream flows times a conversion factor. Existing loads were calculated for the highest single sample exceedances and the highest geometric mean sample exceedances. In the same manner, allowable loads were calculated for both the single sample criterion and the geometric mean criterion. There were both single sample and geometric

mean violations for each waterbody; the TMDL was based on the violation that produced the highest calculated percent reduction to achieve the applicable water quality criteria.

Existing Conditions

The **single sample** mass loadings were calculated by multiplying the highest single sample exceedance concentrations by the flows on the day of the exceedances. The highest exceedance for Paint Rock River was on June 5, 2024, at station PRRJ-4. For Hurricane Creek, the highest exceedance was on March 16, 2021, at station HURR-1, and for Cole Spring Branch, the highest exceedance was on June 21, 2024, at station CSPJ-70. The product of the concentration, flow, and the conversion factor gives the total mass loading (colonies per day) of *E. coli* to each waterbody. Below are the calculations for each station.

PRRJ-4:

$$\frac{795.70\ \text{ft}^3}{s} \times \frac{2092.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{4.07 \times 10^{13}\text{colonies}}{\text{day}}$$

HURR-1:

$$\frac{360.09\ \text{ft}^3}{s} \times \frac{2419.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{2.13 \times 10^{13}\text{colonies}}{\text{day}}$$

CSPJ-70:

$$\frac{2.68\ \text{ft}^3}{s} \times \frac{1299.7\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{8.52 \times 10^{10}\text{colonies}}{\text{day}}$$

The **geometric mean** mass loadings were calculated by multiplying the highest geometric mean exceedance concentrations times the averages of the measured stream flows over the geometric mean sampling periods. Geometric mean studies were completed at stations PRRJ-4, HURR-1, CSPJ-69 and CSPJ-70 in 2024. For Paint Rock River at station PRRJ-4, the highest geometric mean concentration was calculated based on measurements between May 28 and June 21, 2024, with an average stream flow of 932.5 cfs. The highest geometric mean concentration for Hurricane Creek at HURR-1 was calculated based on measurements taken June 5 through June 26, 2024, with an average stream flow of 31.97 cfs. For Cole Spring Branch at CSJP-70, the calculations were based on measurements between June 5 and June 25, 2024, with an average stream flow of 10.72 cfs. The product of the average streamflows, the geometric mean values, and the conversion factor gives the total mass loadings (colonies per day) of *E. coli* to Paint Rock River, Hurricane Creek and Cole Spring Branch under the geometric mean exceedance conditions.

PRRJ-4:

$$\frac{932.5\ \text{ft}^3}{s} \times \frac{246.7\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{5.63 \times 10^{12}\text{colonies}}{\text{day}}$$

HURR-1:

$$\frac{31.97\ \text{ft}^3}{s} \times \frac{158.7\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.24 \times 10^{11}\text{colonies}}{\text{day}}$$

CSPJ-70:

$$\frac{10.72\ \text{ft}^3}{s} \times \frac{286.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{7.51 \times 10^{10}\text{colonies}}{\text{day}}$$

Allowable Conditions

The **allowable loads** to the watershed were 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 flows and the allowable concentrations. These values were then multiplied by the conversion factor to calculate the allowable loads. The calculations for the sampling stations on Paint Rock River, Hurricane Creek and Cole Spring Branch can be seen below.

PRRJ-4:

For the **single sample** *E. coli* target concentration of 268.2 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{795.70\ \text{ft}^3}{s} \times \frac{268.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{5.22 \times 10^{12}\text{colonies}}{\text{day}}$$

The explicit margin of safety of 29.8 colonies/100 ml equals a daily loading of:

$$\frac{795.70\ \text{ft}^3}{s} \times \frac{29.8\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{5.80 \times 10^{11}\text{colonies}}{\text{day}}$$

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

$$\frac{932.5\ \text{ft}^3}{s} \times \frac{113.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{2.59 \times 10^{12}\text{colonies}}{\text{day}}$$

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

$$\frac{932.5\ \text{ft}^3}{s} \times \frac{12.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{2.87 \times 10^{11}\text{colonies}}{\text{day}}$$

HURR-1:

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

$$\frac{360.09\ \text{ft}^3}{s} \times \frac{211.5\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.86 \times 10^{12}\text{colonies}}{\text{day}}$$

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

$$\frac{360.09\ \text{ft}^3}{s} \times \frac{23.5\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{2.07 \times 10^{11}\text{colonies}}{\text{day}}$$

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

$$\frac{31.97\ \text{ft}^3}{s} \times \frac{113.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{8.87 \times 10^{10}\text{colonies}}{\text{day}}$$

