Draft
Total Maximum Daily Load (TMDL)
for
Fowl River

Assessment Unit ID #AL03160205-0104-111

Pathogens (Enterococci)

Mobile County

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

Figure 1-1. Site map of impaired portion of Fowl River

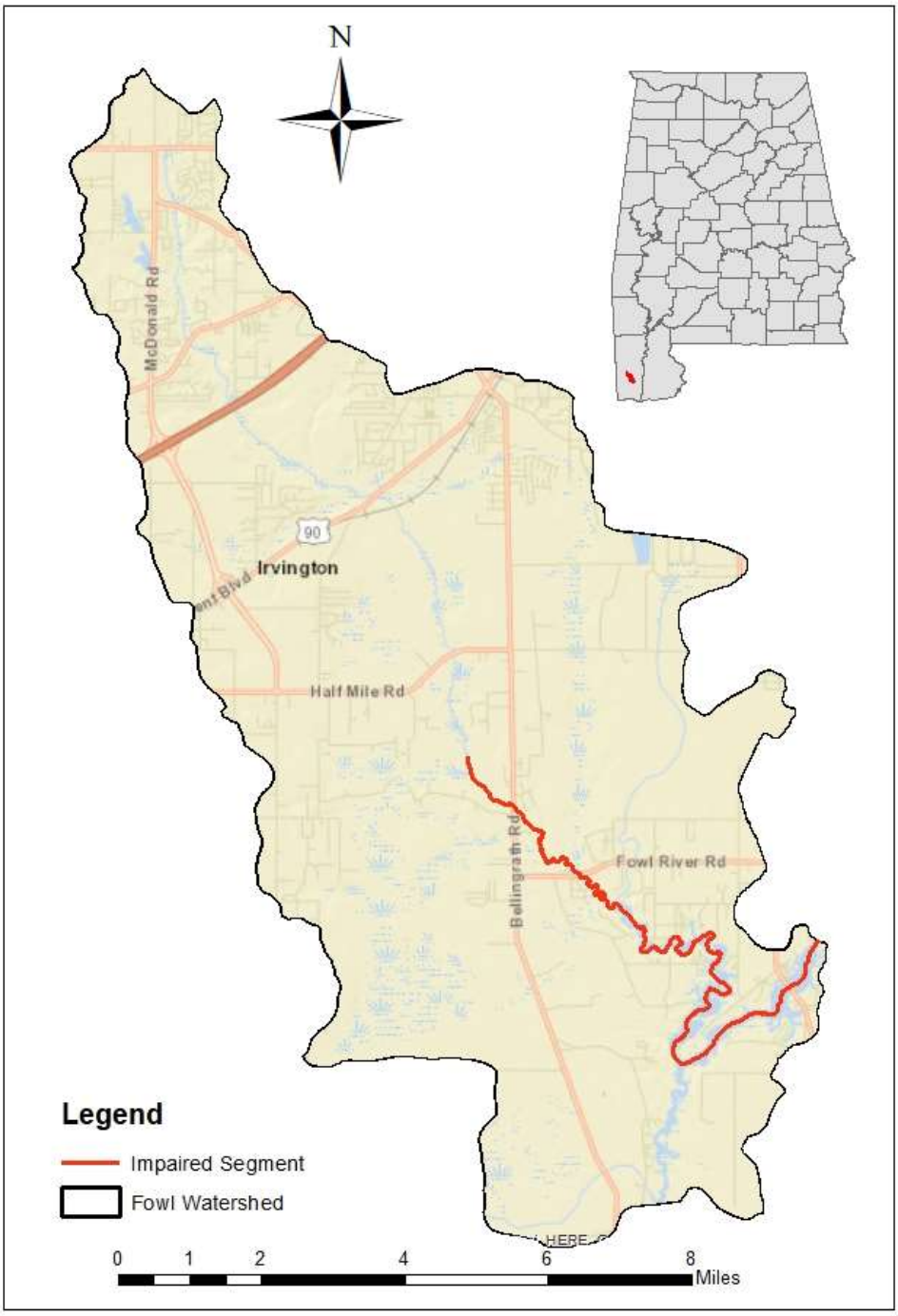


Table of Contents *Page*

List of Figures *Page*

List of Tables

List of Photos

1.0 Executive Summary

Section 303(d) of the Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify waterbodies which are not meeting their designated uses and to determine the total maximum daily load (TMDL) for pollutants causing the use impairment. A TMDL is the maximum amount of pollutant a waterbody can assimilate while meeting all applicable water quality standards for the pollutant of concern. All TMDLs include the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS).

Fowl River, from Mobile Bay to 10 feet above mean sea level (MSL), is currently included on Alabama's §303(d) list as impaired for pathogens (Enterococci). (It is also listed as impaired for metals (mercury); this TMDL only addresses the pathogens impairment.) This segment of Fowl River has an impaired length of approximately 10.69 miles with a total contributing drainage area of 62.1 square miles. It was originally placed on Alabama's §303(d) list for pathogens (Enterococci) in 2020 based on data from ADEM station FWLR in 2017 and 2018. Fowl River is in southeastern Mobile County and is tidally influenced. The listed portion of Fowl River holds use classifications of Swimming and Other Whole-Body Water Contact Sports (Swimming) and Fish & Wildlife (F&W).

Between 2019 and 2024, additional monitoring was conducted to evaluate the impaired waterbody. The available data indicates that the impaired region of Fowl River is still not meeting applicable water quality standards with respect to pathogens (Enterococci). During 2019-2024, there were multiple single sample and geometric mean exceedances. Therefore, this Enterococci TMDL has been developed for the assessment unit listed in Table 1-1.

Table 1-1. Assessment unit ID for Fowl River

Assessment Unit ID	Waterbody	Description
AL03160205-0104-111	Fowl River	From Mobile Bay to 10 feet above MSL

A percent reduction approach was utilized to calculate the pathogen TMDL for the impaired segment of Fowl River. Typically, TMDLs are expressed on a mass loading basis (e.g., pounds per day). In this instance, flow was not a consideration due to the tidal nature of the waterbody. Therefore, a percent reduction was based solely on the highest exceedance value measured in terms of concentration.

