Total Maximum Daily Load (TMDL)

For

pH Exceedences in

Ebenezer Creek, GA

Long Bridge to Savannah River near Springfield
(Effingham 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 Ebenezer Creek in the Savannah River Basin. Subsequent actions must be consistent with this TMDL.

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James D. Giattina, Director Date
Water Management Division

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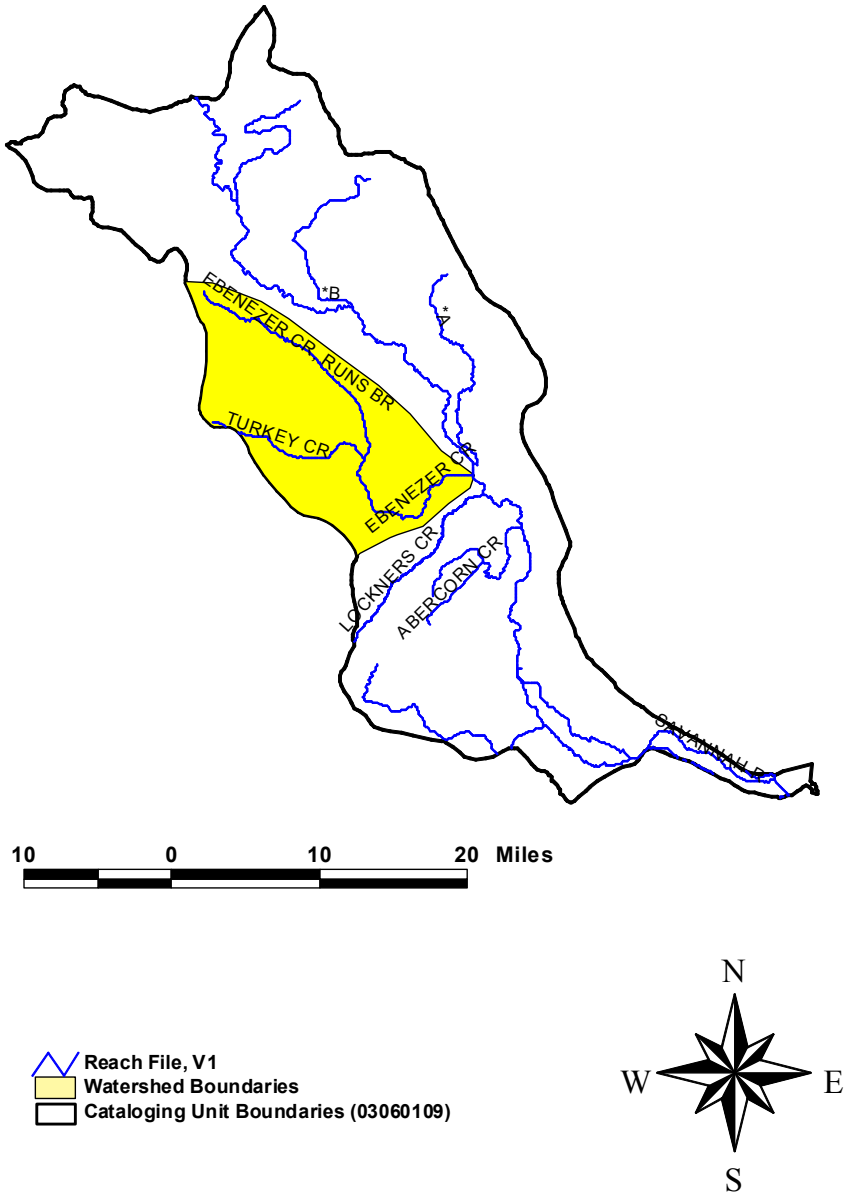
Figure 1- **Ebenezer Creek Watershed**

Ebenezer Creek Watershed



TMDL at a Glance

Basin Name/Subbasin:	Savannah River Basin/Lower Savannah Subbasin
Waterbody of Concern:	Ebenezer Creek (Long Bridge Road to Savannah River)
***Pollutant*:**	pH
Designated Use:	Fishing
Size of Listed Segment	20 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:	Implicit

Executive Summary

A segment of Ebenezer Creek has been placed on the State of Georgia's Section 303(d) list of impaired waters due to pH excursions. pH, the 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, 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 dischargers in the Ebenezer Creek drainage shows no pH violations. Therefore, it is unknown if pH violations are the result of non-point source activities in the watershed, or if pH violations are natural excursions. 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 that both point (new and existing) and non-point sources activities meet the pH criterion at the point of discharge to Ebenezer Creek.

