Total Maximum Daily Load

Evaluation

for

Three Stream Segments

in the

Ochlockonee River Basin

for

Bacteria

Submitted to:
The U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

Submitted by:
The Georgia Department of Natural Resources
Environmental Protection Division
Atlanta, Georgia

October 2022

TMDL Action ID: GAR4_22_10_04 **Approved by EPA:** 01/05/2023

Table of Contents

List of Tables

List of Figures

List of Appendices

EXECUTIVE SUMMARY

The State of Georgia Environmental Protection Division (GA EPD) assesses its waterbodies for compliance with water quality criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed waterbodies are placed into one of three categories, supporting designated use, not supporting designated use, or assessment pending, depending on water quality assessment results. These waterbodies are found on Georgia's 2022 305(b) list as required by that section of the CWA that defines the assessment process and are published in *Water Quality in Georgia 2020-2021* (GA EPD, 2022). This document is available on the Georgia Environmental Protection Division (GA EPD) website.

The subset of the waterbodies that do not meet designated uses on the 305(b) list are also assigned to Georgia's 303(d) list, named after that section of the CWA. Although the 305(b) and 303(d) lists are two distinct requirements under the CWA, Georgia reports both lists in one combined format called the Integrated 305(b)/303(d) List, which is found in Appendix A of *Water Quality in Georgia 2020-2021* (GA EPD, 2022). Waterbodies on the 303(d) list are denoted as Category 5, and are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standards.

The TMDL formulations in this document are based on impaired segments contained in the 2022 305(b)/303(d) List. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a waterbody based on the relationship between pollutant sources and instream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

Every waterbody in the State has one or more designated uses, and each designated use has water quality criteria established to protect it. Waterbodies in Georgia are assessed based on the 305(b)/303(d) Listing Assessment Methodology included in Appendix A of *Water Quality in Georgia 2020-2021*, as such GA EPD has placed three (3) stream segments in the Ochlockonee River Basin on the 303(d) list of impaired waters because it was assessed as "not supporting" its designated use of "Fishing" due to violation of the fecal coliform water quality criteria. The water quality criteria when the stream segments were listed was as follows:

> For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. Should water quality and sanitary studies show fecal coliform levels from non-human sources exceed 200 counts per 100 mL (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 counts per 100 mL in lakes and reservoirs and 500 counts per 100 mL in free flowing freshwater streams. For the months of November through April, fecal coliform not to exceed a geometric mean of 1,000 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a maximum of 4,000 counts per 100 mL for any sample. The State does not encourage swimming in these surface waters since a number of factors which are beyond the control of any State regulatory agency contribute to elevated levels of bacteria.

A waterbody is assessed as "not supporting" its use if more than ten percent of the geometric means are greater than their seasonal waterbody specific criteria or if more than ten percent of the samples exceed the single sample criteria.

In January 2022, the Georgia DNR Board adopted new bacteria criteria for "Fishing" and "Drinking Water" designated uses using the bacterial indicators *E. coli* and enterococci. These bacteria are better indicators for human health illnesses. The adopted criteria have the same estimated illness rate (8 per 1000 swimmers) as the previously established fecal coliform criteria. EPA approved

the proposed standards August 31, 2022. Since this TMDL was written after EPA approved the new bacteria criteria, the TMDL will use both bacterial indicators. The current *E. coli* load cannot be determined, but the TMDL will use a 0.63 conversion factor to convert from fecal coliform standards to *E. coli* standards, based on the 30-day geometric mean water quality standard. The current water quality criteria approved August 31, 2022, are as follows:

> For the months of May through October, when primary water contact recreation activities are expected to occur, culturable *E. coli* not to exceed a geometric mean of 126 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an *E. coli* statistical threshold value (STV) of 410 counts per 100 mL in the same 30-day interval. For the months of November through April, culturable *E. coli* not to exceed a geometric mean of 265 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an *E. coli* statistical threshold value (STV) of 861 counts per 100 mL in the same 30-day interval.

A waterbody is assessed as “not supporting” its use if more than ten percent of the geometric means are greater than their seasonal criteria or if more than ten percent of the samples exceeded the STV water quality criteria cited above. An important part of the TMDL analysis is the identification of potential source categories. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Nonpoint sources are diffuse, and generally, but not always, involve accumulated fecal coliform bacteria that wash off land surfaces following storm events.

The process of developing fecal coliform bacteria TMDLs for listed segments in the Ochlockonee River Basin involved the determination of the following:

- The current critical bacterial load to the stream under existing conditions;
- The TMDL for similar conditions under which the current critical load was determined; and
- The percent reduction in the current critical bacterial load necessary to achieve the TMDL.

The calculation of the bacterial load at any point in a stream requires the bacterial concentration and stream flow. The availability of water quality and flow data varies considerably among the listed segments. The Loading Curve Approach was used to determine the current fecal coliform load and TMDL. The bacterial loads and required reductions for each of the listed segments are summarized in Table 1 below.

Point and nonpoint source management practices should be used to help reduce bacteria source loads. The amount of bacteria delivered to a stream is difficult to determine. However, the use of management practices should improve stream water quality, and future monitoring will provide a measurement of TMDL implementation.

Table 1: Bacterial Loads and Required Bacterial Load Reductions

AUID	Stream Segment	Description	Bacterial Indicator	Current Load (counts/ 30 days)	TMDL Components					Reduction Required
					WLA (counts/ 30 days)(1)	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
GAR031200020203	Bay Pole Branch	Pond 400 feet upstream Bay Pole School Road to Bridge Creek	Fecal coliform	1.13E+12	--	--	3.14E+11	3.49E+10	3.49E+11	69.2%
			E. coli	(2)	--	--	1.98E+11	2.20E+10	2.20E+11	Undetermined (3)
GAR031200020706	Unnamed Tributary to Parkers Mill Creek	Pond at headwaters to Parkers Mill Creek	Fecal coliform	1.73E+12	--	--	3.27E+11	3.64E+10	3.64E+11	79.0%
			E. coli	(2)	--	--	2.06E+11	2.29E+10	2.29E+11	Undetermined (3)
GAR031200020504	West Branch Barnetts Creek	Pond 1.2 miles upstream GA Hwy 93 to Big Branch	Fecal coliform	6.52E+11	--	--	1.08E+11	1.20E+10	1.20E+11	81.6%
			E. coli	(2)	--	--	6.82E+10	7.58E+09	7.58E+10	Undetermined (3)

Notes:

(1) The assigned bacterial load from the NPDES permitted facility for WLA was determined as the product of the bacteria permit limit and the facility average monthly discharge at the time of the critical load.
(2) Sample was not analyzed for *E. coli*, therefore critical load calculation not possible.
(3) Percent reduction could not be determined due to absence of current load calculation.

1.0 INTRODUCTION

1.1 Background

The State of Georgia assesses its waterbodies for compliance with water quality criteria established for their designated uses as required by the CWA. Assessed waterbodies are placed into one of three categories, supporting designated use, not supporting designated use, or assessment pending, depending on water quality assessment results. These waterbodies are found on Georgia's 2022 305(b) list as required by that section of the CWA that defines the assessment process and are published in *Water Quality in Georgia 2020-2021* (GA EPD, 2022). This document is available on the Georgia Environmental Protection Division (GA EPD) website.

The subset of the waterbodies that do not meet designated uses on the 305(b) list are also assigned to Georgia's 303(d) list, named after that section of the CWA. Although the 305(b) and 303(d) lists are two distinct requirements under the CWA, Georgia reports both lists in one combined format called the Integrated 305(b)/303(d) List, which is found in Appendix A of *Water Quality in Georgia 2020-2021* (GA EPD, 2022). Waterbodies on the 303(d) list are denoted as Category 5, and are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standards.

The TMDL formulations in this document are based on impaired segments contained in the 2022 305(b)/303(d) List. The TMDL process establishes the allowable pollutant loadings or other quantifiable parameters for a waterbody based on the relationship between pollutant sources and instream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality.

The 303(d) list identifies the stream segments that are not supporting its designated use classification due to exceedances of water quality standards for bacteria. Fecal coliform, *E. coli, and enterococci* bacteria are used as indicators of the potential presence of pathogens in a stream. Table 2 presents the three stream segments in the Ochlockonee River Basin included on the 2022 303(d) list for exceedances of the fecal coliform standard criteria.

Table 2: Stream Segments Listed on the 2022 303(d) List for Bacteria in the Ochlockonee River Basin

Stream Segment	Location	Reach AUID	Segment Length (miles)	Designated Use
Bay Pole Branch	Pond 400 feet upstream Bay Pole School Road to Bridge Creek	GAR031200020203	3	Fishing
Tributary to Parkers Mill Creek	Pond at headwaters to Parkers Mill Creek	GAR031200020706	1	Fishing
West Branch Barnetts Creek	Pond 1.2 miles upstream GA Hwy 93 to Big Branch	GAR031200020504	4	Fishing

1.2 Watershed Description

The Ochlockonee River Basin is located in southwestern Georgia and north-central Florida. The total basin occupies an area of 6,330 square miles of which approximately 1,460 square miles are within Georgia. The United States Geologic Survey (USGS) has divided the Ochlockonee River Basin into four sub-basins, or Hydrologic Unit Codes (HUCs). These are numbered as HUCs 03120001-3120004. Figure 1 shows the location of the Ochlockonee Basin and Figure 2 shows the HUC 8 sub-basins of the Ochlockonee River Basin. Figures 3-5 shows the location of the listed bacteria segments in the Ochlockonee River Basin.

The Basin lies within the Coastal Plain physiographic province, which extends throughout the southeastern United States. The headwaters of the Ochlockonee River originate southwest of the town of Sylvester in Worth County, in southwest Georgia. Other major cities in the Ochlockonee River Basin include Attapulgus, Cario, Doerun, Moultrie, Meigs, Ochlockonee, Pelham, and Thomasville. The main tributaries of the Ochlockonee River in Georgia are the Little Ochlockonee River, Barnett Creek, and Tired Creek. Attapulgus Creek and Aucilla River are also in the Ochlockonee River Basin and originate in Georgia. The Ochlockonee and Aucilla Rivers form their own distinct watersheds in Florida and both eventually drain into the Gulf of Mexico.

The land use characteristics of the Ochlockonee River Basin watersheds were determined using data from the Georgia Land Use Trends (GLUT) for Year 2015. This raster land use trend product was developed by the University of Georgia – Natural Resources Spatial Analysis Laboratory (NARSAL) and follows land use trends for years 1974, 1985, 1991, 1998, 2001, 2005, 2008, and 2015. Some of the NARSAL land use types were reclassified, aggregated into similar land use types, and used in the final watershed characterization. Table 3 lists the watershed land use distribution for the drainage areas of the three stream segments.

1.3 State Water Planning

The Georgia Legislature enacted the Metropolitan North Georgia Water Planning District Act in 2001 to create the Metropolitan North Georgia Water Planning District (MNGWPD) to preserve and protect water resources in the 15-county metropolitan Atlanta area. The MNGWPD is charged with the development of comprehensive regional and watershed specific water resource management plans to be implemented by local governments in the metropolitan Atlanta area. The MNGWPD issued its first water resource management plan documents in 2003.

In 2004, the Georgia Legislature enacted the Comprehensive State-wide Water Management Planning Act to ensure management of water resources in a sustainable manner to support the state's economy, to protect public health and natural systems, and to enhance the quality of life for all citizens on a state-wide level. GA EPD later developed the 2008 Comprehensive State-wide Water Management Plan, which established Georgia's ten Regional Water Planning Councils (RWPCs) and laid the groundwork for the RWPCs to develop their own Regional Water Plans. The boundaries of the RWPCs, in addition to the MNGWPD, are shown in Figure 5. The three listed waterbodies are located within the boundaries of the Lower Flint-Ochlockonee Regional Water Planning Council.

In 2011, each RWPC developed and adopted Regional Water Plans, which identify ranges of actions or management practices to help meet the State's water quality challenges. Implementation of these plans is critical in meeting Georgia's water resource challenges. The Lower Flint-Ochlockonee RWPC updated its Water Plan in June 2017, which was adopted by GA EPD in July 2017. Their Water Plan is available here.

