FMA #0500042

DFMP
Mountain Pine Beetle Addendum

2008

Weyerhaeuser Company Ltd.
Drayton Valley, Alberta

Foreword

This document incorporates a revised Timber Supply Analysis that reflects provincial direction to manage Alberta pine forests in an attempt to reduce the threat of loss by the Mountain Pine Beetle (*Dendroctonus ponderosae* Hopkins). It presents Weyerhaeuser's approach to support this provincial strategy, while managing for a multitude of other values, of which Species of Concern and watershed are only two. This document also updates a number of implementation and monitoring components of the currently approved Detailed Forest Management Plan (November 10, 2006).

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1 Introduction

Extensive tracts of mature lodge pole pine along Alberta's Eastern Slopes are susceptible to Mountain Pine Beetle (MPB) (*Dendroctonus ponderosae* Hopkins) infestations. Epidemic MPB populations have been recorded in British Columbia and new infestations are being identified in Alberta

In the Drayton Valley FMA, approximately 52% of the gross land base contains pine forests, of which 14% have a Rank 1 or Rank 2 susceptibility rating which makes them moderately to highly susceptible to MPB infestations (a detailed explanation of the MPB susceptibility ranking is presented in Appendix 1).

This MPB Plan is designed to help attain provincial MPB control objectives outlined in the Mountain Pine Beetle Action Plan for Alberta released by the Forest Management Branch of Alberta Sustainable Resource Development (ASRD) in September 2006.

The objectives of the Action Plan are to:

1. Effectively detect, accurately survey and aggressively control infested trees;
2. Reduce the number of highly susceptible stands;
3. Minimize the impact of a major outbreak;
4. Establish ASRD policies and procedures to facilitate efficient and timely MPB management;
5. Conserve all the long-term forest values and maintain and protect public health, safety and infrastructure;
6. Maintain a project management structure that ensures effective planning and implementation of mitigation measures among all land managers and adjacent jurisdictions; and
7. Communicate to all clients and stakeholders.

The Province has developed three management strategies intended to control or prevent MPB infestations as outlined in the Province's Interpretive Bulletin, Planning Mountain Pine Beetle Response Operations (Version 2.6, September 2006).

These strategies are identified as:

1. Control (Beetle) Strategy – The objective is to destroy all of the infested trees by implementing one of two response levels. At a level 1 response, the removal of single infested trees is the responsibility of ASRD. A level 2 response is the responsibility of the forest industry and involves stand level treatments (i.e. harvesting) on the working forest to remove infestations.
2. Prevention (Pine) Strategy – The objective is to modify the age-class structure of susceptible pine forests on the eastern slopes to increase their long-term resistance to MPB infestations. The target set by the Province is to do whatever is practical and feasible to reduce the area of susceptible pine stands to 25% of that currently projected in twenty years. The Canadian Forest Service Shore/Safranyik Stand Susceptibility Index Model, adapted for use in Alberta and

made available by the Forest Management Branch of ASRD, is used to calculate the relative susceptibility of a stand. The model evaluates stand age and density, species composition, and a measure of climate suitability.

3. Salvage Strategy – The objective is to minimize the impact of a major outbreak should MPB populations expand to the point where control is no longer possible. The focus of this strategy is to recover dead and dying trees before the fiber value is lost.

Weyerhaeuser's MPB plan focuses on the Prevention Strategy to reduce the area of MPB susceptible stands on the Defined Forest Area (DFA).

No beetle-infected trees had been located on the FMA as of the spring of 2007. A massive pheromone baiting project has been initiated by ASRD, with help from FMA operators. The objective of the baiting program is to ensure early detection of Mountain Pine Beetle in currently uninfested areas located in the likely path of beetles dispersing from infested areas. The dispersal baits are intended to detect large scale aerial dispersal of MPB in the same year as the attack to allow both Level 1 and Level 2 control activities to be carried out in a timely manner.

Both the Forests Act and the Forest Management Agreement (FMA) between the Government of Alberta and Weyerhaeuser define the rights and responsibilities of Weyerhaeuser as the sole area-based forest land manager. The FMA defines an area-based tenure that requires Weyerhaeuser to fulfill timber supply objectives to sustain its own fibre requirements as well as to fulfill a number of other volume-based commitments to the Crown. The TSA will also quantify the other overlapping timber allocations within the FMA area.

Upon approval by ASRD, the Weyerhaeuser Drayton Valley MPB Plan will be incorporated into the Detailed Forest Management Plan(s) (DFMP) (FMA#0500042) through a separate amendment processes.

The MPB plan is applied to the legal boundaries of FMA #0500042 and the embedded grazing dispositions, with the exception of Grazing Reserves / Allocations.

2 Goals and Objectives

The goal of the MPB Management Plan is to define the actions that will be taken to implement the 'Mountain Pine Beetle Action Plan for Alberta' (MPB-AP) on Weyerhaeuser's FMA. Weyerhaeuser and other timber operators acknowledge their responsibilities according to the Alberta Forest Heath Strategy and Shared Roles and Responsibilities between ASRD and the Forest Industry.

The key objectives of this plan are to:

1. Reduce the age class imbalance of the predominantly pine forests;
2. Minimize the long term impacts on future annual allowable cuts directly resulting from the pine reduction strategy;
3. Minimize long-term negative impacts to the deciduous growing stock;
4. Minimize the harvest of spruce-leading stands over the life of the plan;
5. Maintain a balanced haul distance from the entire DFA; and
6. Maintain a harvesting presence in the area west of the Forestry Trunk road.

2.1 Consultation Process

Weyerhaeuser, in conjunction with ASRD regional staff, developed a public consultation plan (Mountain Pine Beetle Prevention Public Involvement Plan). The goals of the Mountain Pine Beetle Prevention Public Involvement Plan were to:

1. Foster stakeholder[1] understanding and support for the MPB-AP;

[1] The Province has the mandate to inform Albertans about forest health initiatives and issues on crown land

2. Provide meaningful opportunities for the public and stakeholders to review and comment on MPB plans;
3. Provide staff the opportunity to obtain information on the MPB-AP and implementation of forest management strategies; and
4. Deliver the MPB message prior to final implementation of the Detailed Forest Management Plan amendment.

Local and regional stakeholders were generally positive about the proposed approach that provided a logical rationale for changes to the forest management plans. However, the level of response and requests for more information from stakeholders and other interested parties was low.

2.1.1 Weyerhaeuser Forest Advisory Committees (FAC)

Throughout the development of the MPB plans (DFMP and public involvement) Weyerhaeuser's FAC groups were kept well informed of both the progress of the company's activities and the mountain pine beetle status in Alberta. Mountain pine beetle has been and will continue to be an agenda or update item at FAC meetings.

The two Forest Advisory Committees (Drayton Valley FMA and Edson FMA) are comprised of representatives from the public who have an interest on the FMA area and currently include members from:

1. Alberta Trapper's Association;
2. Grazing Community;
3. Educational Institutions;
4. Fish and Wildlife Association;
5. Oil and Gas;
6. Recreational Clubs;
7. Local Governments;
8. General Public;
9. Other Timber Operators;
10. Youth;
11. Seniors Groups;
12. Environmental Groups;
13. Woodlot Associations;
14. Aboriginal – First Nations and Métis; and
15. Guides and Outfitters.

2.1.2 Embedded Timber Operators

The Province reserves timber rights for Quota Holders and individuals accessing timber through the Community Timber Program (CTP) on the FMA area. With timber allocation rights on the FMA areas, both groups have a right to be involved in the MPB planning process.

The Company worked with all Quota Holders and ASRD, representing the CTP Program, keeping all parties informed of progress on the MPB plan. Initial and follow-up meetings (where requested), were conducted throughout the process to share updates on the plan's development, address issues or concerns as they arose, and discuss implementation (submission timelines, AAC impacts, spatial harvest sequencing, and other matters).

2.1.3 First Nations

Weyerhaeuser had already established ongoing communications with local First Nations communities, for the purposes of gaining involvement in forest management planning and developing cooperative relationships with these key stakeholders. These communities have expressed an ongoing interest in the Company's forest management activities, and have offered input on forest management issues to varying extents over recent years. Communities include the O'Chiese, Sunchild and Alexis First Nations.

The Company contacted all of the First Nations groups outlined in the above list and offered to share forest management planning information. Only two of the five communities responded and subsequent meetings indicated the need for further dialogue between ASRD and First Nations.

2.1.4 Stakeholders

Throughout the MPB planning process, Weyerhaeuser and ASRD met with stakeholders who have both a long and short term interest in forest management planning and implementation. The intent was to work together on ways to implement the MPB plan so that all forest values are fairly addressed.

Trappers, Grazing Disposition Holders and Tourism and Recreational Operators are the main groups with short to long term interest on large parts of the FMA. These groups were asked to provide input into the strategic planning process; over 200 maps and letters were sent out, but only four responses were received. These responses stressed that open lines of communication would be needed if groups were to have meaningful input into harvest plans in their areas.

Weyerhaeuser encourages ongoing stakeholder input through:

1. Seeking their input into harvest plans as they are developed;
2. Providing feedback to stakeholders outlining how their input into a harvest plan was incorporated; and
3. Annual notification of Annual Operating Plan development.

2.1.5 General Public

The Province is responsible for informing Albertans about forest health initiatives and issues on Crown land. To this end, Weyerhaeuser will continue to co-operate with the Province by participating in or co-sponsoring community based open houses, media releases or other such initiatives. Weyerhaeuser will continue to provide opportunities for public input and issue identification for short term planning (e.g. Annual Operating Plans). Such notice may be given to the public annually through the local media.

The approved amendment to Weyerhaeuser's DFMP will be available for review by the general public at the local regional ASRD offices.

2.1.6 Weyerhaeuser Employees

Pembina Forestlands staff, the mill staff and the prime contractors have been informed about the progress of the Company's MPB planning during both scheduled meetings (staff, safety, etc.) and informally during operational discussions. Forestlands also prepared issue briefs that were made available to staff.

3 Timber Supply Analysis

3.1 Background

This section addresses the timber supply component of Weyerhaeuser's Drayton Valley FMA Mountain Pine Beetle Management Plan (MPB Plan). This plan, including revisions to the current timber supply analysis (TSA), are required in order to achieve the objectives of the Mountain Pine Beetle Action Plan for Alberta released by the Forest Management Branch of ASRD in September 2006.

The TSA has been revised in accordance with the ASRD Interpretive Bulletin, Planning Mountain Pine Beetle Response Operations (version 2.6, September 2006) and this section compares and discusses the timber supply outcomes from the following management scenarios:

1. The existing Detailed Forest Management Plan (DFMP) submitted in December 2005;
2. The Mountain Pine Beetle Preferred Forest Management Strategy (MPB PFMS);
3. The Weyerhaeuser Prevention (Pine) Strategy aimed at accelerating pine harvest to control MPB; and
4. The MPB outbreak or "Disaster Scenario" modeled according to the Province's Timber Supply Analysis Criteria for the Mountain Pine Beetle Disaster Scenario Evaluation.

There have been no changes made to the land base assignment, yield curves, long run sustained yield, cull deduction, or stand structure retention modeling approaches since the December 2005 DFMP submission. Information from the approved DFMP will not be repeated in this report unless changes were made, and these will be discussed.

This TSA is based on the effective date of November 18, 2000 which was used in the DFMP submission (December 2005). Harvest volumes for period 1 (2000 – 2005) have already been realized, therefore, shifting back the implementation of the MPB plan by one period (5 years). Weyerhaeuser will apply accelerated harvest levels during the period from May 1, 2007 to November 17, 2025 (approximately 18.5 years) to reduce the area of MPB susceptible pine stands in the FMA area. The modeling of the preferred MPB forest management scenario considers the following:

1. Securing fiber supply to meet the current or expected needs of the mill facility.
2. The Company's obligations to accept industrial salvage.
3. Current purchase wood agreements with other timber operators.
4. Economic balance of wood supply over the first twenty years of the MPB plan's implementation plus the measures to control drastic changes in economic viability in subsequent periods.

Similar considerations will be used to assess harvest levels for the Quota Holders and CTP Program Operators. The Company will seek confirmation from ASRD that timber harvest levels below the Provinces' Prevention (Pine) Strategy target will not be reallocated to other timber operators at this time.

Over the next several years, the Company may analyze both manufacturing capacity and resource allocation, from which revised PFMS may be derived. Weyerhaeuser will initiate discussions with ASRD regarding the planning process to be followed should future amendments to the approved DFMP be warranted.

3.2 Modeling Overview

The timber supply analysis was modeled using Remsoft's Spatial Planning System (RSPS), specifically Woodstock™, Spatial Woodstock™, and Stanley™. MOSEK optimization software was used to solve the linear programming matrix generated by Woodstock™. Additional information on these software products can be viewed in Chapter 4 of the December 2005 DFMP submission.

The initial long-term Woodstock™ runs were based on the PFMS from the DFMP, with specific changes to constraints and assumptions in order to meet the Mountain Pine Beetle (MPB) objectives of the revised TSA. These changes are discussed in later sections.

The preferred spatial harvest schedule produced by Stanley™ was then incorporated into the original Woodstock™ run, providing a direct linkage between the operationally feasible spatial harvest schedule and long-term sustainability. The harvest schedule in periods 13 to 32 was re-optimized to incorporate adjustments made by Stanley™ in the first 12 periods of harvest into the long-term harvest schedule. All modeling outputs displayed in this report are based on this harvest schedule unless otherwise specified.

Following the calculation of the final outputs, the aspatial reduction factors (cull and in-block retention) were applied to the estimated harvest volumes to derive the final sustainable harvest volumes.

Specific assumptions relating to the expected MPB attack are included with the description of the model variables.

3.3 Alternate Utilization Standards for Conifer

Weyerhaeuser, for the immediate future will operate at a 15/13 utilization standard. This means they harvest stems down to a 13 cm minimum top diameter rather than 11 cm. An adjustment factor was applied to convert the yield estimates. Details of the conifer adjustment factor for the 15/13 utilization factor are provided in Appendix 9 of this report.

3.4 Changes to the Woodstock™ Model Formulation

This section summarizes the changes from Weyerhaeuser Drayton Valley FMA's DFMP PFMS described in Chapter 4 of Volume II in December 2005 DFMP submission. The changes applied to the DFMP PFMS Woodstock™ model formulations include:

1. Input shapefiles;
2. Landscape;
3. Areas;
4. Transitions;
5. Optimize section; and
6. Outputs.

3.4.1 Input Shapefiles

Due to changes in pre-blocks, as well as the addition of a mountain pine beetle strategy, the input shapefiles have undergone some updates since their initial creation from the net land base determination process. The specifics are documented in Appendix 1.

3.4.2 Landscape

The Woodstock™ landscape section defines the variables (called themes) that will be utilized during the modeling process. Theme10 was added to the model while the remaining themes are unchanged. Theme10 provides a stand MPB rating based on climate factor, pine rating, and stand susceptibility index. Detailed descriptions of each theme are presented in Appendix 1.

3.4.3 Areas

The area file was re-built using the automated Spatial Woodstock™ function. There were no user-defined locks or proximal analyses.

3.4.4 Transitions

There are two different types of transitions, those that occur after death and after harvesting. In all cases, stands transition to a non-ranked MPB stand (Theme10 = "ZZ").

3.4.5 Optimize Section

The optimize section is where the objective function and constraints are formulated using tools provided by linear programming. This section captures the most important changes in the MPB model formulation. In general terms, the optimize sections are the same. However, idiosyncrasies have resulted in differences in objective function, volume flow and MPB constrains as explained below.

3.4.5.1 Objective Function

The primary objective of this analysis was to maximize the total volume harvested over the planning horizon. This essentially means maximizing the sum of coniferous and deciduous total harvest volumes over the next 160 years.

Two factors were added to the objective function to aid in MPB management. The first factor was a surge cut limiter (subtracting from the objective function value). It was derived from Rank 3 and non-MPB ranked stands. The second factor was surge cut booster (adding to the objective function value). It was calculated as volume from MPB Rank 1 and 2 stands in the pine cover group. Both of these factors were applied only during the surge cut in periods 2 through 5 of the planning horizon, therefore, causing the Woodstock model to focus on susceptible pine harvest during the main MPB management periods.

3.4.5.2 Volume Flow Constraints

Constraints were incorporated into the model to ensure that the level of forest management is sustainable over time and to incorporate controls ensuring that any specific strategic or operational requirements are met. Constraints to control the flow of total (primary and incidental) volumes are implemented in the model.

Due to the introduction of the MPB management strategy requirements, constraints on the total conifer and deciduous flows had to be applied over distinct timeframes as described next.

Total conifer updates include:

1. Period 1 – Stanley™ allocation from the December 2005 DFMP submission.
2. Period 2 – the first 1.5 years or 29% of period 2 harvests were set at the Stanley™ allocated volumes from the current DFMP. The harvest level for the remaining 3.5 years or 71% was set at the surge harvest level of period 3.
3. Periods 3 to 5 – strict even flow during the “surge period”. Surge cut ends by the end of period 5.
4. Periods 6 to 12 – strict even flow.

