



## Bed load sampling techniques for gravel-bed channels

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Only a few studies have described the entire range of bed load samplers deployed in recent decades for gravel-bed channels, including beds of gravel and sand mixtures. Methods of measuring bed load sediment transport and bed material in rivers are therefore reviewed and evaluated.

A comprehensive analysis of direct measurement techniques, including net and trap samplers, as well as indirect techniques, such as tracers and acoustic devices, shows that they suffer from serious limitations. In particular, no single device has proved to be completely adequate for sampling all size fractions of sediment particles with the same efficiency, while leaving the natural flow and sediment movement patterns unaltered and while remaining in a stable position on the river bed. Perhaps the most serious disadvantage of the methods mentioned is that they deal with only small sample sizes. Even promising devices that hold hope for the future, such as the acoustic technique, can't overcome the stochastic nature of the transport process.

Thus, of great importance is the means of calibrating the devices accurately in situ as well as under defined and repeatable laboratory conditions. In recent years a number of organizations have been founded, such as the Federal Interagency Sedimentation Project in Northern America, or the Bedload Research International Cooperative (BRIC), which aim to link individual researchers and develop common and generally accepted approaches to measurement and calibration.