

## Sediment Delivery in Managed Forest Streams of British Columbia (B.C.)

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### Background

Natural soil erosion contributes sediment to streams, but a variety of human activities (i.e., urbanization, agriculture, forestry, mining) can also increase sediment contributions. Sediment is considered a pollutant in streams and rivers and is regulated by federal and provincial laws. Sediment can affect water quality leading to higher costs of water treatment for human consumption. Fish, macroinvertebrates, and other aquatic biota can also be negatively affected by elevated sediment concentrations.

### Contemporary forest management practices are effective in reducing sediment delivery to streams

While in the past, harvesting practices contributed large quantities of sediment to streams, modern forest practices are generally effective in reducing sediment delivery to streams in the Pacific Northwest and beyond. Sediment responses have ranged from either no effect (Arismendi et al. 2017; Hatten et al. 2017) of harvesting on stream sediment concentrations to short-term (1 to 3 year) increases. For example, in the Stuart-Takla watersheds in the northern Interior of B.C., elevated suspended sediment returned to pre-harvest levels within three years or less following harvest (MacDonald et al. 2003).

### Geology is an important predictor of sediment response

Geology is an important predictor of where forest harvest may increase sediment delivery to streams. When differences in stream sediment concentrations have been observed, underlying geology has

explained those differences in streams from the Kootenay region of B.C. and in the Tsitika River Watershed on northern Vancouver Island, B.C. For example, in the Kootenay region of B.C., forest roads had a significant effect on suspended sediment in one watershed but not the other due to differences in geology (Jordan 2006). Sediment storage and redistribution in B.C. streams can also vary with history of glaciation in the watershed.



Cruickshank River, British Columbia

## How does harvesting and road building affect stream sediment delivery?

Harvesting alone rarely results in significant surface erosion or sediment delivery to streams. Primary sediment sources typically include roads, trails made by harvesting equipment, and stream crossings. Proper road placement, construction, and maintenance can minimize road-related sediment sources to streams. The majority of erosion in any road network is derived from a small fraction of the road network (NCASI 2012). Identifying and maintaining these sections is important to minimize sediment inputs to streams.

## Current regulations for road building, maintenance, and reducing sediment sources from legacy roads

All provinces have established guidelines and guidebooks on the design, installation, maintenance, and decommissioning of legacy forest roads, road drainage, and stream crossing structures (NCASI 2012). In B.C., the forest road engineering guidebook and the fish stream-crossing guidebook provide detailed technical information regarding current regulatory requirements of the Forest and Range Practices Act and the federal Fisheries Act (BC MOF 2012; BC MOF 2019). Road placement is one of the most critical factors to limit sediment inputs to surface waters. Some of the key guidelines for the location of roads include: using existing roads when possible, placing roads far away from streams and riparian zones, following the contour of the landscape, placing roads on well-drained soil when possible, avoiding steep or unstable slopes, minimizing stream crossings, and mulching and seeding to stabilize disturbed areas (NCASI 2009a, 2012).

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