Total Maximum Daily Load (TMDL)

For

pH Exceedences in

Sweetwater Creek, GA

Headwaters to Flint River, Andersonville
(Sumter and Macon Counties)

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

Signed February 28, 2003

James D. Giattina, Director
Water Management Division

Date

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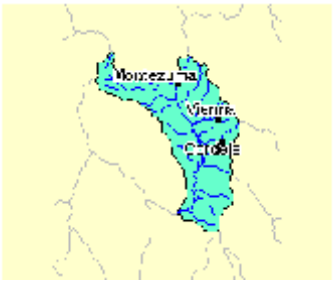
TMDL at a Glance

Basin Name/Subbasin:	Flint River Basin(3070102)
Waterbody of Concern:	Sweetwater Creek
***Pollutant*:**	pH
Designated Use:	Fishing
Size of Waterbody:	10 Miles
Water Quality Standards:	6.0 to 8.5 standard units (su)
TMDL Target:	6.0 to 8.5 standard units (su)
Wasteload Allocation:	6.0 to 8.5 standard units (su)
***Load Allocation*:**	6.0 to 8.5 standard units (su)
Margin of Safety:	Not Applicable



Executive Summary

Sweetwater Creek (Headwaters to Flint River, Andersonville) has been placed on the State of Georgia Section 303(d) list of impaired waters due to pH excursions. pH concentration (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 standard units (su), where a pH of 7 su represents neutrality. pH concentrations lower than 7 su represents increasing acidity, while a pH concentrations of greater than 7 su represent 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. Two permitted facilities discharge to Sweetwater Creek. Both facilities currently have technology-based effluent limits for pH which allows the pH of the effluent to range from 6.0 - 9.0 su. Based on the available data and information, it is unknown if pH violations in Sweetwater Creek are associated with non-point source activities or if pH violations are natural. For this TMDL, because pH is not a load, but rather a measure of acidity and/or alkalinity of a given solution, the TMDL uses an *other appropriate measure* (40 CFR § 130.2(i)) rather than an actual mass-per-unit time measure. The wasteload allocation or *other appropriate measure* given to both facilities is the State's numeric pH criterion of 6.0 to 8.5 su. The load allocation provided to nonpoint source is also the State's numeric pH criterion of 6.0 to 8.5 su. The final TMDL ensures both existing and future point and non-point sources activities meet the pH criterion at the point of discharge.

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.

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

The Sweetwater Creek watershed is located in the Middle Flint River Basin in Sumter and Macon Counties. Populated towns near Sweetwater Creek include the City of Andersonville, and the City of Pennington. Landuse in the Sweetwater Creek watershed is comprised mostly of deciduous/mixed/evergreen forest and row crops (Table 1, Figure 1).

Table 1 - Landuse in the Sweetwater Creek Watershed

Landuse	Percent Area
Deciduous Forest	27.70%
Mixed Forest	18.60%
Row Crops	17.40%
Evergreen Forest	11.60%
Pasture/Hay	8.10%
Transitional	8.10%
Woody Wetlands	4.80%
Quarries/Strip Mines/Gravel Pits	1.90%
Open Water	1.10%
High Intensity Commercial/Industrial/Transportation	0.30%
Other Grasses (Urban/recreational; e.g. parks law	0.20%
Emergent Herbaceous Wetlands	0.10%
Low Intensity Residential	0.10%
High Intensity Residential	0%

