Draft

Total Maximum Daily Load (TMDL)

for the

Big Wills Creek Watershed

Assessment Unit ID Numbers:

AL03150106-0103-100 (Big Wills Creek)
AL03150106-0108-102 (Big Wills Creek)
AL03150106-0102-100 (Jacks Creek)
AL03150106-0102-200 (Little Wills Valley Branch)
AL03150106-0102-400 (Little Sand Valley Creek)
AL03150106-0102-500 (Mush Creek)

DeKalb/Etowah Counties

Pathogens (*E. coli*)

Alabama Department of Environmental Management
Water Quality Branch
Water Division
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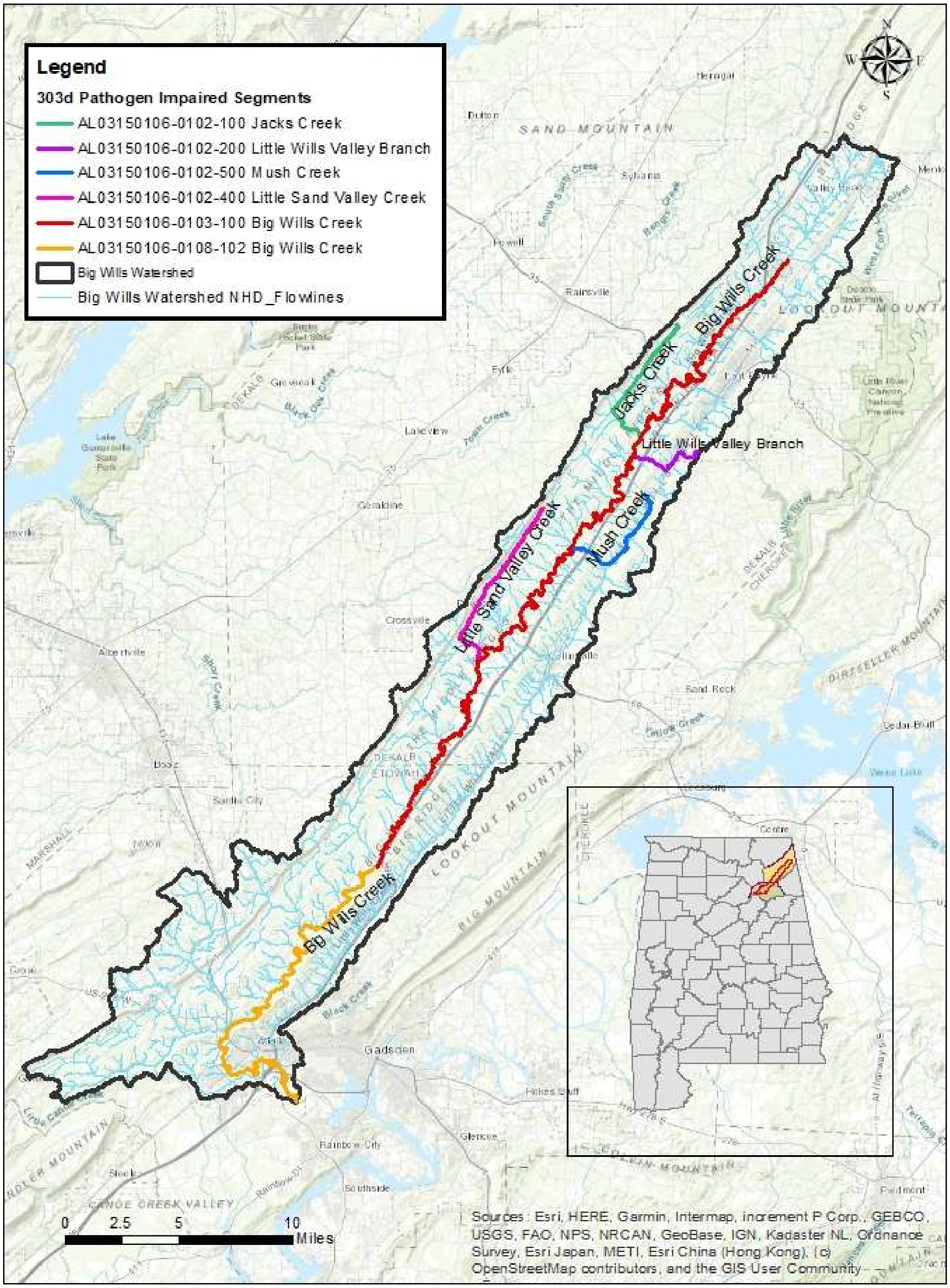
Figure 1 Map of Big Wills Creek Watershed



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1.0 Executive Summary

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

Two segments of Big Wills Creek are currently included on Alabama's §303(d) list for pathogens (*E. coli*), from Neely Henry Lake to Little Sand Valley Creek (24.76 miles) and from Little Sand Valley Creek to 100 yards below Allen Branch (51.63 miles). The following tributaries to Big Wills Creek are also listed as impaired for pathogens (*E. coli*) and are included in this TMDL: Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek. Each tributary is listed as impaired from Big Wills Creek to its source.

Big Wills Creek begins west of Mentone, Alabama in DeKalb County and flows southwest into Neely Henry Lake in Etowah County south of Gadsden, Alabama. The total impaired length of Big Wills Creek is 76.39 miles, and the total drainage area of the Big Wills Creek watershed is 286 square miles. The upper impaired segment of Big Wills Creek (AL03150106-0103-100) and the four impaired tributaries have a use classification of Fish & Wildlife (F&W). The lower Big Wills Creek segment (AL03150106-0108-102) has use classifications of Swimming and Other Whole Body Water-Contact Sports (S) and Fish & Wildlife (F&W).

Big Wills Creek was first included on the §303(d) list for pathogens in 2018 based on ADEM monitoring data collected in 2015-2016 at station BWC-1 (located on the upper segment, AL03150106-0103-100) and data collected in 2013 and 2015-2016 at station BWCE-1 (located on the lower segment, AL03150106-0108-102). Big Wills Creek has subsequently been listed for pathogens on the 2020 and 2022 §303(d) lists. Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek were first included on the §303(d) list for pathogens in 2022 based on ADEM monitoring data collected in 2019 at stations JACD-1, LWBD-1, LSCD-1, and MUSD-2, respectively.

Additional data was collected by ADEM between 2018 and 2022 to further assess the water quality of Big Wills Creek. The 2019 data collected on Jacks Creek, Little Wills Valley Branch, Little Sandy Valley Creek, and Mush Creek is the most recent available data for the tributaries. According to the data collected, these waterbodies were not meeting the pathogen criteria applicable to their use classification. 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 Appendix 7.2, Tables 25, 26, and 27 for reference.

A mass balance approach was used for calculating the pathogen TMDLs for the Big Wills Creek watershed. The mass balance approach utilizes the conservation of mass principle. The TMDL was calculated using the single sample or geometric mean sample exceedance event which 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 based on the applicable use classification. For Big Wills Creek segment AL03150106-0103-100 as well as the four tributaries, 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 the lower Big Wills Creek segment AL03150106-0108-102, 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 1-6 list the TMDLs, defined as the maximum allowable *E. coli* loading under critical conditions, for both segments of Big Wills Creek as well as the tributaries, Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek.

Table 1 *E. coli* TMDL for Big Wills Creek (AL03050106-0103-100)

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)
1.92E+12	1.92E+11	7.68E+10	89%	0	1.65E+12	89%

a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Current and future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Current and 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.

Table 2 *E. coli* TMDL for Big Wills Creek (AL03150106-0108-102)

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)
9.03E+12	9.03E+11	7.68E+10	96%	0	8.05E+12	96%

a. TMDL was established using the single sample criterion of 235 colonies/100ml.
b. Current and future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Current and 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.

Table 3 *E. coli* TMDL for Jacks Creek (AL03150106-0102-100)

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)
4.96E+10	4.96E+9	NA	NA	0	4.46E+10	89%

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.

Table 4 *E. coli* TMDL for Little Wills Valley Branch (AL03150106-0102-200)

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)
3.79E+10	3.79E+9	NA	NA	0	3.41E+10	65%

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.

Table 5 *E. coli* TMDL for Little Sand Valley Creek (AL03150106-0102-400)

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)
5.10E+10	5.10E+9	NA	74%	0	4.59E+10	74%

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. Current and 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.

Table 6 *E. coli* TMDL for Mush Creek (AL03150106-0102-500)

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)
2.33E+10	2.33E+9	NA	NA	0	2.10E+10	54%

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 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 Big Wills Creek 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 total maximum daily load (TMDL) for pollutants causing use impairment. The TMDL process establishes the allowable loading of pollutants for a waterbody based on the relationship between pollution sources and 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 76.39 miles (two segments) of Big Wills Creek as impaired for pathogens. The §303(d) listings for pathogens were originally reported on Alabama's 2018 List of Impaired Waters based on 2013 through 2016 ADEM monitoring data from stations BWC-1 and BWCE-1 and were subsequently included on the 2020 and 2022 lists. The source of the impairment on the 2022 §303(d) list is listed as pasture grazing and animal feeding operations for both segments, along with collection system failure for segment AL03150106-0103-100.

The State of Alabama has also identified Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek, which are all tributaries to Big Wills Creek, as impaired for pathogens. The §303(d) listings were originally reported on Alabama's 2022 List of Impaired Waters based on 2019 ADEM monitoring data from stations JACD-1, LWBD-1, LSCD-1, and MUSD-2. The source of the impairment on the 2022 §303(d) list for Jacks Creek is listed as pasture grazing and animal feeding operations, and the source of impairment for Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek is listed as pasture grazing.

2.2 Problem Definition

Waterbody Impaired:	**Big Wills Creek** – from Neely Henry Lake to Little Sand Valley Creek; and from Little Sand Valley Creek to 100 yards below Allen Branch. **Jacks Creek** – from Big Wills Creek to its source. **Little Wills Valley Branch** – from Big Wills Creek to its source. **Little Sand Valley Creek** – from Big Wills Creek to its source. **Mush Creek** – from Big Wills Creek to its source.
Impaired Reach Length:	**Big Wills Cree**k – 24.76 miles; 51.63 miles **Jacks Creek** – 7.02 miles **Little Wills Valley Branch** – 3.8 miles **Little Sand Valley Creek** – 8.71 miles **Mush Creek** – 6.31 miles
Impaired Drainage Area:	286 square miles
Water Quality Standard Violation:	Pathogens (single sample, geometric mean)
Pollutant of Concern:	Pathogens (*E. coli*)
Water Use Classification:	**Big Wills Creek** – Swimming and Other Whole Body Water-Contact Sports/Fish & Wildlife; Fish & Wildlife **Jacks Creek** – Fish & Wildlife **Little Wills Valley Branch** – Fish & Wildlife **Little Sand Valley Creek** – Fish & Wildlife **Mush Creek** – Fish & Wildlife

Usage Related to Classification:
The impaired segment of Big Wills Creek from Neely Henry Lake to Little Sand Valley Creek is classified as Swimming and Other Whole Body Water-Contact Sports (S)/Fish and Wildlife (F&W). The impaired segment of Big Wills Creek from Little Sand Valley Creek to 100 yards below Allen Branch, as well as the tributaries, Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek, are classified as F&W.

Usage of waters in the Swimming and Other Whole Body Water-Contact Sports classification is described in ADEM Admin. Code R. 335-6-10-.09(3)(a) and (b).

> *(a) Best usage of waters: swimming and other whole body water contact sports.*
>
> *(b) Conditions related to best 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. The quality of waters will also be suitable for the propagation of fish, wildlife and aquatic life. The*

quality of salt waters and estuarine waters to which this classification is assigned will be suitable for the propagation and harvesting of shrimp and crabs.

Usage of waters in the Fish and Wildlife classification is described in ADEM Admin. Code R. 335-6-10-.09(5)(a), (b), (c) and (d).

(a) Best usage of waters: fishing, propagation of fish, aquatic life, and wildlife.

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

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

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

<u>*E. coli* Criteria:</u>
Criteria for acceptable bacteria levels for the Swimming and Other Whole Body Water-Contact Sports use classification are described in ADEM Admin. Code R. 335-6-10-.09(3)(c)6(i),(ii) and (iii) as follows:

(i) 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.

(ii) In all other areas, 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 235 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 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. When the geometric mean bacterial 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.

