

Forest Health Strategy For Mount Robson Provincial Park



Submitted By

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Provincial Park

Introduction

Mount Robson Provincial Park (the 'Park') is a Class A park located on the west slope of the Rocky Mountains along the Alberta-British Columbia border, adjacent to Jasper National Park. Established in 1913, the Park covers an area of over 225,000 hectares and includes variants of the Alpine Tundra (AT), Englemann Spruce-Subalpine Fir (ESSF), Sub-boreal Spruce (SBS), and Interior Cedar Hemlock (ICH) biogeoclimatic zones. Along with Jasper and Banff National Parks, Mt. Robson Provincial Park has been designated a World Heritage Site by the United Nations Environmental, Scientific, and Cultural Organization.

Key features of the park include world class climbing and hiking opportunities and important habitat for a wide range of species including ungulates, caribou, grizzly bears and a large number of migratory and resident birds. The park also contains a strategic road and rail travel corridor that links British Columbia to Alberta.

During the construction of the railway line through the Park in 1913-1915 much of the travel corridor was burned. This, coupled with successful forest fire suppression since the 1940s, has produced large stands of even-aged forests that are slowly maturing. The resultant uniform age-class distribution is not considered representative of historic composition and structure of the forests within the park. Historically forests within these sub boreal ecosystems contained much larger areas of early seral forests.

Since 1997, Mountain Pine Beetle has been active in the Swift Current drainage along the western boundary of the Park. Over the past three years, this infestation has increased significantly in size, and spread into the main Robson valley beyond Moose Lake. Localized incidence of the beetle has been identified as far east as Jasper National Park.

As identified in earlier planning documents (Blackwell *et. al* 1996 and Blackwell 2000) there are three inter-related forest health and ecosystem management issues that need to be addressed by this strategy. Each of these issues pertains primarily to the main valley and travel corridor that runs through the park:

1. Seral Stage Distribution: There is currently an unnaturally high percentage of mature or older forests (47% of forested area is mature or old stands) (Figure 1). Forests in younger age classes (1-3) are increasingly rare within the greater Rocky Mountain Parks region. There is a substantial amount of literature to support that the current distribution of seral stages is outside its historic range (White 1985; Tande 1979; Mackenzie 1973; Masters 1989). The lack of early seral forest can be directly related to less diverse and available wildlife habitat.
2. Mountain Pine Beetle: There is a significant percentage (31%) of forests that are rated moderate to highly susceptible to Mountain Pine Beetle (Figure 2).

The latest incidence surveys show that the spread of the beetle through the park has reached JNP (Figure 3).

3. Fire Hazard: There is a significant percentage (30%) of forests that are rated with a moderate to high wildfire hazard (Figure 4). The uniform age class distribution in combination with associated Mountain Pine Beetle mortality will increase the landscape level fire risk over the next 15 to 20 years in the absence of any prescribed or natural wildfire if the epidemic continues unabated.

The purpose of this report is to document the process and final recommendations for a 10-year forest health management strategy for Mount Robson Park. The strategy is guided by the broader Provincial Pine Beetle Management Program Strategy (MWLAP 2003) and all of the related policies and regulations related to vegetation management within parks and protected areas within the Province of British Columbia. The strategy is also consistent with the final recommendations from the recently released Firestorm 2003 report (Filmon et.al.2003).

Strategy Development Process

The strategy development process centered around two workshops of the Mount Robson Ecosystem Working Group in January and April 2004. The first workshop involved a detailed review of the issues, an examination of treatment options and a preliminary identification of potential treatment sites. The second workshop involved a detailed review and evaluation of different combinations of site treatments spread over a 10-year planning horizon.

