Total Maximum Daily Load (TMDL)
Rawls Creek, South Carolina

Hydrologic Unit
03050109-210

South Carolina Water Quality Monitoring Station
S-287

South Carolina Department of
Health and Environmental Control
Bureau of Water

September 19, 2000

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Table of Contents

Abstract

Levels of fecal coliform bacteria can be elevated in water bodies as the result of both point and nonpoint sources of pollution. Rawls Creek (classified freshwater) is currently in violation of the fecal coliform bacteria water quality standard, as more than 10% of the samples collected at station S-287 during 1994-1998 exceed the 400 colonies/100ml standard. Urban and forest are the two major land uses in the Rawls Creek watershed. Both can be sources of fecal coliform bacteria. Targeting urban land for reduction of bacteria is the most effective strategy for this watershed.

The geometric mean for this site is 543 colonies/100ml. Flow information for Rawls Creek was estimated using flow data from USGS gauge station 02169570 on Gills Creek, in Columbia. Using a target level of bacteria of 175 colonies/100ml, the target loading for Rawls Creek is 3.46×10^{10} colonies/day. This translates to an urban reduction of 69% or a final urban loading of 3.20×10^{10} colonies/day. Forested lands are not targeted for reduction, as there are currently no acceptable means of reducing fecal coliform sources within that land use.

There are several tools available for implementing this TMDL, including an ongoing Section 319 funded project, as well as NPS pollution outreach activities and materials. DHEC will continue to monitor water quality in Rawls Creek to evaluate the effectiveness of these measures.

