

Comparison of three pebble count procedures in a gravel-bed mountain stream: procedural details cause huge differences

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Abstract. A variety of pebble counts procedures are used for characterizing streambed material, evaluating aquatic habitat, and monitoring the percentage of bedmaterial fines. Procedures vary in the specific streambed locations sampled, in methods of streambed particle selection and size estimates, and in sample size. This can lead to different results among procedures and to contrasting conclusions about the impact of fines, habitat conditions, and incipient motion.

This study applied three procedures: USEPA's EMAP, USFS's PIBO and SFT (named for its major field tools—sampling-frame and template) to two mountain gravel-bed streams with pool-riffle morphology and compared results. EMAP collected 105 particles within the wetted width, PIBO 100 particles from riffles, and SFT 460-600 over the entire reach.

Particle-size distributions varied dramatically among the procedures. EMAP's D_{50} size was about half the size of PIBO's, while EMAP's percentage of fines <5.6 mm was 4-5 times higher than PIBO's. Results from the SFT procedure took a middle ground. The study analyzed how differences in sampling locations and methods of particle selection and size estimates affected the study outcomes. Omitting gravel bars, both EMAP and PIBO collected particles from locations coarser than the reach-average. This partly explained the coarseness of the PIBO result, but not EMAP's fineness. Sorting particles into broad size classes 2-3 phi units wide explained much of EMAP's fine-grained particle-size distribution, while PIBO's ruler measurements of b -axis length indicate particle sizes 0.15-0.3 phi-units too coarse. Some procedural details caused not only bias, but also imprecision and uncertainty of the sampling result.

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