Working Group participants included:

- BC WLAP Environmental Stewardship Section
- BC Ministry of Forests
- Parks Canada, Jasper National Park
- AB Ministry of Sustainable Resource Development, Forest Health Section
- Natural Resources Canada– Canadian Forestry Service

Treatment Options

The 10-year management strategy for Mount Robson Park is comprised of a combination of three treatment types:

Single Tree Treatments (fall and burn)

Single tree treatments, in particular the use of falling and burning individually infested trees, has been the dominant tactic used by BC Parks to treat beetle infested areas in parks and protected areas. This treatment is effective in controlling low level incidence before beetle populations have reached epidemic population levels¹ When conducted on a small scale, this treatment has a limited impact on site-level conservation goals and is considered cost-effective. Fall and burn treatments are particularly suitable in cases where infested trees pose a direct threat to human safety (e.g., in and around campgrounds).

Within this strategy, falling and burning is viewed as a short-term tactic, best applied at the leading easterly front of the mountain pine beetle incidence.

Prescribed Burning

In designated areas within the park, prescribed fire can be an effective tool for addressing the inter-related issues identified above. In particular, prescribed fire can be used as a tool to alter the seral stage (age class) distribution, thus reducing the area susceptible to Mountain Pine Beetle and the resulting fire hazard associated with large-scale tree mortality. Changes in seral stage distribution associated with prescribed fire reduces the requirements for single-tree beetle treatments and reduces the probability of unplanned, large scale, catastrophic wildfires that may have negative consequences to resources both within and adjacent to the park.

Within Mount Robson Park, prescribed burning is viewed as the preferred landscape-level tool that meets the long-term ecosystem management goals for the park. It plays a dominant role within the strategy.

Selective Tree Removals

Over the past several years there has been a realization within B.C. Parks that tree removal is a required tool necessary to address issues related to public safety, forest ecosystem restoration, and forest health. While commercial logging or salvage is not allowed in parks and protected areas, legislation and policy changes have been made to facilitate tree removal where treatments are deemed necessary to restore ecosystems or protect public safety.

Tree removals are prescribed based on a strict set of criteria and guidelines focused on meeting ecological goals and objectives, while at the same time minimizing the immediate site-level impact. The current beetle infestation in B.C. has caused B.C. Parks to consider tree removals in areas where large-scale mortality has occurred or will occur, and where fuel accumulations present a

¹ Although use of the herbicide Monosodium Methanearsenate (MSMA) is allowed under current policy, it has not been considered within this strategy given the lack of acceptance by the general public.

significant fire risk to public safety and communities. Tree removal is considered an acceptable treatment to remove forest ingrowth or encroachment in ecosystems where long-term fire suppression has increased stand density and altered ecosystem structure and function.

In designated areas within the park, tree removal will be used as a substitute for, or as a pre-treatment for, prescribed fire. In particular, tree removal treatments are included to remove susceptible lodgepole pine in areas where prescribed fire poses a risk to the community of Jasper. Proposed tree removals will alter the current species composition such that forest health risks are reduced, and will have limited but acceptable environmental impacts when compared with the alternative of landscape scale beetle mortality similar to events experienced in Tweedsmuir and Manning Provincial Parks.

Selective tree removals will be prescribed to minimize impacts on park resources including wildlife habitat, water quality, visual quality, and physical site disturbance including soil disturbance. Construction of permanent roads and landings will not be considered. All access structures will be designated temporary and subject to the highest standards of rehabilitation.

The over-riding rationale for all proposed tree removal activities must reflect the long-term ecosystem management objectives for the Park. Each prescription will be driven by site specific restoration goals such as mimicking natural disturbance patterns both at the stand and landscape level and restoring a component of Douglas-fir in pine dominated stands.

Effective monitoring of results on an annual basis and re-adjustment of priorities and prescriptions over time is viewed as essential for successful implementation of the strategy over the 10-year period.

Site Descriptions

The sites identified for each treatment technique were selected based on a preliminary analysis of forest cover (i.e., % pine), stand age and treatment feasibility. Table 1 provides a brief synopsis of each proposed treatment area.

