

Current Status of Mountain Pine Beetle in British Columbia

Tim Ebata

Forest Practices Branch, BC Ministry of Forests, PO Box 9513 Stn Prov Govt, Victoria, B.C. V8W 9C2

Abstract

Province-wide aerial overview surveys have been conducted in British Columbia by the Ministry of Forests since 1999 and earlier by the Forest Insect and Disease Survey, Canadian Forest Service. The results of the 2003 overview survey shows that the size of the mountain pine beetle infestation has doubled since 2002 increasing from 1.98 million ha to approximately 4.1 million ha and is now the largest infestation of mountain pine beetle ever documented. The greatest changes have occurred in the central interior plateau where the area infested increased by 4.3 times in the former Cariboo Forest Region. The outbreak is expected to continue unabated until the host is depleted or a lethal cold-winter event occurs.

Introduction

The B.C. Ministry of Forests has conducted an annual provincial aerial overview survey since 1999. Prior to 1996, overview surveys were conducted by the Forest Insect and Disease Survey unit of the Canadian Forest Service. The survey has documented the damage caused by the mountain pine beetle, *Dendroctonus ponderosae* (Hopkins), and many other disturbance agents. This report provides preliminary data on the mountain pine beetle infestation from the most recent compilation of the 2003 aerial survey. At the time of presentation at the Kelowna symposium, final survey results were not available but are now included in this report.

Methods

Fixed-wing aircraft are used for aerial overview surveying. Flights are conducted in the summer months preferably on clear days at an altitude of about 1000 m and at an airspeed of about 175 kph. If the terrain is generally flat, the survey follows a grid whose swath width varies depending on the intensity of damage present. Mountainous terrain is flown along contours. Two mappers are seated so observations are made from both sides of the aircraft at one time. Sketch mapping records damage in one of two ways: as spot (point) infestations varying in size from 1 tree to 50, or as polygons which are larger patches of mortality and defoliation that are assigned a damage severity class. The severity classes for mortality are: Light (1-10% of the stems within the polygon), Moderate (11-30%), and Severe (30%+). The points and polygons are drawn on customized 1:100,000 maps that use recent LANDSAT 7 black and white images

Mountain Pine Beetle Symposium: Challenges and Solutions. October 30-31, 2003, Kelowna, British Columbia.

T.L. Shore, J.E. Brooks, and J.E. Stone (editors). Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Information Report BC-X-399, Victoria, BC. 298 p.

as a base that are overlaid with other information that aid in navigation (i.e., roads, place names, recent cutblocks, contours, etc.). The flight lines are tracked using a hand-held GPS receiver (Garmin II+) that is capable of recording positions at user specified time intervals. A spatial file is downloaded from the receiver and serves as a digital record of the survey progress (Fig. 1).

Once completed, the rough sketch maps from each observer are consolidated onto a final sketch map that will be digitized. Digitized data is checked for errors and omissions and then forwarded electronically in GIS file formats to the provincial data roll-up contractor to be stitched together with maps from other surveyors. The final product is a provincial coverage containing point and polygon data for all detected damaging agents for the year. The spatial data is tabulated and summarized by Region, District, and pest and included into the Ministry of Sustainable Resource Management's Land and Resource Data Warehouse (LRDW) where it becomes accessible province-wide to those granted access, and may be viewed using an ArcIMS web map viewer developed specifically for displaying this forest health information. Data summaries and maps, along with links to historical data and the overview data collection standards, are posted on the Ministry of Forests Aerial Overview Survey web site.