(iii) The policy of nondegradation of high quality waters shall be stringently applied to bacterial quality of recreational waters.

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

(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:
Big Wills Creek was first included on the §303(d) list for pathogens in 2018 based on ADEM's 2015-2016 *E. coli* data collected at station BWC-1 and 2013 and 2015-2016 *E. coli* data at station BWCE-1. The original listing data from stations BWC-1 and BWCE-1 is shown in Appendix 7.2, Tables 23 and 24. Five out of 22 *E. coli* samples collected at station BWC-1 during 2015-2016 exceeded the applicable single sample maximum criterion of 298 col/100 ml. Seven out of 28 *E. coli* samples collected at station BWCE-1 during 2013 and 2015-2016 exceeded the applicable single sample maximum criterion of 235 col/100 ml. The exceedances are shown in red in Tables 23 and 24.

Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek were first included on the §303(d) list for pathogens in 2022 based on ADEM's 2019 *E. coli* data collected at stations JACD-1, LWBD-1, LSCD-1, and MUSD-2, respectively. Data from station JACD-1 on Jacks Creek showed the *E. coli* criterion was exceeded in seven out of 12 samples. Data collected from LWBD-1 on Little Wills Valley Branch showed exceedances in three out of 12 samples. At station LSCD-1 on Little Sand Valley Creek, there were exceedances in five out of 12 samples. At station MUSD-2 on Mush Creek, four out of 12 samples exceeded the single sample criterion. The listing data for these stations can be found in Appendix 7.2, Table 27, with the exceedances shown in red.

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 segment AL03150106-0103-100 of Big Wills Creek and each of the tributaries, and a single sample *E. coli* target of 211.5 colonies/100 ml will be used for segment AL03150106-0108-102 of Big Wills Creek. These targets were derived by using a 10% explicit margin of safety from the single sample maximum criteria of 298 colonies/100 ml and 235 colonies/100 ml for the Fish & Wildlife and Swimming and Other Whole Body Water-Contact Sports use classifications, respectively. 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 Big Wills Creek 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 National Pollutant Discharge Elimination System (NPDES) process administered by ADEM. In urban settings, sewer lines typically run parallel to streams in the floodplain. If a leaking sewer line is present, high concentrations of bacteria can flow into the stream or leach into the groundwater. Illicit discharges are found at facilities that are discharging bacteria when not permitted, or when the pathogens criterion established in the issued NPDES permit is not being upheld.

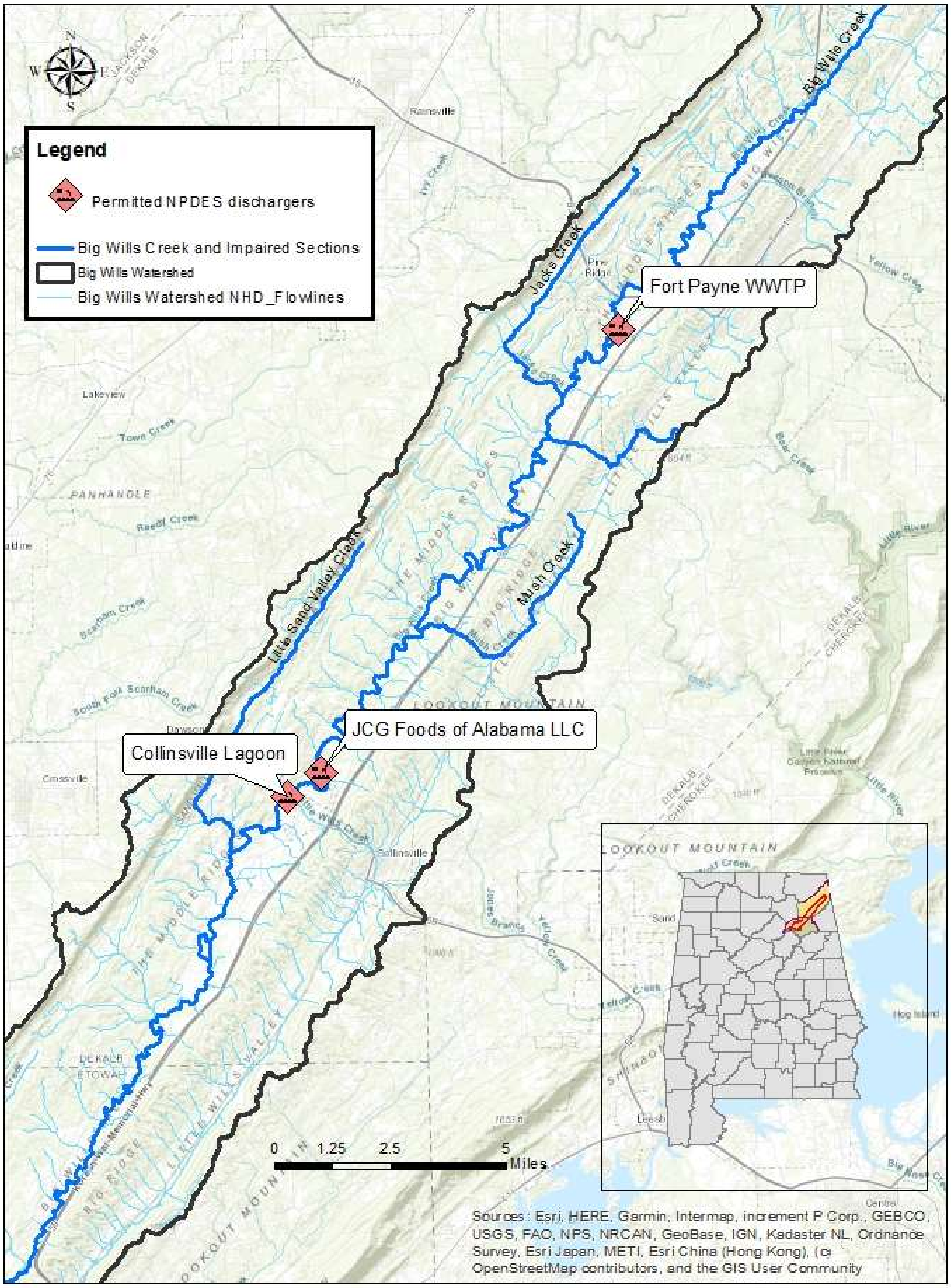
Continuous Point Sources
There are currently three continuous NPDES-permitted facilities that discharge to Big Wills Creek. These facilities are shown below in Table 7 and Figure 2. All of these permitted facilities have daily maximum and monthly average *E. coli* limits. The permit limits are the applicable pathogen criteria for the *Fish and Wildlife* use classification and are as follows:

Monthly average (May-October): 126 colonies/100ml
Monthly average (November-April): 548 colonies/100ml
Daily maximum (May-October): 298 colonies/100ml
Daily maximum (November-April): 2507 colonies/100ml

Table 7 Permitted NPDES Continuous Dischargers in the Big Wills Creek Watershed

Type	Permit Number	Facility Name	Receiving Stream	Flow (MGD)
Municipal	AL0023311	Fort Payne WWTP	Big Wills Creek	5.0
Municipal	AL0024236	Collinsville Lagoon	Big Wills Creek	0.3
Industrial	AL0002241	JCG Foods of Alabama LLC	Big Wills Creek	1.5

Figure 2 Map of Permitted NPDES Continuous Dischargers in the Big Wills Creek Watershed



Crossville Industrial Park WWTP is located in the Big Wills Creek watershed but is currently permitted as a land application system. Since the facility is not permitted to discharge wastewater to a surface water, it will not be given an allocation in this TMDL. Terrapin Hills Sewer System Inc. Lagoon (AL0052493) is located in the watershed but does not currently have an active permit; however, if the permit is reissued, the applicable water quality criteria will be imposed as limits.

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

Fort Payne WWTP, JCG Foods of Alabama LLC, and Crossville Industrial Park WWTP are also permitted through their NPDES permits to discharge storm water runoff in the Big Wills Creek watershed. These facilities will be required to comply with the provisions of this TMDL through implementation of Best Management Practices (BMPs) for the permitted storm water outfalls.

There are currently 44 other NPDES non-continuous/storm water discharge permits within the Big Wills Creek watershed. Table 28 in Appendix 7.3 provides a list of these facilities and the type of activity that occurs at each facility (e.g., landfill, salvage and recycling, etc.). 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.

Urban areas designated as part of the Municipal Separate Storm Sewer System (MS4) program are regulated by NPDES, and as such, are considered to be point sources by EPA and receive waste load allocations (WLAs) in TMDLs. The EPA defines an MS4 as *"a of conveyance or system conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):*

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law);
(ii) Designed or used for collecting or conveying stormwater;
(iii) Which is not a combined sewer; and
(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2."

During rain events in an urbanized watershed, stormwater runoff has the potential to collect pollutants which are transported through MS4 systems before discharging into state waters. Therefore, in 1990 the EPA developed the NPDES stormwater program, which promulgated rules, in two different phases, in order to address the potential negative water quality effects associated with stormwater runoff. In 1990, the EPA issued Phase I regulations under the NPDES stormwater program, which required both medium and large cities and also counties with populations of 100,000 or more to obtain NPDES permit coverage specifically for their stormwater discharges. In 1999, the second phase of the NPDES stormwater program amended existing regulations in addition to requiring NPDES permits for stormwater discharges from certain small MS4 systems.

There are three MS4 permits within the Big Wills Creek watershed. These permits are listed below in Table 8. Contributions from these Phase II MS4 areas drain to the lower pathogen impaired segment of Big Wills Creek and will be allocated as MS4 WLAs in the TMDL. Future MS4s will be required to demonstrate consistency with the assumptions and requirements of this TMDL.

Table 8 MS4 Permits in the Big Wills Creek Watershed

Permit Number	Name	Phase
ALR040053	City of Gadsden	II
ALR040052	City of Attalla	II
ALR040009	Etowah County	II

The Big Wills Creek watershed contains several Concentrated Animal Feeding Operations (CAFOs) or Animal Feeding Operations (AFOs). There is one cattle/slaughter operation and one swine farm, while the other operations are primarily poultry farms. 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.

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, it was found that numerous SSOs have been reported in the Big Wills Creek watershed in recent years. Since 2018, 48 SSOs within the watershed have been reported from the Attalla Wastewater Treatment Lagoon, the Gadsden West River WWTP, and the Collinsville Lagoon. The numerous SSOs are considered a source of pathogens to Big Wills Creek and are listed in Appendix 7.4, Table 29 along with a map of the SSO locations in Figure 6.

3.2.2 Nonpoint Sources in the Big Wills Creek 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 Big Wills Creek watershed was determined using ArcMap with land use datasets derived from the 2021 National Land Cover Dataset (NLCD). Table 9 and Figures 3 and 4 display the land use areas for the Big Wills Creek watershed.