Table 1: Summary of Proposed Prescribed Burn Sites

Treatment Type	Site	Area ¹	Forest Cover (% pine)	Average Stand Age
Single Tree Prescribed Burning	East-end of Park	7,000 hectares		
	Moose Lake	2,364 hectares	62 %	103 yrs
	Swift Current	2,200 hectares	56 %	158 yrs.
	Yellowhead West	3,100 hectares	66 %	109 yrs
	Upper Fraser Cork	650 hectares	75 %	183 yrs
	Moose West	1,900 hectares	52 %	116 yrs
	TOTAL	17,214 hectares		
Tree Removal	Lucerne Pilot	39 hectares	87 %	130 yrs
	Lucerne	600 hectares	78 %	115 yrs
	Ghita Creek	600 hectares	82 %	109 yrs
	Moose East	100 hectares	74 %	95 yrs
	Swift Current	120 hectares	30 % ²	88 yrs ²
	Headquarters	160 hectares	50 % ²	105 yrs ²
	TOTAL	1,619 hectares		

1 Except for the Moose Lake prescribed burn and Lucerne pilot tree removal sites that have prescriptions under development, all areas are estimates until such time as detailed prescriptions are developed.

2 Based on partial data (within park only)

Results

The proposed location of treatments across Mount Robson Park is shown in Figure 5, and the preliminary schedule for these treatments is shown in Figure 6. The expected results from implementation of these treatments on MPB management, wildfire fire hazard, and landscape-level biodiversity are discussed below.

Mountain Pine Beetle Management

To measure the potential benefits across sites from a mountain pine beetle (MPB) management perspective, an 'MPB Hazard Reduction Potential' indicator was calculated. This indicator reports the potential improvement in using treatments to return areas of extreme and high MPB hazard ratings to low ratings. It is assumed that both prescribed burning and tree removal will be equally effective at reducing MPB hazard ratings given the type of restoration prescriptions required in both cases (i.e., a primary focus on mortality or removal of mature lodgepole pine).

Table 2 reports the total area of extreme and high MPB rating in each proposed treatment area. Accounting for the overlap of some treatment areas, the end result of implementing all treatments would be the elimination of nearly 3,000 hectares of extreme and high rated MPB hazard area.

In addition to the use of prescribed fire and tree removals to reduce the percentage of available host pine, the 10-year strategy includes the ongoing use of single tree treatments of beetle infested trees until such time as a weather event or other factor results in a major collapse of the current epidemic.

Table 2: Summary of MPB Hazard Reduction Potential

		Total Area	MPB Hazard Area		
		ha	Extreme ha	High ha	Sum ha
Prescribed Burning Sites	Moose Lake	2364	309.8	250.0	559.8
	Swift Current	2200	8.8	72.9	81.7
	Yellowhead West	3100	540.4	306.9	847.3
	Upper Fraser Cork	650	0.6	359.0	359.6
	Moose West	1900	29.7	368.6	398.3
	Total	10214	889.3	1357.4	2246.8
Tree Removal Sites	Lucerne - Pilot	39	0.0	36.6	36.6
	Lucerne	600	1.0	344.0	345.0
	Ghita Creek	600	97.7	235.5	333.2
	Moose East	100	28.9	0.0	28.9
	Swift Current	120	n/a	n/a	n/a
	Park HQ	160	n/a	n/a	n/a
	Total	1619	127.6	1746.6	743.7

Fire Hazard Management

To measure the potential benefits across sites from a fire management perspective, a 'Fire Hazard Reduction Potential' indicator was calculated. This indicator reports the potential improvement in using treatments to return areas of extreme and high fire hazard ratings to low ratings. Again it is assumed that both prescribed burning and tree removal will be equally effective at reducing fire hazard ratings given the type of restoration prescriptions required in both cases.

Table 3 reports the total area of extreme and high fire rating in each proposed treatment area. Accounting for the overlap of some treatment areas, the end result of implementing all treatments would be the elimination of over 9,300 hectares of extreme and high rated fire hazard area.

