Total Maximum Daily Load (TMDL)

For

pH Exceedences in

Bluff Creek, GA

(Downstream Wiggins Road to Oconee River)

In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C §1251 et.seq., as amended by the Water Quality Act of 1987, P.L. 400-4, the U.S Environmental Protection Agency is hereby establishing a Total Maximum Daily Load (TMDL) for pH for Bluff Creek. Subsequent actions must be consistent with this TMDL.

_____ _____

Beverly H. Banister, Director Date
Water Management Division

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Figure 1- Bluff Creek Watershed

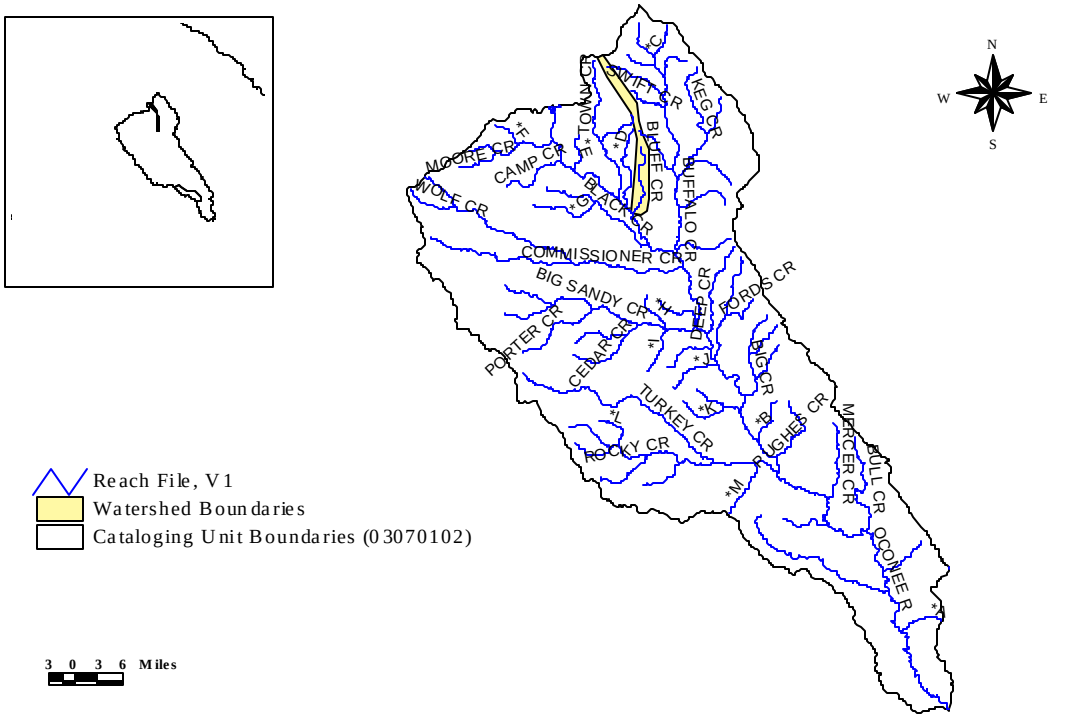

Figure - 1. Site Location Map.
Bluff Creek

TMDL at a Glance

Basin Name/Subbasin:	Oconee Basin/Lower Oconee Subbasin (3070102)
Waterbody of Concern:	Bluff Creek (Downstream Wiggins Road to Oconee River)
Pollutant:	pH
Designated Use:	Fishing
Size of Waterbody:	12.3 Miles
TMDL Target:	6.0 to 8.5 standard units
Wasteload Allocation:	6.0 to 8.5 standard units
Load Allocation:	6.0 to 8.5 standard units
Margin of Safety:	None

Executive Summary

A segment of Bluff Creek has been placed on the State of Georgia's Section 303(d) list of impaired waters due to pH excursions. pH (or hydrogen ion concentration) is a measure of acidity and alkalinity of a given solution. The measure of pH is on a number scale from 0 to 14, where a pH of 7 represents neutrality. pH numbers lower than 7 represent increasing acidity, while a pH of greater than 7 represent increasing alkalinity. The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical constituents.

