Southeastern Section–55th Annual Meeting (23–24 March 2006)

Paper No. 23-5

Presentation Time: 1:30 PM-5:30 PM

INFLUENCE OF WASTE WATER TREATMENT EFFLUENT ON NUTRIENT CONCENTRATIONS IN THE REEDY AND SALUDA RIVERS, SOUTH CAROLINA

ROWE, Alicia[1], IRIZARRY, Ivan[1], DIAZ, Shayara[2], WALKES, Christopher[3], LEWIS, Greg[4], and ANDERSEN, C. Brannon[1], (1) Dept. of Earth and Environmental Sciences, Furman Univ, 3300 Poinsett Highway, Greenville, SC 29613, alicia.rowe@furman.edu, (2) Dept. of Chemistry, Universidad Metropolitana, PO Box 21150, San Juan, PR 00928, (3) Dept. of Biology, St. Augustine's College, 1315 Oakwood Avenue Raleigh, Raleigh, NC 27610, (4) Department of Biology, Furman Univ, 3300 Poinsett Highway, Greenville, SC 29613

The discharge of nitrogen and phosphorus into rivers often causes eutrophication of lakes and coastal ecosystems. In the South Carolina piedmont, eutrophication occurs in Lake Greenwood where one major tributary (the Reedy River) enters the lake but not where the other major tributary (the Saluda River) enters. Wastewater treatment plants (WWTPs) discharge effluents into both rivers: two plants discharge into the Reedy River (96,000 m^3/day), and eight plants discharge into the Saluda River (>12,000 m^3/day). The purpose of our study was to examine how WWTP effluent affected nutrient concentrations in the Reedy and Saluda Rivers and the flux of nutrients into Lake Greenwood.

For the Reedy River, we collected four weekly water samples from localities on the main channel (n=18) and tributaries (n=9) and the two WWTPs. WWTP effluent comprised a median of 17% of total river discharge at Fork Shoals. Average nitrate and phosphate concentrations in the effluent were 17.9 mg/L and 1.2 mg/L, respectively. Nitrate and phosphate concentrations downstream from the upper WWTP increased from 2 mg/L and <0.10 mg/L to 5 mg/L and 0.25 mg/L, respectively. Concentrations of both nutrients then decreased downstream. The lower WWTP caused only slight increases in concentrations. Nitrogen concentrations in the lake were lower than those in the river, whereas phosphate was slightly higher.

For the Saluda River, we collected four weekly water samples from localities on the main channel (n=15) and tributaries (n=5) and eight WWTPs. WWTP effluent comprised a median of <1% of total river discharge at Ware Shoals and Williamston. Average nitrate and phosphate concentrations in the effluent were 30.4 mg/L and 5.0 mg/L, respectively. Effluent discharge caused little change in concentrations within the river. Concentrations in the lake were lower than in the river, with phosphate decreasing to <0.10 mg/L.

Our results demonstrate that the ratio of river water to WWTP effluent has more influence on river nutrient concentrations than do the concentrations in the effluent. Our results also suggest that Lake Greenwood acts as a sink for nutrients. As phosphorus is typically the most limiting nutrient in freshwater systems, the higher phosphate concentrations in the Reedy River may be the main driver of eutrophication in Lake Greenwood.

Southeastern Section–55th Annual Meeting (23–24 March 2006)
General Information for this Meeting

Session No. 23--Booth# 15
Undergraduate Research in Watershed Assessment (Posters)
Marriott Hotel: Georgia Ballroom
1:30 PM-5:30 PM, Thursday, 23 March 2006

Geological Society of America *Abstracts with Programs*, Vol. 38, No. 3, p. 33