



Mountain Pine Beetle Ecology Program

Research Theme No. 1 MPB Biology and Management

Importance of Research Theme

Understanding the various aspects of MPB biology, population growth and spread is necessary for managing beetle infestations effectively. Most of what we know about MPB biology stems from studies conducted in BC. Although there are several well documented endemic population of beetle in Alberta the current situation stems from in flights from BC in 2006 and 2009. Several anecdotal observations suggest that these new populations exhibit different behavior, infestation dynamics, and survival and growth patterns than in their native range. Alberta's forests are different to those in BC in terms of stand structure and they do not share a co-evolutionary history as observed in BC. In addition, Alberta's climate differs from the interior BC or USA where outbreaks have mostly been studied. Management tools employed in Alberta are mainly predicated on an understanding of beetle biology as observed in its historic range. It is yet unclear how these tools can be adapted to improve their relevance, accuracy and predictive power in Alberta's landscapes.

The efficacy of current management aimed at slowing the rate of spread of Mountain Pine Beetle infestation needs to be continually evaluated in order to manage prescriptions to suit changing conditions. Early detection and aggressive action are crucial for timely control of MPB populations. When populations are still small the chances of eradicating spot infestation are highest. Accurate detection methods are necessary for any management action.

Implications if information needs are not addressed

MPB biology, population dynamics and spread potential can have major implications for forest managers and the communities that depend on the forest industry. Harvest plans need to be adjusted to prevent beetles from spreading, new containment measures need to be taken to transport and store infested wood adding to processing costs. Where, when and how much harvesting is necessary for slowing the spread can be improved with more accurate spread models.

If the effect of current control actions cannot be measured it is difficult to be accountable to tax payers, to request more funding and to evaluate the merits of different strategies. When low populations are

missed it is more difficult to control them once they have grown into large epidemics. Forest industry may lose its immediate to mid-term timber supply. Communities may lose their main source of income and natural heritage. Drinking water supply may be jeopardized and wildlife may lose critical habitat.

Economic, social and ecological benefits derived from addressing information needs

Government and industry will be able to make well informed decisions about managing the infestation. Detection of low MPB populations would enable early management action before populations grow, reducing the overall cost of control. Knowing when, where and how much to harvest will enable forest companies to stay in business and secure the future of the communities that depend on them. Understanding the growth and spread potential of MPB populations enables identifying risk to key forest values. Vulnerable watersheds can be prioritized for protection so drinking water quality is sustained. The people of Alberta will be able to enjoy the beauty of the forest. Wildlife will persist if its habitat is maintained and created for the future. Spread through the Boreal forest to other provinces of Canada might be prevented. Other provinces in Canada will be in a better position to manage MPB infestations as more knowledge becomes available.

Urgency of addressing information needs

Finding answers to priority questions is urgent as the window of opportunity for managing infestations is narrowing with populations growing across Alberta. Since large-scale management is conducted every year it is urgent to be able to evaluate its effectiveness at slowing MPB spread.

Early, rapid and accurate detection of beetle infestations are essential if containment and control of the beetle is to occur. Accurate detection of low level populations is most critical on the eastern and northern edge where MPBs are crossing the borders to SK and NWT. Knowledge on MPB survival and population growth in northern latitudes is increasingly critical.



Critical Questions¹

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1	What is the efficacy of current control measures applied to MPB in Alberta? (*)
2	Can a spread model that incorporates key resource modules and variables be developed that is applicable at multiple landscape scales and can accommodate influences of climate change?
3	a) What drives local and long distance beetle dispersal, promotes establishment and affects population dynamics in novel host environments? (*) b) Do indicators of stand susceptibility to beetle attack vary eastward and can they be exploited to curb expansion?
4	What are the critical thresholds in terms of population dynamics of beetles that can be defined and used to guide operational management of infestations in novel habitats?
5	Detecting populations of MPB at low densities is a critical step in managing the spread of MPB. Can baits and protocols for its placement with respect to endemic populations be developed and successfully deployed? (*)
6	What can we expect from secondary injurious insect populations following MPB attack? Should we be concerned about residual pine and other species?
7	Demonstrate how genomic science can be used and eventually adopted to support operational decisions for the management and control of MPB.

¹ Critical Questions denoted by (*) were addressed in a previous Call for Proposal, 2013.