5. Periods 12 to 32 – ± 5% flow variation from the post-surge average harvest level (periods 6-32).
6. The post-surge average was also constrained to a maximum 10% drop from the baseline harvest level (current DFMP average Table 4-20 of Chapter 4 in Volume II SYU R12 DFMP) consistent with Section 5.6(iv)(c) of Annex 1 of the Alberta Forest Management Planning Standard.

Total deciduous updates include:

1. Period 1 – Stanley™ allocated volume from the current DFMP.
2. Periods 2 to 12 – strict even flow.
3. Periods 12 to 32 – ± 5% flow variation from the period 2 to 32 average with no drop from the baseline (current DFMP average over periods 2-32) allowed.

3.4.5.3 Mountain Pine Beetle Constraints

The Prevention (Pine) Strategy proposed by ASRD aims to decrease the spread and outbreak potential of MPB by reducing the area of susceptible pine stands to 25% of that in the baseline scenario (DFMP 2000-2015). Weyerhaeuser's strategy for the Preferred Forest Management Scenario attempts to reduce the area of Rank 1 and Rank 2 stands on the net land base by 75% from the initial (year 0) inventory over the surge cut.

Rather than a 20-year MPB strategy, Weyerhaeuser has applied an 18.5-year surge cut on primary conifer, effective May 1, 2007. With a model effective date of November 18, 2000, this means the surge cut ends by period 5 on November 17, 2025.

To further reduce the area of Rank 1 and Rank 2 stands beyond the first 25 years, the model is constrained, from period 5 onwards, to harvest all operable Rank 1 and Rank 2 stands in the period in which they are (or become) operable. This constraint is goal programmed to ensure the remaining sustainability constraints are not broken.

3.4.6 Outputs

Appendix 1 contains a detailed list of the outputs that were used in the model and their meaning.

3.5 Changes to the Stanley™ Model Formulation

Stanley™ model formulation was the same as for the DFMP 2000 – 2015. To ensure current deciduous harvest levels are maintained, stands sequenced by the existing DFMP, within the DX and DC land-base, may be manually sequenced or "locked-in" to ensure they remain available for harvesting under the MPB Plan. Appendix 1 contains more detailed list of Stanley™ model formulation.

3.6 Preferred Forest Management Strategy

3.6.1 Management Objectives and Model Constraints

Following the Provinces' Prevention (Pine) Strategy which is aimed at accelerating the pine harvest in an attempt to control MPB, a preferred scenario that best represented the collective goals and objectives was modeled to estimate sustainable harvest levels for the FMA. This scenario was designed so that the model does not liquidate volume at the close of the planning horizon but ensures that forest timber volume will be present beyond the conclusion of the planning horizon. Additional components of the management strategy modeled by this scenario include:

1. Maximization of total deciduous and coniferous harvest volume;
2. An operationally based Spatial Harvest Sequence, including maintaining quota volumes within targeted geographic areas;
3. Reduction in area of highly susceptible MPB stands;
4. Maintenance of older seral stages;
5. Adequate average block size; and
6. Minimum block size of 2 ha.

The harvest sequence selected provides a flexible operationally based scenario that allows Weyerhaeuser and the embedded quota holders to harvest volume from the FMA economically and sustainably. A portion of the blocks in the 20 year spatial harvest sequence were manually planned by the Weyerhaeuser planning team in Drayton Valley and some of the other timber operators (Dale Hansen Ltd, Tall Pine Timber Co Ltd, MTU, and Lodgepole CTP) within the FMA. This increases the expected congruency between the Spatial Harvest Sequence and the operational harvesting activities.

3.6.2 Harvest Levels

The proposed net harvest levels are provided in Table 3-1 and Table 3-2. These volumes have been adjusted for cull and stand retention using the percentages as shown in Table 3-4. The harvest levels are effective May 1, 2007 to November 17, 2025. The procedures used to calculate the harvest levels are presented in Appendix 2. An additional 1% of the Weyerhaeuser FMA harvest level will be made available to the MTU program.

Table 3-1 Net Harvest Allocations by Operator

Operator	Deciduous	Conifer
Weyerhaeuser (FMA)*	100% - Non-FMA	92.04% - Non-FMA - CTP
Weyerhaeuser (Non-FMA)	20,402 m^3/yr	20,669 m^3/yr
Dale Hansen	0.00%	1.76%
Tall Pine (R1 Q4)	0.00%	3.23%
Tall Pine (R1 Q5)	0.00%	0.67%
Tall Pine (R4 Q11)	0.00%	2.30%
Lodgepole CTP	0 m^3/yr	4,000 m^3/yr

*1% of Weyerhaeuser AAC is made available to the local MTU program in all FMUs

Table 3-2 Proposed Net Harvest Levels by Operator

Operator	Deciduous	Conifer
Weyerhaeuser (FMA)*	257,970	853,670
Weyerhaeuser (Non-FMA)	20,402	20,669
Dale Hansen	-	16,796
Tall Pine (R1 Q4)	-	30,824
Tall Pine (R1 Q5)	-	6,394
Tall Pine (R4 Q11)	-	21,949
Lodgepole CTP	-	4,000
Total	278,372	954,301

*1% of Weyerhaeuser AAC is made available to the local MTU program in all FMUs

Table 3-3 shows the gross volume harvested by Land Management Unit (LMU), and Harvest Design Area (HDA) for the first 5 periods of the SHS. The LMU will be the base unit to gauge the 20% allowable variance of sequenced harvest area.

Table 3-3 SHS Gross Harvest Volumes by LMU and HDA

LMU	Harvest Design Area	Period 1 (2000 - 2005)			Period 2 (2005-2010)			Period 3 (2010-2015)			Period 4 (2015-2020)			Period 5 (2020-2025)		
		Conifer	Decid	Total	Conifer	Decid	Total	Conifer	Decid	Total	Conifer	Decid	Total	Conifer	Decid	Total
Baptiste	Brewster Creek	124,136	128,419	252,555	17,773	13,904	31,677	214,401	42,530	256,931	0	0	0	92,307	34,080	126,387
	Buster Creek	28,829	22,530	51,359	9,543	17,011	26,554	25,771	5,279	31,049	0	0	0	52,525	17,987	70,512
	Chambers Creek	297,235	229,705	526,940	37,098	27,774	64,872	102,166	18,168	120,334	0	0	0	108,986	68,050	177,036
	Crimson	18,372	20,176	38,548	57,418	84,215	141,633	1,944	359	2,302	232,481	65,384	297,865	5,050	1,534	6,584
	Diamond Hill	3,559	925	4,484	6,294	9,249	15,543	4,012	744	4,756	9,916	2,822	12,738	34,604	16,102	50,706
	Grace Creek	100,761	66,271	167,032	101,502	51,453	152,955	85,465	17,331	102,796	0	0	0	52,078	10,459	62,537
	Louis Lake	7,392	4,809	12,201	124,710	60,590	185,301	30,800	4,334	35,133	29,551	12,458	42,008	29,487	27,820	57,307
	No Name Creek	58,872	23,360	82,232	33,830	33,320	67,151	150,076	30,781	180,857	0	0	0	167,408	63,299	230,707
	Omni	26,463	41,341	67,804	39,470	33,394	72,864	0	0	0	198,319	37,317	235,636	0	0	0
	Prentice Creek	79,482	69,321	148,803	203,617	111,849	315,466	0	0	0	62,717	14,077	76,794	0	0	0
	Sunchild	62,513	91,608	154,121	85,713	113,855	199,568	0	0	0	251,979	65,356	317,335	0	0	0
Subtotal (Baptiste)		807,614	698,464	1,506,078	716,968	556,615	1,273,583	614,635	119,524	734,159	784,963	197,413	982,376	542,446	239,331	781,777
Blackstone	Beaver Flats	0	0	0	326,673	4,759	331,431	0	0	0	50,444	726	51,170	0	0	0
	Black Mountain	0	0	0	25,417	414	25,831	0	0	0	0	0	0	0	0	0
	The Gap	0	0	0	206,570	2,259	208,829	0	0	0	57,450	192	57,642	0	0	0
	Lookout Creek	0	0	0	13,895	222	14,116	116,209	1,525	117,734	0	0	0	87,488	1,065	88,553
	North False Gap	0	0	0	0	0	0	228,913	2,558	231,471	0	0	0	298,939	2,017	300,956
	R2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	South False Lake	0	0	0	0	0	0	106,796	964	107,760	0	0	0	135,616	1,018	136,634
	Trunk Road	89,841	1,519	91,359	325,785	5,981	331,767	0	0	0	13,267	164	13,430	0	0	0
	Wapiabi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal (Blackstone)		89,841	1,519	91,360	898,340	13,635	911,975	451,918	5,047	456,965	121,160	1,082	122,242	522,043	4,100	526,143
Elk River	Broken Arm	49,518	63,035	112,553	20,179	21,648	41,828	0	0	0	160,494	72,012	232,506	0	0	0
	North Dismal Creek	26,172	20,018	46,190	152,218	49,620	201,838	0	0	0	433,031	71,658	504,689	0	0	0
	Poachers Creek	49,552	23,968	73,520	8,175	9,047	17,222	78,557	71,726	150,284	0	0	0	261,824	59,530	321,354
	South Dismal Creek	11,482	18,068	29,550	6,441	10,331	16,772	153,567	41,471	195,038	0	0	0	48,421	15,212	63,633
	Wolf Lake East	48,589	29,474	78,063	124,761	43,237	167,998	0	0	0	1,070,587	209,628	1,280,215	0	0	0
	Wolf Lake West	133,840	30,157	163,997	127,876	26,622	154,497	245,140	28,149	273,289	0	0	0	233,829	14,154	247,983
Subtotal (Elk River)		319,153	184,721	503,874	439,649	160,505	600,154	477,265	141,347	618,612	1,664,112	353,299	2,017,410	544,075	88,895	632,970
Marshy Bank	Chungo Lookout	0	0	0	50,010	723	50,733	0	0	0	30,475	239	30,714	0	0	0
	Canyon Creek	0	0	0	220,609	3,060	223,669	0	0	0	532,363	6,915	539,277	0	0	0
	Race Creek	0	0	0	0	0	0	232,799	2,353	235,152	0	0	0	164,857	1,143	165,999
Subtotal (Marshy Bank)		0	0	0	270,618	3,783	274,402	232,799	2,353	235,152	562,838	7,153	569,991	164,857	1,143	165,999
Medicine Lake	Gosling Lake	1,954	2,083	4,037	49,910	72,563	122,473	0	0	0	38,836	42,685	81,521	0	0	0
	Medicine Creek	1,199	3,956	5,155	16,047	20,029	36,076	15,028	23,981	39,009	0	0	0	78,131	38,119	116,250
Subtotal (Medicine Lake)		3,152	6,039	9,192	65,957	92,593	158,550	15,028	23,981	39,009	38,836	42,685	81,521	78,131	38,119	116,250
R1 Outside FMA	R1 Outside FMA	22,647	64,326	86,973	0	0	0	7,683	5,010	12,693	22,478	2,869	25,347	140,204	198,708	338,913
Subtotal (R1 Outside)		22,647	64,326	86,973	0	0	0	7,683	5,010	12,693	22,478	2,869	25,347	140,204	198,708	338,913
Nordegg River	Elke Summers	339	129	468	142,129	75,487	217,616	175,449	113,751	289,201	15,483	9,582	25,065	158,795	23,716	182,511
	East Rundell	145,000	25,234	170,235	36,290	19,686	55,976	479,477	45,117	524,594	1,078	972	2,050	393,036	22,393	415,428
	South Brazeau	95,518	28,902	124,421	172,739	14,686	187,425	0	0	0	262,790	58,125	320,915	0	0	0
	South Reservoir	15,716	9,701	25,417	4,186	3,920	8,106	715,090	310,059	1,025,148	0	0	0	470,855	113,094	583,950
	Wawa Creek	123,428	2,611	126,040	85,834	1,780	87,615	442,777	8,563	451,340	0	0	0	461,510	9,488	470,998
	West Rundell	106,997	5,029	112,026	373,353	8,462	381,815	0	0	0	158,056	4,912	162,968	0	0	0
Subtotal (Nordegg River)		486,999	71,606	558,605	814,532	124,020	938,552	1,812,793	477,490	2,290,283	437,407	73,592	510,998	1,484,196	168,691	1,652,887
OChiese	Boundary	54,099	21,293	75,392	0	0	0	243,983	325,222	569,205	0	0	0	255,813	258,224	514,037
	Docs Lake	64,186	19,210	83,396	115,319	20,614	135,933	0	0	0	293,859	149,528	443,388	0	0	0
	Grey Owl Creek	238,732	65,828	304,560	17,758	3,957	21,715	281,585	35,367	316,952	0	0	0	385,423	63,060	448,483
	North Canal	3,816	650	4,466	0	0	0	31,504	18,625	50,129	930	375	1,305	20,915	11,586	32,501
	Rapid Creek	2,921	835	3,756	269,255	8,886	278,141	0	0	0	278,616	9,448	288,064	0	0	0
	South Canal	0	0	0	5,639	4,191	9,830	22,177	27,707	49,883	121,919	79,332	201,251	1,270	593	1,862
	Stevens Creek	12,875	240	13,115	185,954	4,237	190,191	405,241	12,391	417,633	0	0	0	454,897	12,068	466,964
Subtotal (O'Chiese)		376,629	108,057	484,685	593,925	41,885	635,810	984,489	419,313	1,403,802	695,324	238,683	934,008	1,118,318	345,530	1,463,848
Sand Creek	Brazeau	0	0	0	16,054	25,220	41,275	61,623	67,762	129,385	0	0	0	63,421	32,281	95,701
	Cathedral Grove	19,015	40,155	59,169	29,264	58,783	88,047	941	2,809	3,750	125,052	256,846	381,898	1,668	648	2,317
	Jack Knife	42,235	130,984	173,219	62,737	139,229	201,966	66,254	148,480	214,734	81,168	64,093	145,261	57,171	95,977	153,148
	Lodgepole	961	751	1,712	14,063	28,357	42,420	95,216	20,924	116,140	5,117	4,403	9,521	1,837	4,018	5,856
	Pembina	0	0	0	28,926	68,324	97,250	31,536	15,774	47,310	139,139	99,729	238,867	9,426	4,994	14,420
Subtotal (Sand Creek)		62,210	171,891	234,100	151,045	319,913	470,957	255,568	255,750	511,319	350,476	425,072	775,547	133,523	137,919	271,441
Tall Pine	Big Bend	12,131	5,403	17,534	71,691	94,745	166,436	46,861	55,669	102,530	42,570	19,951	62,521	54,070	58,211	112,281
	Little One	0	0	0	3,328	5,394	8,722	119	580	699	0	0	0	0	0	0
	North Brazeau	4,163	2,891	7,054	57,184	44,949	102,132	84,174	40,469	124,644	135,196	33,797	168,993	100,678	29,346	130,024
	Norms Throw	0	0	0	29,291	16,708	45,999	49,428	22,059	71,488	70,996	17,674	88,670	81,142	40,043	121,185
	Power House	6,277	5,517	11,795	32,769	33,154	65,923	32,781	26,165	58,947	59,989	21,763	81,752	18,721	25,414	44,134
	Saskatchewan	20,524	11,667	32,191	115,666	101,788	217,454	38,460	7,103	45,563	93,368	35,354	128,722	46,776	105,822	152,598
Subtotal (Tall Pine)		43,095	25,478	68,573	309,928	296,738	606,666	251,823	152,047	403,870	402,118	128,539	530,657	301,387	258,835	560,223
Willesden Green	Alder Flats	4,590	6,031	10,621	15,107	38,261	53,368	46,788	52,420	99,208	0	0	0	54,630	52,783	107,413
	Dominion Lake	11,549	28,134	39,683	9,509	23,904	33,413	17,946	5,457	23,403	0	0	0	100,585	137,027	237,613
	Open Creek	0	0	0	9,094	29,557	38,652	0	0	0	26,768	35,478	62,246	0	0	0
	South Deer Corner	2,984	3,883	6,867	19,341	25,368	44,709	0	0	0	1,808	1,620	3,428	0	0	0
	Strawberry Mountain	80,846	227,802	308,649	38,908	76,456	115,364	0	0	0	112,548	192,505	305,053	0	0	0
	Wolf Creek	0	0	0	15,081	21,635	36,716	52,128	40,359	92,487	0	0	0	36,509	23,753	60,262
Subtotal (Willesden Green)		99,970	265,851	365,821	107,040	215,182	322,222	116,862	98,235	215,097	141,124	229,604	370,727	191,724	213,563	405,288
Grand Total (DV)		2,311,309	1,597,952	3,909,261	4,368,002	1,824,868	6,192,871	5,220,863	1,700,097	6,920,960	5,220,835	1,699,990	6,920,825	5,220,903	1,694,835	6,915,738
Annual Average (DV)		462,262	319,590	781,852	873,600	364,974	1,238,574	1,044,173	340,019	1,384,192	1,044,167	339,998	1,384,165	1,044,181	338,967	1,383,148

3.6.2.1 Stand Structure Retention

Stand retention deductions are applied to account for retained patches of standing timber that maintain non-timber values in harvested stands. A volume reduction of 5% was deducted from the gross harvest level to account for in-block retention. Refer to Table 3-4 for the reduction factors.

