



## **Long-term Monitoring of Spawning Habitat Rehabilitation Projects in a Regulated River**

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Monitoring geomorphic changes in response to river restoration interventions through the use of repeat topographic surveying is becoming more common in long-term monitoring programs. Repeat monitoring surveys are often performed before and immediately following construction, and then on some defined interval (typically annually) or event-basis. How uncertainties in these surveys are managed to decipher what changes can be taken as meaningful adjustments of the project and/or geomorphic changes versus just noise in the data requires careful consideration. Moreover, once the reliability of the data is reasonably well understood, how to interpret the changes and segregate the resulting sediment budgets has not received adequate attention in the literature. Here, eight repeat topographic surveys from four different spawning habitat rehabilitation projects on the heavily Mokelumne River of California, are used to demonstrate the utility of applying some new methods for accounting for DEM reliability uncertainties and budget segregation techniques. The significance of recorded geomorphic changes are related to spawning and incubating Chinook salmon (*Oncorhynchus tshawytsch*) to explore questions such as: 1) the impact of a large flood on incubating salmonids embryos; 2) the influence of high-flow dam releases on physical habitat quality; and 3) documenting changes that took place specifically where salmon spawned. The results highlight some simple but interpretively powerful techniques for linking ecohydraulic and geomorphic field monitoring data at a scale relevant to salmon.