

# An Overview of the Mountain Pine Beetle Initiative

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## Abstract

The abundant inventory of mature timber in Canadian forests is a mixed blessing. Mixed, because it attracts premium prices due to relatively outstanding performance characteristics (albeit increasingly mitigated by processing technologies) and low development costs, but the mature age class makes these stands vulnerable to a variety of forest health threats. Securing the wealth in publicly owned forests requires investment in effective monitoring and delivery in controlling a host of forest pests. This paper discusses emergence of the mountain pine beetle to epidemic proportions in British Columbia, outlining the major factors contributing to this epidemic and the federal government's efforts to assist British Columbia in responding to the epidemic.

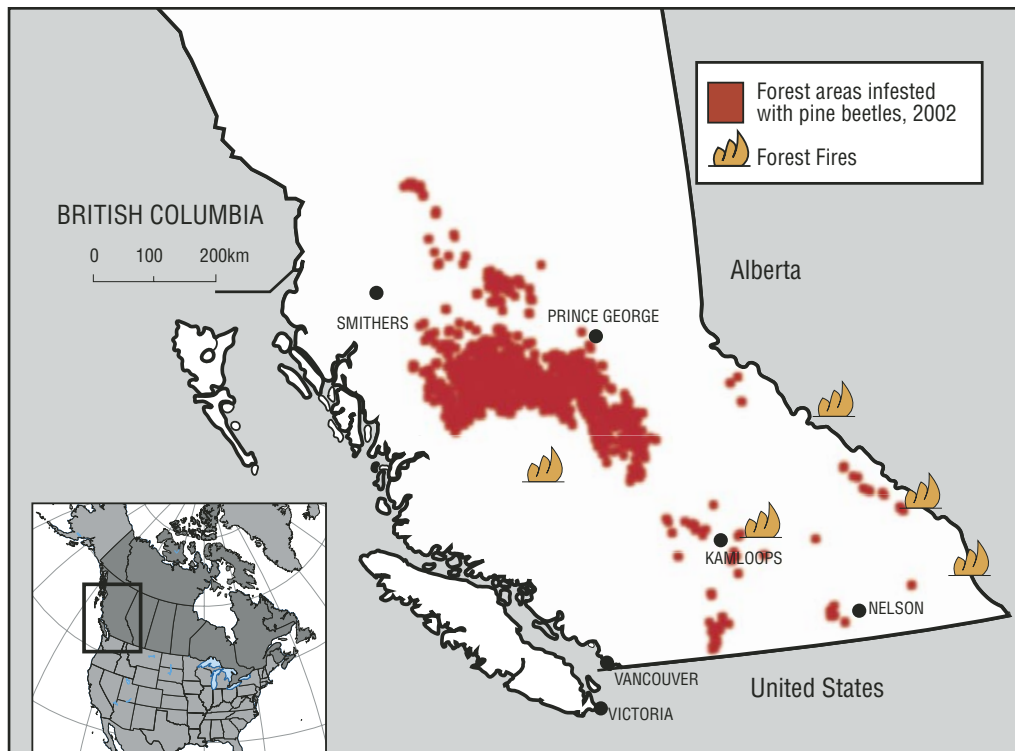
## Introduction

The mountain pine beetle (*Dendroctonus ponderosae* Hopkins) is endemic to western North American lodgepole pine (*Pinus contorta* Dougl.) forests and is an integral component of these forested ecosystems (Safranyik, 1978; McMullen et al. 1986; Koch, 1996;). Unfortunately, the standard system of checks and balances within certain ecosystems appears to have become destabilized in the current mountain pine beetle epidemic in west-central British Columbia (BC). The scale of the infestation, spread across an estimated 4.2 million hectares of forestland, rivals that of any natural forest pest recorded in North American forests.<sup>1</sup>

