

Runoff and sediment transport through riparian buffers in a Rocky Mountain headwater catchment

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Abstract. Sediment, made more readily accessible through disturbance to soil and vegetation from timber harvesting operations, is a concern for in-stream water quality of steep, forested headwater catchments. Current regulations require the retention of treed riparian buffers to mitigate or avoid harvesting impacts. However, extensive debate remains as to the effectiveness and design of buffer strips. As such, there is a need for greater understanding of runoff, erosion, and sediment transport processes from harvested hillslopes into, and through, riparian buffers to streams. We present preliminary data from field observations of the near-surface hillslope runoff processes at the disturbance interface of a recent clear-cut harvest and the associated 30-m riparian buffer of a headwater catchment in the Rocky Mountains of Alberta, Canada. Modified Gerlach troughs (n=40) were installed along hillslopes to intercept rainfall runoff and transported sediment at the mineral soil boundary. Troughs were located 1) along the harvest edge (~30 m from the stream) to capture samples entering into the riparian buffer, 2) 10 m into the riparian buffer, 3) along an undisturbed, control hillslope ~30 m from the stream, and 4) along the same control hillslope 10 m downslope. Preliminary analysis of collected runoff volumes and sediment concentrations following rainfall events between June-September, 2015 suggest higher sediment concentrations along the harvest edge than within the buffer. Moreover, sediment concentrations from 10 m within the buffer were more similar to the samples from the undisturbed hillslope. To better understand localized “hot-spots” for runoff and sediment transport, variation between individual collection points will be compared to additional site characteristics, including surface soil moisture, slope, vegetation cover, soil type, litter depth, and upslope accumulated area.