

**TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT**

*For Fecal Coliform in the*

**EASTANOLLEE CREEK WATERSHED**

(HUC 03060102)

Stephens County, Eastanollee River Basin, Georgia



---

**APPROVAL PAGE**

for FECAL COLIFORM TMDL in

Eastanollee Creek, GA

Georgia's final 1998 303(d) list identified Eastanollee Creek as not supporting its designated use, with the pollutant of concern being fecal coliform. This total maximum daily load (TMDL) is being established pursuant to the 1998 Georgia 303(d) list and the Consent Decree in the Georgia TMDL Lawsuit.

The load allocation for Eastanollee Creek is based on the low flow value and the background concentration of fecal coliform in the stream. Low flow in Eastanollee Creek is assumed to be 0.47 cubic meters per second (BASINS, 1998). The background concentration of fecal coliform in Eastanollee Creek is assumed to be 20 counts/100ml. This concentration is based on the background levels in other streams in the basin.

The Total Maximum Daily Load for Eastanollee Creek for fecal coliform is given below:

<b>Pollutant</b>	<b>TMDL (counts/day)</b>	<b>WLA (counts/day)</b>	<b>LA (counts/day)</b>	<b>MOS</b>
Fecal Coliform	$1.909 \times 10^{10}$	$1.098 \times 10^{10}$	$8.10 \times 10^9$	Implicit

The Fecal Coliform TMDL for Eastanollee Creek is  $1.909 \times 10^{10}$  counts/day.

APPROVED BY:

-----  
 Robert F. McGhee, Director  
 Water Management Division  
 EPA-Region 4

-----  
 Date

---

## Table of Contents

Introduction .....	1
Problem Definition.....	1
Target Identification.....	2
Background .....	2
Numeric Targets and Sources - Model Development .....	2
Critical Condition Determination.....	3
Total Maximum Daily Load (TMDL).....	3
Margin of Safety .....	4
TMDL Calculation.....	4
Seasonal Variation .....	5
Allocation of Responsibility and Recommendations .....	5
Appendix A - Site Map.....	6
Appendix B - Units Conversion Table .....	7
Administrative Record.....	8
Response to Public Comment on the Proposed TMDL.....	9
References:.....	15

---



## **Introduction**

Section 303(d) of the Clean Water Act (CWA) as Amended by the Water Quality Act of 1987, Public Law 100-4, and the United States Environmental Protection Agency's (USEPA/EPA) Water Quality Planning and Management Regulations [Title 40 of the Code of Federal Regulation (40 CFR), Part 130] require each State to identify those waters within its boundaries not meeting water quality standards applicable to the waters' designated uses. Total maximum daily loads (TMDLs) for all pollutants violating or causing violation of applicable water quality standards are established for each identified water. Such loads are established at levels necessary to implement the applicable water quality standards with consideration given to seasonal variations and margins of safety. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body, based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991).

## **Problem Definition**

Georgia's final 1998 Section 303(d) list identified 14 miles of Eastanollee Creek between Toccoa and Lake Hartwell as not supporting its designated use as a fishing water, with the pollutant of concern being Fecal Coliform. This listing decision was based on limited historical data that was collected.

The TMDL is being established pursuant to EPA commitments in the October 1997 Consent Decree in the Georgia TMDL lawsuit (*Sierra Club v. EPA & Hankinson*, 1998). These conditions include a requirement that TMDLs be proposed by August 30, 1999, for each water on the 1998 303(d) list that is impacted by a National Pollutant Discharge Elimination System (NPDES) permitted point source or point sources, and is located in the Savannah/Ogeechee Basins.

## **Target Identification**

The target level for the development of the Fecal Coliform TMDL in the Eastanollee Creek segment is the numeric criterion established in Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised July 6, 1999. Georgia Regulations establish the freshwater criteria for Fecal Coliform expressed in terms of a geometric mean concentration of no more than 200 counts/100 ml for the months of May through October and 1,000 counts/100 ml for the months of November through April.

