

Total Maximum Daily Load (TMDL)

For

pH Exceedences in

Avera Creek, GA

Headwaters to Flint River
(Crawford Co.)



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 Avera Creek. Subsequent actions must be consistent with this TMDL.

Signed February 28, 2003

James D. Giattina, Director
Water Management Division

Date

Table of Contents

Executive Summary 1

Introduction 2

Watershed Characterization 2

Problem Definition 2

Applicable Water Quality Standards 4

Available Monitoring Data 5

Source Identification 6

Total Maximum Daily Load (TMDL) 6

Point Sources 6

Non-Point Sources 7

Margin of Safety 7

Seasonal Variation 7

Critical Conditions 7

Implementation 7

References 12

TMDL at a Glance

Basin Name/Subbasin:	Flint River Basin (3070102)
Waterbody of Concern:	Avera Creek (Headwaters to Beaver Creek)
Pollutant:	pH
Designated Use:	Fishing
Size of Waterbody:	5 Miles
Water Quality Standards:	6.0 to 8.5 standard units (su)
TMDL Target:	6.0 to 8.5 standard units (su)
Wasteload Allocation:	0
Load Allocation:	6.0 to 8.5 standard units (su)
Margin of Safety:	Not Applicable



Executive Summary

A segment of Avera Creek (Headwaters to Flint River) has been placed on the State of Georgia's Section 303(d) list of impaired waters due to pH excursions. pH (or negative logarithm of the 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 standard units (su), where a pH of 7 su represents neutrality. A pH concentration lower than 7 su represents increasing acidity, while a pH concentration of greater than 7 su represents increasing alkalinity.

The applicable water quality criterion for pH, as described in State of Georgia's Rules and Regulation, is 6.0 to 8.5 su. Presently, there are no permitted discharges to Avera Creek. Therefore, it is unknown if pH violations are associated with non-point source activities, 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, additional data/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 su) is used as the TMDL target (*other appropriate measure*). Thus, the final TMDL ensures both point and non-point sources activities meet the pH criterion at the point of discharge.

Introduction

TMDLs are required for impaired waters on a State's Section 303(d) list as required by the Federal Clean Water Act Section 303(d) and implementing regulation 40 CFR 130. A TMDL establishes the maximum amount of a pollutant a waterbody can assimilate without exceeding the applicable water quality standard. The TMDL then allocates the total allowable load to individual sources or categories of sources through wasteload allocations (WLAs) for point sources, and through load allocations (LAs) for non-point sources. The WLAs and LAs in the TMDL provide a basis for states to reduce pollution from both point and non-point source activities that will lead to the attainment of water quality standards and protection of the beneficial use.

This TMDL proposal 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 most current Section 303(d) list consistent with the schedule established by Georgia for its rotating basin management approach.

Watershed Characterization

Landuse / Land Ownership

The Avera Creek watershed is located in the Middle Flint River Basin in Crawford County. Populated towns near Avera Creek include the towns of Roberta, Horne, Gallard, and Nakomis. Landuse in the Avera Creek watershed is comprised mostly of row crops, pasture/hay and wetlands (Table 1, Figure 1).

Table 1 - Landuse in the Avera Creek Watershed

Landuse	Percent Area
Row Crops	43.9%
Pasture/Hay	20.6%
Woody Wetlands	13.8%
Deciduous Forest	13.6%
Mixed Forest	3.9%
Evergreen Forest	3.2%
Transitional	0.7%
Emergent Herbaceous Wetlands	0.2%
Other Grasses (Urban/recreational; e.g. parks law	0.1%
Low Intensity Residential	0.0%
Open Water	0.0%