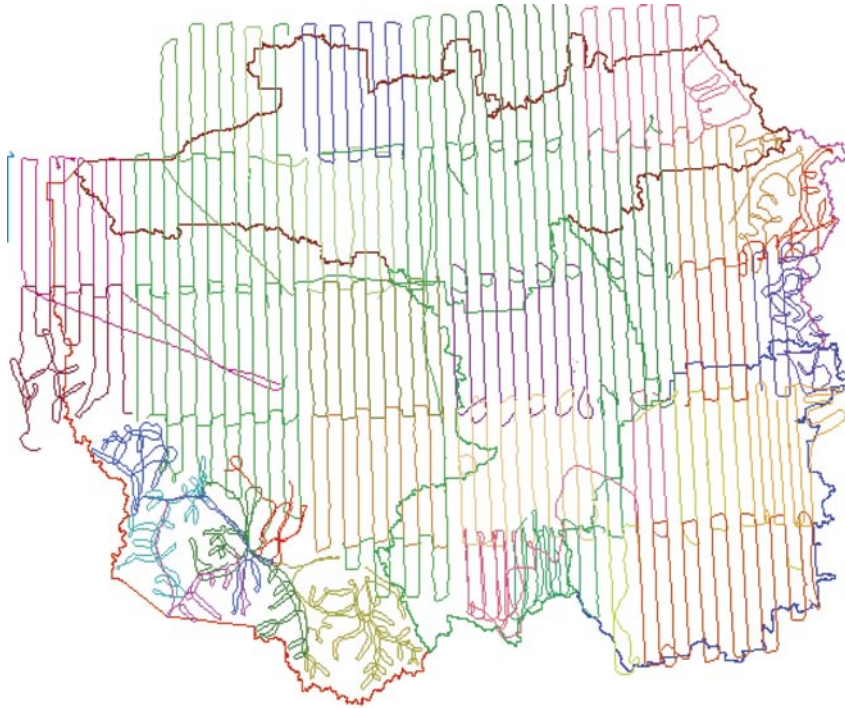


Figure 1. Example of GPS track record for the 2003 overview survey of the former Cariboo Forest Region. Different coloured lines indicate different survey dates. Note the variation in flight lines between flat (grid pattern) and mountainous (contour) topography.

Results and Discussion

Area of damage caused by the mountain pine beetle increased from 1.98 million ha in 2002 to about 4.1 million ha in 2003. This increase represents an increase in area of approximately 2 times and is the largest area ever recorded of damage caused by the mountain pine beetle. Table 1 summarizes the area attacked by the beetle in the three Forest Regions for all forested lands excluding national parks. Comparing regional data from 2002 and earlier, with 2003 data requires the earlier data to be consolidated following the amalgamation of six regions into three in April 2003. The Northern Interior Forest Region is

comprised of the former Prince George and Prince Rupert Forest Regions (minus Robson Valley and North Coast Forest Districts). The Southern Interior Forest Region now contains the former Nelson, Cariboo and Kamloops Forest Regions plus the former Robson Valley Forest District. The Coastal Forest Region is nearly identical to the former Vancouver Forest Region with the addition of the North Coast Forest District.

Table 2 and 3 separate these data into damage occurring within and outside of the boundaries of Provincial parks. Non-park lands include all forested vacant crown land, Tree Farm Licences, woodlots, community forests, private land, federal lands, and other tenured land in timber supply areas. Non-park lands include both areas designated in the Timber Harvest Land Base (THLB) and Non-Timber Harvest Land Base (NTHLB).

Table 1. Provincial forestland infested by mountain pine beetle in BC in 2003. The change in area since 2002 is also provided.

	Area (ha)			Total	Change since 2002
	Light (1%-10%)	Moderate (10%-30%)	Severe (30+%)		
Coast	87,773	51,946	75,051	214,770	1.2 X
NIFR	674,434	317,285	439,893	1,431,612	1.2 X
SIFR	1,845,981	382,571	191,869	2,420,421	4.1 X
Provincial Total	2,608,188	751,802	706,813	4,066,803	2.8 X

Table 2. Area infested by mountain pine beetle in B.C. in 2003 in provincial parks.

	Area (ha)			Total
	Light (1%-10%)	Moderate (10%-30%)	Severe (30+%)	
Coast	81,183	48,312	72,731	202,225
NIFR	148,361	83,681	88,248	320,290
SIFR	67,537	9,814	8,900	86,252
Provincial total	297,081	141,807	169,879	608,767

Table 3. Area infested by mountain pine beetle in B.C. in 2003 on non-park forest land.

	Area (ha)			Total
	Light (1%-10%)	Moderate (10%-30%)	Severe (30+%)	
Coast	6,591	3,634	2,320	12,545
NIFR	526,073	233,604	351,645	1,111,318
SIFR	1,778,444	372,757	182,969	2,334,170
Provincial total	2,311,108	609,995	536,934	3,458,033

Tables 4, 5 and 6 show the distribution of damage by the new Forest Regions sub-totaled by the former Forest Regions to help compare damage from previous years. When separated into former Regions, differences in the expansion rate of mountain pine beetles become more obvious. The most southern Districts actually show a slight decrease in area infested. However, it is likely that the overall number of trees killed has increased, causing an intensification of damage covering a similar area. The rate of expansion is limited in these Districts due to past outbreaks and a smaller area of susceptible lodgepole pine. The greatest increases in area affected occurred in the former Cariboo Forest Region, now part of the Southern Interior Forest Region. The changes occurred when small spot infestations mapped

in 2002 expanded into light infestations covering entire stands. The outbreak has intensified in the Quesnel Forest District and has expanded across the remaining mature pine stands in the Chilcotin Forest District, Central Cariboo District (formerly Horsefly and Williams Lake) and threatens to engulf the 100 Mile Forest District. Ongoing outbreaks near Kamloops may expand into neighbouring drainages where beetle suppression activities have been concentrated.

Table 4. Area infested by mountain pine beetle in 2003 in the Southern Interior Forest Region with the change in area since 2002.