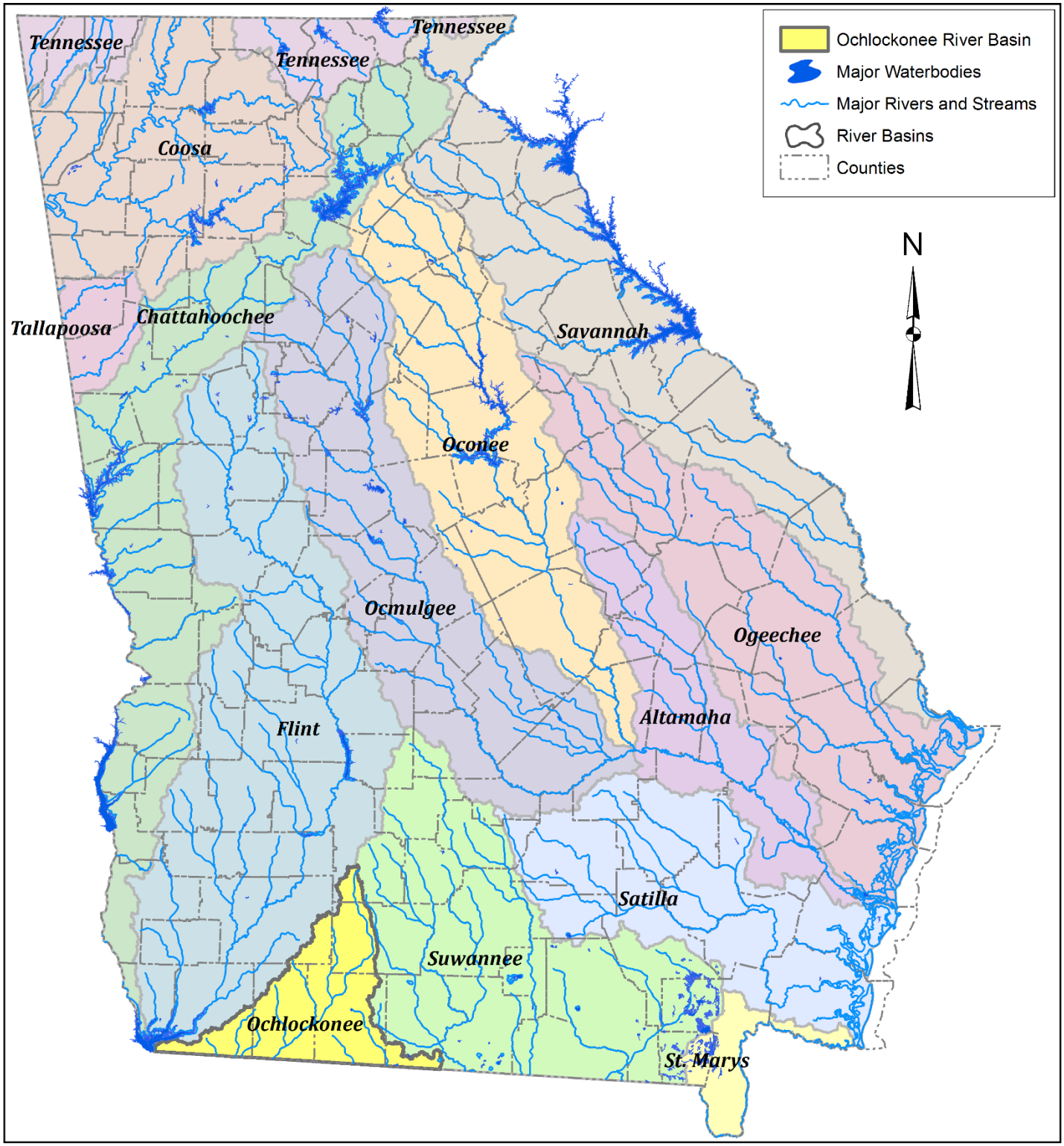

Figure 1: Location of the Ochlockonee River Basin in Georgia

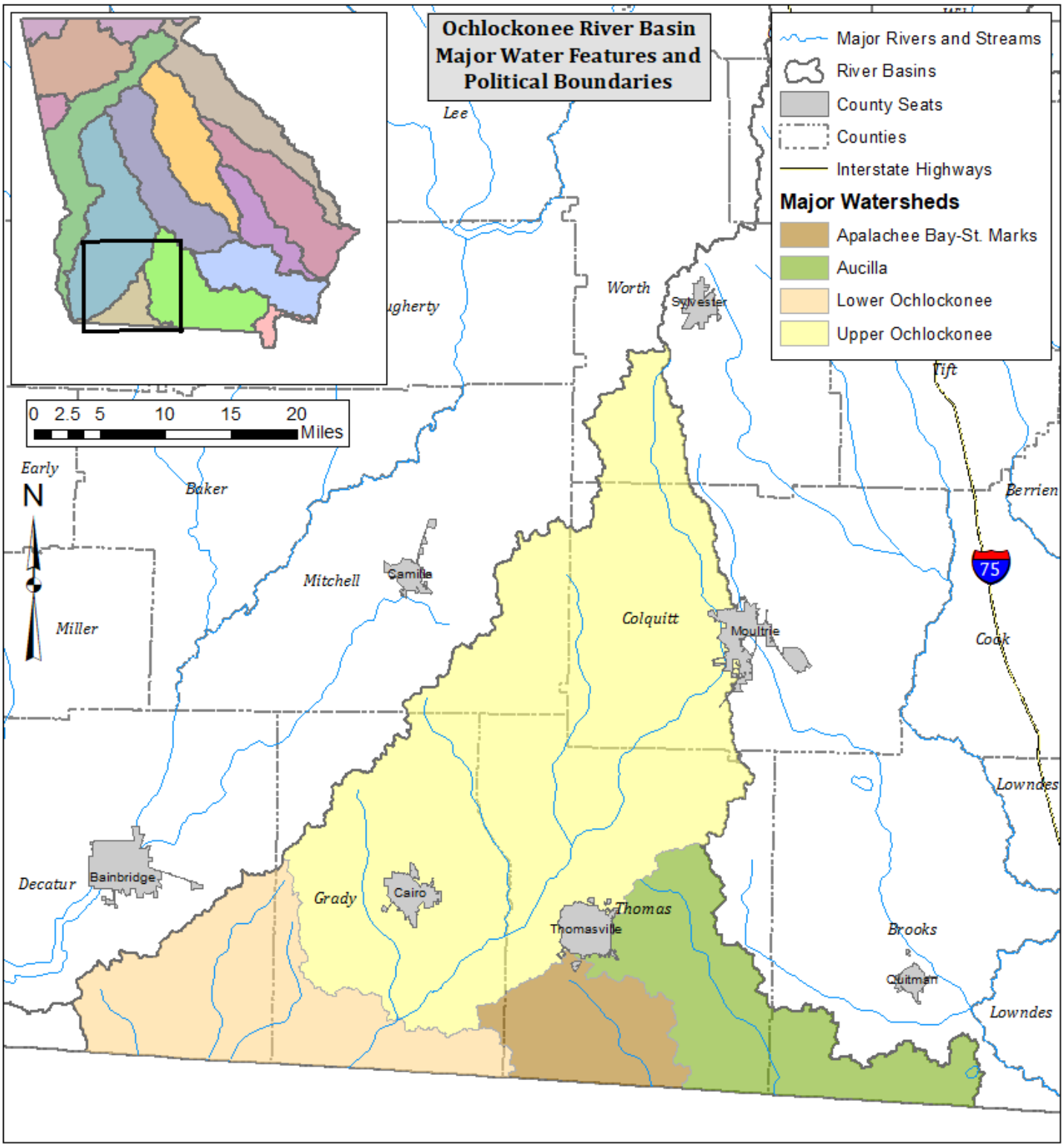

Figure 2: Major Political Boundaries, Water Features, and U.S.G.S. 8-digit HUCs

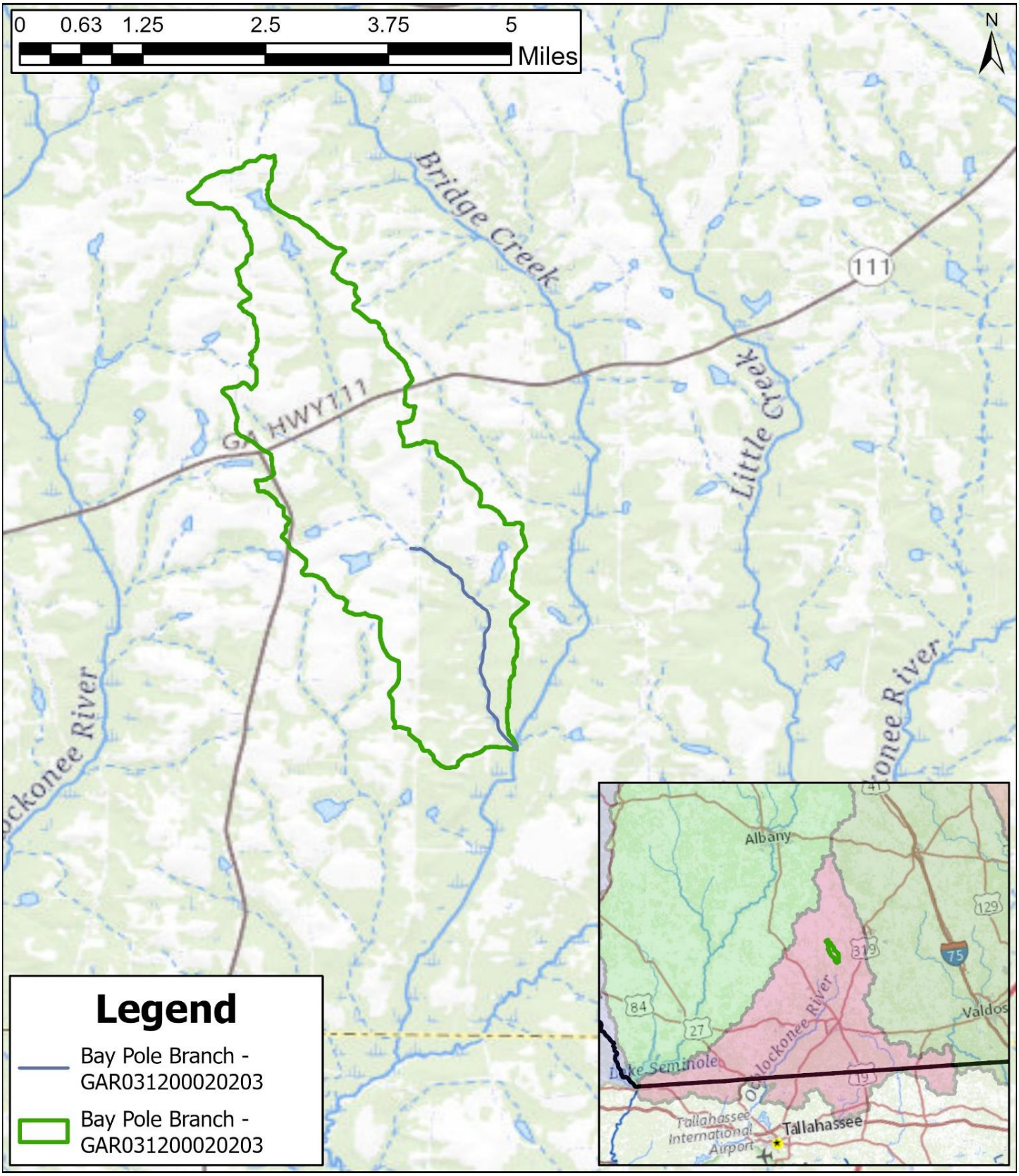

Figure 3: Impaired Stream Segment of Bay Pole Branch

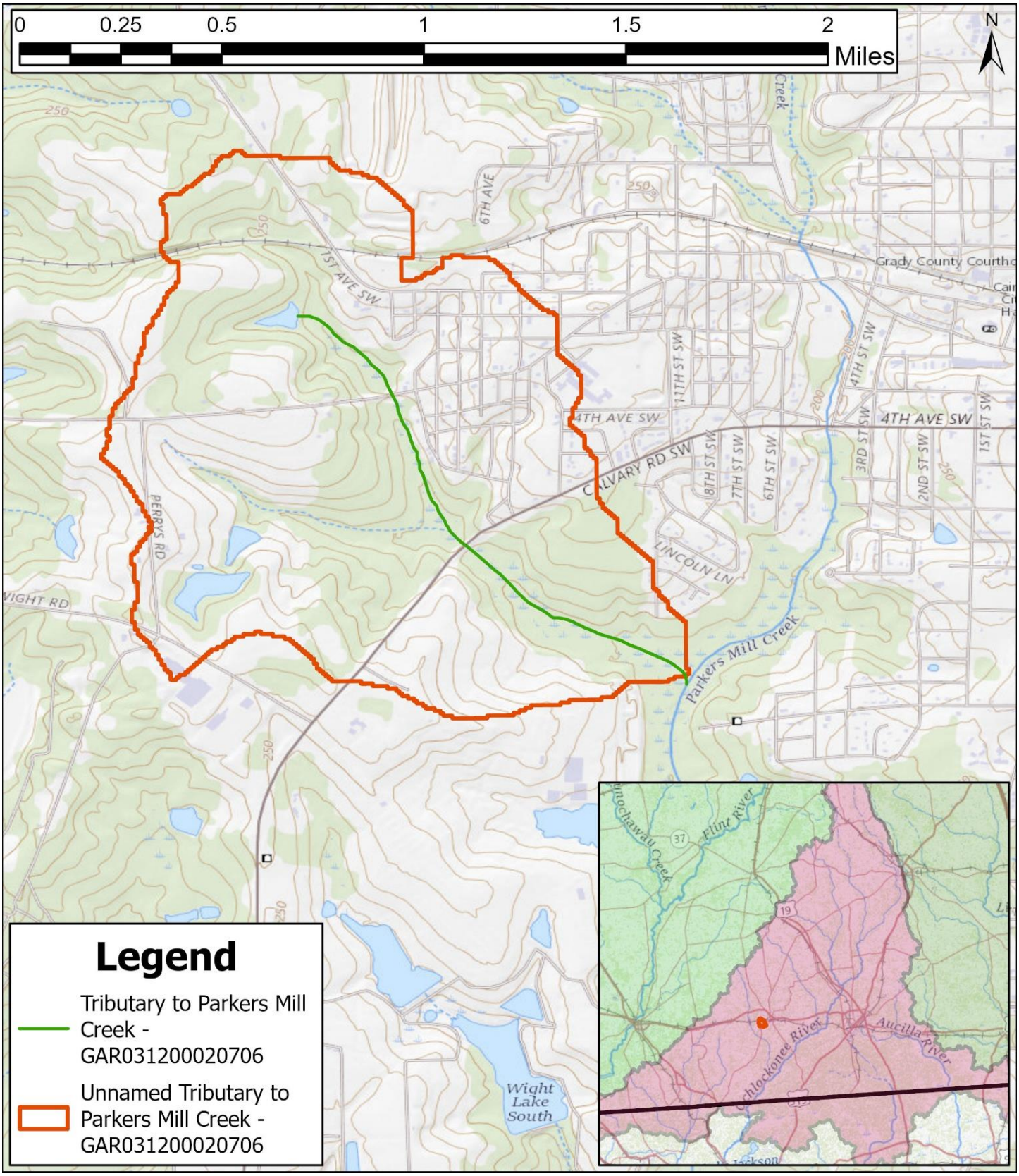

Figure 4: Impaired Stream Segment of Unnamed Tributary to Parkers Mill Creek

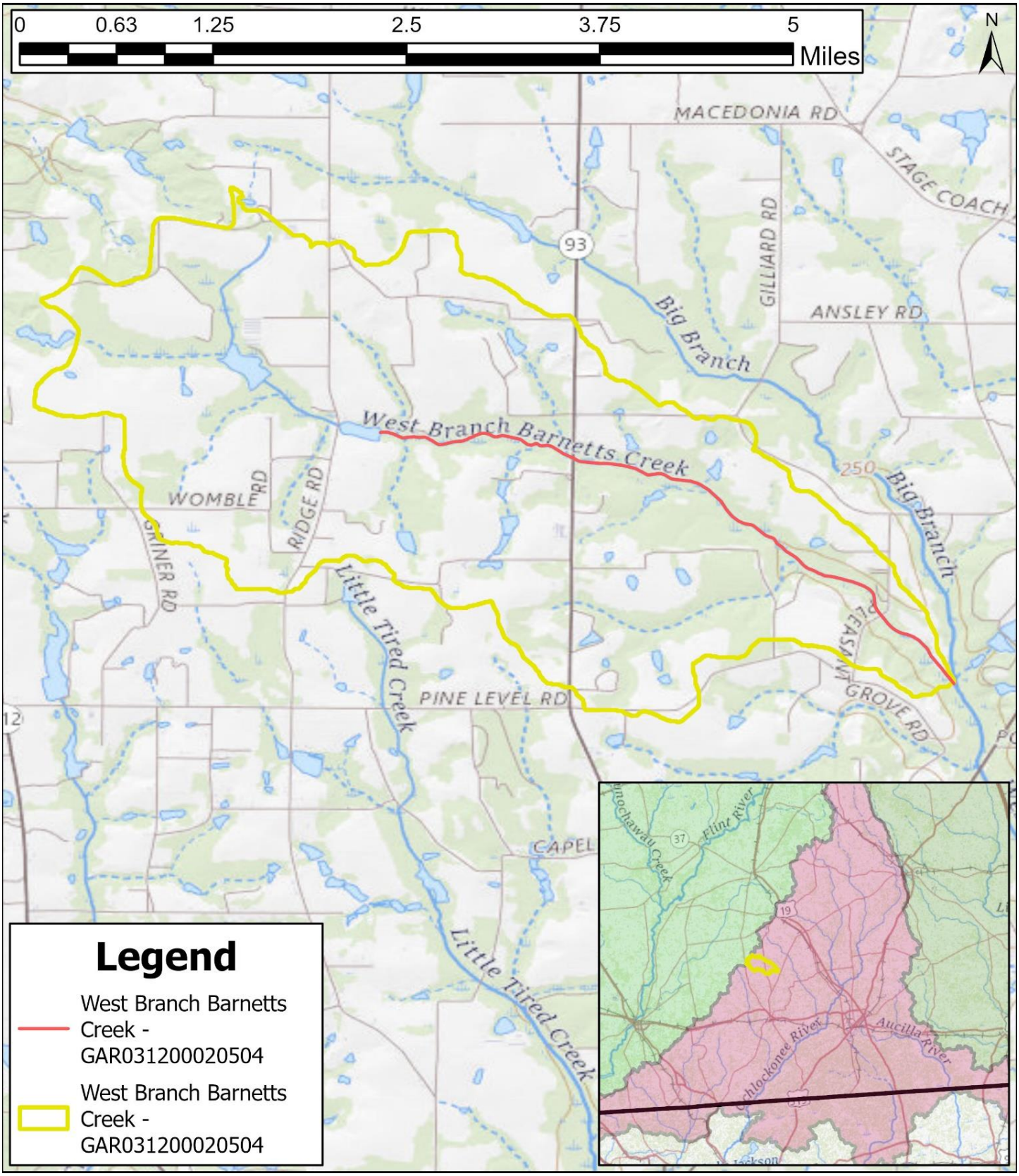

Figure 5: Impaired Stream Segment of West Branch Barnetts Creek

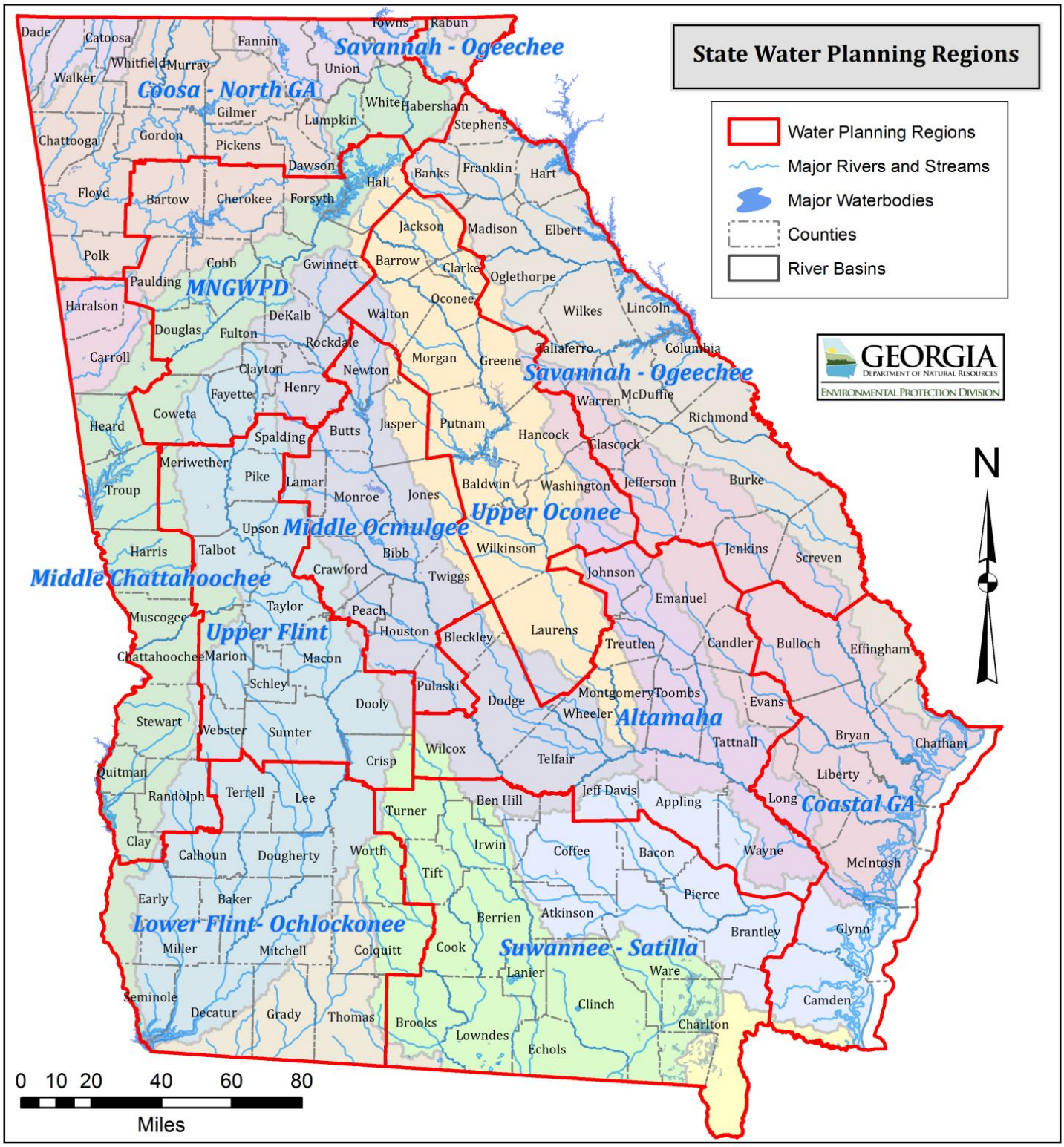

Figure 6: Boundaries of the Regional Water Planning Councils and the Metropolitan North Georgia Water Planning District

1.4 Water Quality Standard

Every waterbody in the State has one or more designated uses, and each designated use has water quality criteria established to protect it. Waterbodies in Georgia are assessed based on the 305(b)/303(d) Listing Assessment Methodology, as such GA EPD placed three (3) stream segments in the Ochlochonee River Basin on the 2022 303(d) list of impaired waters because it was assessed as "not supporting" its designated use of "Fishing" due to violations of the fecal coliform criteria. The potential causes listed include urban runoff and nonpoint sources. The fishing bacteria water quality standards as approved by US EPA Region 4 on January 20, 2021, and applicable at the time of listing was as follows:

(c) Fishing: Propagation of Fish, Shellfish, Game and Other Aquatic Life; primary contact recreation in and on the water for the months of May – October, secondary contact recreation in and on the water for the months of November – April; or for any other use requiring water of a lower quality.

(i) Bacteria:

1. For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. Should water quality and sanitary studies show fecal coliform levels from non-human sources exceed 200 counts per 100 mL (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 counts per 100 mL in lakes and reservoirs and 500 counts per 100 mL in free flowing freshwater streams. For the months of November through April, fecal coliform not to exceed a geometric mean of 1,000 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a maximum of 4,000 counts per 100 mL for any sample. The State does not encourage swimming in these surface waters since a number of factors which are beyond the control of any State regulatory agency contribute to elevated levels of bacteria.

2. For waters designated as shellfish growing areas by the Georgia DNR Coastal Resources Division, the requirements will be consistent with those established by the State and Federal agencies responsible for the National Shellfish Sanitation Program. The requirements are found in National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2007 Revision (or most recent version), Interstate Shellfish Sanitation Conference, U.S. Food and Drug Administration.

In January 2022, the Georgia DNR Board adopted new bacteria criteria for "Fishing" and "Drinking Water" designated uses using the bacterial indicators *E. coli* and enterococci. These bacteria are better indicators for human health illnesses. The adopted criteria have the same estimated illness rate (8 per 1000 swimmers) as the previously established criteria. EPA approved the proposed standards August 31, 2022. Since this TMDL was written after EPA approved the new bacteria criteria, the TMDL will use both bacterial indicators. The use classification water quality standards for fecal coliform bacteria, as stated in the *State of Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(6)(c)(iii) (GA EPD, 2022), are:

(c) Fishing: Propagation of Fish, Shellfish, Game and Other Aquatic Life; primary contact recreation in and on the water for the months of May – October, secondary contact recreation in and on the water for the months of November – April; or for any other use requiring water of a lower quality.

(i) Bacteria:

1. Estuarine waters: For the months of May through October, when primary water contact recreation activities are expected to occur, culturable enterococci not to exceed a geometric mean of 35 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an enterococci statistical threshold value (STV) of 130 counts per 100 mL the same 30-day interval.

For the months of November through April, culturable enterococci not to exceed a geometric mean of 74 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an enterococci statistical threshold value (STV) of 273 counts per 100 mL in the same 30-day interval.

2. All other fishing waters: For the months of May through October, when primary water contact recreation activities are expected to occur, culturable E. coli not to exceed a geometric mean of 126 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an E. coli statistical threshold value (STV) of 410 counts per 100 mL in the same 30-day interval.

   For the months of November through April, culturable E. coli not to exceed a geometric mean of 265 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an E. coli statistical threshold value (STV) of 861 counts per 100 mL in the same 30-day interval.

3. The State does not encourage swimming in these surface waters since a number of factors which are beyond the control of any State regulatory agency contribute to elevated levels of bacteria.

4. For waters designated as shellfish growing areas by the Georgia DNR Coastal Resources Division, the requirements will be consistent with those established by the State and Federal agencies responsible for the National Shellfish Sanitation Program. The requirements are found in National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2007 Revision (or most recent version), Interstate Shellfish Sanitation Conference, U.S. Food and Drug Administration.

Table 3: Ochlockonee River Basin Land Coverage

Stream/Segment	Land Use Categories - Acres (Percent)													Total
	Open Water	Developed, Low Intensity	Developed, Medium Intensity	Developed, High Intensity	Rock Outcrop, Sand, Clay, Beaches, Dunes, & Mud	Quarries, Strip Mines	Transitional, Clearcut, Sparse	Forest	Row Crops	Pasture, Hay	Other Grasses (Developed Open Space, Utility Swaths, Golf Courses)	Forested Wetlands	Non-Forested Wetlands	
Bay Pole Branch	86.5	64.5	15.1	2.4	24.9	0.0	30.2	1145.6	2248.2	401.4	245.3	430.3	5.1	4699.6
GAR031200020203	1.8%	1.4%	0.3%	0.1%	0.5%	0.0%	0.6%	24.4%	47.8%	8.5%	5.2%	9.2%	0.1%	100%
Tributary to Parkers Mill Creek	2.4	93.4	30.7	12.0	0.4	0.0	6.2	234.4	32.5	180.1	93.0	42.0	2.7	729.9
GAR031200020706	0.3%	12.8%	4.2%	1.6%	0.1%	0.0%	0.9%	32.1%	4.4%	24.7%	12.7%	5.8%	0.4%	100%
West Branch Barnetts Creek	28.2	94.5	25.8	3.8	9.3	0.0	42.0	975.0	3108.0	465.3	143.4	554.9	7.3	5457.6
