

ASSESSMENT OF TIDALLY INFLUENCED RIPARIAN WETLANDS AS SINKS
FOR FECAL COLIFORM BACTERIA

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TABLE OF CONTENTS

ABSTRACT	iv
ACKNOWLEDGMENTS.....	vi
DEDICATION	viii
LIST OF TABLES	ix
LIST OF FIGURES.....	x
INTRODUCTION.....	1
OBJECTIVES	5
SITE DESCRIPTIONS	6
METHODOLOGY	10
RESULTS.....	14
System Characteristics	14
Intersite Variability	14
Intrasite Variability	15
Temporal Changes in Fecal Coliform and TSS	16
Rising vs. Falling Water.....	18
Fecal Coliform and TSS Correlation.....	21
Seasonal Variability	21
Flow Conditions	23
DISCUSSION	24
Blackwater System.....	24
Brownwater System	25

Conceptual Model	27
Drought Effects	30
CONCLUSIONS.....	38
REFERENCES.....	41

ABSTRACT

Suspended particulate and fecal coliform bacteria concentrations measured in the riparian swamps of two differing tidal river systems, one brownwater and one blackwater, in southeast North Carolina indicate that both swamp surfaces export fecal coliform bacteria to the river. The measurements of suspended particulates and fecal coliforms spanned a six-month period and were carried out to determine the extent to which these systems serve as sinks for the coliform bacteria, and to relate the changes in bacterial concentrations during inundation events to the availability of suspended particulates in each of the river systems. Results of this study suggest that in both types of swamps, the fecal coliform bacteria were not associated with suspended particles, and that the swamp surface was a source of bacteria ultimately exported to the river during an inundation event. Temporal variations in bacteria concentrations, results from replicate sampling that examined differences in coliform concentration between rising and falling water, and several anecdotal observations further suggest that the swamp surface is a source of bacteria, as opposed to a sink. To explain the export of bacteria from the swamp surface, a conceptual model was developed based upon the changes in fecal coliform concentration, flow patterns on the swamp surface, and the relative contribution of river water and swamp water. Higher concentrations of bacteria were present in the water during falling water phase because additional bacteria are picked up from the sediment and debris on the surface as long as the water is in contact with the swamp surface. Thus, waters having had greater contact with the swamp surface, contained higher concentrations of bacteria. Because this study was conducted during a time when the watershed, particularly the brownwater system, was affected by a severe drought, the

results were different from those originally anticipated. The reduced streamflow in the mainstem river lowered the availability of fecal coliform bacteria and TSS to the swamp surface, which may explain why the brownwater swamp surface exported bacteria instead of trapping the bacteria. The results of this study suggest that the swamp surfaces may always have an export of bacteria, but that during normal streamflow conditions (particularly in the brownwater) this export of bacteria may be undetectable due to increased concentrations of larger-grained suspended particulates.

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DEDICATION

I would like to dedicate this thesis to my parents, William and Patricia, whom have constantly supported me in my decisions and have continuously encouraged me through all the challenges I have faced.

LIST OF TABLES

Table	Page
1. Evaluated Parameters, Sampling Configuration, and Number of Samples	12
2. Results of One Way ANOVA for Blackwater System Fecal Coliform Concentrations	20
3. Results of One Way ANOVA for Brownwater System Fecal Coliform Concentrations	20

LIST OF FIGURES

Figure	Page
1.	Location of Dollisons Landing on the Cape Fear River (brownwater) and Prince George on the Northeast Cape Fear River (blackwater) 7
2.	Brownwater swamp at Dollisons Landing along the Cape Fear River. Note the tubing extending into the swamp surface for collection of fecal coliform bacteria samples, and the ISCO in the background for the collection of TSS samples 9
3.	Blackwater swamp at Prince George along the Northeast Cape Fear River. Note the ISCO in the background of the picture for the collection of TSS samples 9
4.	Blackwater swamp fecal coliform concentrations over time. Each bar represents the mean of all fecal coliform concentrations measured in that time interval relative to high tide. The error bars indicate the standard error of each mean 17
5.	Brownwater swamp fecal coliform concentrations over time. Each bar represents the mean of all fecal coliform concentrations measured in that time interval relative to high tide. The error bars indicate the standard error of each mean 17
6.	Blackwater swamp TSS concentrations over time. Each bar represents the mean of all TSS concentrations measured in that interval relative to high tide. The error bars indicate the standard error of each mean 19
7.	Brownwater swamp TSS concentrations over time. Each bar represents the mean of all TSS concentrations measured in that interval relative to high tide. The error bars indicate the standard error of each mean 19
8.	Blackwater site fecal coliform and TSS scatter plot combining interior and edge sampling measurements ($r=0.04$, $p=0.1727$) 22
9.	Brownwater site fecal coliform and TSS scatter plot with the interior and edge sampling location measurements ($r=0.0033$, $p=0.6981$) 22
10.	Conceptual model demonstrating flow patterns on and off the swamp surface and the resulting changes in fecal coliform bacteria concentrations during the rising water, mid-tide and falling water phases of an inundation period. The concentration of fecal coliform

	bacteria increases with greater input of swamp water with the exception of initial flooding in the brownwater system. At this site, a higher abundance of debris on the swamp surface may have contributed to the elevated concentrations	28
11.	Historical and monthly average of streamflow in the Cape Fear River from August 1998 to December 2002 Data from the USGS gauging station at Lock #1	31
12.	Cape Fear River TSS from August 1998 to December 2002. Data from Dr. Lynn Leonard (unpublished).....	31
13.	Flux of fecal coliform bacteria in the mainstem Cape Fear River, Black River, and below the convergence of the Black and Cape Fear Rivers. Data collected by the Aquatic Ecology Lab at UNCW (unpublished)	34
14.	Flux of TSS in the mainstem Cape Fear River, Black River, and below the convergence of the Black and Cape Fear Rivers. Data collected by the Aquatic Ecology Lab at UNCW (unpublished)	34
15.	Fecal coliform concentrations measured on the brownwater swamp surface and changes in Cape Fear River streamflow during the study period. Streamflow data from the USGS gauging station at Lock #1 on the CFR	35
16.	Fecal coliform and TSS correlation in the mainstem CFR above the confluence from July 2002 to March 2003 ($r=0.6299$, $p=0.0107$, $n=9$).....	37
18.	Fecal coliform and TSS correlation in the CFR below the confluence of the mainstem CFR and Black River tributary from July 2002 to March 2003 ($r=0.5742$, $p=0.0180$, $n=9$).....	37
19.	Fecal coliform and TSS correlation on the brownwater swamp surface from July, August, November, December 2002 and March 2003 ($r=0.0330$, $p=0.6668$, $n=8$)	37