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# Erosion, Sediment Delivery, and Consequence from Roads in Foothills Watersheds in West-Central Alberta: A Case-Study in the Simonette | Part 3: Diverting sediment from streams

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Sediment generated on the road surface must be diverted before it reaches streams. Numerous studies have investigated both road erosion and how connected roads are to stream network, however a few have found that road connectivity is essentially a hydrological process. If there is water to move sediment to streams, then road segments will deliver at least some of that sediment to streams. The amount of water generated from a road is a function of the area of the road surface and the adjacent right-of-way, the intensity of the rain event, and the amount of infiltration into the road surface. If the water generated by the road segment infiltrates into the slopes below the road drain point then it should not be able to deliver sediment to streams downslope.

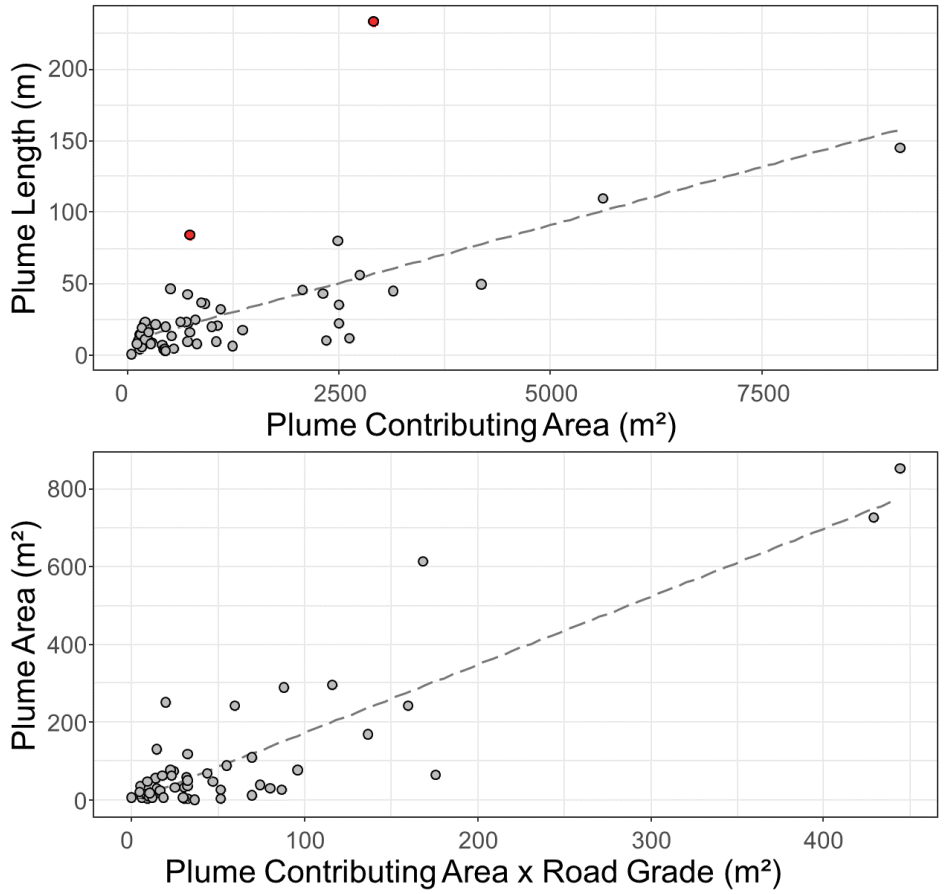
We surveyed plumes of sediment generated by road segments in the Simonette to determine drivers of connectivity in this watershed. The objective was to define the main influences of connectivity in the watershed.

## Results

We found a strong relationship between road and right-of-way contributing area and plume extent, and a moderate relationship between plume length and contributing area. The relationships are highly significant, and although the datasets are not normally distributed, the relationship is linear. Plume area is best represented by an interaction between contributing right-of-way and overall grade of the contributing surface. This suggests that in less steep roads, the water may have a greater tendency run off the crown and infiltrate rather than forming concentrated flows that can create sediment plumes.

The plume length relationship appears to be compromised by two outliers, shown in red, both of which are located in very narrow drainage features. This suggests that rather than helping solve road sediment delivery issues, training water from roads in long dictches or swales may simply extend the problem downslope, and may even increase the likelihood that sediment from the road surface will deliver to a stream. Overall, the

data support the notion that contributing area has a strong role to play in defining sediment connectivity from road surfaces, and this in turn suggests that road connectivity is primarily a hydrological problem.




This study provides two very useful lessons in controlling sediment delivery from road surfaces:

1. Longer undrained sections of road will have larger connectivity issues.
2. Rather than concentrating outflows in narrow ditches, road-builders should install structures to spread out the flow so that it infiltrates over the maximum available downslope surface area.

If roads are professionally engineered, connectivity at key crossings can be estimated using standard hydrological techniques such as the rational method or curve number.