

# Forest Health

by Andrew Fall, PhD.

## Landscape-scale Forest Management and the Mountain Pine Beetle

The mountain pine beetle (MPB) has killed much of the mature lodgepole pine over an area of approximately 9 million hectares in BC in recent years. This major event has widespread implications for current and future forest management, ranging from effects on timber supply and operations, to impacts on wildfire urban interface, wildlife habitat, and aesthetics.

Three primary MPB management strategies in forestry include prevention, direct control, and salvage. Preventive management is used when beetles are at or below endemic levels and managers have the opportunity to be proactive in making trees, stands, and landscapes less susceptible to large infestations. Direct control is used when an infestation is underway and management efforts are reactive and primarily directed at killing beetles in order to reduce population size and spread. Salvage occurs either post-outbreak or during outbreaks that are too large for effective control.

Effective forest management planning requires information on which to base resource allocation decisions and expectations (eg.

allowable harvest levels, fell and burn budgets, focus of harvest treatments, access to infested trees). Landscape-scale risk information ranges from the location and severity of infested trees and susceptible stands to estimated trends and impacts.

To examine the main outbreak in BC, we developed an empirical projection model, BCMPB, to forecast possible impacts over the entire province for the next 20 years. We utilized 7 years of infestation history collected through the Provincial Aerial Overview of Forest Health and a seamless spatial dataset for the entire province (forest cover, physical environment, and management). Based on recent infestation mapping we estimated that approximately 25% of the merchantable pine volume in the province was observed to be dead (red or grey crowns) during the summer of 2005 (Figure 1). Because trees killed during the summer cannot be detected through aerial surveys (their crowns are still green) we relied on the projection model to estimate that an additional 10% of the pine volume was killed during that summer. We projected that by 2010 over 60% of the merchantable pine

