

**STATE OF GEORGIA**  
**REVISED TMDL IMPLEMENTATION PLAN**  
**SAVANNAH RIVER BASIN**  
Revision 01; June 15, 2007

**DISSOLVED OXYGEN**  
**0% REDUCTION OF OXYGEN DEMANDING SUBSTANCE REQUIRED**

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TMDL Implementation Plans are platforms for establishing a course of actions to restore the quality of impaired water bodies in a watershed. They are intended as a continuing process that may be revised as new conditions and information warrant. Procedures will be developed to track and evaluate the implementation of the management practices and activities identified in the plans. Once restored, appropriate management practices and activities will be continued to maintain the water bodies.

The initial TMDL Implementation Plan was part of the TMDL developed in 2005. This Revision supercedes the initial TMDL Implementation Plan.

**This Implementation Plan is applicable to the following segments in the Savannah River Basin:**

<b>Impaired Waterbody</b>	<b>Location</b>	<b>County</b>	<b>Miles/Area Impacted</b>
Middle Creek	Childers Creek to Big Creek (tributary to Clarks Hill Lake), near Wrightsboro	McDuffie	6
Run Branch (Ebenezer Creek)	Cowpen Creek to Little Ebenezer Creek near Clyo	Effingham	11

## **INTRODUCTION**

Based on United States Geological Survey (USGS) water quality data collected in 2002 Middle Creek and Run Branch were determined to be impaired due to low dissolved oxygen levels and classified on the Georgia Environmental Protection Division (GA EPD) 2002 Section 303 (d) List as partially supporting and not supporting for fishing use. The data indicated that this impairment occurred during, and was limited to, summer months, low flow and high temperature conditions. Stream flows during

periods of impairment were at or below 7Q10 (the minimum 7-day average flow that occurs once in 10 years on the average).

Since the observed DO impairments were clearly driven by persistent low flows and high temperatures, occurring over several months in the summer, a steady state modeling approach was adopted as appropriate for DO TMDL analysis. The two critical components of the TMDL are point sources/Waste Load Allocations (WLA) and nonpoint sources/Load Allocations (LA). WLA and LA represent the entire TMDL because Margin of Safety (MOS) is implicitly considered through conservative model assumptions. The steady-state Georgia DOSAG water quality model, developed by GAEPD, provides a complete spatial view of a system, upstream to downstream, for understanding important differences in stream behavior at various locations throughout a basin.

## DISCUSSION OF POLLUTANT

Naturally occurring low levels of dissolved oxygen are often the result of high organic (leaf litterfall, decomposing plants) loading, slow flows (due to minimum topographical relief) and elevated temperatures in a surface water system.

The data collected by the USGS in Georgia during 2002 showed that dissolved oxygen impairments were limited to headwater streams where the drainage areas are relatively small and dry weather flows are low, intermittent, or zero. In larger watersheds where the flows are higher, the dissolved oxygen concentrations always met the minimum standard of 4.0 mg/l, and the daily average of 5.0 mg/l.

TMDLs for the stream segments listed above state that no load reductions are needed to meet water quality standards for dissolved oxygen. The applicable dissolved oxygen water quality standards for waters in the Chattahoochee River Basin are as follows:

- Numeric – GAEPD. A daily average of 5.0 mg/l and no less than 4.0 mg/l at all times for waters supporting warm water species of fish. 391-3-6-.03 (c) (1). (GAEPD, 2000)
- Natural Water Quality – GAEPD. It is recognized that certain natural waters of the State may have a quality that will not be within the general or specific requirements contained herein. This is especially the case for the criteria for dissolved oxygen, temperature, pH and fecal coliform. NPDES permits and best management practices will be the primary mechanisms for ensuring that the discharges will not create a harmful situation. 391-3-6-.03 (7). (GAEPD, 2000)
- Natural Water Quality – EPA. Where natural conditions alone create dissolved oxygen concentrations less than 110 percent of the applicable criteria means or minima or both, the minimum acceptable concentration is 90 percent of the natural concentration. (USEPA, 1986).