Introduction

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 nonpoint pollutant sources. Point sources receive wasteload allocations (WLAs) which are regulated by the 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) list consistent with the schedule established by Georgia for its rotating basin management approach.

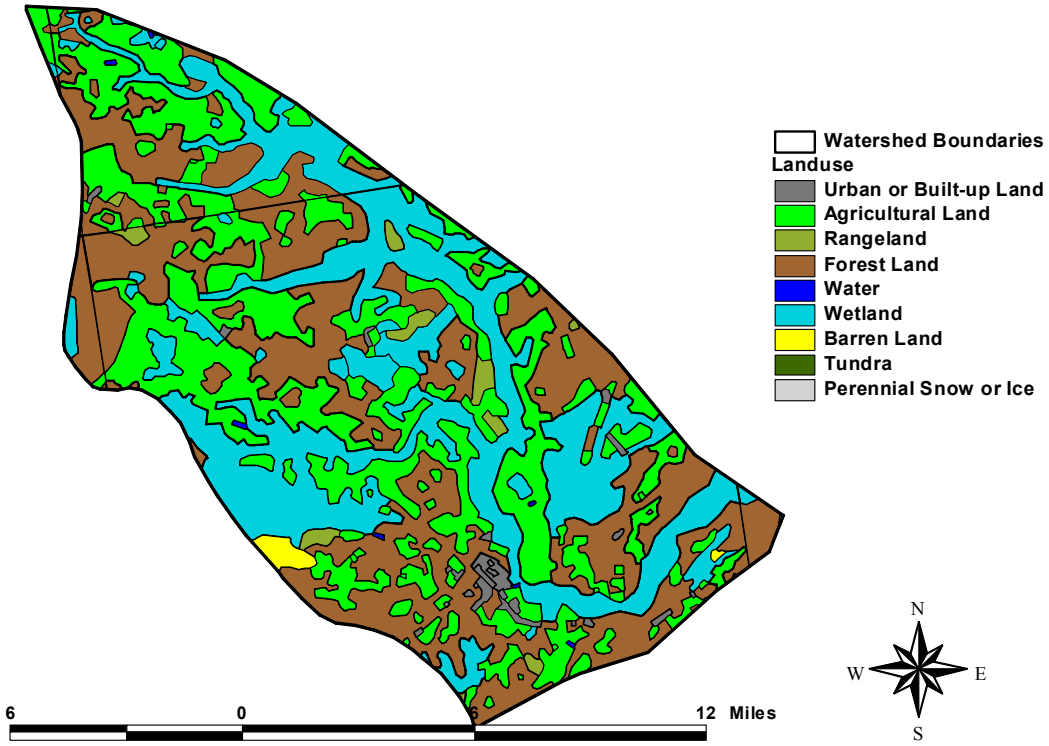
Watershed Characterization

Landuse I Land Ownership

The Ebenezer Creek watershed is located in the Lower Savannah River Basin in Effingham County. Populated towns near Ebenezer Creek include the City of Springfield. Landuse in the Ebenezer Creek watershed is comprised mostly of agricultural crop land, forest lands and wetlands (Table 1). Landuse along Ebenezer Creek is comprised of mostly wetland type vegetation (Figure 2).