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

$$\frac{31.97\ \text{ft}^3}{s} \times \frac{12.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{9.86 \times 10^{9}\text{colonies}}{\text{day}}$$

CSPJ-70:

For the **single sample** *E. coli* target concentration of 268.2 colonies/100 ml, the allowable *E. coli* loading is:

$$\frac{2.68\ \text{ft}^3}{s} \times \frac{268.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.76 \times 10^{10}\text{colonies}}{\text{day}}$$

The explicit margin of safety of 29.8 colonies/100 ml equals a daily loading of:

$$\frac{2.68\ \text{ft}^3}{s} \times \frac{29.8\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.95 \times 10^{9}\text{colonies}}{\text{day}}$$

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

$$\frac{10.72\ \text{ft}^3}{s} \times \frac{113.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{2.97 \times 10^{10}\text{colonies}}{\text{day}}$$

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

$$\frac{10.72\ \text{ft}^3}{s} \times \frac{12.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{3.30 \times 10^{9}\text{colonies}}{\text{day}}$$

The difference in the pathogen loadings between the existing condition (violation event) and the allowable condition converted to a percent reduction represents the total load reduction needed to achieve the *E. coli* water quality criteria. The TMDLs were calculated as the total daily *E. coli* loads to each applicable waterbody. Table 9 shows the existing and allowable *E. coli* loads and required reductions for Paint Rock River, Hurricane Creek and Cole Spring Branch.

Table 9 - *E. coli* Loads and Required Reductions for Paint Rock River and Tributaries

Waterbody	Source	Existing Load (col/day)	Allowable Load (col/day)	Required Reduction (col/day)	% Reduction
Paint Rock River (PRRJ-4)	Single Sample Load	4.07E+13	5.22E+12	3.55E+13	87%
	Geometric Mean Load	5.63E+12	2.59E+12	3.04E+12	54%
Hurricane Creek (HURR-1)	Single Sample Load	2.13E+13	1.86E+12	1.94E+13	91%
	Geometric Mean Load	1.24E+11	8.87E+10	3.55E+10	29%
Cole Spring Branch (CSPJ-70)	Single Sample Load	8.52E+10	1.76E+10	6.76E+10	79%
	Geometric Mean Load	7.51E+10	2.97E+10	4.53E+10	60%

The TMDL, WLA, LA and MOS values necessary to achieve the applicable *E. coli* criteria are provided in Tables 10, 11 and 12 for each waterbody.

Table 10 - *E. coli* TMDL for Paint Rock River (AL06030002-0203-100)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[e]			Load Allocation (LA)	
		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)
5.80E+12	5.80E+11	NA	NA	0	5.22E+12	87%

Note: NA = not applicable
a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources will 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. Future CAFOs will be assigned a wasteload allocation (WLA) of zero.

Table 11 - *E. coli* TMDL for Hurricane Creek (AL06030002-0101-100)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[e]			Load Allocation (LA)	
		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)
2.07E+12	2.07E+11	NA	NA	0	1.86E+12	91%

Note: NA = not applicable
a. TMDL was established using the single sample criterion of 235 colonies/100ml.
b. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources will 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. Future CAFOs will be assigned a wasteload allocation (WLA) of zero.

Table 12 - *E. coli* TMDL for Cole Spring Branch (AL06030002-0203-401, AL06030002-0203-402, AL06030002-0203-403)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[e]			Load Allocation (LA)	
		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)
1.95E+10	1.95E+09	NA	NA	0	1.76E+10	79%

Note: NA = not applicable
a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Future MS4 areas and other NPDES stormwater sources will 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. Current and future CAFOs will be assigned a wasteload allocation (WLA) of zero.

4.3 TMDL Summary

Paint Rock River was first included on the §303(d) list for pathogens in 2020 based on ADEM's *E. coli* monitoring data collected in 2017 from stations PRRJ-21 and PRRJ-4. Cole Spring Branch was first included on the §303(d) list for pathogens in 2020 based on ADEM monitoring data collected during 2013 and 2017 at stations CSPJ-69 and CSPJ-70. Paint Rock River and Cole Spring Branch have subsequently been listed for pathogens on the 2022 and 2024 §303(d) lists. Hurricane Creek was initially listed for pathogens in 2022 based on 2015-2020 data collected at station HURR-1 and was subsequently included on the 2024 §303(d) list. Between 2020 and 2024, ADEM collected water quality data that confirmed the pathogen impairments and provided the basis for TMDL development for Paint Rock River, Hurricane Creek and Cole Spring Branch.

