AN EVALUATION OF TWO MEASURES OF STREAMBED CONDITION

by

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ABSTRACT

Current regulations surrounding forestry activities and their effects on stream channels require meaningful, rapid, and reliable techniques for monitoring streambed condition. This research evaluates two techniques for estimating stream channel condition, Dietrich's q^* and Kappesser's Riffle Armor Stability Index (RASI), on four reaches of Little Lost Man Creek, California. Variance, optimal sample size, cost, and reliability were estimated for both methods.

The first method, a dimensionless bedload transport rate (q^*), proposed by Dietrich et al. (1989), requires two people and at least one full day of field work, but has a sampling variance as low as 0.003 (mean = 0.34). For reaches A, B, C and D q* was 0.34, 1.69, 1.75 and 0.91 respectively. The second method, the Riffle Armor Stability Index (RASI) proposed by Kappesser (1992), can be done by one person with a scale within two hours and also has a low variance, but may be prone to bias, especially if done by an untrained investigator. For reaches A, B, C and D the RASI was 72.0, 76.5, 68.3 and 89.5 respectively. An attempt to remove bias by comparing RASI to tracer gravel motion is made. Tracer movement shows nearly equal probability of movement for all particle sizes at bankfull discharge,

suggesting that all RASI values on alluvial channels should equal 85 or more.

Equations using bankfull geometry from Andrews (1983) and Kappesser (1991) were also used to predict mobile particle sizes in place of the 30-count. This tended to over or underestimate 30-counts picked by hand depending on whether the riffle or reach slope was used, but suggests this is a promising approach to removing RASI bias.

Although Little Lost Man Creek has relatively low sediment discharge, both techniques had samples indicating abundant fine sediment, and inconsistent sediment supply between adjacent reaches. The poor performance of these techniques suggests that more refinement may be necessary before they are applicable to every stream. The relationship between the grain size distributions of the bedload and the subsurface needs to be clarified to determine where the size distribution is equal and it is appropriate to sample q^*. RASI should only be done with another method, as a check for bias, until the 30-count can be defined more precisely, either theoretically or in the field.

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