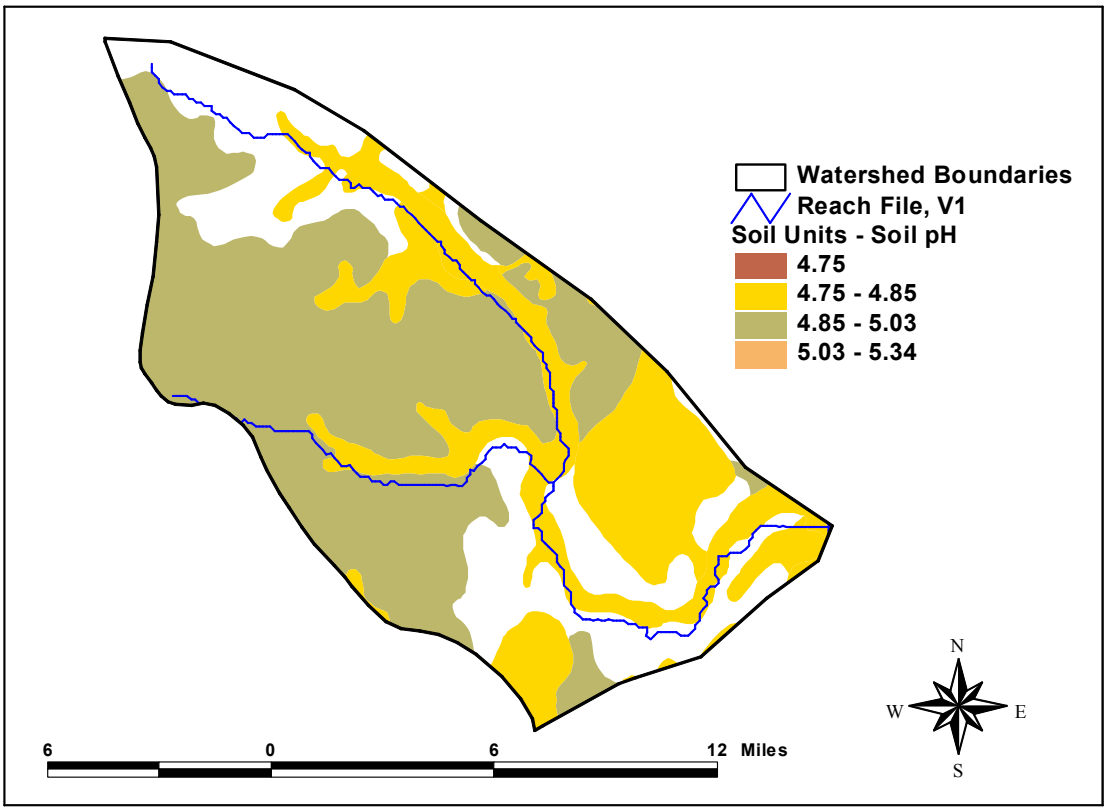
Table 1 - Landuse in the Ebenezer Creek Watershed

Landuse	Acres	Percent
Agriculture/Crops	35671	32.1
Barren Land	605	0.6
Forest Land	39501	35.5
Rangeland	1465	1.3
Urban Land	1181	1.1
Water	105	0.1



5Figure 2 - Landuse in the Ebenezer Creek Watershed

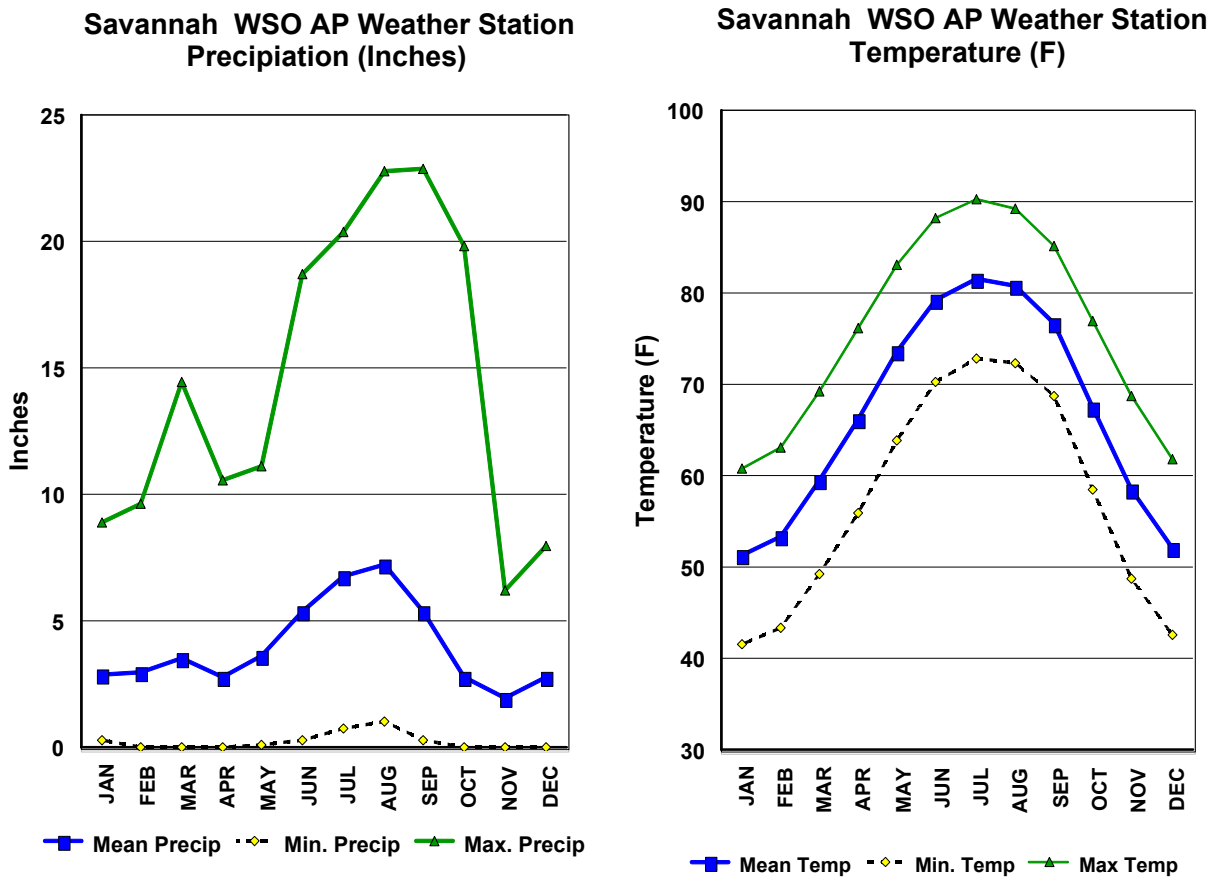
Landuse	Acres	Percent
Wetlands	32734	29.4
Total	111262	100.0