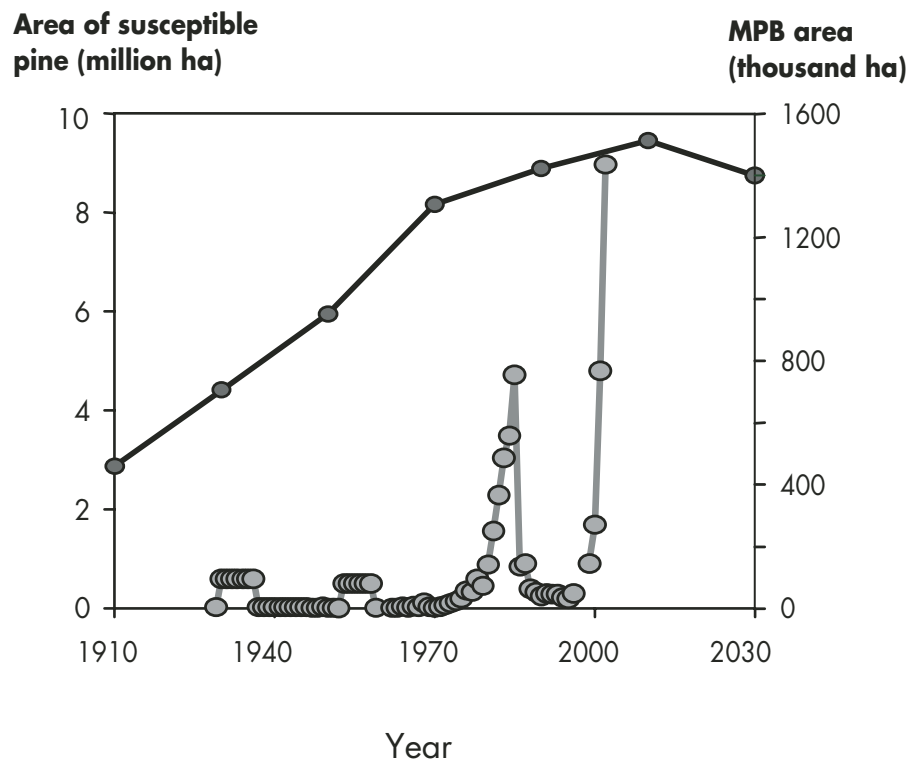
Key factors held to have altered the lodgepole pine (Pl) ecosystem equilibrium are the public policy on containment of forest wildfires for much of the past half-century and a moderating trend in temperature extremes. Historically, Pl ecosystems are a product of beetle and fire events interacting to produce an age class mix across the landscape. In an eerie fashion, the 2003 fire season in BC worked around the beetle attack (Fig. 1).

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<sup>1</sup> This estimate is based on the aerial survey results of post-2002 beetle flight. The 2003 flight is expected to add considerably to the area of infestation – perhaps doubling the current estimate.



**Figure 1.** Beetle attack and fire zones – 2003.



**Figure 2.** Trends in Pl inventory (black line) and estimated mountain pine beetle (MPB) infestation area (gray line). (Source: Taylor and Carroll 2004.)

Fire control and relatively benign weather combined with a series of major fires in the early 1900s to produce a large inventory of mature PI (Fig. 2). This large inventory, the ideal food source for mountain pine beetle, and a reduced frequency in cold temperature events required to knock back beetle populations to endemic or to incipient levels has led to the current epidemic.

