Uncertainty of stream nutrient transport estimates using random sampling of storm events from high and low resolution water quality and discharge data.

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The uncertainties associated with stream nutrient transport estimates are frequently overlooked and the sampling strategy is rarely if ever investigated. Indeed, the impact of sampling strategy and estimation method on the bias and precision of stream phosphorus (P) transport calculations is little understood despite the use of such values in the calibration and testing of models of phosphorus transport. The objectives of this research were to investigate the variability and uncertainty in the estimates of total phosphorus transfers at an intensively monitored agricultural catchment. The Oona Water which is located in the Irish border region, is part of a long term monitoring program focusing on water quality. The Oona Water is a rural river catchment with grassland agriculture and scattered dwelling houses and has been monitored for total phosphorous (TP) at 10 min resolution for several years (Jordan et al, 2007). Concurrent sensitive measurements of discharge are also collected. The water quality and discharge data were provided at 1 hour resolution (averaged) and this meant that a robust estimate of the annual flow weighted concentration could be obtained by simple interpolation between points (0.23 mg l-1). A two-strata approach (Kronvang and Bruhn, 1996) was used to estimate flow weighted concentrations using randomly sampled events from the 400 identified within the time series and also base flow con-

centrations. Using a random stratified sampling approach for the selection of events, a series ranging from 10 through to the full 400 were used, each time generating a flow weighted mean using a load-discharge relationship identified through log-log regression and monte-carlo simulation. These values were then compared to the observed total phosphorus concentration for the catchment. Analysis of these results show the impact of sampling strategy, the inherent bias in any estimate of phosphorus concentrations and the uncertainty associated with such estimates. The estimates generated using the full set of events underestimate the flow weighted mean concentration of total phosphorus. This methods was then applied to additional set of (data poor) catchments where water quality data was collected using a sparse monitoring pattern (10 events, plus baseflow). This allowed an estimate of uncertainty to be calculated for these additional catchments. This work compliments other contemporary work in the area of load estimation uncertainty in the UK (Johnes, 2007).This work compliments other contemporary work in the area of load estimation uncertainty in the UK (Johnes, 2007).

Johnes P,J. 2007, Uncertainties in annual riverine phosphorus load estimation: Impact of load estimation methodology, sampling frequency, baseflow index and catchment population density, Journal of hydrology 332 (1- 2): 241-258

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