The applicable water quality criterion for pH, as described in State of Georgia's Rules and Regulation, is 6.0 to 8.5. Effluent data from a discharger in the Bluff Creek drainage shows no pH violations. Therefore, it is unknown if pH violations are the result of point or non-point source activities in the watershed, or if pH violations are natural. Because of the lack of data/information regarding the pollutant and pollutant source(s) causing or contributing to the instream pH violations, this TMDL will be a phased TMDL whereby additional information should be collected to determine the pollutant and pollutant source(s) causing the water quality problem.

Because pH is not a load, but rather a measure of acidity and/or alkalinity of a given solution, this TMDL uses an *other appropriate measure* (40 CFR § 130.2(i)) rather than an actual mass-per-unit time measure. For this TMDL, the state's numeric pH criterion (6.0 to 8.5) is used as the TMDL target (*other appropriate measure*). Thus, the TMDL ensures both point and non-point sources activities meet the pH criterion at the point of discharge to Bluff Creek. The Georgia Environmental Protection Division should ensure any new dischargers to Bluff Creek should be required to meet the 6.0 to 8.5 criterion at the point of discharge.

Introduction

Total maximum daily loads (TMDLs) are required for impaired waters on a state's Section 303(d) list as described in Federal Clean Water Act Section 303(d) and 40 CFR 130. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The TMDL allocates pollutant loadings among point and non-point pollutant sources. Point sources receive wasteload allocations (WLAs) which are regulated by National Pollutant Discharge Elimination System (NPDES) program, while non-point sources receive load allocations (LAs) for non-point sources activities. The WLAs and LAs in the TMDL provide a basis for states to reduce loadings from both point and non-point sources that will lead to attainment of the applicable water quality criterion.

Establishment of this TMDL satisfies the consent decree obligation established in Sierra Club v. EPA, Civil Action No: 94-CV-2501-MHS(N.D GA). The Consent Decree requires TMDLs to be developed for all waters on Georgia's current Section 303(d) consistent with the schedule established by Georgia for its rotating basin management approach.

Watershed Characterization

Landuse / Land Ownership

The Bluff Creek watershed is located in the Oconee River Basin in Baldwin, Hancock, Washington and Wilkinson counties. Populated towns near Bluff Creek include the towns of Deerstep (population 128), Oconee (population 260), Sandersville (population 6290), and Sparta (population 1710). It is estimated that 643 people reside within the Bluff Creek watershed. Landuse in the Bluff Creek watershed is comprised mostly of deciduous and evergreen forest (Table 1).

Table 1 - Landuse in the Bluff Creek Watershed

Landuse	Percent Area
Bare Rock/Sand/Clay	0.2
Deciduous Forest	24.9
Emergent Herbaceous Wetlands	0.0
Evergreen Forest	35.3
High Intensity Commercial/Industrial/Transportation	0.0
Low Intensity Residential	0.1
Mixed Forest	10.1
Open Water	0.8
Other Grasses (Urban/recreational; e.g. parks law	0.0
Pasture/Hay	3.2
Quarries/Strip Mines/Gravel Pits	6.7
Row Crops	5.3
Transitional	12.2
Woody Wetlands	1.4

Soils

Soils in the Bluff Creek watershed are comprised of mostly sandy and silt loam soils. As shown in Figure 2, soils in the Bluff Creek watershed are acidic with pH ranging from 4.85 to 5.54 standard units.