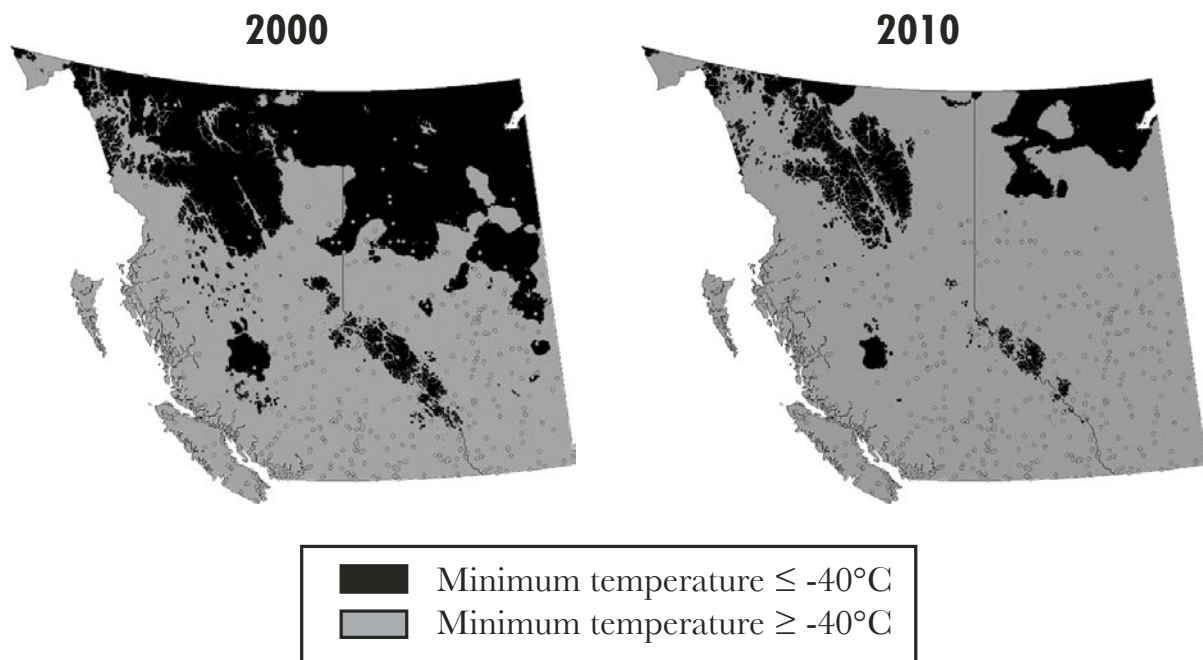
Vulnerability to mountain pine beetle attack increases markedly with timber age class and BC's PI forests are largely mature stands (Table 1). It is estimated about 70% of BC's PI inventory is vulnerable to mountain pine beetle – about 1 billion cubic metres of timber. Additional confounding factors to the epidemic include a lack of early direct beetle control and a large number of inaccessible beetle “hot-spots”.

**Table 1.** Age class and mountain pine beetle vulnerability.

Years	MPB Risk Factor
$\leq 60$	0.1
61 – 80	0.6
$\geq 81$	1.0

Source: Shore and Safranyik 1992, Canadian Forest Service  
(MPB = mountain pine beetle)

It is clear this current epidemic will serve to alter the fundamental structure and performance of BC's interior forestry. In the absence of a beetle-killing cold weather event, the bulk of mature PI within the historical range of the mountain pine beetle will be hit within the next five years. Based on weather trends and global circulation models (a key analytical tool in climate change research), the probability for such a beetle-kill event is not high (Fig. 3).



**Figure 3.** Climate patterns and forecast: 2000 versus 2010. (Source: Régnière et al. 2003)

It is important to recognize, given the current scale of the epidemic, that even with a major cold-weather event producing the beetle mortality rates necessary to cause population collapse, the timber supply, community stability and environmental character of interior forest ecosystems will be greatly affected. Thus, the sector and the region are facing major changes in the medium to long term. A comprehensive and rigorous examination of the impacts and options can reduce the unnecessary loss resulting in responding to these changes.

## **The Mountain Pine Beetle Initiative – What is it?**

The provincial government requested federal assistance in responding to the mountain pine beetle epidemic, and in October 2002, the federal government announced the Mountain Pine Beetle Initiative (MPBI) within a suite of federal programs intended to assist the forest sector<sup>2</sup>. The federal program response is consistent with the content contained in the provincial request. One exception is the federal government is not providing assistance for forest rehabilitation on provincial Crown lands. Investing to secure the value of provincial forests remains the responsibility of the landowner and licensees.

The MPBI is a six-year package of programs with a total budget of \$40 million. The objectives are to reduce the impacts of the current mountain pine beetle epidemic and to reduce the risk of future beetle epidemics. The Initiative includes the following programs:

- Mountain Pine Beetle Epidemic Risk Reduction and Value Capture Research and Development;
- Federal Forestlands Rehabilitation Program; and
- Private Forestlands Rehabilitation Program.