The majority of the Big Wills Creek watershed is forested/natural (65.76%). Other land uses include agriculture (21.0%) and developed land (12.97%). The remaining 0.28% of the 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 9 Land Use Areas for the Big Wills Creek Watershed

Cumulative Land Use	Mi^2	Acres	Percent
Open Water	0.80	512.51	0.28%
Forested/Natural	188.06	120359.78	65.76%
Agriculture	60.05	38429.25	21.00%
Developed (cumulative)	37.10	23742.12	12.97%
Total	**286.00**	**183040.00**	**100.00%**

Figure 3 Land Use Graph for the Big Wills Creek Watershed

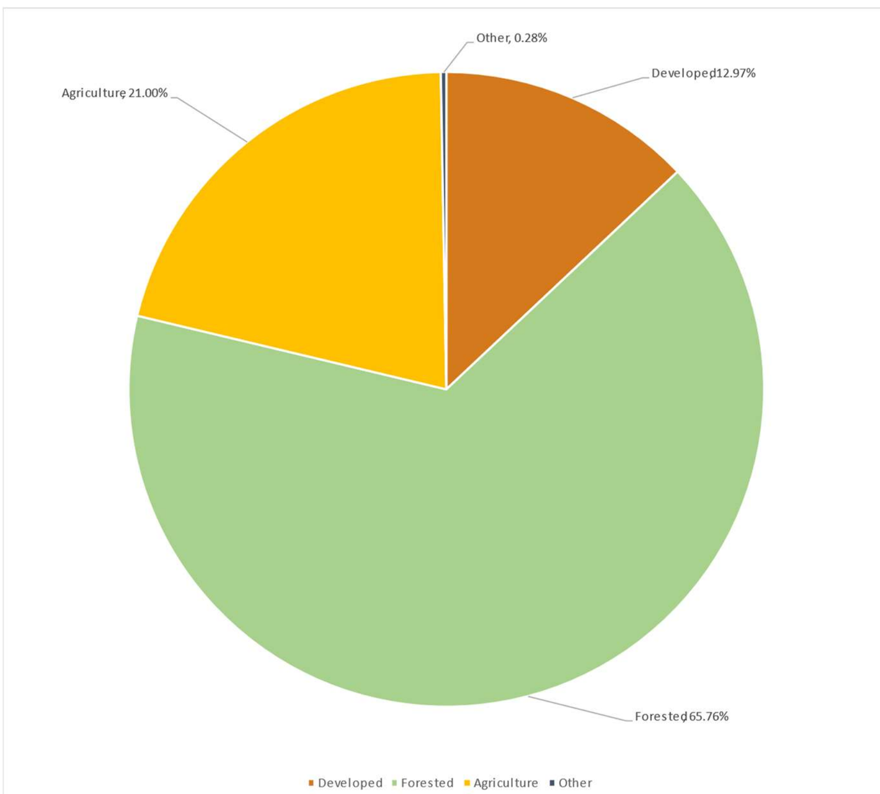
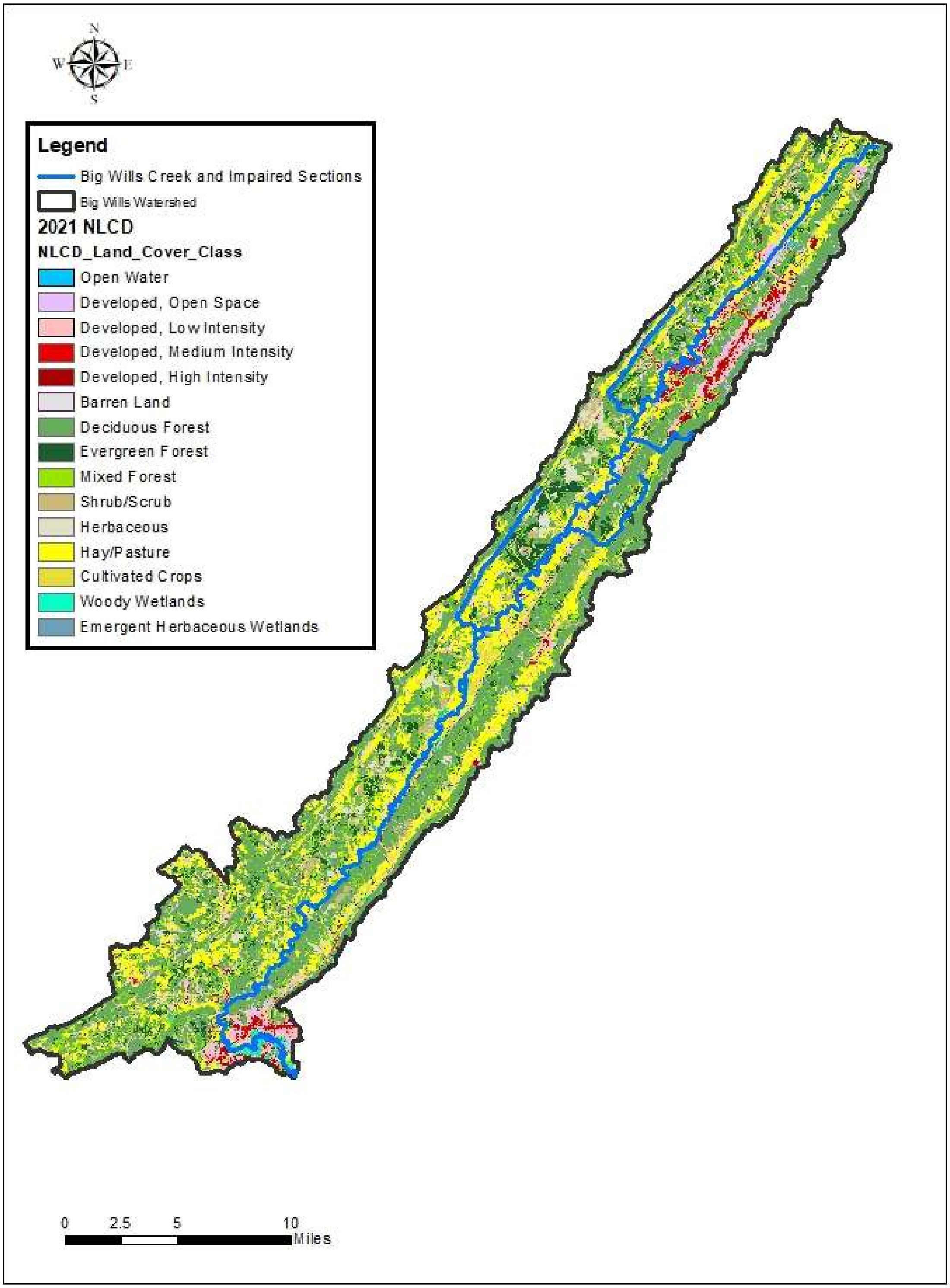


Figure 4 Land Use Map for the Big Wills Creek Watershed



3.4 Linkage Between Numeric Targets and Sources

The majority of the Big Wills Creek 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 in Big Wills Creek are from agricultural land uses, unpermitted discharges of wastewater, storm water runoff, and possibly failing septic systems. It is not considered a logical approach to calculate individual components for nonpoint source loadings. Hence, there will not be individual loads or reductions calculated for the various nonpoint sources. The loadings and reductions will only be calculated as a single total nonpoint source load and reduction.

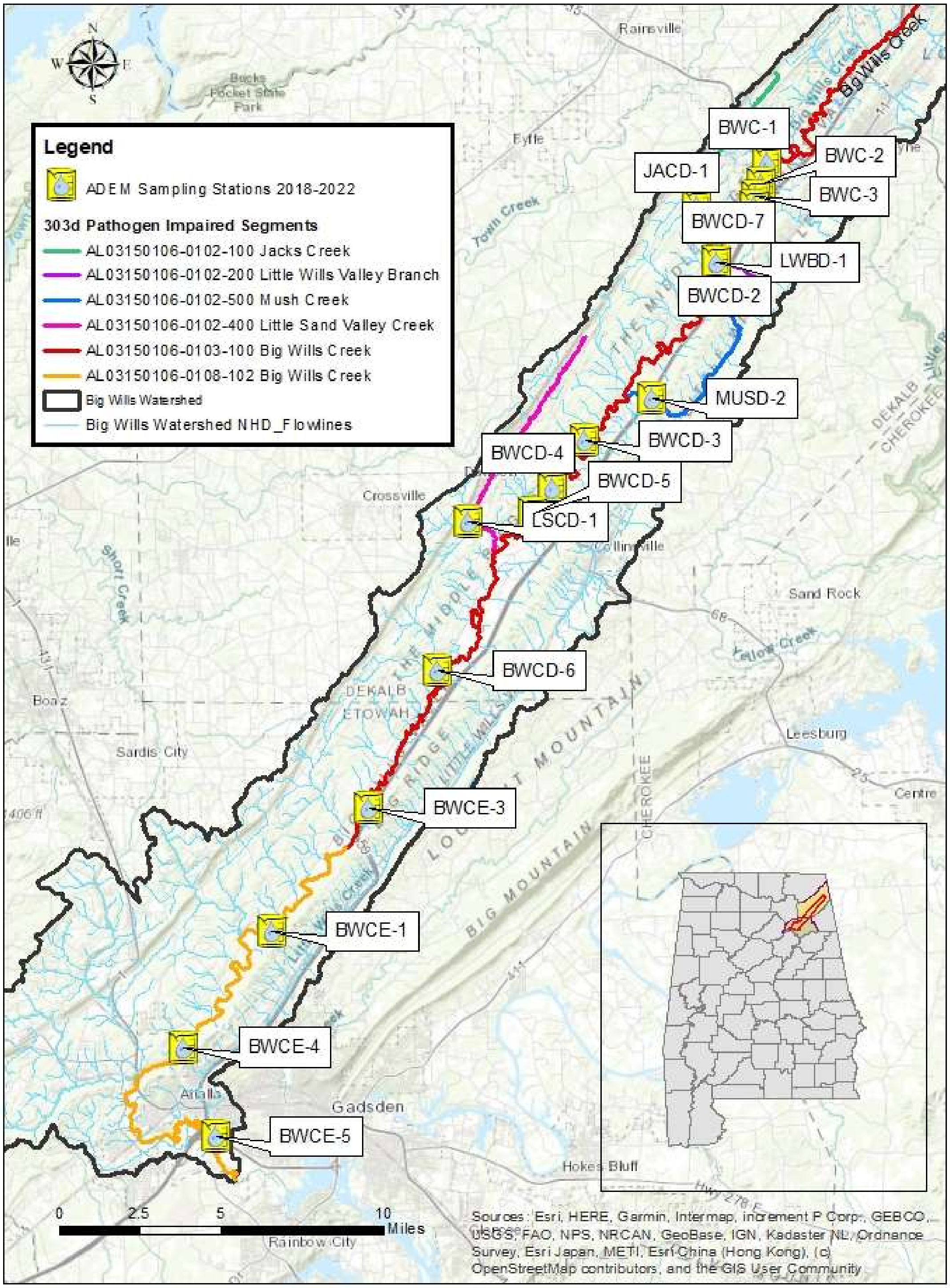
3.5 Data Availability and Analysis

Between 2018 and 2022, ADEM collected water quality data in the Big Wills Creek watershed at sixteen stations on the impaired waterbodies. These stations are listed below in Table 10, and the locations of the sampling stations are shown in Figure 5. The *E. coli* data for the Big Wills Creek stations and tributary stations is shown in Appendix 7.2, Tables 25 through 27. There were exceedances of the applicable single sample maximum criterion (298 col/100 ml or 235 col/100 ml) at each station. There were also exceedances of the geometric mean criterion of 126 col/100 ml at stations BWC-1 and BWCE-1. The exceedances are shown in red in Tables 25 through 27.

Table 10 ADEM Sampling Stations (2018-2022) in the Big Wills Creek Watershed

Station ID	Station Location	Latitude	Longitude
BWC-1	Big Wills Creek at AL Hwy 35	34.438850	-85.76695
BWC-2	Big Wills Cr upstream of Fort Payne WWTP outfall	34.429533	-85.77043
BWCD-2	Big Wills Creek upstream of confluence with Little Wills Valley Branch	34.395069	-85.79511
BWCD-3	Big Wills Creek immediately upstream of the Old Mill Dam at CR 207	34.315561	-85.86730
BWCD-4	Big Wills Creek at CR 30	34.294746	-85.88438
BWCD-5	Big Wills Creek at St Hwy 68 upstream of Little Wills Creek	34.283690	-85.89539
BWCD-6	Big Wills Creek at CR 39 crossing	34.213560	-85.94751
BWCD-7	Big Wills Creek at 2900 Industrial Road	34.419560	-85.77430
BWCE-1	Big Wills Creek at Broton Gap Rd at continuous gage	34.098050	-86.03809
BWCE-3	Big Wills Creek at Stephens Road	34.152414	-85.98517
BWCE-4	Big Wills Creek at Wesson Gap Rd	34.046500	-86.08589
BWCE-5	Big Wills Creek at Brooke Ave	34.006528	-86.06919
JACD-1	Jacks Creek at CR 88 and CR 461	34.419587	-85.80506
LSCD-1	Little Sand Valley Creek at CR 86 crossing	34.280196	-85.93033
LWBD-1	Little Wills Valley Branch upstream of its mouth near Shiloh Church	34.394938	-85.79515
MUSD-2	Mush Creek at CR 484 crossing	34.334127	-85.83062

Figure 5 Map of ADEM Sampling Stations



During 2018-2022, multiple stations were sampled on the impaired segments of Big Wills Creek. Stations BWC-1, BWC-2, BWCD-2, BWCD-3, BWCD-4, BWCD-5, BWCD-6, BWCD-7, and BWCE-3 were sampled on the upper impaired segment (AL03150106-0103), which is classified as F&W. Stations BWCE-1, BWCE-4, and BWCE-5 were sampled on the lower impaired segment (AL03150106-0103), which is classified as S/F&W.

