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INFLUENCE OF WETLANDS ON STREAM NITRATE AND SULFATE CONCENTRATIONS IN THE BROAD MOUTH CREEK WATERSHED, SOUTH CAROLINA

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Wetlands can improve the water quality of streams by removing excess nutrients, especially nitrogen and sulfur. This study focused on three wetlands in the Broad Mouth Creek Watershed, located in the Saluda River basin of South Carolina. All three of the wetlands were located at the upstream ends of surface impoundments. During June-July 2001, we collected water samples from the wetlands themselves (3 locations total), as well as from freely-flowing sections of streams upstream of the wetlands and downstream of the surface impoundments (14 stream locations total). Samples were collected between three and five times from each locality. Because of a summer drought, stream flow was low on all but one sample date.

In general, the chemical composition of streams and wetlands in the Broad Mouth Creek watershed was mixed-cation bicarbonate. Both nitrate and sulfate concentrations were lower in the wetlands than in the flowing streams. The average nitrate and sulfate concentrations in the streams entering the wetlands were 1.05 mg/L and 2.50 mg/L, respectively. The average nitrate and sulfate concentrations in the wetlands were 0.45 mg/L and 0.85 mg/L, respectively. In addition, average dissolved oxygen concentration in the streams (7.8 mg/L) exceeded the average concentration in the wetlands (3.9 mg/L). Silicon, an important nutrient for diatoms, had an average concentration of 8.1 mg/L (Si^{4+}) for all sites. Silicon did not decrease in concentration in the wetlands, suggesting that it acts like a conservative solute such as chloride. This suggests that diatoms are not an important component of the wetland ecosystem.

The decreases in the concentrations of nitrate and sulfate suggest that the wetlands were sinks for these solutes. If so, nitrate concentrations most likely decreased due to biological assimilation and denitrification, whereas sulfate concentrations likely decreased due to sulfate reduction. Alternatively, nitrate may have been converted to either ammonium or dissolved organic nitrogen and transported out of the wetlands. Wetland retention of nitrates and sulfates may well be lower during higher-flow periods and in cooler seasons.

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