FIA-FSP

Forest Science Board

Mountain Pine Beetle Research

Eligible Research Topics 2007/08

September 2006

NOTE: Research related to MPB is supported through funding provided by the Government of Canada to the Province, and is administered separately from the regular FIA-FSP. This document identifies research topics and priorities that are eligible for funding only under this program.

Research topics eligible for funding under the regular Forest Investment Account Forest Science Program 2007/08 Call for Proposals are identified in two other documents--*Sustainability Program Eligible Research Topics 2007/08,* and *Timber Growth and Value Program Eligible Research Topics 2007/08*.

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Note: Numbering of topics corresponds to that of the Sustainability and Timber Program documents.

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Introduction

The research topics and priorities for Mountain Pine Beetle (MPB) funding described in this document serves as reference material to support the FIA Forest Science Program (FIA-FSP) Call for Proposals in September 2006.

Research related to MPB is supported through funding provided by the Government of Canada to the Province, and is administered separately from the regular FIA-FSP. Some priorities drawn from the priorities of the Sustainability and Timber Programs are described in general terms; only their application with respect to, and on areas affected by, MPB is relevant for funding under this program.

For research topics eligible for regular FIA-FSP funding, please refer to the *Sustainability Program Eligible Research Topics 2007/08*, and *Timber Growth and Value Program Eligible Research Topics 2007/08.*

Proposals for MPB research must be submitted using the appropriate proposal template, which is available on the PricewaterhouseCoopers website (www.bcfsp.com) under the Call for Proposals tab.

Note that this year only proposals for single-year projects are being considered for MPB research funding.

Research topics are organized by theme, and priorities within research topics are specified by geographic region. The regions used are those of the Ministry of Forests and Range: Coast (C), Northern Interior (NI), and Southern Interior (SI). A map showing these regions is available at: http://www.for.gov.bc.ca/mof/maps/regdis/

Sustainability Program Topics

Theme 1.0 Ecosystem structure, function and processes, and biodiversity related to forest management

Note that, in addition to other experimental approaches, research that utilizes variable-retention harvesting and/or alternative silvicultural systems as a treatment framework for experimental research will be considered eligible for funding in all topics in this sub-theme, and may be considered especially appropriate in some cases.

1.1 Riparian ecology and management of small streams

Small streams comprise the majority of total channel length in a stream network, and play a critical function in providing water, nutrients, sediment and energy to downstream reaches. Considerable uncertainty and controversy surrounds the impacts of roads, access management and forest harvesting around small streams, particularly in the requirements and specifications for riparian buffers. Priority areas for research in 2007/08 include:

	MPB research priorities for topic 1.1	C	N I	S I
c	Consequences of MPB salvage and management on riparian character and function of small streams and wetlands, and other aquatic habitats (e.g., channel morphology, stream temperature, organic matter dynamics). **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	

1.3 Coarse-filter approaches to maintaining biodiversity at the landscape scale

Maintenance of biodiversity at a broad scale is related to the maintenance of habitat attributes for a broad array of species using a "coarse filter approach" of allocating representative ecosystems across the landscape and providing connectivity between these patches. The scientific/technical basis for allocating these patches across the landscape is poorly established. A common theme or question is "single large or several small" (SLOSS) in reference to the trade-off inherent in distributing small patches across the landscape (potentially improving representation, but fragmenting the area) versus amalgamating patches into one large unit (thus providing relatively larger areas of undisturbed habitat that may be required by some species). The issue of scale further complicates this question in that different organisms require different areas of suitable habitat -- so what is a large patch for one species might only be a small patch for another. There is currently little authoritative information to guide selection of scale, amount, or distribution of desired habitats across the landscape, so different consultative processes in B.C. are prescribing different approaches. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 1.3	C	N I	S I
b	Can current management practices, such as MPB salvage operations and variable-retention harvesting, create or maintain structures and processes that are effective in maintaining key elements of biodiversity at landscape scales? **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	✓