The existing pathogen concentration used for this TMDL was based on the highest single sample exceedance that occurred within the past six years at the beach monitoring station FWLR. The highest single sample exceedance was 2755 colonies/100 ml, taken on September 16, 2024. The allowable concentration, defined by the single sample criterion including a margin of safety, was calculated by subtracting 10% from the single sample criterion. The allowable concentration was determined to be 93.6 colonies/100 ml (104 colonies/100 ml – 10% Margin of Safety). The

reduction required to meet the allowable concentration was then calculated by subtracting the existing concentration from the allowable concentration and then dividing that value by the existing concentration. The highest single sample violation calls for a reduction of 97%. Required geometric mean reductions were found to be less stringent than the required single sample reduction.

Table 1-2 is a summary of the existing concentration, allowable concentration, and percent reduction for the single sample criterion vs. the geometric mean criterion for the impaired segment of Fowl River (AL03160205-0104-111). Table 1-3 provides details of the TMDL along with the corresponding reductions for Fowl River, which are protective of the Enterococci water quality standards year-round.

Table 1-2. Enterococci concentrations and required reductions for Fowl River

Source	Existing Concentration (col/100 ml)	Allowable Concentration (col/100 ml)	Required Reduction (col/100 ml)	% Reduction
Single Sample	2755	93.6	2661.4	97%
Geometric Mean	104	31.5	72.5	70%

Table 1-3. Enterococci TMDL for Fowl River (AL03160205-0104-111)

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/100 ml)	(col/100 ml)	(col/100 ml)	(% reduction)	(col/day)	(col/100 ml)	(% reduction)
104	10.4	NA	97%	0	93.6	97%

NA = not applicable

a. There are no CAFOs in the subject watershed. Future CAFOs will be assigned a waste load allocation (WLA) of zero.

b. Future WWTPs must meet applicable instream water quality criteria for pathogens at the point of discharge.

c. Current and future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation and maintenance of BMPs on a case-by-case basis. For the purposes of this TMDL, the 97% reduction for MS4s and other stormwater sources should not be interpreted as a numeric permit limitation.

d. The objective for leaking collections 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 pathogen loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for pathogens.

e. TMDL was established using the Swimming and Other Whole-Body Water Contact single sample criterion of 104 colonies/100 ml.

Compliance with the terms and conditions of existing and future National Pollutant Discharge Elimination System (NPDES) permits will effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL. Required load reductions in the LA portion of this TMDL can be implemented through voluntary measures and may be eligible for CWA §319 grants.

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

2.0 Basis for §303(d) Listing

2.1 Introduction

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

The state of Alabama has identified a 10.69 mile segment of Fowl River as impaired for pathogens. This portion of Fowl River was originally placed on Alabama's 2020 §303(d) list of impaired waterbodies for pathogens (Enterococci) based on beach monitoring program data collected in 2017 and 2018 at station FWLR. The source of the impairment on the current §303(d) list is collection system failure.

2.2 Problem Definition

Waterbody Impaired:	Fowl River – from Mobile Bay to 10 feet above MSL
Impaired Area:	10.69 square miles
Contributing Drainage Area:	62.1 square miles
Water quality Standard Violation:	Pathogens (Single Sample & Geometric Mean)
Pollutant of Concern:	Pathogens (Enterococci)
Water Use Classification:	Fish and Wildlife / Swimming and Other Whole-Body Water Contact Sports

Usage Related to Classification:

The impaired segment of Fowl River has two use classifications: Fish and Wildlife (F&W) and Swimming and Other Whole-Body Water Contact Sports (Swimming). Usage of waters for the

F&W classification is described in ADEM Admin. Code R. 335-6-10-.09 (5)(a), (b), (c), and (d) as follows:

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

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

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

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

Usage of waters for the Swimming classification is described in ADEM Admin. Code R. 335-6-10-.09 (3)(a) and (b) as follows:

(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.

<u>Pathogen Criteria:</u>

Pathogen criteria for the F&W classification are described in ADEM Admin. Code R. 335-6-10-.09 (5)(e) 7. (i) and (ii) as follows:

7. Bacteria:

(i) In non-coastal waters, bacteria of the E. coli group shall not exceed a geometric mean of 548 colonies/100 ml; nor exceed a maximum of 2,507 colonies/100 ml in any sample. In coastal waters, bacteria of the enterococci group shall not exceed a maximum of 275 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than

five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

(ii) For incidental water contact and whole body water-contact recreation during the months of May through October, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean E. coli organism density does not exceed 126 colonies/100 ml nor exceed a maximum of 298 colonies/100 ml in any sample in non-coastal waters. In coastal waters, bacteria of the enterococci group shall not exceed a geometric mean of 35 colonies/100 ml nor exceed a maximum of 158 colonies/100 ml in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric bacterial coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports.

Pathogen criteria for the Swimming classification are described in ADEM Admin. Code R. 335-6-10-.09 (3) (c) 7. (i), (ii), and (iii) as follows:

7. Bacteria:

(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.

A summary of Alabama's bacteria criteria for the F&W and Swimming use classifications is shown in Table 2-1 below. These values are for coastal waters only.

Table 2-1. Alabama's Enterococci criteria.

Use Classification	Single Sample	Geometric Mean
F&W	≤ 158 colonies/100 ml (May-October) ≤ 275 colonies/100 ml (November-April)	≤ 35 colonies/100 ml (May-October)
Swimming	≤ 104 colonies/100 ml (year-round)	≤ 35 colonies/100 ml (year-round)

Criteria Exceeded:

Criteria for different use classifications are not always the same. If a waterbody has multiple use classifications, the most stringent of the criteria will apply, thereby ensuring that criteria are maintained for each use classification. In this case, the bacteria criteria for the Swimming use classification are applicable. An assessment of the pathogen criteria for the impaired segment of Fowl River results in the following applicable criteria:

Annual (January – December):

The geometric mean for Enterococci may not exceed 35 colonies/100 ml.
The single sample maximum for Enterococci may not exceed 104 colonies/100 ml.

