A Case Study: Climate Change Decision Support for the Apalachicola, Chattahoochee, Flint Basins

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Abstract. Riverside Technology, inc. has developed a Climate Change Decision Support System (DSS) to provide water managers with a tool to explore a range of current Global Climate Model (GCM) projections to evaluate their potential impacts on streamflow and the reliability of future water supplies. The DSS uses downscaled GCM data as input to small-scale watershed models to produce time series of projected undepleted streamflow for various emission scenarios and GCM simulations.

Until recently, water managers relied on historical streamflow data for water resources planning. In many parts of the country, great effort has been put into estimating long-term historical undepleted streamflow accounting for regulation, diversions, and return flows to support planning and water rights administration. In some cases, longer flow records have been constructed using paleohydrologic data in an attempt to capture climate variability beyond what is evident during the observed historical record. Now, many water managers are recognizing that historical data may not be representative of an uncertain climate future, and they have begun to explore the use of climate projections in their water resources planning. The Climate Change DSS was developed to support water managers in planning by accounting for both climate variability and potential climate change. In order to use the information for impact analysis, the projected streamflow time series can be exported and substituted for the historical streamflow data traditionally applied in their system operations models for water supply planning.

This paper presents a case study in which climate-adjusted flows are coupled with the U.S. Army Corps of Engineers (USACE) ResSim model for the Apalachicola, Chattahoochee, and Flint (ACF) River basins. The study demonstrates how climate scenarios can be used with existing or proposed operating rules to explore the range of potential climate impacts on lake levels, drought trigger frequency, hydropower generation, and low-flow statistics. Initial system implementation of the Climate Change DSS was focused in the State of Colorado working with water supply agencies in the Front Range to assess local water supply vulnerability to climate change. To facilitate national implementation, the system capitalizes on National Weather Service (NWS) watershed models currently used for operational river forecasting. These models are well calibrated and available for the entire country. The system has been extended to include the ACF and the Sacramento River basins because of the importance of the water resources in these basins. Plans are now being made to expand coverage to include the Baltimore-Washington, D.C. water supply area. The DSS is operational and publicly available (www.climatechangedss.com).

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