ENVIRONMENTAL FLOW AND ECOLOGICAL IMPACTS OF ALTERNATIVE REGULATION SCENARIOS FOR THE ACF RIVER BASIN

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Abstract. This article presents a study that evaluates the impact of several different alternative regulation scenarios on the environmental flows within the Apalachicola-Chattahoochee-Flint (ACF) river basin. A river basin model is used to simulate the flow of water through the basin under each regulation scenario. The resulting river flows are then analyzed to determine the effects of different regulation policies on environmental flows.

A variety of water uses exist within the ACF basin. Water is withdrawn to support municipal, agricultural, and industrial uses, while hydropower can be generated at several locations throughout the river basin. There is also demand for water to be kept within the rivers for recreation and navigation. Additionally, environmental flow regimes represent in-stream uses of water that are designed to help sustain the natural ecosystem.

The basin contains several large reservoirs that can be used to regulate the flow of water and help allocate it to different uses. Driven by long timeseries of historical inflow data, the ACF-DSS river basin model is used to simulate different regulation scenarios. For each scenario, the resulting output consists of timeseries of system variables such as withdrawals, hydropower production, reservoir elevations, and river flows. The impacts of a particular regulation scenario on the environmental flows and river ecology are determined by analyzing the river flows at several locations through the basin. Using the Indicators of Hydrologic Alterations (IHA) software (Nature Conservancy, 2009), a host of biologically relevant statistics is calculated. By comparing each scenario's statistics to those resulting from the natural unimpaired river flows, the degree of hydrologic alteration caused by the specific regulation policy is determined. Additionally, the statistics from different scenarios are compared to each other to identify which regulation policies provide desirable flow regimes for ecosystem protection.