Fowl River was originally placed on Alabama's 2020 §303(d) list of impaired waterbodies for pathogens (Enterococci) based on beach monitoring program data collected in 2017 and 2018 at station FWLR. The applicable single sample Enterococci criterion was exceeded in seven out of thirty-seven samples in 2017 and in eight out of thirty-seven samples in 2018. The geometric mean criterion was also exceeded in 2017 and 2018. This data can be found in Appendix 7.2, Table 7-2.

3.0 Technical Basis for TMDL Development

3.1 Water Quality Target Identification

A single sample Enterococci allowable concentration of 93.6 colonies/100 ml will be used for this TMDL. This concentration was derived by using the single sample criterion of 104 col/100 ml and a 10% explicit margin of safety. This allowable concentration is protective of water quality standards and should not allow the single sample criteria of 104 colonies/100 ml to be exceeded. In addition, a geometric mean Enterococci target of 31.5 colonies/100 ml will be used for a series of at least five samples taken no less than 24 hours apart over the course of 30 days. This target was derived by using a 10% explicit margin of safety from the geometric mean maximum of 35 colonies/100 ml criterion. This target is considered protective of water quality standards and should not allow the geometric mean of 35 colonies/100 ml to be exceeded.

3.2 Source Assessment

3.2.1 Point Sources in the Fowl River Watershed

A point source can be defined as a discernible, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point source contributions can typically be attributed to municipal wastewater facilities, leaking sewer systems in urban areas, and illicit discharges. Municipal wastewater treatment facilities are permitted through the NPDES process administered by ADEM. In urban settings, sewer lines typically run parallel to streams in the floodplain. If a leaking sewer line is present, high concentrations of Enterococci can flow into the stream or leach into the groundwater. Illicit discharges are found at facilities that are discharging Enterococci bacteria when not permitted, or when Enterococci criterion established in an issued NPDES permit is not being upheld.

3.2.1.1 Continuous Point Sources

There are currently no NPDES-regulated continuous point sources in the Fowl River watershed. Any future NPDES-regulated, continuous discharges that are considered by the Department to be a pathogen source will be required to meet the instream water quality criteria for pathogens at the point of discharge.

3.2.1.2 Non-Continuous Point Sources

There are numerous facilities with mining, construction, and industrial (individual and general) NPDES permits located within the TMDL watershed. These facilities are not required to monitor for Enterococci and are not considered to be a source of pathogens due to the nature of their operations. As such, no Enterococci loading will be attributed to these facilities, nor will they 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 WLAs in TMDLs. The EPA defines an MS4 as *"a conveyance or system of 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 two MS4 permits within the Fowl River watershed. These permits are listed below in Table 3-1. Contributions from these MS4 areas will be allocated as MS4 WLAs in the TMDL. Current and future MS4s will be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation of BMPs on a case-by-case basis.

Table 3-1 MS4 Permits in the Fowl River Watershed

Permit Number	Name	Phase
ALS000007	City of Mobile	I
ALR040043	Mobile County	II

There are currently no Animal Feeding Operation/Concentrated Animal Feeding Operation (AFO/CAFO) facilities located within the Fowl River watershed. The ADEM AFO/CAFO rules prohibit discharges of pollutants from the facilities and their associated waste land application activities. As a result, future AFOs/CAFOs will receive a waste load allocation of zero.

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

Sanitary sewer overflows (SSOs) have the potential to severely impact water quality and can often result in the violation of water quality standards. It is the responsibility of the NPDES wastewater discharger or collection system operator for non-permitted "collection only" systems to ensure that releases do not occur. Unfortunately, releases to surface waters from SSOs are not always preventable or reported. From a review of the Department's Alabama Environmental Permitting

and Compliance System (AEPACS) database, it was found that, during 2019-2024, there were two SSOs related to the Clifton C. Williams WWTP. Further details of the SSOs in the watershed are included in Appendix 7.3.

There are currently no registered sites in the Fowl River watershed where land application of by-products for beneficial use is present. Beneficial use sites are regulated by ADEM's Land Division and are required to implement appropriate BMPs and agronomic application rates to protect the environment.

3.2.2 Nonpoint Sources in the Fowl River Watershed

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

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

Enterococci bacteria can also originate from forested areas due to the presence of wild animals such as deer, raccoons, turkeys, beavers, and waterfowl. 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.

Enterococci loading from urban areas is potentially attributable to multiple sources including storm water runoff, illicit discharges of wastewater, runoff from improper disposal of waste materials, failing septic tanks, sewer overflows due to infiltration and inflow, 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 Enterococci bacteria to surface waters due to system failure and malfunction.

3.3 Land Use Assessment

Land use for the Fowl River watershed was determined using ArcMap with land use datasets derived from the 2021 National Land Cover Dataset (NLCD). Figure 3-1 and Table 3-2 display the land use areas for the watershed of the impaired segment of Fowl River. Figure 3-2 shows the grouped land uses for the watershed.

Most of the watershed is forested/natural (62.09%). Agricultural land and developed land make up 18.13% and 17.82% of the watershed, respectively. Developed land includes both commercial and residential land uses. The remaining land use is approximately 1.96% open water.