3.6.2.2 Cull Deductions

Cull deductions are applied as a method of accounting for non-merchantable volume lost due to defect, substandard and/or marginal quality of the harvested trees. The cull deductions were removed as an aspatial deduction to the gross harvest level. Refer to Table 3-4 for the reduction factors.

Table 3-4 Aspatial Post-modeling Harvest Level Reductions

Cull Reduction %		Stand Structure Retention %		Total Reduction %	
Coniferous	Deciduous	Coniferous	Deciduous	Coniferous	Deciduous
3.06	5.83	5	5	8.06	10.83

3.6.3 Indicators from the MPB Preferred Forest Management Strategy

The MPB preferred forest management strategy was designed to achieve the maximum harvest volume within the objectives for operability and sustainability of both timber and non-timber resources. As always, it is prudent to understand the tradeoffs and impacts that competing values, objectives, and goals have on one another. The remainder of this section will provide a thorough overview of the various indicators to assess the sustainability of the preferred scenario.

3.6.3.1 Average Volume per Hectare

The area-weighted average harvest volumes occurred in the range of 208 to 261 m^3/ha for the coniferous and 194 to 274 m^3/ha for the deciduous dominant cover types, with overall averages of 242 and 231 m^3/ha for conifer and deciduous respectively. Figure 3-1 shows the volume per hectare over time for the deciduous and conifer broad cover types.

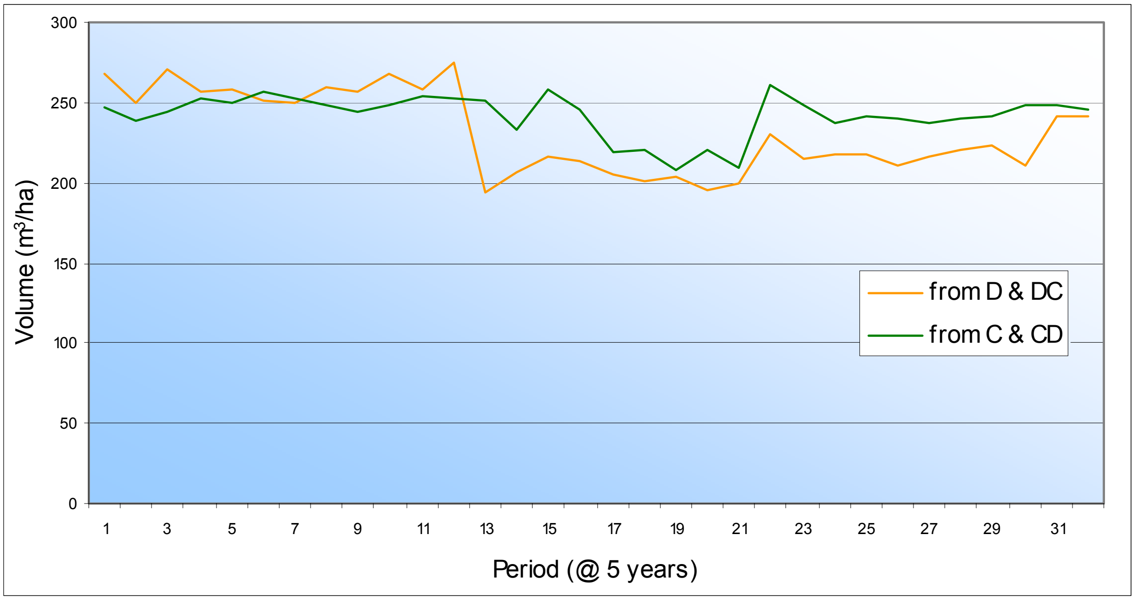


Figure 3-1 Average Volume per Hectare

3.6.3.2 Average Harvest Age

The average harvest age of from deciduous cover types initially varies between 103 and 123 years over the first 60 years and then drops sharply down to 66 years by the 65th year. It stabilizes in the range of 63 to 79 years for the remainder of the planning horizon. The conifer average harvest age starts at 114 years, then continues to climb steadily to 184 years by year 70. It then drops rapidly over a 15 year period to 87 years by year 90 before stabilizing in the range of 87 to 103 years for the remainder of the planning horizon. The average harvest ages for the deciduous and conifer cover types over the entire planning horizon are 85 and 98 years respectively. Figure 3-2 presents the harvest ages over time for the deciduous and conifer stand types.

Figure 3-2 Average Harvested Stand Age

3.6.3.3 Piece Size

The quadratic mean diameter (DBHq) was used to model piece size. Figure 3-3 shows a relatively stable (30-32 cm) deciduous piece size for the first 60 years, before dropping to a low of 25 cm at the 85th year and then stabilizing in the 25 to 28 cm range for the rest of the planning horizon. The conifer piece size is almost the same throughout the planning period with a minimum of 23 cm and a maximum of 24 cm.

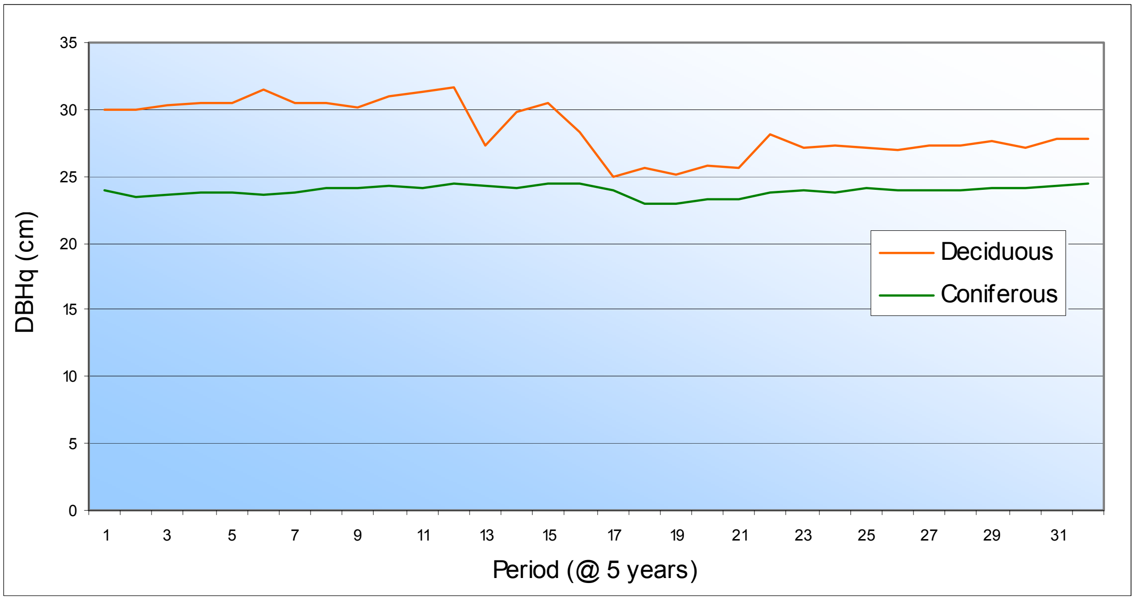


Figure 3-3 Piece Size (DBHq)

3.6.3.4 Growing Stock

Growing stock projections are provided in Figure 3-4. With the planned surge cut at the beginning of the planning horizon both the conifer total growing and operable growing stock drop sharply over the initial 25 year period. At this point the total growing stock levels off for the remainder of the planning horizon while the operable growing stock continues to fall until the 80th year. The conifer operable growing stock then increases for a number of years before leveling off in the 120th year due to a non-declining yield constraint imposed in the model. Deciduous growing stock exhibits a declining trend over the first 60 years of the planning horizon, before stabilizing and showing a gradual increase for the remainder of the planning period. This pattern is typical of mature forest with plenty of standing merchantable volume at the beginning of the modeling start date.

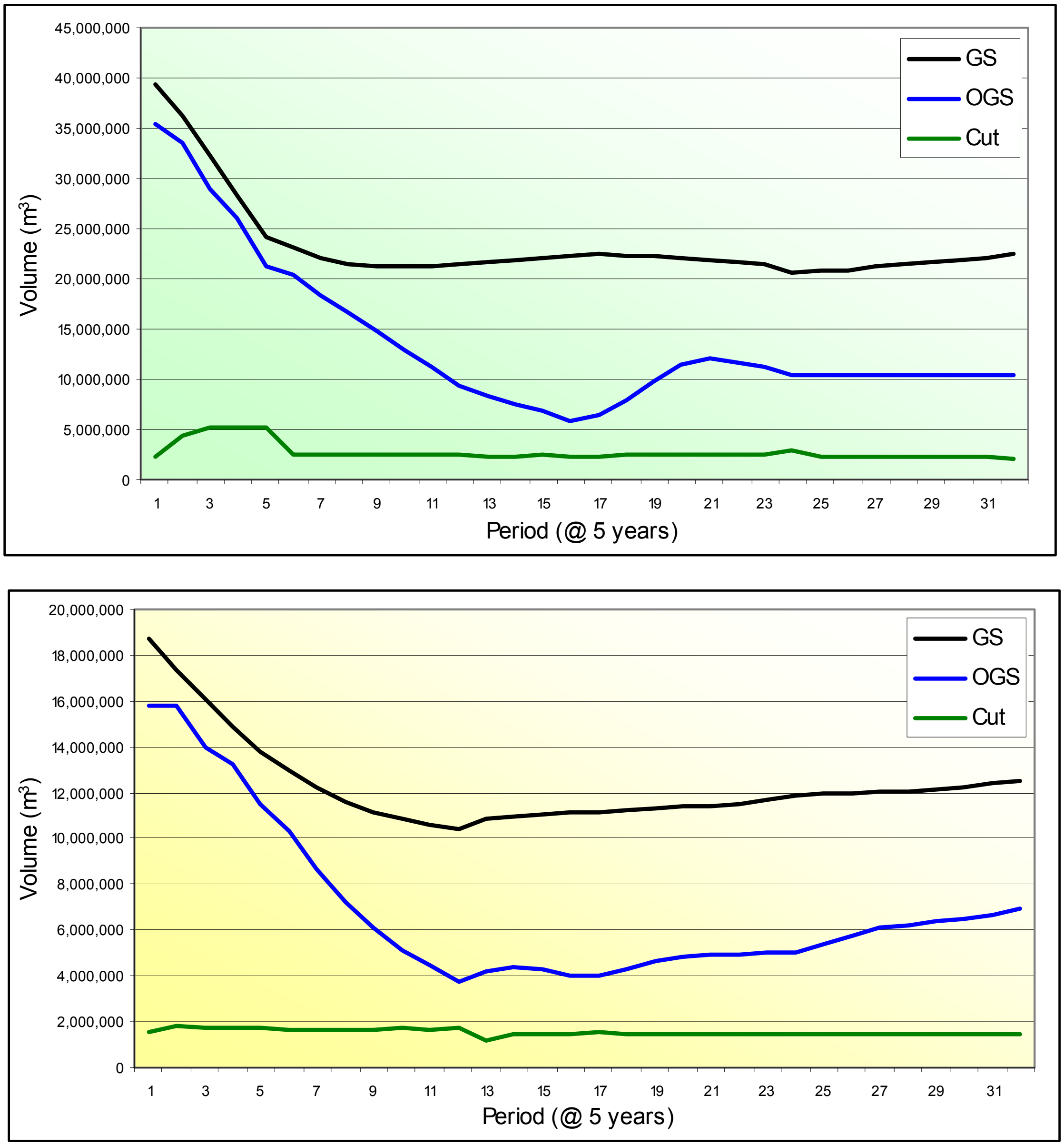


Figure 3-4 MPB PFMS Growing Stock Projections

3.6.3.5 Seral Stage Retention

Future forest conditions were modified under the modeled management scenario. Retention of late, very late and extremely late (overmature) seral stages for the various natural subregions over time are shown in Table 3-5 through Table 3-7 for both the gross and net land bases. Overall, the seral constraints were generally met with the exception of the extremely late “other” conifer in both the Upper Foothills and Subalpine Natural Subregions during the early portion of the planning horizon. Seral stage retention values marked in red represent seral stages with area targets that were not achieved.

Table 3-5 Lower Foothills Seral Stage Gross Retention Area (ha)

Lower Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	4,527	44,198	46,338	24,219	13,407	15,922
Very Late Decid	1.0	905	3,397	15,410	8,880	12,337	12,515
Overmature Decid			0	4	257	5,840	12,337
Late DC	5.0	1,409	17,039	14,425	5,787	4,734	10,449
Very Late DC	1.0	282	1,844	6,859	2,714	3,071	3,129
Overmature DC			0	7	101	1,813	3,071
Late CD	5.0	1,783	14,299	13,969	7,978	11,234	6,364
Very Late CD	1.0	357	2,945	8,467	5,592	3,079	3,529
Overmature CD			4	10	1,577	2,194	3,411
Late PL	5.0	2,461	33,578	25,287	7,601	4,776	7,938
Very Late PL	1.0	492	2,741	13,316	5,280	4,086	4,470
Overmature PL			10	4	360	3,063	4,452
Late PS	5.0	862	10,991	7,950	2,720	2,140	2,352
Very Late PS	1.0	172	2,851	5,821	1,955	1,356	1,439
Overmature PS			92	33	600	1,239	1,372
Late SW	10.0	1,661	10,360	12,078	10,836	3,910	7,035
Very Late SW	2.0	332	3,684	8,109	9,200	3,477	3,516
Overmature SW			54	105	2,815	2,904	3,513
Late 'other' Con	5.0	5,066	57,098	68,566	88,331	86,253	88,938
Very Late 'other' Con	1.0	1,013	20,982	43,020	62,651	84,470	85,647
Overmature 'other' Con			614	2,345	19,789	61,076	85,645

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-6 Upper Foothills Seral Stage Gross Retention Area (ha)

Upper Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	83	1,186	680	321	207	1,158
Very Late Decid	2.0	33	358	597	240	194	196
Overmature Decid			0	0	29	134	194
Late DC	5.0	97	1,653	1,145	487	403	1,196
Very Late DC	2.0	39	691	1,065	426	190	194
Overmature DC			0	0	22	162	190
Late CD	5.0	183	1,704	1,377	793	368	1,016
Very Late CD	2.0	73	179	889	737	241	247
Overmature CD			12	68	88	191	243
Late PL	2.0	950	31,413	26,901	11,762	6,450	7,058
Very Late PL	1.0	475	3,716	14,431	10,914	6,446	6,450
Overmature PL	0.5	238	766	844	945	6,118	6,448
Late PS	10.0	2,221	16,527	16,258	11,658	4,352	5,442
Very Late PS	5.0	1,111	8,277	13,597	11,041	4,022	4,113
Overmature PS	2.5	555	3,374	3,972	4,500	3,905	4,109
Late SW	10.0	1,687	8,170	9,021	8,248	2,832	3,445
Very Late SW	5.0	562	5,671	7,054	7,174	2,734	2,736
Overmature SW	2.5	281	1,640	2,557	3,763	2,295	2,735
Late 'other' Con	10.0	1,752	12,066	13,682	15,835	13,401	13,696
Very Late 'other' Con	5.0	876	3,620	8,728	13,049	13,342	13,347
Overmature 'other' Con	2.5	438	375	707	3,387	11,384	13,344

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-7 Subalpine Seral Gross Retention Area (ha)

Subalpine	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late PL	5.0	64	1,181	1,103	826	302	302
Very Late PL	2.0	26	216	1,099	784	302	302
Overmature PL	1.0	13	70	83	61	290	302
Late PS	10.0	369	3,079	3,488	2,469	1,265	1,532
Very Late PS	7.5	277	2,121	3,077	2,458	1,254	1,261
Overmature PS	5.0	184	1,137	1,747	1,131	1,247	1,261
Late SW	20.0	494	2,433	2,387	1,693	1,056	1,310
Very Late SW	10.0	247	2,254	2,367	1,679	1,056	1,056
Overmature SW	5.0	123	1,046	1,640	1,480	1,043	1,056
Late 'other' Con	10.0	75	615	651	748	591	626
Very Late 'other' Con	5.0	37	332	614	651	591	591
Overmature 'other' Con	2.5	19	0	0	332	494	591

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-8 Lower Foothills Seral Stage Net Retention Area (ha)

Lower Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	4,527	38,441	37,941	12,797	1,023	3,538
Very Late Decid	1.0	905	3,010	12,134	2,283	131	131
Overmature Decid			0	3	35	83	131
Late DC	5.0	1,409	15,255	12,089	2,888	1,652	7,367
Very Late DC	1.0	282	1,650	5,616	706	46	46
Overmature DC			0	5	9	28	46
Late CD	5.0	1,783	12,613	11,795	5,102	7,733	2,863
Very Late CD	1.0	357	2,651	7,162	3,418	27	27
Overmature CD			4	2	1,283	20	27
Late PL	5.0	2,461	30,827	22,228	3,754	358	3,519
Very Late PL	1.0	492	2,566	11,664	2,221	52	52
Overmature PL			10	3	185	3	52
Late PS	5.0	862	9,857	6,712	1,371	705	917
Very Late PS	1.0	172	2,512	4,919	717	4	4
Overmature PS			86	26	261	1	4
Late SW	10.0	1,661	8,098	9,193	7,403	414	3,538
Very Late SW	2.0	332	2,983	6,144	6,314	20	20
Overmature SW			38	74	2,114	19	20
Late 'other' Con	5.0	5,066	9,511	8,384	5,261	1,851	4,536
Very Late 'other' Con	1.0	1,013	1,721	4,859	2,468	1,245	1,245
Overmature 'other' Con			18	70	527	893	1,245