Table 3: Summary of Fire Hazard Reduction Potential

		Total Area	Fire Hazard Area		
		ha	Extreme ha	High ha	Sum ha
Prescribed Burning Sites	Moose Lake	2364	1406.0	800.0	2206.0
	Swift Current	2200	180.4	1277.1	1457.5
	Yellowhead West	3100	1960.5	719.9	2680.4
	Upper Fraser Cork	650	246.0	332.0	578.0
	Moose West	1900	966.4	533.1	1499.5
	Total	10214	4759.2	3662.2	8421.4
Tree Removal Sites	Lucerne - Pilot	39	1.6	32.7	34.3
	Lucerne	600	69.4	309.6	379.0
	Ghita Creek	600	147.5	264.6	412.1
	Moose East	100	25.4	37.0	62.4
	Swift Current	120	n/a	n/a	n/a
	Park HQ	160	n/a	n/a	n/a
	Total	1619	243.9	643.9	887.8

Landscape-level Biodiversity

To measure the potential biodiversity and forest health benefits across sites, an age class distribution index was developed. The index calculates the potential improvement in landscape-level age class distribution by setting mature seral stage areas back to early seral stage areas, particularly in the SBS biogeoclimatic zone. In this case, only prescribed fire treatments are assumed effective at adjusting the effective seral stage. For each site, a weighted area index score was calculated both pre and post treatment using the weights assigned in Table 4.

Prescribed burning has the potential to change environmental conditions by altering the landscape level age-class distribution. The extent of this alteration is dependent on the size of the burned area and the present age-class distribution. Age-class 5 lodgepole pine forests dominate all the proposed sites identified above. Recent studies in the Mountain Parks indicate that montane forests in these parks are significantly older than their historic distributions and burning any of this area will result in a greater distribution of younger forests.

Table 5 reports the total area of landscape-level age class improvement potential in each proposed prescribed burn treatment area.

Table 4: Age Class Distribution Index Weights

Age Weighting		BEC Weighting	
Early	1	SBS	1
Mid	0.25	ESSF	0.5
Mature	0	ICH	0.25
Old	1		

Table 5: Summary of Biodiversity (Age Class) Improvement Potential

		Total Area ha	Improvement Potential ha
Prescribed Burning Sites	Moose Lake	2364	1213.0
	Swift Current	2200	778.0
	Yellowhead West	3100	1106.4
	Upper Fraser Cork	650	179.0
	Moose West	1900	565.6
	Total	10214	3841.9

Costs

Implementation of the strategy will have costs associated with planning and management, single tree treatments, prescribed burn treatments and tree removal treatments. There will also be revenues associated with the tree removal treatments. As a matter of principle, the Working Group set itself the target of developing a strategy that would essentially balance the costs and revenues on the basis of a 10-year discounted cashflow analysis.

In the April workshop, the Working Group explored alternative combinations of treatments over a 10-year period. Additional estimates and refinements were later made based on questions and suggestions made during the workshop. Key notes and assumptions adopted for the final recommended strategy include:

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- Costs are not specifically allocated among participating jurisdictions at this time, recognizing that flexibility is necessary regarding the availability of financial resources.
 - Estimates for Planning and Management Costs are set at 'high' for the first 3 years, 'mid' for the next 3 years and 'low' for the final 4 years.
 - Estimates for Single Tree Treatment Costs are set at 'mid' for the first 5 years and 'low' for the final 5 years.
 - Estimates for Prescribed Fire and Tree Removal set at 'mid' for the full 10 years.
 - A contingency fund of \$350,000 is incorporated to address any fire escapes associated with the prescribed burn treatments.
 - The priority on timing for the prescribed burn sites is:
 - o Moose Lake = Year 1
 - o Swift Current = Year 2
 - o Yellowhead West = Year 3
 - o Upper Fraser = Year 5
 - o Moose West = Year 10
 - The priority on timing for the tree removal sites is:
 - o Lucerne Pilot area = Year 1
 - o Swift Current = Year 1
 - o Park Headquarters = year 1
 - o Lucerne, Ghita and Moose East = 20% / year across Years 2 to 6
 - Stumpage costs on tree removals are ignored, assuming that all payments would flow directly back to implementation of the strategy.