6Figure 2 - Soils pH in the Ebenezer Creek Watershed

Soils

Soils in the Ebenezer Creek watershed are comprised of mostly sandy and silt loam soils. As shown in Figure 3, soils in the Ebenezer Creek watershed are acidic with pH ranging from 4.75 to 5.34. Soil along Ebenezer Creek corridor have pH ranging from 4.75 to 4.85.



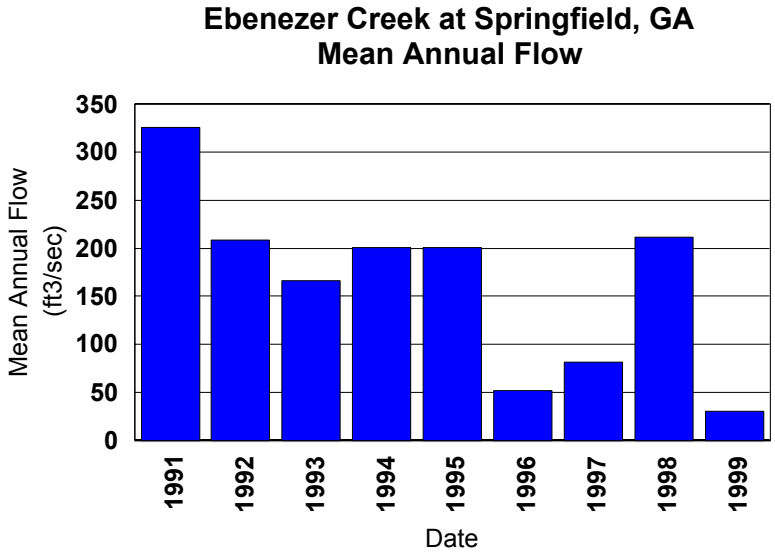
7Figure 4 - Climate Patterns in the Oconee River Basin

Climate

Climatic patterns in the Savannah River Basin (Savannah Weather Station) are summarized in Figure 4, shown below. Precipitation in the Savannah River basin is generally highest in mid-summer and lowest in early 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.

