

An Evaluation of Debris Avalanches in the Central Cape Breton Highlands, Nova Scotia¹

P. W. Finck

Abstract

Debris avalanches are a complex failure involving components of rock topple, rotational slippage, translational sliding and flow with rates of movement from 0.5 to 30 m/s. Avalanches influence mineral exploration, mine development, forest harvest practices, the fresh water sport fishery and associated tourism.

Fifty-six avalanche events in the central Cape Breton Highlands were classified as: (1) low-mobility, (2) intermediate-mobility, (3) intermediate- to high-mobility and (4) high-mobility avalanches. The volume of debris increases from an average of 210 m³ per event in low-mobility avalanches to an average of 5300 m³ per event for high-mobility avalanches with a resulting increase in the impact on the river system where the avalanche debris is discharged.

Dendromorphological evidence indicates that the frequency of debris avalanches increased by 1000% between 1980 and 1991 compared to the time period 1925 to 1979. Budworm defoliation, root decay and loss of soil strength are the prime local triggering mechanisms for debris avalanches. There is no correlation between the incidence of avalanches and road construction, ground disturbance, increased runoff due to logging, or earthquake. Average critical slope angles of 40° and an increase in precipitation during April between 1980 and 1990 are regional controlling mechanisms of avalanches. Local trigger mechanisms initiate avalanches independent of the overall regional slope instability.

¹ Funded by Nova Scotia Department of Natural Resources under the Canada - Nova Scotia Cooperation Agreement on Mineral Development 1990-1992