Avera Creek Land Use Distribution

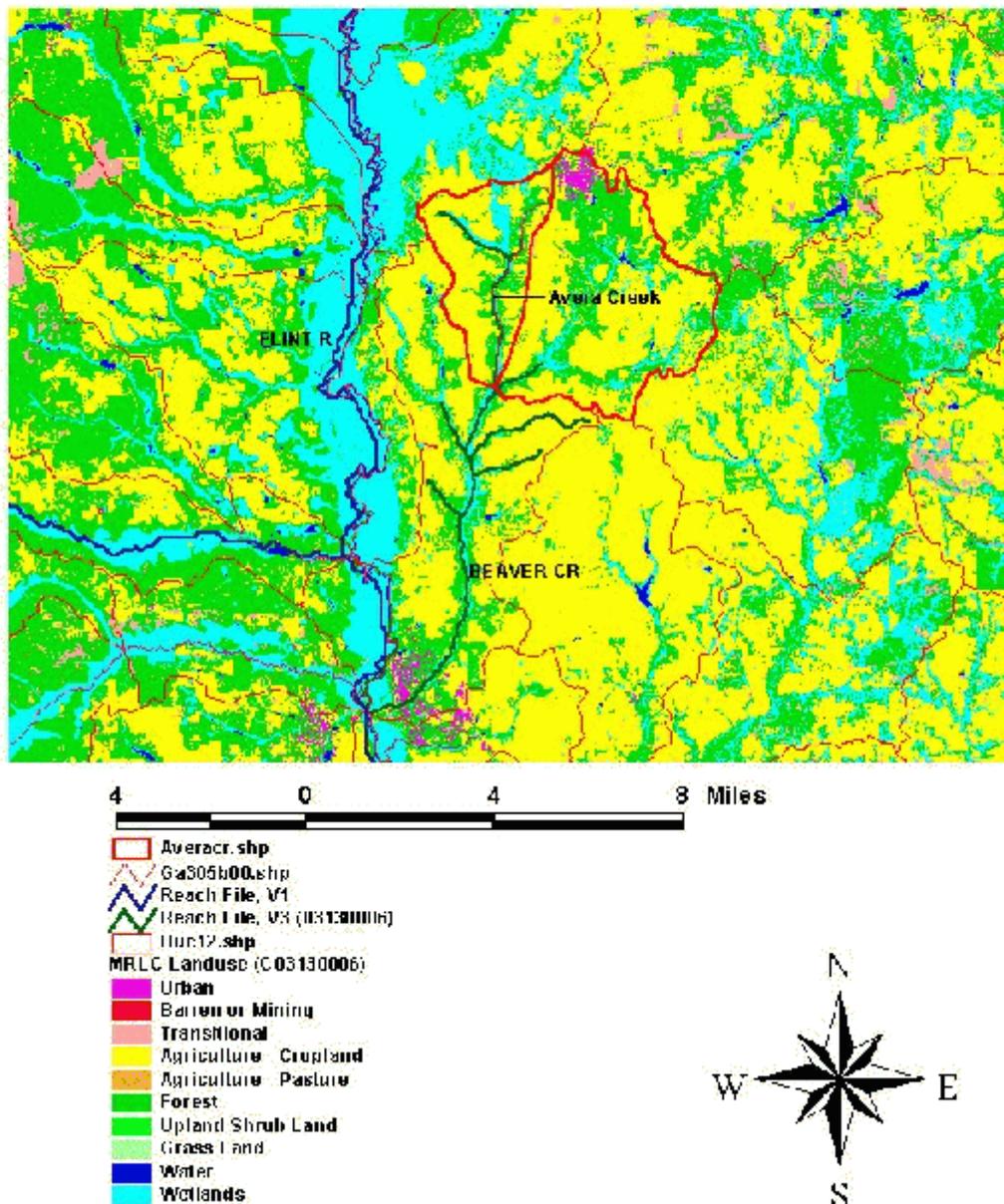


Figure 1 - Landuse in Avera Creek

Landform, Soils and Geochemistry

The Avera Creek watershed is located in the Sand Hills sub-ecoregion of the Coastal Plains Province. This sub-ecoregion is characterized by a narrow, rolling, hilly, and highly dissected coastal plain belt stretching from Augusta, Georgia to Columbus, Georgia (Omernick). The underlying geology in this sub-ecoregion is comprised of cretaceous and eocene-age marine sands, as well as clays deposited over the crystalline and metamorphic rocks of the Piedmont.

