

MAGNITUDE AND FREQUENCY OF FLOODS IN URBAN BASINS OF GEORGIA

Anthony J. Gotvald and Andrew E. Knaak

AUTHORS: Hydrologists, U.S. Geological Survey, Georgia Water Science Center, Peachtree Business Center, Suite 130, 3039 Amwiler Road, Atlanta, GA 30360.

REFERENCE: *Proceedings of the 2011 Georgia Water Resources Conference*, held April 11–13, 2011, at the University of Georgia.

Abstract. The U.S. Geological Survey (USGS), in cooperation with the Georgia Department of Transportation, conducted an investigation to update methods for estimating the magnitude and frequency of floods in ungaged urban basins in Georgia that are not affected significantly by regulation or tidal backwater fluctuations. Annual peak-flow data through September 2008 were analyzed for 50 streamgages having 10 or more years of record on urban streams in Georgia (Fig. 1). Flood-frequency estimates were computed for each streamgage by fitting logarithms of annual peak flows to a log-Pearson Type III distribution using the guidelines described in Bulletin 17B of the Hydrology Subcommittee of the Interagency Advisory Committee on Water Data (Interagency Advisory Committee on Water Data, 1982). Additionally, basin characteristics for these streamgages were computed by using geographical information systems and automated computer algorithms.

Regional regression analysis, using generalized least-squares regression, was used to develop a set of predictive equations for use in estimating the 50-, 20-, 10-, 4-, 2-, 1-, 0.5-, and 0.2-percent annual exceedance flows for ungaged urban basins in Georgia. Six urban streamgages in adjacent states and 171 rural streamgages were included in the regression analyses to maintain continuity between urban and rural flood estimates as the basin characteristics pertaining to urbanization approach zero. Flood-frequency estimates and basin characteristics for all 227 streamgages were combined to form the final database used in the regional regression analysis. Regional regression equations were developed for hydrologic regions 1, 3, 4 and 5 (Gotvald and others, 2009; Fig. 1). The final predictive equations are functions of drainage area and percentages of impervious area for hydrologic regions 1, 2, and 5; and drainage area, percentage of developed land, and mean basin slope for hydrologic region 4.

The investigation includes (1) developing regional equations for estimating the magnitude and frequency of peak-flows on urban, ungaged, non-regulated streams in Georgia; (2) estimating the magnitude of floods at the 2-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals determined for 50 urban streamgages in the State; (3) determining the accuracy and limitations of the equations; and (4) providing examples of applications of the methods.

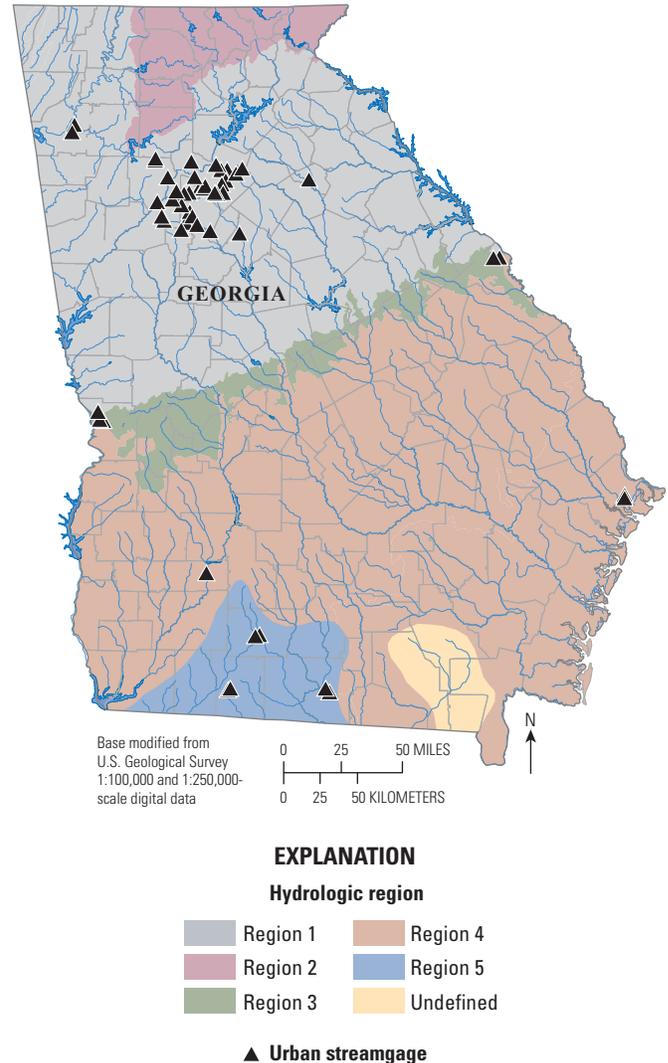


Figure 1. Locations of urban streamgages in Georgia that were used in regional regression analyses.

REFERENCES

Gotvald, A.J., Feaster, T.D., and Weaver, J.C., 2009, Magnitude and frequency of rural floods in the southeastern United States, 2006—Volume 1, Georgia: U.S. Geological Survey Scientific Investigations Report 2009–5043, 120 p.

Interagency Advisory Committee on Water Data, 1982, Guidelines for determining flood flow frequency: Hydrology Subcommittee Bulletin 17B, 28 p., 14 apps., 1 pl.