GAR031200020504	0.5%	1.7%	0.5%	0.1%	0.2%	0.0%	0.8%	17.9%	56.9%	8.5%	2.6%	10.2%	0.1%	100%

2.0 WATER QUALITY ASSESSMENT

Stream segments are placed on the 303(d) list as not supporting their water use classification based on water quality sampling data. Currently, a stream is placed on this list if more than ten percent of the calculated geometric means exceed their water quality criteria or if more than ten percent of the samples exceed the single sample criteria. Water quality samples collected within a 30-day period that have a fecal coliform geometric mean in excess of 200 counts per 100 milliliters (mL) during the period May through October, or in excess of 1000 counts per 100 mL during the period November through April, are in violation of the bacteria water quality standard. There is also a single sample criterion (4000 counts per 100 mL) not to be exceeded at any given time.

Fecal coliform data used for development of the TMDL in this document were collected during calendar years 2013 through 2021 by GA EPD as part of the trend monitoring program. A summary of sampling station locations and sampling dates is given in Table 4. The raw data are presented in Appendix A.

Table 4: Sampling Stations and Dates – Ochlockonee River Basin

Stream Segment	Location	GA EPD Monitoring Station No.	GPS Coordinates	Monitoring Station Description	Sample Date Range
Bay Pole Branch GAR031200020203	Pond 400 feet upstream Bay Pole School Road to Bridge Creek	RV_10_16318	31.099492, -83.918695	Bay Pole Branch at Lower Meigs Rd near Moultrie GA	03/09/2016-12/20/2016
Tributary to Parkers Mill Creek GAR031200020706	Pond at headwaters to Parkers Mill Creek	RV_10_5096	30.868427, -84.228458	Unnamed Tributary to Parkers Mill Creek at State Road111 near Cairo, GA	03/09/2015-12/09/2015
West Branch Barnetts Creek GAR031200020504	Pond 1.2 miles upstream GA Hwy 93 to Big Branch	RV_10_17320	31.01052, -84.20431	West Branch Barnetts Creek @ SR 93	01/10/2018-10/29/2018

3.0 SOURCE ASSESSMENT

An important part of the TMDL development process is the identification of potential sources of pollutants causing the waterbody to be listed on the 303(d) list. A source assessment identifies the known and suspected sources and discharges of bacteria in the watershed. Sources are broadly classified as either point or nonpoint sources. The CWA defines a point source as any "discernable, confined, and discrete conveyance including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture." Nonpoint sources are diffuse, and generally, but not always, involve accumulation of bacteria on land surfaces that wash off due to storm events.

3.1 Point Source Assessment

Title IV of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit program. Basically, there are two categories of NPDES permits: 1) wastewater treatment facilities, and 2) regulated stormwater discharges.

3.1.1 Wastewater Treatment Facilities

In general, NPDES point source discharge permits are issued to Publicly Owned Treatment Works (POTWs) and Non-Publicly Owned Treatment Works (Non-POTWs) authorizing the discharge of treated wastewater to surface waters. POTWs are commonly associated with city and county owned wastewater treatment facilities; whereas Non-POTWs are associated with industrial, private, and federal facilities. The permits include permit conditions, requirements, and numeric effluent limits developed using federal and state effluent guidelines (secondary treatment standards for POTWs and technology-based limits (TBELs) for Non-POTWs) or on water quality standards (water quality-based effluent limits, WQBELs).

The United States Environmental Protection Agency (USEPA) has developed technology-based standards and guidelines, which establish a minimum standard of pollution control for POTW and Non-POTW discharges without regard for the quality of the receiving waters. For POTWs, EPA has established Secondary Treatment Standards. For Non-POTW, the TBELs are based on Best Practical Control Technology Currently Available (BPT), Best Conventional Control Technology (BCT), Best Available Technology Economically Achievable (BAT), and New Source Performance Standards. The level of control required by each facility is dependent on the source of wastewater generated and the pollutants found in the discharge.

The USEPA and the States have also developed numeric and narrative water quality criteria to protect a stream's designated uses. Typically, these criteria are based on the results of aquatic toxicity tests and/or human health criteria and include a margin of safety. Wastewater NPDES permits also include WQBELs to protect these narrative and numeric water quality criteria and their designated uses. WQBELs ensuring water quality standards are met in the receiving water and downstream uses are protected.

For purposes of this TMDL, permitted wastewater treatment facilities are considered point sources, and include POTWs and Non-POTWs. Pollutants discharged from wastewater treatment plants can contribute bacteria to receiving waters. As of 2022, there are no NPDES permitted

discharges identified in the watershed of the listed segments in the Ochlockonee River Basin that could potentially impact streams on the 2022 303(d) list for fecal coliform bacteria. Typically, the contributing watershed for a 303(d) listed segment is defined as the area upstream of the segment, however there are no NPDES permitted discharges on listed stream segments, so they are not considered a contributor to the bacteria listing.

Another potential point source contribution may be a combined sewer system (CSS) that conveys a mixture of raw sewage and stormwater in the same conveyance structure to the wastewater treatment plant and may also have direct discharges (as authorized under a NPDES permit) to waters of the state. These are generally a component of POTWs. When the combined sewage exceeds the capacity of the wastewater treatment plant, the excess is diverted to a combined sewage overflow (CSO) discharge point. There are no permitted CSO outfalls in the Ochlockonee River Basin.

3.1.2 Regulated Stormwater Discharges

Discharges of stormwater authorized under a NPDES permit are considered a point source. Unlike other wastewater NPDES permits that establish end-of-pipe effluent limits, storm water NPDES permits establish best management practices (BMPs) and controls that are intended to reduce the quantity of pollutants that storm water picks up and carries into storm sewer systems during rainfall events “to the maximum extent practicable.” Currently, regulated stormwater discharges that may contain bacteria, consist of those associated with industrial activities and large, medium, and small municipal separate storm sewer systems (MS4s) that serve populations of 10,000 or more.