There were multiple single sample *E. coli* exceedances at all stations sampled on the impaired segments of Big Wills Creek. The highest exceedances for the upper and lower impaired segments were found at stations BWC-1 and BWCE-1, respectively. In addition, geometric mean studies were conducted at station BWC-1 on the upper segment and station BWCE-1 on the lower segment in 2022. There were exceedances of the geometric mean criterion at both stations in 2022. The 2018-2022 data for stations BWC-1 and BWCE-1 can be seen below in Tables 11 and 12. A summary of all *E. coli* data collected at all stations during 2018-2022 can be found in Appendix 7.2, Tables 25 and 26. The exceedances are shown in red in these tables.

Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek were sampled in 2019 at stations JACD-1, LWBD-1, LSCD-1, and MUSD-2, respectively. There were exceedances of the applicable *E. coli* criterion of 298 col/100 ml at each of these stations. The tributary data is shown in Appendix 7.2, Table 27, with the exceedances shown in red.

Table 11 2018-2022 *E. coli* data at BWC-1 (AL03150106-0103-100)

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
BWC-1	1/10/2018 8:06	45.3	107.6		2507		
BWC-1	2/13/2018 15:27	230	209.8	H	2507		
BWC-1	3/29/2018 8:11	58.7	307.6		2507		
BWC-1	4/25/2018 17:40	288	275.5	H	2507		
BWC-1	5/31/2018 7:48	82.6	325.5		298		
BWC-1	6/27/2018 16:27	263	**2419.6**	GH	298		
BWC-1	7/25/2018 8:15	36.1	328		298		
BWC-1	8/28/2018 17:18	20.1	65	H	298		
BWC-1	9/25/2018 17:27	54	870.4	H	298		
BWC-1	10/24/2018 8:07	14.7	132.6		298		
BWC-1	11/14/2018 7:50	133	976.8		2507		
BWC-1	12/5/2018 7:50	92.2	137.6		2507		
BWC-1	1/9/2019 8:14	151	86.2		2507		
BWC-1	2/6/2019 8:39	85	88.4		2507		
BWC-1	3/20/2019 8:02	126	125.9		2507		
BWC-1	4/3/2019 9:30	56.1	96		2507		
BWC-1	5/8/2019 10:18	85	161.6		298		
BWC-1	6/12/2019 10:10	35.1	365.4		298		
BWC-1	7/10/2019 16:29	41.3	648.8	H	298		
BWC-1	8/1/2019 10:43	18.8	206.4		298		
BWC-1	9/11/2019 15:48	14.2	107.6	H	298		
BWC-1	10/2/2019 9:50	13	148.3		298		
BWC-1	11/14/2019 8:08	25.2	85.6		2507		
BWC-1	12/12/2019 8:42	79.9	307.6		2507		
BWC-1	1/16/2020 8:29	431	1986.3		2507		
BWC-1	2/27/2020 8:27	236	261.3		2507		
BWC-1	1/20/2021 8:19	24.1	172.6		2507		
BWC-1	2/25/2021 7:53	119	53.7		2507		
BWC-1	3/30/2021 13:54	248	228.2	H	2507		
BWC-1	4/21/2021 17:12	57.6	32.7	H	2507		
BWC-1	5/19/2021 16:09	56.9	365.4	H	298		
BWC-1	6/23/2021 15:23	162	214.3	H	298		
BWC-1	7/21/2021 14:52	55.3	166.4	H	298		
BWC-1	8/18/2021 15:33	127	461.1	H	298		
BWC-1	9/22/2021 15:34	269	1553.1	H	298		
BWC-1	10/25/2021 17:40	30.9	125.9	H	298		
BWC-1	11/8/2021 16:26	26.4	185	H	2507		
BWC-1	12/8/2021 15:43	50.1	298.7	H	2507		
BWC-1	3/24/2022 8:52	1690	1203.3		2507		
BWC-1	4/20/2022 9:53	116	90.6		2507		
BWC-1	5/18/2022 9:54	33.9	107.6		298		
BWC-1	6/23/2022 9:08	25.5	307.6		298		
BWC-1	7/7/2022 11:40	20.3	866.4		298	331.8	126
BWC-1	7/11/2022 12:00	19.7	145		298		
BWC-1	7/14/2022 11:30	20.7	155.3		298		
BWC-1	7/18/2022 11:25	18.8	201.4		298		
BWC-1	7/20/2022 10:07	34.5	1299.7		298		
BWC-1	7/28/2022 11:30	20.7	261.3		298		
BWC-1	8/24/2022 10:11	22.7	307.6		298		
BWC-1	9/6/2022 11:10	70.7	456.4		298	192.2	126
BWC-1	9/12/2022 11:20	39.4	387.3		298		
BWC-1	9/19/2022 11:15	18.8	81.6		298		
BWC-1	9/21/2022 11:05	18.2	93.3		298		
BWC-1	9/22/2022 10:12	17.2	143.9		298		
BWC-1	9/26/2022 11:20	16.3	260.3		298		
BWC-1	10/20/2022 8:51	11.6	68.3		298		

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

Table 12 2018-2022 *E. coli* data at BWCE-1 (AL03150106-0108-102)

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100ml)	Geometric Mean (col/100 ml)	Geometric Mean Criterion (col/100 ml)
BWCE-1	1/9/2018 15:28	134	36.4	H	235		
BWCE-1	2/13/2018 14:27	945	203.4	H	235		
BWCE-1	3/28/2018 17:48	294	143.9	H	235		
BWCE-1	4/25/2018 16:37	1120	461.1	H	235		
BWCE-1	5/30/2018 17:24	228	224.7	H	235		
BWCE-1	6/27/2018 15:27	126	260.3	H	235		
BWCE-1	7/24/2018 16:41	99.3	579.4	H	235		
BWCE-1	8/28/2018 16:17	64.8	81.3	H	235		
BWCE-1	9/25/2018 16:31	91.9	488.4	H	235		
BWCE-1	10/23/2018 16:23	71.2	131.4	H	235		
BWCE-1	11/13/2018 16:01	1570	**4839.2**	GH	235		
BWCE-1	12/4/2018 15:21	391	118.7	H	235		
BWCE-1	1/8/2019 15:28	613	101.4	H	235		
BWCE-1	2/5/2019 15:38	314	27.9	H	235		
BWCE-1	3/19/2019 15:43	461	81.6	H	235		
BWCE-1	4/2/2019 11:15	245	74.4	H	235		
BWCE-1	5/7/2019 10:37	371	461.1	H	235		
BWCE-1	6/12/2019 10:33	143	111.9	H	235		
BWCE-1	7/9/2019 12:46	80.6	85.7	H	235		
BWCE-1	8/7/2019 11:08	80.6	119.8	H	235		
BWCE-1	9/10/2019 15:43	59.6	157.6	H	235		
BWCE-1	10/8/2019 12:15	61	133.3	H	235		
BWCE-1	11/13/2019 16:10	97.3	77.1	H	235		
BWCE-1	12/11/2019 15:15	658	2419.6	GH	235		
BWCE-1	1/15/2020 14:57	983	2419.6	H	235		
BWCE-1	2/26/2020 15:27	917	172.3	H	235		
BWCE-1	1/19/2021 15:32	138	30.5	H	235		
BWCE-1	2/24/2021 15:07	416	117.8	H	235		
BWCE-1	3/30/2021 12:31	911	547.5	H	235		
BWCE-1	4/21/2021 16:06	216	70.6	H	235		
BWCE-1	5/19/2021 15:02	236	88.9	H	235		
BWCE-1	6/23/2021 14:16	1800	727	H	235		
BWCE-1	7/21/2021 13:51	426	2419.6	H	235		
BWCE-1	8/18/2021 14:29	654	2419.6	GH	235		
BWCE-1	9/22/2021 14:41	1140	2419.6	GH	235		
BWCE-1	10/25/2021 14:50	125	435.2	H	235		
BWCE-1	11/8/2021 15:22	110	63.1	H	235		
BWCE-1	12/8/2021 14:51	146	122.3	H	235		
BWCE-1	3/23/2022 14:46	368	2419.6	GH	235		
BWCE-1	4/19/2022 16:10	476	153.9	H	235		
BWCE-1	5/17/2022 15:42	142	79.4	H	235		
BWCE-1	6/22/2022 16:18	101	101.4	H	235		
BWCE-1	7/7/2022 10:40	77.1	235.9		235	268.7	126
BWCE-1	7/11/2022 10:50	95.5	214.3		235		
BWCE-1	7/14/2022 10:30	83.7	228.2		235		
BWCE-1	7/18/2022 10:25	73.9	186		235		
BWCE-1	7/19/2022 14:54	97.3	980.4	H	235		
BWCE-1	7/28/2022 10:30	90.4	178.9		235		
BWCE-1	8/23/2022 15:08	92.9	214.3	H	235		
BWCE-1	9/6/2022 10:10	303	1632.8		235	470.6	126
BWCE-1	9/12/2022 10:20	425	2419.6	G	235		
BWCE-1	9/19/2022 10:15	85.3	165.8		235		
BWCE-1	9/21/2022 14:50	82	248.1	H	235		
BWCE-1	9/26/2022 10:15	69.2	142.1		235		
BWCE-1	10/19/2022 15:19	58.6	104.3	H	235		

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

3.6 Critical Conditions/Seasonal Variation

The *E. coli* single sample maximum criterion of 235 colonies/100 ml and geometric mean criterion of 126 colonies/100 ml for the Swimming and Other Whole Body Water-Contact Sports 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 Fish & Wildlife 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 Big Wills Creek and the tributaries 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 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 S/F&W 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 total maximum daily load (TMDL) is the sum of individual waste load allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS). The margin of safety can be included either explicitly or implicitly and accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. As discussed earlier, the MOS is explicit in this TMDL. A TMDL can be denoted by the equation:

$$\text{TMDL} = \Sigma \text{ WLAs} + \Sigma \text{ LAs} + \text{MOS}$$

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 the Big Wills Creek watershed. The mass balance approach utilizes the conservation of mass principle. Total mass loads can be calculated by multiplying the *E. coli* concentration times the instream 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 and the geometric mean criterion. There were both single sample and geometric mean violations; the TMDL was based on the violation that produced the highest calculated percent reduction to achieve applicable water quality criteria.

Existing Conditions

The **single sample** mass loading was calculated by multiplying the highest single sample exceedance concentration by the flow on the day of the exceedance. The highest exceedances were on June 27, 2018, and November 13, 2018, for BWC-1 and BWCE-1, respectively. The highest exceedances were on July 10, 2019, for the tributary stations JACD-1, LSCD-1 and LWBD-1 and September 12, 2019, for MUSD-2. The product of the concentration, flow, and the conversion factor gives the total mass loading (colonies per day) of *E. coli* to the waterbody. Below are the calculations for each station.

BWC-1:

$$\frac{263\ \text{ft}^3}{s} \times \frac{2419.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.56 \times 10^{13}\text{colonies}}{\text{day}}$$

BWCE-1:

$$\frac{1570\ \text{ft}^3}{s} \times \frac{4839.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.86 \times 10^{14}\text{colonies}}{\text{day}}$$

JACD-1:

$$\frac{6.8\ \text{ft}^3}{s} \times \frac{2419.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{4.03 \times 10^{11}\text{colonies}}{\text{day}}$$

LWBD-1:

$$\frac{5.2\ \text{ft}^3}{s} \times \frac{770.1\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{9.80 \times 10^{10}\text{colonies}}{\text{day}}$$

LSCD-1:

$$\frac{7.0\ \text{ft}^3}{s} \times \frac{1046.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{1.79 \times 10^{11}\text{colonies}}{\text{day}}$$

MUSD-2:

$$\frac{3.2\ \text{ft}^3}{s} \times \frac{579.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{4.54 \times 10^{10}\text{colonies}}{\text{day}}$$

The **geometric mean** mass loading was calculated by multiplying the highest geometric mean exceedance concentration times the average of the measured stream flows over the geometric mean sampling period. Geometric mean studies were completed at stations BWC-1 and BWCE-1 in 2022. For BWC-1, the concentration was calculated based on measurements between July 7 and July 28, 2022, with an average stream flow of 22.5 cfs. For BWCE-1, the calculations were based on measurements between September 6 and September 26, 2022, with an average stream flow of 192.9 cfs. The product of the average stream flow, the geometric mean value, and the conversion factor gives the total mass loading (colonies per day) of *E. coli* to Big Wills Creek under the geometric mean exceedance condition.

