

# Comparison of the Index Flood Method and the Population Index Flood Method Using Extreme Precipitation Data

Oli G. B. Sveinsson<sup>1</sup> and Jose D. Salas

Department of Civil Engineering, Colorado State University, Fort Collins

Duane C. Boes

Department of Statistics, Colorado State University, Fort Collins

**Abstract.** Regional frequency analysis of hydrologic data is often used to improve accuracy of estimated quantiles and to estimate quantiles at ungaged sites. A common practice is to use the index flood method, where data at each site divided by their index-flood are assumed to be from the same population. The so-called Hosking and Wallis regional estimation scheme (*HW-scheme*) is perhaps the most widely used variant of the index flood method. In the *HW-scheme* the index-flood at each site is estimated by the at-site sample mean, and the parameters of the regional distribution are estimated using L-moments. In recent studies the practice of estimating the index-flood by sample statistics has been questioned. For example, it has been shown that a random sample drawn from a given parent distribution, when indexed by the sample mean, yields a different distribution than the parent distribution, and the indexed sample becomes correlated. A newly suggested analytical model for regional frequency analysis, referred to as the Population Index Flood (PIF) method, could be used as an alternative to the index flood method (*HW-scheme*). In the PIF method the index flood is taken to be a function of certain unknown population quantities (such as the population mean), and the homogeneity of a region is embedded in the structure built into the parameter space. Regional frequency analysis based on the *HW-scheme* and the PIF method is conducted for extreme precipitation data from a small region in Northeastern Colorado, and the results from applying the two different methods are compared. The analysis is carried out for both annual maximum series and partial duration series of the extreme precipitation data.

---

<sup>1</sup> Water Resources, Hydrologic and Environmental Sciences Division  
Civil Engineering Department  
Colorado State University  
Fort Collins, CO 80523-1372  
Tel: (970) 491-3384  
e-mail: oli@lamar.colostate.edu