Alabama Department of Environmental Management

Draft

Total Maximum Daily Load (TMDL)
for
Elliotts Creek

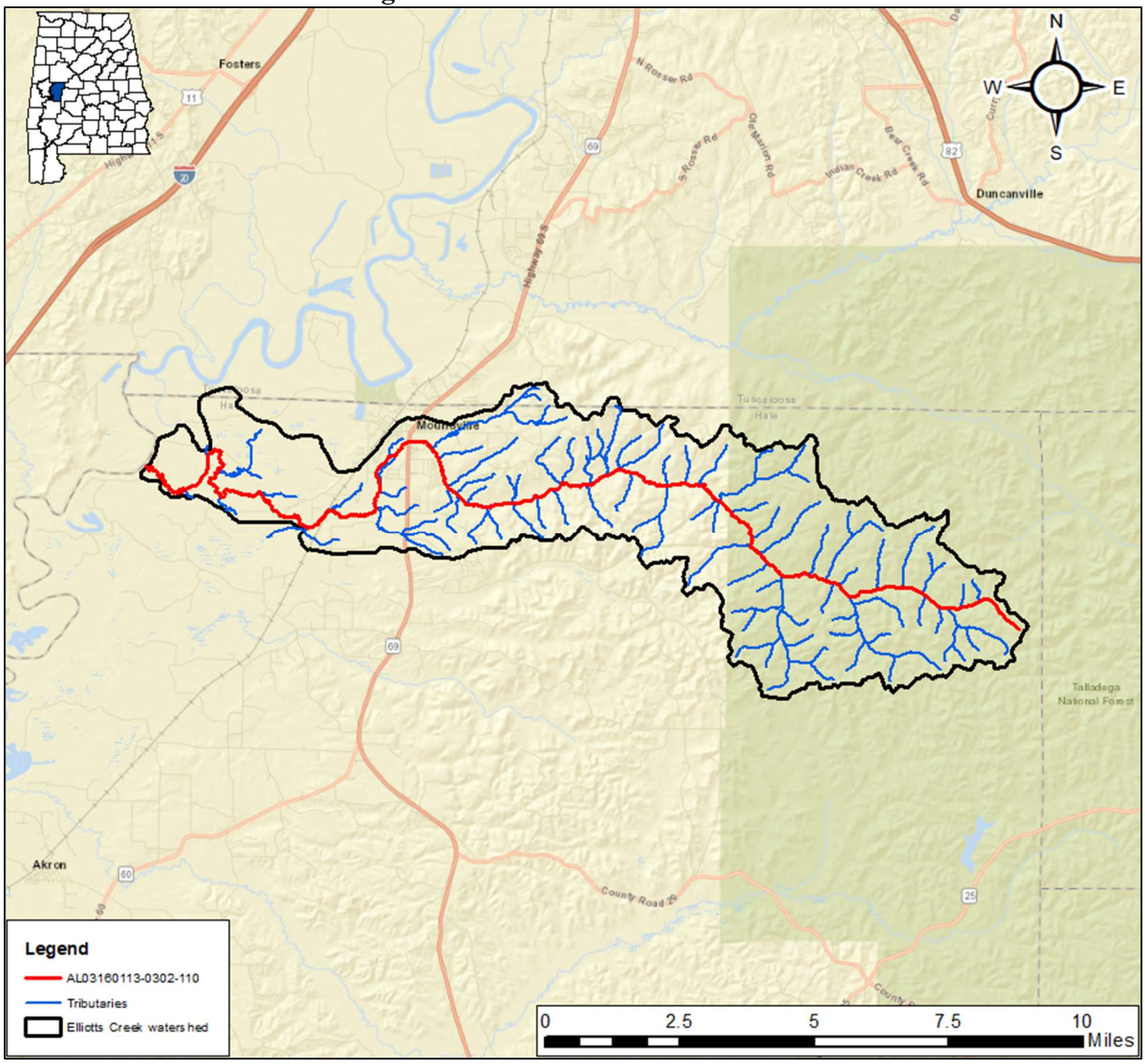
Assessment Unit ID Number:
AL03160113-0302-110

Pathogens (*E. coli*)

Hale County

Alabama Department of Environmental Management
Water Quality Branch
Water Division
April 2025

Figure 1: Elliotts Creek watershed



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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).

Elliotts Creek, from the Black Warrior River (Warrior Lake) to its source, is currently included on Alabama's §303(d) list as impaired for pathogens (*E. coli*). Elliotts Creek begins approximately midway between Centreville, Alabama and Moundville, Alabama in the Oakmulgee District of the Talladega National Forest. Elliotts Creek flows west for approximately 24.74 miles before it merges with the Black Warrior River (Warrior Lake). Elliotts Creek is assigned a use classification of Fish and Wildlife (F&W).

