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The Development of a Low Flow Estimation Tool for Watershed Assessment in West Virginia

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Abstract Text:

Land-use planners and resource managers involved with fish, wildlife, or water rights issues require stream flow estimates. Estimating stream flow is important for determining the assimilative capacity of streams when discharge permits are being evaluated. Continuously-monitored gauging stations are not numerous, and those that exist are infrequently located where streamflows are desired or required. The WV Division of Environmental Protection was in need of a tool to calculate the low flow values for ungauged streams. Specifically, they required a way to spatially query stream locations anywhere in the state and determine the 7 day 10 year low flow occurrence (7Q10). We have developed a Geographic Information System based decision support system for calculating low flow stream estimates in WV. The method incorporates regional and stream variability curves and equations to provide annual and average values for 7Q10 flow estimates. This poster presentation will outline the methods which include incorporating geomorphic, geologic, and hydrogeologic datasets with a statistical model based on principal components analysis and cluster analysis. The decision support system accesses the spatial variables and allows users to quickly select a watershed, stream segment, and location in the stream in which to query for 7Q10. Results are reported back to the user for annual and monthly conditions as well as the variance and confidence thresholds for each computation. While the statistical relationships are unique for the topography and landscape of WV, the methodology and user interface could be adopted for other regions.

Impact Statement:

The developed decision support tool accesses the flow models and provides resource managers in WV with a way to quickly and accurately make decisions about permitting. The impact is a consistent and documentable method to aid in decision making. The tool could easily be adapted to other regions once a statistical model was properly fit.