Figure 3-1. Land use map for the Fowl River watershed

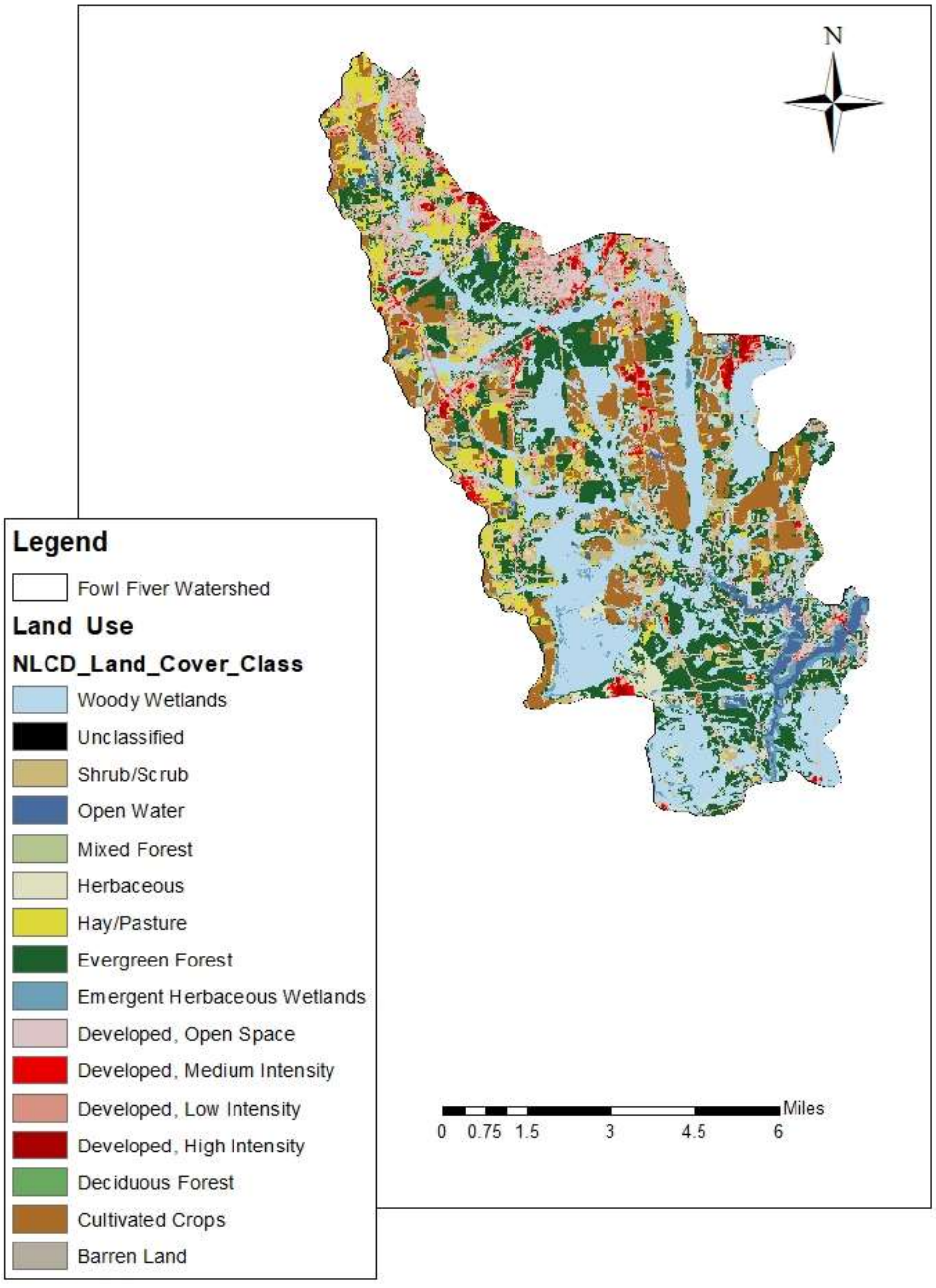
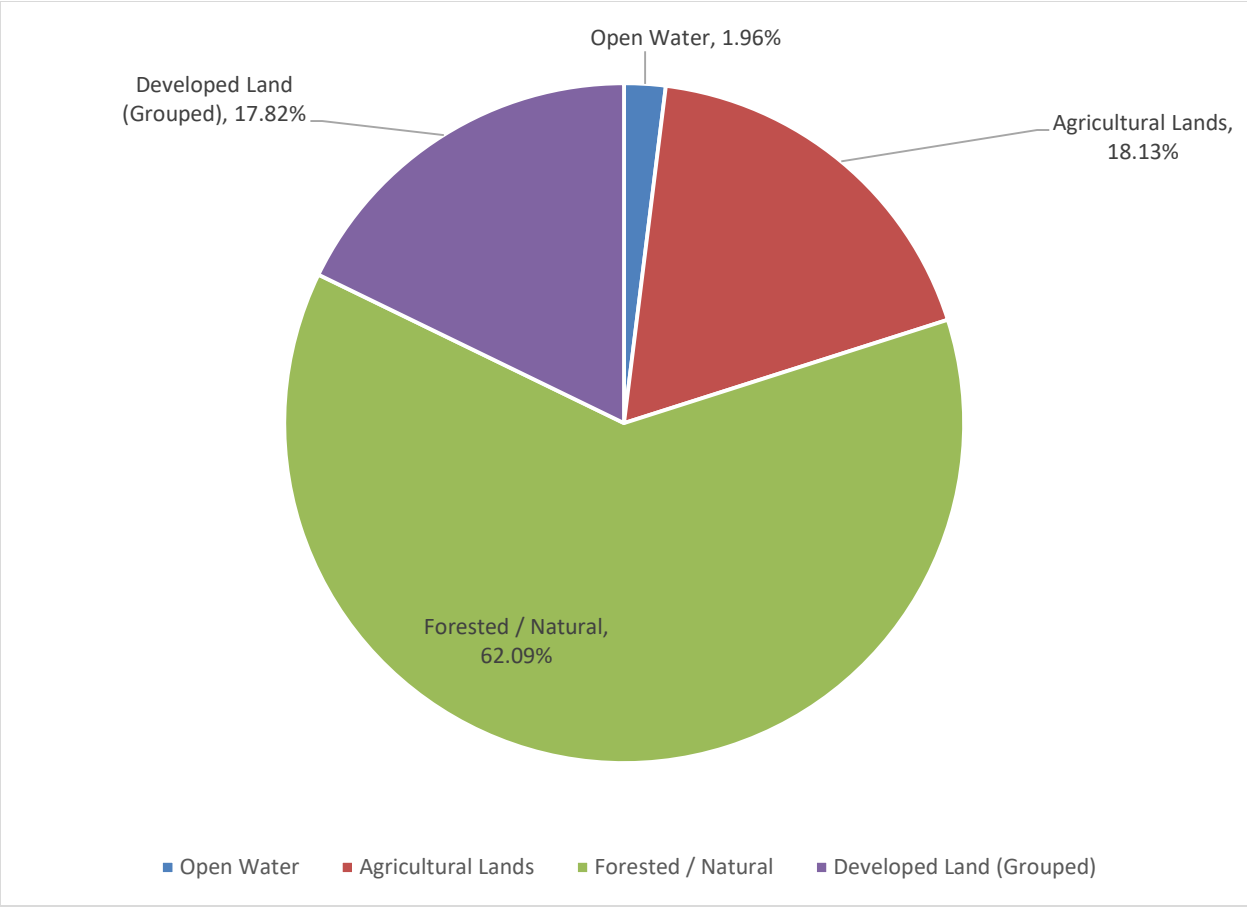