Due to naturally occurring low dissolved oxygen in the impaired segments, the EPA natural water quality standard was appropriate to support the proposed allocations. If a model result showed a natural dissolved oxygen less than 5.0 mg/l the natural model result would define the DO standard to be applied. In this case the standard becomes 90 percent of the computed natural DO.

## **POLLUTANT SOURCES**

The Savannah River Basin land use categories associated with Middle Creek and Run Branch are predominately Forested and Agriculture. These stream segments received significant natural contributions of oxygen demanding organic material from local wetland and forested stream corridors. In 2002, many streams in the basin were dry or had ponded areas and stagnant pools as a result of the 5-year drought in Georgia. Due to the absence of rainfall during the summer months, the critical time period, stormwater did not contribute any washoff of materials into the streams. Any constituents that may have washed off disturbed land surfaces in previous months or years have either: (1) already flushed out of the system along with water column flow; or, (2) a portion may have settled out to become a part of the stream channel bottom. The historic washoff of settleable material could accumulate and exert an additional sediment oxygen demand (SOD) attributable to man's land disturbing activities.

The following sources of naturally occurring organic material have been identified:

- Adjacent wetland and swamps with organically rich bottom sediments; and,
- Direct leaf litterfall onto water surfaces and adjacent floodplains from overhanging trees and vegetation.

Leaf litterfall is a major contributor to the amount of dissolved organic matter in the stream water column and the amount of sediment oxygen demand being exerted. The oxygen demanding effects of leaf litterfall are reflected here in two ways: (1) by lowering the DO saturation of water entering the channel from adjacent swampy areas caused by decaying vegetation; and, (2) by increasing SOD associated with vegetation decaying on the stream channel bottoms.

## **PLAN FOR IMPLEMENTATION OF TMDL**

TMDLs for the stream segments listed state that no load reductions are needed to meet water quality standards for dissolved oxygen. Certain waters of Georgia have conditions where the dissolved oxygen is naturally lower and cannot meet the numeric criteria unless reductions in the natural nutrient and carbon loads are obtained. Since a reduction in natural forest or wetland contributions is not feasible, practicable or desirable, the EPA Dissolved Oxygen Criteria was instituted to identify target limits for TMDLs.

Georgia EPD and/or other agencies will address the impairment scenario represented by naturally low concentrations of dissolved oxygen with state-level controls and

management measures. EPD will also encourage local governments and stakeholders to continue implementing management practices and activities that are already in place, including watershed assessments of pollutant sources and controls as well as water quality sampling and monitoring.

## **MONITORING PLAN**

The GAEPD has adopted a basin approach to water quality management that divides Georgia's fourteen major river basins into five groups. This approach provides for additional sampling work to focus on one of the five basin groups each year and offers a five year planning and assessment cycle. The Savannah and Ogeechee River Basins were the subjects of focused monitoring in 2002 and will again receive focused monitoring in 2007.

## **EDUCATION/OUTREACH ACTIVITIES**

The Environmental Protection Division will continue to provide guidance and education to the public on all water quality issues through outreach by the Water Protection Branch. Permitted discharges will be regulated through the NPDES permitting process. EPD is working with local governments, agricultural, and forestry agencies such as the Natural Resources Conservation Service, the Regional Development Centers, the Georgia Soil and Water Conservation Commission, and the Georgia Forestry Commission to foster the implementation of best management practices to address nonpoint sources. Public education efforts will be targeted to stakeholders to provide information regarding the use of best management practices to protect water quality.

## **REFERENCES**

Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03,  
Water Use Classifications and Water Quality Standards,  
Revised November 2005.

GAEPD, 2005. TMDL Evaluation for Three Stream Segments in the Savannah River Basins for Dissolved Oxygen. January 2005.