

Road Inventory and Monitoring with GRAIP

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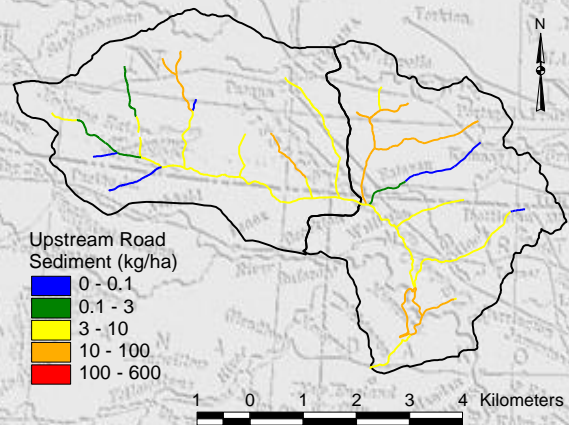
The Geomorphic Road Analysis and Inventory Package (GRAIP) is a road inventory protocol and analysis method that implements the latest scientific findings on the impacts of roads on water quality. The tools for analysis are a new generation, bringing together existing resource data and DEMs with road inventory data in way that allows more powerful analyses than previously possible.

The Tools

The road inventory protocol describes how to systematically field inventory a road system using GPS and automated data forms. Once downloaded, these data can be immediately run through a data quality checking and correction program. Quality checked data can then be analyzed in a program implemented in ARC-GIS. The program produces maps of surface erosion (bottom left), accumulated road sediment in streams (top right), and contributing length by segment, which relates directly to slope stability and gullying risks (middle right). Other analyses relating to stream diversion potential, stream crossing failure, culvert maintenance needs, and fish passage are also provided with the program.

Using The Latest Science

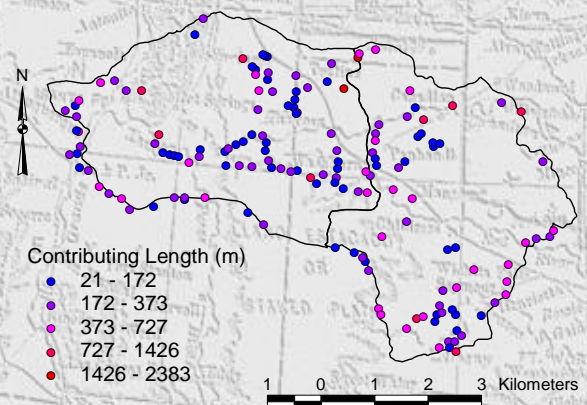
The surface erosion modeling uses recent updates to R1-R4 methods based on Luce and Black (1999, 2001). It is sufficiently flexible to take input from WEPP or local monitoring data. Slope stability risk is modeled using SINMAP 2 (Pack et al. 2005) and papers by Montgomery (1994), Wemple et al. (1996), and Croke and Mockler (2001). Downstream accumulated sediment is a new analysis



based on spatial patterns that fisheries biologists believe may better represent risk to fisheries (Luce et al., 2001, Luce and Rieman, 2006). Stream crossing failure risk modeling is based on culvert and stream size data (Flanagan et al., 1998). It is the only tool providing a look at cumulative effects from roads both as multiple processes and over large areas.

Saving Time and Money

The inventory is designed to feed seamlessly into automated analysis procedures. Many National Forests, BLM Districts and tribes have used seasonal crews to complete inventories. A crew of two covers an average of 2 miles per day, yielding an average cost of about \$200 per mile. The data correction and analysis procedures can be accomplished by a GIS technician. The resource specialist's time then becomes devoted to interpreting the maps and results. Substantial savings in money can be realized by using the inventory as a basis for prioritization of watershed restoration treatments.



How Can I Use GRAIP?

GRAIP is being utilized to aid with sediment TMDLs, to monitor road project effectiveness, and to guide restoration work around the Western US. We welcome new users to join the GRAIP community and apply it to new areas.

More information and training opportunities are available www.fs.fed.us/GRAIP/index.shtml

For more specific information about GRAIP contact

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