Table 3-2. Land use areas for the Fowl River watershed

Class Description	Mi²	Acres	Percent
Open Water	1.22	779.72	1.96%
Developed, Open Space	6.28	4020.09	10.11%
Developed, Low Intensity	2.71	1736.40	4.37%
Developed, Medium Intensity	1.29	821.50	2.07%
Developed, High Intensity	0.40	257.75	0.65%
Barren Land	0.38	245.07	0.62%
Deciduous Forest	0.05	33.58	0.09%
Evergreen Forest	12.93	8272.13	20.81%
Mixed Forest	0.88	561.30	1.41%
Shrub/Scrub	3.11	1987.92	5.00%
Herbaceous	1.79	1143.74	2.88%
Hay/Pasture	4.12	2639.96	6.64%
Cultivated Crops	7.13	4564.49	11.49%
Woody Wetlands	18.47	11820.09	29.74%
Emergent Herbaceous Wetlands	1.34	859.53	2.16%
TOTALS →	**62.10**	**39743.25**	**100.00%**
Class Description	**Mi²**	**Acres**	**Percent**
Open Water	1.22	779.72	1.96%
Agricultural Lands	11.26	7204.45	18.13%
Forested / Natural	38.56	24678.28	62.09%
Developed Land (Grouped)	11.06	7080.80	17.82%
TOTALS →	**62.10**	**39743.25**	**100.00%**

Figure 3-2. Graph of primary land uses for the Fowl River watershed



3.4 Linkage Between Numeric Targets and Sources

The primary land use for the Fowl River watershed is forested/natural, followed by agriculture and developed land. Pollutant loadings from forested areas tend to be low due to their filtering capabilities and will be considered as background conditions. The most likely sources of pathogen loadings in this watershed are from urban runoff and agricultural land uses. Individual loads and reductions will not be calculated for the range of nonpoint sources, but rather the loadings and reductions will be calculated as a single total load and reduction.

3.5 Data Availability and Analysis

The beach monitoring program has been in effect for approximately 25 years with the purpose of protecting human health for whole body contact (i.e., swimming) within coastal waters. The data is collected by ADEM and the Alabama Department of Public Health (ADPH). Samples are usually collected twice per week, once per week, or once every other week during the summer season and once per month during the cooler months. Results of the data are assessed employing ADEM's water quality criteria for pathogens in the coastal area. If values exceed the criteria, then ADPH issues a swimming advisory until subsequent data indicates there is no longer a problem.

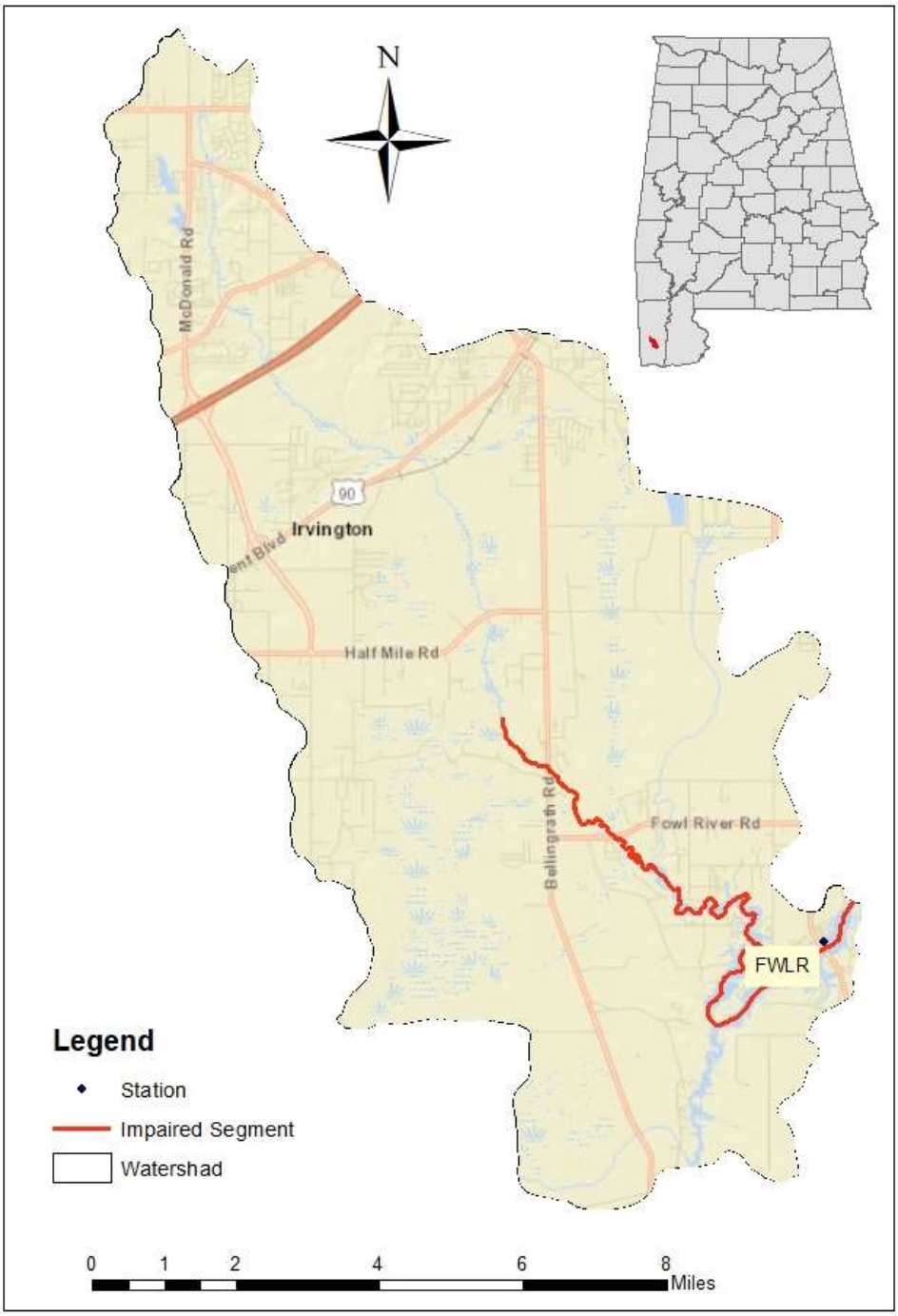
The beach monitoring station FWLR on the impaired segment of Fowl River is located near the bottom of the segment. Table 3-3 describes the station location, and Figure 3-3 is a map showing the station location. (Station FR-1, part of ADEM's coastal waters monitoring program, is at the same location as FWLR and has also been monitored periodically over the past six years. The Enterococci data from this station can be seen in Appendix 7.2, Table 7-3.)

