

**Paper No. 12-5****Presentation Time:** 3:00 PM-3:20 PM***THE IMPACT OF WASTEWATER TREATMENT EFFLUENT ON THE BUSH RIVER, SC, DURING EXTREME DROUGHT CONDITIONS***

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As population in the upstate region of South Carolina increases, the increase in treated effluent from wastewater treatment plants (WWTP) will greatly affect the chemical composition of the river water. Furthermore, the biogeochemical processes are also affected by human alteration of natural river environments. The predicted response to global warming in this area is that it will become drier, with more frequent droughts. The impact of treated effluent from WWTP effluent on stream chemistry has been exaggerated by the extreme drought in South Carolina since 1998. The Bush River in South Carolina may be a good predictor of what may occur in the future in the more populated areas of the upstate.

The Bush River is about 50 km long and experienced extreme low flow conditions during the summer of 2002. Two wastewater treatment plants discharge into the river, accounting for as much as 89% of the river flow. Below each plant, there is a large increase in the concentrations of sodium and chloride, typical of treated effluent. The responses of dissolved organic nitrogen, dissolved inorganic nitrogen, sulfate, and phosphate, however, are very different below each WWTP. Below the upstream WWTP, nutrient concentrations either only slightly increase or decrease, and most of the nitrogen is in the dissolved organic form. Below the downstream WWTP, nutrient concentrations increase dramatically, and nearly all the nitrogen is in the inorganic form. We interpret the difference in the nutrient response as being the result of the presence of a wetland below the upstream WWTP. Fluxes of solutes, determined at U.S.G.S. gaging stations, are much higher below the downstream WWTP.

The results indicate that the treated effluent of wastewater treatment plants have a significant impact on the biogeochemistry of rivers during drought periods. The impact is particularly severe in rivers with small discharges. Wetlands downstream of WWTP plants could mitigate much of the impact. If climate change does result in increased drought, the combination of drought, population growth, and river channel modification can result in significant alteration of the biogeochemistry of rivers in the southeastern United States.

[South-Central Section \(37th\) and Southeastern Section \(52nd\), GSA Joint Annual Meeting \(March 12–14, 2003\)](#)

[General Information for this Meeting](#)

Session No. 12

[Water Rock Life: Interactions Between Hydrology and Biology](#)

University of Memphis Conference Center: Fogelman Executive Center 315

1:10 PM-5:00 PM, Thursday, March 13, 2003

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