Elliotts Creek was originally included on the §303(d) list for pathogens (*E. coli*) in 2018 based on data collected by the Alabama Department of Environmental Management (ADEM) in 2012 at station ELLH-1. The applicable bacteriological criterion was exceeded in three out of eight samples collected at ELLH-1 in 2012.

Follow-up sampling on Elliotts Creek was performed by ADEM in 2020 and 2024 to further assess the water quality of the impaired stream. For purposes of this TMDL, the 2020 and 2024 data will be used because it is the most current data and provides the best picture of the current water quality conditions of the stream. 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. ADEM collected eight samples from Elliotts Creek in 2020 at ELLH-47A and 18 samples in 2024 at ELLH-1. According to the data, Elliotts Creek was not meeting the pathogen criteria applicable to its use classification of F&W. Therefore, this TMDL has been developed for pathogens (*E. coli*) for Elliotts Creek (AL03160113-0302-110).

A mass balance approach was used for calculating the pathogen TMDL for Elliotts Creek. The mass balance approach utilizes the conservation of mass principle. The TMDL was calculated using the single sample or geometric mean sample 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 268.2 colonies/100 ml (298 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 lists the TMDL for the impaired segment, defined as the maximum allowable *E. coli* loading under critical conditions for Elliotts Creek.

Table 1: *E. coli* TMDL for Elliotts Creek (AL03160113-0302-110)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[b]			Load Allocation (LA)	
		WWTPs[c]	Stormwater (MS4s and other NPDES sources)[d]	Leaking Collection Systems[e]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
3.71E+11	3.71E+10	NA	NA	0	3.34E+11	76%

NA = Not Applicable
a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Future CAFOs in the watershed will be assigned a waste load allocation (WLA) of zero.
c. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
d. 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.
e. 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*.

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.

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 Elliotts Creek 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 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 one segment of Elliotts Creek, totaling 24.74 miles, as impaired for pathogens (*E. coli*). The §303(d) listing was originally reported on Alabama's 2018 List of Impaired Waters based on data collected from 2012 and has been included on all subsequent lists. Pasture grazing is listed as the potential source of the impairment on the 2024 §303(d) list.

2.2 Problem Definition

Waterbody Impaired:	Elliotts Creek - from Black Warrior River (Warrior Lake) to its source
Impaired Reach Length:	24.74 miles
Impaired Drainage Area:	41.49 square miles
Water Quality Standard Violation:	Pathogens (Single Sample, Geometric Mean)
Pollutant of Concern:	Pathogens (*E. coli*)
Water Use Classification:	Fish and Wildlife

Usage Related to Classification:
Elliotts Creek is classified as Fish and Wildlife (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.

E. coli Criteria:
Criteria for acceptable bacteria levels for the F&W 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:
Elliotts Creek, from the Black Warrior River (Warrior Lake) to its source, was placed on the 2018 §303(d) list for pathogens (*E. coli*) based on data collected at station ELLH-1 in 2012. There were exceedances for three out of eight samples collected at this station. The data used for the original listing can be found in Appendix 7.2

3.0 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

For this TMDL, a single sample maximum *E. coli* target of 268.2 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 298 colonies/100 ml. This target is considered protective of water quality standards and should not allow the single sample maximum of 298 colonies/100 ml to be exceeded. In addition, a geometric mean target of 113.4 colonies/100 ml will be used for a series of five or more samples taken at least 24 hours apart over the course of 30 days. This target was also derived by using a 10% explicit margin of safety from the geometric mean criterion of 126 colonies/100 ml. 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 Elliotts Creek Watershed

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 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.

Continuous Point Sources

There are currently no continuous NPDES-permitted facilities in the Elliotts Creek watershed. 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.

Non-Continuous Point Sources

There are a few facilities with industrial (general) NPDES permits located within the TMDL 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 operations. As such, no *E. coli* loading will be attributed to these facilities, nor will they receive an allocation in this TMDL.

Currently, there are no Municipal Separate Storm Sewer System (MS4) areas located within the Elliotts Creek watershed. Any future MS4 stormwater discharges will be required to demonstrate consistency with the assumptions and requirements of this TMDL.

The Elliotts Creek watershed currently contains no Voluntary Animal Feeding Operations (AFOs)/Concentrated Animal Feeding Operations (CAFOs). The ADEM AFO/CAFO rules prohibit discharges of pollutants from the facilities and their associated waste land application activities. As a result, future AFOs/CAFOs will receive a waste load allocation of zero.