Based on the information presented above, and further supporting analysis undertaken since the development of the Park Ecosystem Management Plan in 1996, the Mount Robson Ecosystem Working Group recommend the following:

- The program of Single Tree Treatments, Prescribed Burns and Tree Removals should be implemented as described above to meet the forest health objectives of the park while reducing the risk of Mountain Pine Beetle spread and wildfire.
- The goal should be to fully balance the costs and revenues of all treatments and management costs over the 10 year planning horizon.
- Working Group members should continue to provide assistance and funding support in recognition of the joint benefits that accrue to all jurisdictions.

- The Working Group should continue to meet annually (or more often if necessary) in order to review monitoring results, develop annual implementation plans and refine the 10-year strategy as required.
- The Working Group should invite other interested stakeholders to participate in the ongoing development and implementation of the strategy.

References

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Figure 1: Seral Stage Distribution

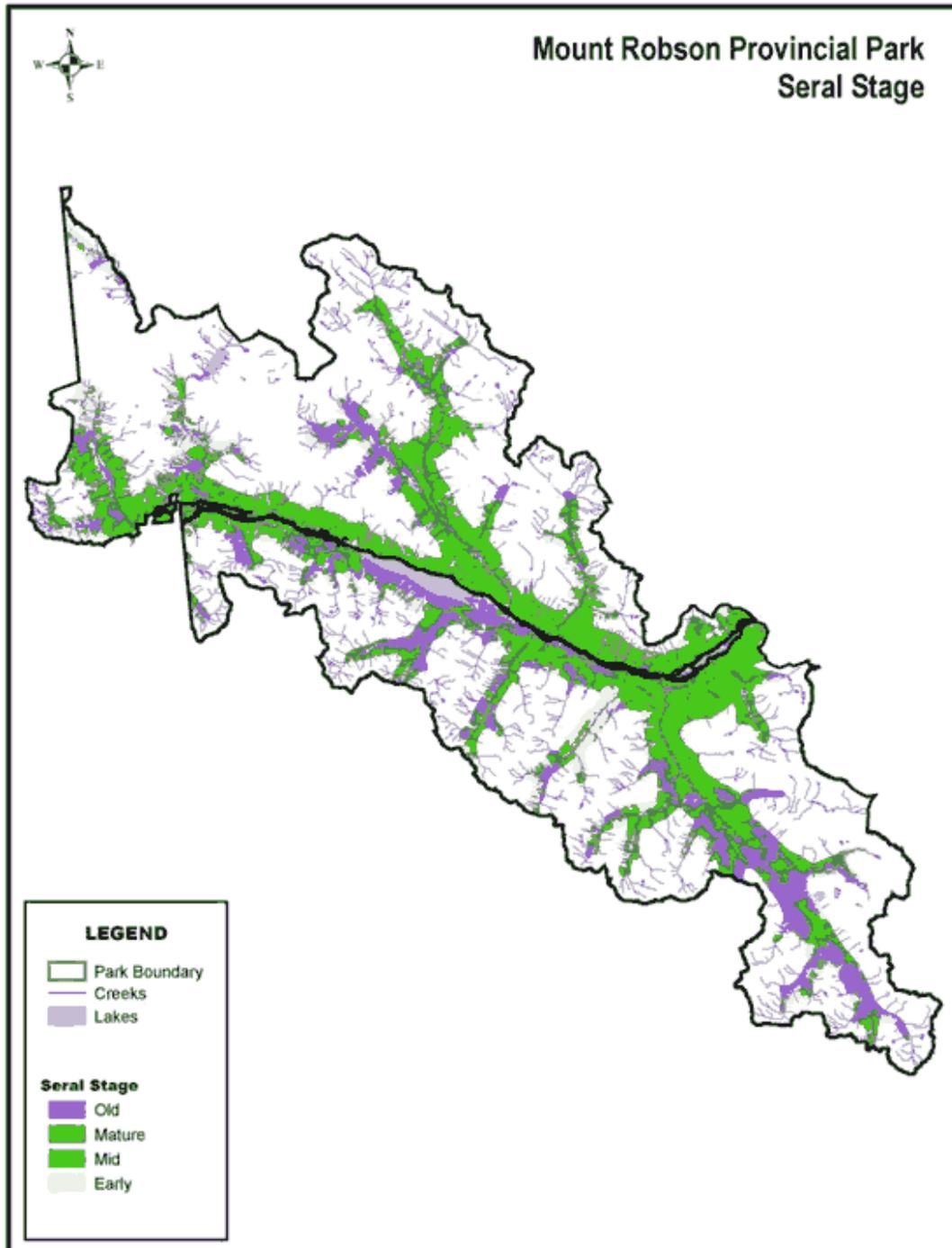


Figure 2: Mountain Pine Beetle Hazard

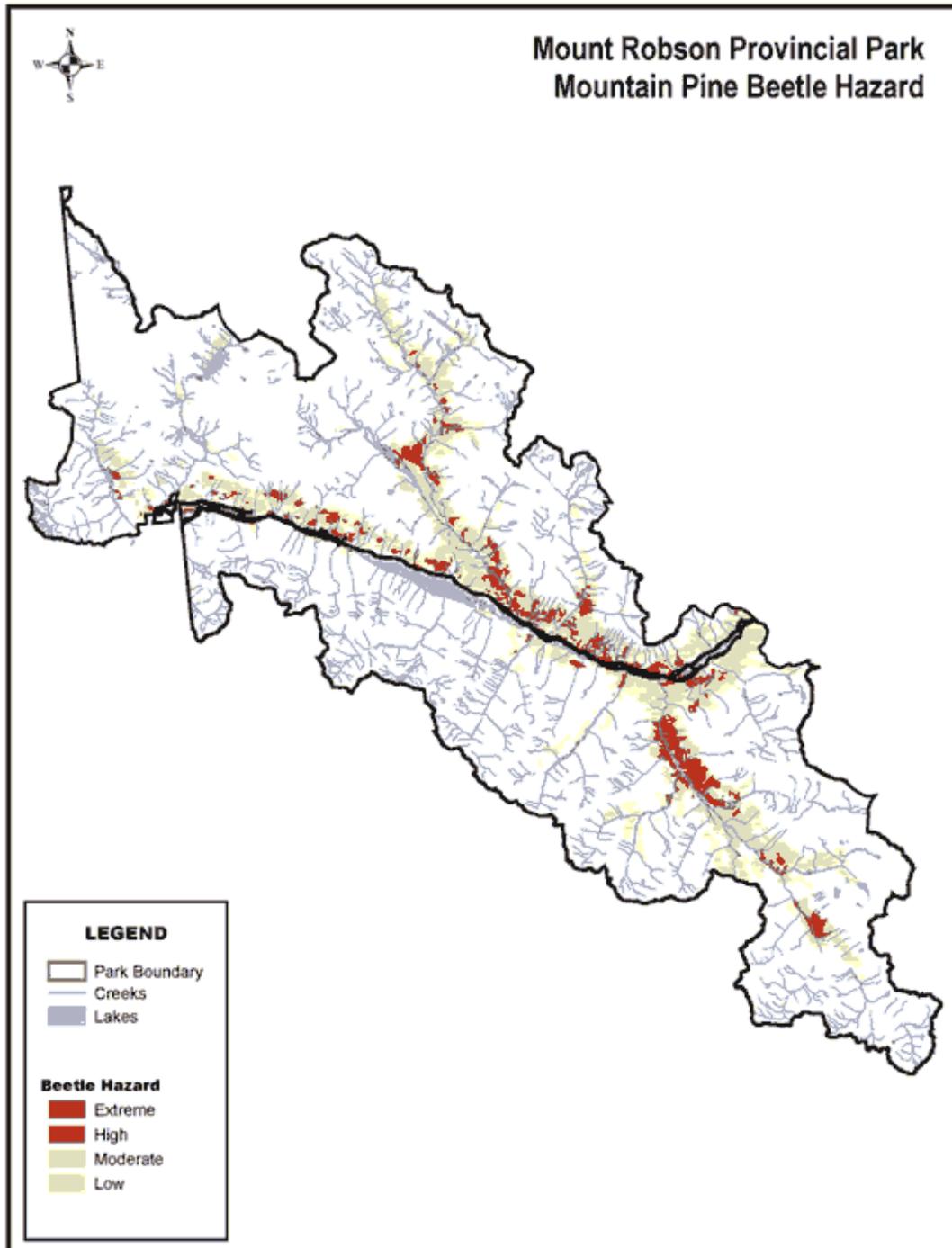


Figure 3: Mountain Pine Beetle Incidence

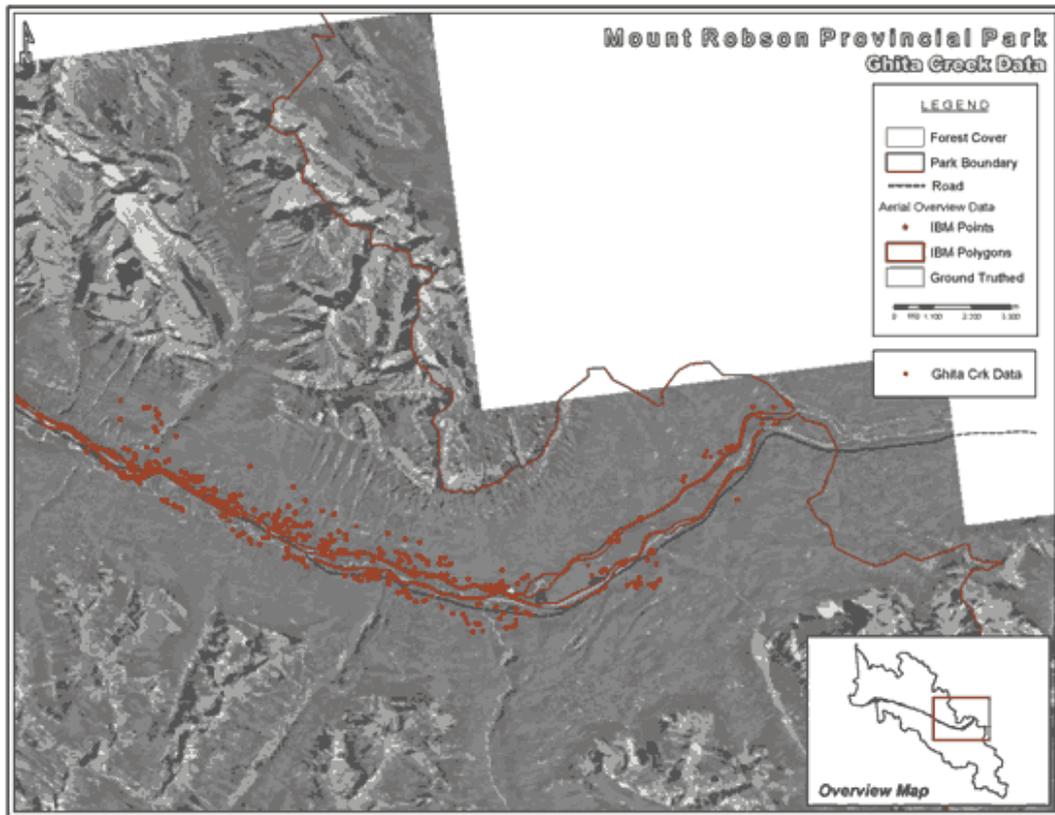


Figure 4: Fire Hazard

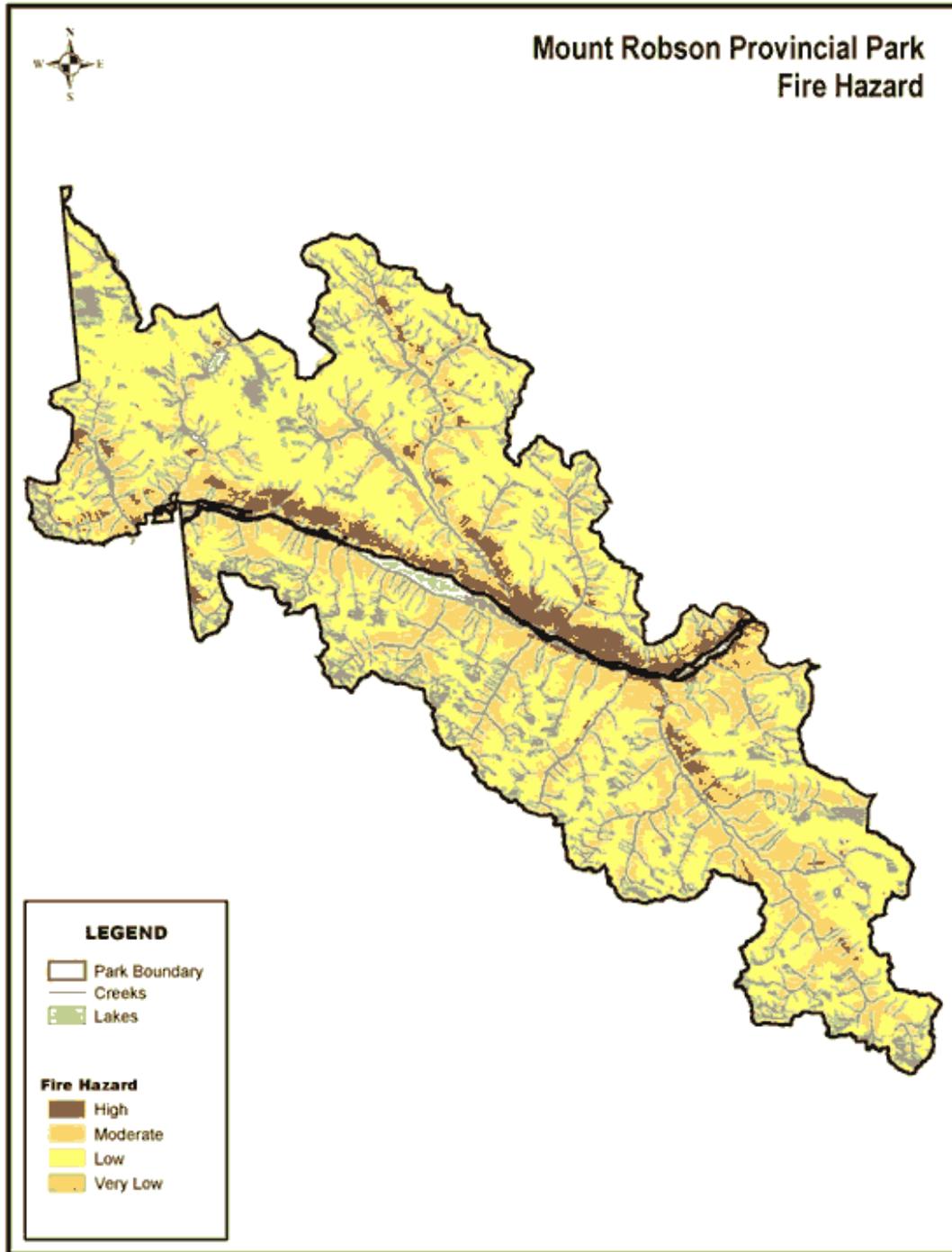


Figure 5: Ortho-photo Showing Proposed Treatment Areas



Figure 6: Preliminary Schedule of Treatments

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
		04 / 05	05 / 06	06 / 07	07 / 08	08 / 09	09 / 10	10 / 11	11 / 12	12 / 13	13 / 14
Single Tree Treatments		X	X	X	X	X	X	X	X	X	X
Prescribed Fire	<i>Moose Lake</i>	X									
	<i>Swift Current</i>		X								
	<i>Yellowhead West</i>			X							
	<i>Upper Fraser Cork</i>					X					
	<i>Moose West</i>										X
Tree Removal	<i>Lucerne</i>	X	X	X	X	X	X				
	<i>Ghita Creek</i>		X	X	X	X	X				
	<i>Moose East</i>		X	X	X	X	X				
	<i>Swift Current</i>	X									
	<i>Park HQ</i>	X									