BWC-1:

$$\frac{22.5\ \mathrm{ft}^3}{s} \times \frac{331.8\ \mathrm{colonies}}{100\mathrm{ml}} \times \frac{24{,}465{,}755\ 100\mathrm{ml} * s}{\mathrm{ft}^3 * \mathrm{day}} = \frac{1.82 \times 10^{11}\mathrm{colonies}}{\mathrm{day}}$$

BWCE-1:

$$\frac{192.9\ \mathrm{ft}^3}{s} \times \frac{470.6\ \mathrm{colonies}}{100\mathrm{ml}} \times \frac{24{,}465{,}755\ 100\mathrm{ml} * s}{\mathrm{ft}^3 * \mathrm{day}} = \frac{2.22 \times 10^{12}\mathrm{colonies}}{\mathrm{day}}$$

The **continuous point sources** mass loading was calculated by taking the average discharge flow from the month of June 2018 (since this is when the highest exceedance occurred) and multiplying that by the reported maximum daily *E. coli* value for the same month for each facility. These numbers were found in the June 2018 Discharge Monitoring Reports (DMRs) submitted by the facilities.

Fort Payne WWTP (AL0023311):

$$1.651\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{10\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{6.26 \times 10^8 colonies}{day}$$

Collinsville Lagoon (AL0024236):

$$0.127\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{1\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{4.82 \times 10^6 colonies}{day}$$

JCG Foods of Alabama LLC (AL0002241):

$$0.925\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{4\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{1.40 \times 10^8 colonies}{day}$$

<u>Allowable Conditions</u>

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 and the allowable concentration. This value was then multiplied by the conversion factor to calculate the allowable load. The calculations for the sampling stations on Big Wills Creek and its four impaired tributaries, as well as for the continuous point sources, can be seen below.

BWC-1:

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

$$\frac{263\ \mathrm{ft}^3}{s} \times \frac{268.2\ \mathrm{colonies}}{100\mathrm{ml}} \times \frac{24{,}465{,}755\ 100\mathrm{ml} * s}{\mathrm{ft}^3 * \mathrm{day}} = \frac{1.73 \times 10^{12}\mathrm{colonies}}{\mathrm{day}}$$

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

$$\frac{263\ \mathrm{ft}^3}{s} \times \frac{29.8\ \mathrm{colonies}}{100\mathrm{ml}} \times \frac{24{,}465{,}755\ 100\mathrm{ml} * s}{\mathrm{ft}^3 * \mathrm{day}} = \frac{1.92 \times 10^{11}\mathrm{colonies}}{\mathrm{day}}$$

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

$$\frac{22.5\ \text{ft}^3}{s} \times \frac{113.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{6.24 \times 10^{10}\text{colonies}}{\text{day}}$$

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

$$\frac{22.5\ \text{ft}^3}{s} \times \frac{12.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{6.94 \times 10^{9}\text{colonies}}{\text{day}}$$

BWCE-1:

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

$$\frac{1570\ \text{ft}^3}{s} \times \frac{211.5\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{8.12 \times 10^{12}\text{colonies}}{\text{day}}$$

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

$$\frac{1570\ \text{ft}^3}{s} \times \frac{23.5\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{9.03 \times 10^{11}\text{colonies}}{\text{day}}$$

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

$$\frac{192.9\ \text{ft}^3}{s} \times \frac{113.4\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{5.35 \times 10^{11}\text{colonies}}{\text{day}}$$

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

$$\frac{192.9\ \text{ft}^3}{s} \times \frac{12.6\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{5.95 \times 10^{10}\text{colonies}}{\text{day}}$$

For the tributaries, for the **single sample** *E. coli* target concentration of 268.2 colonies/100 ml, the allowable *E. coli* loadings are:

JACD-1:

$$\frac{6.8\ \text{ft}^3}{s} \times \frac{268.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{4.46 \times 10^{10}\text{colonies}}{\text{day}}$$

LWBD-1:

$$\frac{5.2\ \text{ft}^3}{s} \times \frac{268.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{3.41 \times 10^{10}\text{colonies}}{\text{day}}$$

LSCD-1:

$$\frac{7.0\ \text{ft}^3}{s} \times \frac{268.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{4.59 \times 10^{10}\text{colonies}}{\text{day}}$$

MUSD-2:

$$\frac{3.2\ \text{ft}^3}{s} \times \frac{268.2\ \text{colonies}}{100\text{ml}} \times \frac{24{,}465{,}755\ 100\text{ml} * s}{\text{ft}^3 * \text{day}} = \frac{2.10 \times 10^{10} \text{colonies}}{\text{day}}$$

The WLA for the continuous point sources was calculated by multiplying the design flow of each facility by the applicable in-stream single sample *E. coli* criterion. This value was then multiplied by a conversion factor to come up with the appropriate loading. Therefore, the allowable conditions for all facilities are based on the applicable *E. coli* limitations.

Fort Payne WWTP (AL0023311):

$$5.0\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{298\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{5.65 \times 10^{10} colonies}{day}$$

Collinsville Lagoon (AL0024236):

$$0.3\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{298\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{3.39 \times 10^{9} colonies}{day}$$

JCG Foods of Alabama LLC (AL0002241):

$$1.5\ MGD \times \frac{1.55\ ft^3}{s * MGD} \times \frac{298\ colonies}{100\ mL} \times \frac{24{,}465{,}755 * 100\ mL * s}{ft^3 * day} = \frac{1.70 \times 10^{10} colonies}{day}$$

The difference in the pathogen loading 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. Tables 13 and 14 show the existing and allowable *E. coli* loads and required reductions for the upper and lower segments of Big Wills Creek, respectively. Table 15 shows the existing and allowable loads and required reductions for the tributaries (Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek).

Table 13 *E. coli* Loads and Required Reductions for Big Wills Creek (AL03150106-0103-100)

Source	Existing Load (col/day)	Allowable Load (col/day)	Required Reduction (col/day)	% Reduction
Single Sample Load	1.56E+13	1.73E+12	1.39E+13	89%
Geometric Mean Load	1.82E+11	6.24E+10	1.20E+11	66%
Fort Payne WWTP (AL0023311)	6.26E+08	5.65E+10	0	0%
Collinsville Lagoon (AL0024236)	4.82E+06	3.39E+09	0	0%
JCG Foods of Alabama, LLC (AL0002241)	1.40E+08	1.70E+10	0	0%

Table 14 *E. coli* Loads and Required Reductions for Big Wills Creek (AL03150106-0108-102)

Source	Existing Load (col/day)	Allowable Load (col/day)	Required Reduction (col/day)	% Reduction
Single Sample Load	1.86E+14	8.12E+12	1.78E+14	96%
Geometric Mean Load	2.22E+12	5.35E+11	1.69E+12	76%
Fort Payne WWTP (AL0023311)	6.26E+08	5.65E+10	0	0%
Collinsville Lagoon (AL0024236)	4.82E+06	3.39E+09	0	0%
JCG Foods of Alabama, LLC (AL0002241)	1.40E+08	1.70E+10	0	0%

Table 15 *E. coli* Loads and Required Reductions for the Big Wills Creek Tributaries

Tributary	Source	Existing Load (col/day)	Allowable Load (col/day)	Required Reduction (col/day)	% Reduction
Jacks Creek	Single Sample Load	4.03E+11	4.46E+10	3.58E+11	89%
Little Wills Valley Branch	Single Sample Load	9.80E+10	3.41E+10	6.39E+10	65%
Little Sand Valley Creek	Single Sample Load	1.79E+11	4.59E+10	1.33E+11	74%
Mush Creek	Single Sample Load	4.54E+10	2.10E+10	2.44E+10	54%

The TMDL, WLA, LA, and MOS values necessary to achieve the applicable *E. coli* criteria for each impaired segment are provided in Tables 16 through 21 below.

Table 16 *E. coli* TMDL for Big Wills Creek (AL03050106-0103-100)

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)
1.92E+12	1.92E+11	7.68E+10	89%	0	1.65E+12	89%

a. TMDL was established using the single sample criterion of 298 colonies/100ml.
b. Current and future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Current and 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.

Table 17 *E. coli* TMDL for Big Wills Creek (AL03150106-0108-102)

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)
9.03E+12	9.03E+11	7.68E+10	96%	0	8.05E+12	96%

a. TMDL was established using the single sample criterion of 235 colonies/100ml.
b. Current and future WWTPs must meet the applicable instream water quality criteria for pathogens at the point of discharge.
c. Current and 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.

Table 18 *E. coli* TMDL for Jacks Creek (AL03150106-0102-100)

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)
4.96E+10	4.96E+9	NA	NA	0	4.46E+10	89%

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.

Table 19 *E. coli* TMDL for Little Wills Valley Branch (AL03150106-0102-200)

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)
3.79E+10	3.79E+9	NA	NA	0	3.41E+10	65%

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.

Table 20 *E. coli* TMDL for Little Sand Valley Creek (AL03150106-0102-400)

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)
5.10E+10	5.10E+9	NA	74%	0	4.59E+10	74%

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. Current and 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.

Table 21 *E. coli* TMDL for Mush Creek (AL03150106-0102-500)

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)
2.33E+10	2.33E+9	NA	NA	0	2.10E+10	54%

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

Big Wills Creek was first included on the §303(d) list for pathogens in 2018 based on ADEM's *E. coli* data collected from stations BWC-1 and BWCE-1. Between 2018 and 2022, ADEM collected water quality data that confirmed the pathogen impairment and provided the basis for TMDL development for Big Wills Creek. Jacks Creek, Little Wills Valley Branch, Little Sand Valley Creek, and Mush Creek were included on the §303(d) list for pathogens in 2022 based on ADEM monitoring data collected in 2019 at stations JACD-1, LWBD-1, LSCD-1, and MUSD-2, respectively. The 2019 data provided the basis for TMDL development for these tributaries.

A mass balance approach was used to calculate the *E. coli* TMDLs for the Big Wills Creek watershed. Based on the TMDL analysis, it was determined that reductions in the *E. coli* loads of 96% and 89% for the segments of Big Wills Creek from Neely Henry Lake to Little Sand Valley Creek and from Little Sand Valley Creek to 100 yards below Allen Branch, respectively, were necessary to achieve compliance with applicable water quality standards. For the tributaries, reductions in the *E. coli* loads of 89% for Jacks

Creek, 65% for Little Wills Valley Branch, 74% for Little Sand Valley Creek, and 54% for Mush Creek were necessary.

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/best management practices (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.

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 Big Wills Creek 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 22.

Table 22 Follow-up Monitoring Schedule

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

6.0 Public Participation

As part of the public participation process, this TMDL will be placed on public notice and made available for review and comment. The public notice will be prepared and published in four newspapers in Montgomery, Huntsville, Birmingham, and Mobile, as well as submitted to persons who have requested to be on ADEM's postal and electronic mailing distributions. In addition, the public notice and subject TMDL will be made available on ADEM's Website: www.adem.alabama.gov. The public can 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 Appendix

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. 2013-2022. ADEM.

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

Alabama Department of Environmental Management, 2018, 2020, and 2022 §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 23 Original §303(d) Listing Data for AL03150106-0103-100 at BWC-1 (2015-2016)

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWC-1	3/31/2015 10:15	58	161.6		2507
BWC-1	4/29/2015 9:12	95	166.4		2507
BWC-1	5/20/2015 8:32	28	307.6		298
BWC-1	6/24/2015 8:50	13	98.7		298
BWC-1	7/22/2015 8:03	14	235.9		298
BWC-1	8/19/2015 8:06	22	261.3		298
BWC-1	9/30/2015 8:32	12	195.6		298
BWC-1	10/20/2015 8:27	18	140.1		298
BWC-1	11/17/2015 17:11	24	25.6		2507
BWC-1	12/9/2015 8:39	76	129.6		2507
BWC-1	1/21/2016 9:04	63	59.1		2507
BWC-1	2/18/2016 8:31	156	387.3		2507
BWC-1	3/10/2016 8:32	98	185		2507
BWC-1	4/5/2016 15:32	105	28.8	H	2507
BWC-1	5/4/2016 8:08	217	410.6		298
BWC-1	6/16/2016 8:10	20	275.5		298
BWC-1	7/13/2016 8:15	19	325.5		298
BWC-1	8/11/2016 9:01	22	148.3		298
BWC-1	9/14/2016 9:08	12	816.4		298
BWC-1	10/26/2016 8:34	9.8	344.8		298
BWC-1	11/29/2016 16:49	23.5	2419.6	H	2507
BWC-1	12/14/2016 8:11	19.7	172.2		2507

*H = The analytical holding times for analysis are exceeded.