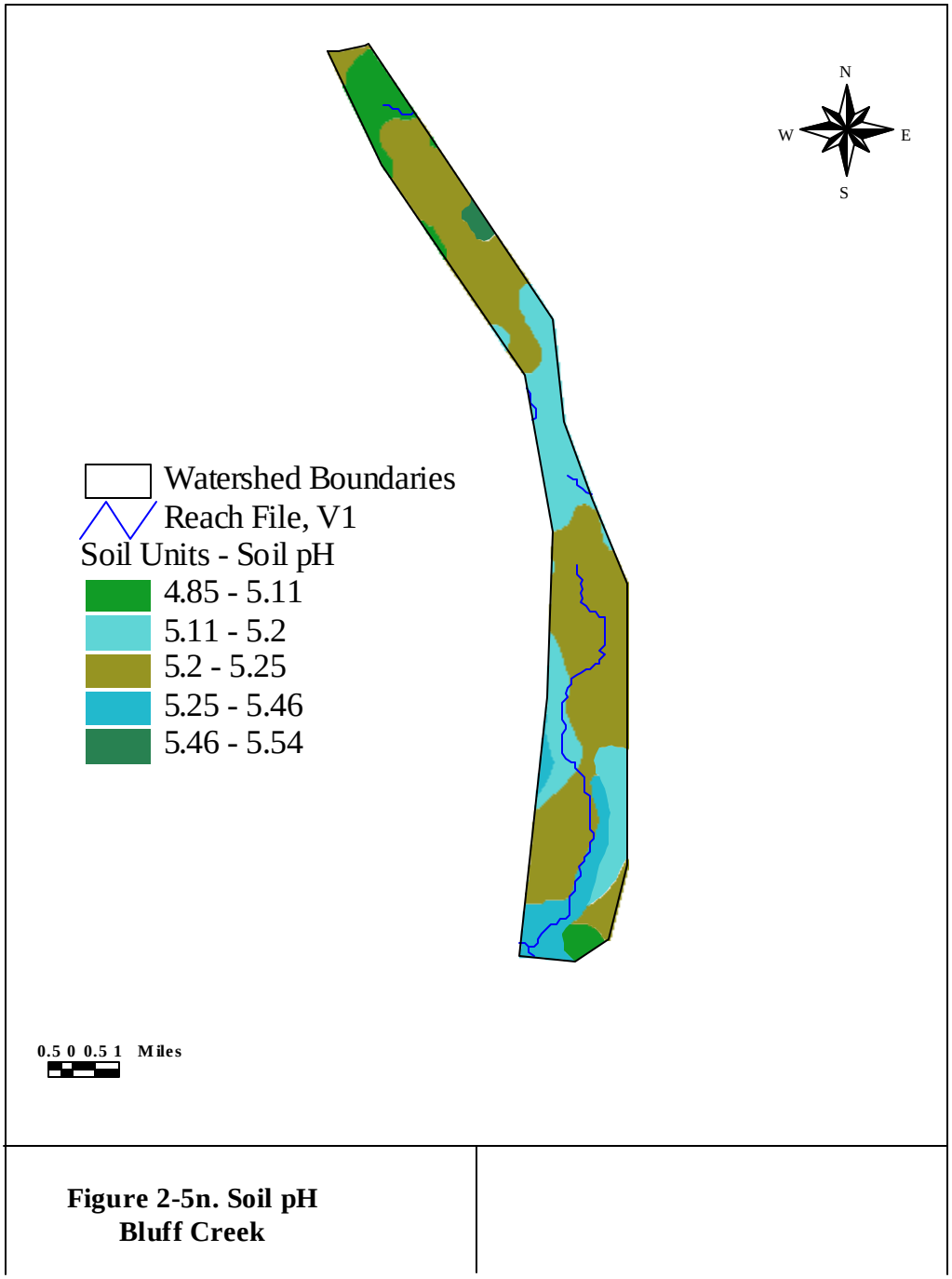

Figure 2 - Soil pH in Bluff Creek

Climate

Climatic patterns in the Oconee River Basin (Milledgeville Weather Station) are summarized in Figure 3, shown below. Precipitation in the Oconee River basin is generally highest in the late winter-early spring and summer periods and lowest in the fall. Air temperatures in this basin are generally lower in late fall and winter and increase sharply in February to peak in the months of June and July.

