

## **TURBIDITY THRESHOLD SAMPLING: METHODS AND INSTRUMENTATION**

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Traditional methods for determining the frequency of suspended sediment sample collection often rely on measurements, such as water discharge, that are not well correlated to sediment concentration. Stream power is generally not a good predictor of sediment concentration for rivers that transport the bulk of their load as fines, due to the highly variable routing of sediment to the channel from hillslopes, roads, and landslides. A method, such as turbidity threshold sampling, that employs a parameter well correlated to concentration, can improve sampling efficiency by collecting samples that are distributed over a range of rising and falling concentrations. The resulting set of samples can be used to estimate sediment loads by establishing a relationship between concentration and turbidity for any sampled period and applying it to the continuous turbidity data. All river systems, particularly smaller watersheds that respond very quickly to rainfall, benefit from automated data collection.

A data logger, under direction of the turbidity threshold sampling program, collects stage and turbidity data at 10 or 15-minute intervals, depending on the drainage size, then periodically triggers an automatic pumping sampler to collect a sample when specified conditions have been satisfied. The program uses a set of rules to improve the efficiency of sample collection. The program collects 60 turbidity readings in 30 seconds and then selects the median value. This reduces outliers by integrating sediment pulses and rejecting false values. The program also attempts to distinguish false spikes from true rises in turbidity, and it uses different sets of rising and falling thresholds.

The turbidity probe, mounted inside of a housing, and the sampler intake, are usually attached to the end of an articulated boom. Booms are most suited to sites that have adequate depth of flow. The boom and housing reduce contamination from organics by shedding debris, protecting the sensor from direct impacts by woody material, and when properly designed, they can reduce hydrodynamic noise caused by turbulence and the entrainment of air or re-suspension of sediment close to the sensor. Field personnel can retrieve the bank or bridge-mounted boom to remove debris during high flows. The boom controls the depth of the turbidity probe and sampler intake in the stream to maintain their position above bedload transport and below the water surface.