Soils in this sub-ecoregion are comprised of mostly sandy and silt loam soils which are typically low in nutrient content, and are usually formed in thick beds of sand (Omernick). Stream geochemistry in this province is characterized by low pH (4.1 to 6.7 su), low conductivities (1 to 45 micromhos/cm) and low alkalinities in the range of 0.02 to 0.10 meq/L(Omernick).

Climate

The Flint River Basin is characterized by a warm and humid, temperate climate. Major factors influencing climate variability in the basin are latitude, altitude, and proximity to the Gulf of Mexico. Average annual temperature ranges from about 60EF in the north to 70EF in the south (GDNR, 1997).

Average daily temperatures in the basin for the month of January range from about 34EF to 56EF, and for July from 69EF to 91EF. In the winter, cold winds from the northwest cause the minimum temperature to dip below freezing for only short periods. Summer temperatures commonly range from the 70s to the 90s.(GDRN 1997, Omernick).

Precipitation is greatest at the north end of the basin, and at the south end near the Gulf of Mexico as a result of the availability of moist air. Average annual precipitation in the basin, primarily as rainfall, is about 50 inches (in.), but ranges from a low of 46 in. in the east-central part of the basin to a high of 55 in. in the southern region of the basin (GDRN 1997, Omernick).

Problem Definition

Georgia has identified Avera Creek (Headwaters to Beaver Creek) 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. This process is important in surface waters. As the pH falls (solution becomes more acidic) many 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) includes a numeric water quality criterion 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 data (instantaneous samples) for Avera Creek was taken in 1999 (May) and again in 2001 (June) by Georgia EPD. Based on the available data, 75% of the samples did not meet the pH criterion (pH data below 6.0 su) (Figure 2, Table 1). Although the available water quality data shows that the pH criterion is not met, it is unknown what pollutant is causing the pH violations.

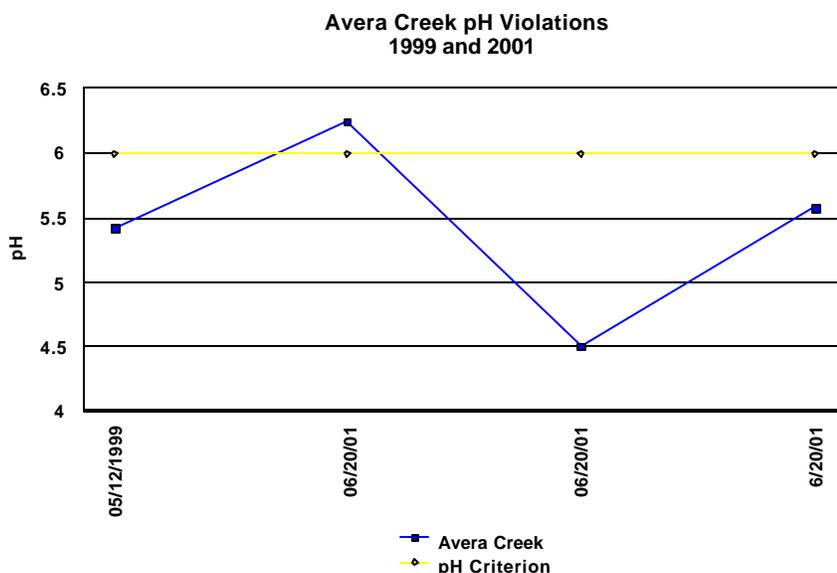


Figure 2 - Avera Creek pH Violations

Table 1 - pH Exceedences

	Number of Samples	Number of Exceedences	Percent Exceedence
Multiple Years	4	3	75%

Source Identification

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

Point Sources

Point sources have the greatest potential to impact instream water quality during periods of low flow. For the Avera Creek watershed, no point source discharges exist.

