

Hydrological impacts of mountain pine beetle infestation: potential for river channel changes

PHILIP M. MARREN¹, MARWAN A. HASSAN² & YOUNES ALILA³

*1 Department of Resource Management and Geography, The University of Melbourne, Parkville, 3010, Australia
pmarren@unimelb.edu.au*

*2 Department of Geography, University of British Columbia, 1984 West Mall, Vancouver, British Columbia V6T 1Z2,
Canada*

*3 Department of Forest Resources Management, University of British Columbia, 2424 Main Mall, Vancouver,
British Columbia V6T 1Z4, Canada*

Abstract Tree kill and salvage logging are profoundly changing the hydrology of mountain pine beetle-infested, snowmelt-dominated catchments. Baker Creek, located in the interior plateau of British Columbia, Canada, is in the heart of the infested region. This study relates observed and modelled changes in hydrology to geomorphic controls to predict the potential for channel change. Modelling using the Distributed-Hydrology-Soil-Vegetation-Model indicates that discharge is highly sensitive to tree kill and salvage logging, with increases of 65–100% possible. It was found that low-gradient reaches typical of the interior plateau are likely to be relatively insensitive to channel change, but will become significant sediment stores as sediment is mobilized elsewhere in the catchment. Higher gradient reaches, which typically occur where interior rivers incise to meet the Fraser River, are more susceptible to change. A geomorphic threshold classification was able to identify change channel thresholds. Salvage harvesting scenarios exceeding 40% cause some reaches to cross stability thresholds, with the potential for significant changes in channel morphology.

Key words salvage harvesting; fluvial geomorphology; channel stability; Shields number; British Columbia, Canada