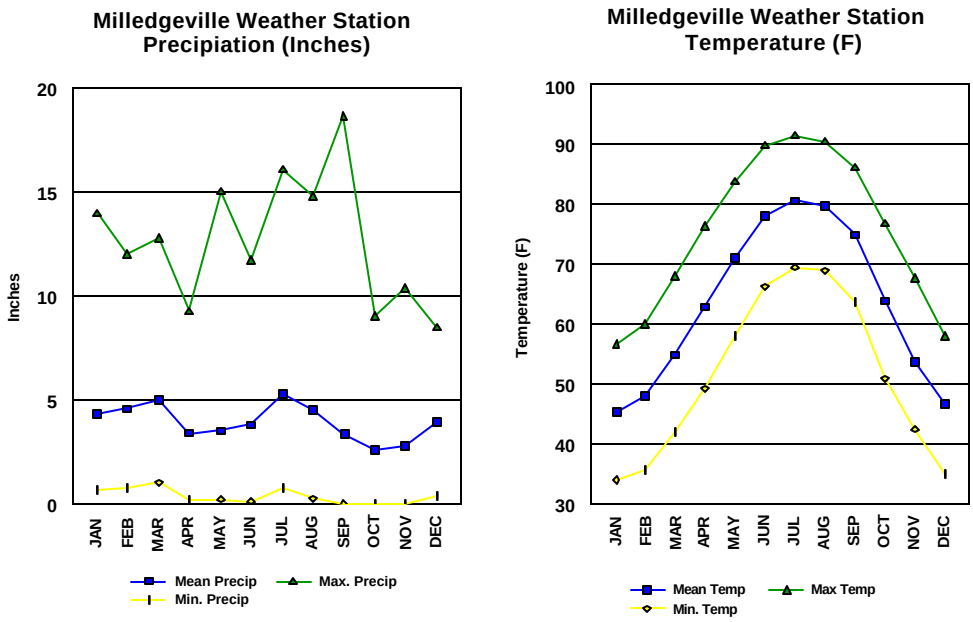

Figure 3 - Climate Patterns in the Oconee River Basin

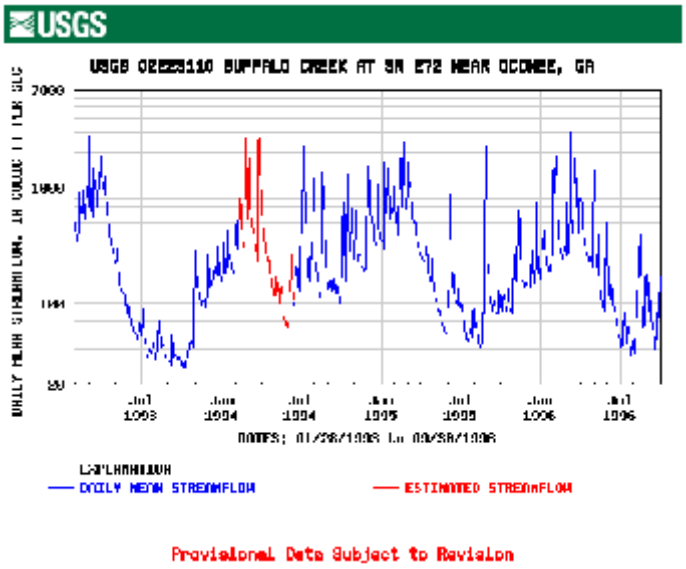

Figure 4 - Streamflow in Buffalo Creek Watershed

Hydrology/Streamflow

No streamflow data was

available for the Bluff Creek. Instead, data from Buffalo Creek was used to illustrate stream flow response to climatic conditions which is typical of most southeastern streams (Figure 4). Peak flow in these streams generally occur during late winter/early spring and low flows generally occur during the summer periods. Peak flow in these streams generally respond immediately to episodic storm events which are common in the southeast.