List of Tables and Figures

SC 2000 303(d) LIST
AQUATIC LIFE AND RECREATIONAL USES
LISTED ALPHABETICALLY

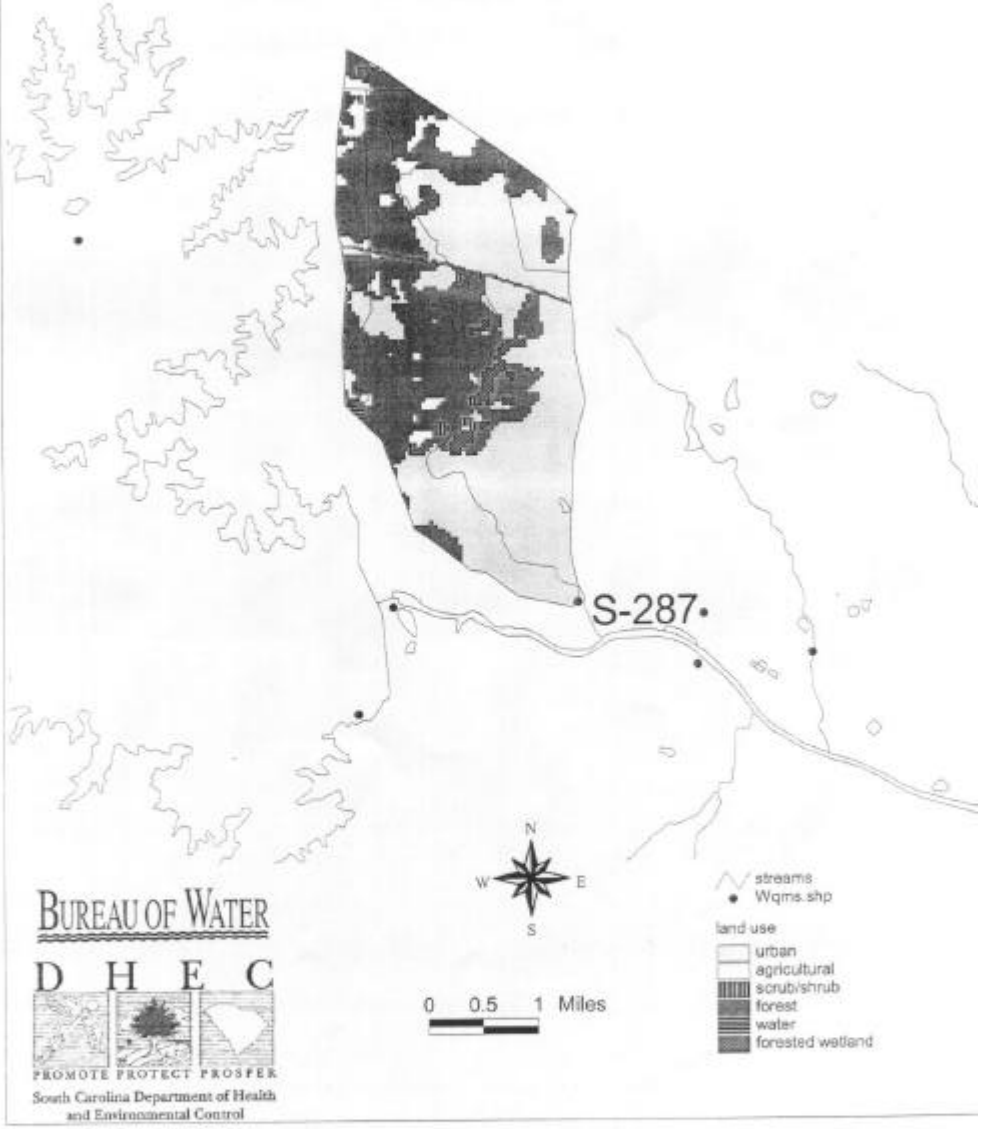
	WATERBODY	IMPAIRED SITE	STATION NUMBER	BASIN	COUNTY	HYDROLOGIC UNIT	IMPAIRED USE	CAUSE	PRIORITY
	PAGE CREEK	PAGE CK AT S-42-1258 1.7 MI SE LANDRUM	B-301	BROAD	SPARTANBURG	03050105155	REC	FC	3
	PEE DEE RIVER	PEE DEE RVR AT US 378	PD-076	PEE DEE	FLORENCE	03040201140	AL	CU	3
		PEE DEE RVR AT U.S. 301/76	PD-337	PEE DEE	FLORENCE	03040201120	AL	CR	3
	PEOPLES CREEK	PEOPLES CK AT UNIMPROVED RD 2.3 MI E OF GAFFNEY	B-211	BROAD	CHEROKEE	03050105094	REC	FC	3
	POCOTALIGO RIVER	POCOTALIGO RVR AT US 17 AT POCOTALIGO	MD-007	SALKEHATCHIE	BEAUFORT	03050208090	REC	FC	1
	POLK SWAMP	POLK SWP AT UNIMP RD S-18-180 2 MI S OF ST GEORGE	E-016	EDISTO	DORCHESTER	03050205040	REC	FC	3
		POLK SWAMP AT S-18-19	E-109	EDISTO	DORCHESTER	03050205040	REC	FC	3
	POTATO CREEK	POTATO CREEK AT S-14-127	SC-020	SANTEE	CLARENDON	03050111050	AL	CU	3
		POTATO CREEK AT S-14-127	SC-020	SANTEE	CLARENDON	03050111050	REC	FC	3
	POTTER BRANCH	POTTER BR ON RD 30 BL OUTFALL FROM HOUSING PROJ COWPENS	B-191	BROAD	SPARTANBURG	03050105170	REC	FC	2
	PRINCESS CREEK	PRINCESS CREEK AT SUBER MILL RD, SECOND RD S OF US 29 OFF S-23-540	B-192	BROAD	GREENVILLE	03050108010	REC	FC	3
		PRINCESS CREEK AT SUBER MILL RD, SECOND RD S OF US 29 OFF S-23-540	B-192	BROAD	GREENVILLE	03050108010	AL	ZN	3
	RABON CREEK	RABON CK AT S-30-54 8.8 MI NW CROSS HILL	S-096	SALUDA	LAURENS	03050109130	REC	FC	3
	RAWLS CREEK	RAWLS CREEK AT S-32-107	S-287	SALUDA	LEXINGTON	03050109210	AL	BIO	2
*		RAWLS CREEK AT S-32-107	S-287	SALUDA	LEXINGTON	03050109210	REC	FC	2
	RED BANK CREEK	RED BANK CK AT SANDY SPRINGS RD BTWN S-32-104 & SC 602	C-067	SALUDA	LEXINGTON	03050110020	REC	FC	3
	REDIVERSION CANAL	REDIVERSION CANAL AT US 52	ST-031	SANTEE	BERKELEY	03050112020	AL	CU	3
		REDIVERSION CANAL AT US 45	SC-037	SANTEE	BERKELEY	03050112020	AL	CU	3
	REEDER POINT BRANCH	REEDER POINT BR AT SC 48	C-073	SALUDA	RICHLAND	03050110010	AL	DO	3
		REEDER POINT BR AT SC 48	C-073	SALUDA	RICHLAND	03050110010	REC	FC	3
	REEDY RIVER	REEDY RVR AT S-23-30 3.9 MI SE GREENVILLE	S-013	SALUDA	GREENVILLE	03050109100	REC	FC	2
		REEDY RVR AT S-23-30 3.9 MI SE GREENVILLE	S-013	SALUDA	GREENVILLE	03050109100	AL	CR	3
		REEDY RVR AT S-23-30 3.9 MI SE GREENVILLE	S-013	SALUDA	GREENVILLE	03050109100	AL	CU	3
		REEDY RVR AT S-23-448 1.75 MI SE CONESTEE	S-018	SALUDA	GREENVILLE	03050109100	REC	FC	1
		REEDY RVR AT S-23-448 1.75 MI SE CONESTEE	S-018	SALUDA	GREENVILLE	03050109100	AL	CR	2