## **Background**

The segment that is impaired is located directly downstream of the City of Toccoa, Georgia. This 14-mile segment of Eastanollee Creek is on the State of Georgia's 1998 §303 (d) list for violating the total Fecal Coliform standard for the State of Georgia. The City of Toccoa is currently under order to upgrade the Eastanollee Facility (NPDES Permit #GA000238) to reduce the number of sewer overflows. The City is also under order to reduce the Infiltration/Inflow (I/I) problems identified in its sewer system. These improvements should lead to dramatic decreases in fecal coliform loading to Eastanollee Creek.

## **Numeric Targets and Sources - Model Development**

A steady-state water quality model provides predictions for only a single set of environmental conditions. For NPDES permitting purposes, steady-state models are applied for "critical" environmental conditions that represent conditions when the assimilative capacity of a waterbody is very low. For discharges to riverine systems, critical environmental conditions correspond to drought upstream flows. The assumption behind steady-state modeling is that permit limits that protect water quality during critical conditions will be protective for the large majority of environmental conditions that occur. This TMDL does not consider the impacts of non-point source loadings of fecal coliform due to wet weather events when the assimilative capacity of a waterbody is greater.

## **Critical Condition Determination**

The most critical condition for this segment of Eastanollee Creek will be used to determine the TMDL. Fecal Coliform will be considered a conservative substance in the TMDL calculation. The influence on the instream Fecal Coliform concentration will be river flow. For Eastanollee Creek watershed segment, the critical flow will be considered to be 0.47 cubic meters per second. This flow represents the seven-day low flow that occurs once every ten years (7Q10) on record for Eastanollee Creek, which is required by Georgia State law for regulated waters. The 7Q10 low flow of Eastanollee Creek was obtained from BASINS, accessing the Reach File 1 meta information.

## **Total Maximum Daily Load (TMDL)**

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while achieving water quality standards. The components of the TMDL are the Wasteload Allocation (WLA) and the Load Allocation (LA) and taking into consideration a margin of safety and seasonality. The WLA is the pollutant allocation to point sources while the LA is the pollutant allocation to natural background and nonpoint sources.

Eastanollee Creek is listed for fecal coliform impairment due to violations of the permitted effluent limitations at the Eastanollee Creek Wastewater Treatment Facility and numerous overflows from the sewer system. Based on a review of the Discharge Monitoring Reports for December 1997 through April 1999 the Eastanollee Facility has violated the monthly average limitation for fecal coliform bacteria (1 month), and the weekly maximum limitation for fecal coliform bacteria (3 months). During the period from January 1998 through July 1999 the City of Toccoa has experienced 25 overflows from manholes and lift stations located on its sewer system.

Consent Order No. EPD-WQ-3276 (Order) was executed by the City and the State of Georgia Environmental Protection Division to address violations at the Facility. The Order required the City to perform actions to identify and correct the sources of infiltration and inflow into the sewer system required

to meet water quality criteria in Eastanollee Creek. In response, the City agreed to comply with the permitted effluent limitations at the Facility and complete construction of the Facility upgrade (treatment units and processes) at the Eastanollee Creek Facility by October 31, 1999.

### ***Margin of Safety***

The margin of safety (MOS) is part of the TMDL development process. There are two basic methods for incorporating the MOS (USEPA, 1991a):

- Implicitly incorporating the MOS using conservative model assumptions to develop allocations, or
- Explicitly specifying a portion of the total TMDL as the MOS; using the remainder for allocations.

The MOS is incorporated implicitly into this modeling process by selecting the critical low flow from the previous 20 years.