Problem Definition

Georgia has identified a portion of Bluff Creek (Downstream Wiggins Road to the Oconee River) (Figure 1) as not meeting the State of Georgia's water quality criterion for pH. One of the most significant environmental impacts of pH is the effect that it has on the solubility and thus the bioavailability of other substances. As the pH falls (solution becomes more acidic) many insoluble substances become more soluble and thus available for absorption.

Applicable Water Quality Standard

The State of Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6.03(6)(c)(II) include a numeric water quality standard for pH of 6.0 to 8.5. This TMDL will be established at a level to ensure compliance with the applicable water quality criterion and protection of the beneficial use.

Available Monitoring Data

pH measurements (instantaneous measurements) in Bluff Creek were taken in 1996 (June through September) and 1999 (January through December). This data shows that 75% of the measurements taken in 1996 exceeded the pH criterion, while 46% exceeded the criterion in 1999 (Table 2).

Table 2 - pH Exceedences

	Number of Samples	Number of Exceedences	Percent Exceedence
1996	8	6	75.00%
1999	11	5	45.45%
Total	19	11	57.89%

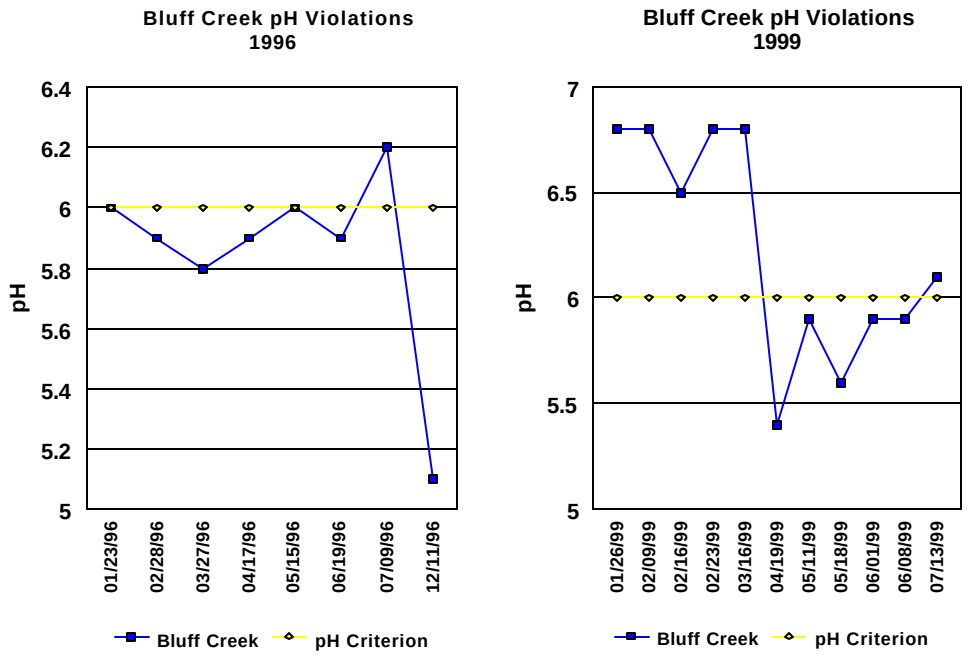

Figure 5 - pH Violations in Bluff Creek

Figure 5 shows that the pH violations in Bluff Creek in both 1996 and 1999 occurred during late fall to early spring.

Source Identification

The TMDL focuses on identifying those controllable pH altering sources in the Bluff Creek watershed. In doing this, the TMDL identifies both point and potential non-point sources.

Point Sources

An evaluation of current point source discharges to Bluff Creek was developed to determine if any point source has violated its discharge limits for pH. As shown in Table 3 below, one discharger is permitted to discharge to Bluff Creek. This discharger currently has a NPDES permits which prescribes monthly discharge concentration pH limits of 6.0 to 9.0.