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

There are currently no registered sites in the Elliotts Creek 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. From review of ADEM files, it was found that there have been no recent SSOs reported within the Elliotts Creek watershed.

3.2.2 Nonpoint Sources in the Elliotts Creek 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 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 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 stormwater runoff, unpermitted discharges of wastewater, runoff from improper disposal of waste materials, failing septic tanks, and domestic animals. On-site septic systems are common in unincorporated portions of the watershed and may be direct or indirect sources of bacterial pollution via ground and surface waters due to system failures and malfunctions.

3.3 Land Use Assessment

Land use for the Elliotts Creek watershed was determined using ArcMap with land use datasets derived from the 2021 National Land Cover Dataset (NLCD). Figure 2 displays the land use areas within the watershed. Table 2 depicts the primary land uses in the Elliotts Creek watershed.

The major land use in the Elliotts Creek watershed is forested/natural, which makes up 84.17% of the total watershed area. Agricultural and developed land uses make up 9.35% and 6.37%, respectively. The remaining 0.11% of the land area consists of open water.

Figure 2: Land use in the Elliotts Creek watershed

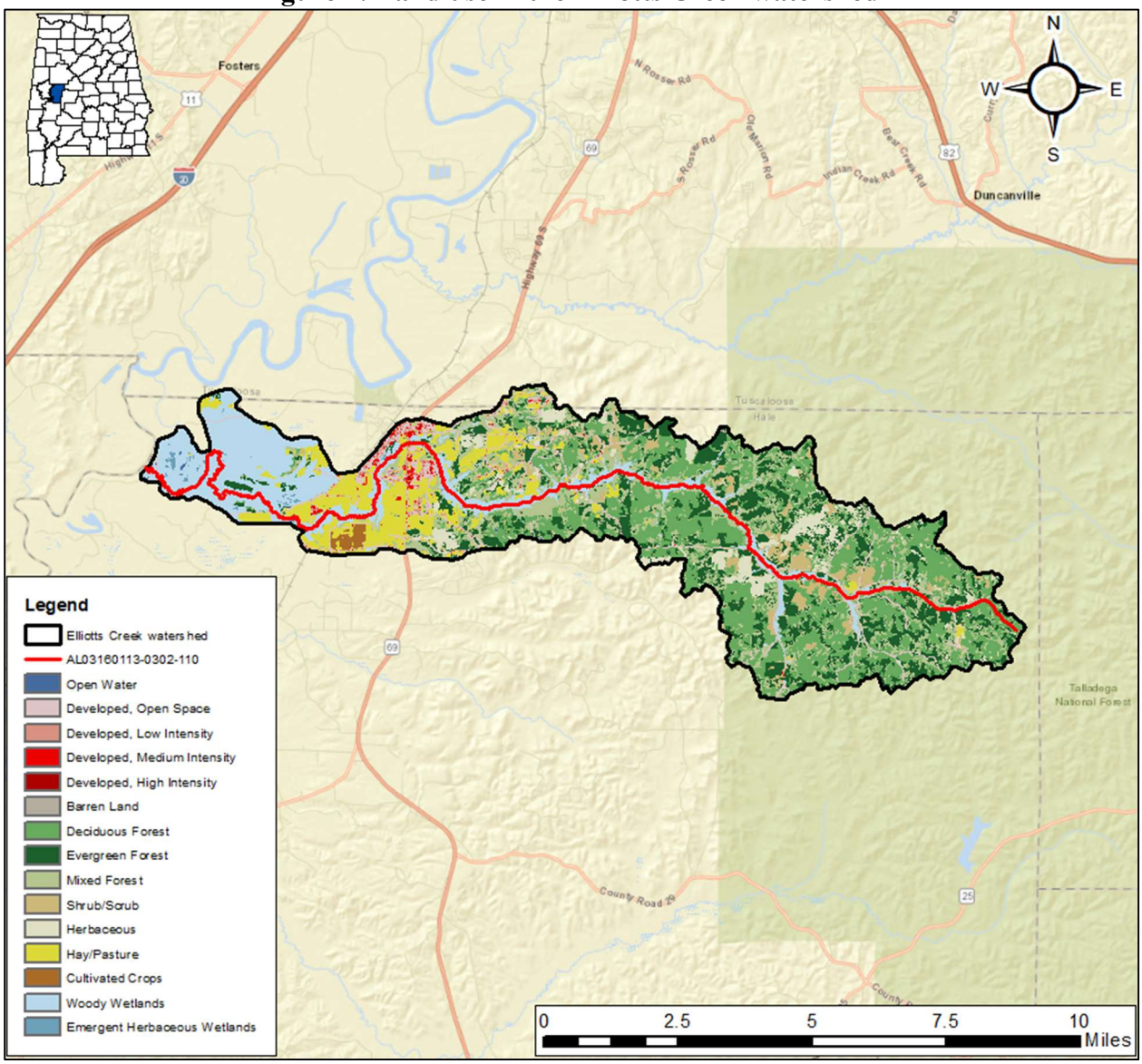
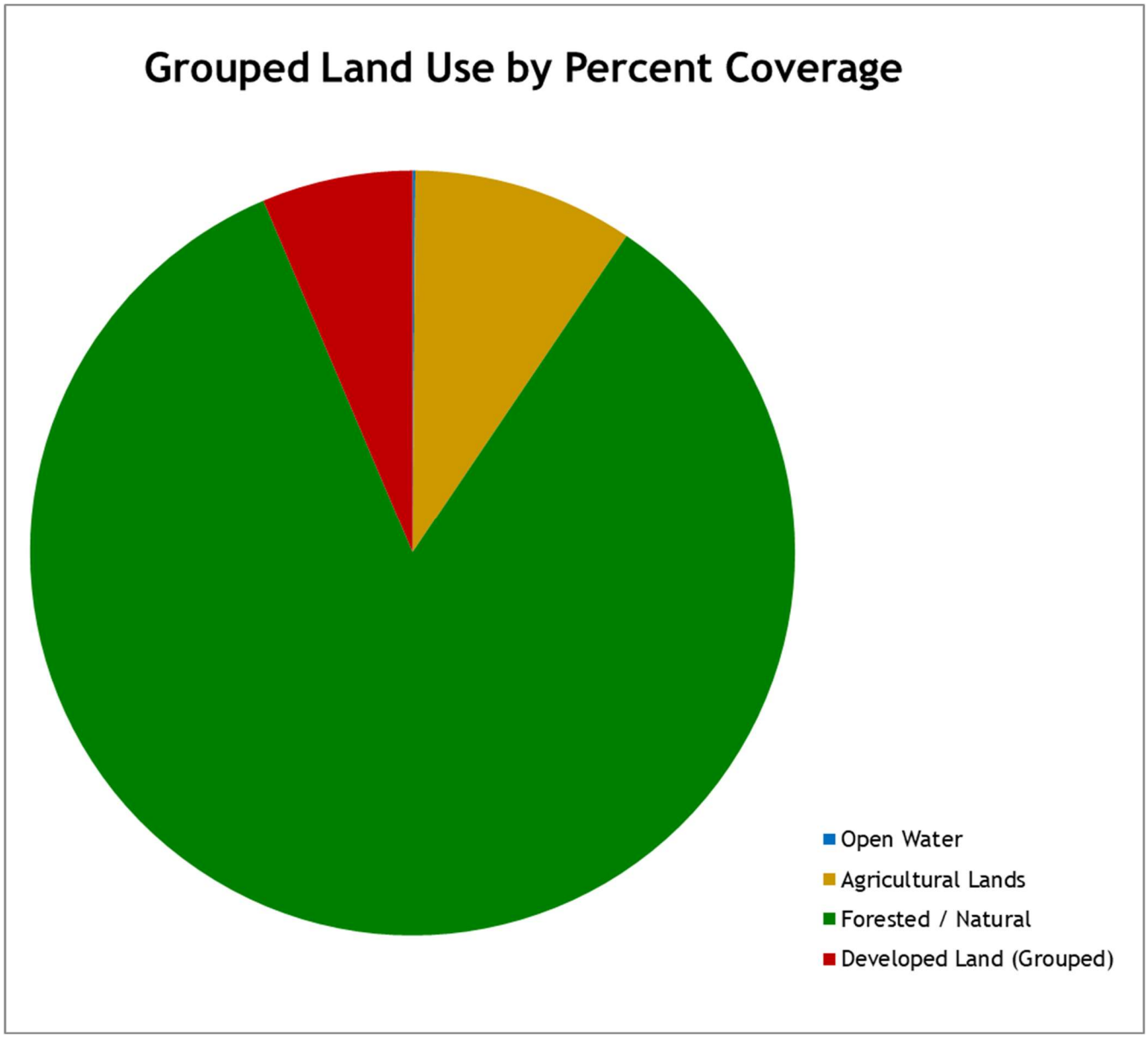


