

GRAIP-Lite: A Tool for Large Scale Assessment of Road Erosion

Nathan Nelson ¹, Charles Luce ², Thomas Black ³, and Richard Cissel ⁴

U.S. Forest Service, Rocky Mountain Research Station, Boise, Idaho

¹ nnelson@fs.fed.us

² cluce@fs.fed.us

³ tblack@fs.fed.us

⁴ rcissel@fs.fed.us

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The objective of this paper is to describe a new tool for efficiently modeling the road sediment impact to streams at a broad scale. GRAIP-Lite provides the ability to describe the general effects of road location, maintenance, and design on road-derived sediment across sub-watersheds at relatively low cost and effort. The model requires a Digital Elevation Model, a GIS road line feature, and a calibration dataset, to predict the amount of sediment production on road segments, sediment delivery to streams, and sediment accumulation across the stream network.

GRAIP-Lite results were validated against inventory and modeling done with the Geomorphic Inventory and Analysis Package (GRAIP) in 46 sub-watersheds in the Northwestern US across a substantial range of geology, topography, and weather. Early results indicate good agreement between the two approaches with a Nash-Sutcliffe of 0.80 for sub-watershed scale sediment delivery and 0.80 for specific sediment. Further analysis in streams with contributing areas of 10 – 15 km² have Nash-Sutcliffe scores of 0.73 for sediment delivery and 0.71 for specific sediment. Prioritizing areas for restoration work based on the simple tool provides added value beyond road density, which treats all roads equally and may result in sub-optimal project selection.