

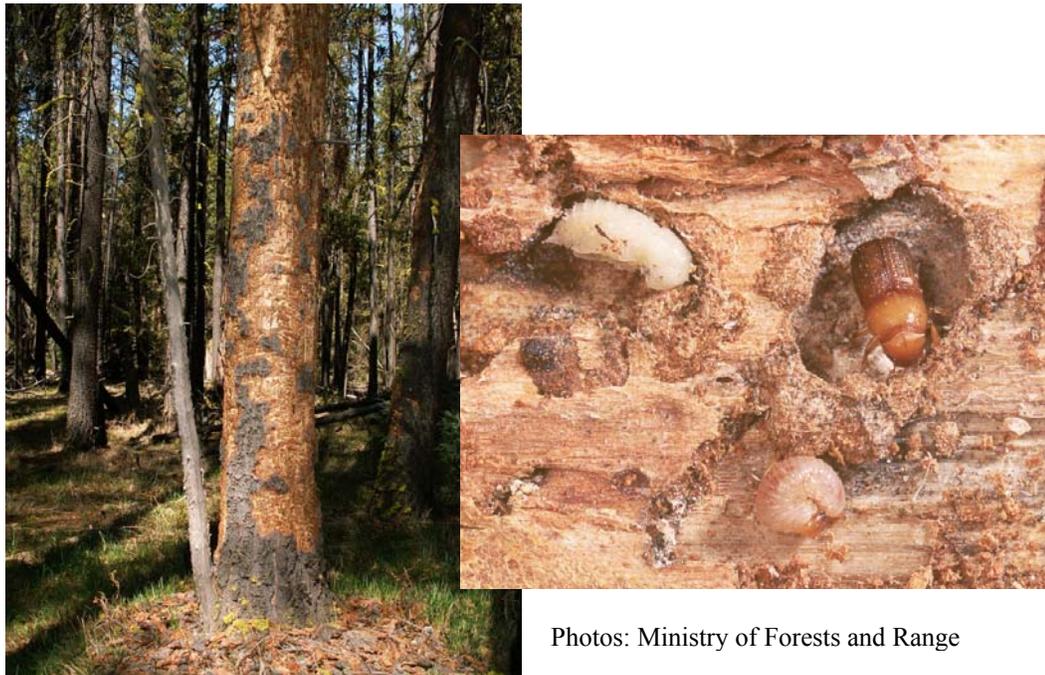
# An Assessment of Mountain Pine Beetle Implications to the Okanagan-Shuswap Land and Resource Management Plan

## Project Overview

### Introduction

The mountain pine beetle (MPB) is affecting British Columbia's forests in an unprecedented way. The impacts of the beetle create risk for land use plan values and compromise the ability to meet some of the plans' strategic direction (objectives and strategies).

The Integrated Land Management Bureau (ILMB) has recently completed a strategic assessment to determine whether mountain pine beetle is likely to impact the ability of society, government and plan stakeholders to achieve the Okanagan-Shuswap Land and Resource Management Plan's (OSLRMP) strategic land use plan vision, goals and objectives. The cumulative impacts of recent fires were also incorporated into the assessment, because fire has similar effects to MPB on forest stands. Currently, the ILMB is working to understand what actions need to be taken to conserve the long-term values and strategic direction identified in the plan. This document is part of an effort to communicate the changes, impacts, risks, and opportunities posed by mountain pine beetle in the plan area, as well as lay out possible next steps. These proposed next steps and potential management options will need to be explored by natural resource managers, First Nations, LRMP Monitoring Table representatives, other stakeholders and the public.



Photos: Ministry of Forests and Range

**Mountain pine beetles kill trees by burrowing in the living layer under the bark. These photos show an affected tree (left) and an emerging adult beetle as well as larva (right).**

## Current and Future Impacts of Mountain Pine Beetle

Fires and forest insects are natural disturbances that shape forests. However, forest managers have never seen such widespread changes to BC's forests like those being caused by the current MPB epidemic. Experts predict at least 80 percent of all mature lodgepole pine, as well as many of the less abundant pine species like ponderosa pine, will be killed before the epidemic runs its course. Vast areas of mature and old forest will be converted to young forest. The wildfires of 2002 and 2003 have had similar effects on forest stands, though on a smaller scale.