## **Land-Based Programs**

At the operational level, the MPBI is designed to assist private forestland owners and federal forestlands in response to beetle infestations. The federal element works with First Nations reserve lands, the Chilcotin Military Reserve and the Dominion Coal Blocks in an effort to control beetle spread and on the rehabilitation of beetle-killed federal forestlands.<sup>3</sup> Content in the private and First Nations program elements is developed in collaboration with advisory committees drawn from the respective stakeholders (for program details see [www.mpbi.cfs.nrcan.gc.ca](http://www.mpbi.cfs.nrcan.gc.ca)).

A third federal forestlands element focuses on the federal parks in the Rocky Mountains. This world heritage area has mountain pine beetle infestations and an abundance of mature lodgepole pine. These protected areas afford an opportunity to research aspects of beetle attack, control and impacts not available in forests elsewhere. Forest health challenges are indifferent to institutional boundaries and research related to beetle surveillance, monitoring, risk management decision-support systems and control are being deployed and tested in the national parks. One program element objective is to demonstrate beetle management options to managers of other protected areas.

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<sup>2</sup> The major focus was to assist the sector in response to a U.S. trade action on softwood lumber imports. The package now includes MPBI; the Canada Wood Export Program; the Softwood Industry and Community Adjustment Fund; and the Value-added Research Initiative for Wood Products.

<sup>3</sup> The Chilcotin Military Reserve lands total about 40,000 ha and are located near Williams Lake. The Dominion Coal Blocks total about 20,000 ha in two main blocks and are situated in southeastern British Columbia.

## Research Program

The scale of the current beetle infestation overwhelms any direct control in heavily infested areas; at least any acceptable form of control. The mountain pine beetle will work through a major volume of BC's mature Pl. However, focussed research will provide information on the range of impacts, options to mitigate, and systems to reduce the risk of future beetle epidemics. The MPBI research program is a partnership among stakeholders which identifies information needs and develops this information through research.

MPBI research is intended to deliver a strategic response to the beetle epidemic in pursuit of the Initiative's two objectives: reducing the impact of the current epidemic and reducing the risk of future beetle epidemics. Research will address economic, ecological and social information needs. Following is a summary of the MPBI research agenda flowing from forestlands, harvesting, processing and marketing.

### Forestlands and ecosystems

This focus is on incorporating beetle risk into forestland management and determining the character of a post-beetle forest ecosystem. Key projects include:

- operational evaluation of beetle risk reduction through stand thinning;
- assessing beetle management implications at landscape levels;
- modelling beetle spread; and the consequences of climate change on beetle spread;
- assessing the potential for remote sensing techniques to improve forest health monitoring;
- integrating silvicultural control of mountain pine beetle with sustainable forest management objectives; and
- modifying existing fire risk-rating systems to better incorporate beetle disturbance and to upgrade control-burn models for fuel reduction use.

Reducing the risk of future beetle epidemic events, indeed most forest health shocks, will require effective monitoring, direct control at the incipient stage<sup>4</sup>, and forest landscape modification to increase species and/or age class diversity.

### Harvesting and processing

This focus is on examining:

- impacts of beetle-kill on timber quality;
- timeframe for harvesting "grey attack" timber;
- phytosanitary risks;
- impacts of increased beetle recovery fibre on pulping and panel production; and
- assessing the economic and socio-economic impacts of communities located within the beetle zone.

### Markets and Products

This focus is to provide information on beetle zone product performance and to assess potential options to utilize salvage timber. The lodgepole pine harvest, the dominant commercial species for the interior region, will increasingly include salvage timber characterized by high desiccation rates, increased sap and bluestain. Capture of lumber value from beetle zone timber is largely dependent on moving products into established export markets; primarily the United States, because the Japanese market, which has emerged as a significant export destination for interior lumber, has little tolerance for bluestain. Unfortunately, the

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<sup>4</sup> The infestation cycle is endemic population, incipient population, outbreak, and the outbreak collapse.