Of the data collected at station FWLR during 2019-2024, there were numerous exceedances of both the single sample and geometric mean criteria. The data was evaluated against the single sample and geometric mean criteria for the Swimming use classification. The exceedance event which results in the largest pathogen reduction at FWLR occurred on September 16, 2024. This was a single sample event with a measured Enterococci value of 2755 colonies/100 ml. A table with all the exceedances can be found in Appendix 7.2, Table 7-1.

Table 3-3. ADEM beach monitoring station on Fowl River

Station	Beach Monitoring Station	Waterbody	Latitude	Longitude
FR-1	FWLR	Fowl River	30.44417°	-88.1131°

Figure 3-3. ADEM station on Fowl River



3.6 Critical Conditions/Seasonal Variation

The Enterococci single sample maximum criterion of 104 colonies/100 ml and geometric mean criterion of 35 colonies/100 ml for the Swimming use classification are applicable year-round. The critical condition for this pathogen TMDL was taken to be the one with the highest Enterococci single sample exceedance value. The highest single sample maximum concentration of 2755 colonies/100 ml was collected on September 16, 2024. The use of the highest exceedance to calculate the TMDL is expected to be protective of water quality in Fowl River year-round.

3.7 Margin of Safety

There are two methods for incorporating a Margin of Safety (MOS) in the analysis: 1) implicitly by using conservative model assumptions to develop allocations, or 2) explicitly by 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 Enterococci data used in this analysis. An explicit MOS was applied to the TMDL by reducing the Enterococci single sample and geometric mean criteria concentrations by ten percent. The single sample criterion of 104 colonies/100 ml was reduced by ten percent to 93.6 colonies/100 ml, while the geometric mean criterion of 35 colonies/100 ml was also reduced by 10% to 31.5 colonies/100 ml.

4.0 TMDL Development

4.1 Definition of a TMDL

A TMDL is the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources including natural background levels, and a margin of safety (MOS). As discussed earlier, the MOS is explicit in this TMDL. A TMDL can be denoted by the following equation:

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

The TMDL is the total amount of pollutant that can be assimilated by the receiving waterbody while achieving water quality standards under critical conditions.

For some pollutants, TMDLs are expressed on a mass loading basis (e.g. pounds per day). However, for pathogens, TMDL loads are typically expressed in terms of organism counts per day (colonies/day), in accordance with 40 CFR 130.2(i). In this instance, flow was not a consideration due to the tidal nature of the impaired waterbody. Therefore, a percent reduction was based solely on the highest exceedance value measured in terms of concentration.

4.2 Reduction and TMDL Calculations

A percent reduction approach was utilized to calculate the pathogen TMDL for Fowl River. The following equation was used to calculate the appropriate reduction:

$$\%\ Reduction = \frac{(Highest\ Exceedance - Sample\ Criterion\ w/MOS)}{Highest\ Exceedance}\ X\ 100$$

The single sample criterion was used because it yielded the greatest reduction among the available data. The TMDL was based on the single sample violation that produced the highest percent reduction of Enterococci necessary to achieve applicable water quality criteria.

The difference in the pathogen concentrations between the existing conditions (violation event) and the allowable conditions converted to a percent reduction represents the total reduction needed to achieve the Enterococci water quality criterion. The percent reduction calculations are shown below. The greatest reduction value seen below (single sample) was used as the basis for this TMDL.

Single sample:

$$\frac{(2755\ col/100\ mL - 93.6\ col/100\ mL)}{2755\ col/100\ mL} X\ 100\% = 97\%\ Reduction$$

Geometric mean:

$$\frac{(104\ col/100\ mL - 31.5\ col/100\ mL)}{104\ col/100\ mL} X\ 100\% = 70\%\ Reduction$$

The TMDL was calculated as the Enterococci concentration to the impaired segment of Fowl River as evaluated at station FWLR. Table 4-1 shows a summary of the existing concentrations, allowable concentrations, and percent reductions for both the single sample and geometric mean criteria for Fowl River. Table 4-2 provides the details of the TMDL along with the corresponding reductions for Fowl River which are protective of Enterococci water quality standards year-round.

Table 4-1. Enterococci concentrations and required reductions for Fowl River

Source	Existing Concentration (col/100 ml)	Allowable Concentration (col/100 ml)	Required Reduction (col/100 ml)	% Reduction
Single Sample	2755	93.6	2661.4	97%
Geometric Mean	104	31.5	72.5	70%

Table 4-2. Enterococci TMDL for Fowl River (AL03160205-0104-111)

TMDL[e]	Margin of Safety (MOS)	Waste Load Allocation (WLA)[a]			Load Allocation (LA)	
		WWTPs[b]	Stormwater (MS4s and other NPDES sources)[c]	Leaking Collection Systems[d]		
(col/100 ml)	(col/100 ml)	(col/100 ml)	(% reduction)	(col/day)	(col/100 ml)	(% reduction)
104	10.4	NA	97%	0	93.6	97%

NA = not applicable

a. There are no CAFOs in the subject watershed. Future CAFOs will be assigned a waste load allocation (WLA) of zero.

b. Future WWTPs must meet applicable instream water quality criteria for pathogens at the point of discharge.

c. Current and future MS4 areas and other NPDES stormwater sources would be required to demonstrate consistency with the assumptions and requirements of this TMDL through implementation and maintenance of BMPs on a case-by-case basis. For the purposes of this TMDL, the 97% reduction for MS4s and other stormwater sources should not be interpreted as a numeric permit limitation.

d. The objective for leaking collections 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 pathogen loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for pathogens.

e. TMDL was established using the Swimming single sample criterion of 104 colonies/100 ml.