3.1.2.1 Industrial General Stormwater NPDES Permit

Storm water discharges associated with industrial activities are currently covered under the 2022 NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (GAR050000) also called the Industrial General Permit (IGP). This permit requires visual monitoring of storm water discharges, site inspections, implementation of BMPs, preparation of a Storm Water Pollution Prevention Plan (SWPPP), and annual reporting. The IGP requires that stormwater discharging into an impaired stream segment or within one linear mile upstream of, and within the same watershed as, any portion of an impaired stream segment identified as “not supporting” its designated use(s), must satisfy the requirements of Appendix C of the 2022 IGP, if the pollutant(s) of concern for which the impaired stream segment has been listed may be exposed to stormwater as a result of industrial activity at the site. If a facility is covered under Appendix C of the IGP, then benchmark monitoring for the pollutant(s) of concern is required. Delineations of both supporting and not supporting waterbodies are provided on the GA EPD website, and are available in ESRI ArcGIS shapefile format or in KMZ format for use in Google Earth. Interested parties may evaluate their proximity to not supporting waterbodies by utilizing these geospatial files.

3.1.2.2 MS4 NPDES Permits

The collection, conveyance, and discharge of diffuse storm water to local waterbodies by a public entity are regulated in Georgia by the NPDES MS4 permits. These MS4 permits have been issued under two phases. Phase I MS4 permits cover medium and large cities, and counties with populations over 100,000. Each individual Phase I MS4 permit requires the prohibition of non-storm water discharges (i.e., illicit discharges) into the storm sewer systems and controls to reduce the discharge of pollutants to the maximum extent practicable, including the use of

management practices, control techniques and systems, as well as design and engineering methods (Federal Register, 1990). A site-specific Storm Water Management Plan (SWMP) outlining appropriate controls is required by and referenced in the permit. A program to monitor and control pollutants in storm water discharges from industrial facilities, construction sites, and highly visible pollutant sources that exist within the MS4 area must be implemented under the permit. Additionally, monitoring of not supporting streams, public education and involvement, post-construction storm water controls, low impact development, and annual reporting requirements must all be addressed by the permittee on an ongoing basis. As of 2022, fifty-seven (57) counties and municipalities are covered by Phase I MS4 permits in Georgia.

Small MS4s serving urbanized areas are required to obtain a storm water permit under the Phase II storm water regulations. An urbanized area is defined as an area with a residential population of at least 10,000 people and an overall population density of at least 1,000 people per square mile. As of 2022, Seventy-three (73) municipalities, thirty-five (35) counties, five (5) Department of Defense facilities, and the Georgia Department of Transportation (GDOT) are permitted under the Phase II storm water regulations in Georgia. All municipal Phase II permittees are authorized to discharge under Storm Water General Permit GAG610000. Department of Defense facilities are authorized to discharge under Storm Water General Permit GAG480000. GDOT owned or operated facilities are authorized to discharge under Storm Water General Permit GAR041000. Under these general permits, each permittee must design and implement a SWMP that incorporates BMPs that focus on public education and involvement, illicit discharge detection and elimination, construction site runoff control, post-construction storm water management, and pollution prevention in municipal operations. Urbanized areas include land uses identified as lawns, parks, and greenspace, as well as residential, commercial, industrial, and transportation facilities. There are no permitted Phase 1 or Phase 2 MS4s in the Ochlockonee River Basin.

3.1.3 Concentrated Animal Feeding Operations

Animal feeding operations (AFOs) are agricultural operations where animals are kept and raised in confined situations. AFOs that meet the regulatory definition of a concentrated animal feeding operation (CAFO) are regulated under the NPDES permitting program. The NPDES program regulates the discharge of pollutants from point sources to waters of the state. From 1999 through 2001, Georgia adopted rules for permitting swine and non-swine liquid manure animal feeding operations (AFOs). Georgia rules required medium size AFOs with more than 300 animal units (AU), but less than 1,000 AU, to apply for a non-discharge state land application system (LAS) waste disposal permit. Large operations with more than 1000 AU were required to apply for an NPDES permit (also non-discharge) as a CAFO. The USEPA CAFO regulations were successfully appealed in 2005. They were revised to comply with the court's decision that NPDES permits only be required for actual discharges. Georgia's rules were amended on August 7, 2012, to reflect the USEPA revisions. The revised state rules authorize LAS permitting of medium and large size liquid manure AFOs unless they elect to obtain an NPDES permit. There are no known liquid manure CAFOs located in the watershed of the listed segment in the Ochlockonee River Basin that have NPDES or land application permits.

In 2002, the USEPA promulgated expanded NPDES permit regulations for CAFOs that added dry manure poultry operations larger than 125,000 broilers or 82,000 layers. In accordance with the Georgia rule amendment discussed above, the general permit covering these facilities has been terminated and they are no longer covered under any permit. Georgia is consistently among the top three states in the U.S. in terms of poultry operations. Most poultry farms are dry manure operations where the manure is stored for a time and then land applied. Freshly stored litter can be a nonpoint source of bacteria. However, land-applied litter previously stored for an extended length of time

typically exhibits very low bacteria levels. Table 5 presents the current swine and non-swine (primarily dairies) CAFOs located in the Ochlockonee River Basin**.** There are none that impact the listed streams**.**

Table 5: Permitted CAFOs in the Ochlockonee River Basin

Name	Permit No.	County	Animal Type	Total No. of Animals Units
Southbrook Dairy, LLC	GAG930063	Brooks	Dairy	5940 AU
Sparkman Dairy LLC	GAG920011	Colquitt	Dairy	300 to 1000 AU
Providence Dairy, Inc.	GAG930066	Decatur	Dairy	1820 AU
Johnson Ranch	GAG920038	Grady	Dairy	300 to 1000 AU

Source: Georgia Pollutant Discharge Elimination System, GA EPD, 2022

3.2 Nonpoint Source Assessment

In general, nonpoint sources cannot be identified as entering a waterbody through a discrete conveyance at a single location. Typical nonpoint sources of bacteria include:

- Wildlife
- Agricultural Livestock
  - Animal grazing
  - Animal access to streams
  - Application of manure to pastureland and cropland
- Urban Development
  - Leaking sanitary sewer lines
  - Leaking septic systems
  - Land Application Systems
  - Landfills

In urban areas, a large portion of stormwater runoff may be collected in storm sewer systems and discharged through distinct outlet structures. For large urban areas, these storm sewer discharge points may be regulated as described in Section 3.1.2.

3.2.1 Wildlife

The significance of wildlife as a source of bacteria in streams varies considerably depending on the animal species present in the watershed. Based on information provided by the Wildlife Resources Division (WRD) of GA DNR, the greatest wildlife sources of bacteria are the animals that spend a large portion of their time in or around aquatic habitats. Of these, waterfowl, especially ducks and geese, are considered the most significant source, because when present, they are typically found in large numbers on the water surface. Other animals regularly found around aquatic environments include racoons, beavers, muskrats, and to a lesser extent, river otters and minks. Recently, rapidly expanding feral swine populations have become a substantial presence in the floodplain areas of the major rivers in Georgia.

White-tailed deer populations are also abundant throughout the Ochlockonee River Basin. Bacteria contributions to waterbodies from deer are generally considered to be less significant than that of waterfowl, racoons, and beavers. This is because a greater portion of their time is

spent in terrestrial habitats. This also holds true for other terrestrial mammals such as squirrels and rabbits, and for terrestrial birds (GA WRD, 2007). However, feces deposited on the land surface can result in the introduction of bacteria to streams during runoff events. Between storm events, considerable decomposition of the fecal matter might occur, resulting in a decrease in the associated bacteria numbers.

3.2.2 Agricultural Livestock

Agricultural livestock are a potential source of bacteria to streams in the Ochlockonee River Basin. The animals grazing on pastureland deposit their feces onto land surfaces, where it can then be transported during storm events to nearby streams. Animal access to pastureland varies monthly, resulting in varying bacteria loading rates throughout the year. Beef cattle spend all of their time in pastures, while dairy cattle and hogs are periodically confined. In addition, agricultural livestock will often have direct access to streams that pass through their pastures and can thus impact water quality in a more direct manner (USDA, 2002). Table 6 provides the estimated number of beef cattle, dairy cattle, goats, horses, swine, sheep, and chickens reported by county.

Table 6: Estimated Agricultural Livestock Populations in Counties Containing the 303(d) Listed Segment Watershed in the Ochlockonee River Basin

County	Livestock								
	Beef Cattle	Dairy Cattle	Swine	Sheep	Horses	Goats	Chickens		
							Broilers	Layers	Pullets
Brooks	7,083	11,000	500	135	240	1,250	1,794,987	55,569	-
Colquitt	13,772	-	5,022	50	450	650	54,915,247	220,952	196,470
Decatur	21,412	1,200	50	50	200	400	5,795,493	23,815	-
Grady	19,665	515	176	30	290	250	15,682,116	31,092	83,916
Mitchell	27,149	4,250	-	150	850	600	22,354,357	126,353	22,644
Thomas	17,089	600	-	-	3,800	-	1,602,823	11,908	110,556
Worth	21,098	-	-	75	340	2,502	3,907,334	27,784	-

Source: Center for Agribusiness and Economic Development, UGA 2022

3.2.3 Urban Development

Bacteria from urban areas are attributable to multiple sources, including: domestic animals, leaks and overflows from sanitary sewer systems, illicit discharges, leaking septic systems, runoff from improper disposal of waste materials, and leachate from both operational and closed landfills.

Urban runoff can contain high concentrations of bacteria from domestic animals and urban wildlife. Bacteria enter streams by direct wash off from the land surface, or the runoff may be diverted to a stormwater collection system and discharged through a discrete outlet structure. For large, medium, and small urban areas (populations greater than 10,000), the stormwater outlets are regulated under MS4 permits (see Section 3.1.2). For smaller urban areas, the stormwater discharge outlets currently remain unregulated.

In addition to urban animal sources of bacteria, there may be illicit connections to the storm sewer system. As part of the MS4 permitting program, municipalities are required to conduct dry-weather monitoring to identify and then eliminate these illicit discharges. Bacteria may also enter streams from leaky sewer pipes, or during storm events when inflow and infiltration can cause sewer overflows.

3.2.3.1 Leaking Septic Systems

A portion of the bacteria contributions in the Ochlockonee River Basin may be attributed to failure of septic systems and illicit discharges of raw sewage. Table 7 below presents the number of septic systems in counties containing the watershed of the 303(d) listed segments in the Ochlockonee River Basin existing at the end of 2015 and the number existing at the end of 2020. This is based on data provided by the Georgia Department of Public Health and information obtained from the U.S. Census. In addition, an estimate of the number of septic systems installed and repaired during the period from 2015 through 2020 is given. These data show an increase in the number of septic systems in all counties. Often, this reflects population increases outpacing the expansion of sewage collection systems.

Table 7: Estimated Number of Septic Systems in Counties within the Ochlockonee River Basin

County	Existing Septic Systems (2015)	Existing Septic Systems (2020)	Number of Septic Systems Installed (2015 to 2020)	Number of Septic Systems Repaired (2015 to 2020)
Brooks	5,960	6,153	193	147
Colquitt	13,224	13,566	342	339
Decatur	10,010	10,278	268	306
Grady	8,467	8,811	344	252
Mitchell	7,537	7,709	172	244
Thomas	12,379	12,697	318	269
Worth	7,773	7,957	184	304

Source: The Georgia Dept. of Public Health, Environmental Health Section, 2022

3.2.3.2 Land Application Systems

Some communities and industries use land treatment systems for wastewater disposal. These facilities are required through land application system (LAS) permits to dispose of their treated wastewater by land application, and to operate as non-discharging systems that do not contribute wastewater effluent runoff to surface waters. However, sometimes the soil's percolation rate is exceeded when applying the wastewater, or encountering excess precipitation, resulting in runoff. This runoff could contribute bacteria to nearby surface waters. Runoff of storm water might also carry surface residual containing bacteria. Listed in Table 8 below are the permitted LASs identified in the Ochlockonee River Basin and the LASs that could potentially impact the stream segments in this TMDL are identified.

Table 8: Permitted Land Application Systems in the Ochlockonee River Basin

LAS Name	Permit No.	County	Type	Flow (MGD)	Impaired Stream Watershed
Coolidge, City of	GAJ020145	Thomas	Municipal	0.083	n/a

Source: Georgia Pollutant Discharge Elimination System, GA EPD, Atlanta, Georgia, 2022

3.2.3.3 Landfills

Leachate from landfills may contain bacteria that could at some point reach surface waters. Sanitary (or municipal) landfills are the most likely to serve as a source of bacteria. These types of landfills receive household wastes, animal manure, offal, hatchery and poultry processing plant wastes, dead animals, and other types of wastes. Older sanitary landfills were not lined, and most have been closed. Those that remain active and have not been lined operate as construction/demolition landfills. Currently active sanitary landfills are lined and have leachate collection systems. All landfills, excluding inert landfills, are now required to install environmental monitoring systems for groundwater and methane sampling. Table 9 provides the landfills located in the Ochlockonee River Basin.

Table 9: Permitted Landfills in the Ochlockonee River Basin

Facility Name	Permit Number	County	Interest Type	Operating Status
Brooks County High School Football Stadium	*-*	Brooks	SW- Inert Landfill	Closed
Quitman - SR 33 Ph 1 (SL)	229-2635561	Brooks	SW- Municipal Solid Waste Landfill	Closed/PCC
Brooks County CR 122 Inert Landfill	*-*	Brooks	SW- Inert Landfill	In-Closure
City Of Moultrie - 15th Avenue SW	229-985-1974	Colquitt	SW- Inert Landfill	Closed
City Of Moultrie E.Hulse St.-S.Balfour Ave. Inert LF	229-985-1974	Colquitt	SW- Inert Landfill	Closed
City Of Moultrie Moultrie Municipal Airport Inert LF	229-985-1974	Colquitt	SW- Inert Landfill	Closed
Colquitt County Board Of Education	229-986-1550	Colquitt	SW- Inert Landfill	Closed
Estate Of Paul A. And Neta B. Strickland Highway 319 Inert LF	229-941-5489	Colquitt	SW- Inert Landfill	Closed
Farmers Favorite Fertilizer	229-985-1624	Colquitt	SW- Inert Landfill	Closed
George Plymel	229-985-9380	Colquitt	SW- Inert Landfill	Closed
J.B. Tumlin Inert Landfill	229-985-1129	Colquitt	SW- Inert Landfill	Closed
Oxford Construction Company Inert Landfill	229-883-3232	Colquitt	SW- Inert Landfill	Closed
Colquitt Co - Cr 15 Sunset Ph 1 (SL)	229-616-7404	Colquitt	SW- Municipal Solid Waste Landfill	Closed/PCC
Safe Lands, Ltd 11th Avenue S.E. Inert LF	229-985-1145	Colquitt	SW- Inert Landfill	In-Closure
Blount & Sons Concrete Finishing Service	229-985-7872	Colquitt	SW- Inert Landfill	Operating
City Of Moultrie - Service Center	229-890-5421	Colquitt	SW- Inert Landfill	Operating