A mass balance approach was used to calculate the *E. coli* TMDLs for the upper Paint Rock River watershed. Based on the TMDL analysis, it was determined that *E. coli* reductions of 87%, 91% and 79% for Paint Rock River, Hurricane Creek and Cole Spring Branch, respectively, were 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 load allocation portion of this TMDL will be implemented through voluntary measures/BMPs. Cooperation and active participation by the public and various other groups are 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 Tennessee Department of Environment & Conservation (TDEC) to determine possible sources of *E. coli* in the watershed within Tennessee. Based on the results of this TMDL, the two agencies will work 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 necessary to achieve applicable water quality criteria, and we are committed to targeting the load reductions to improve water quality in the upper Paint Rock River watershed. As additional data and/or information becomes 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 13.

Table 13 – Follow-up Monitoring Schedule

River Basin Group	Years to be Monitored
Alabama, Cahaba, Mobile, Tallapoosa, Tennessee (Pickwick and Wilson)	2026/2029
Black Warrior, Blackwater, Chattahoochee, Chipola, Choctawhatchee, Escambia, Perdido, Tennessee (Wheeler), Yellow	2027/2030
Coosa, Escatawpa, Tennessee (Guntersville), Tombigbee	2028/2031

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 and subject TMDL were made available on ADEM's website: www.adem.alabama.gov. In addition, the public notice was submitted to persons who requested to be on ADEM's postal and electronic mailing distributions. 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. No written comments were received during the public notice period.

7.0 Appendix

7.1 References

ADEM Administrative Code, 2025. Water Division - Water Quality Program, Chapter 335-6-10, Water Quality Criteria.

ADEM Administrative Code, 2025. Water Division - Water Quality Program, Chapter 335-6-11, Use Classifications for Interstate and Intrastate Waters.

Alabama's Monitoring Program. 2013-2024. ADEM.

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

Alabama Department of Environmental Management, 2020, 2022 and 2024 §303(d) Lists and Fact Sheets. ADEM.

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.

United States Environmental Protection Agency, 1986. *Quality Criteria for Water.* Office of Water. EPA 440/4-91-001.

7.2 Water Quality Data

Table 14 - §303(d) Listing Data Collected on Paint Rock River (2017)

Station	Visit Date / Time	Flow (cfs)	*E. coli* (col/100ml)	*E. coli* dc*	*E. coli* Criterion (col/100ml)
PRRJ-21**	3/7/2017 14:17	257.73	139.6	H	2507
	4/4/2017 13:44	-	613.1	JH	2507
	5/2/2017 14:26	-	**579.4**	H	298
	6/6/2017 13:32	-	**1299.7**	H	298
	7/5/2017 13:23	-	**1732.9**	H	298
	8/2/2017 13:33	63.38	59.4	H	298
	9/5/2017 13:36	61.89	83.9	H	298
	10/3/2017 13:50	31.62	77.1	H	298
PRRJ-4	3/7/2017 13:28	413.68	209.8	H	2507
	4/4/2017 12:57	-	1046.2	JH	2507
	5/2/2017 13:47	-	**2419.6**	GH	298
	6/6/2017 12:55	-	**2092.4**	H	298
	7/5/2017 12:43	-	**1732.8**	H	298
	8/2/2017 12:45	130.42	85.7	H	298
	9/5/2017 12:49	123.08	81.3	H	298
	10/3/2017 12:59	-	28.8	H	298

*H = The analytical holding times for analysis are exceeded. JH = Reported microbiological result is an estimate. The analytical holding time for analysis was exceeded beyond 24 hours. GH = The analytical holding times for analysis are exceeded. The actual number was probably greater than the number reported.
**Station PRRJ-21 is located at 34.775340, -86.250585.

Table 15 - §303(d) Listing Data Collected on Hurricane Creek (2015-2020)

