Prediction uncertainty in a median-based index flood method using L-moments

T. R. Kjeldsen and D. A. Jones

Centre for Ecology and Hydrology, Maclean Building, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB, UK. (trkj@ceh.ac.uk, daj@ceh.ac.uk)

The standard for conducting flood frequency analysis in the UK, as set out in the Flood Estimation Handbook (IH, 1999), is based on the index flood method, using the median of the annual maximum flood as the index flood. For a given ungauged target site, a region-of-influence approach is used, involving the creation of a collection of similar catchments (pooling-group). This presentation examines the sampling uncertainty of quantile estimates based on pooling-groups and using the median as the index flood for both gauged and ungauged sites. Analytical approximations for the variance of the quantile estimates were derived, based on asymptotic theory, and used to calculate approximate confidence intervals for flood frequency curves obtained using both single-site and pooled analysis at gauged and ungauged sites. A series of bootstrap experiments were conducted to quantify the intersite dependence and to develop generalised expressions to be included in the analysis. It is shown that the pooled analysis yields narrower confidence intervals than the single-site analysis and that the presence of intersite correlations increases the sampling uncertainty. The method was extended to encompass estimation at ungauged sites in the UK based on a regression model for the index flood, which significantly increases the prediction uncertainty. Using a simple technique for transferring data from a gauged catchment judged hydrologically similar to the ungauged site can reduce the prediction uncertainty.

IH 1999. *The Flood Estimation Handbook.* Institute of Hydrology, Wallingford, UK.