1.4 Effectiveness of stand-level structures and habitat in maintaining biodiversity

Current stand-level harvesting practices in both old and immature stands include the retention of old-growth attributes and wildlife habitats such as green trees, wildlife tree patches, downed wood, riparian reserves, patches of residual advanced regeneration, and high stumps (created with feller-bunchers). In addition, silvicultural treatments may be used to create old-growth attributes in immature stands; for example: simulating advanced decomposition by halving and hollowing variable diameter logs or hollowing out stumps; creating openings by felling stems; inoculating stems with decay pathogens; thinning around stems; and fertilizing residual trees to encourage accelerated growth. The intent of these practices is to provide or maintain habitat at the stand level, thus enhancing stand-level biodiversity and contributing to landscape biodiversity over time. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 1.4	C	N I	S I
b	What are appropriate stand-level targets and configurations of stand-level structures in cutblocks in order to maintain biodiversity (e.g., in MPB attacked areas)? **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	✓
c	What are appropriate targets and configurations of stand level structures in dry forest and open range (grassland, shrubland) in order to maintain biodiversity? **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	✓
d	How effective are management strategies in creating stand-level structures and how effective are these in maintaining stand-level biodiversity, non-timber forest values and rangeland habitat? **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	✓
e	How do riparian buffers and their design contribute to maintenance of stand-level wildlife habitat and biodiversity (aquatic, upland and riparian)? **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	✓

1.5 Natural disturbance ecology

Natural disturbance ecology studies the role of events, such as windthrow, wildfire frequency and intensity, floods, landslides and insect and disease-caused tree mortality, on the structure, composition and/or function of ecosystems and the patterning of ecosystems on the landscape. The diversity of life in an ecosystem has co-evolved in response to the forces of natural disturbance. Maintaining biodiversity and ecosystem integrity requires that we understand the relationships between natural disturbance, ecosystem structure, composition and pattern, and habitat requirements of the organisms living in a given ecosystem. This will enable us to design and test human interventions in nature that are informed by an improved understanding of natural disturbance patterns and processes. In particular it will also enable us to understand the impacts of wildfire in severely effected MPB-killed stands and landscape. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 1.5	C	N I	S I
a	What is the dominant type, intensity, frequency, pattern, and scale at which historic natural disturbance (e.g. fires, wind, insect and disease infestations) occur in different areas of the province? What are the rates of tree mortality, tree fall down and tree decomposition for those dominant disturbances?			✓
b	To what degree can large areas of dead trees (e.g., killed by insects, disease or windthrow) meet resource management objectives?		✓	
c	Measuring the effectiveness of various approaches for managing for biodiversity, including emulation of natural disturbance patterns?		✓	✓
d	How do natural disturbance processes including gap creation affect forest regeneration, succession and wildlife habitat at landscape and site scales?		✓	✓
e	How do insects and disease affect structural and spatial diversity (including forest regeneration), wildlife habitat, and the occurrence of wildfire?		✓	✓

1.6 Watershed function

Forest practices can significantly influence the movement of water, sediment, woody debris, and energy through a watershed and ultimately influence streamwater quantity, quality and flow timing, as well as stream channel geomorphology and the quality of aquatic habitat.

Watershed processes are complex and many are still poorly understood, particularly in relation to the connection between upslope and stream channel processes. Relevant and effective research may be carried out at both watershed and site specific scales – in the latter case, providing there are ways to extrapolate results accurately to the watershed scale. Information obtained from studies of watershed processes will be used to build and improve watershed response models which in turn will assist decision-makers in selection of appropriate management regimes to meet objectives. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 1.6	C	N I	S I
a	Developing methods for landslide risk assessment and landslide avoidance.			✓
b	Evaluating the physical, biological and cumulative effects of forest management (incl. salvage harvesting), natural disturbance (e.g., fire, mass wasting, MPB), and range practices on watershed processes (e.g., streamflow quantity and timing, water quality, water table response), channel morphology, and aquatic habitat (e.g., salmon spawning grounds).	✓	✓	✓

