



## WATER RESOURCES RESEARCH GRANT PROPOSAL

**Project ID:** 2004SC9B

**Title:** Modeling the Impact of Reservoir Management Regimes on Important Ecosystems in the Santee River Basin

**Project Type:** Other

**Focus Categories:** Management and Planning, Hydrology, Methods

**Keywords:** Extend Simulation Software, Stochastic Transfer Function Models, Vector ARIMA Time Series Models

**Start Date:** 03/01/2004

**End Date:** 02/28/2005

**Federal Funds Requested:** \$30,000

**Non-Federal Matching Funds Requested:** \$78,675

**Congressional District:** Second

**Principal Investigator:**

John M. Grego

### **Abstract**

Over the next several years, 15 large reservoirs in the Santee River Basin will undergo hydropower re-licensing through three separate FERC processes for the Santee-Cooper, Catawba-Wateree and Saluda Projects. The eventual license specifications for each project's operations will have implications not only for power generation, but also for management objectives as diverse as water supply, fish and wildlife habitat, floodplain ecology, and recreation. In order to understand the combined effect of proposed management regimes of these three facilities on these diverse, basin-wide factors, a basin-wide modeling approach is imperative. The FERC process, which requires the development of project-specific models, does not require the development of a basin-wide modeling tool that captures basin-wide management objectives.

With the support of several stakeholder groups in the Santee River Basin, the Natural Heritage Institute (NHI), a non-profit organization with legal and technical expertise in FERC re-licensing, is over-seeing the development of a basin-wide hydropower planning tool. A first stage model of the Santee-Cooper Project has been configured using historic inflow data from the USGS Wateree at Camden and Congaree at Columbia gauges as the

input to drive project operations. Both gauges are located well upstream of the project, and in the case of the Congaree at Columbia gauge, upstream of the Congaree National Park, an important environmental resource in South Carolina. Future effort in the development of the basin-side model will involve extending the model upstream to include hydropower projects in the Catawba-Wateree and Saluda-Broad-Congaree River systems, the latter of which lies upstream of the park's wetlands system.

Clearly, the wetlands are nested within a watershed where upstream reservoir management influences the condition of an important ecosystem, which, in turn, influences downstream hydrology and associated reservoir management. A model of the Congaree Swamp National Park wetlands is needed to develop a robust basin-wide reservoir management model. The PI has developed stochastic (random) models for floodplain flows in Four Holes Swamp in which downstream flows are successfully predicted using upstream flows. Project funds will be used to apply this methodology to the Congaree Swamp based on Saluda River and Broad River flows and the Upper Santee Swamp based on Congaree and Wateree River flows. Finally these stochastic models will be nested with the basin-wide model being developed by NHI so that the effect of different reservoir management regimes can be studied for their impact on basin-wide ecological and economic objectives.