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-9 Upper Foothills Seral Stage Net Retention Area (ha)

Upper Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	83	1,052	521	137	11	962
Very Late Decid	2.0	33	324	475	98	0	0
Overmature Decid			0	0	27	0	0
Late DC	5.0	97	1,491	982	312	209	1,002
Very Late DC	2.0	39	642	913	263	0	0
Overmature DC			0	0	15	0	0
Late CD	5.0	183	1,531	1,187	563	121	769
Very Late CD	2.0	73	156	768	546	0	0
Overmature CD			3	52	65	0	0
Late PL	2.0	950	26,645	20,927	5,503	148	756
Very Late PL	1.0	475	3,213	10,544	4,940	148	148
Overmature PL	0.5	238	659	628	442	143	148
Late PS	10.0	2,221	12,962	12,461	7,761	342	1,433
Very Late PS	5.0	1,111	6,556	10,119	7,244	109	103
Overmature PS	2.5	555	2,815	3,088	2,779	108	103
Late SW	10.0	1,687	6,247	6,744	5,541	114	727
Very Late SW	5.0	562	4,321	5,223	4,897	18	18
Overmature SW	2.5	281	1,447	2,047	2,413	18	18
Late 'other' Con	10.0	1,752	2,299	2,307	2,608	75	369
Very Late 'other' Con	5.0	876	732	1,619	1,674	21	21
Overmature 'other' Con	2.5	438	68	57	499	9	21

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-10 Subalpine Seral Gross Retention Area (ha)

Subalpine	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late PL	5.0	64	892	814	526	1	1
Very Late PL	2.0	26	188	810	494	1	1
Overmature PL	1.0	13	68	77	33	1	1
Late PS	10.0	369	2,156	2,245	1,219	4	271
Very Late PS	7.5	277	1,666	2,154	1,215	4	0
Overmature PS	5.0	184	994	1,405	677	4	0
Late SW	20.0	494	1,413	1,347	640	3	256
Very Late SW	10.0	247	1,384	1,347	639	3	3
Overmature SW	5.0	123	693	1,019	610	3	3
Late 'other' Con	10.0	75	156	157	157	0	35
Very Late 'other' Con	5.0	37	104	156	157	0	0
Overmature 'other' Con	2.5	19	0	0	104	0	0

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

3.6.3.6 Area Harvested

Figure 3-5 summarizes the area in hectares harvested by cover type over the planning horizon. The area of deciduous cover types harvested averages 7,288 ha per period with a low point of 1,644 ha during period 22 and a high of 11,168 ha in period 17. In line with the planned surge cut, the area of conifer harvested ranges between 16,866 ha and 21,634 ha during periods 2 through 5. After this the area of conifer harvested ranges between 7,182 and 14,062 ha.

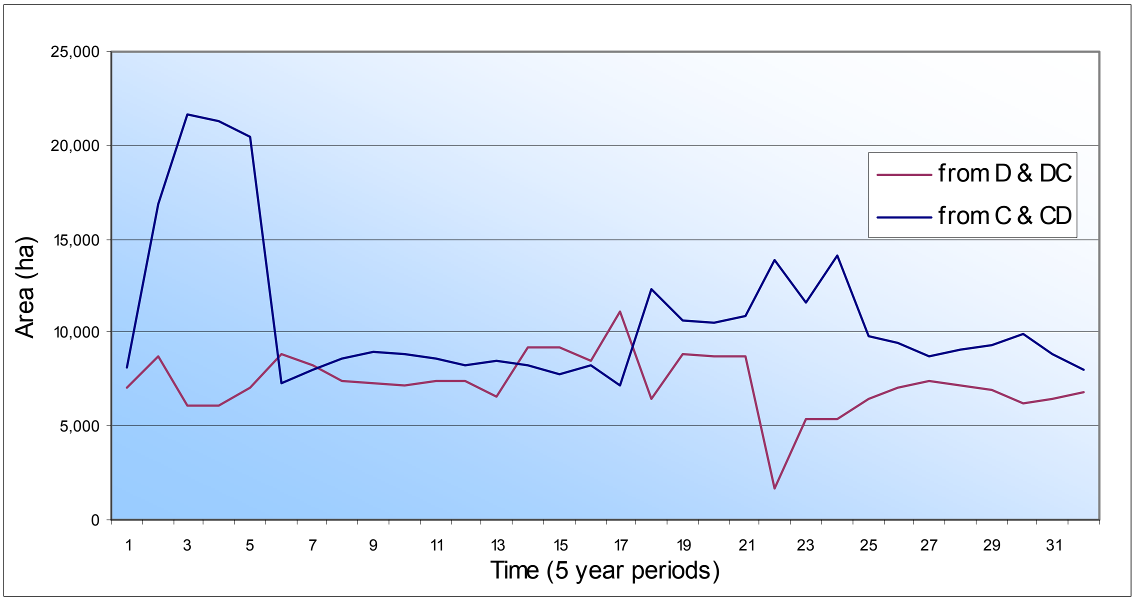


Figure 3-5 Area Harvested

3.6.3.7 Age Class Distribution

The initial age class structure of the net harvestable land base is skewed towards the mature stages. There is a large area covered by merchantable timber between 90 and 110 years of age and a relative shortage of younger (> 50 years) stands (Figure 3-6). This large spike in age class distribution (age 105) is the primary focus of much of the harvest until enough area is converted to younger stands and the forest age class distribution becomes more balanced.

The initial age class distribution for all forested stands (across the gross land base) is presented in Figure 3-6. The pattern looks almost exactly the same as the net land base but covers a larger area. The pattern of development over time is similar as well; the large spike of mature timber is reduced as the merchantable component is harvested and is replaced by younger age classes. The age class difference between the net and total land base is that as the merchantable portion of the forest becomes regulated, the productive, but non-harvestable component continues to age over time.

These age class distributions only account for forest management activities and forest dynamics. They do not model the effects of other industries or natural disturbances.

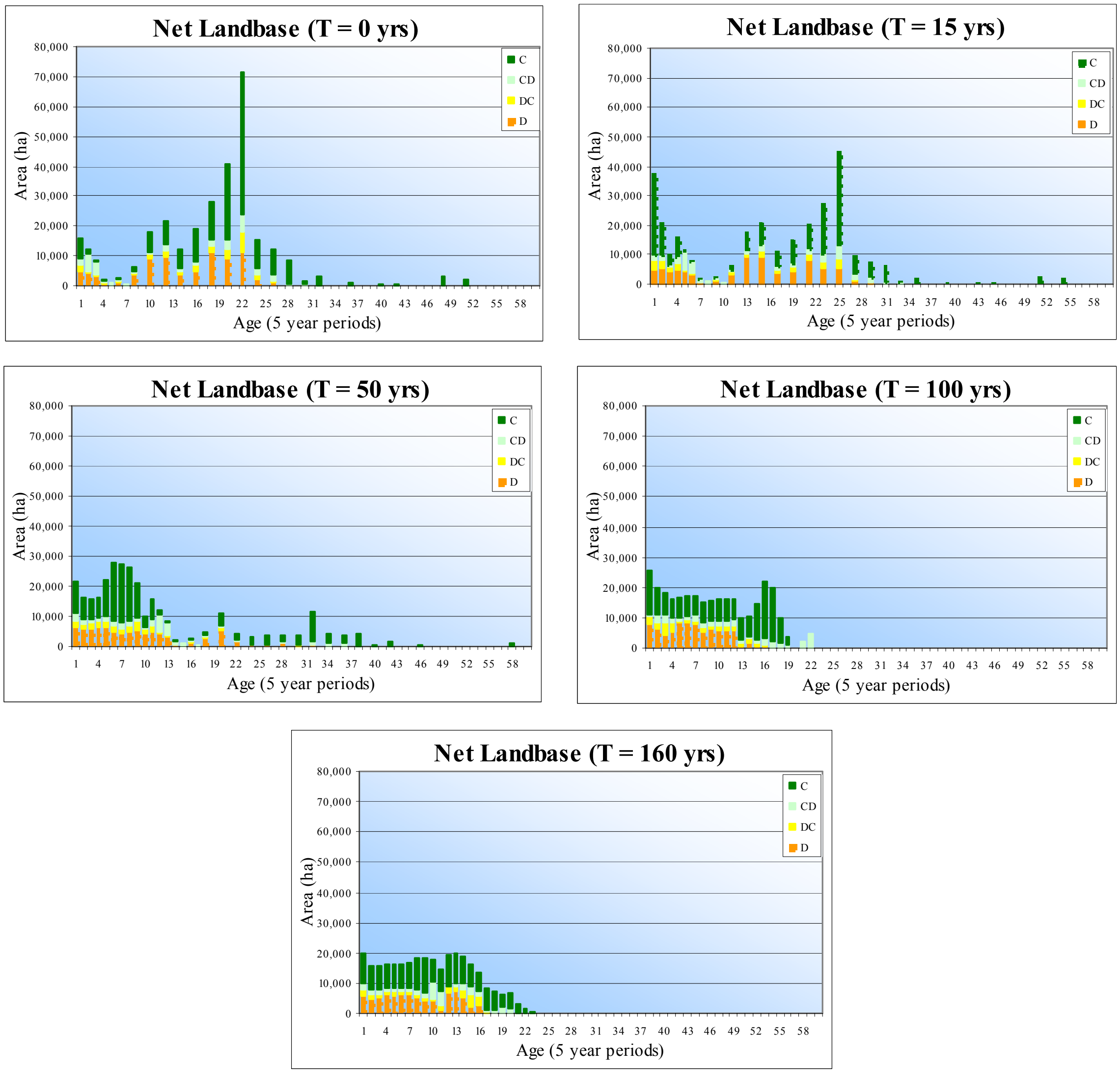


Figure 3-6 Net Land Base Age Class Projections

3.6.3.8 Patches

Patches, the areas of contiguous forest (defined using BCG and Seral Stage) during the spatial harvest sequence, were analyzed in periods 0 (initial), 3 (15 years), and 10 (50 years). Patch sizes across the FMA varied; the average patch size, depending on planning period and seral stage (Table 3-11), ranged from approximately 1.1 to 34.8 ha. The range of average patch sizes decreases over the spatial harvest planning horizon (i.e. the minimum increases and the maximum decreases). By period 10, modeled patch size ranges from 1.4 to 16.7 ha. Similar tables showing individual BCG are available on the enclosed DVD.

Table 3-11 Patch Size Distribution

Time From Now (yrs)	Seral Stage	Average Patch Area (ha)
0	Early	1.1
	Immature	1.4
	Mature	7.6
	Late	8.1
	Very Late	9.7
	Over Mature	34.8
	Total	4.9
15	Early	2.2
	Immature	1.4
	Mature	3.6
	Late	5.2
	Very Late	4.3
	Over Mature	16.7
	Total	3.2
50	Early	1.8
	Immature	2.3
	Mature	2.3
	Late	1.6
	Very Late	2.8
	Over Mature	2.2
	Total	5.4

3.6.3.9 Interior Older Forest

Patches of Interior Older Forest (IOF) were also analyzed. Interior older forests are defined by ASRD as contiguous forested area greater than 100 ha with no part of the area less than the following distance from a forest edge:

1. 60 m from a linear disturbance greater than 8 m in width;
2. 30 m from the line which cover group changes; and
3. 30 m from the line where forest seral stage changes.

Age classes included in the definition were defined as:

1. Deciduous - 100 years or older;
2. Mixedwood (DC & CD BCG combined) - 100 years or older;
3. Pine leading - 100 years or older;
4. White Spruce leading - 120 years or older; and
5. Black Spruce leading - 140 years or older.

Table 3-12 looks at the amount of IOF at 0, 15, and 50 years both ignoring and incorporating seismic lines as hard edges. Both the total area of IOF and the average IOF patch size decrease over time. Supporting tables are available on the enclosed DVD. Maps of the IOF are located in Appendix 10.

Table 3-12 Area of Interior Older Forest

FMA Area		Ignoring Seismics			Incorporating Seismics		
Year	Cover Group	# of Patches	Total Patch Area (ha)	Avg Patch Area (ha)	# of Patches	Total Patch Area (ha)	Avg Patch Area (ha)
0	Decid	9	1,878	208.6	1	137.5	137.5
	MX	5	578	115.6	-	-	-
	Pine	68	29,483	433.6	55	12,701.7	230.9
	SB	4	457	114.2	-	-	-
	SW	20	8,256	412.8	17	4,679.3	275.3
	Total	106	40,650.6	383.5	73	17,518.5	240.0
15	Decid	5	721.3	144.3	-	-	-
	MX	2	243.6	121.8	-	-	-
	Pine	47	14,995.5	319.1	32	7,038.3	219.9
	SB	8	915.8	114.5	-	-	-
	SW	20	8,341.6	417.1	13	4,699.6	361.5
	Total	82	25,217.7	307.5	45	11,737.9	260.8
50	Decid	1	202.4	202.4	-	-	-
	MX	-	-	-	-	-	-
	Pine	21	6,945.1	330.7	22	4,423.3	201.1
	SB	29	4,588.8	158.2	2	270.4	135.2
	SW	15	4,822.5	321.5	7	2,361.1	337.3
	Total	66	16,558.7	250.9	31	7,054.9	227.6

3.6.4 Mountain Pine Beetle

The goal is to harvest at least 75% of all highly susceptible stands (Rank 1 or Rank 2) within 18.5 years (by the end of period 5) starting May 1, 2007. Table 3-13 summarizes the net area of Rank 1 and 2 stands after the surge cut (both aspatial and spatial results) while Figure 3-7 shows the susceptible area and the cumulative reduction of the area over time based on spatial outputs.

Figure 3-7 suggests that the 75% reduction target cannot be met. Goal programming was used in Woodstock™ to prevent model infeasibility and to provide a means to determine the maximum amounts of MPB susceptible areas that could be harvested during the first four periods.

It would appear that the main reason why a higher percentage of the MPB operable area was not harvested during the surge cut is due to the conifer harvest constraint limiting the post-surge average to be no more than 10% below the baseline (DFMP) average.

Figure 3-7 suggests that the 75% reduction target is only achieved in period 9. 100% reduction in the area of Rank 1 and 2 stands is achieved by period 19.

Table 3-13 MPB Net Rank 1 and 2 Areas after 25 years

	FMU
Initial inventory (ha)	162,429
Target inventory (ha)	40,607
Actual inventory (ha)	67,573
Inventory excess/(shortfall) (ha)	26,966
Inventory reduction (%)	58%

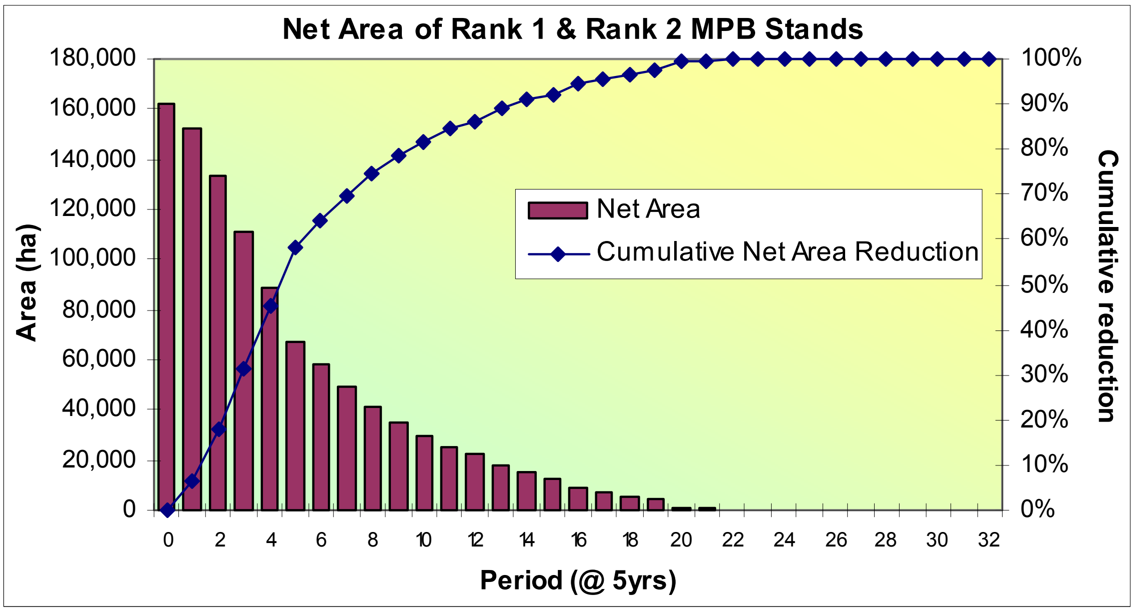


Figure 3-7 Highly Susceptible MPB Area

3.7 Comparison of MPB PFMS and DFMP PFMS

Long-term average conifer harvest level in the aspatial PFMS was 90% of the 2005 DFMP submission harvest levels, due to the 10% fall-down constraint. Average deciduous harvest in the aspatial PFMS was equal to the 2005 DFMP submission also due to a model constraint requiring such.