Table 3 - Identified NPDES Permitted Dischargers

Point Sources	NPDES Permit	pH Limit	Receiving Waterbody
Thiele Kaolin	GA0002453	6.0 - 9.0	Bluff Creek
Englehard	GA0050067	6.0 - 9.0	Bluff Creek
EEC International	GA0002780	6.0 - 9.0	Bluff Creek

A five year compliance history (Appendix A) shows no NPDES permit violations.

Non-Point Sources

There are potential non-point sources that could cause or contribute to exceedences of the pH criterion in Bluff Creek. Presently no information is available to adequately characterize non-point source loads which may impact pH.

Total Maximum Daily Load (TMDL)

A TMDL established the total pollutant load a waterbody can receive and still achieve water quality standards. The components of a TMDL include a wasteload allocation (WLA) for point sources and a load allocation (LA) for non-point sources (including natural background) and a margin of safety (MOS) to account for uncertainty. Because pH is not a load, but rather a measure of acidity and/or alkalinity of a given solution, this TMDL uses an *other appropriate measure* (40 CFR § 130.2(i)) rather than an actual mass-per-unit time measure. For this TMDL, the state's numeric pH criterion (6.0 to 8.5) is used as the TMDL target (*other appropriate measure*). Thus, the TMDL ensures both point and non-point sources activities meet the pH criterion at the point of discharge to Bluff Creek.

Point Sources

The contribution from point source discharges was considered for Bluff Creek.

Effluent pH levels, at the point of discharge (Table 4) into Bluff Creek shall be between 6.0 and 8.5 standard units during both normal and 7Q10 flow conditions. Implementation and/or enforcement of these allocations should occur as a part of the NPDES permitting

process. All new NPDES permits issued within the Bluff Creek drainage should ensure that the is met.

Table 4 - TMDL Target for Point Source to Bluff Creek

Point Sources	NPDES Permit	Wasteload Allocation
Thiele Kaolin	GA0002453	6.0 - 8.5
Englehard	GA0050067	6.0 - 8.5
EEC International	GA0002780	6.0 - 8.5

Non-Point Sources

Because it is unknown what pollutant or pollutant sources are causing or contributing to pH violations in Bluff Creek, the pH TMDL target for non-point source in the Bluff Creek watershed is 6.0 and 8.5 standard units.

Margin of Safety

The margin of safety in TMDL development is used to account for the lack of knowledge concerning the relationship between the pollutant loads and the quality of the receiving waterbody. The targets used for this TMDL ensures that loads from the point source and loads originating from non-point source activities must individually meet the pH target of 6.0 to 8.5. As long as pH from both point and non-point source activities are consistent with the TMDL target, water quality standards in Bluff Creek will be met. Therefore, an additional margin of safety for Bluff Creek was determined unnecessary.

Seasonal Variation

Based on the limited pH data, a seasonal fluctuation in pH was observed. Low pH generally occurred in late spring/early summer, while pH values above the criterion occurred throughout the remaining portion of the year. Because the available data set is limited to less than a full year, and the data was collected during a five year statewide drought, additional consideration of seasonal variation was determined unnecessary.

TMDL Implementation

EPA recognizes that a TMDL improves water quality when there is a plan for implementing the TMDL. However, CWA section 303(d) does not establish any new implementation authorities beyond those that exist elsewhere in State, local, Tribal or Federal law. Thus, the wasteload allocations within TMDLs are implemented through enforceable water quality-based effluent limitations in NPDES permits authorized under section 402 of the CWA. Load allocations within TMDLs are implemented through a wide variety of State, local, Tribal and Federal nonpoint source programs (which may be regulatory, non-regulatory, or incentive-based, depending on the program), as well as voluntary action by committed citizens. See New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs), dated August 8, 1997.

EPA believes it is useful during TMDL development, if time is available, to gather information that would facilitate TMDL implementation. For example, the TMDL may identify

management strategies that categories of sources can employ to obtain necessary load reductions. EPA believes, however, that TMDL implementation – and implementation planning – is the responsibility of the State of Georgia, through its administration of the National Pollutant Discharge Elimination System (NPDES) point source permit program and through its administration of any regulatory or non-regulatory nonpoint source control programs.

