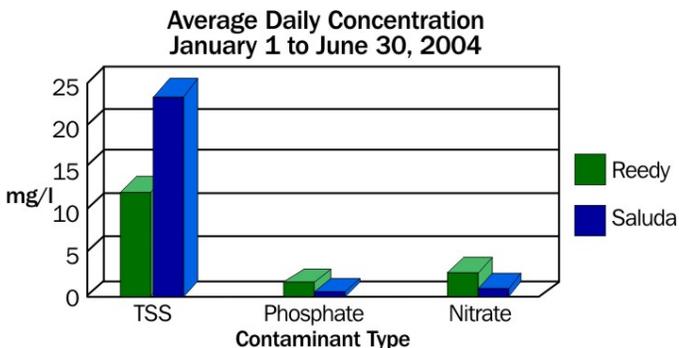


## Nutrient Loading in Lake Greenwood



Lake Greenwood, located approximately 65 miles downstream from the Saluda River headwaters in the SC Blue Ridge Mountains, is the cornerstone of the Greenwood community. The lake serves a vital role as the primary water source for the area and as a source of hydroelectric energy while providing numerous recreational opportunities for visitors and residents alike. Although this lake has a productive fishery and supports a robust recreation-based economy in the area, excess quantities of nutrients and sediments flowing into the lake from its upper tributaries may threaten water quality and biotic habitat, which could have negative economic impacts for the Lakelands community as a whole.

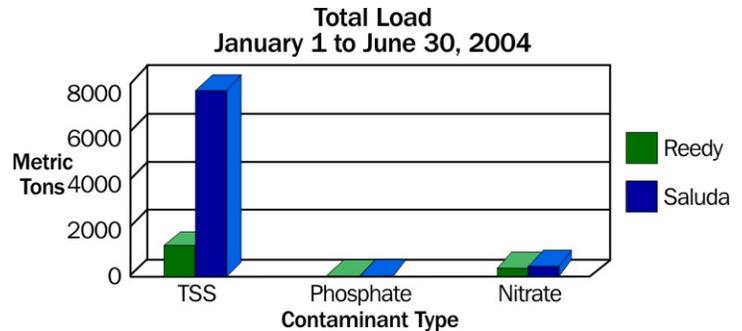
A study conducted by Clemson University's Institute of Environmental Toxicology monitored sampling stations on the Saluda and Reedy Rivers just before each river entered Lake Greenwood. Water samples were collected from these stations during more than 25 storm events from December, 2003 through June, 2005 to determine the composition and quantities (known as loading) of key contaminants into the lake. Each water sample was analyzed for a range of nutrients, such as nitrate and phosphate, and was also measured for the amount of total suspended solids (TSS) present. In addition, researchers gathered data on the flow rates of both rivers from nearby U.S. Geological Survey gauging stations. Researchers were then able to calculate the loadings for each variable by using measured flow rates and water quality measurements.



An analysis of water samples for the first half of 2004 indicates that the Reedy River contributed higher concentrations of all nutrients into Lake Greenwood with the exception of TSS. The higher nutrient concentrations within the Reedy River may be the result of more point-source discharges, such as wastewater treatment facilities, along its course. The higher concentrations of TSS within the Saluda River may reflect the greater amounts of non-point source discharges from various suburban and agricultural land uses.

However, an analysis of the flow data suggests that the average daily flow in the Saluda River was approximately 3 times greater than in the Reedy River during this time period. Therefore, when overall loads for the two river basins were compared, the loading of many constituents into Lake

Greenwood were approximately equal for both basins, as the higher concentrations of nutrients in the Reedy River were balanced by the higher flow of water in the Saluda River.



A further factor to consider is that the Saluda River basin drains twice the land area compared to the Reedy River basin. The fact that the loads of dissolved constituents (ions, nutrients, etc.) were approximately equal between the two basins suggests that the Reedy River basin contributes approximately twice the load per unit land area. Undoubtedly, this is due to the large number and volume of point-source discharges in the highly urbanized Reedy River basin.

Similar results were seen in the second half of 2004 as increasing levels of land development in the Saluda River basin contributed to 9 times more TSS loading into Lake Greenwood from the Saluda Basin as compared to the Reedy River basin. During the same sampling period, the flow in the Saluda River was 6 times greater than the flow in the Reedy River. Hence, while concentrations of dissolved constituents were similar during the two time periods, loads increased slightly in the second half of 2004.

Once again, the exception was TSS concentrations, which increased nearly six-fold in the second half of 2004 as compared to the first half of the year. The higher concentrations coupled with the increased flow resulted in increased TSS loading approximately an order of magnitude in the last 6 months of 2004 for both basins combined. The higher rates of TSS in the Saluda River basin indicate that non-point source pollution is a growing concern for that portion of the watershed and an issue that must be addressed at the source, upstream, in order to have a positive impact on the downstream communities and habitats. Further, this large amount of TSS loading into Lake Greenwood contributes to the large reduction in hydraulic capacity of the reservoir.

The results of this, and other studies, point the to fact that sedimentation is one of the key issues affecting water quality in the region. In order to maintain healthy and abundant water resources, and to minimize the negative economic consequences of excessive sedimentation, community leaders should make future land-use decisions with these data in mind.

This project was sponsored by the Saluda-Reedy Watershed Consortium and has involved technical work by Clemson University's Environmental Toxicology Institute. Watershed Insights Report No. 7, authorized for release by SRWC on 26 June 2006. Key Contacts: Dr. Steve Klaine, Clemson University, [sklaine@clemson.edu](mailto:sklaine@clemson.edu) and John Smink, Clemson University, [smink@clemson.edu](mailto:smink@clemson.edu).

The SRWC is a broad-based group of universities, public agencies, private consultants, and non-profit organizations focused on assuring "Clean, Healthy and Abundant Water for a Sustainable Economy and Environment Throughout the Saluda-Reedy Watershed". For more info, visit [www.saludareedy.org](http://www.saludareedy.org).