		REEDY RVR AT S-23-448 1.75 MI SE CONESTEE	S-018	SALUDA	GREENVILLE	03050109100	AL	ZN	2
		REEDY RVR AT S-30-06 E WARE SHOALS	S-021	SALUDA	LAURENS	03050109120	REC	FC	2
		REEDY RVR AT U.S. 76	S-070	SALUDA	LAURENS	03050109120	REC	FC	3
		REEDY RVR ON HWY 418 AT FORK SHOALS	S-072	SALUDA	GREENVILLE	03050109100	REC	FC	1
		REEDY RVR AT UN# RD OFF US 276 .75 MI W TRAVELERS REST	S-073	SALUDA	GREENVILLE	03050109100	REC	FC	3
		REEDY RVR AT RIVERS ST, DOWNTOWN GREENVILLE	S-319	SALUDA	GREENVILLE	03050109100	REC	FC	1
		REEDY RVR AT RIVERS ST, DOWNTOWN GREENVILLE	S-319	SALUDA	GREENVILLE	03050109100	AL	ZN	1
		REEDY RVR AT S-23-68	S-778	SALUDA	GREENVILLE	03050109120	AL	BIO	3
		REEDY RVR AT SR 133	S-868	SALUDA	GREENVILLE	03050109100	AL	BIO	3
	ROBERTS SWAMP	ROBERTS SWAMP @ Sr. 690	E-592	EDISTO	ORANGEBURG	03050204070	AL	BIO	3
	REMICK SWAMP	REMICK SWAMP CREEK AT S-15-41	CSTL-584	SALKEHATCHIE	COLLETON	03050208010	AL	BIO	3
	ROCKY CREEK	ROCKY CK AT BRDG IN BATESVILLE 1 MI AB JCT WITH ENOREE	BE-007	BROAD	GREENVILLE	03050108010	REC	FC	3
*	ROCKY CREEK	ROCKY CK AT S-12-335 3.5 MI E OF CHESTER	CW-002	CATAWBA	CHESTER	03050103090	REC	FC	2
		ROCKY CK AT S-12-335 3.5 MI E OF CHESTER	CW-002	CATAWBA	CHESTER	03050103090	AL	BIO	3
*		ROCKY CK AT S-12-141 SE OF GREAT FALLS	CW-175	CATAWBA	CHESTER	03050103090	REC	FC	2
*		ROCKY CK AT S-12-138	CW-236	CATAWBA	CHESTER	03050103090	REC	FC	2
	ROCKY CREEK	ROCKY CK AT S-23-453 3.5 MI SW OF SIMPSONVILLE	S-091	SALUDA	GREENVILLE	03050109100	REC	FC	2
		ROCKY CK AT S-23-453 3.5 MI SW OF SIMPSONVILLE	S-091	SALUDA	GREENVILLE	03050109100	AL	BIO	3
*	ROCKY RIVER	ROCKY RVR AT S-04-263 2.7 MI SE ANDERSON AT STP	SV-031	SAVANNAH	ANDERSON	03060103070	REC	FC	1
*		ROCKY RVR AT S-04-152 BL ROCKY RVR STP	SV-041	SAVANNAH	ANDERSON	03060103070	REC	FC	1
		FLAT ROCK POND IN FOREBAY NEAR DAM	SV-650	SAVANNAH	ANDERSON	03060103070	AL	BIO	3
		ROCKY CREEK @ SR 87	SV-730	SAVANNAH	MCCORMICK	03060107010	AL	BIO	3
	ROSS BRANCH	ROSS BR TO TURKEY CK AT SC 49 SW OF YORK	B-086	BROAD	YORK	03050106020	REC	FC	3
	RUM CREEK	RUM CK AT S-29-187	CW-232	CATAWBA	LANCASTER	03050103042	AL	DO	2
		RUM CK AT S-29-187	CW-232	CATAWBA	LANCASTER	03050103042	REC	FC	3
	SALKEHATCHIE RIVER	SALKEHATCHIE RVR AT SC 278 2.5 MI S BARNWELL	CSTL-003	SALKEHATCHIE	BARNWELL	03050207030	REC	FC	3
		SALKEHATCHIE RIVER AT U.S. 301 & 321	CSTL-048	SALKEHATCHIE	ALLENDALE	03050207030	REC	FC	2
		SALKEHATCHIE RIVER AT SC 63	CSTL-104	SALKEHATCHIE	HAMPTON	03050207040	REC	FC	3
	SALUDA RIVER	SALUDA RVR AT SC 81 SW OF GREENVILLE	S-007	SALUDA	ANDERSON	03050109040	AL	CU	3
		SALUDA RVR AT SC 81 SW OF GREENVILLE	S-007	SALUDA	ANDERSON	03050109040	REC	FC	3