Table 24 Original §303(d) Listing Data for AL03150106-0108-102 at BWCE-1 (2013-2016)

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWCE-1	6/19/2013 10:30	396	522.5		235
BWCE-1	8/21/2013 11:45	131	129.6		235
BWCE-1	10/16/2013 10:30	61	238.2		235
BWCE-1	6/25/2014 10:45	136	131.4		235
BWCE-1	8/6/2014 10:20	75	71.7		235
BWCE-1	10/9/2014 9:50	68	185		235
BWCE-1	3/31/2015 8:57	295	95.9		235
BWCE-1	4/28/2015 16:34	423	161.6	H	235
BWCE-1	5/19/2015 15:33	153	129.6	H	235
BWCE-1	6/23/2015 15:03	75	69.7	H	235
BWCE-1	7/21/2015 14:45	69	86.2	H	235
BWCE-1	8/18/2015 15:12	122	218.7	H	235
BWCE-1	9/29/2015 15:57	61	108.6	H	235
BWCE-1	10/19/2015 15:31	68	195.6	H	235
BWCE-1	11/17/2015 16:16	110	78.5	H	235
BWCE-1	12/8/2015 15:33	309	290.9	H	235
BWCE-1	1/20/2016 15:13	240	59.4	H	235
BWCE-1	2/17/2016 15:48	791	579.4	H	235
BWCE-1	3/10/2016 11:03	415	101.2		235
BWCE-1	4/5/2016 12:22	412	148.3	H	235
BWCE-1	5/4/2016 11:09	60	365.4		235
BWCE-1	6/16/2016 9:44	94	185		235
BWCE-1	7/13/2016 10:15	82	135.4		235
BWCE-1	8/11/2016 10:41	83	151.5		235
BWCE-1	9/14/2016 10:50	54	150		235
BWCE-1	10/26/2016 10:42	44	118.7		235
BWCE-1	11/29/2016 15:51	58.4	866.4	H	235
BWCE-1	12/13/2016 12:24	69.2	290.9	H	235

*H = The analytical holding times for analysis are exceeded.

Table 25 2018-2022 Data at Big Wills Creek Stations on AL03150106-0103-100

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWC-1	1/10/2018 8:06	45.3	107.6		2507
BWC-1	2/13/2018 15:27	230	209.8	H	2507
BWC-1	3/29/2018 8:11	58.7	307.6		2507
BWC-1	4/25/2018 17:40	288	275.5	H	2507
BWC-1	5/31/2018 7:48	82.6	325.5		298
BWC-1	6/27/2018 16:27	263	**2419.6**	GH	298
BWC-1	7/25/2018 8:15	36.1	328		298
BWC-1	8/28/2018 17:18	20.1	65	H	298
BWC-1	9/25/2018 17:27	54	870.4	H	298
BWC-1	10/24/2018 8:07	14.7	132.6		298
BWC-1	11/14/2018 7:50	133	976.8		2507
BWC-1	12/5/2018 7:50	92.2	137.6		2507
BWC-1	1/9/2019 8:14	151	86.2		2507
BWC-1	2/6/2019 8:39	85	88.4		2507
BWC-1	3/20/2019 8:02	126	125.9		2507
BWC-1	4/3/2019 9:30	56.1	96		2507
BWC-1	5/8/2019 10:18	85	161.6		298
BWC-1	6/12/2019 10:10	35.1	365.4		298
BWC-1	7/10/2019 16:29	41.3	648.8	H	298
BWC-1	8/1/2019 10:43	18.8	206.4		298
BWC-1	9/11/2019 15:48	14.2	107.6	H	298
BWC-1	10/2/2019 9:50	13	148.3		298
BWC-1	11/14/2019 8:08	25.2	85.6		2507
BWC-1	12/12/2019 8:42	79.9	307.6		2507
BWC-1	1/16/2020 8:29	431	1986.3		2507
BWC-1	2/27/2020 8:27	236	261.3		2507
BWC-1	1/20/2021 8:19	24.1	172.6		2507
BWC-1	2/25/2021 7:53	119	53.7		2507
BWC-1	3/30/2021 13:54	248	228.2	H	2507
BWC-1	4/21/2021 17:12	57.6	32.7	H	2507
BWC-1	5/19/2021 16:09	56.9	365.4	H	298
BWC-1	6/23/2021 15:23	162	214.3	H	298
BWC-1	7/21/2021 14:52	55.3	166.4	H	298
BWC-1	8/18/2021 15:33	127	461.1	H	298
BWC-1	9/22/2021 15:34	269	1553.1	H	298
BWC-1	10/25/2021 17:40	30.9	125.9	H	298
BWC-1	11/8/2021 16:26	26.4	185	H	2507
BWC-1	12/8/2021 15:43	50.1	298.7	H	2507
BWC-1	3/24/2022 8:52	1690	1203.3		2507
BWC-1	4/20/2022 9:53	116	90.6		2507
BWC-1	5/18/2022 9:54	33.9	107.6		298
BWC-1	6/23/2022 9:08	25.5	307.6		298
BWC-1	7/7/2022 11:40	20.3	866.4		298
BWC-1	7/11/2022 12:00	19.7	145		298
BWC-1	7/14/2022 11:30	20.7	155.3		298
BWC-1	7/18/2022 11:25	18.8	201.4		298
BWC-1	7/20/2022 10:07	34.5	1299.7		298
BWC-1	7/28/2022 11:30	20.7	261.3		298
BWC-1	8/24/2022 10:11	22.7	307.6		298
BWC-1	9/6/2022 11:10	70.7	456.4		298
BWC-1	9/12/2022 11:20	39.4	387.3		298
BWC-1	9/19/2022 11:15	18.8	81.6		298
BWC-1	9/21/2022 11:05	18.2	93.3		298
BWC-1	9/22/2022 10:12	17.2	143.9		298
BWC-1	9/26/2022 11:20	16.3	260.3		298
BWC-1	10/20/2022 8:51	11.6	68.3		298

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWC-2	3/6/2019 11:01		248.1		2507
BWC-2	4/3/2019 8:54	46.8	116.2		2507
BWC-2	5/8/2019 9:48		146.7		298
BWC-2	6/12/2019 9:42		613.1		298
BWC-2	7/10/2019 15:51		248.1	H	298
BWC-2	7/11/2019 10:12		579.4		298
BWC-2	8/1/2019 9:56	20.5	184.2		298
BWC-2	9/11/2019 10:25		547.5		298
BWC-2	9/11/2019 14:55		209.8	H	298
BWC-2	9/12/2019 9:31		547.5		298
BWC-2	10/2/2019 8:43	15	517.2		298
BWCD-2	3/6/2019 9:09		290.9		2507
BWCD-2	4/2/2019 14:37	97.9	51.2	H	2507
BWCD-2	5/7/2019 15:31	124.5	172.5	H	298
BWCD-2	6/11/2019 13:52	66.5	344.8	H	298
BWCD-2	7/10/2019 8:45		328.2		298
BWCD-2	7/10/2019 14:07		547.5	H	298
BWCD-2	7/11/2019 8:40		146.7		298
BWCD-2	7/31/2019 14:34		344.8	H	298
BWCD-2	9/11/2019 9:25		167		298
BWCD-2	9/11/2019 14:07		127.4	H	298
BWCD-2	9/12/2019 8:19		285.1		298
BWCD-2	10/1/2019 15:03	21.5	73.3	H	298
BWCD-2	3/24/2022 9:27		1203.3		2507
BWCD-2	4/20/2022 10:48		108.1		2507
BWCD-2	5/18/2022 10:30		118.7		298
BWCD-2	6/23/2022 10:06		101.4		298
BWCD-2	7/20/2022 10:42		2419.6	G	298
BWCD-2	8/24/2022 10:52		290.9		298
BWCD-2	9/22/2022 10:46		260.3		298
BWCD-2	10/20/2022 9:27		127.4		298
BWCD-3	3/5/2019 15:43		290.9	H	2507
BWCD-3	4/2/2019 12:46	106.5	62.4	H	2507
BWCD-3	5/7/2019 13:04		325.5	H	298
BWCD-3	6/11/2019 11:58	83.2	307.6	H	298
BWCD-3	7/10/2019 7:15		410.6	H	298
BWCD-3	7/10/2019 13:02		387.3	H	298
BWCD-3	7/11/2019 7:11		172.3	H	298
BWCD-3	7/31/2019 13:02	54.7	248.9	H	298
BWCD-3	9/11/2019 7:49		196.8		298
BWCD-3	9/11/2019 12:37		238.2	H	298
BWCD-3	9/12/2019 6:53		261.3		298
BWCD-3	10/1/2019 13:38	29.8	127.4	H	298
BWCD-4	3/5/2019 14:55		613.1	H	2507
BWCD-4	4/2/2019 15:02		48	H	2507
BWCD-4	5/7/2019 15:12		435.2	H	298
BWCD-4	6/12/2019 14:04		248.9	H	298
BWCD-4	7/10/2019 11:46		248.9		298
BWCD-4	7/10/2019 15:14		172.2	H	298
BWCD-4	7/11/2019 10:33		191.8		298
BWCD-4	8/7/2019 14:01		133.3	H	298
BWCD-4	9/11/2019 10:28		126.7		298
BWCD-4	9/11/2019 14:31		145	H	298
BWCD-4	9/12/2019 10:31		186		298
BWCD-4	10/8/2019 15:15		151.5	H	298

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWCD-4	3/23/2022 16:07		2419.6	GH	2507
BWCD-4	4/20/2022 11:51		461.1		2507
BWCD-4	5/18/2022 11:06		86.2		298
BWCD-4	6/23/2022 10:52		160.7		298
BWCD-4	7/20/2022 11:31		2419.6	G	298
BWCD-4	8/24/2022 11:31		2419.6	G	298
BWCD-4	9/22/2022 11:20		159.7		298
BWCD-4	10/20/2022 10:46		114.5		298
BWCD-5	3/5/2019 14:22		461.1	H	2507
BWCD-5	4/2/2019 14:25		42	H	2507
BWCD-5	5/7/2019 14:41		579.4	H	298
BWCD-5	6/12/2019 13:34		166.4	H	298
BWCD-5	7/10/2019 11:24		290.9		298
BWCD-5	7/10/2019 14:55		275.5	H	298
BWCD-5	7/11/2019 10:14		172.3		298
BWCD-5	8/7/2019 13:38		248.9	H	298
BWCD-5	9/11/2019 10:06		118.7		298
BWCD-5	9/11/2019 14:12		261.3	H	298
BWCD-5	9/12/2019 10:14		129.6		298
BWCD-5	10/8/2019 14:52		95.9	H	298
BWCD-6	3/5/2019 12:24		727	H	2507
BWCD-6	4/2/2019 12:37	184.8	79.8	H	2507
BWCD-6	5/7/2019 11:40		488.4	H	298
BWCD-6	6/12/2019 11:49	122	121.1	H	298
BWCD-6	7/10/2019 9:25		193.5		298
BWCD-6	7/10/2019 13:49		150	H	298
BWCD-6	7/11/2019 9:05		179.3		298
BWCD-6	8/7/2019 12:04	85	75.4	H	298
BWCD-6	9/11/2019 8:44		218.7		298
BWCD-6	9/11/2019 12:50		325.5	H	298
BWCD-6	9/12/2019 9:08		210.5		298
BWCD-6	10/8/2019 13:25	1.6	224.7	H	298
BWCD-7	5/21/2019 16:55	76.7	172.3	H	298
BWCD-7	6/11/2019 14:49	60.6	435.2	H	298
BWCD-7	7/10/2019 10:14		579.4		298
BWCD-7	7/10/2019 14:43		1986.3	H	298
BWCD-7	7/11/2019 9:06		435.2		298
BWCD-7	8/1/2019 8:21	23.6	461.1		298
BWCD-7	9/11/2019 9:59		235.9		298
BWCD-7	9/11/2019 14:35		209.8	H	298
BWCD-7	9/12/2019 9:00		866.4		298
BWCD-7	10/2/2019 8:13	12.6	298.7		298
BWCE-3	3/5/2019 11:21		579.4	H	2507
BWCE-3	4/2/2019 11:59		72.7	H	2507
BWCE-3	5/7/2019 11:11		488.4	H	298
BWCE-3	6/12/2019 11:11		161.6	H	298
BWCE-3	7/10/2019 8:34		248.9		298
BWCE-3	7/10/2019 13:21		186	H	298
BWCE-3	7/11/2019 8:40		328.2		298
BWCE-3	8/7/2019 11:37		133.4	H	298
BWCE-3	9/11/2019 8:13		129.6		298
BWCE-3	9/11/2019 12:24		121.1	H	298
BWCE-3	9/12/2019 8:46		178.5		298
BWCE-3	10/8/2019 12:51	1.4	135.4	H	298

