

Regional Incidence of Landslides

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A regional study was made of landslides in a portion of Arrow and Kootenay Lake Forest District, which enables us to make some preliminary conclusions about the aerial frequency of landslides, their causes, **and their importance as sediment sources to streams. The main purpose of the study was to determine the** terrain attributes most responsible for development-related landslides, and to use this information to improve classification criteria for terrain stability mapping.

The study covered all or parts of 100 map sheets, totaling about One million hectares. Approximately 1/300 landslides were inventoried by air photo interpretation; of these, a subset of about 200 was field checked. These data were supplemented with information on recent landslide events reported to our **engineering section.**

The data show that landslide frequencies typically increased by roughly 2 to 10 times by forest development (depending on how one defines the land base for calculation of aerial frequencies). The landslide frequency on private land is higher than on crown land. About 95% of development-related landslides are due to roads or skid trails. On older roads, road fill & curbs are apparently the most **common cause. However, on newer roads, the most common cause is drainage concentration and** diversion by roads. An important category of landslides occurs some distance below roads, below a culvert or a point of accidental drainage discharge. In many of these cases, the road itself is on gently-sloping, low-hazard terrain, and the landslide occurs on steeper terrain below. This is known as the "gentle->steep" situation. The Forest Practices Code does little to reduce landslide hazard in this situation, because the need for professional engineering involvement in road design is triggered by the hazard at the road location, not below the road.

The terrain type most frequently involved in landslides, on an aerial basis, is deep glaciofluvial or other stratified glacial deposits in valley bottoms. Many of the main forest roads accessing mountain valleys follow such deposits, and the deliverability of sediment to streams tends to be high. Otherwise, there are few generalizations that can be made about contributions of landslide sediment to streams. An important concept is that landslides, like other geomorphic and hydrologic processes, tend to follow magnitude-frequency relations. Small landslides are most frequent, and often do not reach a stream. Large landslides are much less frequent, but often enter streams. A range of landslide sizes and runout distances is **possible, and is often unpredictable at any given site.**

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1973 B.Sc. University of B.C.

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