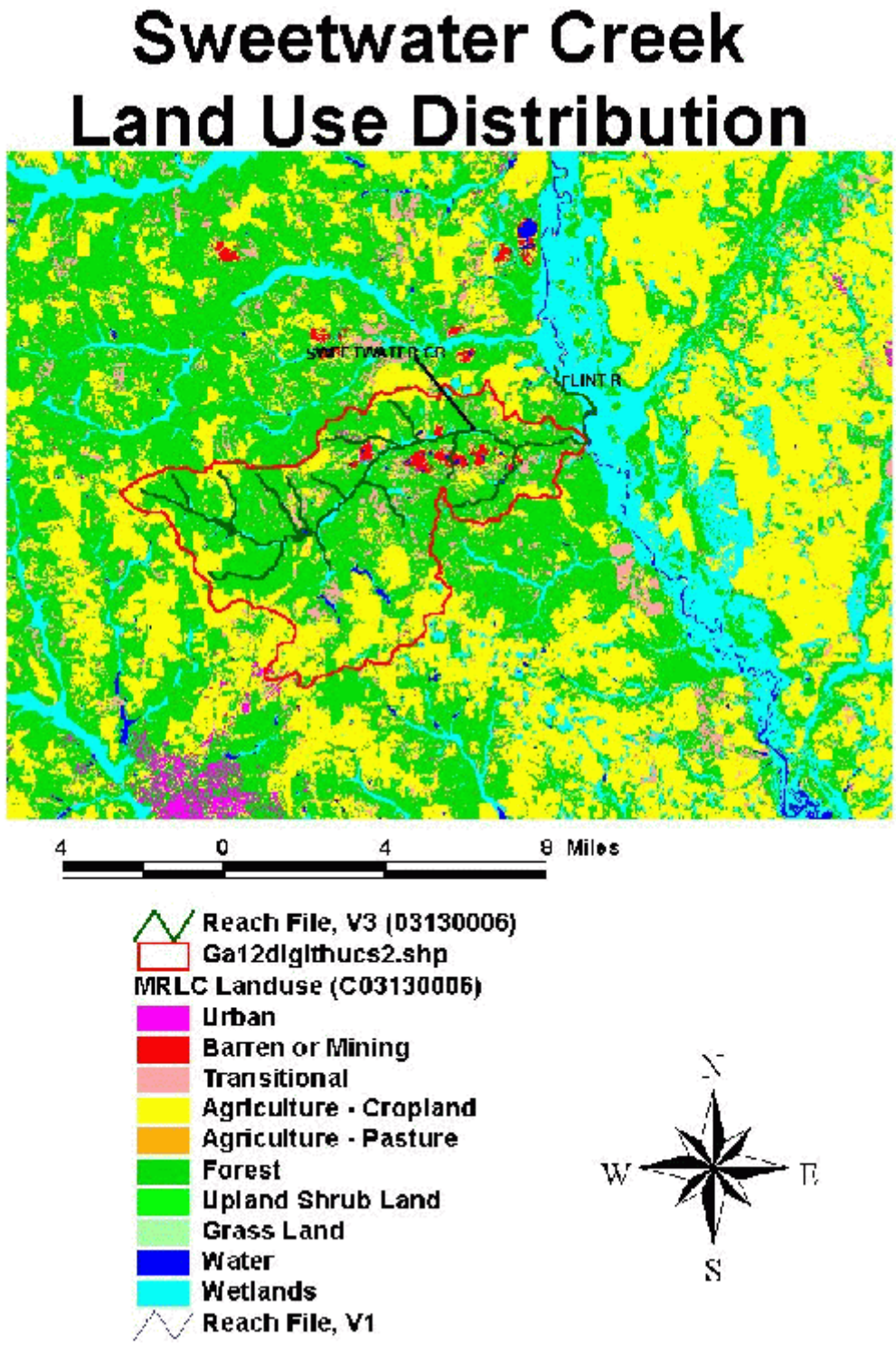


Figure 1 - Landuse in Sweetwater Creek

Landform, Soils and Geochemistry

The Sweetwater Creek watershed is located in the Coastal Plains Province, Southeastern Plains Ecoregion, Sand Hills sub-ecoregion. This sub-ecoregion is characterized by a narrow, rolling and hilly, highly dissected coastal plain belt stretching from Augusta, Georgia to Columbus, Georgia (GDNR). Underlying geology in this sub-ecoregion is comprised of cretaceous and some eocene-age marine sands and 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.(GDNR 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 (GDNR 1997, Omernick).

Problem Definition

Georgia has identified Sweetwater Creek (Headwaters to Flint River, Andersonville) 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 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 su. 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 concentration data (instantaneous samples) for Sweetwater Creek was taken in 1999 (January through December). Based on the available data, 18.75% of the samples did not meet the pH criterion (Table 2). Although the available water quality data shows that the pH criterion is not met, it is unknown what pollutant is causing the pH violations.