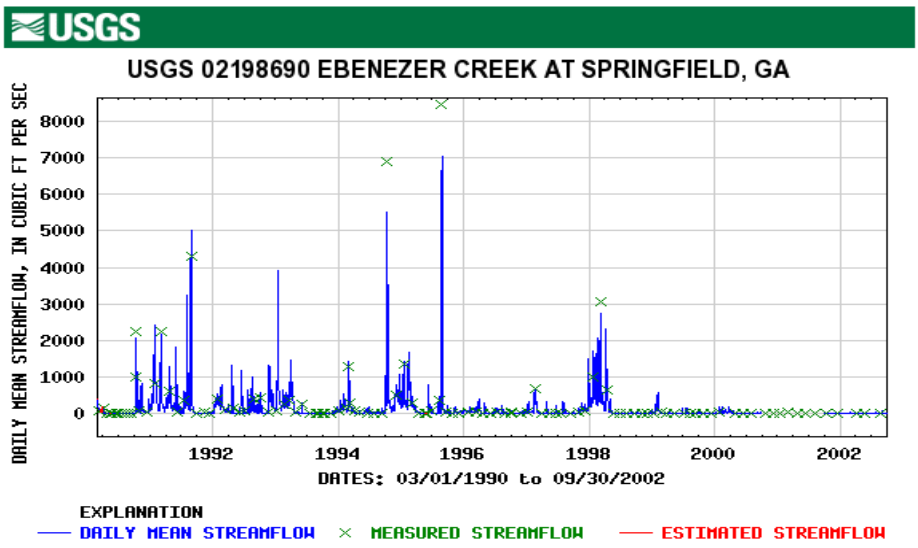
Hydrology/Streamflow

Stream flow data was available for the Ebenezer Creek. The mean annual flow in Ebenezer Creek has decreased substantially over the past 10 years due to the drought in the southeastern U.S. (Figure 5). Water Years 1995 through 1999 show a significant decrease in the mean annual flows in comparison to previous years. Peak flow in these streams generally occur during late winter/early spring and low flows generally occur during the summer periods (Figure 6). Peak flow in these streams generally respond immediately to episodic storm events which are common in the southeast.



8Figure 5 - Mean Annual Flow in Ebenezer Creek

Problem



9Figure 6 - Ebenezer Creek Hydrograph

Definition

Georgia has identified a portion of Ebenezer Creek (Long Bridge to Savannah River) 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 bio-availability 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 Ebenezer Creek were taken in 2003 (July 2003 through December 2003) and 2004 (January through April 2004) by the Environmental Protection Division (EPD). This data shows that one-hundred percent (100%) of the pH measurements exceeded the lower bound pH criterion in 2003, and thirty-eight percent (38%) exceeded the lower bound pH of the pH criterion in 2004 (Table 2 / Figure 7). These pH violations occurred during summer, fall and winter conditions.

Table 2 - pH Exceedences

	Number of Samples	Number of Exceedences	Percent Exceedence
2003	11	11	100%
2004	8	3	38%
Total	19	14	74%

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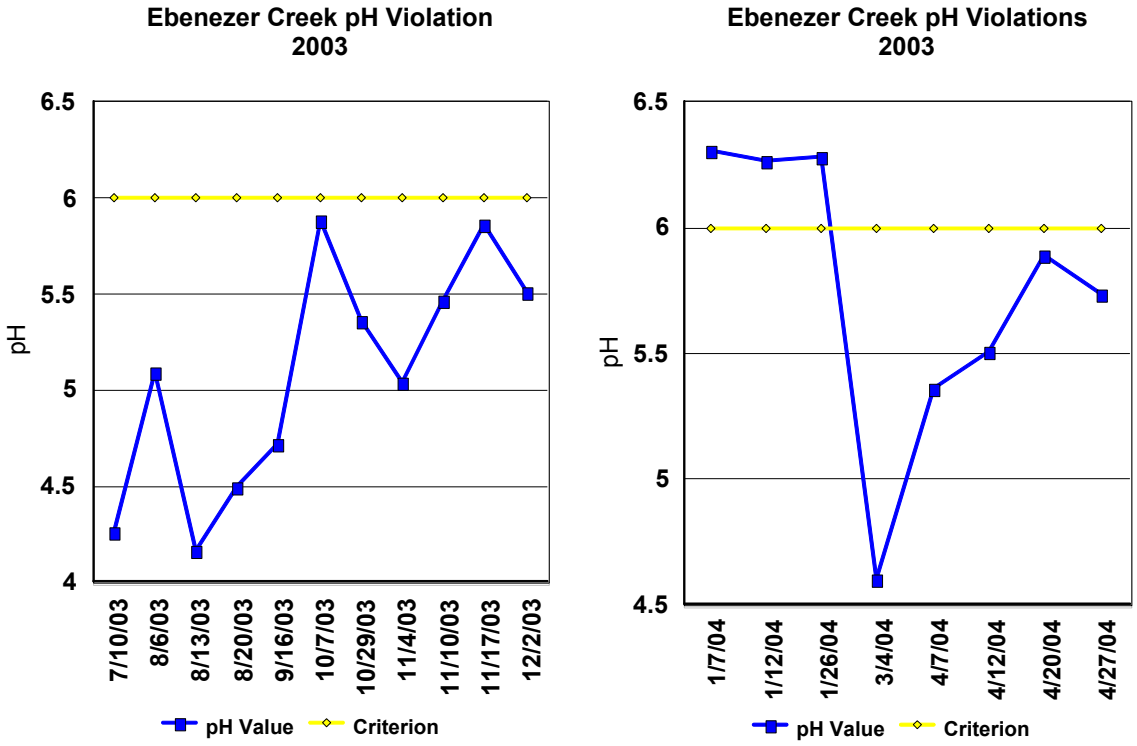

