

## **Assessment of Future Water Availability in the Major River Basins of Alabama: A Look at Some of the Phase I Model Results**

The Office of Water Resources (OWR) in the Alabama Department of Economic and Community Affairs (ADECA) is charged in the Alabama Water Resources Act to, among other things, assess the state's water resources including estimating the water use and the amount of water available in 11 major river basins that are within Alabama or cross Alabama's borders. These basins are in need of long-term hydrologic tools that can be used for assessing water availability under a variety of different conditions, including, climate extremes, water-use, and land-use changes.

Almost one year ago, the U.S. Geological Survey began working cooperatively with OWR to construct a statewide modeling framework using a topographic-based surface watershed model called TOPMODEL that would assist them in the assessment of future water availability. The Phase 1 study area models in the Black Warrior, Cahaba, and Choctawhatchee/Pea-Yellow river basins are nearing completion. The models were constructed at the subwatershed level (HUC-12 level), which entailed constructing a TOPMODEL input file for a total of 343 subwatersheds in these major basins. Spatially distributed daily mean temperature and total precipitation were also required for each subwatershed. Calibration and sensitivity analysis of the models are being performed using the Parameter ESTimation software package (PEST). PEST has been seamlessly programmed into the TOPMODEL graphical user interface so that very few manual edits are needed to perform calibrations and sensitivity analyses.

The subwatersheds for the Phase 1 basins total approximately 12,400 square miles with the smallest subwatershed being 5.3 square miles and the largest being 144 square miles. The soils information required for each subwatershed includes hydraulic conductivity, soil depth, field capacity, water holding capacity, porosity, and root depth; these data were obtained using GIS techniques from the NRCS Soil Survey Geographic Database (SSURGO). To model the effects of urban or improved areas, impervious surfaces and impervious road area were obtained from the U.S Census Bureau TIGER/Line data and the 2002 National Land Cover Dataset (NLCD). All input datasets were stored in a Microsoft ACCESS database and are retrieved automatically by the TOPMODEL program.

The primary objective of this project is to provide monthly water budgets for each subbasin (HUC-8 level). However, by building the base model structure at the subwatershed level, basin characteristics and climate data can be more accurately distributed, but this also means that the daily hydrographs from each subwatershed must be routed to the outlet of its parent subbasin for a total hydrograph. The subwatershed approach also allows for downscaling for higher resolution studies, if needed.

This presentation will look at some of the results of the calibration basins, subwatersheds, and subbasins. Monthly water budgets will be explored as well as the daily hydrographs generated to compose the monthly water budget.

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