4.3 TMDL Summary

The segment of Fowl River from Mobile Bay to 10 feet above MSL was placed on Alabama's §303(d) list for pathogens in 2020 based on data collected at ADEM station FWLR in 2017 and 2018. Since then, ADEM has performed additional monitoring as part of the Department's beach monitoring program. The results from this monitoring confirmed the impairment and provided the basis for this TMDL.

A percent reduction approach was used to calculate the Enterococci TMDL for the impaired segment of Fowl River. Based on the TMDL analysis, it was determined that a 97% reduction was necessary to achieve compliance with applicable water quality standards.

Compliance with the terms and conditions of existing and future NPDES sanitary and stormwater permits will effectively implement the WLA and demonstrate consistency with the assumptions and requirements of the TMDL.

Required load reductions in the 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 needed to achieve applicable water quality criteria, and we are committed to targeting the load reductions to improve water quality in the Fowl River watershed. As additional data and/or information become available, it may become necessary to revise and/or modify the TMDL accordingly.

5.0 Follow-up Monitoring

ADEM has adopted a basin approach to water quality monitoring, an approach that divides Alabama's sixteen major river basins into three groups. Each year, ADEM's water quality resources are concentrated in one of the three basin groups and are divided among multiple priorities including §303(d) listed waterbodies, waterbodies with active TMDLs, and other waterbodies as determined by the Department. Monitoring will help further characterize water quality conditions resulting from the implementation of best management practices and load reductions in the watershed. This monitoring will occur in each basin according to the schedule shown in Table 5-1.

Table 5-1: Follow-up monitoring schedule

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

6.0 Public Participation

As part of the public participation process, this TMDL will be placed on public notice and made available for review and comment. The public notice and subject TMDL will be made available on ADEM's website: www.adem.alabama.gov. In addition, the public notice will be submitted to persons who have requested to be on ADEM's postal and electronic mailing distributions. The public may also request paper or electronic copies of the TMDL by contacting Ms. Kimberly Minton at 334-271-7826 or kminton@adem.alabama.gov. The public will be given an opportunity to review the TMDL and submit comments to the Department in writing. At the end of the public review period, all written comments received during the public notice period will become part of the administrative record. ADEM will consider all comments received by the public prior to final completion of this TMDL and subsequent submission to EPA Region 4 for final approval.

7.0 Appendices

7.1 References

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

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

Alabama's Monitoring Program. 2017-2024. ADEM.

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

Alabama's §303(d) Lists and Fact Sheets. 2020, 2022, 2024. ADEM.

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 7-1. Beach monitoring data at FWRL (2019-2024)

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
12/02/24	20	
11/04/24	10	
10/01/24	63	91.05
09/23/24	63	84.76
09/17/24 resample	41	84.76
09/16/24	2755	98.01
09/09/24	31	36.60
09/03/24	41	29.19
08/26/24	41	32.93
08/19/24	63	39.12
08/12/24	20	39.00
08/05/24	10	39.00
07/29/24	75	51.71
07/22/24	97	70.53
07/15/24	62	63.57
07/08/24	20	52.65
07/01/24	41	52.65
06/25/24 resample	41	58.09
06/24/24	609	62.28
06/17/24	52	31.45
06/10/24	20	28.36
06/04/24	20	38.97
05/28/24	74	
05/20/24	20	
05/13/24	31	
05/06/24	98	
04/08/24	58	
03/11/24	101	
02/06/24 resample	99	
02/05/24	126	
01/08/24	50	
12/07/23 resample	15	
12/06/23 resample	108	

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
12/05/23 resample	200	
12/04/23	200	
11/06/23	1	
10/02/23	6	
09/25/23	21	
09/11/23	3	10.25
09/05/23	54	11.78
08/28/23	25	8.23
08/21/23	2	6.55
08/14/23	14	10.59
08/07/23	6	13.66
07/31/23	9	13.66
07/24/23	8	19.17
07/17/23	22	63.56
07/10/23	50	40.87
07/05/23	6	31.99
06/26/23	49	33.33
06/22/23 resample	81	31.26
06/21/23 resample	400	25.84
06/20/23	400	17.97
06/12/23	1	8.00
06/06/23	9	15.23
05/30/23	8	15.23
05/22/23	65	
05/15/23	7	
05/08/23	25	
05/01/23	9	
04/03/23	1	
03/16/23 resample	72	
03/15/23 resample	190	
03/14/23	282	
02/14/23	27	
01/09/23	18	
12/05/22	60	
11/07/22	16	
10/03/22	6	18.14
09/26/22	25	31.17

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
09/19/22	10	37.37
09/12/22	32	49.74
09/07/22 resample	7	43.73
09/06/22	106	59.35
08/31/22 resample	43	52.85
08/29/22	112	28.61
08/22/22	89	25.58
08/15/22	74	13.76
08/08/22	13	13.36
08/01/22	2	12.68
07/25/22	64	25.20
07/18/22	4	14.47
07/11/22	64	17.38
07/05/22	10	14.52
06/27/22	62	13.88
06/21/22	4	13.30
06/13/22	10	19.01
06/07/22	26	22.00
05/31/22	8	17.23
05/23/22	50	
05/17/22 resample	2	
05/16/22	227	
05/09/22	24	
05/02/22	6	
04/04/22	10	
03/14/22	6	
02/07/22	22	
01/10/22	24	
12/13/21	6	
11/01/21	4	
10/13/21	14	
09/27/21	22	37.22
09/22/21	48	28.71
09/13/21	18	23.04
09/07/21	40	18.50
09/01/21	94	10.16
08/23/21	6	7.46
08/16/21	16	10.55
08/09/21	6	9.96