Non-Point Sources

The sources of low pH in the watershed have not been determined. Because the predominate landuse in the watershed is agriculture, agricultural erosion and runoff of the naturally low pH soils may be a potential source. Runoff of fertilizer, vegetative decay and rainwater are also potential sources of low pH. It is possible that the low pH is natural due to biological activity associated with woody wetlands.

Total Maximum Daily Load (TMDL)

A TMDL establishes 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 final TMDL ensures both point and non-point sources activities meet the pH criterion at the point of discharge.

Point Sources

No point sources exist in the Avera Creek watershed. Therefore, all new NPDES permits issued within the Avera Creek drainage should ensure that their discharge meets the pH target of 6.0 to 8.5 su at the point of discharge.

Non-Point Sources

Because the pollutant or pollutant sources are causing or contributing to pH violations in Avera Creek are unknown, the pH TMDL target for non-point source in Avera Creek is 6.0 to 8.5 su.

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 su. As long as pH from both point and non-point source activities are consistent with the TMDL target, water quality standards in Avera Creek will be met. Therefore, an additional consideration of a margin of safety for Avera Creek was determined to be unnecessary.

Seasonal Variation

Based on the limited pH data (less than 1 full year), seasonal fluctuations in pH could not be determined. Because the available data set is limited to less than a full year, and the data were collected during a five year statewide drought, additional consideration of seasonal variation was determined to be unnecessary.

Critical Conditions

Based on the limited pH data (less than 1 full year), critical conditions could not be determined. Therefore, the TMDL applies year round and during all flow conditions.

Implementation

EPA has coordinated with the Georgia Environmental Protection Division (EPD) to prepare this Initial TMDL Implementation Plan for this TMDL. EPD has also established a plan and schedule for the development of a more comprehensive implementation plan to be completed after this TMDL is established. EPD and EPA have executed a Memorandum of Understanding (MOU) that documents the schedule for developing the more comprehensive plans.

This initial Implementation Plan includes a list of best management practices (BMPs) and provides for an initial implementation of demonstration projects to address one or more of the major sources of pollutants identified in the TMDL, while State and/or local agencies work with local officials to develop a revised TMDL Implementation Plan. The Initial TMDL Implementation Plan also includes a process whereby EPD and/or

Regional Development Centers (RDCs), will develop expanded plans (hereinafter, "Revised TMDL Implementation Plans").

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		-			-				
	10. Wetlands Forest Management	-	-	-	-	-		-		
Urban	1. New Development	-	-		-	-			-	
	2. Watershed Protection & Site Development	-	-		-	-		-	-	

Proposed Avera Creek pH TMDL

February 2003

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	-	-		-	-				
	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. Envirofacts Report: Detailed Report, Roberta Water Pollution Control Plant (WPCP) (GA0020834)
2. Envirofacts Report: Detailed Report, Roberta Water Pollution Control Plan (WPCP) (GA0001384)
3. GDNR, , Memorandum, From: Steve L. Schleiger, To: David Kemps, Subject: Biotic Information on Stream in Region IV, 1993
4. Code of Federal Regulation, 40 CFR § 130.2(i)
5. Georgia Department of Natural Resources, 2002 Section 303(d) List, March 27, 2002
6. Georgia Department of Natural Resources, Flint River Basin Plan, 2001
7. Georgia Department of Natural Resources, Rules and Regulations for Water Quality Control, Water Use Classifications and Water Quality Standards, Revised 2001.
8. Mississippi Department of Environmental Quality, TMDL for Low pH in the Big Black River, Big Black River Basin, Madison & Yahoo Counties, Mississippi
9. Mississippi Department of Environmental Quality, TMDL for Low pH in Turkey Creek, Coastal Streams Basin, Harrison Counties, Mississippi
10. Omernick, Ecoregions of Alabama and Georgia
11. Sierra Club v. EPA & Hankinson USDC-ND-GA Atlanta Div. #1: 94-CV-2051-MHS
12. 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