Table 2: Land use (2021) in the Elliotts Creek watershed

Land Use	Miles^2	Acres	Percent
Open Water	0.05	30.25	0.11%
Developed, Open Space	1.94	1242.96	4.68%
Developed, Low Intensity	0.45	290.23	1.09%
Developed, Medium Intensity	0.21	137.22	0.52%
Developed, High Intensity	0.03	20.02	0.08%
Barren Land	0.004	2.45	0.01%
Deciduous Forest	10.52	6732.11	25.35%
Evergreen Forest	6.86	4390.52	16.53%
Mixed Forest	6.92	4429.44	16.68%
Shrub/Scrub	1.69	1078.84	4.06%
Herbaceous	1.95	1251.19	4.71%
Hay/Pasture	3.66	2343.6	8.83%
Cultivated Crops	0.21	136.11	0.51%
Woody Wetlands	6.86	4387.63	16.52%
Emergent Herbaceous Wetlands	0.13	82.95	0.31%
Totals→	**41.49**	**26555.5**	**100.00%**
Class Description	**Miles^2**	**Acres**	**Percent**
Open Water	0.05	30.25	0.11%
Agricultural Lands	3.87	2479.7	9.35%
Forested/Natural	34.93	22352.68	84.17%
Developed Land (Grouped)	2.65	1692.87	6.37%
Totals→	**41.49**	**26555.5**	**100.00%**

Figure 3: Pie graph of land use in the Elliotts Creek watershed



3.4 Linkage between Numeric Targets and Sources

The predominant land usage in the Elliotts Creek watershed is forested/natural, with agriculture and developed areas a distant second and third, respectively. Pollutant loadings from forested areas tend to be low due to their filtering capabilities and will be considered as background conditions. The most probable sources of pathogen loadings within the watershed are agricultural land applications (pasture grazing) and failing septic tanks. 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

In 2020 and 2024, ADEM collected data from stations ELLH-1 (2024) and ELLH-47A (2020) on the pathogen impaired segment of Elliotts Creek. There were 26 total *E. coli* samples collected at these two stations, and there were a total of two single sample exceedances and two geometric mean exceedances between the two stations. Table 3 and Figure 4 show the location of the ADEM stations on Elliotts Creek. The data can be seen below in Table 4 and Table 5.

Table 3: ADEM sampling stations in the Elliotts Creek watershed

Station	Locale Name	Latitude	Longitude
ELLH-1	Elliotts Creek	32.994737°	-87.624137°
ELLH-47A	Elliotts Creek	32.98369°	-87.57245°

