

# Provincial Level Projection of the Current Mountain Pine Beetle Outbreak:

## Appendix 4: Indicator File Descriptions

*Supported by the  
Mountain Pine Beetle Initiative of the Canadian Forest Service  
and the BC Forest Service*

Canada 



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## Introduction

As outlined in the minutes of the first workshop held in September 2003, we identified 8 specific clients for the information being generated by this project:

- Federal government; National Forest Carbon Sinks Committee
- Forest Investment Council
- Ministry of Forests; Forest Practices Branch; Forest Health Program
- Ministry of Sustainable Resource Management; Terrestrial Information Branch
- Ministry of Water Land and Air Protection; Environmental Stewardship Division
- Ministry of Sustainable Resource Management; Planning Division
- Ministry of Forests; Forest Analysis Branch
- Ministry of Forests; Tree Improvement Branch, Gene Resource Management (GRM)

For each client the workshop identified the decisions that may be affected by the current outbreak and the information required to support the decision making processes. The workshop then identified a set of indicators that the model could produce that would be helpful in providing the information and, importantly, a domain expert that could summarize and interpret the indicator file for the appropriate decision maker.

The indicator files consist of:

- **“Strata”** that can be thought of as the rows and columns in a summary table and;
- **“Measured Values”** that can be thought of as the values that would fill the cells of the table.

For example, a common request at the workshop was to see results in the form of the area of pine affected (measured value) by cumulative impact class (strata: say the columns in a table) for each management unit (strata: say the rows in the table). Note that all indicator files include the “year of the simulation” as a strata to enable summaries over specific time frames and calculations of rates of change

Based on the discussions at the workshop and subsequent work we developed a set of indicator file specific to each client. The structure of those files was reviewed by the appropriate domain expert.

This document describes the strata and measured values available for inclusion in the indicator files and specifies the indicator file for each client. Details regarding the source and methods of creation of the data for each strata and measured value can be found in Appendix 1.

## Description of Strata and Measured Values

**Table 1. List of Reporting Strata and Associated Labels**

Strata		
Name	N	Labels
Forest Management Unit	73	TSA & TFL name
Parks	850+	Park name
Resource Management Zones	3	Enhanced, IRM, Special
Caribou Range	46	Herd name
Grizzly Bear Range	60	Population name
Pine Seed Planning Zones	~100	SPZ Name
Spruce Seed Planning Zone	~100	SPZ Name
Beetle Mgmt.Units (LUs)	~1500	Landscape Unit Name
THLB/NCLB	1	Yes and No
BGC subzone/variant	192	BGC Unit name
Visual Quality Objective zones	5	Preservation, Retention, Partial Retention, Modification, Maximum Modification
Site Index Class	4	See Table 2
Inventory Type Group	42	See Table 3
Pine Species	5	See Table 4
Percent Pine Class	4	See Table 5
Age Class	12	See Table 6
Annual Impact Class	5	See Table 7
Cumulative Impact Class	7	See Table 8

**Table 2. Growing Site Index (Site) classes and their descriptions**

Site	Class Description	Range Site Indices
1	Poor	0
2	Low	1 - 40%
3	Moderate	41 - 80%
4	Good	91 - 100%

Note that 0 and -1 both could indicate non-forest and therefore have no site index

**Table 3. Inventory Type Groups (ITG) and their descriptions**

ITG Code	First Species	Second Species
Fd	Fd >80%	Any
FdCw	Fd	Cw or Yc
FdH	Fd	H B
FdS	Fd	S
FdPl	Fd	Pl
FdPy	Fd	Py
FdL	Fd	L, Pw
FdDecid	Fd	Decid
Cw	Cw/Yc >80%	Any
CwFd	Cw/Yc	Fd, L, Py, Pw, Pl, or dec.,
CwH	Cw/Yc	H, B, or S
H	H >80%	Any
HFd	H	Fd, L, Py, Pw or Pl
HCw	H	Cw or Yc
HB	H	B
HS	H	S
HDecid	H Decid	
B	B >80%	Any
BH	B	H, Cw, or Yc
BS	B	S, Fd, Pw, Pl, L, Py, or dec.
S	S >80%	Any
SFd	S	Fd, L, Pw or Py
SH	S	H, Cw or Yc
SB	S	B
SPl	S	Pl
SDecid	S	Decid
Pw	Pw	Any
Pl	Pl/Pa >80%	Any
PlFd	Pl	Fd, Pw, L, or Py
PlS	Pl	S, B, H, Cw, or Yc
PlDecid	Pl	Decid
Py	Py	Any
LFd	L	<=80% Fd
L	L	Any (Fd when L>80%)
AcConif	Ac	Conif
AcDecid	Ac	Decid
DrConif	Dr	Conif
DrDecid	Dr	Decid
Mb	Mb	Any
E	E	Any
AtConif	At	Conif
AtDecid	At	Decid

**Table 4. Common names of pine species used and the associated latin names**

Common Name	Latin Name
Limber Pine	<i>Pinus flexilis</i>
Lodgepole Pine	<i>Pinus contorta</i>
Western White Pine	<i>Pinus monticola</i>
Whitebark Pine	<i>Pinus albicaulis</i>
Ponderosa Pine	<i>Pinus ponderosa</i>

