

THE PHYSICAL AND GEOCHEMICAL INTERACTION BETWEEN A TIDALLY-DOMINATED ESTUARY SYSTEM (WASSAW SOUND, GA) AND A RIVER-DOMINATED ESTUARY (SAVANNAH RIVER, GA) THROUGH SALINITY AND INORGANIC CARBON

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The Wilmington, Bull, and Savannah Rivers are interconnected waterways that flow through adjacent Savannah and Wassaw Sound Estuaries. These systems are linked by the upper reaches of the Wilmington River maintained as part of the Intracoastal Waterway. Significant changes to the Savannah River began in December 2014 with the initiation of the Savannah Harbor Expansion Project. The purpose of this study was to determine the extent of interaction between the Wilmington and Savannah Rivers using a suite of physical and chemical parameters. Samples were collected 1 m above the benthos and 1 m below the surface. Sampling occurred in the summer 2012-2014 during high and low tides on the same days, on spring and neap tides in the same month, extending into the fall in 2014. Drought, flood, and average rainfall years were captured. Samples were analyzed for temperature, salinity, carbonate chemistry, dissolved oxygen and stable carbon isotope along the river transects. DIC ranged from 875 $\mu\text{mol kg}^{-1}$ to 2250 $\mu\text{mol kg}^{-1}$ and pH ranged from 7.11 to 7.79. The flooding of the Savannah River in 2013 saw salinities in the Wilmington River as low as 7 ppt while during the drought and average years salinities between 13 and 17 ppt were observed. The only freshwater input for the Wilmington River is from the Savannah River and can be detected on the surface through half of the Wilmington River. There is negligible detection of Savannah River water in the Bull River. The Bull and Wilmington rivers connect through the narrow St. Augustine Creek. Water from the Wilmington River may be blocked by a sill formed at the entrance to Bull River. Estuarine pH was lower during low tide in the rivers with CO_2 input from respiration in the high marsh during high tide. The pH was also lower overall between 2012 and 2014, likely due to the difference in a drought and average rainfall year. The deepening of the Savannah River will allow more salt water moving up river, which may redirect more surface water into the Wilmington River increasing the freshwater influence to the ecosystem.

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