3.8 Pine Strategy

3.8.1 Background

The Prevention (Pine) Strategy aims to decrease the spread and outbreak potential of mountain pine beetle by reducing the area of susceptible pine stands by 75%.

Reduction targets were defined from the initial (time 0) inventory of highly susceptible (Rank 1 and Rank 2) stands on the net land base. Targets were to be met by the end of the 5th period (November 17, 2025), approximately 18.5 years from the start of the accelerated harvest (May 1, 2007).

Although reduction targets were to be defined from a DFMP inventory projected 25 years into the future, which would represent additional harvest area requirements, the TSA model was incapable of meeting the current targets. The model could only meet the targets by relaxing numerous constraints. Because these targets cannot be met, the Pine Strategy is essentially a sensitivity analysis that indicates the possible outcomes of accelerated harvest.

3.8.2 Model Formulation

The model formulation was based on the MPB PFMS, with the following exceptions:

1. The 10% primary conifer fall down constraint (post-surge average harvest levels greater than or equal to 90% of the DFMP average harvest level) was removed.
2. The constraint limiting the primary deciduous average harvest level to be greater than or equal to the DFMP average harvest level was removed.
3. The goal programming of the MPB constraints was removed during the surge cut. The model was required to meet the 75% Rank 1 and Rank 2 reduction target.

3.8.3 Results

3.8.3.1 Harvest Volume

Table 3-14 provides a summary of Pine Strategy harvest levels for the 160 year planning horizon.

Table 3-14 Net Harvest Levels for Pine Strategy for Weyerhaeuser Drayton Valley FMA

<table>
<tr><th>Volume</th><th>May 1, 2007 – Nov 17, 2025</th><th>Nov 18, 2025 – Nov 17, 2160</th></tr>
<tr><td>Conifer</td><td>1,251,814</td><td>356,046</td></tr>
<tr><td>Deciduous</td><td colspan="2">290,168</td></tr>
<tr><td>Total</td><td>1,541,982</td><td>646,213</td></tr>
</table>

3.8.3.2 Harvest Area

Figure 3-8 summarizes the area in hectares harvested by cover type over the planning horizon. The area of conifer harvested ranges between 21,080 and 30,935 ha per period during the 20 year period from years 5 to 25. After this period, the area of conifer harvested ranges between 4,965 and 11,300 ha per year. The area of deciduous cover types harvested averages 7,905 ha per year with a low of 2,985 ha during period 5 and a high of 10,300 ha in period 20.

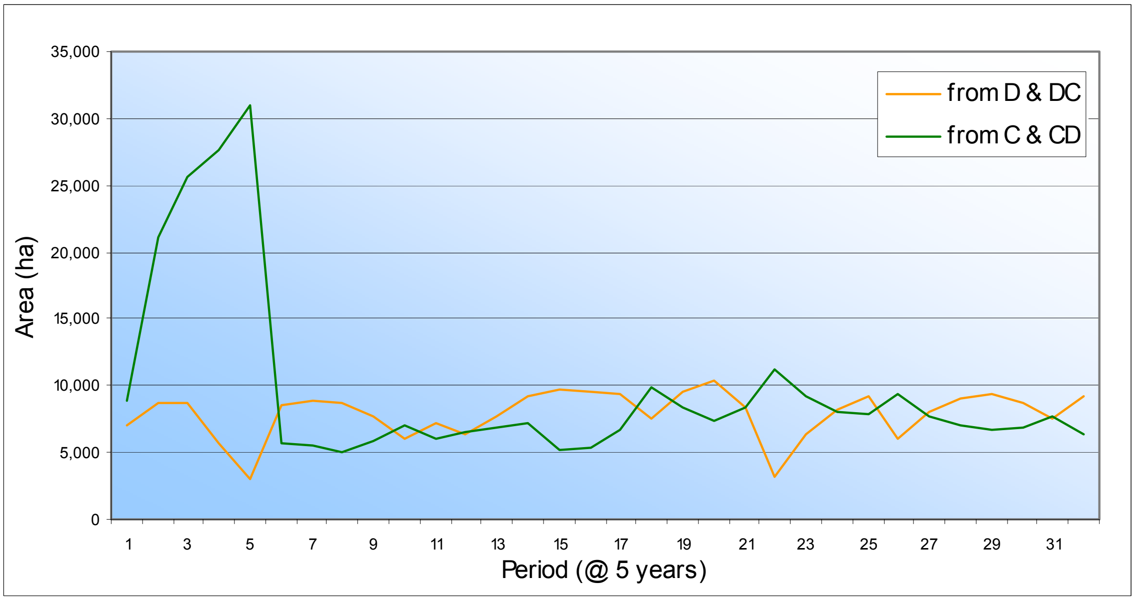


Figure 3-8 Harvest Area Projections Due to Pine Strategy

3.8.3.3 Mountain Pine Beetle

Through either harvesting or death, the area of MPB stands with a Rank 1 or Rank 2 susceptibility index decreases sharply during the first five periods (Figure 3-9). The Pine Strategy can meet 75% reduction of Rank 1 and Rank 2 stands by the end of period 5 (Table 3-15).

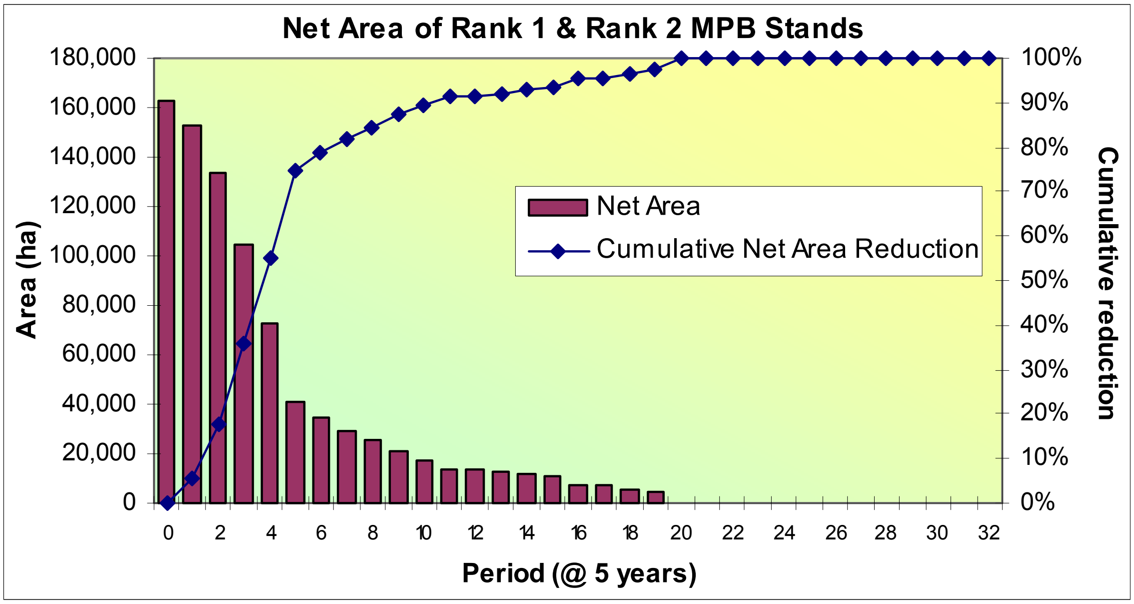


Figure 3-9 Highly Susceptible MPB Area by FMU

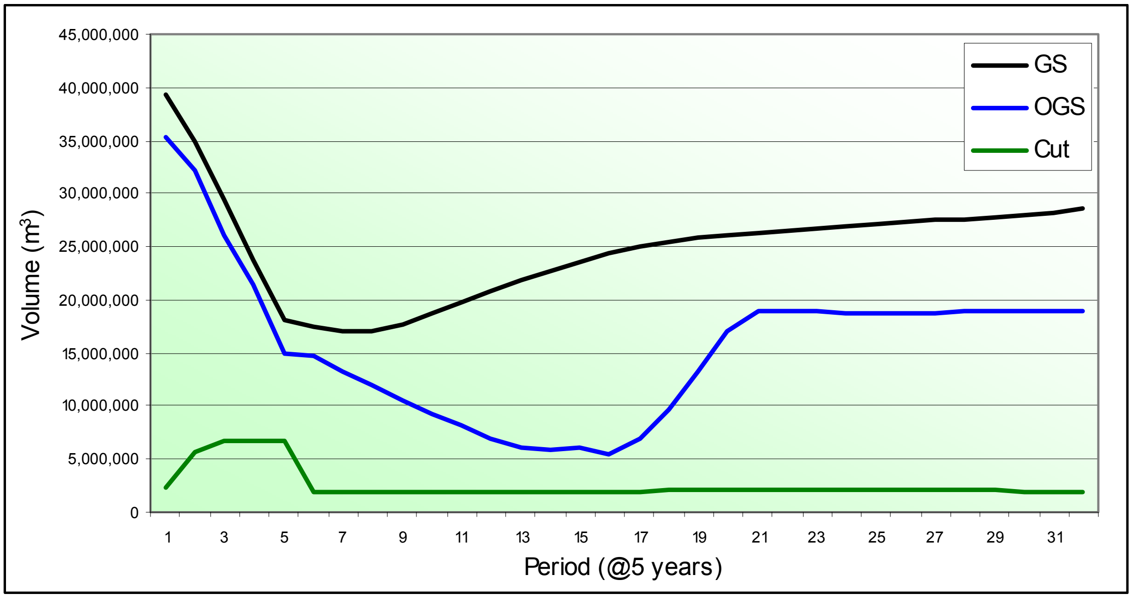
Table 3-15 Net MPB Area after 25 years

	FMU
Initial inventory (ha)	162,429
Target inventory (ha)	40,607
Actual inventory (ha)	40,607
Inventory excess/(shortfall) (ha)	0
Inventory reduction (%)	75%

3.8.3.4 Growing Stock

Figure 3-10 provides an overview of the changes in coniferous and deciduous growing stock over 160 years in the Pine Strategy scenario. Although the trend in conifer growing stock (total and operable) is similar to the DFMP, the decline in the early periods is much more rapid due to the increased harvest of susceptible pine stands to meet the 75% reduction target. The lower post-surge average harvest levels result in higher ending growing stocks than the PFMS.

The pattern of deciduous growing stock is similar to that in the MPB PFMS scenario. Deciduous growing stock exhibits a declining trend over the first 12 periods (60 years) of the planning horizon, before stabilizing and showing a gradual increase for the remainder of the planning period. This pattern is typical of a mature forest with plenty of standing merchantable volume at the beginning of the modeling start date.



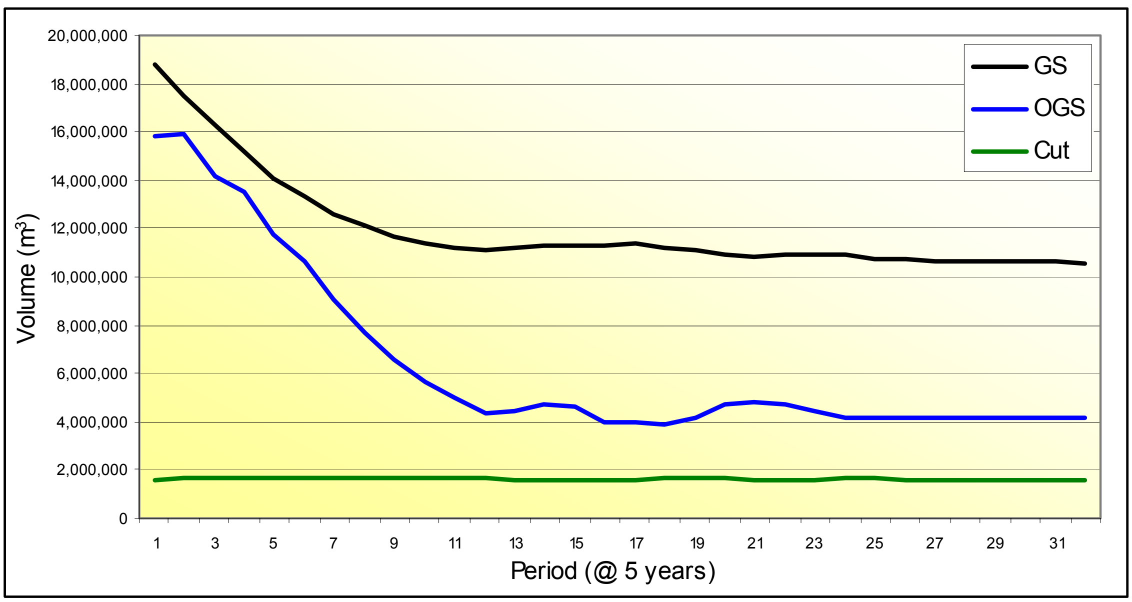


Figure 3-10 Growing Stock Projections Due to Pine Strategy

3.9 MPB Disaster Scenario

3.9.1 Background

Alberta Sustainable Resource Development's Interpretive Bulletin: *Planning Mountain Pine Beetle Response Operation* (September 2006) outlines a salvage strategy in the event of a MPB outbreak.

The following timber supply analysis was provided by ASRD:

1. Set the harvest rate at a level to “reduce the area of Rank 1 and Rank 2 stands to 25% of that in the currently approved FMP at a point 20 years in the future” (“Harvest Rate A”).
2. Assume massive mortality in 10 years.
3. Assume harvest of salvage to continue at “Harvest Rate A” for the next 10 years (years 11 to 20).
4. Stands that are salvaged return at normal regeneration transition and normal regeneration lags.
5. For stands that are not salvaged the following rules apply:
6. For stands with greater than 60% pine content, assume entire stand mortality (mortality applied to stands that are 20 years or older). The stand goes onto the lowest density yield curve (e.g. A/B density) for that stratum with a 15-year regeneration lag. The stand age is reset to 0.
7. For stands with less than or equal to 60% pine content, the approved yield curves from the last DFMP are reduced to remove the pine content, on a proportionate basis, and the stand continues to grow at it’s current age (stand age is not reset to zero). No assumption is made for stand release due to opening of the canopy by the pine mortality.
8. Calculate an even flow AAC for years 21 to 200 using normal planning criteria.

The absolute pine content was used to establish if a stand had greater or less than 60% pine content. Stands with greater than 60% pine had a “D” code appended to the MPB theme (theme 10), signifying the stand would undergo the mortality event. Stands with less than or equal to 60% pine content had a value appended to the MPB theme representing the proportional reduction in conifer volume to be applied to the stand. Because the conifer yield is tracked separately in the yield curves, the proportionate reduction represents the relative pine percent rounded to the nearest 10%. Values 0-9 represent reduction of 0% to 90%, with X representing 100%. As the mortality event applies only to stands greater than 20 years of age at the time of the mortality event (10 years from the start date of the model), stands currently less than 10 years of age were re-classified as non-MPB stands (Theme 10 = “ZZ”) and were not subject to volume reductions.

3.9.2 Model Formulation

The MPB PFMS playback model formulations were used as a base for the disaster scenario models. A variety of model changes were made to accommodate the MPB disaster strategy, as follows:

1. Because we are ~1.5 years into the second period of the mortality event was adjusted to occur at the end of period 3, ~ 8.5 years from May 1, 2007.
2. Mortality affects all stands with >= 60% pine and >= 20 years old.
3. The Stanley™ run associated with the MPB PFMS was used and the SHS was played back for periods one through three.
4. Salvage can occur for ten years (periods 4 and 5).

5. Constraints were used to force harvest volumes equal to the spatial harvest sequence in periods 4 and 5. The conifer harvests were set to 5,220,835 m^3 and 5,220,903 m^3 in periods 4 and 5, respectfully. The deciduous harvests were set to 1,699,990 m^3 and 1,694,835 m^3 in periods 4 and 5, respectfully.
6. Harvest flows were constrained as follows
    a. Coniferous: in period 6-12 strict even flow; periods 6-32 even flow within10%
    b. Deciduous: in period 6-12 strict even flow; periods 6-32 even flow within 10%.
7. The mortality event is modeled as a harvest action. The "harvest" occurs in period 5, after stands killed by MPB are no longer eligible for salvage.
    a. Stands killed by MPB and not salvaged are transitioned with a 5 year regeneration lag (which is equivalent to a regeneration lag of 15 years after the mortality event).
    b. After MPB attack, the un-salvaged stands regenerate to the same stand type as before MPB, but on the lowest density yield curves (transition to A density). Salvaged stands regenerate to normal post-harvest conditions.
    c. Volumes are adjusted for MPB killed stands starting in period 4. Un-salvaged stands contribute no harvest volume or growing stock. This is true for both deciduous and conifer, as it is assumed that the deciduous volume in these stands is unavailable for harvest.
    d. Stands with <60% pine have their conifer volumes adjusted to reflect how much of the conifer volume is pine. If a stand is 40% pine, but pine represents half the conifer volume (the stand is 80% conifer), the stand's conifer volume is reduced by 50%. Harvest volume and growing stock are represented by adjusting the yields relative to the percent of pine starting in period 6.
8. Seral stage and harvest profile constraints from the MPB PFMS scenario were included in the disaster scenario.