Figure 4: ADEM sampling stations in the Elliotts Creek watershed

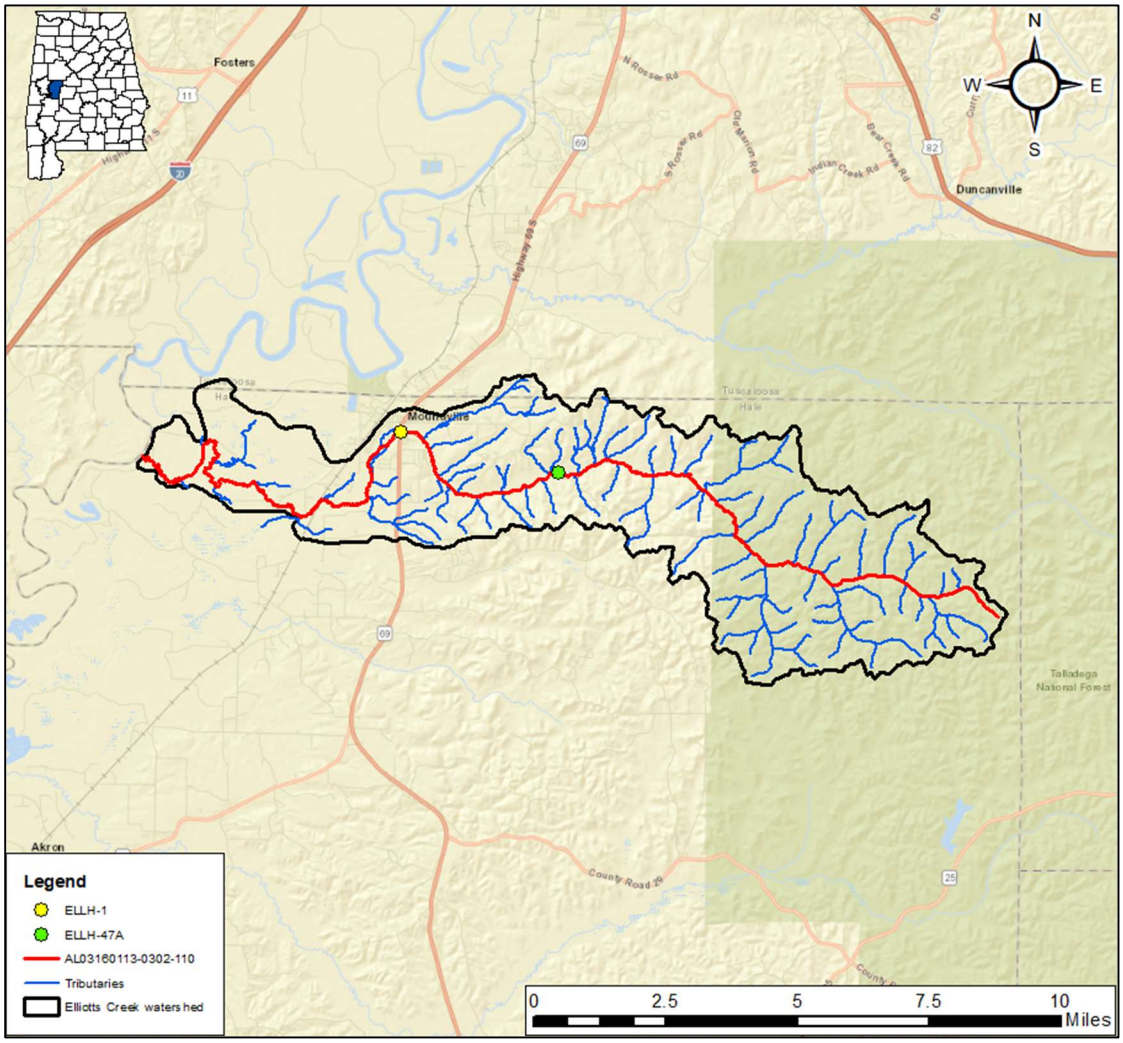


Table 4: 2024 *E. coli* data from ELLH-1

ELLH-1						
Visit Date	***E. coli* (col/100 mL)**	***E. coli* Criterion (col/100 mL)**	**Geometric Mean (col/100 mL)**	**Geometric Mean Criterion (col/100 mL)**	**Flow (ft^3/s)**	**Qualifier Code***
3/13/2024	172.3	2507	-	-	46.8	H
4/17/2024	96	2507	-	-	27.3	H
5/22/2024	156.5	298	-	-	20.3	H
6/5/2024	116.9	298			20.1	-
6/10/2024	152.9	298	152.9	126	18	-
6/17/2024	93.3	298			14.9	-
6/18/2024	101.2	298			16.8	H
6/25/2024	275.5	298			16.8	-
6/28/2024	209.8	298			18	-
7/17/2024	111.9	298	-	-	14.9	H
8/7/2024	344.8	298	223.2	126	11.2	-
8/12/2024	172.2	298			10.5	-
8/15/2024	290.9	298			11	-
8/21/2024	172.5	298			11	H
8/26/2024	186	298			10.3	-
9/5/2024	178.9	298			11.6	-
9/18/2024	157.6	298	-	-	15.8	H
10/23/2024	129.6	298	-	-	13.3	H

*Qualifier code "H" means that analytical holding times for analysis have been exceeded.

Table 5: 2020 *E. coli* data from ELLH-47A

ELLH-47A				
Visit Date	***E. coli* (col/100 mL)**	***E. coli* Criterion (col/100 mL)**	**Flow (ft^3/s)**	**Qualifier Code***
1/7/2020	78.9	2507	44.01	H
1/21/2020	73.3	2507	40.08	H
2/11/2020	579.4	2507	-	H
2/25/2020	73.8	2507	73.78	H
3/10/2020	117.8	2507	-	H
5/12/2020	79.4	298	14.18	H
6/9/2020	1119.9	298	-	H
6/30/2020	228.2	298	13.1	-

*Qualifier code "H" means that analytical holding times for analysis have been exceeded.