A consent decree in the case of Sierra Club v. EPA, 1:94-cv-2501-MHS (N.D. Ga.), requires EPA to develop TMDLs for all waterbodies on the State of Georgia's current 303(d) list that are not developed by the State that year, according to a schedule contained in the decree. That is, EPA and the State work cooperatively to develop all TMDLs for a given set of river basins each year, with all river basins in the State covered over a 5-year period. On July 24, 2001, the U.S. District Court entered an order finding that the decree also requires EPA to develop TMDL implementation plans. EPA disagrees with the court's conclusion that implementation plans are required by the decree and has appealed the July 24, 2001, order.

In the absence of that order, EPA would not propose an implementation plan for this TMDL. The Agency is moving forward, however, to comply with the obligations contained in the order. EPA has coordinated with the Georgia Environmental Protection Division (EPD) to prepare an initial implementation plan for this TMDL and has also entered into a Memorandum of Understanding (MOU) with EPD, which sets out a schedule for EPD to develop more comprehensive implementation plans after this TMDL is established. The initial plan provides for an implementation demonstration project to address one of the major sources of pollution identified in this TMDL while State and/or local agencies work with local stakeholders to develop a revised implementation plan.

EPA understands, pursuant to the July 24, 2001, order, that it continues to have responsibilities for implementation planning if for any reason EPA cannot complete an implementation plan for this TMDL as set out in the MOU. If the July 24, 2001, order is vacated, EPA would expect to support efforts by the State of Georgia to develop an implementation plan for this TMDL.

This Initial TMDL Implementation Plan, written by EPD and for which EPD and/or the EPD Contractor are responsible, contains the following elements.

1. EPA has identified a number of management strategies for the control of nonpoint sources of pollutants, representing some best management practices. The "Management Measure Selector Table shown below identifies these management strategies by source category and pollutant. Nonpoint sources are the primary cause of excessive pollutant loading in most cases. Any wasteload allocations in this TMDL will be implemented in the form of water-quality based effluent limitations in NPDES permits issued under CWA Section 402. See 40 C.F.R. § 122.44(d)(1)(vii)(B). NPDES permit discharges are a secondary source of excessive pollutant loading, where they are a factor, in most cases.

2. EPD and the EPD Contractor will select and implement one or more best management practice (BMP) demonstration projects for each River Basin. The purpose of the demonstration projects will be to evaluate by River Basin and pollutant parameter the site-specific effectiveness of one or more of the BMPs chosen. EPD intends that the BMP demonstration project be completed before the Revised TMDL Implementation Plan is issued. The BMP demonstration project will address the major category of contribution of the pollutant(s) of concern for the respective River Basin as identified in the TMDLs of the watersheds in the River Basin. The demonstration project need not be of a large scale, and may consist of one or more measures from the Table or equivalent BMP measures proposed by the EPD Contractor and approved by EPD. Other such measures may include those found in EPA's "Best Management Practices Handbook", the "NRCS National Handbook of Conservation Practices, or any similar reference, or measures that the volunteers, etc., devise that EPD approves. If for any reason the EPD Contractor does not complete the BMP demonstration project, EPD will take responsibility for doing so.

3. As part of the Initial TMDL Implementation Plan the EPD brochure entitled "Watershed Wisdom -- Georgia's TMDL Program" will be distributed by EPD to the EPD Contractor for use with appropriate stakeholders for this TMDL, and a copy of the video of that same title will be provided to the EPD Contractor for its use in making presentations to appropriate stakeholders, on TMDL Implementation plan development.

4. If for any reason an EPD Contractor does not complete one or more elements of a Revised TMDL Implementation Plan, EPD will be responsible for getting that (those) element(s) completed, either directly or through another contractor.