These major forest changes affect aquatic and terrestrial ecosystems in many ways. Mountain pine beetle (MPB) and fires affect ecosystems by changing water quality and quantity, altering timing of flows, shifting water temperatures, and changing sediment delivery to streams. Serious reductions in the amount of mature and old forest habitat, and decreasing connectivity of older forest habitat across landscapes can also occur. In addition to these direct impacts, indirect impacts can occur due to salvage harvesting. An example would be increased road access, associated with widespread salvage harvesting to recover the economic value of the dead and dying trees. Depending on the methods used, the impacts of increased road access and harvesting efforts include loss of valuable wildlife habitat, damage to understory regeneration and mixed species stands, and increased spring run-off that can harm aquatic values.



Photo: Ministry of Forests and Range

**Aerial photo from the Kamloops area, of beetle-affected forestry 'leave strips'. Extensive mountain pine beetle infestations such as these have negative effects on terrestrial and aquatic ecosystems. Forest harvesting to recover the economic value of the affected trees can increase these effects.**

Communities that rely on forest harvesting and wood processing will feel the effects of MPB when the current harvest upsurge begins decreasing. The forest industry currently has as much or more wood as it can harvest, but a shortage is expected once the MPB epidemic has run its course, the remaining dead trees no longer have economic value, and the long-term sustainable harvest level is known. Tourism and recreational activities could also be affected by MPB if viewscapes and trails are surrounded by dead pine, or if such stands are inappropriately salvage harvested.

The agricultural sector will likely feel the affects of mountain pine beetle – ranching opportunities will probably increase with the more open areas and road access created by MPB and associated salvage harvesting. Range managers will also need to deal with the loss of natural range barriers and cattle access into sensitive areas. Agriculture that relies on irrigation may also experience changes, as water quality and timing of spring runoff will be affected.

## Forecasted Impacts to Plan Values

In the Okanagan-Shuswap Land and Resource Management Plan area, 29 percent of the timber harvesting land base contains pine forests that will probably be affected by MPB, as well as a further 11 percent of mixed forests that include pine. Effects of mountain pine beetle on plan values were forecast using information on tree species and ages, and predicted mountain pine beetle spread. Effects on water-related values were measured using predicted ‘equivalent clearcut area’ (ECA, which is an indicator of changes to water run-off), while effects on other values were predicted using percent area affected – in other words, the percent of the resource management zone(s) in question that will be covered by dead pine stands.

The mountain pine beetle epidemic is well underway, and is predicted to run its course by 2020, though some forecasts indicate this may happen much sooner. Current forest conditions (ECA or percent area affected) and forecasts for 2010, 2015 and 2020 were shown on color-coded maps generated by a computer model. Using these maps, project consultants were able to predict the final effects of MPB on plan values, objectives and strategies. It is important to note that it is possible for OSLRMP objectives and strategies to be met while risk to values remain, and project consultants provided an interpretation regarding where this might happen.

Any additional effects of salvage harvesting (such as new roads) on plan values were not predicted beyond general comments on potential effects – it was not possible to include harvesting effects on specific areas at this strategic level. Additionally, salvage harvest planning is still underway. However, salvage harvesting of MPB-affected timber, as well as areas affected by wildfire, means that forest harvest levels were raised by 27% as of January 2006.

### Effects on Water and Fish

Of all the values in the OSLRMP, water-related values such as drinking water, flood control, and fish habitat are likely to be the most affected by mountain pine beetle. The large areas of the landscape that are or will be covered by dead pine trees will increase

**Community watersheds are highly affected and many will experience significant impacts to stream channels and flows.**

spring run-off, as the dead trees change snow melt and do not transpire water as do living trees. Roads that originate from salvage harvesting will also increase run-off, unless they are quickly decommissioned or carefully maintained. Increased run-off damages stream channels and lowers water quality. Once watersheds are affected in this way, recovery does not begin to happen for 10 to 20 years, with full recovery taking longer.

The modeling exercise done for this project showed nine community watersheds with a very high equivalent clearcut area, another eight with

a high ECA, and 34 further community watersheds with an ECA that exceeds the threshold beyond which hydrologic impacts become a concern. These predicted ECAs indicate high levels of impact to stream channels and flows.