Region	Area affected (ha)			Total	Change
	Light (1%-10%)	Moderate (10%-30%)	Severe (30+%)		
Cariboo					
Non-Park	1,752,472	346,792	163,635	2,262,900	4.3 X
Parks	65,841	7,354	7,714	79,307	5.4 X
Total	1,818,313	354,146	171,349	2,342,207	4.3 X
Kamloops					
Non-Park	21,966	15,883	7,996	45,845	1.3 X
Parks	720	1,645	388	2,753	1.3 X
Total	22,686	17,528	8,384	48,598	1.3 X
Nelson					
Non-Park	3,620	9,875	11,190	24,685	1.2 X
Parks	72	483	1,896	2,452	1.7 X
Total	3,692	10,358	13,086	27,137	1.2 X
SIFR Total	1,844,690	382,032	192,819	2,417,942	4.0 X

Table 5. Area infested by mountain pine beetle in the Northern Interior Forest Region in 2003 with the change in area since 2002.

Region	Area affected (ha)			Total	Change
	Light (1%-10%)	Moderate (10%-30%)	Severe (30+%)		
Prince George					
Non-Park	418,740	186,404	231,153	836,297	1.4 X
Parks	25,430	17,863	47,046	90,339	1.3 X
Total	444,170	204,267	278,199	926,636	1.5 X
Prince Rupert					
Non-Park	107,719	47,407	120,638	275,764	1.0 X
Parks	123,835	66,149	41,706	231,691	1.0 X
Total	231,554	113,556	162,344	507,455	1.0 X
NIFR Total	675,724	317,823	440,543	1,434,091	1.2 X (1.2 out, 1.0 in Parks)

Table 6. Area infested by mountain pine beetle in the Coastal Forest Region in 2003 with the change in area from 2002.

	Area affected (ha)			Total	Change
	Light (1%-10%)	Moderate (10%-30%)	Severe (30+%)		
Non-Park	6,591	3,634	2,320	12,545	0.7 X
Parks	81,183	48,312	72,731	202,225	1.3 X
CFR Total	87,774	51,946	75,051	214,770	1.2 X

In the Northern Interior Forest Region (Table 5), the overall infestation size increased by 1.2X since 2002. The area infested outside provincial parks increased by 1.3X as compared to 1.0X within the parks. Increases in area affected were predominantly seen in the former Prince George Forest Region concentrated within Vanderhoof, Prince George and Ft. St. James Forest Districts. Infestations in the former Prince Rupert Forest Region remained relatively unchanged in size from 2002. The infestation's growth may be slowing due to intensive management, natural factors, or because the infestation has intensified within the same areas. Further analysis is required to determine if any of these factors explain the minimal change in infestation size.

In the Coastal Forest Region, mountain pine beetle is restricted to three Forest Districts – Mid-Coast (now North Island – Central Coast), Squamish, and Chilliwack Forest Districts. The Mid-Coast Forest District includes the southern half of Tweedsmuir Provincial Park, which contains more than 200,000 ha of infested pine. The Squamish and Chilliwack Forest Districts have relatively small but active mountain pine beetle populations that are limited by the availability of susceptible lodgepole pine. The 3,670-ha infestation north of the resort village of Whistler has received some media attention due to its potential to increase the risk of fire damage to the site of the 2010 Winter Olympic games.

At this time it is highly probable that the area infested will increase in 2004. The magnitude of the increase is difficult to predict, but a doubling of the current area to over 8 million ha is possible given previous years' trends. However, if the infestations intensify rather than spread, the area affected will be less than 8 million ha. This province-wide outbreak will only be slowed or stopped when the host has been depleted or by a cold weather event of temperatures reaching -40°C for at least one week. Management efforts are being directed toward suppressing small populations on the periphery of the outbreaks, but these measures will only buy a limited amount of time unless the outbreak-ending cold weather event occurs.

Conclusions

Mountain pine beetle infestations continue to expand throughout BC. The central interior plateau is the most heavily affected, but infestations in the Kamloops area are also problematic. Opportunities to slow the expansion and suppress small infestations are becoming limited, although it is still possible in the northern districts and on the periphery of the larger outbreaks.

Acknowledgments

I would like to acknowledge the assistance of the following staff and contractors who participated in this year's overview survey: Kevin Buxton, Lorraine Maclauchlan, Leo Rankin, Don Heppner, Ken White, Robert Hodgkinson, Joan Westfall (Entopath Management Ltd.), Jason Pope (Pro-Tech Forest Resources), Julie Castonguay (Sattva Consulting), Mike Ferguson, Forrest Joy (Pacific Ecological Services), Joe Cortese, and Duncan Richards (HRGisolutions).

Tim Ebata is a Forest Health Project Specialist with the BC Ministry of Forests.