*** Indicates TMDLs will be done within 2 years**

See Key

Rawls Creek Watershed

Figure 1.



BUREAU OF WATER

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

Rawls Creek
03050109-210

BASIS FOR 303(d) LISTING

INTRODUCTION:

Levels of fecal coliform bacteria can be elevated in water bodies as the result of both point and nonpoint sources of pollution. Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop total maximum daily loads (TMDLs) for water bodies that are not meeting designated uses under technology-based pollution controls. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in stream water quality conditions so that states can establish water quality-based controls to reduce pollution and restore and maintain the quality of water resources (USEPA 1991).

PROBLEM DEFINITION:

Impaired Waterbody: Rawls Creek
Lexington and Richland Counties
Latitude: 81° 11' 10"
Longitude: 34° 3' 13"

Water Classification: Freshwater

Rawls Creek is designated as Class Freshwater. Waters of this class are described as follows:

> "Freshwaters suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora. Suitable also for industrial and agricultural uses." (R.61-68)

Water Quality Standard Being Violated: Fecal Coliform Bacteria

Pollutant of Concern: Fecal Coliform Bacteria

Fecal Coliform Criteria:

> "Not to exceed a geometric mean of 200/100 ml, based on five consecutive samples during any 30 day period; nor shall more than 10% of the total samples during any 30 day period exceed 400/100 ml." (R.61-68)

The South Carolina Watershed Water Quality Assessment: Saluda-Edisto River Basin (SCDHEC 1995) was used to identify this stream segment as impaired and for listing the water body on the 1998 South Carolina 303(d) list. This segment has been listed again on the 2000 303 (d) list. Waters in which no more than 10% of the samples collected over a five year period are greater than 400 colonies/100 ml are considered to comply with the South Carolina water quality standard for fecal coliform bacteria. Waters with more than 10 percent of samples greater than 400 colonies/100 ml are considered impaired and listed for fecal coliform bacteria on South Carolina's 303(d) List. There is one SCDHEC ambient monitoring station, S-287, on Rawls Creek. Data from this station show that recreational uses are not supported due to violations of the 400/100 ml fecal coliform criterion. During the years 1994-1998, 54% of the samples did not meet the fecal coliform criterion.

TMDL TECHNICAL BASIS

TARGET IDENTIFICATION:

Target levels for fecal coliform bacteria in water bodies are those levels established in South Carolina's Water Quality Standards, Regulation 61-68, as described earlier. The criterion used in this TMDL will be "not to exceed a geometric mean of 175/100 ml" allowing an explicit margin of safety of 25/100 ml to ensure that the 200/100 ml criterion will be met.

This target of a geometric mean of 175/100 ml is expected also to satisfy the criterion, "nor shall more than 10% of the total samples during any 30 day period exceed 400/100 ml." Based on a review of water quality assessments in South Carolina, over 75% of waters that have a fecal coliform geometric mean of less than 175/100ml also meet the criterion "not more that 10% of samples exceed 400/100ml" (SCDHEC unpublished data). Most of the data in those assessments, however, reflect fecal coliform concentrations in areas that do not have sufficient best management practices (BMPs) in place. Thus, implementation of BMPs as described in this TMDL will likely achieve an even greater rate of compliance with the latter criterion since the BMPs are generally focused on reducing fecal loadings during runoff events, the condition most likely to result in an exceedence of the 400/100ml criterion.

Source Assessment:

General Sources of Fecal Coliform:

Both point and nonpoint sources may contribute fecal coliform to a given water body. Potential sources of fecal coliform are numerous and often occur in combination. Nationwide, poorly treated municipal sewage is a major source of fecal coliform, but data presented below suggest this is not the case here. Urban storm water runoff and sanitary

sewer overflows can be sources of fecal coliform. Rural storm water runoff can transport significant loads of fecal coliform from livestock pastures and animal feedlots. Failing septic systems and wildlife can also be sources of bacteria. Sources of fecal coliform loads to water bodies can be assigned to two broad classes: point source loads and nonpoint source loads.

Point Sources in the Rawls Creek Watershed:
There are no point sources in the Rawls Creek watershed upstream of station S-287. Carolina Water Service operates a wastewater treatment facility (WWTF) at the Friarsgate Subdivision NPDES #SC0036137. The service area of this facility includes the urban area in the Rawls Creek watershed; however, this WWTF discharges to the Saluda River, outside of the watershed addressed in this TMDL.

Table 1. Summary of Point Sources to Rawls Creek

Wastewater Treatment Facilities	NPDES #	Receiving Waterbody	Point Source Loading to Rawls Creek
CWS/Friarsgate SD	SC0036137	Saluda River	0

Nonpoint Sources in the Rawls Creek Watershed:

As there are no point sources, fecal coliform loadings in this watershed can be attributed to nonpoint sources. The land use in the watershed is 47.90% urban, 43.14% forested, 5.84% agricultural, 1.88% forested wetland, and 1.24% other.

Urban land can be a major contributor of fecal coliform bacteria in streams. Malfunctioning septic tanks, pet waste, and waste from natural wildlife are all sources of fecal coliform. Sewer line leakage and overflows during heavy rains can also flush fecal coliform bacteria into water bodies.