### ***TMDL Calculation***

The TMDL calculation will utilize the conservation of mass principle, where the load can be calculated by using the following relationship:

$$\text{Concentration} = \text{Load} / \text{Flow}$$

Rearranging this equation the maximum load can be calculated as follows:

$$\text{Load} = \text{Concentration (Water Quality Standard)} * \text{Flow}$$

The load allocation for Eastanollee Creek is based on the low flow value and the background concentration of fecal coliform in the stream. Low flow in Eastanollee Creek is assumed to be 0.47 cubic meters per second. The background concentration of fecal coliform in Eastanollee Creek is assumed to be 20 counts/100ml. This concentration is based on the background levels in other streams in the basin. The resulting load allocation for Eastanollee Creek is  $8.10 \times 10^9$ .

The Total Maximum Daily load for the Eastanollee Creek segment between Toccoa and Lake Hartwell for fecal coliform is given in Table 1.



**Table 1. TMDL for Fecal Coliform**

Pollutant	TMDL (counts/day)	WLA (counts/day)	LA (counts/day)	MOS
<b>Fecal Coliform</b>	<b>1.909 x 10<sup>10</sup></b>	<b>1.098 x 10<sup>10</sup></b>	<b>8.10 x 10<sup>9</sup></b>	<b>Implicit</b>

**The Fecal Coliform TMDL for the section of the Eastanollee Creek segment between Toccoa and Lake Hartwell is 1.909 x 10<sup>10</sup> Counts/day.**

### ***Seasonal Variation***

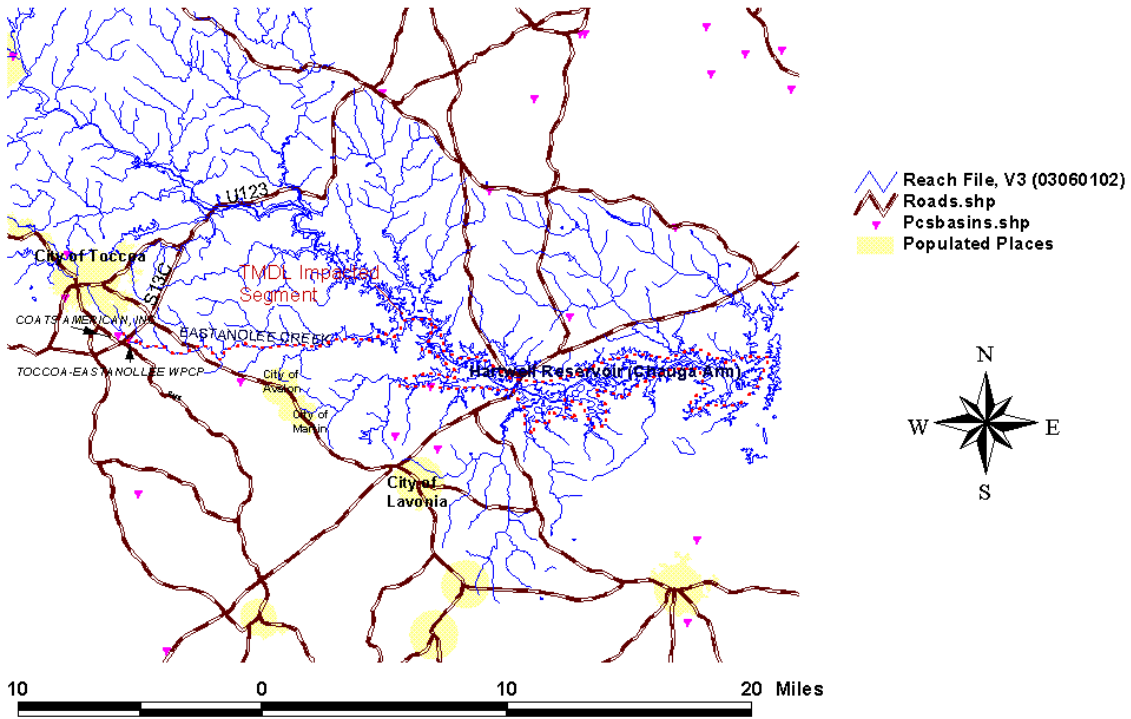
The low flow condition represents the most critical design condition and will provide year round protection. For example at the long term mean flow of 1.98 cubic meters per second the maximum daily load of fecal coliform counts/day would be 48% lower. There are no seasonal variations that impact the concentration of Fecal Coliform in the river due to biological activities.

