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The effect of rating curve model fit on suspended sediment load estimates and the assessment of model fit

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This poster examines the effect of rating curve model choice on suspended sediment load estimates for five catchments in the British uplands: Trout Beck and Rough Sike, Upper Teesdale; Burnhope Burn and Langtae Burn, Upper Weardale; and Candleseaves, northern Lake District. The accurate estimation of suspended sediment load from upland areas has become an increasingly important problem given recent concerns about rates of upland erosion, carbon loss and contaminant transport from headwater catchments. A suite of ten basic rating curves were developed for each catchment, four of which were linear regression models (uncorrected for back-transformation bias and corrected by the log-normal correction factor, smearing and the Bradu-Mundlak estimator) and six of which were generalised linear models (with combinations of gamma and Gaussian distributions, log and identity links and raw or log-transformed discharge series). The variability in load estimates established using the ten models varied by several orders of magnitude in some catchments (e.g. 184.4 to 877,124,139 t yr^{-1} for Trout Beck, North Pennines) and was positively related to variability in the discharge record. Linear regression back-transformed by smearing was established as the most applicable model for the study sites. As a result of this analysis of different rating curve models, it is suggested that multiple indices of fit are used to evaluate their appropriateness. The coefficient of determination, sampled period load estimates and diagnostic plots are recommended as measures of model applicability, in terms of fit and accuracy of load estimates.