Station	Visit Date / Time	Flow (cfs)	*E. coli* (col/100ml)	*E. coli* dc*	*E. coli* Criterion (col/100ml)
HURR-1	3/18/2015 10:40	-	79		235
	4/1/2015 10:15	89.24	119		235
	5/5/2015 10:30	38	**248.1**		235
	6/2/2015 11:15	43.32	**435.2**		235
	7/1/2015 10:00	9.79	**344.8**		235
	8/26/2015 11:00	14.43	**344.8**		235
	9/15/2015 10:45	5.77	**344.8**		235
	10/27/2015 10:45	4.33	**461.1**		235
	3/29/2016 11:00	48.3	218.7		235
	4/13/2016 10:45	67.87	224.7		235
	5/11/2016 11:00	12.55	**435.2**		235
	6/7/2016 11:00	7.54	178.9		235
	7/12/2016 14:45	2.12	177.7		235
	8/16/2016 13:00	1.5	137.4		235
	9/14/2016 8:50	2.24	**325.5**		235
	10/18/2016 10:15	-	57.3		235
	3/15/2018 9:41	51.55	127.4		235
	4/12/2018 8:43	77.87	193.5		235
	5/10/2018 9:23	28.41	**365.4**		235
	6/14/2018 9:08	19.99	165.8		235
	7/12/2018 9:27	4.75	185		235
	8/9/2018 9:04	3.87	129.1		235
	9/6/2018 8:55	0.9	96		235
	10/25/2018 8:59	3.08	78	H	235
	4/2/2019 10:30	51.77	140.1		235
	6/6/2019 13:00	5.59	**260.3**		235
	8/13/2019 13:20	1.51	201.4		235
	10/15/2019 12:40	-	178.2		235
	5/14/2020 9:45	48.45	91		235
	6/25/2020 9:30	21.81	**435.2**		235
	7/28/2020 10:30	80.97	**2419.6**	G	235
	8/26/2020 9:45	10.01	**235.9**		235
	9/23/2020 9:45	2.31	**488.4**		235
	10/20/2020 11:45	13.48	193.5		235
	11/4/2020 10:00	37.75	172.5		235
	11/30/2020 10:20	231.63	**1413.6**		235

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

Table 16 - §303(d) Listing Data Collected on Cole Spring Branch (2013 and 2017)

Station	Visit Date / Time	Flow (cfs)	*E. coli* (col/100ml)	*E. coli* dc*	*E. coli* Criterion (col/100ml)
CSPJ-69	4/3/2013 8:55	26.62	275.5		2507
	6/12/2013 8:41	6.22	**435.2**		298
	8/7/2013 8:36	5.52	248.9		298
	10/16/2013 8:21	0.98	**613.1**		298
	3/7/2017 12:26	16.4	166.4	H	2507
	5/2/2017 12:41	10.74	**298.7**	H	298
	8/2/2017 11:47	3.58	209.8	H	298
	9/5/2017 11:41	5.47	**387.3**	H	298
	10/3/2017 11:54	2.89	137.4	H	298
CSPJ-70	4/3/2013 9:33	26.37	307.6		2507
	6/12/2013 9:36	-	235.9		298
	8/7/2013 11:05	-	**488.4**		298
	10/16/2013 8:58	-	70.3		298
	3/7/2017 12:52	15.97	344.8	H	2507
	4/4/2017 12:35	-	387.3	JH	2507
	5/2/2017 13:12	10.49	**365.4**	H	298
	6/6/2017 12:11	10.04	280.9	H	298
	7/5/2017 12:08	-	**410.6**	H	298
	8/2/2017 12:15	4.11	172.3	H	298
	9/5/2017 12:14	8.52	**298.7**	H	298
	10/3/2017 12:21	3.22	65.7	H	298

*H = The analytical holding times for analysis are exceeded. *JH = Reported microbiological result is an estimate. The analytical holding time for analysis was exceeded beyond 24 hours.

7.3 Upper Paint Rock River Watershed Photos

Photo 1 - Paint Rock River at PRRJ-4 (August 12, 2024), upstream view.

Photo 2 - Paint Rock River at PRRJ-4 (August 12, 2024), downstream view.

Photo 3 - Paint Rock River at PRRJ-3A (November 4, 2020), upstream view.

Photo 4 - Paint Rock River at PRRJ-3A (November 4, 2020), downstream view.

Photo 5 - Paint Rock River at PRRJ-5 (April 11, 2023), upstream view.

Photo 6 - Paint Rock River at PRRJ-5 (April 11, 2023), downstream view.

Photo 7 - Paint Rock River at PRRJ-21 (October 3, 2017), upstream view.

Photo 8 - Paint Rock River at PRRJ-21 (October 3, 2017), downstream view.

Photo 9 - Hurricane Creek at HURR-1 (August 19, 2024), upstream view.

Photo 10 - Hurricane Creek at HURR-1 (August 19, 2024), downstream view.

Photo 11 - Cole Spring Branch at CSPJ-69 (October 30, 2024), upstream view.

Photo 12 - Cole Spring Branch at CSPJ-69 (October 30, 2024), downstream view.

Photo 13 - Cole Spring Branch at CSPJ-70 (October 30, 2024), upstream view.

Photo 14 - Cole Spring Branch at CSPJ-70 (October 30, 2024), downstream view.