Legacy Roads and Trails Monitoring Project

Road Decommissioning in the Skokomish River Watershed

Olympic National Forest

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Executive Summary

In Fiscal Year 2008, Congress authorized the Legacy Roads and Trails Program and allocated the US Forest Service (USFS) $40 million to begin its implementation. This program is intended to reduce road and trail impacts to watersheds and aquatic ecosystems by decommissioning unneeded roads, removing fish passage barriers, and addressing critical repair and maintenance needs.

The USFS, Rocky Mountain Research Station and Pacific Northwest Region are monitoring some of the road decommissioning and maintenance projects in Oregon and Washington to assess their effectiveness in reducing impacts and risks to key watershed processes. Risk profiles are being developed and compared, before and after road treatments, with the Geomorphic Road Analysis and Inventory Package (http://www.fs.fed.us/GRAIP). This suite of robust inventory and analysis tools evaluates the following road impacts and risks: road-stream hydrologic connectivity, fine sediment production and delivery, shallow landslide risk, gully initiation risk, stream crossing failure risk, and drain point condition.

To date, pre-treatment inventories have been conducted at twelve locales where decommissioning or heavy maintenance (i.e., stormproofing) treatments have since been implemented. At each of these locations, four miles of road were assessed. Inventories were also completed on four miles of control sites for each locale. Five post-treatment inventories were executed, as well as one post-storm validation evaluation. This status report focuses only on decommissioning work implemented by the Olympic National Forest (ONF) in the Skokomish River watershed. At the ONF sites, treatments included removal of culverts and fills at stream crossings, replacement of culverts with armored waterbars or broad-based dips, construction of new waterbars and dips, outsloping of road surfaces, pullback of unstable sidecast material, deep scarification of the roadway and ditches, placement of vegetative material on disturbed areas, revegetation of select sites, and seed and/or mulching of disturbed areas. At one site, a road was converted to a trail.

Before-after comparisons using GRAIP indicate that decommissioning treatments resulted in a large reduction of most impact-risk metrics. Road-stream connectivity was reduced by 70%, from 3,474 m of connected road to 1,032 m. Delivery of fine sediment was reduced by 81%, from 27.1 tons/year to 5.2 tons/year. Values of a stream blocking index were reduced from an average of 1.7 before treatment to zero after treatment (n=15), indicating the risk of stream crossings becoming plugged was completely eliminated by excavation and removal of culverts and associated fills. While former crossings sites may contribute fine sediment to streams in the short term, the restoration treatments removed over 4,000 m^3 of earthen material from areas with a high potential for failure and delivery to stream channels. Diversion potential was eliminated at 89% (8 of 9) of crossing sites.

The slope stability risk below drain point locations on the original road was reduced as water was redistributed across the hillslope to waterbars and diffuse drainage. It is unclear, however, if landslide risk was reduced across the entire treated road length because the treatments slightly increased risk in some areas where new concentrated drainage features were added above steep slopes. These features were generally installed to break up long road segments that delivered road runoff and sediment directly to streams or posed a risk of gully initiation.

Reductions in gully risk, as determined by comparisons of a gully initiation index (ESI) to an empirically-derived threshold (ESI_{crit}), were modest across the length of treated road. New drainage features reduced the gully index at some of the original drainage points by reducing the length of the road segments discharging to them. In some cases, however, post-treatment index values still exceeded the initiation threshold, indicating elevated risk was still present. Moreover, index values were increased at some of the new drainage points. The net effect was that treatments reduced the number of drainage points with elevated gully risk by only one. Current calculations are based on conservative assumptions, so the actual performance of the treatments may exceed these initial expectations. Such assumptions will be assessed during future post-storm monitoring.

Before treatment, inventoried road segments had problems at 49% of 75 inventoried drainage points. Post-treatment monitoring indicates that these problems were almost entirely eliminated by the decommissioning treatments and that most replacement drainage features are less vulnerable to failure.

Taken collectively, preliminary results indicate the decommissioning treatments should be effective in significantly reducing most hydrogeomorphic impacts and risks to aquatic ecosystems. Some risk of shallow landsliding and gully formation may remain where complete recontouring was not used, and some assessment of tradeoffs between more thorough local treatment and greater treated lengths may be warranted for future treatments. GRAIP can be used to address these needs in the design phase of future projects.

Summary of GRAIP road risk predictions for the Skokomish River watershed decommissioning project.

Impact/Risk Type	Effect of Treatment: Initial GRAIP Prediction	Effect of Treatment: Post-storm validation
Road-Stream Hydrologic Connectivity	-70%, -2,442 m of connected road	To be determined.
Fine Sediment Delivery	-81%, -21.8 tons/year	To be determined.
Landslide Risk	uncertain, slight reduction likely	To be determined.
Gully Risk	1 less drain point with elevated gully risk (32 vs. 33), greater reductions possible	To be determined.
Stream Crossing Risk		
- plug potential	-100% (eliminated at 15 sites)	To be determined.
- fill at risk	-100% (-4098 m^3)	To be determined.
- diversion potential	-89% (eliminated at 8 of 9 sites)	To be determined.
Drain Point Problems	-98% (1% vs. 49% of drain points)	To be determined.