Fecal coliform bacteria also originate in forested areas. Sources are generally wild animals such as deer, raccoons, wild turkeys, waterfowl, etc. The primary means for directly controlling fecal coliform from forested lands would include relocating or killing wildlife. These are generally not acceptable management alternatives.

Linkage Between Numeric Targets and Sources:

Land use in this watershed and field reconnaissance indicates that the major sources of fecal coliform are forested areas and urban areas. As previously described, wildlife is the main source of fecal coliform in forested areas, and there are no acceptable management tools for controlling fecal coliform from wildlife sources at this time. On the other hand, there are steps that can be taken in urban lands that can successfully reduce fecal coliform

levels in adjacent water bodies. Therefore, load reductions in this TMDL will be allocated to urban lands.

The loading from forested lands will be considered background conditions. The geometric mean of fecal coliform concentration in water bodies flowing through forested areas in South Carolina during all flow conditions is estimated to be 30 colonies/100 ml (SCDHEC unpublished data). The 30 colonies/100 ml observed in South Carolina falls well within the range reported by Schueler (1999) of 10 to 100 colonies/100 ml of fecal coliform from forested lands. Thus, 30 colonies/ 100 ml will be considered the background condition.

Data Availability and Analysis:

Watershed Characteristics:
Rawls Creek drains into the Saluda River near Irmo, South Carolina. The drainage area of concern for this TMDL is located in watershed 03050109-210 in Lexington and Richland Counties and consists of the area of land draining to station S-287. All references to the Rawls Creek watershed in this TMDL refer specifically to the area draining to S-287. This includes 5122 acres in the Sandhills and Piedmont regions of South Carolina.

Table 2. Rawls Creek Watershed Land Use

Land Use	Acres	Percentage
Urban	2453.47	47.90%
Forest	2209.72	43.14%
Agricultural	299.25	5.84%
Forested Wetland	96.10	1.88%
Other	63.46	1.24%

Fecal Coliform
SCDHEC monitors water quality on Rawls Creek at ambient monitoring station S-287 monthly during May through October every year. Existing data from this monitoring station are available through STORET and included in the data appendix. The geometric mean of fecal coliform using the most recent available data (1994-98) is 543 colonies/100ml.

Flow
Flow information for Rawls Creek was estimated using flow data for water years 1967-1998 from USGS gauge station 02169570 on Gills Creek, at Columbia. A generation coefficient was established by dividing the average flow from May through October at the

USGS station by the drainage area for the station. The generation coefficient (Gc) is established as follows:

$$Gc = \frac{\text{Mean flow in cfs (May through October)}}{\text{Drainage area in square miles}}$$

Gc = 60.12 cfs/59.6 square miles = 1.01 cfs/square mile

The generation coefficient is multiplied by Rawls Creek drainage area (8.00 square miles) to obtain the average flow for Rawls Creek of 8.07cfs.

Critical Conditions:
Summer months (May-October) are generally considered critical conditions. Novotny & Olem (1994) found statistically lower fecal coliform counts in cold weather urban runoff samples than in warmer weather urban runoff. Ambient monitoring data was collected at this station from May to October during the years 1994 through 1998. Usage of this data in calculating the TMDL for Rawls Creek is justifiable, since it was collected during what is usually considered the critical condition. It should be noted that when comparing fecal coliform concentrations and a wide range of flow values for Rawls Creek, no relationship was found (Appendix A, Figure 2).

Load Calculations:

With the observed geometric mean of 543 colonies/100 ml and the average flow of 8.07cfs, the current loading at S-287 is determined to be 1.07×10^{11} colonies/day using the equation below.

Fecal Coliform * Qa * Factor = Loading

where: Fecal Coliform = # colonies/100ml
Qa = average warm weather flow in cfs
Factor = conversion factor = 24468984
Loading = # fecal coliform colonies/day

Using a geometric mean of 200 colonies/100 ml, the allowable load during average warm weather flow is 3.95×10^{10}.

Assuming the flow attributable to forest lands is proportional to the percent of forest land in the watershed, the loading from forest lands was calculated to be 2.56×10^{09} colonies/day (using the equation above and the geometric mean of 30 colonies/100 ml). The remaining fecal loading from the watershed, 1.05×10^{11} colonies/day, is the load attributable to urban land.

TMDL Development:

A total maximum daily load (TMDL) for a given pollutant and waterbody comprises the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for both nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving water body. Conceptually, this definition is represented by the equation:

$$TMDL = \Sigma WLAs + \Sigma LAs + \Sigma MOS$$

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while still achieving water quality standards. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide the basis to establish water quality-based controls.

For some pollutants, TMDLs are expressed on a mass loading basis (e.g., pounds per day). For bacteria, however, TMDLs can be expressed in terms of organism counts (or resulting concentration), in accordance with 40 CFR 130.2(l).