### ***Allocation of Responsibility and Recommendations***

For a potential future point or nonpoint source of Fecal Coliform loadings introduced into the system, the total of the WLA (wasteload allocations for point source loadings) and LA (load allocation for nonpoint source loadings) shall not exceed this TMDL.

# Appendix A - Site Map

## Eastanolee Creek TMDL Site Location Map



---

**Appendix B - Units Conversion Table**

<b>From</b>	<b>To</b>	<b>Multiply by:</b>
Million Gallons per Day (MGD)	Cubic Meters per Second (cms)	0.04381
Cubic Feet per Second (cfs)	Cubic Meters per Second (cms)	0.02832
Pounds (lbs)	Kilograms (Kg)	0.4536
Tons (Short)	Kilograms (Kg)	907.1848
Tons (Long)	Kilograms (Kg)	1016.00

## **Administrative Record**

1. Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards
2. Better Assessment Science Integrating Point and Nonpoint Sources, BASINS, Version 2, User's Manual. EPA-823-B-98-006, November 1998. Model available at <http://www.epa.gov>
3. Environmental Protection Division, Department of Natural Resources, State of Georgia NPDES Permit No. GA0021814, July 1995
4. Consent Order No. EPD-WQ-3648, Environmental Protection Division of the Department of Natural Resources State of Georgia, September 1999

## Response to Public Comment on the Proposed TMDL

### ***COMMENT:***

The wasteload allocation (WLA) component of the TMDL is presumably directed at the City of Toccoa and its permit will need to be reduced accordingly. If the WLA can be reduced even further to bring the stream even closer to meeting standards, then that must be done.

Mr. Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, December 7, 1999

### ***RESPONSE:***

Comment noted.

### ***COMMENT:***

The 7Q10 value used in the proposed TMDL is 16.57 cfs. The value in commenter's records indicate the correct value is 13.5 cfs. Commenter requests to see detailed data and studies used in determining the 7Q10 value in the proposed TMDLs.

Mr. Thomas Culbertson, Director, Friends of the Eastanollee Creek, Rural Route Two, Box 2392, Old Mill Road, Eastanollee, Georgia 30538, November 21, 1999

### ***RESPONSE:***

The 7Q10 was from the Reach File 1 database of BASINS. This is a 7Q10 for the entire Eastanollee Creek watershed. The suggested 7Q10 may be for an upper section of the watershed. If these data are provided, we will review and correct as needed.

### ***COMMENT:***

The TMDLs were calculated using mass balance techniques. Commenters do not believe that the mass balance technique addresses the complexity of the sampling and potential elevated background loading associated with fecal coliform.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

***RESPONSE:***

Comment noted.

***COMMENT:***

The flows and concentrations for the City of Clayton and City of Toccoa, respectively, were not provided.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

***RESPONSE:***

These data were not available during the development of the TMDL.

***COMMENT:***

The low flow scenario is not the only water quality limited situation for this water. It is not legally or technically acceptable for a TMDL to fail to address all pertinent critical flow scenarios. Failure to address high flow scenarios at this time will allow the most serious fecal problems to go unaddressed for a long time.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

***RESPONSE:***

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. The low flow scenario represents critical conditions. Load allocations established for this period will provide an added margin of safety during high flow scenarios.

**COMMENT:**

EPA needs to justify its intention to set a TMDL at low flow and to use that as a margin of safety. There must be some accounting of nonpoint loads of fecal. The evident desire of EPA to split fecal into two separate TMDLs in order to address high flow TMDL considerations at a later time is not an appropriate approach and it fails to adequately address the required seasonal variation component of a TMDL.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

**RESPONSE:**

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Insufficient data are collected on Eastanollee Creek for wet weather analysis. The margin of safety incorporated in the TMDL includes a background concentration of fecal coliform bacteria of 20 counts/100ml.