In addition to community watersheds, all watersheds were assessed for their anticipated equivalent clearcut area, including watersheds for Fish Resource Management Zones (RMZs). In the plan area, effects of the MPB are greatest south and west of a line joining the south end of Shuswap Lake (including Salmon River), through the north end of Okanagan Lake, ending in the headwaters of the Kettle River. In this area, around half of the watersheds were modeled as having very high ECAs by 2020, with some showing extremely high ECAs. For Fish Resource Management Zones, the Okanagan basin Fish RMZs show modeled ECAs that may be of concern, with ECAs increasing moving south. A total of 16 Fish RMZs are predicted to have ECAs that create a moderate to high risk of damage to fish habitat by the time the MPB epidemic is complete.

***Many 'general' watersheds are also negatively affected, and 16 Fish RMZs are at moderate to high risk of damage to fish habitat.***

### **Effects on Biodiversity, Wildlife and Parks**

Old Growth Management Areas (OGMAs) are a primary tool for biodiversity management in the OSLRMP. In addition to being conservation reserves for older forest on the landscape (outside of Parks), they assist in delivering objectives and strategies for certain wildlife species dependent on older forests, and provide protection for rare ecosystems, viewsapes, and sensitive riparian corridors. OSLRMP objectives and strategies related to Old Growth Management Areas do not appear to be affected at this strategic scale of analysis. However a ground survey to confirm OGMA status is recommended. This appears to be a situation where OSLRMP objectives and strategies are met, while risks to values remain. At this strategic level of analysis, it appears that two landscape units (Pennask and Trout) are at high risk of loss of old forest biodiversity, and another three (Ashnola, Trepanier and Penticton) are or will become high risk. This means that there are likely to be extirpations (i.e. local extinctions) of some species that rely on older forest habitat, until old forest habitat recovers.

The OSLRMP describes numerous objectives and strategies for wildlife. An analysis was done for each species, and for most species, impacts will be low and/or the plan provides the flexibility for objectives and strategies to be met. For moose, it was difficult to assess risk at a strategic scale. The greatest potential impacts will be related to access, and moose survival is significantly linked to access management effectiveness. It is possible that moose populations will decline significantly because of issues related to access, even while objectives and strategies are being met. Elk will probably be significantly affected. Elk habitat already altered by recent fires is at further risk from spreading Mountain Pine Beetle infestations, and Elk RMZ objectives and strategies may be difficult to achieve beginning in 2010 or earlier.



Photo: Ministry of Forests and Range

**Riparian corridors and wildlife tree reserves are two ways of maintaining forest biodiversity and ensuring older forest habitats are connected and available across a landscape. Older forests and forest connectivity are threatened by the beetle outbreak.**

Parks and Protected Areas are significantly affected by the MPB, with half in the moderate to extremely high categories of percent area affected. Significant management challenges are predicted in attempts to maintain recreation, natural and cultural values within these areas, and particularly for those sites rated as having very high or extremely high percent area affected. However the OSLRMP objectives provide significant flexibility and it seems likely they will be met regardless of impact to individual sites. There may be some impacts or costs to grazing tenures within parks.

### **Effects on Communities, Visual Quality, and Recreation/Tourism,**

The computer modeling shows that the effect of MPB on the Community/Crown interface RMZ will be limited, as these areas are generally dominated by tree species other than pine. Plan objectives and strategies will likely be met. There may be site-specific impacts, which are better examined at a watershed level. Fire risk has been brought up as a concern in these areas close to communities, and this strategic-level analysis does not provide sufficient detail to address it.

Significant impacts to viewsapes are anticipated. Only Zone 1 was assessed, as this is the zone with the highest level of protection through Visual Quality Objectives (VQOs). However, the high degree of flexibility provided for in the plan means that Visual Quality Objectives are expected to be met.

Recreation objectives and strategies described in the plan may be difficult to meet in the coming years. There may be challenges meeting objectives that address access, trails, maintenance of values and coordinated planning, given the magnitude of projected impacts of pine beetle. Of particular concern is forest cover retention associated with Category A trails.

Tourism RMZs are expected to experience significant changes in viewsapes, and the results indicate that strategies for Visual Quality Objectives in Zone 1 will not be met. An initial review also suggested a problem with meeting objectives to maintain backcountry tourism, however the computer modeling suggests these objectives can be met. One backcountry zoned area (Crater Mountain-Cathedral-Snowy) is modeled as having significant impacts, but these impacts are likely to be consistent with what is allowed within the OSLRMP.