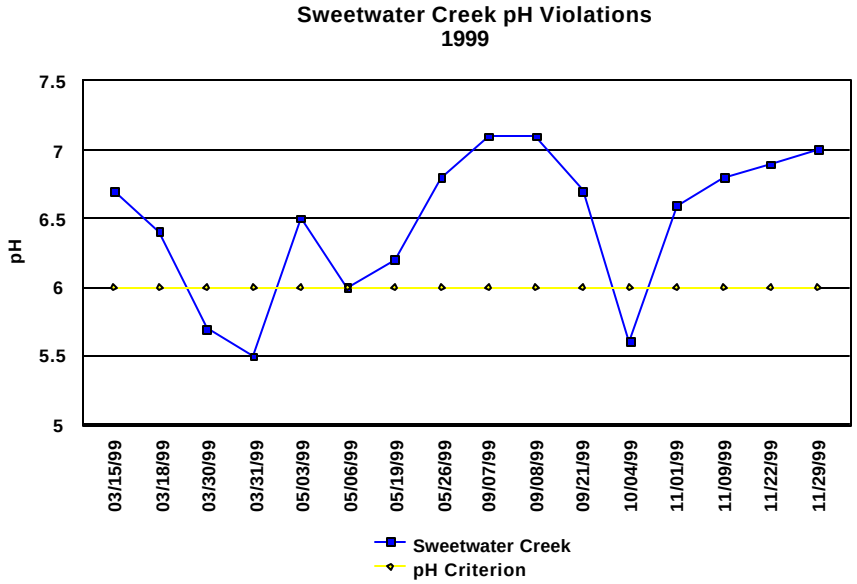


Figure 2 - Sweetwater Creek pH Violations

Table 2 - pH Exceedences

	Number of Samples	Number of Exceedences	Percent Exceedence
1999	16	3	18.75%

Figure 2 shows that the pH violations in Sweetwater Creek occurred during the early spring and fall.

Source Identification

The TMDL focuses on identifying the controllable pH altering sources in the Sweetwater 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 Sweetwater Creek was developed to determine if any point source has violated its discharge limits for pH. As shown in Table 3 below, two facilities are permitted to discharge to Sweetwater Creek (or tributaries which lead to Sweetwater Creek). Each of these discharges currently has NPDES permits which prescribe a concentration maximum discharge limit of 9.0 su and a concentration minimum discharge limit of 6.0 su. These facilities have not violated their existing permit limit.

Table 3 - Identified NPDES Permitted Dischargers

Point Sources	NPDES Permit	pH Limit	Receiving Waterbody
E.E. Minerals (Plant #5)	GA0023728	6.0 - 9.0	Camp Creek/ Sweetwater Creek
Andersonville WPCP	GA0033669	6.0 - 9.0	Unnamed Tributary/ /Sweetwater Creek/ Flint River

Non-Point Sources

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

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

The contribution from point source discharges was considered for Sweetwater Creek. Effluent pH levels, at the point of discharge (Table 4) into Sweetwater Creek shall be greater than or equal to 6.0 su during both normal and 7Q10 flow conditions. Implementation and/or enforcement of these allocations should occur as a part of the NPDES permitting process. Reasonable potential should be used to determine if the upper pH limit will be 8.5 su or 9.0 su. The reasonable potential analysis should take into consideration available dilution and the buffering capacity of the receiving stream.

Table 4 - pH TMDL Targets

Point Sources	NPDES Permit	Wasteload Allocation
E.E. Minerals (Plant #5)	GA0023728	6.0 - 8.5 su
Andersonville WPCP	GA0033669	6.0 - 8.5 su

Non-Point Sources

Because the pollutant or pollutant sources causing or contributing to pH violations are unknown in Sweetwater Creek , the pH TMDL target for non-point source in Sweetwater 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 Sweetwater Creek will be met.

Therefore, an additional consideration of a margin of safety for Sweetwater 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 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 may be a secondary source of excessive pollutant loading, in some 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	_	_		_	_		_	_	

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: Detalied Report, Andersonville Water Pollution Control Plant (WPCP) (GA0033669)

2. Envirofacts Report: Detalied Report, E.E. Minerals (Plant #5) (GA0023728)

3. Code of Federal Regulation, 40 CFR § 130.2(i)

4. Georgia Department of Natural Resources, 2002 Section 303(d) List, March 27, 2002

5. Georgia Department of Natural Resources, Flint River Basin Plan, 2001

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

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

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

9. Omernick, Ecoregions of Alabama and Georgia

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

11. 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