Area specific constraints on the Rose Creek forest were goal programmed to remedy infeasibilities in the model. The constraint was modified as follows:

1. RC_CON_VOL ≥ 21,753 in period 4
2. RC_CON_VOL ≥ 13,980 in period 5
3. RC_CON_VOL ≥ 21,753 in period 6

3.9.3 Results

The disaster scenario was applied across the entire FMA but the effects of a massive mortality will probably differ event differ across the FMA. Given the provincial direction of maximizing the economic recovery of MPB affected areas subject to conservation objectives, the harvest levels would likely need to be recalculated as an outbreak develops, possibly resulting in a new surge harvest level. Operability limits would likely need to be reconsidered as well. Ideally, harvest levels would be non-declining, rather than even flow, to capture the increasing growing stock after the outbreak. It is also highly unlikely that a mortality event would kill every single pine tree in the FMA over 20 years of age in a single period.

3.9.3.1 Harvest Volume

Table 3-16 is a summary MPB disaster harvest levels for the 160 year planning horizon.

Table 3-16 Net Harvest Levels for MPB Disaster Scenario for the Drayton Valley FMA

Volume	May 1, 2007 – Nov 17, 2025	Nov 18, 2025 – Nov 17, 2160
Conifer	954,301	308,666
Deciduous	311,769	286,262
Total	1,266,070	594,928

Volume comparisons to the MPB PFMS and the Pine Strategy are summarized in Section 3.10.

3.9.3.2 Harvest Area

Figure 3-11 summarizes periodic harvest areas following the projections of the MPB Disaster scenario. The area of conifer harvested ranges between 16,865 and 21,635 ha per period during the 20 year period from years 5 to 25. After this the area of conifer harvested ranges between 4,115 and 10,855 ha. The area of deciduous cover types harvested fluctuates less and averages 7,945 ha per period with a low value of 2,400 ha in period 23 and a high value of 11,035 ha per in period 16.

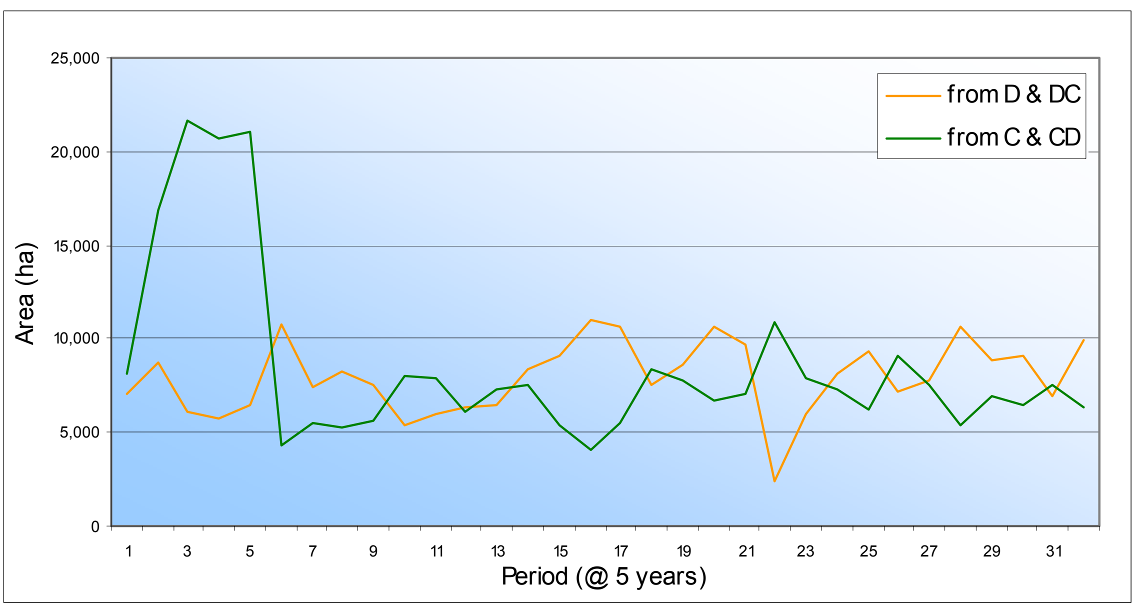


Figure 3-11 Harvest Area Projections Due to MPB Disaster Scenario

3.9.3.3 Mountain Pine Beetle

As expected because of surge cuts or stand mortality, the area of MPB stands with Rank 1 and Rank 2 susceptibility index decreases sharply after the fifth period (Figure 3-12). Table 3-17 shows the net MPB area reduction target was met after 25 years.

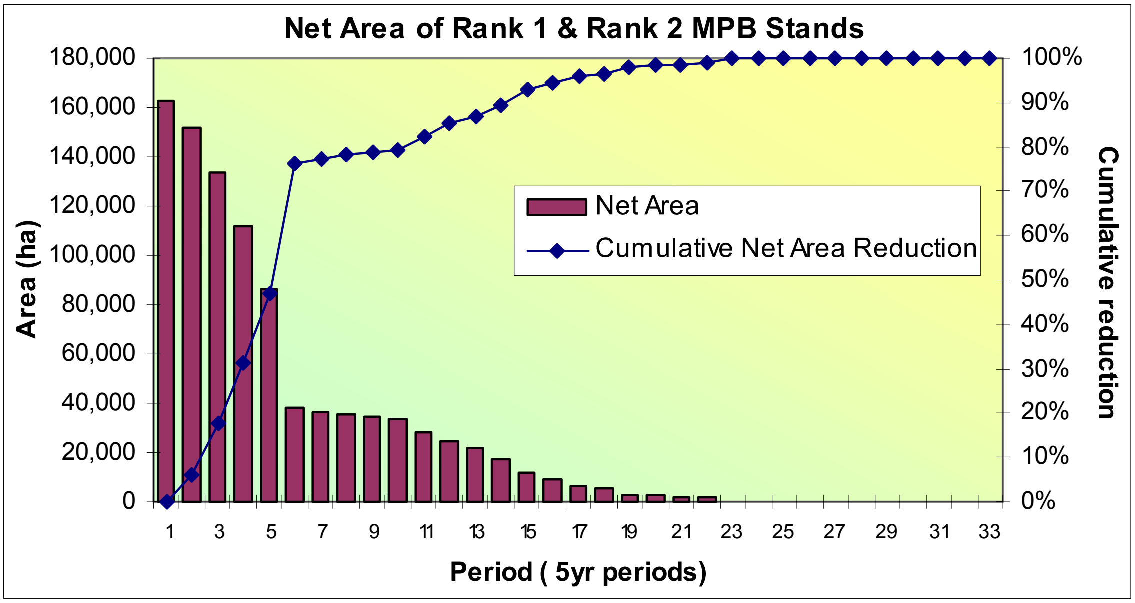


Figure 3-12 MPB Disaster Scenario Susceptible Net Area Reduction

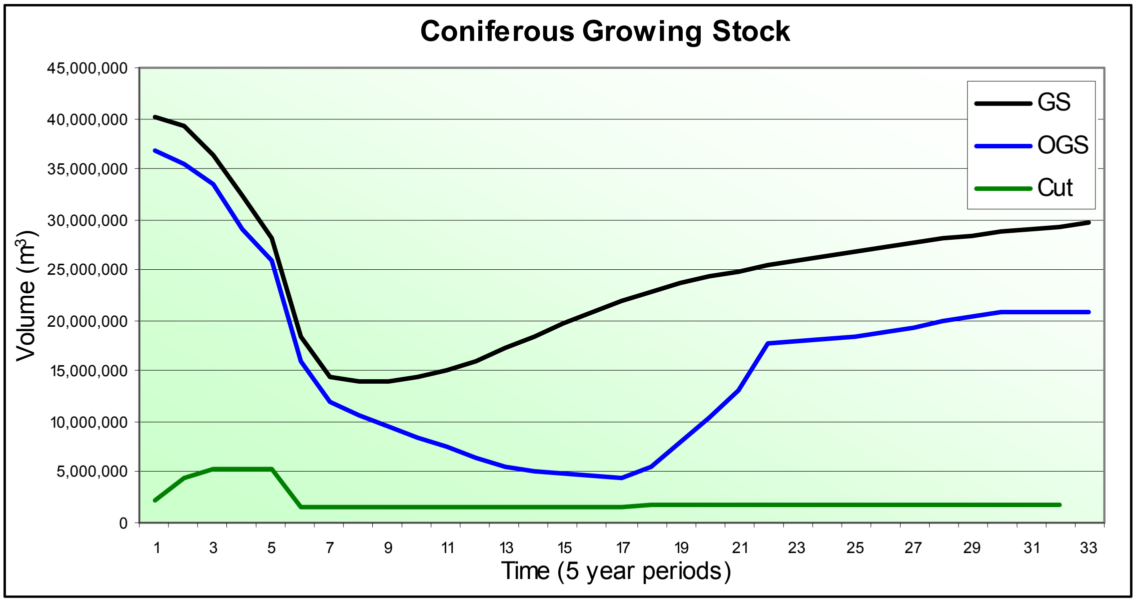
Table 3-17 Net MPB Area Reduction after 25 Years

	FMU
Initial inventory (ha)	162,429
Target inventory (ha)	40,607
Actual inventory (ha)	38,529
Inventory excess/(shortfall) (ha)	-2,078
Inventory reduction (%)	76%

3.9.3.4 Growing Stock

Figure 3-13 provides an overview of the changes in coniferous and deciduous growing stock over 160 years in the disaster scenario. This figure shows a similar trend as the pine strategy scenario. There is a significant decline in coniferous growing stock in periods one through seven, due to both the mortality event and the salvage period. The proportionate reduction in conifer volume of stands not harvested during the salvage period results in lower growing stock levels before recovery. The lower post-surge conifer harvest results in a higher ending conifer growing stock than the pine strategy.

The deciduous growing stocks (total and operable) exhibit very little change form the pine strategy, though area significantly lower than the PFMS by the end of the planning horizon.



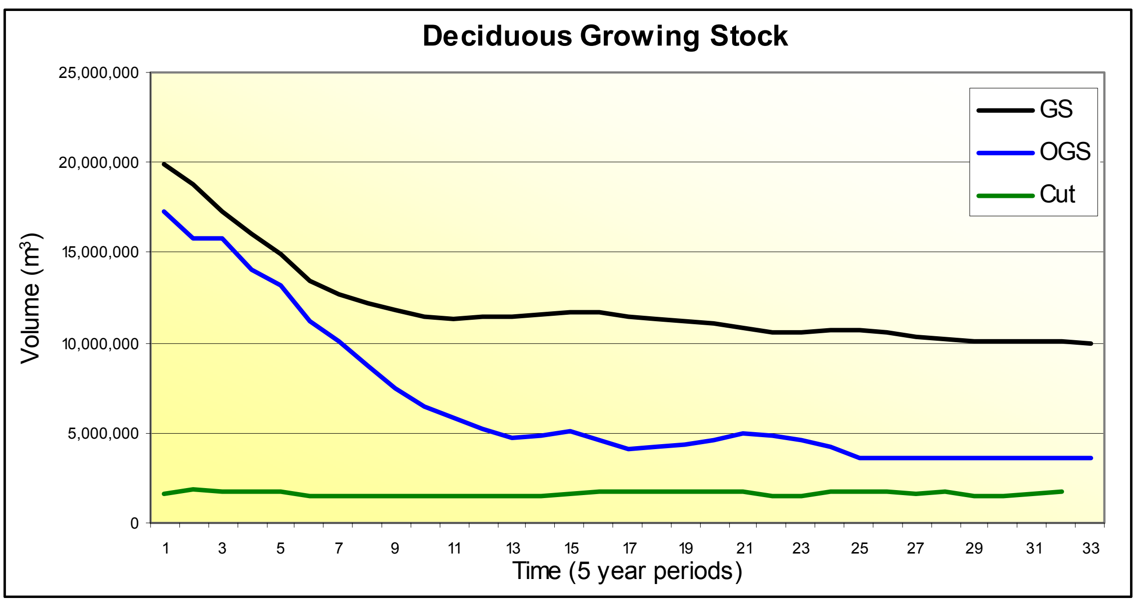


Figure 3-13 MPB Disaster Scenario Coniferous and Deciduous Growing Stock

3.9.3.5 Age Class Distribution

Figure 3-14 shows the age class distribution for the following time periods: present, in 15 years, in 50 years, in 100 years and in 160 years for the net land base. It is important to note the large age class spike created by the MPB disaster scenario in 50 years and that continues in 100 years and in 160 years. The model projects 22% of all coniferous stands in a single age class (25 years old in 50 years).

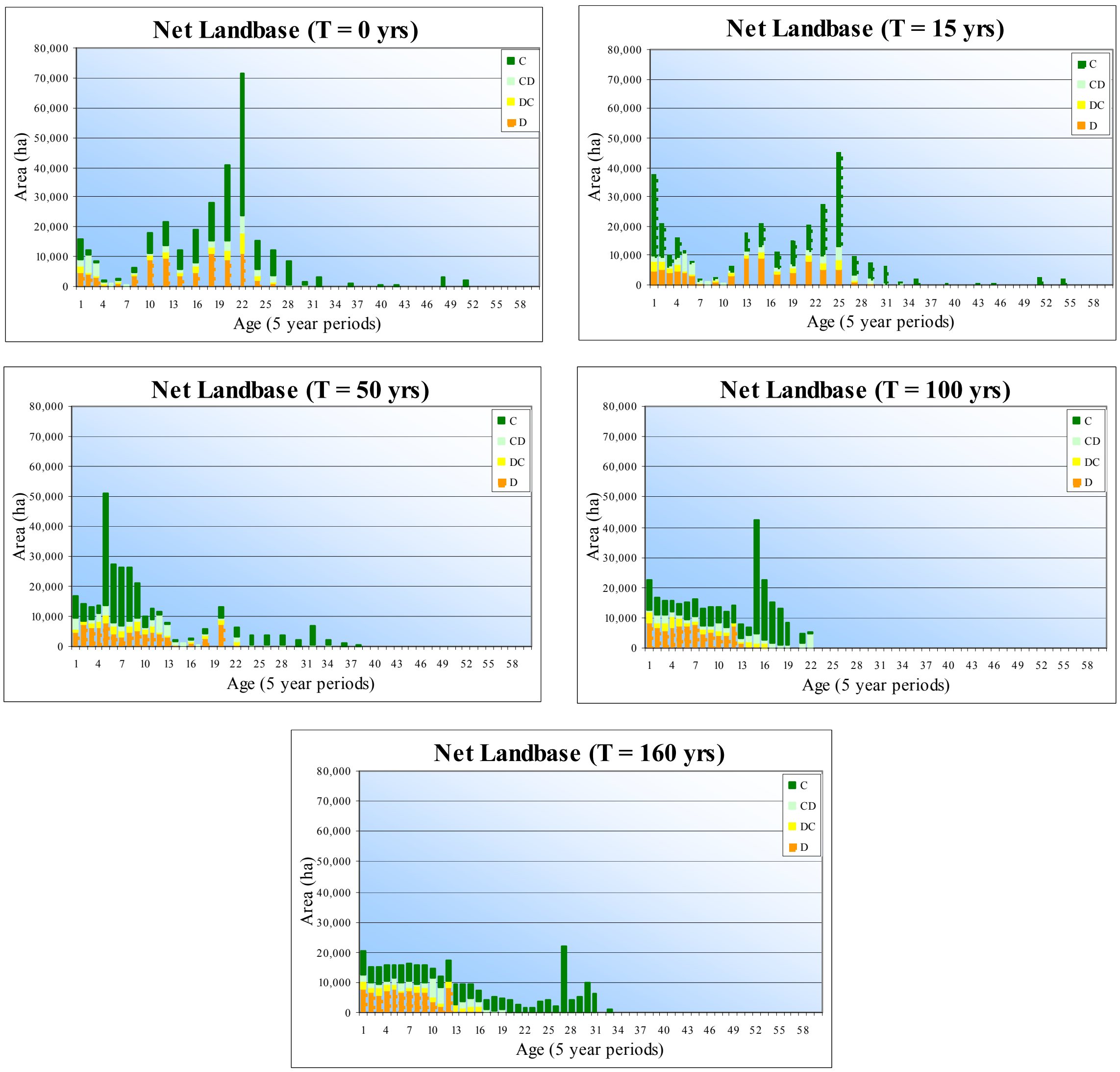


Figure 3-14 MPB Disaster Scenario Age Class Distribution of the Net Land Base

3.9.3.6 Seral Stage Distribution

The Lower Foothills, Upper Foothills and Subalpine Natural Subregions total land base and net land base seral stage distributions from the disaster scenario are shown in Table

3-18 through Table 3-23. For the total land base the minimum target areas are met for all cover types except pine and pine-spruce mixes. Seral stage constraints for pine and pine-spruce types were removed for the disaster scenario due to the modeled massive pine mortality event. For the net land base, minimum target areas are partly met in the Lower Foothills Natural Subregion and fully met in the Upper Foothills and Subalpine Natural Subregions at 160 years. Seral stage retention values marked in red represent seral stages with area targets that were not achieved.

