

## **Beetle studies investigate effects on forest hydrology**

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In many areas of British Columbia, the mountain pine beetle epidemic will kill enough trees to significantly change forest hydrology.



Submitted photo:

**Clear cuts as a result of removing trees killed by Mountain Pine Beetle infestation are becoming ever more present in British Columbia.**

Research into riparian management, salvage harvesting, and rehabilitation processes can help assess the potential impacts of these changed natural water systems on reforestation, aquatic ecosystems and public health.

As few studies to date have examined this concern, Natural Resources Canada's mountain pine beetle program launched a series of integrated projects to fill the knowledge gap.

Hydrology is the science dealing with the occurrence, circulation, distribution, and properties of the waters of the earth and its atmosphere.

The Federal Mountain Pine Beetle Program is investigating the impact of beetle attack on reforestation, aquatic ecosystems, and public health to assess best riparian management, salvage harvesting and rehabilitation practices.

Collectively, the studies will generate a suite of models designed to examine the effects of large-scale tree mortality on forest hydrology – a complex phenomenon further complicated by British Columbia's diverse ecosystems.

"The results will allow forestry managers to evaluate the relative impact of projected hydrological change within forest stands and across forest landscapes," says the program's Chief Implementation Officer Dave Harrison (daharris@pfc.cfs.nrcan.gc.ca).

Healthy forests regulate water through interception of precipitation and groundwater flow, and through transpiration. These processes inhibit snow melt, and pump water and nutrients through the soil and back into the atmosphere.

However, after extensive beetle attack, water and nutrients ordinarily absorbed by trees can raise the water table and increase net flow of water into rivers and streams.

Such an unbalancing may, in the short term, damage river channels and destabilize slopes, and, in the long term, alter the soil conditions necessary for reforestation.

Researchers from the University of British Columbia, the University of Northern British Columbia, the British Columbia Ministry of Forests and Range, and the Canadian Forest Service are investigating a range of beetle impacts on hydrology, including how much dead wood is entering and potentially altering flow hydraulics and channel shape—changes which could upset aquatic habitats and fish-egg incubation processes.

Other studies are examining the effects of changes in hydrological systems on ablation—the reduction in volume of glacial ice by thaw and evaporation—as well as hydrological affects of salvage harvesting, reforestation, and watershed revival.

Two additional studies will add to the model matrix. One examines the effects of increased pulse, or water influx, at the stream-release point.

The other will correlate detailed hydrological information collected 20 years ago in the Bowren Lakes watershed following a large-scale insect outbreak with present conditions. When finished, it will provide the basis for an evaluation framework of hydrological change within areas impacted by mountain pine beetle and subsequent harvesting operations.

Order a copy of Review and synthesis of potential hydrologic impacts of mountain pine beetle and related harvesting activities in British Columbia, Mountain Pine Beetle Initiative Working Paper 2005–23, from the Canadian Forest Service online bookstore ([bookstore.cfs.nrcan.gc.ca](http://bookstore.cfs.nrcan.gc.ca)) for details on possible mountain pine beetle-related hydrological effects.

For more information on Natural Resources Canada's mountain pine beetle research and programs, visit: [mpb.cfs.nrcan.gc.ca](http://mpb.cfs.nrcan.gc.ca)

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