**Table 5. Percent Pine Class (PctPineCls) classes and their descriptions.**

PctPineCls	Class Description	Range of Percent Pine
0	No Pine	0
1	Low	1 - 40%
2	Moderate	41 - 80%
3	High	91 - 100%

**Table 6. Age Class (AgeCls) classes and their descriptions.**

AgeCls	Lower Limit of Age Class (years)
0	0
1	20
2	40
3	60
4	80
5	100
6	120
7	140
8	160
9	180
10	200
11	> 200

**Table 7. Annual severity of beetle infestation (annSevCls) classes and their descriptions.**

annSevCls	Class Description	Percent Kill Range	Mid Point of Percent Kill
0	No MPB	0	0%
1	Endemic	<1%	0.5%
2	Low	1 - 10 %	5%
3	Moderate	11 -20%	15%
4	Severe	21 -50 %	35%

**Table 8. Cumulative severity of beetle infestation (cumSevCls) classes and their descriptions.**

cumSevCls	Class Description	Percent Kill Range	Mid Point of Percent Kill
0	No MPB	0	0%
1	Endemic	<1%	0.5%
2	Low	1 - 10 %	5%
3	Moderate	11 -20%	15%
4	Severe	21 -50 %	35%
5	Very Severe	51 - 75 %	63%
6	Complete Kill	76 - 100 %	88%

**Table 9. Measured values available for the indicator files.**

Measured Values	Units
Land Area	ha
Forest Area	ha
Pine Area (% pine weighted)	ha
Green Harvest Area	ha/yr
Salvage Harvest Area	ha/yr
Volume Total	m <sup>3</sup>
Pine Volume	m <sup>3</sup>
Volume of Green Harvest	m <sup>3</sup> /year
Volume of Salvage 0 - 5 years old	m <sup>3</sup> /year
Volume of Salvage 6 - 10 years old	m <sup>3</sup> /year
Volume of Salvage 11 - 15 years old	m <sup>3</sup> /year
Volume of Non Recovered Losses	m <sup>3</sup> /year

Note that the pine area reported is weighted by the percent pine in a stand. I.E. 100 hectares of 10% pine would be reported as 10 hectares. The “full” area of forest with any pine can be obtained through combinations of the measured value Forest Area and either the Pine Species or Percent Pine strata.

## Client Specific Indicator Files

**Table 10. Indicator file for the Federal government; National Forest Carbon Sinks Committee.**

Strata
Forest Management Unit
BGC subzone/variant
Percent Pine Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Land Area
Forest Area
Pine Area (% pine weighted)
Volume Total
Pine Volume

**Table 11. Indicator file for the Forest Investment Council – Site Rehabilitation**

Strata
Forest Management Unit
THLB/NCLB
Site Index Class
Inventory Type Group
Pine Species
Percent Pine Class
Age Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Land Area
Forest Area
Pine Area (% pine weighted)
Volume Total
Pine Volume
Volume of Non Recovered Losses

**Table 12. Indicator file for the Ministry of Forests; Forest Practices Branch; Forest Health Program**

Strata
Forest Management Unit
Parks
Beetle Mgmt.Units (LUs)
Percent Pine Class
Age Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Land Area
Forest Area
Pine Area (% pine weighted)
Volume Total
Pine Volume
Volume of Non Recovered Losses

**Table 13. Indicator file for the Ministry of Sustainable Resource Management; Terrestrial Information Branch.**

Strata
Forest Management Unit
Beetle Mgmt.Units (LUs)
THLB/NCLB
Percent Pine Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Land Area
Forest Area
Pine Area (% pine weighted)
Volume Total
Pine Volume

**Table 14. Indicator file for the Ministry of Water Land and Air Protection; Environmental Stewardship Division.**

Strata
Forest Management Unit
Parks
Caribou Range
Grizzly Bear Range
Ungulate Winter Ranges
Beetle Mgmt.Units (LUs)
BGC subzone/variant
Inventory Type Group
Pine Species
Percent Pine Class
Age Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Land Area
Forest Area
Pine Area (% pine weighted)
Green Harvest Area
Salvage Harvest Area

**Table 15. Indicator file for the Ministry of Sustainable Resource Management; Planning Division.**

Strata
Name
Forest Management Unit
Parks
Resource Management Zones
Beetle Mgmt.Units (LUs)
Percent Pine Class
Age Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Value
Land Area
Forest Area
Pine Area (% pine weighted)

**Table 16. Indicator file for the Ministry of Forests; Forest Analysis Branch.**

Strata
Name
Forest Management Unit
THLB/NCLB
Site Index Class
Percent Pine Class
Age Class
Annual Impact Class
Cumulative Impact Class
Measured Values
Value
Land Area
Forest Area
Pine Area (% pine weighted)
Green Harvest Area
Salvage Harvest Area
Volume Total
Pine Volume
Volume of Green Harvest
Volume of Salvage 0 - 5 years old
Volume of Salvage 6 - 10 years old
Volume of Salvage 11 - 15 years old
Volume of Non Recovered Losses

**Table 17. Indicator file for the Ministry of Forests; Tree Improvement Branch, Gene Resource Management (GRM).**

Strata
Name
Forest Management Unit
Seed Planning Zones
Annual Impact Class
Cumulative Impact Class
Measured Values
Value
Land Area
Forest Area
Pine Area (% pine weighted)