



Low streamflow prediction at ungaged river sites: how best to use a small quantity of streamflow data

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Estimates of low streamflow statistics are required for a variety of water quality and water quantity management purposes. While a frequency analysis may be performed when a historic record of streamflow discharge is available at the site of interest, a far more vexing problem is how best to estimate low streamflow statistics at ungaged river sites. Two stochastic regionalization methods are often employed to estimate low streamflow statistics at ungaged sites: regional regression and baseflow correlation. Regional regression develops a relationship between low streamflow statistics and measurable watershed characteristics in a region, while with baseflow correlation information is transferred from one or more nearby gaged sites to estimate the moments of lowflow series at the ungaged site. Lowflow regional regression has often performed poorly in practice, often because important explanatory variables (such as those representing hydrogeology) are not available at the ungaged site. While regional regression can be applied to ungaged sites, baseflow correlation requires a nominal number of streamflow measurements at the ungaged site. Of interest is whether this data might better be used estimating hydrogeologic indices at the ungaged site, which would then be employed within a regional regression framework. A delete-one cross-validation experiment is performed in a region in the southeastern United States centered on eastern Tennessee and western North Carolina to understand the performance and uncertainty of these techniques. New advances in regional regression and baseflow correlation are explored with a goal of estimating a number of common low streamflow statistics.