

## SCALING UP WATERSHED MODEL PARAMETERS— FLOW AND LOAD SIMULATIONS OF THE EDISTO RIVER BASIN

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The Edisto River is the longest and largest river system completely contained in South Carolina and is one of the longest free flowing blackwater rivers in the United States. The Edisto River basin also has fish-tissue mercury concentrations that are among the highest recorded in the United States. As part of an ongoing effort by the U.S. Geological Survey to expand the understanding of relations among hydrologic, geochemical, and ecological processes that affect fish-tissue mercury concentrations within the Edisto River basin, analyses and simulations of the hydrology of the Edisto River basin were made using the topography-based hydrological model (TOPMODEL). The potential for scaling up a previous application of TOPMODEL for the McTier Creek watershed, which is a small headwater catchment to the Edisto River basin, was assessed. Scaling up was done in a step-wise process beginning with applying the calibration parameters, meteorological data, and topographic wetness index data from the McTier Creek TOPMODEL to the Edisto River TOPMODEL. Additional changes were made with subsequent simulations culminating in the best simulation, which included meteorological and topographic wetness index data from the Edisto River basin and updated calibration parameters for some of the TOPMODEL calibration parameters. Comparison of goodness-of-fit statistics between measured and simulated daily mean streamflow for the two models showed that with calibration, the Edisto River TOPMODEL produced slightly better results than the McTier Creek model, despite the significant difference in the drainage-area size at the outlet locations for the two models (30.7 and 2,725 square miles, respectively). Along with the TOPMODEL hydrologic simulations, a visualization tool (the Edisto River Data Viewer) was developed to help assess trends and influencing variables in the stream ecosystem. Incorporated into the visualization tool were the water-quality load models TOPLOAD, TOPLOAD-H, and LOADEST. Because the focus of this investigation was on scaling up the models from McTier Creek, water-quality concentrations that were previously collected in the McTier Creek basin were used in the water-quality load models.

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