TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For FECAL COLIFORM in the

REED CREEK WATERSHED

(HUC 03060106)

Columbia County, Reed Creek, Georgia

APPROVAL PAGE

for FECAL COLIFORM in

Reed Creek, GA

Georgia=s final 1998 303(d) list identified Reed Creek near Augusta, GA as not supporting its designated use for fishing, 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 Reed Creek is based on the low flow value and the background concentration of fecal coliform in the stream. Low flow in Reed Creek is assumed to be 0.042 cubic meters per second (USGS, 1988). The background concentration of fecal coliform in Reed 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 Reed Creek for fecal coliform is given below:

Pollutant	**TMDL (counts/day)**	**WLA (counts/day)**	**LA (counts/day)**	**MOS**
Fecal Coliform	4.41×10^{10}	4.34×10^{10}	7.34×10^{8}	Implicit

The Fecal Coliform TMDL for Reed Creek is 4.41×10^{10} counts/day. This accounts for a maximum load from the Reed Creek Water Pollution Control Plant and natural background conditions.

APPROVED BY:

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Robert F. McGhee, Director Date

Water Management Division

EPA-Region 4

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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, 1991a).

Problem Definition

Georgia's final 1998 Section 303(d) list identified 1 mile of Reed Creek in Columbia County as not supporting its designated use for fishing, with the pollutant of concern being Fecal Coliform. This listing decision was based on limited data collected at water quality station 01009051.

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 Reed Creek is the numeric criterion established in Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised July 6, 1999. The regulation establishes 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 1 mile in Columbia County. This segment of Reed Creek is on the State of Georgia's §303 (d) list for violating the total fecal coliform standard for the State of Georgia. The State of Georgia collects water quality data on Reed Creek at State Route 28 near Martinez, Georgia (please see Appendix A). A review of the limited data collected at this station indicates two violations during the months May through October 1997 and five violations during the months November through April 1997.

The only point source on Reed Creek is the Columbia County Reed Creek Water Pollution Control Plant (WPCP). The Reed Creek WPCP is downstream of the monitoring station. The facility is currently operating at end-of-pipe criteria. A suspected source of the fecal coliform contamination is failures in the sewer collection systems. Other contributing sources of contamination could be non-point source urban runoff.

A dam is located in Reed Creek downstream of the WPCP facility and is used to create the effluent pond for the facility. Flow in Reed Creek downstream of the facility is discharged from the effluent pond. The facility is permitted to discharge 0.25 cms (5.75 MGD) to Reed 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 Reed 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 Reed Creek, the critical flow will be considered 0.042 cms.

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 the TMDL must take 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.

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 based on 20 years of flow data.

TMDL Calculation

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

Concentration = Load / Flow

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

Load = Concentration (Water Quality Standard) * Flow

The load allocation for Reed Creek is based on the low flow value and the background concentration of fecal coliform in the stream. Low flow in Reed Creek is assumed to be 0.042 cms (USGS, 1988). The background concentration of fecal coliform in Reed 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 Reed Creek is 7.34×10^8 counts/day.

The Total Maximum Daily load for Reed Creek for fecal coliform is given in Table 1**.**

Table 1 TMDL Calculation and Waste Load Allocation

Pollutant	**TMDL (counts/day)**	**WLA (counts/day)**	**LA (counts/day)**	**MOS**
Fecal Coliform	4.41×10^{10}	4.34×10^{10}	7.34×10^8	Implicit

The Fecal Coliform TMDL for Reed Creek is 4.41×10^{10} counts/day. This accounts for a maximum load from the Reed Creek WPCP and natural background conditions.

Seasonal Variation

The permitted discharge condition represents the most critical design condition and will provide year round protection. There are no seasonal variations that impact the concentration of fecal coliform in the river due to biological activities.

Allocation of Responsibility and Recommendations

The allocation for fecal coliform to Reed Creek is given in Table 1. For a potential future point or nonpoint source of fecal coliform loading 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.

References:

USEPA. 1991a. *Guidance for Water Quality –based Decisions: The TMDL Process.* U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-440/4-91-001, April 1991.

USEPA. 1998. *Better Assessment Science Integrating Point and Nonpoint Sources, BASINS, Version 2.0 User's Manual.* U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-823-B-98-006, November 1998.

Georgia Department of Natural Resources, Environmental Protection Division. 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. 1998. USDC-ND-GA Atlanta Div. #1: 94-CV-2501-MHS.

USGS. 1988. *Low-Flow Profiles of the Upper Savannah and Ogeechee Rivers and Tributaries in Georgia*. R.F. Carter, E.H. Hopkins, and H.A. Perlman, Water Resources Investigations Report 88-4047.