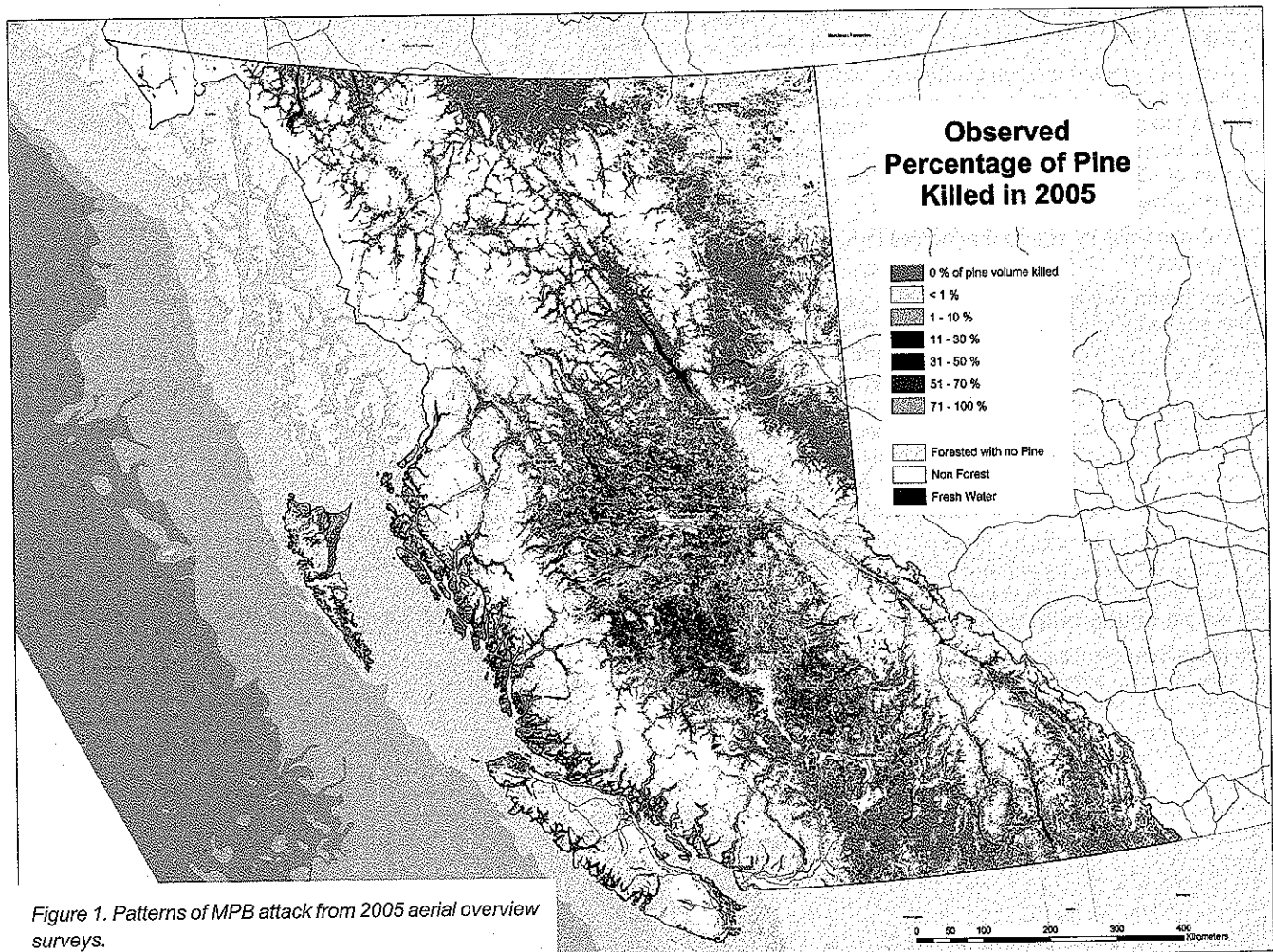


Figure 1. Patterns of MPB attack from 2005 aerial overview surveys.

volume in the province will be observed as dead and that by 2013, when the infestation will have largely run its course, 80% of the merchantable pine volume will be killed (Figure 2). Further maps of the input data and the projections can be found at [www.for.gov.bc.ca/hre/bcmpb](http://www.for.gov.bc.ca/hre/bcmpb).

The results of the projection have helped increase awareness about the severity of the problem and the limited opportunities for direct control, and have been used to help direct funding for control efforts to examine the impacts of the forest management response on the transportation system, and to investigate the possibility of developing a bio-energy plant in the most severely affected area.

The MPB has also been increasing in the boreal forest of Alberta, and poses a risk to the jack pine stands of central Alberta and

Saskatchewan. To date, the management response of Alberta has been to identify and remove (by fell and burn) as many newly attacked trees as possible. We have been examining the spatial pattern and connectivity of susceptible host stands to identify the degree to which stands are linked to infested areas in BC and western Alberta, and to integrate work on climate-related expansion of the MPB range. Our goal is to help forest managers prioritize harvest in pine stands to reduce overall landscape scale risk.

In areas of central BC where the outbreak has largely run its course, the management focus is on salvage and post-salvage timber supply. In conjunction with the BC Forest Service, we have incorporated the results of the BCMPB projections into a forest estate model to assess timber supply impacts and

to explore uncertainties regarding the shelf life of standing dead wood, regeneration, the potential of residual trees (understory and non-pine canopy trees), and salvage options. This analysis will be used to help the chief forester of BC set allowable harvest levels.

The unprecedented MPB outbreak in western Canada requires novel approaches to forest management. Decision-support tools may provide information to assist managers in making appropriate decisions for reducing landscape-scale risk or post-outbreak re-planning.

Andrew Fall is president of Gowland Technologies Ltd. and an adjunct professor in Resource and Environmental Management at Simon Fraser University. Acknowledgement is made to T. Shore and B. Riel (CFS) and M. Eng for collaboration on the projects cited, and for funding from the MPB Initiative of the Canadian Forest Service and the BC Ministry of Forests.