Facility Name	Permit Number	County	Interest Type	Operating Status
Colquitt County Cr15 Inert LF	229-616-7475	Colquitt	SW- Inert Landfill	Operating
Lawrence Gay 1st Street N.E./9th Ave. Inert LF	229-985-8786	Colquitt	SW- Inert Landfill	Operating
Major N. Adderton Inert Landfill	229-985-4924	Colquitt	SW- Inert Landfill	Operating
Major N. Adderton, Sr. Inert Landfill	229-985-3924	Colquitt	SW- Inert Landfill	Operating
Safe Land Ltd. Inert Landfill	229-985-1145	Colquitt	SW- Inert Landfill	Operating
Adams Brothers Construction Co. Hwy 84w. Inert LF	229-246-7000	Decatur	SW- Inert Landfill	Closed
Boyett Contracting Co. Inc.	229-465-3324	Decatur	SW- Inert Landfill	Closed
Boyett Contracting Co.,Inc. Englehard Way Inert LF	229-465-3324	Decatur	SW- Inert Landfill	Closed
Decatur Co.-Sr309 Inert LF	229-248-3030	Decatur	SW- Inert Landfill	Closed
Decatur Co-BASF Catalysts-Attapulgus Operations Inert Landfill	229-465-2268	Decatur	SW- Inert Landfill	Closed
Elberta Crate And Box Company Inert Landfill	229-246-2266	Decatur	SW- Inert Landfill	Closed
Floyd Brothers Asphalt Co., Inc. Highway 84 Inert LF	229-246-1525	Decatur	SW- Inert Landfill	Closed
Highway 84 Inert LF	229-246-3135	Decatur	SW- Inert Landfill	Closed
Z.A. Adams Construction Co., Inc. Hwy309s.-Rich Rd. Inert LF	229-246-1422	Decatur	SW- Inert Landfill	Closed
Bainbridge - Ave C (L)	229-246-2150	Decatur	SW- Construction & Demolition Landfill	Closed/PCC
Decatur County U.S. Highway 27 MSWLF	229-248-3030	Decatur	SW- Inert Landfill	Closed/PCC
Larry Adams Inert Landfill	229-246-8921	Decatur	SW- Inert Landfill	Closed/PCC
Decatur Co-Sr 309 Bainbridge Ph 2 (Sl)	229-248-3032	Decatur	SW- Municipal Solid Waste Landfill	Closed/PCC
Gary Floyd Property	229-2466082	Decatur	SW- Inert Landfill	Operating
Mccullers Construction Co.	229-221-7115	Decatur	SW- Inert Landfill	Operating
Decatur County Solid Waste Facility	229-2483030	Decatur	SW- Municipal Solid Waste Landfill	Operating
BASF Corporation- Attapulgus (Li)	229-465-3341	Decatur	SW- Private Industrial Landfill	
BASFCorporation-Attapulgus Filter Cake-Phase 3	229-465-2300	Decatur	SW- Private Industrial Landfill	
BASFCorporation-Attapulgus-General Refuse (LI)	229-465-3341	Decatur	SW- Private Industrial Landfill	
Mayfield Land Company Sand Mine	850-562-1022	Grady	SW- Inert Landfill	Closed
City Of Cairo-6th Avenue Inert LF	229-377-1722	Grady	SW- Inert Landfill	Operating
Cairo Municipal Solid Waste Landfill	229-377-1722	Grady	SW- Municipal Solid Waste Landfill	Operating

Facility Name	Permit Number	County	Interest Type	Operating Status
Baconton, City Of (L)	229-787-5511	Mitchell	SW- Construction & Demolition Landfill	Archived
City Of Camilla	229-336-2220	Mitchell	SW- Inert Landfill	Closed
Mitchell Co-Ga Power Plant Mitchell Inert Landfill	404-506-7064	Mitchell	SW- Inert Landfill	Closed
Mitchell County-Locast Road Inert Landfill	229-336-2000	Mitchell	SW- Inert Landfill	Closed
City Of Pelham Composting And Inert Landfill	229-294-7900	Mitchell	SW- Inert Landfill	Closed/PCC
Mitchell County Boc - Sr3/Back 9 Rd-Inert Landfill	229-336-2000	Mitchell	SW- Inert Landfill	Closed/PCC
Mitchell Co - Sr 3a (SL)	229-336-2000	Mitchell	SW- Municipal Solid Waste Landfill	Closed/PCC
City Of Baconton S-M.L.K. Drive Inert LF	229-787-5511	Mitchell	SW- Inert Landfill	Operating
Neal Gasseh	229-294-4754	Mitchell	SW- Inert Landfill	Operating
Pleasant View Missionary Baptist Church Inert Landfill	*-*	Mitchell	SW- Inert Landfill	Operating
Shackelford Pecan Grove Inert Landfill	205-802-1100	Mitchell	SW- Inert Landfill	Operating
Defnall Construction Co., Inc. Inert Landfill	229-228-9812	Thomas	SW- Inert Landfill	Closed
Inert Landfill	229-346-3610	Thomas	SW- Inert Landfill	Closed
Thomas County Public Works Camp	229-226-4389	Thomas	SW- Inert Landfill	Closed/PCC
Thomas Co - Thomasville/Sunset Dr Ph 2 MSWL	229-226-1811	Thomas	SW- Municipal Solid Waste Landfill	Closed/PCC
Thomasville/Sunset Dr Ph 1 (SL)	229-228-7673	Thomas	SW- Municipal Solid Waste Landfill	Closed/PCC
Thomas Co - Thomasville/Sunset Dr Ph 3 C/D Landfill	229-228-7673	Thomas	SW- Construction & Demolition Landfill	Operating
City Of Boston Inert Landfill	229-498-6743	Thomas	SW- Inert Landfill	Operating
Floridin Company Inert Landfill	904-627-7688	Thomas	SW- Inert Landfill	Operating
M&M/Vinson Rd (Inert)	229-226-4389	Thomas	SW- Inert Landfill	Operating
Mcgill Enterprieses Private Landfill	229-228-4003	Thomas	SW- Inert Landfill	Operating
Mitchell Brothers Inert LF	*-*	Thomas	SW- Inert Landfill	Operating
Thomasville/Sunset Dr Phases Iv & V MSWL	229-228-7673	Thomas	SW- Municipal Solid Waste Landfill	Operating
Georgia North Plant (Aka Oil Dri Ochlockee Plant)	229-574-4271	Thomas	SW- Private Industrial Landfill	
Worth County Bd. Of Commissioners Inert Landfill	229-776-8200	Worth	SW- Inert Landfill	Closed/PCC
Worth County Landfill	229-776-8200	Worth	SW- Municipal Solid Waste Landfill	Closed/PCC
Mike Barnard-Highway 82 Inert LF	229-776-2040	Worth	SW- Inert Landfill	Operating

Facility Name	Permit Number	County	Interest Type	Operating Status
Seabrook Peanut Company, Inc. Inert Landfill	229-776-7600	Worth	SW- Inert Landfill	Operating
Thomas W. Lawhorne Thompson Street Inert LF	229-776-3335	Worth	SW- Inert Landfill	Operating

Source: Land Protection Branch, GA EPD, 2022

4.0 ANALYTICAL APPROACH

The process of developing bacteria TMDLs for the Ochlockonee River Basin listed segments includes the determination of the following:

- The current critical bacteria load to the stream under existing conditions;
- The TMDL for similar conditions under which the current load was determined; and
- The percent reduction in the current critical bacteria load necessary to achieve the TMDL.

The calculation of the bacteria load at any point in a stream requires the bacteria concentration and stream flow. The Loading Curve Approach was used to determine the current bacteria load and the TMDL. For the listed segments, fecal coliform sampling data were sufficient to calculate at least one 30-day geometric mean to compare with the regulatory criteria (see Appendix A).

4.1 Loading Curve Approach

For those segments in which sufficient water quality data were collected to calculate at least one 30-day geometric mean above the regulatory standard, the loading curve approach was used. This method involves comparing the current critical load to summer and winter seasonal TMDL curves.

The available field measurements and water quality data used to develop the TMDL for this document were calculated using data from a nearby USGS gage. The nearby stream gage had relatively similar watershed characteristics, including land use, slope, and drainage area. The stream flows were estimated by multiplying the measured stream flow by the ratio of the listed stream drainage area to the gaged stream drainage area. One stream gage, located on Little Attapulgus Creek, was used to estimate the flow. Table 10 below provides the USGS stream gage used to estimate the flow for the listed stream segment. For each listed segment, the drainage areas and USGS gage used to estimate the steam flow are given in Table A-1 in Appendix A.

Table 10: USGS Flow Gage Used to Estimate Stream Flow in the 303(d) Listed Segment in the Ochlockonee River Basin

Name	Location	Station No.	USGS Station Name	Flow Gage Drainage Area (sq mile)
Little Attapulgus Creek	Latitude 30.735555 Longitude -84.496944	02329342	Little Attapulgus Creek at Attapulgus, GA	17.3

The current critical loads were determined using fecal coliform data collected within a 30-day period to calculate the geometric means and multiplying these values by the arithmetic means of the flows measured at the time the water quality samples were collected. Georgia's instream bacteria standards are based on a geometric mean of samples collected over a 30-day period, with samples collected at least 24 hours apart. To reflect this in the load calculation, the bacteria loads are expressed as 30-day accumulated loads with units of counts per 30 days. This is described by the equation below:

$$L_{critical} = C_{geomean} \times Q_{mean}$$

Where:

$L_{critical}$ = current critical bacteria load
$C_{geomean}$ = bacteria concentration as a 30-day geometric mean
Q_{mean} = stream flow as an arithmetic mean

The current estimated critical load is dependent on the fecal coliform concentrations and stream flows measured during the sampling events. The number of events sampled is usually 16 per year. Thus, these loads do not represent the full range of flow conditions or loading rates that can occur. Therefore, it must be kept in mind that the current critical loads used only represent the worst-case scenario that occurred during the sampling period.

The maximum bacteria load at which the instream bacteria criteria will be met can be determined using a variation of the equation above. By setting C equal to the seasonal, instream bacteria standard, the load will equal the TMDL. However, the TMDL is dependent on stream flow. Figures in Appendix A graphically illustrate that the TMDL is a continuum for the range of flows (Q) that can occur in the stream over time. There are two TMDL curves shown in these figures. One represents the summer TMDL for the period May through October when the 30-day geometric mean standard is 200 counts/100 mL. The second curve represents the winter TMDL for the period November through April when the 30-day geometric mean standard is 1,000 counts/100 mL. The equations for these two TMDL curves are:

$$TMDL_{summer} = 200 \text{ counts/100 mL (as a 30-day geometric mean)} \times Q$$

$$TMDL_{winter} = 1{,}000 \text{ counts/100 mL (as a 30-day geometric mean)} \times Q$$

The graphs show the relationship between the current critical load ($L_{critical}$) and the TMDL. The TMDL for a given stream segment is the load for the mean flow corresponding to the current critical load. This is the point where the current load exceeds the TMDL curve by the greatest amount. This critical TMDL can be represented by the following equation:

$$TMDL_{critical} = C_{standard} \times Q_{mean}$$

Where:

$TMDL_{critical}$ = critical bacteria TMDL load
$C_{standard}$ = seasonal bacteria standard (as a 30-day geometric mean)
summer - 200 counts/100 mL as fecal coliform
winter - 1,000 counts/ 100 mL as fecal coliform
Q_{mean} = stream flow as an arithmetic mean

A 30-day geometric mean load that plots above the respective seasonal TMDL curve represents an exceedance of the instream bacteria standard. The difference between the current critical load and the TMDL curve represents the load reduction required for the stream segment to meet the appropriate instream bacteria standard. There is also a single sample maximum criterion of 4,000 counts per 100 mL for fecal coliform. If a single sample exceeds the maximum criterion, and the seasonal geometric mean criteria is also exceeded, then the TMDL is based on the criteria exceedance requiring the largest load reduction.

For future *E. coli* TMDLs, one curve will represent the summer TMDL for the period May through October when the 30-day geometric mean standard is 126 counts/100 mL. The second curve will represent the winter TMDL for the period November through April when the 30-day geometric mean standard is 265 counts/100 mL. The equations for these two TMDL curves are:

$$TMDL_{summer} = 126 \text{ counts/100 mL (as a 30-day geometric mean)} \times Q$$

$$TMDL_{winter} = 265 \text{ counts/100 mL (as a 30-day geometric mean)} \times Q$$

The TMDL for a given stream segment is the load for the mean flow corresponding to the current critical fecal coliform load. This is the point where the current fecal coliform load exceeds the fecal coliform TMDL curve by the greatest amount. This critical TMDL can be represented by the following equation:

$$TMDL_{critical} = C_{standard} \times Q_{mean}$$

Where:

$TMDL_{critical}$ = critical bacteria TMDL load
$C_{standard}$ = seasonal bacteria standard (as a 30-day geometric mean)
summer – 126 counts/100 mL as *E. coli*
winter – 265 counts/ 100 mL as *E. coli*
Q_{mean} = stream flow as an arithmetic mean

There is also a statistical threshold value (STV) maximum criterion for the months of May through October (410 counts per 100 mL for *E. coli*) and November through April (861 counts per 100 mL for *E. coli*). If a single sample exceeds the STV maximum criterion, and the seasonal geometric mean criteria is also exceeded, then the TMDL is based on the criteria exceedance requiring the largest load reduction.

For a TMDL, the percent load reduction can be expressed as follows:

$$\text{Percent Load Reduction} = \frac{L_{critical} - TMDL_{critical}}{L_{critical}} \times 100$$

The current critical loads and the TMDLs are expressed as equations that show the loads as a function of the total flow at any given time. The general equations for the critical load and the TMDL are:

$$L_{critical} = Q_{total} \times C_{geomean}$$

Where:

$L_{critical}$ = current critical bacteria load
$C_{geomean}$ = bacteria concentration as a 30-day geometric mean
Q_{total} = stream flow

$$TMDL = C_{criterion} \times Q_{total}$$

Where:

TMDL = total maximum daily load
$C_{criterion}$ = criterion
Q_{total} = estimated instantaneous flow

5.0 TOTAL MAXIMUM DAILY LOAD

A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be assimilated by the receiving waterbody without exceeding the applicable water quality standard. In this case, it is the seasonal bacterial standard. A TMDL is the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources, as well as natural background (40 CFR 130.2) for a given waterbody. The TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving waterbody. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. For bacteria, the TMDLs are expressed as counts per 30 days as a geometric mean.

A TMDL is expressed as follows:

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

The TMDL calculates the WLAs and LAs with a margin of safety to meet the stream's water quality standards. The allocations are based on estimates that use the best available data and provide the basis to establish or modify existing controls so that water quality standards can be achieved. In developing a TMDL, it is important to consider whether adequate data are available to identify the sources, and to understand the fate and transport of the pollutant(s) to be controlled.

TMDLs may be developed using a phased approach. Under a phased approach, the TMDL includes: 1) WLAs that confirm existing limits and controls or lead to new limits, and 2) LAs that confirm existing controls or include implementing new controls (USEPA, 1991). A phased TMDL requires additional data be collected to determine if load reductions required by the TMDL are leading to the attainment of water quality standards.

Watershed-based plans may be developed to address and assess both point and nonpoint sources. These plans establish a schedule or timetable for the installation and evaluation of source control measures, data collection, and assessment of water quality standard attainment. Future monitoring of the listed segments water quality may be used to evaluate this phase of the TMDL, and if necessary, to reallocate the loads.

The existing fecal coliform loads calculated for each listed stream segment are based on sampling data and measured or estimated flows and represent the sum of the total loads from all point and nonpoint sources for the segment. In situations where two or more adjacent segments are listed, the fecal coliform loads to each segment are individually evaluated on a localized watershed basis. The following sections describe the various bacteria TMDL components.

5.1 Wasteload Allocations

5.1.1 Wastewater Treatment Facilities

The wasteload allocation (WLA) is the portion of the receiving water's loading capacity that is allocated to existing or future point sources. WLAs are provided to the point sources from POTW and Non-POTW wastewater treatment systems with NPDES end-of-pipe effluent limits established to meet the applicable water quality standard. In addition, the permits include routine monitoring and reporting requirements.

There are currently no facilities discharging into or upstream of the impaired segments in this TMDL. In most cases, WLAs are calculated based on permitted or design flow and permitted bacteria concentration. However, for facilities whose wastewater is reused, the bacteria limit to discharge into surface waters may be overly restrictive and for those facilities the WLA is calculated using the permitted flow and permitted bacteria concentration. This was expressed as an accumulated load over a 30-day period and presented in units of counts per 30 days. If there is a new facility or a facility expands its capacity and the permitted flow increases, the wasteload allocation for the facility will be the permitted flow times the appropriate water quality criteria, either 200 counts/100 mL for fecal coliform or 126 counts/100 mL for E. coli as a 30-day geometric mean.