Appendix A: Water Quality Data at Station 01009051

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01009051        02196488
                   STORET System
33 32 19.3 082 04 48.7  4
REED CK AT SR 28 NR MARTINEZ
13073 GEORGIA          COLUMBIA
SOUTHEAST                031300
SAVANNAH
21GAEPD  03060106                /TYPA/AMBNT/STREAM
        970208     DEPTH    0


                              31615
  DATE   TIME   DEPTH      FEC COLI
  FROM    OF               MPNECMED
   TO    DAY    FEET        /100ML

97/02/03 0730    0             330
97/02/20 0630    0             170
97/03/20 0650    0             230
97/04/17 0600    0             490
97/05/22 0620    0             790
97/06/19 0530    0             490
97/07/23 0530    0           88500
97/08/21 0530    0          170000
97/09/18 0530    0             790
97/10/16 0600    0           13000
97/11/06 0630    0             490
97/12/04 0630    0             490
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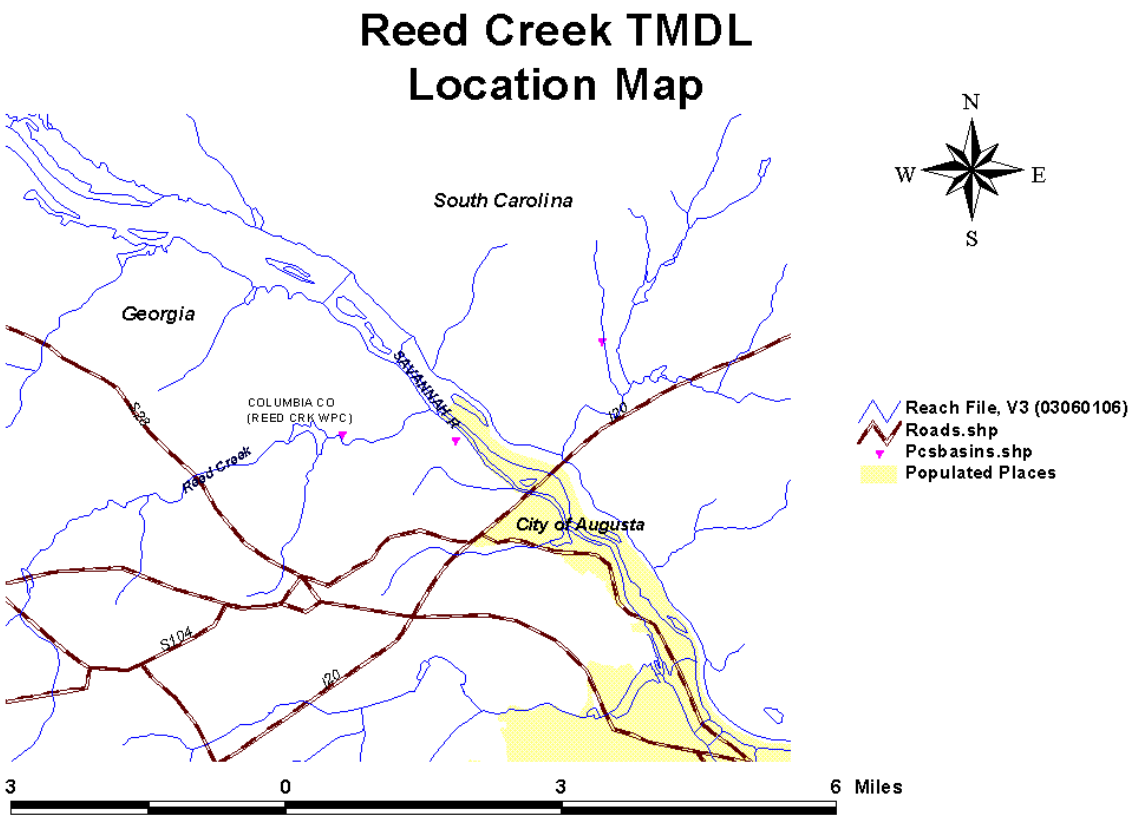
Appendix B: Location Map



