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Erosion depth of sand from an immobile gravel bed

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Abstract This study was conducted to improve prediction of the depth of erosion of sand (D_{50} = 0.3–0.9 mm) from immobile gravel (D_{50} = 36.1 mm) under steady uniform flows with bed shear stresses from 0.1 to 0.9 of that required to entrain the gravel. This situation, often encountered downstream of dams, has important implications for habitat restoration. Steady uniform flows were imposed on a flume channel containing a mixture of sand and gravel until sediment concentrations in the flow exiting the channel became small. The elevation of sand relative to gravel was measured after each experiment and compared poorly to calculated depths from published relationships whose predictions were based in part on the equivalent grain roughness of the bed. An improved predictive relationship was developed by using the cumulative distribution function of the surface gravel elevations to scale the shear velocity available for transporting sand from the gravel substrate.

Key words erosion; sand; immobile gravel