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWCE-3	3/23/2022 15:10		2419.6	GH	2507
BWCE-3	4/19/2022 16:42		579.4	H	2507
BWCE-3	5/17/2022 16:12		167	H	298
BWCE-3	6/22/2022 17:10		124.6	H	298
BWCE-3	7/19/2022 15:33		686.7	H	298
BWCE-3	8/23/2022 15:31		275.5	H	298
BWCE-3	9/21/2022 15:19		139.6	H	298
BWCE-3	10/19/2022 15:54		125.9	H	298

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

Table 26 2018-2022 Data at Big Wills Creek Stations on AL03150106-0108-102

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWCE-1	1/9/2018 15:28	134	36.4	H	235
BWCE-1	2/13/2018 14:27	945	203.4	H	235
BWCE-1	3/28/2018 17:48	294	143.9	H	235
BWCE-1	4/25/2018 16:37	1120	461.1	H	235
BWCE-1	5/30/2018 17:24	228	224.7	H	235
BWCE-1	6/27/2018 15:27	126	260.3	H	235
BWCE-1	7/24/2018 16:41	99.3	579.4	H	235
BWCE-1	8/28/2018 16:17	64.8	81.3	H	235
BWCE-1	9/25/2018 16:31	91.9	488.4	H	235
BWCE-1	10/23/2018 16:23	71.2	131.4	H	235
BWCE-1	11/13/2018 16:01	1570	**4839.2**	GH	235
BWCE-1	12/4/2018 15:21	391	118.7	H	235
BWCE-1	1/8/2019 15:28	613	101.4	H	235
BWCE-1	2/5/2019 15:38	314	27.9	H	235
BWCE-1	3/19/2019 15:43	461	81.6	H	235
BWCE-1	4/2/2019 11:15	245	74.4	H	235
BWCE-1	5/7/2019 10:37	371	461.1	H	235
BWCE-1	6/12/2019 10:33	143	111.9	H	235
BWCE-1	7/9/2019 12:46	80.6	85.7	H	235
BWCE-1	8/7/2019 11:08	80.6	119.8	H	235
BWCE-1	9/10/2019 15:43	59.6	157.6	H	235
BWCE-1	10/8/2019 12:15	61	133.3	H	235
BWCE-1	11/13/2019 16:10	97.3	77.1	H	235
BWCE-1	12/11/2019 15:15	658	2419.6	GH	235
BWCE-1	1/15/2020 14:57	983	2419.6	H	235
BWCE-1	2/26/2020 15:27	917	172.3	H	235
BWCE-1	1/19/2021 15:32	138	30.5	H	235
BWCE-1	2/24/2021 15:07	416	117.8	H	235
BWCE-1	3/30/2021 12:31	911	547.5	H	235
BWCE-1	4/21/2021 16:06	216	70.6	H	235
BWCE-1	5/19/2021 15:02	236	88.9	H	235
BWCE-1	6/23/2021 14:16	1800	727	H	235
BWCE-1	7/21/2021 13:51	426	2419.6	H	235
BWCE-1	8/18/2021 14:29	654	2419.6	GH	235
BWCE-1	9/22/2021 14:41	1140	2419.6	GH	235
BWCE-1	10/25/2021 14:50	125	435.2	H	235
BWCE-1	11/8/2021 15:22	110	63.1	H	235
BWCE-1	12/8/2021 14:51	146	122.3	H	235
BWCE-1	3/23/2022 14:46	368	2419.6	GH	235
BWCE-1	4/19/2022 16:10	476	153.9	H	235
BWCE-1	5/17/2022 15:42	142	79.4	H	235
BWCE-1	6/22/2022 16:18	101	101.4	H	235
BWCE-1	7/7/2022 10:40	77.1	235.9		235
BWCE-1	7/11/2022 10:50	95.5	214.3		235
BWCE-1	7/14/2022 10:30	83.7	228.2		235
BWCE-1	7/18/2022 10:25	73.9	186		235
BWCE-1	7/19/2022 14:54	97.3	980.4	H	235
BWCE-1	7/28/2022 10:30	90.4	178.9		235
BWCE-1	8/23/2022 15:08	92.9	214.3	H	235
BWCE-1	9/6/2022 10:10	303	1632.8		235
BWCE-1	9/12/2022 10:20	425	2419.6	G	235
BWCE-1	9/19/2022 10:15	85.3	165.8		235
BWCE-1	9/21/2022 12:00	78.7	166.4		235
BWCE-1	9/21/2022 14:50	82	248.1	H	235
BWCE-1	9/26/2022 10:15	69.2	142.1		235
BWCE-1	10/19/2022 15:19	58.6	104.3	H	235

Station	Visit Date/Time	Flow (cfs)	*E. coli* (col/100 ml)	*E. coli* dc*	*E. coli* Criterion (col/100 ml)
BWCE-4	3/23/2022 14:19		2419.6	GH	235
BWCE-4	4/19/2022 15:00		613.1	H	235
BWCE-4	5/17/2022 15:09		105.4	H	235
BWCE-4	6/22/2022 15:33		111.2	H	235
BWCE-4	7/19/2022 14:17		1553.1	H	235
BWCE-4	8/23/2022 14:39		235.9	H	235
BWCE-4	9/21/2022 14:25		214.3	H	235
BWCE-4	10/19/2022 14:35		90.5	H	235
BWCE-5	3/23/2022 13:48		2419.6	H	235
BWCE-5	4/19/2022 14:10		344.1	H	235
BWCE-5	5/17/2022 14:15		160.7	H	235
BWCE-5	6/22/2022 14:52		365.4	H	235
BWCE-5	7/19/2022 13:09		1732.9	H	235
BWCE-5	8/23/2022 14:01		1299.7	H	235
BWCE-5	9/21/2022 13:51		139.6	H	235
BWCE-5	10/19/2022 13:36		76.3	H	235

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

Table 27 2019 Data for the Big Wills Creek Tributaries

Station	Waterbody	Visit Date/Time	Flow (cfs)*	*E. coli* (col/100ml)	*E. coli* dc**	*E. coli* Criterion (col/100 ml)
JACD-1	Jacks Ck	3/6/2019 10:10	30.1	59.4		2507
JACD-1	Jacks Ck	4/3/2019 8:04	10.6	41		2507
JACD-1	Jacks Ck	5/8/2019 9:00	14.5	365.4		298
JACD-1	Jacks Ck	6/12/2019 9:04	6.6	547.5		298
JACD-1	Jacks Ck	7/10/2019 10:54	6.8	**2419.6**	G	298
JACD-1	Jacks Ck	7/10/2019 15:16	5.9	920.8	H	298
JACD-1	Jacks Ck	7/11/2019 9:41	3.5	235.9		298
JACD-1	Jacks Ck	8/1/2019 9:13	2.4	488.4		298
JACD-1	Jacks Ck	9/11/2019 10:55	1.8	648.8		298
JACD-1	Jacks Ck	9/11/2019 15:26	1.7	190.4	H	298
JACD-1	Jacks Ck	9/12/2019 10:07	2.1	488.4		298
JACD-1	Jacks Ck	10/2/2019 9:20	1.2	275.5		298
LWBD-1	Little Wills Valley Branch	3/6/2019 8:28	17.8	198.9		2507
LWBD-1	Little Wills Valley Branch	4/2/2019 14:11	5.3	30.1	H	2507
LWBD-1	Little Wills Valley Branch	5/7/2019 14:33	6.5	270	H	298
LWBD-1	Little Wills Valley Branch	6/11/2019 13:26	2.8	218.7	H	298
LWBD-1	Little Wills Valley Branch	7/10/2019 8:31	5.2	**770.1**		298
LWBD-1	Little Wills Valley Branch	7/10/2019 14:03	2.4	285.1	H	298
LWBD-1	Little Wills Valley Branch	7/11/2019 8:26	2.5	410.6		298
LWBD-1	Little Wills Valley Branch	7/31/2019 14:42	1.8	517.2	H	298
LWBD-1	Little Wills Valley Branch	9/11/2019 9:01	1.3	137.6		298
LWBD-1	Little Wills Valley Branch	9/11/2019 13:59	1.3	109.2	H	298
LWBD-1	Little Wills Valley Branch	9/12/2019 8:14	1.6	114.5		298
LWBD-1	Little Wills Valley Branch	10/1/2019 14:58	1.1	146.7	H	298
LSCD-1	Little Sand Valley Creek	3/5/2019 13:12	38.3	146.7	H	2507
LSCD-1	Little Sand Valley Creek	4/2/2019 13:25	7.3	218.7	H	2507
LSCD-1	Little Sand Valley Creek	5/7/2019 13:10	9	501.2	H	298
LSCD-1	Little Sand Valley Creek	6/12/2019 12:36	2	172.3	H	298
LSCD-1	Little Sand Valley Creek	7/10/2019 10:17	7.0	**1046.2**		298
LSCD-1	Little Sand Valley Creek	7/10/2019 14:14	6.5	517.2	H	298
LSCD-1	Little Sand Valley Creek	7/11/2019 9:34	3.6	387.3		298
LSCD-1	Little Sand Valley Creek	8/7/2019 12:52	3.1	201.4	H	298
LSCD-1	Little Sand Valley Creek	9/11/2019 9:14	1.8	613.1		298
LSCD-1	Little Sand Valley Creek	9/11/2019 13:20	1.8	162.4	H	298
LSCD-1	Little Sand Valley Creek	9/12/2019 9:37	2.2	285.1		298
LSCD-1	Little Sand Valley Creek	10/8/2019 14:03	2	204.6	H	298
MUSD-2	Mush Ck	3/5/2019 16:29	63.8	129.6	H	2507
MUSD-2	Mush Ck	4/2/2019 13:29	7.7	88	H	2507
MUSD-2	Mush Ck	5/7/2019 13:41	15.5	307.6	H	298
MUSD-2	Mush Ck	6/11/2019 12:45	3.3	344.8	H	298
MUSD-2	Mush Ck	7/10/2019 7:52	10.9	461.1	H	298
MUSD-2	Mush Ck	7/10/2019 13:28	9.1	178.9	H	298
MUSD-2	Mush Ck	7/11/2019 7:59	5.1	235.9		298
MUSD-2	Mush Ck	7/31/2019 13:44	1.5	90.5	H	298
MUSD-2	Mush Ck	9/11/2019 8:24	2.5	261.3		298
MUSD-2	Mush Ck	9/11/2019 13:24	2.5	222.4	H	298
MUSD-2	Mush Ck	9/12/2019 7:36	3.2	**579.4**		298
MUSD-2	Mush Ck	10/1/2019 14:18	1.7	193.5	H	298

**Flows highlighted in yellow were calculated by ratioing the drainage area of the tributary with the reference gage (USGS Gage 02400680) drainage area and flow at the approximate time of sample collection.
*G = The actual number was probably greater than the number reported.
*H = The analytical holding times for analysis are exceeded.