Non-POTW facilities that discharge sanitary wastewater directly or sanitary waste streams commingled with other waste streams will be given a bacteria effluent limit in their permit.

Potential WLAs for existing Non-POTW discharges without bacteria permit limits would be the facility design flow multiplied by the appropriate bacteria criterion, either 200 counts/100 mL for fecal coliform or 126 counts/100 mL for *E. coli* as a 30-day geometric mean. For these facilities, it is not known if their discharge contains any bacteria at levels that would exceed the instream water quality criteria because the type of treatment processes employed. Therefore, existing Non-POTW facilities may be required to submit bacteria data with their NPDES permit renewal application. Non-POTW discharges must collect, analyze, and submit appropriate bacteria data from at least 4 samples collected 24 hours apart within a 30-day period. GA EPD will evaluate these data and determine if a permit limit for bacteria is needed. There are no existing non-POTW discharges without bacteria permit limits discharging into or upstream of listed segments identified in this TMDL.

5.1.2 Regulated Stormwater Discharges

State and Federal Rules define stormwater discharges covered by NPDES permits as point sources. However, stormwater discharges are from diffuse sources and there are multiple stormwater outfalls. Stormwater sources (point and nonpoint) are different than traditional NPDES permitted sources in four respects: 1) they do not produce a continuous (pollutant loading) discharge; 2) their pollutant loading depends on the intensity, duration, and frequency of rainfall events, over which the permittee has no control; 3) the activities contributing to the pollutant loading may include the various allowable activities of others, and control of these activities is not solely within the discretion of the permittee; and 4) they do not have wastewater treatment plants that control specific pollutants to meet numerical limits.

The intent of stormwater NPDES permits is not to treat the water after collection, but to reduce the exposure of stormwater to pollutants by implementing various controls. It would be infeasible and prohibitively expensive to control pollutant discharges from each stormwater outfall. Therefore, stormwater NPDES permits require the establishment of controls or BMPs to reduce the pollutants entering the environment.

The wasteload allocations from stormwater discharges (WLAsw) associated with MS4s are estimated based on the percentage of urban area in each watershed covered by the MS4 stormwater permit. At this time, the portion of each watershed that goes directly to a permitted storm sewer or is non-permitted sheet flow or diffuse runoff has not been clearly defined. Thus, it is assumed that approximately 70 percent of stormwater runoff from the regulated urban area is collected by the MS4s. This can be represented by the following equation:

$WLA_{SW} = Q_{WLAsw} \times C_{standard}$

where: WLA_{SW} = Wasteload Allocation for permitted storm water runoff from all MS4 urban areas
Q_{WLAsw} = Runoff from all MS4 urban areas conveyed through permitted storm water structures
$Q_{WLAsw} = \Sigma Q_{urban} \times 0.7$
ΣQ_{urban} = Sum of all storm water runoff from MS4 urban
$C_{standard}$ = seasonal fecal coliform standard (as a 30-day geometric mean)
summer – 200 counts/100 mL as fecal coliform
winter – 1000 counts/ 100 mL as fecal coliform
summer – 126 counts/100 mL as *E. coli*
winter – 265 counts/ 100 mL as *E. coli*

For stormwater permits, compliance with the terms and conditions of the permit is effective implementation of the WLA to the Maximum Extent Practicable (MEP), and demonstrates consistency with the assumptions and requirements of the TMDL. GA EPD acknowledges that progress with the assumptions and requirements of the TMDL by stormwater permittees may take one or more permit iterations. Achieving the TMDL reductions may constitute compliance with a SWMP or a SWPPP, provided the MEP definition is met, even where the numeric percent reduction may not be achieved so long as reasonable progress is made toward attainment of water quality standards using an iterative BMP process.

5.1.3 Concentrated Animal Feeding Operations

Wet manure facilities are either included under a State-issued LAS General Permit or an NPDES General Permit. A small number of wet manure operations have an individual NPDES permit. Dry manure facilities are not required to obtain permits. None of the wet manure or dry manure facilities have discharges. Presently, there are no wet or dry manure CAFOs located in the watersheds of the listed segments in the Ochlockonee River Basin, and therefore they were not provided a WLA.

5.2 Load Allocations

The load allocation is the portion of the receiving water's loading capacity that is attributed to existing or future nonpoint sources or to natural background sources. Nonpoint sources are identified in 40 CFR 130.6 as follows:

- Residual waste;
- Land disposal;
- Agricultural and silvicultural;
- Mines;
- Construction;
- Saltwater intrusion; and
- Urban stormwater (non-permitted).

The LA is calculated as the remaining portion of the TMDL load available, after allocating the WLA, WLAsw, and the MOS, using the following equation:

$$LA = TMDL - (\Sigma WLA + \Sigma WLAsw + MOS)$$

As described above, there are two types of load allocations: loads to the stream independent of precipitation, including sources such as failing septic systems, leachate from landfills, animals in the stream, leaking sewer system collection lines, and background loads; and loads associated with bacteria accumulation on land surfaces that is washed off during storm events, including runoff from saturated LAS fields. Currently, it is not possible to partition the various sources of load allocations. In the future, after additional data has been collected, it may be possible to partition the load allocation by source.

5.3 Seasonal Variation

The Georgia bacteria criteria are seasonal. One set of criteria applies to the summer season, while a different set applies to the winter season. To account for seasonal variations, the critical loads for each listed segment were determined from sampling data obtained during both summer and winter seasons, when possible. The TMDL and percent reduction for each listed segment is based on the season in which the critical load occurred. The TMDLs for each season, for any given flow, are presented as equations in Section 5.5.

5.4 Margin of Safety

The MOS is a required component of TMDL development. There are two basic methods for incorporating the MOS: 1) implicitly incorporate the MOS using conservative modeling assumptions to develop allocations; or 2) explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. For this TMDL, an explicit MOS of 10 percent of the TMDL was used.

5.5 Total Bacteria Load

The bacteria TMDL for the listed stream segment is dependent on the time of year, the stream flow, and the applicable state water quality standard. In January 2022, the Georgia DNR Board adopted new bacteria criteria for “Fishing” and “Drinking Water” designated uses using the bacterial indicators *E. coli* and enterococci. These bacteria are better indicators for human health illnesses. The adopted criteria have the same estimated illness rate (8 per 1000 swimmers) as the previously established fecal coliform criteria. Since this TMDL is based on fecal coliform data, but the current bacteria criteria is *E. coli*, this TMDL will use both fecal coliform and *E. coli* as the bacterial indicators.
.

The total maximum daily seasonal fecal coliform loads for Georgia are given below:

$TMDL_{summer}$ = 200 counts/100 mL (as a 30-day geometric mean) x Q

$TMDL_{winter}$ = 1000 counts/100 mL (as a 30-day geometric mean) x Q

TMDL = 4000 counts/100 mL (instantaneous) x Q

The total maximum daily seasonal *E. coli* loads for Georgia are given below:

$TMDL_{summer}$ = 126 counts/100 mL (as a 30-day geometric mean) x Q

$TMDL_{winter}$ = 265 counts/100 mL (as a 30-day geometric mean) x Q

TMDL = 410 counts/100 mL (instantaneous) x Q

For purposes of determining necessary load reductions required to meet the instream water quality criteria, the current critical TMDL was determined. This load is the product of the applicable seasonal bacteria standard and the mean flow used to calculate the current fecal coliform critical load. It represents the sum of the allocated loads from point (WLA and WLA_{sw}) and nonpoint (LA) sources located within the immediate drainage area of the listed segment, and a margin of safety (MOS). For these calculations, the bacteria contributed by a permitted facility to the WLA was the product of the bacteria permitted limit and the monthly permitted discharge. The current critical loads and corresponding TMDLs, WLAs (WLA and WLA_{sw}), LAs, MOSs, and percent load reductions for the Ochlockonee River Basin listed stream segment are presented in Table 11.

The relationships of the current critical loads to the TMDLs are shown graphically in Appendix A. The vertical distance between the two values represents the load reductions necessary to achieve the TMDLs. Because of the localized nature of the load evaluations, the calculated bacterial load reductions pertain to point and nonpoint sources occurring within the immediate drainage area of the listed segment. These current critical values represent a worst-case scenario for the limited set of data. Thus, the load reductions required are conservative estimates, and should be sufficient to prevent exceedances of the instream bacteria standard for a wide range of conditions.

Evaluation of the relationship between instream water quality and the potential sources of pollutant loading is an important component of TMDL development and is the basis for later implementation of corrective measures and BMPs. For the current TMDLs, the association between bacterial loads and the potential sources occurring within the sub-watershed of each segment was examined on a qualitative basis.

Table 11: Bacteria Loads and Required Load Reductions

AUID	Stream Segment	Description	Bacterial Indicator	Current Load (counts/ 30 days)	TMDL Components					Reduction Required
					WLA (counts/ 30 days)(1)	WLAsw (counts/ 30 days)	LA (counts/ 30 days)	MOS (counts/ 30 days)	TMDL (counts/ 30 days)	
GAR031200020203	Bay Pole Branch	Pond 400 feet upstream Bay Pole School Road to Bridge Creek	Fecal coliform	1.13E+12	--	--	3.14E+11	3.49E+10	3.49E+11	69.2%
			E. coli	(2)	--	--	1.98E+11	2.20E+10	2.20E+11	Undetermined (3)
GAR031200020706	Unnamed Tributary to Parkers Mill Creek	Pond at headwaters to Parkers Mill Creek	Fecal coliform	1.73E+12	--	--	3.27E+11	3.64E+10	3.64E+11	79.0%
			E. coli	(2)	--	--	2.06E+11	2.29E+10	2.29E+11	Undetermined (3)
GAR031200020504	West Branch Barnetts Creek	Pond 1.2 miles upstream GA Hwy 93 to Big Branch	Fecal coliform	6.52E+11	--	--	1.08E+11	1.20E+10	1.20E+11	81.6%
			E. coli	(2)	--	--	6.82E+10	7.58E+09	7.58E+10	Undetermined (3)

Notes:

(1) The assigned bacterial load from the NPDES permitted facility for WLA was determined as the product of the bacteria permit limit and the facility average monthly discharge at the time of the critical load.
(2) Sample was not analyzed for *E. coli*, therefore critical load calculation not possible.
(3) Percent reduction could not be determined due to absence of current load calculation.

6.0 RECOMMENDATIONS

The TMDL process consists of an evaluation of the sub-watersheds for each 303(d) listed stream segment to identify, as best as possible, the sources of the bacteria loads causing the stream to exceed instream standards. The TMDL analysis was performed using the best available data to specify WLAs and LAs that will meet bacteria water quality criteria to support the use classification specified for the listed segment.

This TMDL represents part of a long-term process to reduce bacteria loading to meet water quality standards in the Ochlockonee River Basin. Implementation strategies will be reviewed and the TMDL will be refined, as necessary, in the next phase (next five-year cycle). The phased approach will support progress toward water quality standards attainment in the future. In accordance with USEPA TMDL guidance, the TMDL may be revised based on the results of future monitoring and source characterization data efforts. The following recommendations emphasize further source identification and involve the collection of data to support the current allocations and subsequent source reductions.

6.1 Monitoring

Water quality monitoring is conducted at several locations across the State each year. Sampling is conducted statewide by GA EPD personnel in Atlanta, Augusta, Brunswick, Cartersville, and Tifton. Additional monitoring sites are added as necessary.

In the case where a watershed-based plan has been developed for a listed stream segment, an appropriate water quality monitoring program will be outlined. The monitoring program will be developed to help identify the various bacteria sources. The monitoring program may be used to verify the 303(d) stream segment listings. This will be especially valuable for those segments where limited data resulted in the listing.

6.2 Bacteria Management Practices

Based on the findings of the source assessment, NPDES point source bacteria loads from wastewater treatment facilities usually do not significantly contribute to the impairment of the listed stream segments. This is because most facilities are required to treat to levels corresponding to instream water quality criteria. Sources of bacteria in urban areas include wastes that are attributable to domestic animals, leaks and overflows from sanitary sewer systems, illicit discharges of sanitary waste, leaking septic systems, runoff from improper disposal of waste materials, and leachate from both operational and closed landfills. In agricultural areas, potential sources of bacteria may include CAFOs, animals grazing in pastures, dry manure storage facilities and lagoons, chicken litter storage areas, and direct access of livestock to streams. Wildlife, especially waterfowl and mammals living close to or in water environments, can be a significant source of bacteria.

Management practices are recommended to reduce bacteria source loads to the listed 303(d) stream segments, with the result of achieving the instream bacteria standard criteria. These recommended management practices include:

- Compliance with NPDES (wastewater, construction, industrial stormwater, and/or MS4) permit limits and requirements;
- Ensure storm water management plans are in place and being implemented by the local governments located in the watershed;

- Implementation of Georgia's *Statewide Nonpoint Source Management Plan* (GA EPD, 2019);
- Implementation of recommended Water Quality management practices in the Lower Flint-Ochlockonee Water Planning Region;
- Implementation of *Georgia's Best Management Practices for Forestry* (GFC, 2009);
- Implementation of *Best Management Practices for Georgia Agriculture* (GSWCC, 2013) and Adoption of National Resource Conservation Service (NRCS) Conservation Practices for agriculture;
- Adoption and implementation of the *Georgia Stormwater Management Manual* (ARC, 2016) and the *Coastal Stormwater Supplement to the Georgia Stormwater Management Manual* (CWP, 2009) to facilitate water quality treatment of stormwater runoff, including bacteria removal, through structural stormwater BMP installation.

6.2.1 Point Source Approaches

The NPDES permit program provides a basis for municipal, industrial, and stormwater permits, monitoring and compliance with permit limitations, and appropriate enforcement actions for violations. In accordance with GA EPD rules and regulations, all discharges from point source facilities are required to follow the conditions of their NPDES permit at all times. Wastewater treatment plants with the potential for bacteria in their discharge are given end-of-pipe limits to meet the applicable water quality standard. In addition, the permits include routine monitoring and reporting requirements.

Achieving the TMDL reductions may constitute compliance with a SWMP or SWPPP, provided the MEP definition is met, even where the numeric percent reduction may not be achieved so long as reasonable progress is made toward attainment of water quality standards using an iterative BMP process.

6.2.2 Nonpoint Source Approaches

GA EPD is the lead agency for implementing the State's Nonpoint Source Management Program, as described in Georgia's *Statewide Nonpoint Source Management Plan* (GA EPD, 2019). GA EPD will continue to work with local governments, agricultural, and forestry agencies such as the Natural Resources Conservation Service (NRCS), the Georgia Soil and Water Conservation Commission (GSWCC), and the Georgia Forestry Commission (GFC) to foster the implementation of BMPs that address nonpoint source pollution. The following sections describe programs in place and recommendations which should result in reducing nonpoint source loads of bacteria in Georgia's surface waters.

6.2.2.1 Agricultural Sources

GA EPD should coordinate with other agencies that are responsible for agricultural activities in the state to address issues concerning bacteria loading from agricultural lands. It is recommended that information such as livestock populations by sub-watershed, animal access to streams, manure storage and application practices be periodically reviewed so that watershed evaluations can be updated to reflect current conditions. It is also recommended that BMPs be utilized to reduce the number of bacteria transported to surface waters from agricultural sources to the maximum extent practicable.

The following three organizations have primary responsibility for working with farmers to promote soil and water conservation, and to protect water quality:

- University of Georgia (UGA) - Cooperative Extension Service;
- Georgia Soil and Water Conservation Commission (GSWCC); and
- Natural Resources Conservation Service (NRCS).