Table 3-18 Lower Foothills Seral Stage Distribution in the Gross Land Base

Lower Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	4,527	44,198	46,338	23,678	13,266	13,602
Very Late Decid	1.0	905	3,397	15,410	6,690	12,337	12,515
Overmature Decid			0	4	225	5,840	12,337
Late DC	5.0	1,409	17,039	14,425	6,974	5,051	6,160
Very Late DC	1.0	282	1,844	6,859	2,042	3,071	3,129
Overmature DC			0	7	92	1,813	3,071
Late CD	5.0	1,783	14,299	13,969	6,989	10,986	4,689
Very Late CD	1.0	357	2,945	8,467	3,527	2,799	3,529
Overmature CD			4	10	604	1,990	3,129
Late PL	5.0	2,461	33,578	25,287	1,024	660	4,599
Very Late PL	1.0	492	2,741	13,316	9	251	4,470
Overmature PL			10	4	0	9	615
Late PS	5.0	862	10,991	7,950	4,378	2,985	2,108
Very Late PS	1.0	172	2,851	5,821	3,412	961	1,439
Overmature PS			92	33	836	875	975
Late SW	10.0	1,661	10,360	12,078	10,009	4,016	5,459
Very Late SW	2.0	332	3,684	8,109	7,467	3,477	3,516
Overmature SW			54	105	987	2,904	3,513
Late 'other' Con	5.0	5,066	57,098	68,566	91,025	85,638	87,588
Very Late 'other' Con	1.0	1,013	20,982	43,020	64,643	83,956	85,647
Overmature 'other' Con			614	2,345	19,934	60,690	85,131

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-19 Upper Foothills Seral Stage Distribution in the Gross Land Base

Upper Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	83	1,186	680	250	219	263
Very Late Decid	2.0	33	358	597	142	194	196
Overmature Decid			0	0	2	134	194
Late DC	5.0	97	1,653	1,145	260	479	505
Very Late DC	2.0	39	691	1,065	162	190	194
Overmature DC			0	0	7	162	190
Late CD	5.0	183	1,704	1,377	731	385	253
Very Late CD	2.0	73	179	889	653	201	183
Overmature CD			12	68	84	153	168
Late PL	2.0	950	31,413	26,901	326	5,362	44,831
Very Late PL	1.0	475	3,716	14,431	14	135	44,821
Overmature PL	0.5	238	766	844	0	3	137
Late PS	10.0	2,221	16,527	16,258	7,218	4,386	18,671
Very Late PS	5.0	1,111	8,277	13,597	6,647	3,011	13,363
Overmature PS	2.5	555	3,374	3,972	1,599	2,918	3,099
Late SW	10.0	1,687	8,170	9,021	5,580	3,249	10,016
Very Late SW	5.0	562	5,671	7,054	4,490	2,734	6,353
Overmature SW	2.5	281	1,640	2,557	1,410	2,295	2,735
Late 'other' Con	10.0	1,752	12,066	13,682	15,408	13,681	15,850
Very Late 'other' Con	5.0	876	3,620	8,728	12,555	13,255	14,254
Overmature 'other' Con	2.5	438	375	707	2,952	11,297	13,257

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-20 Subalpine Seral Stage Distribution in the Gross Land Base

Subalpine	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late PL	5.0	64	1,181	1,103	91	12	1,196
Very Late PL	2.0	26	70	83	0	0	12
Overmature PL	1.0	13	70	83	0	0	12
Late PS	10.0	369	3,079	3,488	1,329	882	3,505
Very Late PS	7.5	277	2,121	3,077	1,318	871	2,429
Overmature PS	5.0	184	1,137	1,747	564	864	878
Late SW	20.0	494	2,433	2,387	1,087	1,056	2,466
Very Late SW	10.0	247	2,254	2,367	1,072	1,056	1,832
Overmature SW	5.0	123	1,046	1,640	872	1,043	1,056
Late 'other' Con	10.0	75	615	651	644	591	747
Very Late 'other' Con	5.0	37	332	614	547	591	602
Overmature 'other' Con	2.5	19	0	0	227	494	591

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-21 Lower Foothills Seral Stage Distribution in the Net Land Base

Lower Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	4,527	38,441	37,941	12,256	883	1,218
Very Late Decid	1.0	905	3,010	12,134	93	131	131
Overmature Decid			0	3	3	83	131
Late DC	5.0	1,409	15,255	12,089	4,075	1,968	3,078
Very Late DC	1.0	282	1,650	5,616	34	46	46
Overmature DC			0	5	0	28	46
Late CD	5.0	1,783	12,613	11,795	4,385	7,764	1,188
Very Late CD	1.0	357	2,651	7,162	1,558	24	27
Overmature CD			4	2	317	20	24
Late PL	5.0	2,461	30,827	22,228	924	32	181
Very Late PL	1.0	492	2,566	11,664	0	3	52
Overmature PL			10	3	0	0	3
Late PS	5.0	862	9,857	6,712	3,423	1,962	673
Very Late PS	1.0	172	2,512	4,919	2,537	4	4
Overmature PS			86	26	586	1	4
Late SW	10.0	1,661	8,098	9,193	6,576	520	1,962
Very Late SW	2.0	332	2,983	6,144	4,582	20	20
Overmature SW			38	74	286	19	20
Late 'other' Con	5.0	5,066	9,511	8,384	8,451	1,732	3,186
Very Late 'other' Con	1.0	1,013	1,721	4,859	4,847	1,227	1,245
Overmature 'other' Con			18	70	691	893	1,227

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-22 Upper Foothills Seral Stage Distribution in the Net Land Base

Upper Foothills	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late Decid	5.0	83	1,052	521	65	23	67
Very Late Decid	2.0	33	324	475	0	0	0
Overmature Decid			0	0	0	0	0
Late DC	5.0	97	1,491	982	85	284	310
Very Late DC	2.0	39	642	913	0	0	0
Overmature DC			0	0	0	0	0
Late CD	5.0	183	1,531	1,187	538	179	40
Very Late CD	2.0	73	156	768	496	0	0
Overmature CD			3	52	62	0	0
Late PL	2.0	950	26,645	20,927	234	5,231	38,529
Very Late PL	1.0	475	3,213	10,544	10	5	38,519
Overmature PL	0.5	238	659	628	0	0	5
Late PS	10.0	2,221	12,962	12,461	4,278	1,337	14,662
Very Late PS	5.0	1,111	6,556	10,119	3,784	55	9,354
Overmature PS	2.5	555	2,815	3,088	108	55	51
Late SW	10.0	1,687	6,247	6,744	2,873	531	7,298
Very Late SW	5.0	562	4,321	5,223	2,213	18	3,635
Overmature SW	2.5	281	1,447	2,047	60	18	18
Late 'other' Con	10.0	1,752	2,299	2,307	2,268	442	2,523
Very Late 'other' Con	5.0	876	732	1,619	1,267	21	927
Overmature 'other' Con	2.5	438	68	57	69	9	21

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

Table 3-23 Subalpine Seral Stage Distribution in the Net Land Base

Subalpine	Target Minimum Area		Time from Start Date (years)				
Seral Stage	(%)	(ha)	0	15	50	100	160
Late PL	5.0	64	892	814	80	0	895
Very Late PL	2.0	26	188	810	0	0	895
Overmature PL	1.0	13	68	77	0	0	0
Late PS	10.0	369	2,156	2,245	462	4	2,244
Very Late PS	7.5	277	1,666	2,154	458	4	1,168
Overmature PS	5.0	184	994	1,405	136	4	0
Late SW	20.0	494	1,413	1,347	33	3	1,413
Very Late SW	10.0	247	1,384	1,347	32	3	779
Overmature SW	5.0	123	693	1,019	3	3	3
Late 'other' Con	10.0	75	156	157	53	0	156
Very Late 'other' Con	5.0	37	104	156	53	0	11
Overmature 'other' Con	2.5	19	0	0	0	0	0

PL = Pine, PS = Pine/White Spruce, SW = White Spruce

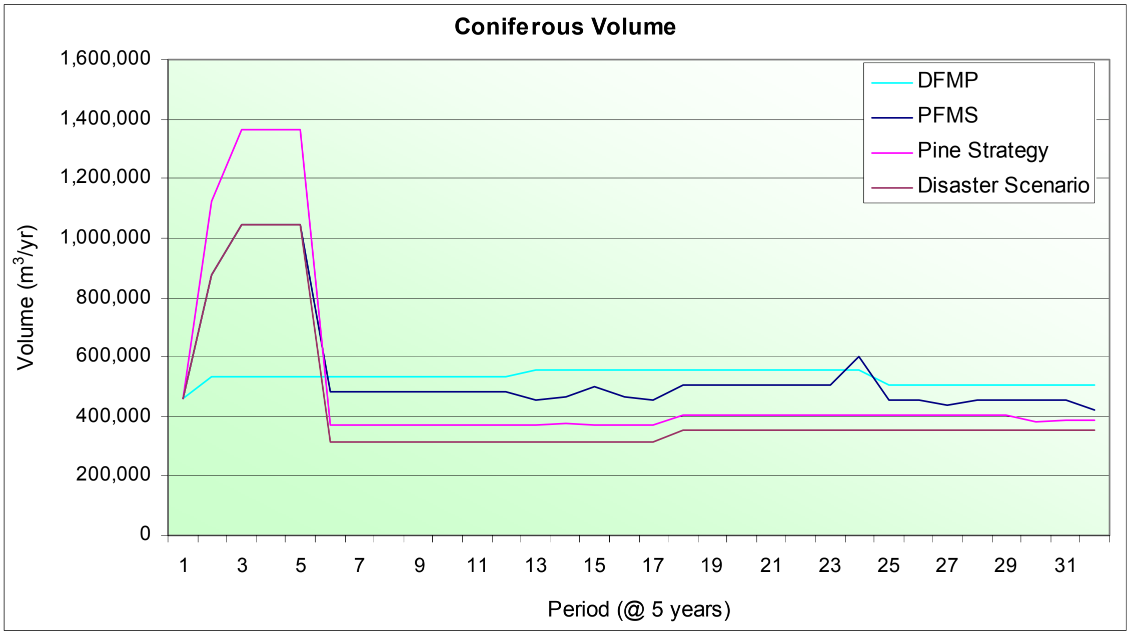
3.10 DFMP PFMS, MPB PFMS, Pine Strategy, and MPB Disaster Run Harvest Volume Comparison

This section summarizes and compares harvest volumes obtained from the MPB PFMS, Pine Strategy, Disaster scenario, and DFMP PFMS runs.

3.10.1 Harvest Volumes

Figure 3-15 shows comparison of harvest volumes. The disaster scenario in period 6 (316,206 m^3/yr) reduced the average AAC by 35% compared to the MPB PFMS scenario (486,372 m^3/yr) and 14% compared to the pine strategy scenario (367,896 m^3/yr).

In general the MPB disaster scenario indicates no significant changes to the deciduous harvest level. There is a slight increase in deciduous harvest in both the disaster scenario and the pine strategy compared to the MPB PFMS in periods 18 through 32.



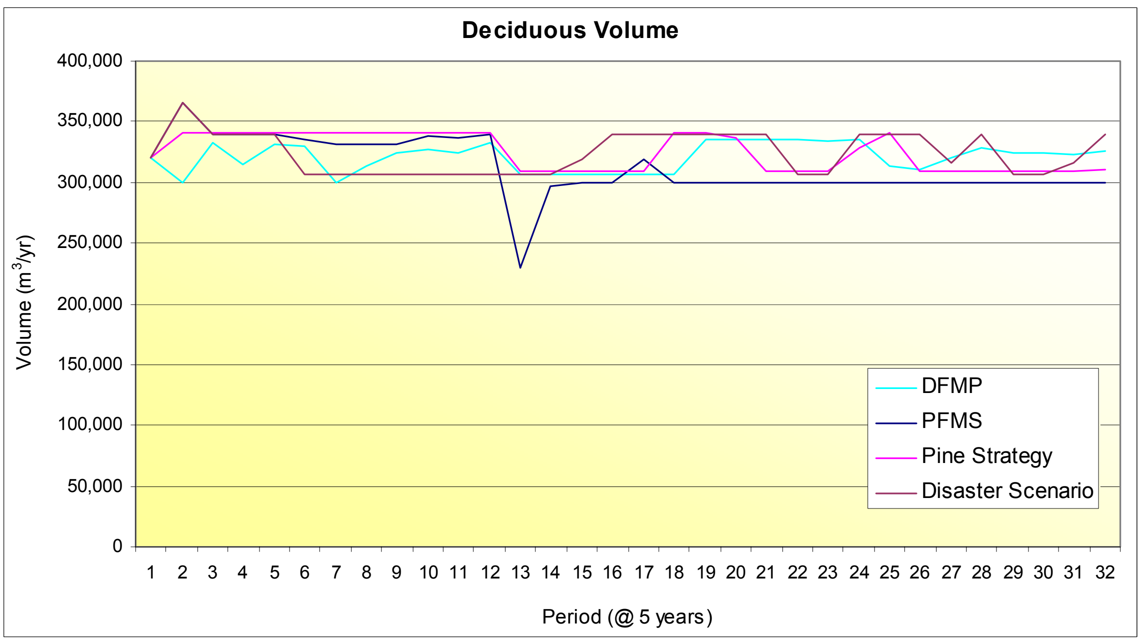


Figure 3-15 Annual Conifer and Deciduous Harvest Volumes

3.10.2 Key Indicators

Table 3-24 summarizes the key indicators for the Drayton Valley FMA area. The significant change between the 3 scenarios is the difference in volume harvested per hectare in conifer stands. The disaster scenario results in a drop in volume harvested per hectare over the planning period. There is a 12% drop in conifer volume harvested per hectare and a 5% drop in deciduous in the disaster scenario compared to the MPB PFMS scenario. Similarly there is a 7% decline in conifer and a 1% decline in deciduous volume harvested per hectare in the disaster scenario when compared to the pine strategy. There is very little change in the MPB disaster scenario harvest age or piece size compared to the MPB PFMS, pine strategy and DFMP.

Table 3-24 Comparison of Key Indicators by Land Base (160 yr Averages)

Scenario	Area Weighted Harvest Age (Yrs)		Average Volume per ha Harvested (m^3/ha)		Average harvested piece size (DBHq cm)		Area Harvested per Period (ha)	
	Conifer	Decid	Conifer	Decid	Conifer	Decid	Conifer	Decid
DFMP	127	83	263	208	24	29	9,668	7,316
PFMS	119	85	242	231	24	29	10,745	7,288
Pine Strategy	119	83	244	227	24	28	9,668	7,904
Disaster Scenario	120	83	226	226	24	28	8,518	7,946

4 Implementation

The implementation plan will provide direction to adaptive forest management practices on the FMA, the benefits of which include:

1. Confidence in forest management practices by identifying variances between forecasted conditions and actual conditions;
2. Flexibility in adjustments to management for identified variances; and
3. Accumulation of an information base for continued improvement for future planning requirements.

The General Development Plan (GDP) and an Annual Operation Plan, guided by the Ground Rules, will be the planning documents within which the MPB plan will be implemented.

4.1 Timber Operations

4.1.1 Sequencing

Timber supply models (Woodstock and Stanley) will provide information on the shape, size, and distribution of harvest areas for the first twelve periods (60 years). Harvest areas identified through previous planning exercises (pre-planned) have been scheduled for harvest in period one or two (2000-2010).

For operational planning purposes, the spatial harvest sequence (SHS) for the first five periods will be utilized. It is expected that the SHS as submitted and approved, will be followed by all timber operators. Harvest areas are identified by operator for the first three periods of the DFMP.

The first planning period of the DFMP has been completed. Variance tracking of the new SHS will commence on May 1, 2007.

There may be the opportunity to exchange blocks between operators if particular blocks do not fit a desired profile. This will occur during the operational planning stage and be agreed to jointly.

4.1.2 Salvage

The Company has been using the normal industrial timber salvage tracking and reporting system for many years and it is our understanding that this remains acceptable to the Province. One hundred percent of the estimated TDA volume will be charged against Weyerhaeuser's Periodic Allowable Cut. However, it is recognized by both industry and government that there may be opportunities to move away from the current status quo for the tracking and chargeability of timber salvage in order to address issues around the accuracy and appropriateness of methods. It is our understanding that the Alberta Forest Products Association and ASRD have agreed to look at alternatives to the current means as described above. We feel that it would be best to await the outcome of any industry – Government level review of this subject before we recommend any new methods to ASRD.

4.1.3 Green-up Constraints

Green-up constraints are not applied for any period in the TSA.

4.1.4 Silviculture

The Forest Management Agreement gives Weyerhaeuser the right to grow timber and carry out reforestation programs. The agreement also requires Weyerhaeuser to progressively reforest all land cut over by the Company. In addition, a goal of this management plan is to increase the sustainable harvest level of deciduous and coniferous timber from the FMA area. These rights, responsibilities, and goals are supported by a set of regeneration assumptions, silviculture strategies, and reforestation standards.

