

# Document 7

*For 16 October 2024 IRST meeting*

## **Example of Relevant Study Review: IRST Road-Stream Connectivity Study Review – Dunham 2023**

### **Publication citation**

Dunham, J.; Hirsch, C.; Gordon, S.; Flitcroft, R.; Chelgren, N.; Snyder, M.; Hockman-Wert, D.; Reeves, G.; Andersen, H.; Anderson, S.; Battaglin, W.; Black, T.; Brown, J.; Claeson, S.; Hay, L.; Heaston, E.; Luce, C.; Nelson, N.; Penn, C.; Raggon, M. 2023. Northwest Forest Plan—the first 25 years (1994–2018): watershed condition status and trends. PNW-GTR-1010. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. PNW-GTR-1010 p. <https://doi.org/10.2737/PNW-GTR-1010> (September 3, 2023).

Other related documents:

Nelson, N.; Luce, C.; Black, T. 2019. GRAIP\_Lite: A system for road impact assessment. Boise, Idaho: USFS, Rocky Mountain Research Station, Boise Aquatic Sciences Lab. <https://research.fs.usda.gov/rmrs/projects/graiplite>

### **Study dates and study duration**

Assessed and compared the road network on federal lands in 1994 to 2022.

### **Study location**

NW Forest Plan (western WA/OR, northern CA)

### **Research question(s), hypotheses**

What were the changes in road-stream connectivity and sediment delivery between 1994 & 2022?

### **Methods: empirical vs modeled**

- Modeled: used the GRAIP-lite modeling system
- GRAIP Lite estimates sediment production on a road segment scale as follows:  $E = BRSV$ , where E is the total sediment production (kg/yr), B is the base rate (kg/yr/m), R is the elevation difference between road segment ends (m), S is the road surface type (categorical), and V is the fraction of the road segments where the flowpath vegetation cover is greater than 25%
- The amount of sediment delivered to streams was modeled as a declining fraction of sediment produced based on the segment to stream distance

- The base erosion rate requires considerable field sampling and have only been estimated for a few locations; this study used a base rate from the Coast Range and qualified results as relative rather than absolute.
- The only road changes used in the study were the addition of new road segments and the decommissioning of existing segments.

## **Sampling**

- Complete analysis of all road segments in the USFS & BLM road databases (only federally managed lands were assessed)
- Results were summarized to the HUC12 (subwatershed) level

## **Applicability to IRST Research Proposal (takeaway messages)**

- GRAIP-lite is a GIS-based tool that can estimate connectivity and sediment delivery, but estimates are only as good as the available data.
- The tool needs a roads inventory, preferably with surface type and maintenance level; it is unlikely that these data are currently available for private lands in Oregon, although some estimate may be generated by the abandoned roads inventory in the next year or two and a full dataset should be available upon completion of the FRIA process in 2029.
- Alternatively, a field mapping & sampling process could be used to feed GRAIP-lite, similar to the Dubé approach.
- The base erosion rate (primarily determined by soils & precipitation) input is important and only empirically derived at 2 locations in Oregon (Siuslaw & Ochoco National Forests); base rates could be field measured for other sites, but the level of effort needed is not clear.