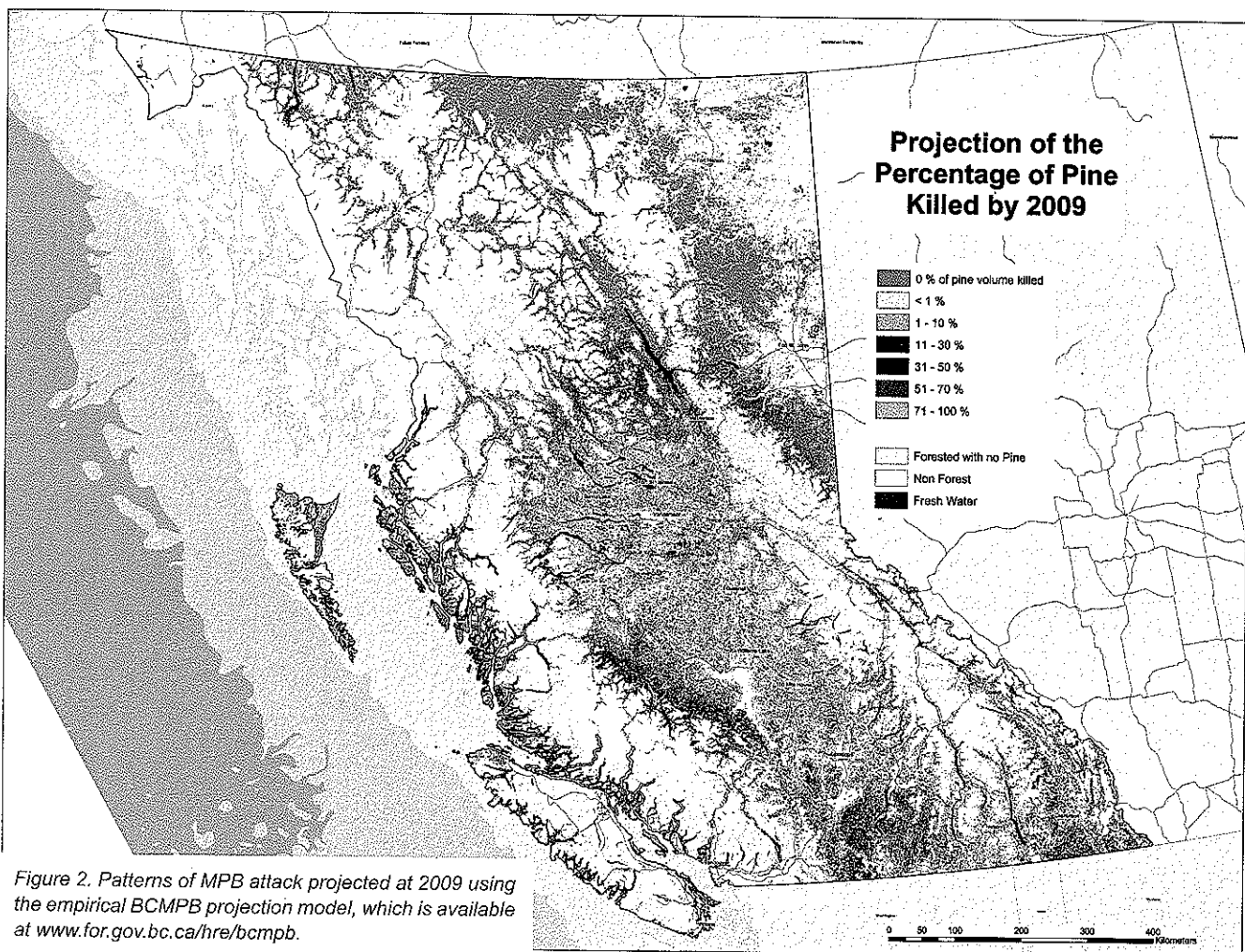


Figure 2. Patterns of MPB attack projected at 2009 using the empirical BCMPB projection model, which is available at [www.for.gov.bc.ca/hre/bcmpb](http://www.for.gov.bc.ca/hre/bcmpb).