Appendix C: Units Conversion Table

From	To	Multiply by:
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 Index

1. Columbia County, Georgia, Water Pollution Control Plant NPDES Permit No. GA0031992.
2. Compilation of Georgia's Current Modeling Guidelines for the Development of Wasteload Allocations and NPDES Permit Limitations. January 1991
3. Georgia Department of Natural Resources, Environmental Protection Division, Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards
4. Shivalingaiah, B. and James, W. (June 1984) Algorithms for buildup washoff and routing pollutants in urban runoff., Proceedings of 3rd International Conference on Urban Storm Drainage, Goteborg Sweden, pp. 1445-1456., Reference No. I3147
5. USGS. 1988. *Low-Flow Profiles of the Upper Savannah and Ogeechee Rivers and Tributaries in Georgia*. R.F. Carter, E.H. Hopkins, and H.A. Perlman, Water Resources Investigations Report 88-4047.
6. STORET Water Quality Data
7. Stored on TMDL Shared drive m:/apps32/tmdl/reed STORET Water Quality Data
8. Stored on TMDL Shared drive m:/apps32/tmdl/reed Excel Spreadsheet to calculate fecal coliform concentration
9. Stored on TMDL Shared drive m:/apps32/tmdl/reed Proposed TMDL Report

Response to Public Comment on Proposed TMDL

COMMENT

The wasteload allocation to the Columbia County Water Pollution Control Plant should bear the full burden of pollutant reduction (no load allocation) because it is a controllable source and the load allocation is not controllable.

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

RESPONSE

The LA portion of the TMDL represents background conditions in Reed Creek. The Reed Creek WPCP is currently operating at end-of-pipe criteria.

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 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

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

The Georgia TMDL Lawsuit consent decree required that TMDLs be developed for waterbodies impacted by NPDES permitted point sources only. There is insufficient data collected on Reed Creek for wet weather analysis, therefore this TMDL did not address wet weather issues.

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

The Georgia TMDL Lawsuit consent decree required that TMDLs be developed for waterbodies impacted by NPDES permitted point sources only. There is insufficient data collected on Reed Creek for wet weather analysis, therefore this TMDL did not address wet weather issues. In general, geometric means of 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

The Georgia TMDL Lawsuit consent decree required that TMDLs be developed for waterbodies impacted by NPDES permitted point sources only. There is insufficient data collected on Reed Creek for wet weather analysis, therefore this TMDL did not address wet weather issues. The margin of safety incorporated in the TMDL includes a background concentration of fecal coliform bacteria of 20 counts/100ml.

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 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

No Appendix A is included as stated on page 2.

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

RESPONSE

Appendix A contains water quality data collected on Reed Creek at State Route 28 near Martinez, Georgia. This appendix is included in the final TMDL.

COMMENT

On page 2, there is mention of a dam on the creek to create the effluent pond. What is meant by an effluent pond, and what is the purpose ? Is there in-stream treatment or a mixing zone approval ? This also suggests that this is a flow regulated stream and 7Q10 may not apply.

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

RESPONSE

The dam on Reed Creek is used to create a pond for storing effluent before it is discharged downstream. The purpose of the pond is for controlling the rate of discharge to Reed Creek. The WPCP facility is required to meet end-of-pipe criterion for fecal coliform bacteria and there is no in-stream treatment for fecal coliform. The dam is located upstream of the impaired segment and other drainage areas flow into Reed Creek below the dam. The 7Q10 flow on Reed Creek is assumed to be 0.042 cms (1.5 cfs) whereas the permitted discharge from the WPCP facility is 0.25 cms (8.86 cfs). A more conservative TMDL is obtained using the 7Q10 flow rate.

COMMENT

The flow from the STP is 8.86 cfs and the low flow of the stream is 1.5 cfs. This indicates that the stream should be listed as WQLS for other parameters also.

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

RESPONSE

The comment concerns a ' 303(d) listing issue and is not directly relevant to the matter of the public opportunity for comment on numerous proposed TMDLs for waters and pollutants in the State of Georgia.

It is recommended that the commenter provide his written comments, along with supporting data and information, to the Georgia EPD for consideration in the development of the 2000 303(d) list.

COMMENT

It is stated on page 3 that nonpoint loadings are not considered but Table 1 shows a LA value. This is inconsistent. It is also stated that at higher flows there is greater assimilative capacity, but that would not be the case if runoff contained high fecal, thus yielding less capacity if the stream exceeded standards. At low flow, the background is assumed to be 20/100 ml allowing for some dilution, but this may not be the case at higher flows when it appears that stream standards have been exceeded.

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

RESPONSE

The LA portion of the TMDL is the pollutant allocation to natural background and non-point sources. Insufficient data are available for wet weather analysis to evaluate the impact of non-point source loadings of fecal coliform. In Table 1, the LA value represents background conditions.

COMMENT

Why is the background of 20/100 ml used in this TMDL different from other TMDLs ?

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

RESPONSE

The background concentration of 20 counts/100ml is an assumed value and is consistent with other fecal coliform bacteria TMDLs developed by EPA.