UGA has faculty, County Cooperative Extension Agents, and technical specialists who provide services in several key areas relating to agricultural impacts on water quality. GA EPD designated the GSWCC as the lead agency for agricultural Nonpoint Source Management in the State. The GSWCC develops nonpoint source management programs and conducts educational activities to promote conservation and protection of land and water devoted to agricultural uses.

The NRCS works with federal, state, and local governments to provide financial and technical assistance to farmers. The NRCS develops standards and specifications for BMPs that are to be used to improve, protect, and/or maintain our state's natural resources. In addition, every five years, the NRCS conducts the National Resources Inventory (NRI). The NRI is a statistically based sample of land use and natural resource conditions and trends that covers non-federal land in the United States.

The NRCS is also providing technical assistance to the GSWCC and the GA EPD with the Georgia River Basin Planning Program. Planning activities associated with this program will describe conditions of the agricultural natural resource base once every five years. It is recommended that the GSWCC and the NRCS continue to encourage BMP implementation, education efforts, and river basin surveys with regard to river basin planning.

6.2.2.2 Urban Sources

Both point and nonpoint sources of bacteria can be significant in the Ochlockonee River Basin urban areas. Urban sources of bacteria can best be addressed using a strategy that involves stormwater management, public participation, and intergovernmental coordination to reduce the discharge of pollutants to the maximum extent practicable. Management practices, control techniques, public education, and other appropriate methods and provisions may be employed. The following activities and programs conducted by cities, counties, and state agencies are recommended:

- Implement stormwater BMPs that incorporate water quality treatment and/or pollutant removal

- Uphold requirements that all new and replacement sanitary sewerage systems be designed to minimize discharges into storm sewer systems;

- Further develop and streamline mechanisms for reporting and correcting illicit connections, breaks, surcharges, and general sanitary sewer system problems;

- Continue efforts to increase public awareness and education towards the impact of human activities in urban settings on water quality, ranging from the consequences of industrial and municipal discharges to the activities of individuals in residential neighborhoods.

6.3 Reasonable Assurance

GA EPD is responsible for administering and enforcing laws to protect the waters of the State. Reasonable assurance ensures that a TMDL's wasteload and load allocations are properly distributed to meet the applicable water quality standards. Without such distribution, a TMDL's ability to serve as an effective guidepost for water quality improvement is significantly diminished. Federal regulations

implementing the CWA require that effluent limits in permits be consistent with “the assumptions and requirements of any available [WLA]” in an approved TMDL [40 CFR 122.44(d)(1)(vii)(B)]. NPDES point source permits will be given effluent limits in the permit consistent with the individual WLAs specified in the TMDL.

The GA EPD is the lead agency for implementing the State's Nonpoint Source Management Program. Regulatory responsibilities that have a bearing on nonpoint source pollution include establishing water quality standards and use classifications, assessing and reporting water quality conditions, and regulating land use activities that may affect water quality. Georgia is working with local governments, agricultural and forestry agencies, such as the NRCS, the GSWCC, and the GFC, to foster the implementation of BMPs to address nonpoint sources. In addition, public education efforts will be targeted to individual stakeholders to provide information regarding the use of BMPs to protect water quality.

6.4 Public Participation

A thirty-day public notice was provided for this TMDL. During that time, the TMDL was available on the GA EPD website, a copy of the TMDL was provided on request, and the public was invited to provide comments on the TMDL.

7.0 INITIAL TMDL IMPLEMENTATION PLAN

This plan identifies applicable State-wide programs and activities that may be employed to manage point and nonpoint sources of bacteria loads for the segment in the Ochlockonee River Basin. Local watershed planning and management initiatives will be fostered, supported, or developed through a variety of mechanisms. Implementation may be addressed by Watershed-Based Plans or other assessments funded by Section 319(h) grants, the local development of watershed protection plans, or "Targeted Outreach" initiated by GA EPD. These initiatives will supplement or possibly replace this initial implementation plan. Implementation actions should also be guided by the recommended management practices and actions contained within each applicable Regional Water Plan developed as part of *Georgia's Comprehensive State-wide Water Management Plan* implementation (Georgia Water Council, 2008).

7.1 Impaired Segments

This initial plan is applicable to the following waterbody that was added to Georgia's 2022 Integrated 305(b)/303(d) List of not supporting waters in *Water Quality in Georgia 2020-2021* (GA EPD, 2022) available on the GA EPD website. The following table summarizes the descriptive information provided in the 303(d) list.

Table 12: Stream Segments Listed on the 2022 303(d) List for Bacteria in the Ochlockonee River Basin

Stream Segment	Location	Reach AUID	Segment Length (miles)	Designated Use
Bay Pole Branch	Pond 400 feet upstream of Bay Pole School Road to Bridge Creek	GAR031200020203	3	Fishing
Unnamed Tributary to Parkers Mill Creek	Pond at headwaters to Parkers Mill Creek	GAR031200020706	1	Fishing
West Branch Barnetts Creek	Pond 1.2 miles upstream GA Hwy 93 to Big Branch	GAR031200020504	4	Fishing

The water use classification for the listed stream segments in the Ochlockonee River Basin is "Fishing." The criterion violated is listed as fecal coliform. The potential causes listed include urban runoff and nonpoint sources. The "Fishing" bacteria water quality standards as approved by US EPA Region 4 on January 20, 2021, and applicable at the time of listing was as follows:

(c) Fishing: Propagation of Fish, Shellfish, Game and Other Aquatic Life; primary contact recreation in and on the water for the months of May – October, secondary contact recreation in and on the water for the months of November – April; or for any other use requiring water of a lower quality.

(i) Bacteria:

1. For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. Should water quality and sanitary studies show fecal coliform levels from non-human sources exceed 200 counts per 100 mL (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 counts per 100 mL in lakes and reservoirs and 500 counts per 100 mL in free flowing freshwater streams. For the months of November through April, fecal coliform not to exceed a geometric mean of 1,000 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a maximum of 4,000 counts per 100 mL for any sample. The State does not encourage swimming in these surface

waters since a number of factors which are beyond the control of any State regulatory agency contribute to elevated levels of bacteria.

2. For waters designated as shellfish growing areas by the Georgia DNR Coastal Resources Division, the requirements will be consistent with those established by the State and Federal agencies responsible for the National Shellfish Sanitation Program. The requirements are found in National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2007 Revision (or most recent version), Interstate Shellfish Sanitation Conference, U.S. Food and Drug Administration.

In January 2022, the Georgia DNR Board adopted new bacteria criteria for "Fishing" and "Drinking Water" designated uses using the bacterial indicators *E. coli* and enterococci. These bacteria are better indicators for human health illnesses. The adopted criteria have the same estimated illness rate (8 per 1000 swimmers) as the previously established criteria. EPA approved the proposed standards August 31, 2022. Since this TMDL was written after EPA approved the new bacteria criteria, the TMDL will use both bacterial indicators. The use classification water quality standards for fecal coliform bacteria, as stated in the *State of Georgia's Rules and Regulations for Water Quality Control*, Chapter 391-3-6-.03(6)(c)(iii) (GA EPD, 2022), are:

(c) Fishing: Propagation of Fish, Shellfish, Game and Other Aquatic Life; primary contact recreation in and on the water for the months of May – October, secondary contact recreation in and on the water for the months of November – April; or for any other use requiring water of a lower quality.

(i) Bacteria:

1. Estuarine waters: For the months of May through October, when primary water contact recreation activities are expected to occur, culturable enterococci not to exceed a geometric mean of 35 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an enterococci statistical threshold value (STV) of 130 counts per 100 mL the same 30-day interval.

   For the months of November through April, culturable enterococci not to exceed a geometric mean of 74 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an enterococci statistical threshold value (STV) of 273 counts per 100 mL in the same 30-day interval.

2. All other fishing waters: For the months of May through October, when primary water contact recreation activities are expected to occur, culturable E. coli not to exceed a geometric mean of 126 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an E. coli statistical threshold value (STV) of 410 counts per 100 mL in the same 30-day interval.

   For the months of November through April, culturable E. coli not to exceed a geometric mean of 265 counts per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. There shall be no greater than a ten percent excursion frequency of an E. coli statistical threshold value (STV) of 861 counts per 100 mL in the same 30-day interval.

3. The State does not encourage swimming in these surface waters since a number of factors which are beyond the control of any State regulatory agency contribute to elevated levels of bacteria.

4. For waters designated as shellfish growing areas by the Georgia DNR Coastal Resources Division, the requirements will be consistent with those established by the State and Federal agencies responsible for the National Shellfish Sanitation Program. The requirements are found in National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, 2007 Revision (or most recent version), Interstate Shellfish Sanitation Conference, U.S. Food and Drug Administration.

7.2 Potential Sources

An important part of the TMDL analysis is the identification of potential source categories. A source assessment characterizes the known and suspected bacteria sources in the watershed. Sources are broadly classified as either point or nonpoint sources. A point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. Point sources of bacteria include NPDES permittees discharging treated wastewater and storm water. Nonpoint sources of bacteria are diffuse sources that cannot be identified as entering the waterbody at a single location. These sources generally involve land use activities that contribute bacteria to streams during a rainfall runoff event.

NPDES point source bacteria loads from wastewater treatment facilities usually do not contribute to impairments. This is because these facilities are required to treat to levels corresponding to instream water quality criteria. However, point sources can and do fail, which may contribute to bacteria loads through leaks and overflows from sanitary sewer systems, CAFOs, or leachate from operational landfills.

Nonpoint sources of bacteria in urban areas include wastes that are attributable to domestic animals, illicit discharges of sanitary waste, leaking septic systems, runoff from improper disposal of waste materials, and leachate from closed landfills. In non-urban areas, potential sources of bacteria may include animals grazing in pastures, dry manure storage facilities and lagoons, chicken litter storage areas, and direct access of livestock to streams. Wildlife, especially waterfowl and mammals living close to or in water environments, can be a significant source of bacteria.

7.3 Management Practices and Activities

GA EPD is responsible for administering and enforcing laws to protect the waters of the State and is the lead agency for implementing the State's Nonpoint Source Management Program. Georgia is working with local governments, agricultural and forestry agencies such as the Georgia Department of Agriculture, NRCS, GSWCC, and GFC to foster implementation of BMPs that address nonpoint source pollution. The following management practices are recommended to reduce bacteria loads to stream segments:

- Sustain compliance with NPDES treated wastewater permit requirements;
- Sustain compliance with NPDES MS4 permit requirements, where applicable;
- Compliance with future NPDES Industrial General Permit requirements, including where applicable, achieving benchmark levels for monitored constituents;
- Ensure storm water management plans are in place and being implemented by the local governments, and by the industrial facilities located in the watershed;
- Implementation of Georgia's *Statewide Nonpoint Source Management Plan* (GA EPD, 2019);
- Adoption and implementation of the *Georgia Stormwater Management Manual* (ARC, 2016) to facilitate water quality treatment of stormwater runoff, including bacteria removal, through structural stormwater BMP installation;
- Further develop and streamline mechanisms for reporting and correcting illicit discharges, breaks, surcharges, and general sanitary sewer system problems;
- Uphold requirements that all new and replacement sanitary sewage systems be designed to minimize discharges into storm sewer systems;

- Adoption of local ordinances (i.e., septic tanks, storm water, etc.) that address local water quality;
- Continue efforts to increase public awareness and education regarding the impact of human activities on water quality, ranging from industrial and municipal discharges to individual's activities in residential neighborhoods;
- Continue working with Federal, State, and local agencies and owners of sites where cleanup measures are necessary, and in developing control measures to prevent future releases of constituents of concern;
- Implementation of recommended Water Quality management practices in the *Altamaha Regional Water Plan* (GA EPD, 2017);
- Adoption of NRCS Conservation Practices for primarily agricultural lands;
- Application of BMPs appropriate to both urban and rural land uses, where applicable; and
- Ongoing public education efforts on the sources of bacteria and common-sense approaches to lessen the impact of this contaminant on surface waters.
- sense approaches to lessen the impact of this contaminant on surface waters.

7.4 Monitoring

GA EPD encourages local governments and municipalities to develop and continue water quality monitoring programs. These programs can help pinpoint various bacteria sources, as well as verify the 303(d) stream segment listings. This will be particularly valuable for those segments where listing was based on limited data. In addition, regularly scheduled sampling will determine if there has been some improvement in the water quality of the listed stream segments. GA EPD would like to particularly commend and encourage downgradient sampling on the LAS system and supports expanding monitoring to quarterly or monthly sampling schedules. GA EPD is available to assist in providing technical guidance regarding the preparation of monitoring plans and Sampling Quality Assurance Plans (SQAP).

7.5 Future Action

This Initial TMDL Implementation Plan includes a general approach to pollutant source identification, as well as management practices to address pollutants. In the future, GA EPD will continue to determine and assess the appropriate point and non-point source management measures needed to achieve the TMDLs and to protect and restore water quality in impaired waterbodies.

For point sources, any wasteload allocations for wastewater treatment plant facilities will be implemented in the form of water quality-based effluent limitations in NPDES permits. Any wasteload allocations for regulated stormwater will be implemented in the form of BMPs in the NPDES permits. Contributions of bacteria from regulated communities may also be managed using permit requirements such as watershed assessments, watershed protection plans, and long-term monitoring. These measures will be directed through current point source management programs.

GA EPD will work to support watershed restoration, improvement and protection projects that address nonpoint source pollution. This is a process whereby GA EPD and/or Regional Commissions or other agencies or local governments, under a contract with GA EPD, will develop a Watershed Management Plan intended to address water quality at the small watershed level (HUC 10 or smaller). These plans will be developed as resources and willing partners become available. The development of these plans may be funded via several grant sources, including,

but not limited to: CWA Section 319(h), Section 604(b), and/or Section 106 grant funds. These plans are intended for implementation upon completion.

Any Watershed Management Plan that specifically addresses a waterbody contained within this TMDL will supersede this Initial TMDL Implementation Plan for that waterbody once GA EPD accepts and/or approves the plan. Watershed Management Plans intended to address this TMDL and other water quality concerns, prepared for GA EPD, and for which GA EPD and/or the GA EPD Contractor are responsible, will contain at a minimum the US EPA's 9 Elements of Watershed Planning:

1) An identification of the sources or groups of similar sources contributing to nonpoint source pollution to be controlled to implement load allocations or achieve water quality standards. Sources should be identified at the subcategory level with estimates of the extent to which they are present in the watershed (e.g., X numbers of cattle feedlots needing upgrading, Y acres of row crops needing improved bacteria control, or Z linear miles of eroded streambank needing remediation);

2) An estimate of the load reductions expected for the management measures;

3) A description of the NPS management measures that will need to be implemented to achieve the load reductions established in the TMDL or to achieve water quality standards;

4) An estimate of the sources of funding needed, and/or authorities that will be relied upon, to implement the plan;

5) An information/education component that will be used to enhance public understanding of and participation in implementing the plan;

6) A schedule for implementing the management measures that is reasonably expeditious;

7) A description of interim, measurable milestones (e.g., amount of load reductions, improvement in biological or habitat parameters) for determining whether management measures or other control actions are being implemented;

8) A set of criteria that can be used to determine whether substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether the plan needs to be revised; and;

9) A monitoring component to evaluate the effectiveness of the implementation efforts, measured against the criteria established under item 8.

The public will be provided an opportunity to participate in the development of Watershed Management Plans that address impaired waters and to comment on them before they are finalized.

