THE INFLUENCE OF SAMPLING TECHNIQUE ON BEDLOAD PREDICTION

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Abstract: The difficult task of predicting the quantity and timing of bedload motion in gravel bed streams is complicated by limitations in sampling technique. This work illustrates a specific example where two common direct sampling techniques (Helley-Smith and net trap sampler) failed during flood flows and describes a new low cost technique that was able to successfully collect bedload samples at high discharges.

Early in the spring of 2013 net trap samplers were set up at three sites along Hobble Creek, a coarse-bed stream that flows through Springville City, Utah into Utah Lake. Then exceptionally unusual weather patterns produced a series of flood events that exceeded bankfull discharge by as much as four times. The net traps were no longer accessible and the back-up method, hand-held Helley-Smith samplers, were unusable. Attaching net trap samplers to the end of a pole and securing the pole against the flow with a tether to both banks, bedload samples were able to be collected during the highest flows of the season. This new technique was referred to as a Stanley sampler, or pole-mounted net trap.

Forty-one samples were collected on a Central Utah stream using this new technique and are used to illustrate the influence of sampling technique on bedload transport rate prediction. Four bedload formulae are compared to the data to show how predictive success of any given formula is related to the sampling technique used to collect the data from which it was derived. In other words, a formula derived from Helley-Smith data will perform better predicting against other Helley-Smith data than a formula derived from net trap data, and vice-versa. This work also provides evidence that the Helley-Smith and net trap samplers collect two very different sampling populations that must be considered when selecting a predictive formula.