Since there are no contributing point sources, the TMDL for Rawls Creek is equal to the load allocations from nonpoint sources and background conditions plus the MOS.

$$\text{Rawls Creek TMDL} = \Sigma LAs + MOS$$

Margin of Safety:

There are two basic methods for incorporating the MOS (USEPA 1991): 1) implicitly incorporate the MOS using conservative model assumptions to develop allocations, or 2) explicitly specify a portion of the total TMDL as the MOS; use the remainder for allocations.

An explicit MOS is used for this TMDL by establishing a target concentration level of 175 colonies/ 100 ml. This level is below the state standard of 200 colonies/ 100 ml.

TMDL

TMDL calculation:

The target level of fecal coliform bacteria is 175 colonies/100ml. For the Rawls Creek watershed, this is equivalent to a loading of 3.46×10^{10} colonies/day. The load from urban lands plus the load from forested lands must equal this target of 175 colonies/100ml.

Allocation of Load:

The existing 2.56×10^{09} colonies/day load from forested land can not reasonably be targeted for reduction. Thus, the existing load of 1.05×10^{11} colonies/day from urban lands must be reduced by 69% (to 3.20×10^{10}) to obtain the TMDL of 3.46×10^{10} colonies/day. So, an allocation strategy that will allow the target TMDL to be maintained is as follows:

Table 3. Allocation of Load

Rawls Creek Land Use	Current Loading	% Reduction	Final Loading
Forest (Background)	2.56×10^{09}	0%	2.56×10^{09}
Urban	1.05×10^{11}	69%	3.20×10^{10}
Total	1.07×10^{11}	67%	3.46×10^{10}

Implementation Strategy:

There are several tools available for implementing this nonpoint source (NPS) TMDL. The South Carolina Department of Natural Resources is currently leading a Nonpoint Source Assessment and Community Education Project on Rawls Creek, funded through SC DHEC's Section 319 program. The objectives of this project are to 1) identify specific sources of polluted runoff, particularly nonpoint sources of fecal coliform contamination, and 2) mitigate the sources with targeted community education of BMPs and recommended actions for reducing inputs from the identified sources. This project is expected to result in significant reductions in fecal coliform loading, and is expected to be completed by June 2000.

This year, Richland County will receive a Phase I Municipal Stormwater NPDES permit through SC DHEC's Industrial and Agricultural Permitting Division. This permit will mandate that the county and its co-permittees implement measures to control stormwater pollution inputs to all county waters receiving drainage through the major part of the stormwater transport infrastructure. Provisions of the permit that are expected to lessen

NPS loads of fecal coliform include homeowner education and adoption of BMP's by municipal service providers.

In addition, the public can take action in helping to prevent NPS pollution. Pet owners should take steps to clean up pet waste and prevent it from washing into storm drains and waterways. Homeowners should ensure that their septic tanks are properly maintained. Proper sewage management can help reduce fecal coliform loading to water bodies. Clemson Extension has developed a Home-A-Syst handbook that can help urban homeowners reduce sources of NPS pollution on their property. This document, which has been made available on the Rawls Creek Watershed, guides homeowners through a self-assessment. SCDHEC also employs a nonpoint source educator who will assist with distribution of this and other tools as well as provide additional BMP information.

DHEC will continue to monitor water quality in Rawls Creek according to the basin monitoring schedule in order to evaluate use support and the effectiveness of implementation measures. If it is determined that these implementation actions are not sufficient for improving water quality, this TMDL will be revised, incorporating more extensive water quality modeling.

References

Doran, J.W., J.S. Schepers, and N.P. Swanson. 1981. Chemical and Bacteriological Quality of Pasture Runoff. J. Soil Water Conserv. May-June: 166-171.

Novotny, Vladimir. Olem, Harvey. 1994. Water Quality Prevention, Identification, and Management of Diffuse Pollution. Van Nostrand Reinhold, New York.

SCDHEC. 1998. Implementation Plan for Achieving Total Maximum Daily Load Reductions From Nonpoint Sources for the State of South Carolina.

SCDHEC. 1995. Watershed Water Quality Assessment: Saluda-Edisto Basin. Technical Report No. 003-95.

Scheuler, T. R. 1999. Microbes and Urban Watersheds: Concentrations, Sources, and Pathways. Watershed Protection Techniques 3(1): 554-565.

United States Environmental Protection Agency (USEPA). 1991. Guidance for Water Quality-Based Decisions: The TMDL Process. Office of Water, EPA 440/4-91-001.

Public Participation

The public notice on page 11 was sent to a mailing list of over 300 individuals statewide interested in water quality issues. In addition, the notice was sent to local watershed organizations and posted on SCDHEC's website at www.state.sc.us/dhec/eqc/water/html/eqpnbow.html#tmdl.

This public notice was also published in Columbia's newspaper, *The State*, on August 14, 2000.