US market for Canada's softwood lumber is currently encumbered with a duty package near 28% and a rapidly appreciating Canadian dollar.

The capability to respond to the volume of beetle zone timber will be constrained by the ability to market timber in some form. There is a need to rigorously assess product options beyond traditional forest products.

The focus is on assessing the potential impacts of beetle salvage on established products and markets. In addition, research will be completed on non-traditional product options.

## Conclusions

It has been a tough year for BC. Events bring to mind the riders of the apocalypse – pestilence, drought, fire, and floods. The U.S. softwood lumber trade action compounds the impacts.

The suite of mountain pine beetle natural controls (i.e., host resistance, natural enemies, weather and competition for food and space) has been overwhelmed by the scale of the epidemic. Mountain pine beetle prevention tools (stand density management, species/age class mix, and harvesting at maturity) are under-deployed and direct management options (baiting/repellents, fall and burn, pesticides, mosaic burns, and harvesting) are of limited use, and very inadequate at an epidemic stage (Safranyik et al. 1974). As a consequence, mountain pine beetle will run through much of the mature PI stands in the heavily infested and threatened areas – short of a major mountain pine beetle-killing weather event.

The pest control focus might be best placed on new outbreaks, including other bark beetles actively chewing through stands elsewhere in BC. Competitive and over-supplied forest product markets rather than processing capacity will constrain efforts on fibre recovery from the beetle zone (Rogers 2001). The social and economic impacts can be expected in the medium to long term, after fibre supply and costs reflect beetle impacts on timber and “grey attack” shelf-life is expiring.

Post-beetle epidemic, Interior forests will be different, and the economic and social basis and structure for many of the region's communities will be challenged. There is no option in which this transition can be avoided. However, the transition can be improved via a thorough assessment of mountain pine beetle epidemic impacts and options to work with these. The Mountain Pine Beetle Initiative is a federal assist to delivering this necessary assessment.

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## Literature Cited

- Koch, P. 1996. Lodgepole Pine in North America. Forest Products Society. Madison, WI.
- McMullen, L.; Safranyik, L.; Linton, D. 1986. Suppression of mountain pine beetle infestations in lodgepole pine forests. Canadian Forestry Service, Victoria, BC. BC-X-276.
- Régnière J.; Logan J.; Carroll A.; Safranyik, L. 2003. Phenological modelling of climate change impacts on North American forest insects. Canadian Forest Service, Victoria, BC. *Unpublished*.
- Rogers, R. 2001. West central BC mountain pine beetle strategic business recommendations report. Report to BC Ministry of Forests, Resource Tenures and Engineering Branch.
- Safranyik, L. 1978. Effects of climate and weather on mountain pine beetle populations. Pages 79-86 in A. Berryman; G. Amman, R. Stark, and D. Kibbee, eds. Symposium proceedings: The theory and practice of mountain pine beetle management in lodgepole pine forests. April 1978, Pullman, WA. University of Idaho – Forest, Wildlife and Range Experiment Station.
- Safranyik, L.; Shrimpton, D.M.; Whitney, H.S. 1974. Management of lodgepole pine to reduce losses from the mountain pine beetle. Can. For. Serv., Pac. For. Cent. Tech. Rep. No. 1. 24 p.
- Shore, T.; Safranyik, L. 1992. Susceptibility and risk rating systems for the mountain pine beetle in lodgepole pine stands. Forestry Canada. Pacific and Yukon Region. Inf. Rep. BC-X-336.
- Taylor, S.; Carroll, A. 2004. Disturbance, forest age, and mountain pine beetle outbreak dynamics in BC: A historical perspective. Pages 41-51 in T.L. Shore, J.E. Brooks, and J.E. Stone (editors). Mountain Pine Beetle Symposium: Challenges and Solutions. October 30-31, 2003, Kelowna, British Columbia. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Information Report BC-X-399, Victoria, BC. 298 p.