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
08/02/21	2	9.96
07/26/21	20	17.34
07/19/21	34	68.38
07/12/21	12	67.86
07/06/21	6	64.51
06/28/21	32	76.71
06/24/21 resample	48	86.92
06/23/21 resample	600	95.96
06/22/21 resample	600	66.51
06/21/21	353	21.25
06/14/21	32	12.98
06/08/21	8	14.82
06/01/21	24	19.30
05/24/21	2	
05/17/21	30	
05/10/21	62	
05/03/21	30	
04/14/21 resample	52	
04/13/21 resample	113	
04/12/21	2300	
03/01/21	20	
02/08/21	33	
01/04/21	10	
12/07/20	12	
11/02/20	12	
10/19/20	33	
09/28/20	8	
09/23/20	34	
09/08/20	8	8.83
08/31/20	14	6.69
08/26/20	12	
08/17/20	10	6.63
08/10/20	4	8.92
08/03/20	2	11.45
07/27/20	8	15.11
07/20/20	20	29.77
07/13/20	44	38.11

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
07/06/20	14	73.71
06/29/20	8	66.30
06/23/20 resample	66	68.17
06/22/20	107	68.49
06/15/20	88	92.26
06/11/20 resample	42	92.81
06/10/20 resample	147	103.94
06/09/20	2027	75.72
06/02/20	6	28.17
05/26/20	10	36.45
05/20/20 resample	94	47.21
05/19/20 resample	130	
05/18/20	600	
05/11/20	16	
05/04/20	2	
04/20/20	78	
03/02/20	94	
02/03/20	10	
01/06/20	8	
12/02/19	2	
11/04/19	42	
10/07/19	6	
09/23/19	6	27.26
09/16/19	24	25.73
09/09/19	26	23.82
09/03/19	2	20.78
08/29/19 resample	14	30.70
08/28/19 resample	267	35.92
08/27/19	400	17.81
08/19/19	4	8.14
08/12/19	14	22.52
08/05/19	10	19.56
07/29/19	8	17.96
07/22/19	8	17.96

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
07/16/19 resample	24	14.26
07/15/19	607	12.84
07/08/19	6	7.73
07/01/19	6	7.13
06/24/19	8	6.58
06/17/19	2	8.88
06/10/19	48	19.50
06/04/19	4	17.75
05/28/19	4	20.39
05/20/19	36	
05/13/19	102	
05/06/19	30	
04/29/19	8	
04/01/19	4	
03/11/19	12	
02/04/19	12	
01/07/19	88	

Table 7-2. Beach monitoring data at FWLR (2017-2018 – Listing Data)

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
12/05/18 resample	98	
12/04/18 resample	433	
12/03/18	193	
11/05/18	6	
10/01/18	8	
09/24/18	84	
09/17/18	4	38.82
09/10/18	26	33.79
08/27/18	22	22.67
08/21/18 resample	76	19.15
08/20/18	507	14.54
08/13/18	2	6.63
08/06/18	8	9.49
07/30/18	10	14.55
07/23/18	8	10.55
07/16/18	10	13.55
07/09/18	12	17.88
07/02/18	68	36.68
06/25/18	2	28.82
06/18/18	28	42.98
06/11/18	40	38.29
06/06/18 resample	40	31.33
06/05/18	400	29.84
05/29/18	16	10.34
05/21/18	22	12.47
05/14/18	14	13.27
05/07/18	12	13.13
04/30/18	2	
04/25/18 resample	4	
04/24/18	127	
04/16/18	32	
03/05/18	4	
02/05/18	18	

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
01/16/18 resample	34	
01/11/18 resample	400	
01/10/18 resample	400	
01/09/18	440	
12/04/17	12	
11/06/17	16	
10/02/17	20	9.84
09/25/17	8	8.19
09/18/17	4	7.13
09/11/17	6	6.21
09/05/17	24	7.90
08/28/17	8	6.88
08/21/17	4	33.67
08/14/17	2	48.56
08/07/17	20	65.36
07/31/17	12	75.33
07/26/17 resample	84	102.31
07/25/17 resample	142	106.43
07/24/17	2140	70.41
07/17/17	52	30.75
07/10/17	16	21.15
07/05/17	54	29.74
06/26/17	18	29.74
06/19/17	34	34.89
06/12/17	8	27.32
06/06/17	88	37.90
05/30/17	54	32.03
05/22/17	40	49.36
05/15/17	10	39.22
05/08/17	20	49.25
05/03/17 resample	78	58.98
05/02/17 resample	220	
05/01/17	400	
04/25/17	13	
04/17/17	8	

Date Collected	Enterococcus Count (col/100 ml)	Enterococcus Geometric Mean (col/100 ml)
03/13/17	36	
02/06/17	8	
01/12/17 resample	96	
01/11/17 resample	533	
01/10/17 resample	800	
01/09/17	1293	

Table 7-3. Station FR-1 Data (2020 and 2023)

Station FR-1		
Date	**Enterococcus (col/100 ml)**	**Enterococcus dc***
5/19/2020	52	J
6/3/2020	10	L
7/9/2020	10	L
8/20/2020	10	L
9/8/2020	10	L
10/13/2020	10	J
3/6/2023	10	L
4/19/2023	10	L
5/3/2023	10	L
6/7/2023	10	L
7/11/2023	110	
8/2/2023	290	
9/5/2023	31	J
10/10/2023	10	J

*J – Reported microbiological result is an estimate;
L – The actual value was probably less than the number reported.

7.3 Sanitary Sewer Overflow (SSO) Data

Table 7-4. Recent SSO data

Permit Number	Facility/Site Name	SSO Began Date and Time	SSO Stopped Date and Time	SSO Volume (Gal)	SSO Latitude	SSO Longitude
AL0023086	Clifton C. Williams WWTP	12/11/2019 11:21 AM	12/11/2019 4:00 PM	16740	30.544399	-88.180702
AL0023086	Clifton C. Williams WWTP	2/16/2021 9:33 AM	2/16/2021 2:35 PM	300	30.583850	-88.255730

7.4 Fowl River Watershed Photos (December 17, 2024)

Photo 7-1 Fowl River at FWRL (State Highway 163), Looking Upstream

Photo 7-2 Fowl River at FWRL (State Highway 163), Looking Downstream

Photo 7-3 Fowl River at Memories Fishing Camp (Fowl River Road), Looking Upstream

Photo 7-4 Fowl River at Memories Fishing Camp (Fowl River Road), Looking Downstream