Comments Received and Responsiveness Summary

No comments were received.

AVAILABILTY OF PROPOASED TOTAL MAXIMUM DAILY LOAD FOR WATERS AND POLLUTANTS OF CONCERN IN THE STATE OF SOUTH CAROLINA

Cedar Creek in Fairfield and Richland Counties
Coneross Creek in Oconee County
Lake Edgar Brown in Barnwell County
Little Eastatoe Creek in Pickens County
Rawls Creek in Richland and Lexington Counties

Section 303(d)(1) of the Clean Water Act (CWA), 33 U.S.C. §1313(d)(1)(C), and the US Environmental Protection Agency's (EPA) implementing regulation, 40 C.F.R. § 130.7(c) (1), require the establishment of total maximum daily loads (TMDLs) for waters identified as impaired pursuant to § 303(d)(1)(A) of the CWA. Each of these TMDLs is to be established at a level necessary to implement applicable water quality standards with seasonal variations and a margin of safety, accounting for lack of knowledge concerning the relationship between effluent limitations and water quality. At this time, the South Carolina Department of Health and Environmental Control (DHEC) has developed proposed TMDLs for the § 303(d)(1)(A) waters:

Cedar Creek, Fairfield and Richland Counties, Fecal Coliform, 03050106-090; Coneross Creek, Oconee County, Fecal Coliform, 03060101-080; Lake Edgar Brown, Barnwell County, Phosphorus, 03050207-020; Little Eastatoe Creek, Pickens County, Fecal Coliform, 03060101-030; Rawls Creek, Richland and Lexington Counties, Fecal Coliform, 03050109-210.

Upon review of any public comment and revision, if necessary, the Department will submit these TMDLs to EPA for approval as final TMDLs.

Persons wishing to comment on the proposed TMDLs or to offer new data regarding the proposed TMDLs are invited to submit the same in writing no later than September 13, 2000, to:

South Carolina Department of Health and Environmental Control
Bureau of Water
2600 Bull St.
Columbia, S.C. 29201
Attn: Andy Miller

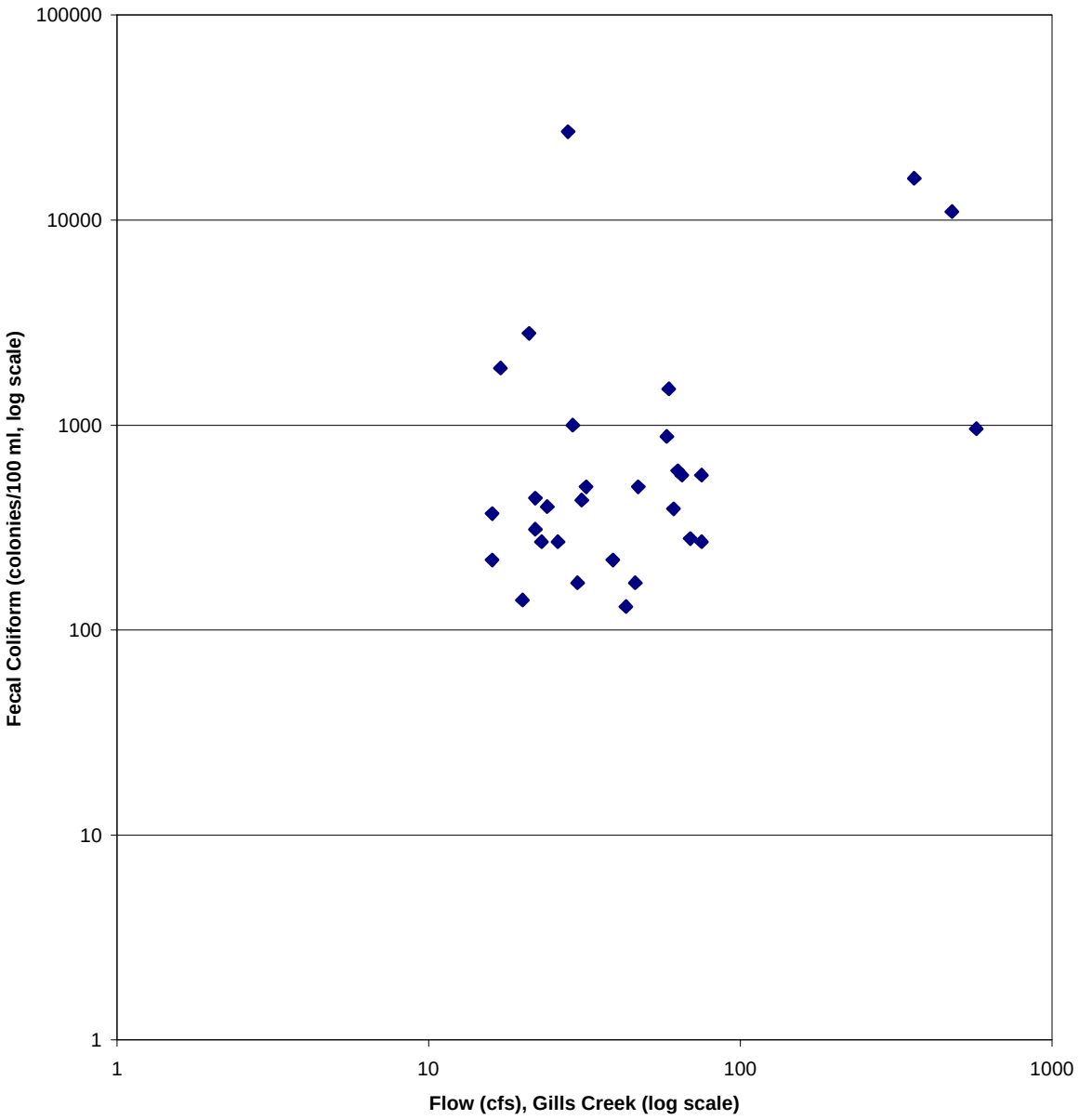
Mr. Miller's phone number is 803-898-4031. His E-mail address is millerca@columb32.dhec.state.sc.us.

