

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

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## 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.

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