USGS

**WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID:** GA4261

**Title:** Impacts of Flow Regime on Ecosystem Processes in the Apalachicola-Chattahoochee-Flint River Basin

**Focus Categories:** Ecology, Management and Planning, Nutrients

**Keywords:** Ecosystem processes; basin-wide analysis for water management; solute transport; flow regime; Apalachicola-Chattahoochee-Flint River Basin

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**Federal Funds:** $18,000

**Non-Federal Matching Funds:** $37,735

**Congressional District:** 11

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**Abstract**

The quantity and timing of river flow is critical to the ecological integrity of river systems (Poff et al. 1997). Although there are many different types of hydrologic and channel alterations that result in changes to the flow regime, dams are one of the most conspicuous and prevalent forms of flow alteration on large and some smaller rivers and streams. Though there have been a number of studies of the impacts of dams on channel morphology (Ligon et al. 1995), fish (Moyle et al. 1998), habitat availability (Bogan 1993), and riparian species survival and recruitment (Rood et al. 1995), less is known about the impact of dams and flow regime on basic ecosystem processes such as nutrient uptake, metabolism, and particle transport. In many cases, these ecosystem processes are directly linked to the ecosystem services (e.g. water supply, pollution control, and fisheries) expected from the river system.

We plan to continue to examine the impact of flow regime on nutrient uptake and net ecosystem metabolism on the Chattahoochee River below Atlanta. These two processes are directly related to both ecosystem function and the assimilation and transformation of wastewater effluent, an ecosystem service. Preliminary data for this research has demonstrated some interesting relationships. Hence, we propose continuing this research to examine a wider range of baseflows. In large, southeastern rivers, suspended fine particulate matter (seston) is an important food resource that is generated both on the floodplain and in the channel. However, there is little information about how flow regulation influences the quality and quantity of seston. Therefore, we will examine how net ecosystem metabolism and the quality and quantity of seston varies above and below the run-of-the river dams on the Flint River and below a major hydropeaking dam on the Chattahoochee River. We plan to examine the impacts of dams on these three processes in order to better understand how flow regime and flow management influence the ecosystem functioning of regulated rivers. We hypothesize that the large increases in flow that are a consequence of dams will decrease the standing stock of algae and therefore limit primary production, reduce nutrient uptake, but increase the chlorophyll a concentration in the seston through the sloughing of periphyton.

Through this research, we expect to be able to provide a more holistic view of flow regime and ecosystem function for a regulated river system in the Southeast. This research should help illustrate the influence of flow regime on ecosystem services such as nutrient uptake and organic matter processing and transport. These ecosystem functions are essential to ecological integrity and water quality control of both in-stream and downstream systems, but little is known about the impact of management decisions regarding flow regime on these processes.