7.3 NPDES Non-Continuous Dischargers

Table 28 Permitted NPDES Non-Continuous Dischargers in the Big Wills Creek Watershed

Permit Number	Facility Name	Activity
AL0054542	Giant Resource Recovery - Attalla Inc.	Fuel Blending, Storage, and Disposal
AL0055778	Fort Payne Quarry	Quarry Operations and Associated Areas
AL0067571	Attalla WTP	Water Treatment Plant
AL0073032	Keener Quarry	Quarry Operations and Associated Areas
AL0075868	Collinsville Chert Pit	Shale and Common Clay and Associated Areas
AL0083534	Collinsville Quarry	Quarry Operations and Associated Areas
AL0084034	YS Inc.	Toll Manufacturing Operations
ALG020145	Wiregrass Construction - Fort Payne Plant	Asphalt
ALG060324	Valley Timber Inc.	Lumber, Wood and Paper Board
ALG060476	Kykenkee - Collinsville	Lumber, Wood and Paper Board
ALG110139	Fort Payne Plant	Concrete
ALG120064	Gulf Coast Plating, Inc	Metals
ALG120116	Heil Environmental Plant Two	Metals
ALG120290	Valley Joist Company	Metals
ALG120297	Fritz Structural Steel Inc	Metals
ALG120352	Gametime A Division of Playcore	Metals
ALG120405	Vulcraft - Fort Payne	Metals
ALG120426	Siemens Energy, Incorporated	Metals
ALG120510	GH Metal Solutions, Inc.	Metals
ALG120759	Frontier Gratings, LLC	Metals
ALG120760	Bailey Bridges, Inc	Metals
ALG120818	YS, Inc.	Metals
ALG120838	Valley Joist, LLC	Metals
ALG140079	Fort Payne Municipal Airport	Transportation
ALG140347	United Parcel Service - Fort Payne	Transportation
ALG140348	United Parcel Service - Gadsden	Transportation
ALG140892	Alabama & Tennessee River Railway, LLC Gadsden Yard	Transportation
ALG141165	Attalla Yard	Transportation
ALG150011	Tyson Farms, Inc. - Ivalee Feed Mill	Food and Related Substances
ALG160106	Fort Payne Landfill	Landfill
ALG160126	Sand Valley Landfill	Landfill
ALG160204	Noble Hill Landfill	Landfill
ALG180281	Kelley and Spurlock Auto Parts Inc	Salvage and Recycling
ALG180342	Schnitzer Southeast - Attalla	Salvage and Recycling
ALG180432	Gibbs Salvage	Salvage and Recycling
ALG180442	Hereford Scrap Metal LLC	Salvage and Recycling
ALG180831	M & J Auto Parts - Attalla	Salvage and Recycling
ALG180895	Jet Polymer Recycling, Inc.	Salvage and Recycling
ALG200104	AP Plasman	Plastics and Rubber
ALG200123	Fehrer Alabama LLC	Plastics and Rubber
ALG240082	Renfro LLC, Fort Payne Plant	Textiles
ALG340645	Cedar Bluff Oil Co. - Ft. Payne	Petroleum Products and Treated Groundwater
ALG340697	X-treme Express Car Wash	Petroleum Products and Treated Groundwater
ALG640021	Fort Payne Water Treatment Plant	Water Treatment Plant

7.4 Sanitary Sewer Overflows (SSOs)

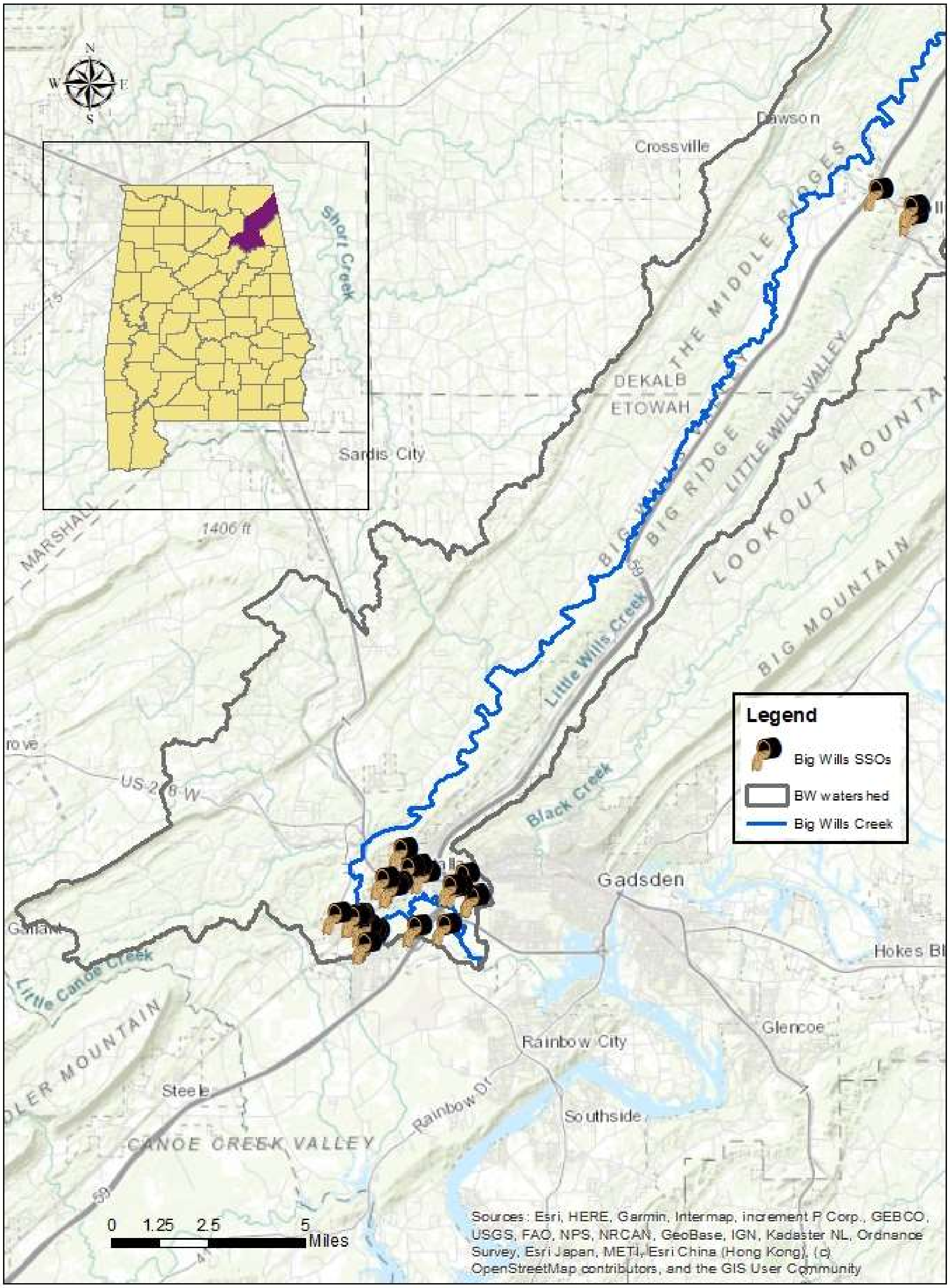
Table 29 Reported SSOs in the Big Wills Creek Watershed

Gadsden West River WWTP (Permit No. AL0053201)		
SSO began	Estimated Release Volume (gallons)	Duration (hours)
2/8/2018	4800	4
7/4/2018	100	2
12/23/2019	2660	4
4/13/2020	4800	3
10/16/2020	< 1000	1
2/1/2021	300	0
3/30/2021	9000	1
8/8/2022	1200	1
12/11/2022	8000	6
12/14/2022	9500	7
1/4/2023	4500	4
2/17/2023	6500	3
2/18/2023	600	2
5/18/2023	850	2

Collinsville Lagoon (Permit No. AL0024236)		
SSO began	Estimated Release Volume (gallons)	Duration (hours)
02/22/19	10 000 - 25 000	72
02/06/20	25 000 - 50 000	49
02/06/20	25 000 - 50 000	49
04/13/20	50 000 - 75 000	70

Attalla Wastewater Treatment Lagoon (Permit No. AL0057657)		
SSO began	Estimated Release Volume (gallons)	Duration (hours)
6/12/2018	< 1000	1
12/28/2018	1 000 - 10 000	6
2/17/2019	1 000 - 10 000	13
2/21/2019	10 000 - 25 000	22
2/21/2019	10 000 - 25 000	22
3/14/2019	1 000 - 10 000	21
9/26/2019	1 000 - 10 000	6
10/30/2019	< 1000	1
10/30/2019	< 1000	1
12/23/2019	1 000 - 10 000	4
12/23/2019	1 000 - 10 000	2
2/6/2020	10 000 - 25 000	24
2/6/2020	10 000 - 25 000	24
2/20/2020	1 000 - 10 000	16
3/5/2020	10 000 - 25 000	21
3/5/2020	10 000 - 25 000	18
3/23/2020	1 000 - 10 000	16
3/23/2020	1 000 - 10 000	16
3/31/2021	10 000 - 25 000	9
3/31/2021	10 000 - 25 000	8
3/31/2021	1 000 - 10 000	8
4/16/2021	< 1000	1
7/20/2021	10 000 - 25 000	17
7/21/2021	10 000 - 25 000	17
5/17/2022	10 000 - 25 000	3
10/15/2022	10 000 - 25 000	9
12/15/2022	1 000 - 10 000	18
12/15/2022	1 000 - 10 000	9
3/2/2023	10 000 - 25 000	2
4/19/2023	10 000 - 25 000	19

Figure 6 Map of SSOs in the Big Wills Creek Watershed



7.5 Big Wills Creek Watershed Photos

Photo 1 Big Wills Creek at Highway 35 (BWC-1), upstream view.

Photo 2 Big Wills Creek at Highway 35 (BWC-1), downstream view.

Photo 3 Big Wills Creek at Briton Gap Rd (BWCE-1), upstream view.

Photo 4 Big Wills Creek at Briton Gap Rd (BWCE-1), downstream view.

Photo 5 Jacks Creek (JACD-1), upstream view.

Photo 6 Little Wills Valley Branch (LWBD-1), upstream view.

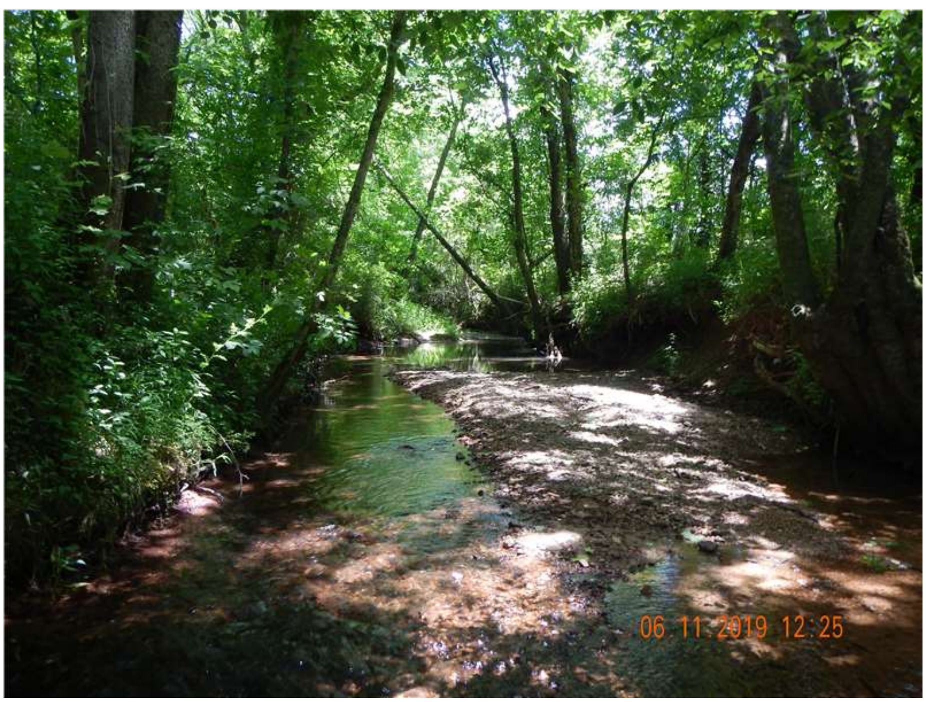


Photo 7 Little Sand Valley Creek (LSCD-1), upstream view.

Photo 8 Mush Creek (MUSD-2), upstream view.