Estimating the Magnitude and Frequency of Floods for Urban and Small, Rural Streams in Georgia, South Carolina, and North Carolina

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Reference: McDowell RJ, CA Pruitt, RA Bahn (eds.), *Proceedings of the 2015 Georgia Water Resources Conference*, April 28-29, 2015, University of Georgia, Athens.

Abstract. Reliable estimates of the magnitude and frequency of floods are essential for such things as the design of transportation and water-conveyance structures, Flood Insurance Studies, and flood-plain management. The flood-frequency estimates are particularly important in densely populated urban areas. A multistate approach was used to update methods for determining the magnitude and frequency of floods in urban and small, rural streams that are not substantially affected by regulation or tidal fluctuations in Georgia, South Carolina, and North Carolina. The multistate approach has the advantage over a single state approach of increasing the number of stations available for analysis, expanding the geographical coverage that allows for application of regional regression equations across state boundaries, and building on a previous flood-frequency investigation of rural streamgages in the Southeastern United States. Generalized least-squares regression techniques were used to generate predictive equations for estimating the 50-, 20-, 10-, 4-, 2-, 1-, 0.5-, and 0.2-percent annual exceedence probability flows for urban and small, rural ungaged basins for three hydrologic regions; the Piedmont-Ridge and Valley, Sand Hills, and Coastal Plain. Incorporation of urban streamgages from the New Jersey Coastal Plain also allowed for the expansion of the applicability of the predictive equations in the Coastal Plain from 2.1 to 53.5 square miles. Explanatory variables in the regression equations included drainage area (DA) and percent of impervious area (IA) for the Piedmont-Ridge and Valley region; DA and percent of developed land for the Sand Hills; and DA, IA, and 24-hour, 50-year maximum precipitation for the Coastal Plain.