### **Effects of Forestry Roads on Plan Objectives and Strategies**

The harvest of MPB-attacked pine stands will necessitate the building of new roads, which in some areas will significantly increase road access and road densities. Access management and access impacts are addressed in objectives/strategies in most RMZs throughout the OSLRMP. In many, strategies recommend tools that can be used to address access risks but do not compel action. If extensive salvage proceeds without the use of tools recommended in the OSLRMP, OSLRMP objectives and strategies for values like water quality and fish will be placed at greater risk.

## **Management Options**

There are at least five options available to resource managers to increase the likelihood of meeting OSLRMP objectives/strategies, and to reduce risk to OSLRMP values. Each of these options has associated costs and benefits. These options may be best assessed after a review of OSLRMP objectives/strategies for intent, clarity and relevance, and some of these options can be applied simultaneously. These options are:

- 1) Maintain the current situation as is (no change to the OSLRMP or to sections of the OSLRMP);
- 2) Make minor strategic changes to the OSLRMP (e.g., revise wording) to maintain plan balance and relevance, and manage risk to plan values.
- 3) Make significant changes to the OSLRMP to address risk and changes posed by MPB and maintain plan balance and relevance;
- 4) Undertake minor initiatives outside the OSLRMP to sustain plan objectives, for example increase government coordination; and,
- 5) Undertake major initiatives outside the OSLRMP to sustain plan objectives, for example carry out coordinated harvest or access planning.

These scenarios are presented as a starting point to guide possible next steps.

As per options 2 and 3, OSLRMP values at high risk may be addressed through changing plan direction, or in some cases by removing or changing some objectives that can't be met. Other objectives may need to have their timeframe extended with interim objectives to take their place. Government will implement the direction set by the OSLRMP, and will choose which 'tools' to use (legal tools, policy direction, voluntary compliance) based on various factors, including the risk of non-compliance. In general, greater government coordination and assistance (options 4 and 5) could have a large positive effect on plan values at risk.

## Conclusions and Next Steps

Based on information provided through computer forecasts and interviews with agency representatives, it appears that some level of management action will be required to maintain the OSLRMP balance between economic, social and environmental values.

This strategic-level analysis identifies OSLRMP objectives and strategies that may not be met. However, the analysis describes risks and potential management solutions in broad terms. More information is required to understand and manage risk to some of the OSLRMP values and objectives/strategies, and to support minor or major changes to the OSLRMP. For example, assessment, planning and monitoring work would help guide management decisions for those community and other watersheds that are predicted to have equivalent clearcut areas higher than 25 percent by the year 2020. A ground survey of actual conditions in Old Growth Management Areas would also be extremely valuable. Better information will help decision-makers make the social choices regarding balancing levels of risk to water, fish, biodiversity and other OSLRMP values.

Potential next steps and management options need to be explored by natural resource managers, First Nations, LRMP Monitoring Table representatives, other stakeholders and the public. Tools for achieving the OSLRMP's strategic vision will need to be further developed prior to making any changes to the plan. Time is of the essence in proceeding with this work, as the MPB infestation is increasing in the southern interior along with salvage harvest planning to capture the economic value of the beetle-killed trees.

## Resources for More Information

Much more detailed information and maps for all the values assessed are available in the consulting report done for this project, which is entitled "*An Assessment of Mountain Pine Beetle Implications to the Okanagan-Shuswap Land and Resources Management Plan.*" This report is available from the ILMB by contacting either Rachael Pollard ([Rachael.Pollard@gov.bc.ca](mailto:Rachael.Pollard@gov.bc.ca)) or Terry Macdonald ([Terry.Macdonald@gov.bc.ca](mailto:Terry.Macdonald@gov.bc.ca)).

Much information has been developed regarding the mountain pine beetle and its effects in British Columbia. The provincial website for mountain pine beetle is:

[http://www.for.gov.bc.ca/hfp/mountain\\_pine\\_beetle/](http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/)

British Columbia's Mountain Pine Beetle Action Plan is found at the following link:

[http://www.for.gov.bc.ca/hfp/mountain\\_pine\\_beetle/actionplan/2005/](http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/actionplan/2005/)

Federal information and initiatives for MPB are found at the following link:

[http://www.pfc.cfs.nrcan.gc.ca/entomology/mpb/index\\_e.html](http://www.pfc.cfs.nrcan.gc.ca/entomology/mpb/index_e.html)