5. The deadline for development of a Revised TMDL Implementation Plan, is the end of August, 2003.

6. The EPD Contractor helping to develop the Revised TMDL Implementation Plan, in coordination with EPD, will work on the following tasks involved in converting the Initial TMDL Implementation Plan to a Revised TMDL Implementation Plan:

   A. Generally characterize the watershed;

   B. Identify stakeholders;

   C. Verify the present problem to the extent feasible and appropriate, (e.g., local monitoring);

   D. Identify probable sources of pollutant(s);

E. For the purpose of assisting in the implementation of the load allocations of this TMDL, identify potential regulatory or voluntary actions to control pollutant(s) from the relevant nonpoint sources;

F. Determine measurable milestones of progress;

G. Develop monitoring plan, taking into account available resources, to measure effectiveness; and

H. Complete and submit to EPD the Revised TMDL Implementation Plan.

7. The public will be provided an opportunity to participate in the development of the Revised TMDL Implementation Plan and to comment on it before it is finalized.

8. The Revised TMDL Implementation Plan will supersede this Initial TMDL Implementation Plan when the Revised TMDL Implementation Plan is approved by EPD.

Management Measure Selector Table

\Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
Agriculture	1. Sediment & Erosion Control	_	_		_	_				
	2. Confined Animal Facilities	_	_							
	3. Nutrient Management	_	_							
	4. Pesticide Management		_							
	5. Livestock Grazing	_	_		_	_				
	6. Irrigation		_		_	_				
Forestry	1. Preharvest Planning				_	_				
	2. Streamside Management Areas	_	_		_	_				
	3. Road Construction &Reconstruction		_		_	_				
	4. Road Management		_		_	_				
	5. Timber Harvesting		_		_	_				
	6. Site Preparation & Forest Regeneration		_		_	_				
	7. Fire Management	_	_	_	_	_				
	8. Revegetation of Disturbed Areas	_	_	_	_	_				
	9. Forest Chemical Management		_			_				

\Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
Agriculture	1. Sediment & Erosion Control	–	–		–	–				
	10. Wetlands Forest Management	–	–	–		–		–		

\Land Use	Management Measures	Fecal Coliform	Dissolved Oxygen	pH	Sediment	Temperature	*Toxicity*	*Mercury*	Metals (copper, lead, zinc, cadmium)	PCBs, toxaphene
Agriculture	1. Sediment & Erosion Control	_	_		_	_				
Urban	1. New Development	_	_		_	_			_	
	2. Watershed Protection & Site Development	_	_		_	_		_	_	
	3. Construction Site Erosion and Sediment Control		_		_	_				
	4. Construction Site Chemical Control		_							
	5. Existing Developments	_	_		_	_			_	
	6. Residential and Commercial Pollution Prevention	_	_							
Onsite Wastewater	1. New Onsite Wastewater Disposal Systems	_	_							
	2. Operating Existing Onsite Wastewater Disposal Systems	_	_							
Roads, Highways and Bridges	1. Siting New Roads, Highways & Bridges	_	_		_	_			_	
	2. Construction Projects for Roads, Highways and Bridges		_		_	_				
	3. Construction Site Chemical Control for Roads, Highways and Bridges		_							
	4. Operation and Maintenance-Roads, Highways and Bridges	_	_			_			_	

References

1. Georgia Department of Natural Resources, 2000 Section 303(d) List
2. Sierra Club v. EPA & Hankinson USDC-ND-GA Atlanta Div. #1: 94-CV-2051-MHS
3. Georgia Department of Natural Resources, Rules and Regulations for Water Quality Control, Water Use Classifications and Water Quality Standards, Revised 2001.
4. Mississippi Department of Environmental Quality, TMDL for Low pH in the Big Black River, Big Black River Basin, Madison & Yahoo Counties, Mississippi
5. Mississippi Department of Environmental Quality, TMDL for Low pH in Turkey Creek, Coastal Streams Basin, Harriston Counties, Mississippi
6. USEPA. Guidance for Water Quality-based Decisions: The TMDL Process. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA/440/4-91-001, April 1991.