Theme 2.0 Decision support tools for sustainable forest management

2.1 Habitat supply modeling

Habitat supply models are computer-driven tools that provide decision makers with information about the potential habitat-related impacts of various land use management options, including trends into the medium and long term. Habitat supply modeling research is generally needed to improve the interpretation of habitat values derived from forest-, landscape- and stand-level ecological attributes by identifying, evaluating and/or constructing habitat supply models relevant to flora and fauna in BC. Priority is to be given to those species or communities designated under the *Forest and Range Practices Act* and regulations as "at risk", and to non-timber forest products (NTFPs), as they affect forest management in MPB-affected areas. Four

additional species are considered to be of immediate concern in MPB-affected areas and will also be eligible for funding: Least Weasel, Red Crossbill, Olive Sided Flycatcher and Marten. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 2.1	C	N I	S I
a	Developing, calibrating and validating habitat models related to priorities identified in Section 1.0 (Ecosystem structure, function and processes,…), Section 3.2 (Thresholds...) and for decision support related to priorities in Section 4 (Species at risk,…). NTFPs may also be treated in this manner. **(Also eligible for regular FIA-FSP funding for projects not related to MPB. Please refer to the regular FIA-FSP eligible topics document for the Sustainability Program.)**		✓	✓

2.3 Watershed response

The effects on watershed processes of changes in hydrology are of immediate concern in MPB-affected areas. Decision support tools are required for exploring the spatial and temporal dynamics of watershed responses to the effects of forest harvesting and salvage operations and in areas left unsalvaged in MPB-affected areas. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 2.3	C	N I	S I
a	Developing, refining and validating spatially explicit watershed models that address the effects of forest development and natural disturbances on: peak flow, timing of flow, volume of flow, effect on critical aquatic habitat, effect on ground water, and water quality.		✓	✓

2.6 Ecological risk assessment frameworks

In the absence of adequate empirical information about the effects of MPB and MPB salvage harvesting on resource values and processes across the variety of BEC zones, reliance must be placed on modeling, projections and analysis to provide a basis for planning and management in the shorter term. Modeling of potential impacts and risk analysis relative to hydrological, geophysical and riparian resources is of particular relevance, and insights are needed urgently at both watershed and landscape scales. It is expected that this topic area will be informed by existing empirical information, and that models and analyses would be refined as additional empirical information becomes available. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 2.6	C	N I	S I
a	Developing frameworks and/or models for evaluating the resilience and sensitivity of ecosystems to change and disturbances, with emphasis on the hydrological, geophysical, and aquatic resources at the watershed and landscape scales.		✓	✓

Timber Growth and Value Program Topics

Theme 4.0 Timber losses to MPB

4.1 Stand and forest dynamics following MPB

Research aimed at understanding and quantifying how stands will develop following MPB attack. Basic research regarding post-attack stand dynamics and succession. Research under this topic may involve the use of growth and yield models, but should not be mainly about growth and yield model development. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 4.1	C	N I	S I
a	Quantification of stand and forest change and development following MPB attack and impacts on timber supply. Evaluating and estimating timber growth implications on residual trees and regenerated stands, in the understory and in clearcut openings. Includes species interactions related to the scale and pattern of harvesting.		✓	✓
b	Growth, development, and health of residual stands (overstory and understory) across a wide range of post-attack stand types and conditions (i.e., mixed species - salvaged; mixed species - unsalvaged; pine dominant - unsalvaged) in different BEC zones. Includes mitigating losses and determining the extent and intensity of MPB impacts on younger stands (e.g., 25-30-year-old plantations).		✓	✓
c	Mitigating MPB losses: silvicultural treatments and regimes, such as fertilization of non-lodgepole pine stands and treatment of repressed lodgepole pine stands, to accelerate operability and enhance mid-term timber supply.		✓	✓

Theme 8.0 Forest harvesting and engineering studies on salvaging MPB–killed timber

This topic includes forest engineering research aimed at enabling cost-effective and environmentally appropriate salvaging of timber killed by MPB. This topic does not include research related to manufacturing with timber killed by MPB, i.e., utilization of the MPB-killed logs after they reach the mill. Areas of research eligible for funding in 2007/08 include:

	MPB Research priorities for topic 8.0	C	N I	S I
a	Forest engineering studies relating to designing efficient, cost-effective, and environmentally appropriate methods of harvesting and hauling MPB-killed timber.		✓	✓
b	Studies to quantify the rates and amount of deterioration of MPB-killed timber for forest product use in relation to timber supply, harvest scheduling, and salvage operations.		✓	✓