10Figure 7 - pH Data for Water 2003 and 2004

Source Identification

The TMDL focuses on identifying those controllable pH altering sources in the Ebenezer 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 Ebenezer Creek was developed to determine if any point source has violated its discharge limits for pH. As shown in Table 4 below, one discharger is permitted to discharge to Ebenezer Creek. This discharger currently have NPDES permits which prescribes monthly discharge concentration pH limits of 6.0 to 9.0. A five year compliance history shows no NPDES permit violations of the pH criterion.

Table 4 - Identified NPDES Permitted Dischargers

Point Sources	NPDES Permit	pH Limit	Receiving Waterbody
City of Springfield	GA0020770	6.0 - 9.0	Ebenezer Creek

Non-Point Sources

There are potential non-point sources that could cause or contribute to exceedences of the pH criterion in Ebenezer Creek. Presently no site-specific information is available to adequately characterize non-point source loads which may impact pH. Given that the dominate landuses in the Ebenezer Creek watershed are agriculture, forest and wetlands, agricultural may have some impact on the instream pH. Because the soils in the watershed are naturally acid, much of the lower pH issues could be a result of natural conditions.

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 TMDL ensures that both point and non-point sources activities meet the pH criterion at the

point of discharge.

Point Sources

The contribution from point source discharges was considered for Ebenezer Creek. Effluent pH levels from the point sources discharging into Ebenezer Creek shall be between 6.0 and 8.5 standard units at the point of discharge (Table 4). EPD will use its reasonable potential procedure to determine the appropriate effluent limitations necessary to ensure that the WLA of 6.0 to 8.5 is met.

Table 4 - pH TMDL Targets

Point Sources	NPDES Permit	pH Target
City of Springfield	GA0020770	6.0 - 8.5

Non-point Sources

Because it is unknown what pollutant or pollutant sources are causing or contributing to pH violations in Ebenezer Creek, the pH TMDL target for non-point source in the Ebenezer 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 Ebenezer Creek TMDL incorporates an implicit margin of safety. 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 Ebenezer Creek will be met.

Seasonal Variation

Based on the available pH data, pH was generally low during all seasons with the exception of January 2004 when the pH values were above 6.0 s.u.

TMDL Implementation

EPA has always recognized that implementation of TMDLs is important, since a TMDL improves water quality when the pollutant allocations are implemented, not when a TMDL is established. 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. Neither the Clean Water Act nor EPA's current regulations require a TMDL to include an implementation plan.

A consent decree in the case of Sierra Club v. EPA, 1:94-cv-2501-MHS (N.D. Ga.) requires the State or EPA to develop TMDLs for all waterbodies on the State of Georgia's current 303(d) list according to a schedule contained in the decree. On July 24, 2001, the 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.

The Agency is moving forward, however, to comply with the obligations contained in the order. Since EPA does not believe it is possible to propose an adequate plan in the time available between July 24, 2001 and the proposal of this TMDL, this proposal outlines the steps EPA intends to undertake to develop an implementation plan before the TMDL is established.

Between now and the time this TMDL is established, EPA intends to coordinate with the Georgia Environmental Protection Division to prepare an implementation plan for this TMDL. EPA will work with the Georgia Environmental Protection Division to facilitate stakeholder involvement in this process, including members of the public and appropriate units of local, state, and federal government. EPA will make its best efforts to afford the public an opportunity to provide comments about an implementation plan before it is finalized. 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.

References

1. Georgia Department of Natural Resources, 2002 Section 303(d) List

1. Sierra Club v. EPA & Hankinson USDC-ND-GA Atlanta Div. #1: 94-CV-2051-MHS

2. Georgia Department of Natural Resources, Rules and Regulations for Water Quality Control, Water Use Classifications and Water Quality Standards, Revised 2001.

3. Mississippi Department of Environmental Quality, TMDL for Low pH in the Big Black River, Big Black River Basin, Madison & Yahoo Counties, Mississippi

4. Mississippi Department of Environmental Quality, TMDL for Low pH in Turkey Creek, Coastal Streams Basin, Harriston Counties, Mississippi

5. USGS Website (Water Quality Data)

1 .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.