GA EPD will continue to offer technical and financial assistance (when and where available) to complete Watershed Management Plans that address the impaired waterbodies listed in this and other TMDL documents. Assistance may include but will not be limited to:

- Assessments of pollutant sources within watersheds;

- Determinations of appropriate management practices to address impairments;
- Identification of potential stakeholders and other partners;
- Developing a plan for outreach to the public and other groups;
- Assessing the resources needed to implement the plan upon completion; and
- Other needs determined by the lead organization responsible for plan development.

GA EPD will also make this same assistance available, if needed, to proactively address water quality concerns. This assistance may be in the way of financial, technical, or other aid and may be requested and provided outside of the TMDL process or schedule.

REFERENCES

Carter, R.F., 1982. Storage Requirements for Georgia Streams, USGS, Water Resources Investigations, Open File Report 82-557.

CWP, 2009. Coastal Stormwater Supplement to the Georgia Stormwater Management Manual, First Edition, Center for Watershed Protection. April 2009.

Federal Register, 1990. Federal Register, Part II: Environmental Protection Agency, Vol. 55, No. 222, November 16, 1990.

GA Dept. of Public Health, 2022. Most Current Summary Data Septic Inspections 2016-08-06, Department of Public Health, Environmental Health Section. August 2022.

GA EPD, 2022. Personal Communications with State of Georgia, Department of Natural Resources, Environmental Protection Division, Land Protection Branch. August 2022.

GA EPD, 2022. Solid Waste Facility Information, State of Georgia, Department of Natural Resources, Environmental Protection Division, Land Protection Branch.

GA EPD, 2017 *Lower Flint-Ochlockonee Regional Water Plan,* Adopted by GA EPD November 2011, Revised June 2017.

GA EPD, 2022. *State of Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6*, State of Georgia, Department of Natural Resources, Environmental Protection Division, Water Protection Branch, amended February 2022.

GA EPD, 2022. *Water Quality in Georgia 2020-2021*, Georgia Department of Natural Resources, Environmental Protection Division, Watershed Protection Branch.

GA EPD, 2022. Georgia Pollutant Discharge Elimination System, Department of Natural Resources, Environmental Protection Division, Watershed Protection Branch, Wastewater Regulatory Program.

GA WRD, 2007. Personal Communications with Region IV Office, Wildlife Resources Division, Georgia Department of Natural Resources, Thomson, GA, May 2007.

Georgia Water Council, 2008. *Georgia Comprehensive State-wide Water Management Plan*, Atlanta, Georgia, January 2008.

MNGWPD, 2017. *Metropolitan North Georgia Water Planning District Water Resource Management Plan,* June 2017

UGA, 2022. Animal Inventory, Center for Agribusiness and Economic Development, College of Agriculture and Environmental Sciences, University of Georgia, 304A Lumpkin House, Athens, Georgia 30605.

USEPA, 1991. *Guidance for Water Quality-Based Decisions*: The TMDL Process, EPA 440/4-91-001, U.S. Environmental Protection Agency, Assessment and Watershed Protection Division, Washington, D.C.

Appendix A

30-day Geometric Mean Fecal Coliform Monitoring Data

Table A-1: Drainage Areas and USGS Flow Gage Used to Estimate Stream Flow in 303(d) Listed Streams

Stream Segment	Location	Drainage Area (sq miles)	USGS Station ID	USGS Description	USGS Drainage Area (sq miles)
Bay Pole Branch GAR031200020203	Pond 400 feet upstream Bay Pole School Road to Bridge Creek	7.343	02329342	Little Attapulgus Creek at Attapulgus, GA	17.3
Tributary to Parkers Mill Creek GAR031200020706	Pond at headwaters to Parkers Mill Creek	1.14			
West Branch Barnetts Creek GAR031200020504	Pond 1.2 miles upstream GA Hwy 93 to Big Branch	8.527			

Table A-2: RV_10_16318 - Bay Pole Branch at Lower Meigs Rd near Moultrie GA Water Quality Monitoring Data

Date	Observed Fecal coliform (Count/100 mL)	Estimated Instantaneous Flow on Sample Day (cfs)	Geometric Mean (counts/100 mL)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
06/13/2016	800	12.9	**241**	**11**	1.53E+11	1.27E+11
06/16/2016	700	11.7				
06/20/2016	300	9.94				
06/22/2016	20	8.81				
09/06/2016	500	11.6	**648**	**30**	1.13E+12	3.49E+11
09/12/2016	170	66.8				
09/15/2016	800	15.9				
09/19/2016	2600	24.8				
03/09/2016	70	14	92	17	8.86E+10	1.93E+11
03/22/2016	20	11				
03/24/2016	220	11.2				
03/30/2016	230	29.5				
12/12/2016	500	9.54	313	16	3.01E+11	1.92E+11
12/14/2016	360	22.9				
12/20/2016	170	16.8				

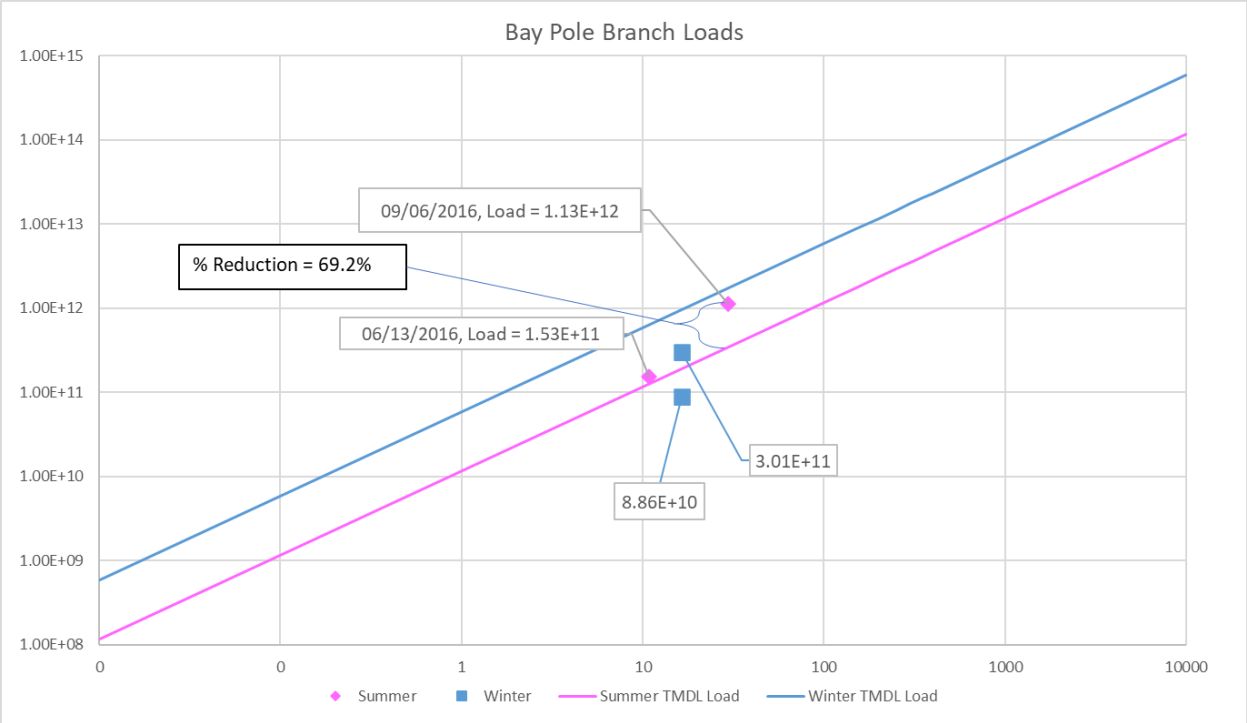

Figure A-1: Bay Pole Branch Fecal Coliform Geometric Mean Loads and Summer and Winter TMDL Curves

Table A-3: RV_10_5096 - Unnamed Tributary to Parkers Mill Creek at State Road111 near Cairo, GA Water Quality Monitoring Data

Date	Observed Fecal coliform (Count/100 mL)	Estimated Instantaneous Flow on Sample Day (cfs)	Geometric Mean (counts/100 mL)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
06/03/2015	300	8.98	**362**	**8**	1.70E+11	9.40E+10
06/09/2015	230	6.31				
06/23/2015	500	5.43				
06/30/2015	500	11.4				
09/01/2015	700	4.52	**951**	**31**	1.73E+12	3.64E+11
09/03/2015	1300	5.04				
09/08/2015	3000	16				
09/10/2015	300	98.7				
03/09/2015	70	18.7	95	18	1.03E+11	2.16E+11
03/11/2015	130	17.8				
03/26/2015	130	20.7				
03/30/2015	70	16.7				
12/01/2015	170	8.95	250	13	1.95E+11	1.56E+11
12/03/2015	1700	23.6				
12/07/2015	80	10.7				
12/09/2015	170	9.87				

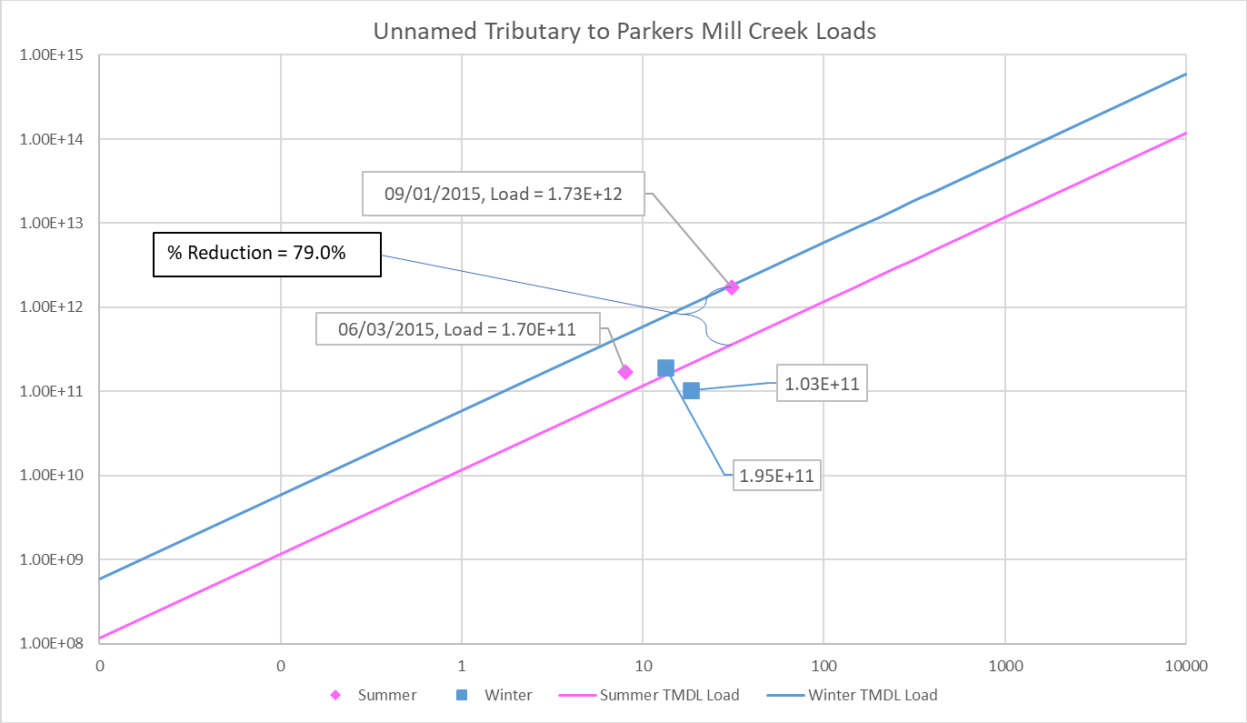

Figure A-2: Unnamed Tributary to Parkers Mill Creek Fecal Coliform Geometric Mean Loads and Summer and Winter TMDL Curves

Table A-4: RV_10_17320 - West Branch Barnetts Creek @ SR 93
Water Quality Monitoring Data

Date	Observed Fecal coliform (Count/100 mL)	Estimated Instantaneous Flow on Sample Day (cfs)	Geometric Mean (counts/100 mL)	Mean Flow (cfs)	Geometric Mean Fecal Coliform Loading (counts/30 days)	Geometric Mean TMDL Fecal Coliform Loading (counts/30 days)
07/09/2018	7000	11.3	**1084**	**10**	6.52E+11	1.20E+11
07/23/2018	140	12.1				
07/26/2018	1300	7.42				
10/09/2018	170	14.2	130	10	7.31E+10	1.13E+11
10/15/2018	140	13.6				
10/22/2018	170	5.88				
10/29/2018	70	4.82				
01/10/2018	170	7.28	137	11	9.08E+10	1.33E+11
01/30/2018	110	15.4				
04/05/2018	80	18.2	164	12	1.20E+11	1.46E+11
04/11/2018	300	11.3				
04/17/2018	230	11.4				
04/19/2018	130	9				

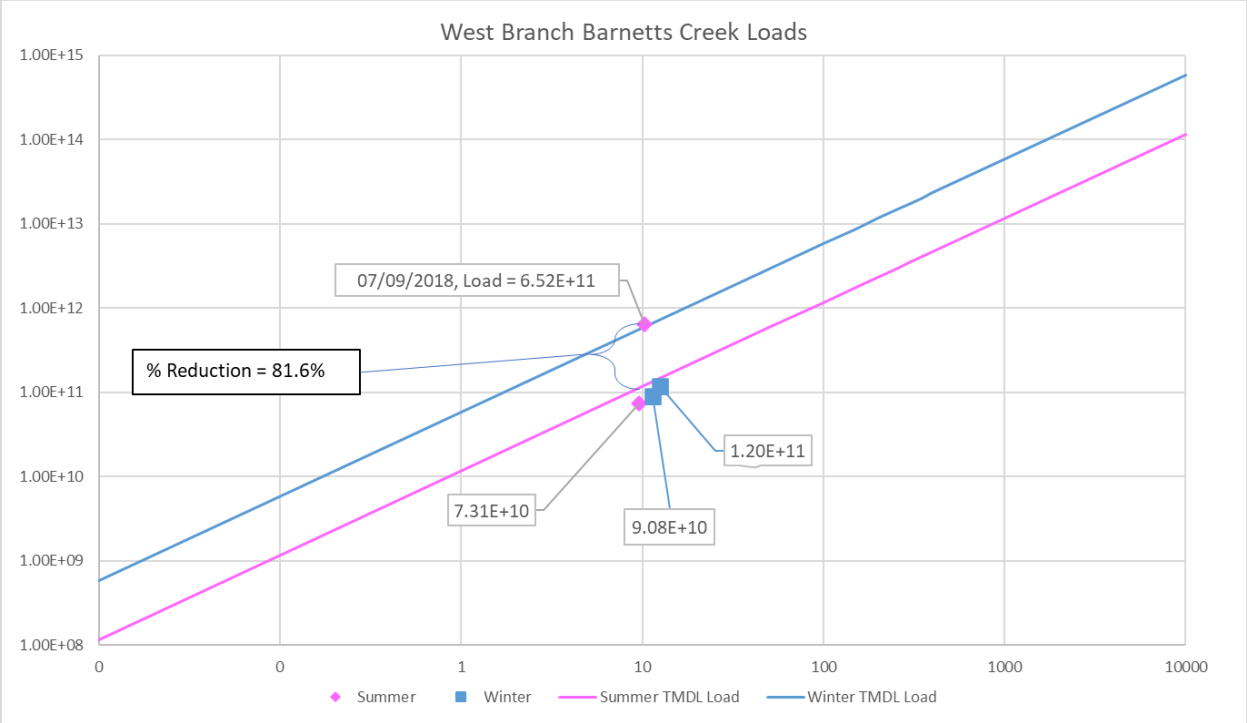

Figure A-3: West Branch Barnetts Creek Fecal Coliform Geometric Mean Loads and Summer and Winter TMDL Curves