3.6 Critical Conditions/Seasonal Variation

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

Elliotts Creek generally follows the trends described above for the summer months of May through October. The critical condition for this pathogen TMDL was taken to be the one with the highest *E. coli* single sample exceedance value. For Elliotts Creek, that value was 1119.9 colonies/100ml and occurred on June 9, 2020, at ELLH-47A. The use of the highest exceedance to calculate the TMDL is expected to be protective of water quality in Elliotts Creek 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 the 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 criterion of 298 colonies/100 ml was reduced by 10% to 268.2 colonies/100 ml, while the geometric mean criterion was reduced in the same fashion 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 *E. coli* TMDL for Elliotts Creek. 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 298 colonies/100 mL and the geometric mean criterion of 126 colonies/100 mL. The TMDL was based on the violation that produced the highest calculated percent reduction 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 flow on the day of the exceedance. The highest exceedance occurred at ADEM station ELLH-47A on June 9, 2020. The flow was not measured on this date due to hazardous flow conditions. Therefore, flow from a nearby United States Geological Survey (USGS) station on Elliotts Creek was chosen to estimate the flow at ELLH-47A at the time of the exceedance. The chosen gauge was USGS 02465493 (Elliotts Creek at Moundville, AL). The flow was calculated by multiplying the flow from USGS 02465493 on June 9, 2020 (66.3 ft^3/s) by the ratio of the drainage areas at ELLH-47A and the USGS gauge. The product of the estimated flow, pathogen concentration, and conversion factor gives the total mass loading (colonies per day) of *E. coli* to Elliotts Creek under the single sample exceedance condition.

ELLH-47A:

$$\frac{66.3\ ft^3}{s} \times \frac{24.8\ mi^2}{32.3\ mi^2} \times \frac{1119.9\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{1.4 \times 10^{12}\ colonies}{day}$$

The **geometric mean** mass loading was calculated by multiplying the highest geometric mean exceedance concentration (223.2 colonies/100 ml) times the average of the five measured daily stream flows. This concentration was calculated based on measurements at ELLH-1 between August 7, 2024, and August 26, 2024, and can be found above in Table 4. The average stream flow was calculated to be 10.8 ft^3/s. The product of these two values multiplied by the conversion factor gives the total mass loading (colonies per day) of *E. coli* in Elliotts Creek under the geometric mean exceedance condition.

ELLH-1:

$$\frac{10.8\ ft^3}{s} \times \frac{223.2\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{5.9 \times 10^{10}\ colonies}{day}$$

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 flow for the violation event, the allowable concentration, and the conversion factor.

ELLH-47A:

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

$$\frac{66.3\ ft^3}{s} \times \frac{24.8\ mi^2}{32.3\ mi^2} \times \frac{268.2\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{3.34 \times 10^{11}\ colonies}{day}$$

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

$$\frac{66.3\ ft^3}{s} \times \frac{24.8\ mi^2}{32.3\ mi^2} \times \frac{29.8\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{3.71 \times 10^{10}\ colonies}{day}$$

ELLH-1:

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

$$\frac{10.8\ ft^3}{s} \times \frac{113.4\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{3.0 \times 10^{10}\ colonies}{day}$$

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

$$\frac{10.8\ ft^3}{s} \times \frac{12.6\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{3.33 \times 10^{9}\ colonies}{day}$$

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. Tables 6 and 7 show the existing and allowable *E. coli* loads and required reductions at each station.

Table 6: *E. coli* loads and required reductions at ELLH-1

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample	9.45E+10	7.35E+10	2.10E+10	22%
Geometric Mean	5.9E+10	3.0E+10	2.9E+10	49%

Table 7: *E. coli* loads and required reduction at ELLH-47A

Source	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Single Sample	1.40E+12	3.34E+11	1.06E+12	76%

The TMDL was calculated as the total daily *E. coli* load to Elliotts Creek as evaluated at station ELLH-47A. From Table 7, compliance with the single sample criterion of 298 colonies/100 ml requires a reduction in the *E. coli* load of 76%. The TMDL, WLA, LA and MOS values necessary to achieve the applicable *E. coli* criteria are provided in Table 8 below.

Table 8: *E. coli* TMDL for Elliotts Creek (AL03160113-0302-110)

TMDL[a]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[b]			Load Allocation (LA)	
		WWTPs[c]	Stormwater (MS4s and other NPDES sources)[d]	Leaking Collection Systems[e]		
(col/day)	(col/day)	(col/day)	% reduction	(col/day)	(col/day)	% reduction
3.71E+11	3.71E+10	NA	NA	0	3.34E+11	76%

NA = Not Applicable
a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Future CAFOs in the watershed will be assigned a waste load allocation (WLA) of zero.
c. Future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
d. 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.
e. 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*.

4.3 TMDL Summary

Elliotts Creek was placed on Alabama's §303(d) list for pathogens in 2018 based on data collected in 2012. Additional data collected by ADEM during 2020 and 2024 confirmed the pathogen impairment and provided the basis for TMDL development.

A mass balance approach was used to calculate the *E. coli* TMDL for Elliotts Creek. Based on the TMDL analysis, it was determined that an *E. coli* reduction of 76% is 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.

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 Elliotts Creek 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 the schedule shown in Table 9.