**COMMENT:**

Fecal problems occur mostly at higher flows from nonpoint sources, from sewer leaks/overflows, as well as from some permitted discharges. A standard protocol is needed for addressing typical fecal TMDLs where site specific models are not available.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

**RESPONSE:**

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Insufficient data are available for wet weather analysis. In general, geometric mean fecal coliform concentrations are higher in the summer dry months than corresponding annual or winter wet weather geometric mean concentrations. This is due to a rate of dilution by high, wet weather discharge that exceeds the subsequent increase in fecal coliform loading.

**COMMENT:**

EPA guidance requires that, where nonpoint sources cannot be reduced through enforceable controls, the reduction burden must be placed on permitted sources. The TMDL has applied the standard to the end of the pipe with an expectation that any necessary reductions would come from unregulated, uncontrolled, or unknown nonpoint sources. In the TMDL, the WLA for the point sources should be established at a lower level than the in-stream standard before there can be any contention that EPA has incorporated any MOS. This is especially true because the TMDL only addresses the low flow situation where there would be zero MOS.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

***RESPONSE:***

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Insufficient data are available for wet weather analysis. In general, geometric mean fecal coliform concentrations are higher in the summer dry months than corresponding annual or winter wet weather geometric mean concentrations. This is due to a rate of dilution by high, wet weather discharge that exceeds the subsequent increase in fecal coliform loading. The margin of safety includes a background concentration of 20 counts/100 ml.

***COMMENT:***

The TMDL addresses only the single criterion of 200/100 ml geometric mean. There are other criterion in the regulations. If EPA contends that its reference to the single criterion is sufficient to address all other regulatory standards, this needs to be stated, explained, and supported.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

***RESPONSE:***

The TMDL is based on the single criterion of 200 counts/100ml reflects critical conditions. Using this approach the TMDL provides reasonable assurance that other water quality standards can be met under various flow conditions.

***COMMENT:***



On page 3, it is stated that the fecal assimilative capacity is greater during wet weather events. If the main problem is fecal loads from sewer overflows and runoff, this would not be the case.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

***RESPONSE:***

This TMDL was used to evaluate the potential impacts of NPDES permitted facilities on water quality as agreed upon in the Georgia TMDL Lawsuit Consent Decree. Insufficient data are available for wet weather analysis. In general, geometric mean fecal coliform concentrations are higher in the summer dry months than corresponding annual or winter wet weather geometric mean concentrations. This is due to a rate of dilution by high, wet weather discharge that exceeds the subsequent increase in fecal coliform loading.

***COMMENT:***

The stated 7Q10 of 16.57 cfs seems quite high. The zinc TMDL for this stream segment uses a 7Q10 of 1.3 cfs.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

***RESPONSE:***

The 7Q10 was from the Reach File 1 database of BASINS. This is a 7Q10 for the entire Eastanollee Creek watershed. The suggested 7Q10 may be for an upper section of the watershed. If these data are provided, we will review and correct as needed. The 7Q10 for the zinc TMDL was used based on the State's Wasteload Allocation Form.

***COMMENT:***

On page 4, it states that there have been 25 overflows from January 1998 through July 1999 and that an order to upgrade required completion of the upgrade by October 31, 1999. It needs to be explained if there has been an imposed moratorium and if the order date was met.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

***RESPONSE:***

EPA-Region 4 has no further information regarding Consent Order No. EPD-WQ-3276. It is suggested that the State's Water Protection Branch be contacted for additional information on this Consent Order.

## **References:**

Better Assessment Science Integrating Point and Nonpoint Sources, BASINS, Version 2, User's Manual. EPA-823-B-98-006, November 1998

Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards, July 1999

Sierra Club v. EPA & Hankinson USDC-ND-GA Atlanta Div. #1: 94-CV-2501-MHS, 1998

Consent Order No. EPD-WQ-3648, Environmental Protection Division of the Dept. Of Natural Resources State of Georgia, September 1999