Copies of individual TMDLs can be obtained by calling, writing, or e-mailing Mr. Miller at the address above. The administrative record, including technical information, data and analyses supporting the proposed TMDLs, are available for review. Requests to review this information must be submitted in writing to DHEC's Freedom of Information Office at 2600 Bull Street, Columbia, SC 29201 or requests can be submitted via FAX to the Freedom of Information Office at 803.898.3816. Reproduction of documents is available at a cost of $0.25 per page.

Appendix A: Data

Date	Time	FC Colonies/100ml
94/05/18	845	220
94/06/14	1135	440
94/07/06	1125	390
94/08/24	1410	570
94/09/07	1040	1900J
94/10/11	1320	570
95/05/16	1229	2800
95/06/13	857	960
95/07/27	935	27000J
95/08/01	1434	400J
95/08/08	1141	1000
95/09/21	1110	270J
95/10/04	1210	11000
96/05/02	1335	600
96/06/05	1245	880
96/07/23	1240	500
96/08/20	1220	310
96/09/18	1245	170
96/10/08	1115	16000J
97/05/13	1010	270
97/06/09	1220	500
97/07/15	940	220
97/08/13	1155	430
97/09/04	1100	370
97/10/14	1225	140
98/05/12	1015	280
98/06/09	1245	130
98/07/21	935	1500J
98/08/11	1115	270
98/09/23	910	170
98/10/21	1025	120

Flow vs fecal coliform concentration for Rawls Creek
Figure 2.



Rawls Creek Drainage Area Flow Calculations

Gills creek guage station used:

Guage # 2169570

Drainage area of gauge station

59.6 sq miles

Monthly mean data for water years 1976-1998

	cfs
May	56.6
June	61.5
July	66.3
August	68.5
September	53.2
October	54.6
	60.11666667 cfs

Warm weather generation coefficient (flow for Gills Creek)

Gc=mean flow cfs/guage station drainage area

Gc = 60.1167/59.6

= **1.008668904** cfs/square mile

Rawls Drainage area: 5122.005 acres

acres		sq miles
5122.005	0.001562	**8.00057181**

Fecal coliform geometric mean= 543

Average warm weather flow for Rawls Creek

=Gc*Rawls Drainage area

= **8.069927997 cfs**

Rawls Creek Loading Allocations

Forest

Rawls Creek Drainage	Forest Acres		sq mi.
	2209.727	0.001562	3.451593574

Gills Creek

Avg flow	60.11666667	cfs
drainage area (sq mi.)	59.6	sq mi
Warm weather generation coefficient (60/59.6)	1.008668904	

forest generation coefficient (flow)

(=gen coef*forest sq mi)	3.481515107	cfs

Current forest loading

(background geo mean =30/100ml)	conversion factor	forest flow	
30	24468984	3.481515107	2.56E+09

Total Current Loading (geo mean =543, current flow for rawls = 8.069927997)

543	24468984	8.069927997	1.07222E+11

Current Urban Loading (= total current loading - current forest loading)

1.07222E+11	2.56E+09	1.05E+11

Target Loading (target geometric mean=175)

175	24468984	8.069927997	3.46E+10

Loading Allocation

(Target-forest=urban allocation)	3.20E+10	**Urban Loading**

69.43% urban reduction needed to obtain target loading

To maintain target loading, use this allocation strategy	Current Loading	% Reduction	Final Loading
Rawls Creek Land Use			
Forest (background)	2.56E+09	0%	2.56E+09
Urban	1.05E+11	69.43%	3.20E+10
Total	1.07E+11	67.77%	3.46E+10

Appendix B:

Public Comments Received

No comments were received.