Table 9: Follow-up monitoring schedule

River Basin Group	Years to be Monitored
Coosa, Escatawpa, Tennessee (Guntersville), Tombigbee	2025/2028
Alabama, Cahaba, Mobile, Tallapoosa, Tennessee (Bear and Pickwick)	2026/2029
Black Warrior, Blackwater, Chattahoochee, Chipola, Choctawhatchee, Escambia, Perdido, Tennessee (Wheeler and Elk), Yellow	2027/2030

6.0 Public Participation

As part of the public participation process, this TMDL will be placed on public notice and made available for review and comment. The public notice and subject TMDL will be made available on ADEM's website: www.adem.alabama.gov. In addition, the public notice will be submitted to persons who have requested to be on ADEM's postal and electronic mailing distributions. The public may 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 will be 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 will become part of the administrative record. ADEM will consider 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.

Alabama's Monitoring Program. 2012, 2020, 2024. ADEM.

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

Alabama's §303(d) List and Fact Sheet. 2018, 2020, 2022, 2024. ADEM.

Alabama Department of Environmental Management (ADEM) Laboratory QA Manual, Chapter 3: Definitions, January 24, 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 10: 2012 *E. coli* listing data from station ELLH-1

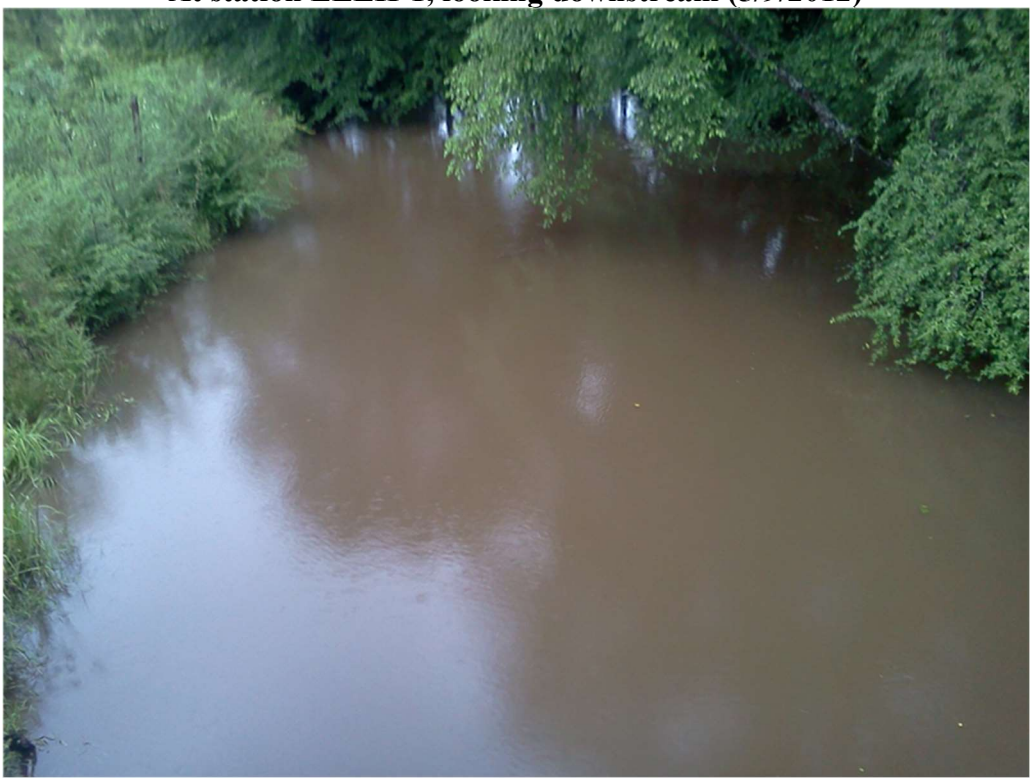
ELLH-1	
Visit Date	***E. coli* (col/100 mL)**
4/4/2012	160.7
5/9/2012	2419.6[G]
6/6/2012	178
7/12/2012	141.4
8/8/2012	648.8
9/5/2012	272.3
10/25/2012	461.1
11/7/2012	344.8

G - the actual number was probably greater than the number reported.

7.3 Elliotts Creek Watershed Photographs

At station ELLH-1, looking upstream (5/9/2012)

At station ELLH-1, looking downstream (5/9/2012)



At station ELLH-1, looking upstream (8/7/2024)

At station ELLH-1, looking downstream (8/7/2024)

At station ELLH-47A, looking upstream (06/18/2020)

At station ELLH-47A, looking downstream (06/18/2020)