The provincial regeneration standards (C, CD, DC, D) will be used to evaluate the performance of regenerating harvest areas until alternative regeneration standards are developed and approved that specifically link regeneration standards to yield stratum. To use resources efficiently while maintaining relative proportions of coniferous, mixedwood, and deciduous stands, certain considerations apply to reforestation decisions including:

1. Site suitability and stand condition;
2. Declining deciduous stand condition and associated low natural regeneration potential;
3. Residual immature coniferous trees; and
4. Regenerating stand stocking and condition.

To effectively integrate these considerations into the operational decision making process while supporting the assumptions of future forest composition, an exchange of areas between different stand type strata following Provincial policy may be considered. There are not anticipated to be any major shifts in leading species across the landscape resulting from the implementation of the silviculture strategies description in the December 2005 DFMP.

Immature coniferous understorey trees will be evaluated and considered in the operational decision making process. Retention of coniferous understorey in both deciduous and coniferous overstorey stands can contribute to regeneration objectives and availability of merchantable coniferous forests for mid-term (30-60 years) timber supply.

Harvested areas will be promptly reforested to sustain long term forest productivity. Planning regeneration activities prior to harvest and scheduling treatments as soon as logistically feasible after harvest will facilitate prompt regeneration. Planting and natural seeding will be used to establish coniferous seedlings. Where planting of coniferous seedlings is used to regenerate C, CD, and DC openings, a target of 1400, 1000, and 800 stems per hectare (SPH) will be used in prescribing planting density. For C stratum openings 1400 SPH is deemed adequate to meet the associated regeneration standard while accounting for normal levels of mortality. Where higher levels of mortality are suspected after planting, openings will be monitored to support early detection and remedial action. Distribution of seedlings for CD and DC openings can be either an even distribution of 1000 and 800 SPH respectively or concentrated higher density planting of an area proportionally less than the entire block. A typical application of this would be to plant the road and decking areas of a DC block at 1400 SPH to the extent that 60 percent of the block is planted. This equates to an average planting density of 840 SPH, which correspond with the guideline of a target of 800 SPH.

When establishing a planting density for specific openings, factors of pre-harvest understorey or post-harvest advanced regeneration and ingress potential will be considered. Ingress potential will be evaluated based on seed source and seedbed conditions. Target planting densities may be adjusted for specific site conditions in recognition of these factors. Adjusted planting densities will be presented in the Silviculture Annual Operating Plan.

All regenerating stands will pass an establishment standard. If an opening does not pass the establishment standard then one or more of the following tactics will be employed to address the failed status.

1. Re-treat using combinations of site preparation, planting, or tending;
2. Leave stands to grow where height performance is the cause for failure; or
3. Change the opening stratum declaration.

Balsam fir and alpine fir are considered an acceptable crop tree for coniferous species. Fir species constitute a part of the inventory and their presence is incorporated in the development of yield curves. Merchantable fir is utilized as a component of the coniferous harvest. Where understorey fir exists in an opening it is often retained to provide value in aesthetics, habitat, structure, and fibre production.

The primary harvesting system used is patch cutting with variable retention, with subsequent reforestation activities to provide for a sustainable timber harvesting land base. Patch cutting involves the removal of a majority of merchantable stems from the harvest area. As part of this harvesting system Weyerhaeuser will be employing the Stand Level Ecological Guidelines that provide for both vertical and horizontal structure to be left on the harvest area.

4.1.5 Incidental Timber Replacement Strategies on the FMA

The DFMP incorporates strategies within the Timber Supply Analysis that account for the primary and incidental components supporting the deciduous and coniferous annual allowable cuts. In general, all strata transition to similar strata of 'C' crown closure (equivalent to full stocking).

Silviculture strategies that support the maintenance of incidental species are identified for all strata (C, DC, CD, D, Switch stands and in-block temporary roads) in the approved plan.

Silviculture activities that contribute to the sustainability of the incidental components of the stands will be undertaken. These activities will be applied at various levels and will include:

1. Establishment of coniferous trees on new harvest areas that do not support deciduous regeneration, most notably on roads and non-satisfactorily restocked areas in deciduous (D) harvest areas;
2. Avoidance and planned protection of coniferous understorey during logging operations in predominately deciduous areas; and
3. Protection of some of the deciduous component in regenerating stands when tending coniferous harvest areas.

Review of establishment and performance survey results of pure 'C' and pure 'D' declared blocks will occur periodically to document the incidental replacement strategy effectiveness.

4.1.6 Corridor Planning

The FMA has been reviewed regarding corridor road plans. The appropriate map can be found in Appendix 10.

4.2 Landscape Strategies

4.2.1 Operational Planning Considerations

4.2.1.1 Stand retention

The retention of trees, snags and woody debris in harvest areas is a significant component of ecologically based forestry.

1. Retaining trees within harvest blocks creates areas that more closely mimic natural disturbance conditions and can therefore help lessen the impact of logging on ecosystem structure and function. Individual trees, clumps and snags increase the structural diversity of the regenerating stand, retain some later seral conditions such as a multi-layered canopy, provide a future supply of large snags and down logs, and increase micro-site variability for a more diverse plant understorey. In-block structure retention can also provide ecological sites (refugia) from which unaffected plant and animal species can disperse onto the surrounding harvest area.
2. Snags (dead trees) play a very important role in a functioning forest ecosystem. In addition to their value in recycling nutrients, snags provide habitat for many species of plants, invertebrates, birds and mammals. The absence of snags can be a major limiting factor for cavity nesting birds, influencing their occurrence and distribution. Retention of large snags on cut-over areas may provide effective habitat for cavity nesters.
3. Woody debris left in piles and dispersed over the block provides valuable hiding and nesting cover for a variety of small mammals. These piles also help reduce the amount of nutrients leaving the harvest area.

In order to achieve or maintain stand level structural diversity, the following general principles will be followed:

1. Safety is a primary concern and must be ensured at all times as noted in the Alberta Forest Products Association tree retention guidelines (Residual Trees in Harvest Areas Guidelines).
2. Effort will be made to retain some form of vertical structure in most harvest areas.
3. The amount of retention within a harvest block is site specific and may vary as site conditions and site-specific objectives allow.
4. Wet sites, unmerchantable areas and understorey protection provide opportunities to retain various structural components (clumps, etc.) and contribute to stand diversity in the regenerating forest. This practice will also help to protect soil and sensitive sites that may harbor rare plants and small wildlife species.

Retention opportunities are available on a site-specific basis and depend on:

1. Pre-harvest stand condition;
2. Topography;
3. Identified values; and
4. Operational and economic feasibility.

Several retention options are available for consideration by the operations planner and supervisor:

1. Snags;
2. Single green trees;
3. Patches varying in size, shape and location of unmerchantable and merchantable trees; and
4. Coarse, down woody debris (including brush pile retention).

Merchantable retention can vary over a harvest area and retention targets are based on an average across the landscape. A monitoring program was established to assess the implementation of structure retention and to determine the amount of merchantable trees left on site. The monitoring program estimates the percent of merchantable volume retained on a block-by-block basis by sampling a sub set of all blocks harvested during a specific time period.

Past monitoring program results show that merchantable retention can vary from zero to ten percent or more. For Drayton Valley, the target for merchantable retention is 5% of both conifer and deciduous.

4.2.1.2 Recognition of Areas of Special Importance to Plants and Wildlife Species

In a forest ecosystem, many unique sites can host rare plant communities and/or species and provide habitat for small mammals, amphibians, reptiles, and invertebrate species. Where these sites (e.g., nest sites of raptors, large mineral licks) are identified, every effort will be made to integrate them into the forest management planning.

Structure retention can be prescribed for important wildlife habitat areas such as:

1. Recognized wildlife travel corridors,
2. Important wildlife ranges, and
3. Identified fisheries.

The size and location of residual areas is governed by the need to provide a balance between protective cover and the desire to minimize disturbance.

4.2.1.3 Timing of Operations in Breeding Bird Habitat

To avoid impacts on most bird species, efforts will be made to avoid harvesting from May 1 to early July. The intent is to allow birds to reach the fledgling stage, thereby increasing their capacity to move away from any disturbance. If this is not operationally possible, the following will be done to minimize impacts on nesting birds:

1. Minimize the area harvested during this period;
2. Harvest as late as possible in this period,

3. Delay harvesting in pure deciduous and mixedwood stands as much as possible; this would avoid the areas with the highest nesting activity; and
4. Prioritize pure conifer stands.

4.2.2 Grizzly Bear

4.2.2.1 Grizzly Bear Analysis

The total area of Weyerhaeuser's Drayton Valley FMA is 4,902 km^2. However, a more detailed grizzly bear habitat analysis was carried out on a smaller portion of the entire FMA. These higher priority grizzly bear areas were identified through discussions with Alberta Government Fish and Wildlife biologists. The areas of interest are primarily found in the west part of the Drayton Valley FMA (Figure 4-1, left) and are defined in this analysis by four operating compartments totaling 2,017 km^2 (Figure 4-1, right). The combined area is equivalent in size to roughly three female grizzly bear home ranges.

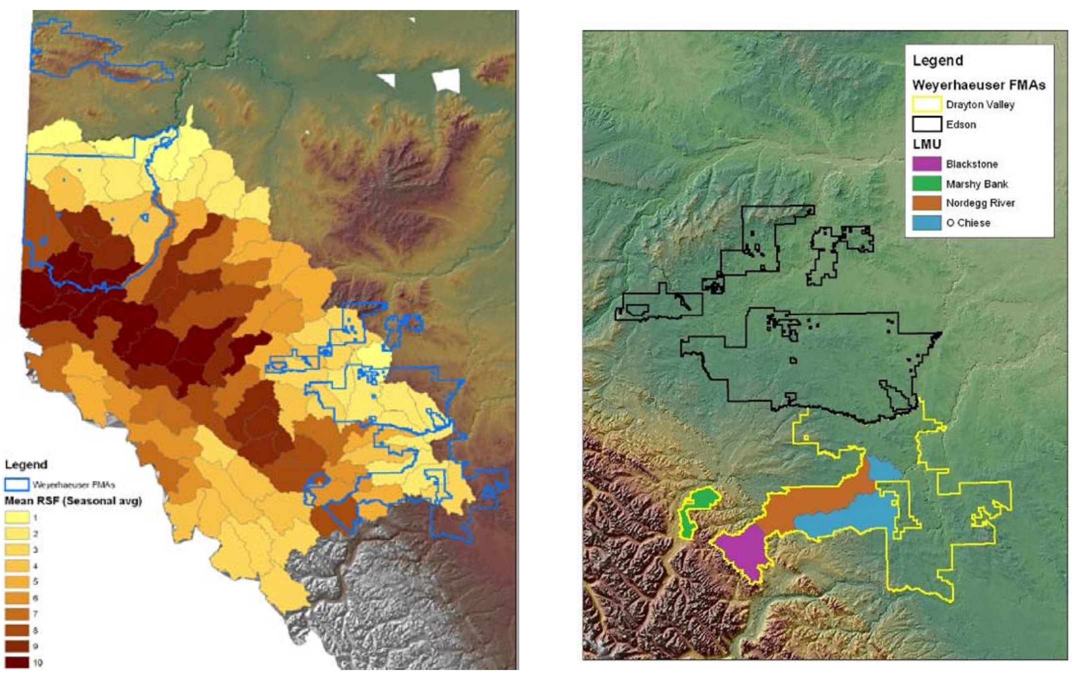


Figure 4-1 Grizzly Bear Areas of Interest (left) and Operating Compartments (right)

The analysis extent lies within grizzly bear range (brown, Figure 4-2) and habitat model extents (red line, Figure 4-2). The general management objectives for this area are to improve or maintain grizzly bear habitat quality (as indicated by an increase in Safe Harbour Index), to work towards reducing risk and to enhance RSF values.

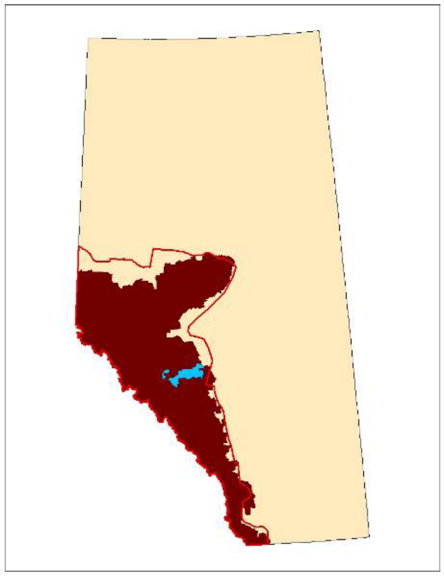


Figure 4-2 Grizzly Bear Range (in brown) and Habitat Model Extents (red line)

There are four components of the detailed grizzly bear analysis:

1. Road Density

There are currently 1,325 km of linear access features (roads, pipelines, power lines, and railway) in the analysis area, for an overall density of 0.657 km/km2.

	Linear access (km)	Area of unit (km^2)	Access density (km/km^2)
Analysis unit	1,325	2,017	0.66

With the additional 138 km of new access roads planned (not including winter roads), the open route densities increases slightly to 0.72 km/km^2.

	Linear access (km)	Area of unit (km^2)	Access density (km/km^2)
Analysis unit	1,453	2,017	0.72

2. RSF Value

Seasonal RSF's were generated from scripts with CutPeriod = 1 blocks included, and a seasonal maximum RSF was calculated using Spatial Analyst Raster Calculator Current Mean seasonal maximum RSF was calculated for the analysis unit to be 3.931 (range 1-10).

Seasonal RSF models for the analysis unit were regenerated with the CutPeriod = (2 or 3) spatial harvest sequence. Forecast Mean seasonal maximum RSF was calculated for the analysis extent and was found to increase to 4.951 (range 0-10).

3. Mortality Risk

Mortality risk surface was generated for analysis extent using scripts with CutPeriod = 1 blocks included. Current Mean mortality risk was calculated for the analysis unit to be 3.685 (range 0-10).

Forecast mortality risk surface was recalculated for analysis area using scripts with CutPeriod 2 or 3 blocks, summer roads as roads, and winter roads as trails. Forecast Mean mortality risk was calculated for the analysis extent to be 4.440 (range 0-10).

4. Safe Harbour Index

Current Safe harbour Index was calculated for the analysis unit as 25.393.
Forecast Safe harbour surface was regenerated for the analysis extent using forecast RSF seasonal maximum and risk, and was calculated to increase to 33.515 (range 0 – 100).

4.2.2.2 Comparison of Current and Future Conditions

Comparison of current and future conditions is provided in Table 4-1.

Table 4-1 Grizzly Bear Habitat Assessment Summary

	Analysis Variables:	Current	Forecast	% Change	Increase/Decrease
1	Mean RSFmax score	3.931	4.951	+ 25.9%	+
2	Mean Mortality Risk	3.685	4.440	+ 20.5%	+
3	Open road density	0.66	0.72	+ 9.1%	+
4	Safe Harbour Index	25.393	33.515	+ 32.0%	+

4.2.2.3 Mitigation

One general management objective was to improve or maintain grizzly bear habitat quality as indicated by an increase in Safe Harbour Index and the other management objective was to enhance RSF value.

Given the assumptions used in this harvest plan, Safe Harbour Index has increased as has the Mean RSF value; therefore it would appear that no mitigation actions are currently required. Road density values appear to be below known thresholds.[2]

4.2.3 Trumpeter Swan

The approved net land base has taken into account know locations of Trumpeter Swan (*Cygnus buccinator*). Lake buffers were increased to 200 meters from the nominal 100 meters. The Pembina ground rules provide direction for planning and operating within vicinities of lakes known to have or have had populations of Trumpeter Swan.

4.3 Watersheds

The hydrologic effects of forest harvesting on water yield and watershed disturbance in Weyerhaeuser Canada's Edson Forest Management Area was assessed, by Watertight Solutions, using the ECA-AB model. Details of this analysis are provided in Appendix 3.

[2] The full report (*Grizzly Bear Habitat Analysis Weyerhaeuser Drayton Valley FMA – MPB Harvest Plan March 2008*) was prepared by Jerome Cranston, Foothills Model Forest Grizzly Bear Research Program, and can be provided if requested.

4.3.1 Methods

The ECA-AB model was used to evaluate water yield responses to the spatial harvest sequence (SHS) and was applied for the first 60 years (12 periods) of the planning horizon. Pre-SHS disturbances (natural and anthropogenic) were included in the ECA-AB model through the DFMP land base assignment. Average precipitation and water yield for each watershed was estimated from isolines for the FMA area. Long term average precipitation and water yield data from Environment Canada (2007) were used to build isolines for precipitation and water yield.

Percent watershed Equivalent Clearcut Area (%ECA) for each watershed was based on basal area growth, using total watershed area for each ECA calculation. This approach was taken as it expresses the amount of disturbance within each watershed attributable to timber harvesting conducted by the Company. The effects of other land uses and disturbances (e.g. oil and gas development, roads) within each watershed were not included in these calculations.

Percent increase in water yield within the ECA-AB model is obtained by expressing the extra water generated by harvesting (i.e. reduction of evapotranspiration) as a percent of the average annual water yield for a watershed. Percent water yield increases therefore will tend to be smaller in areas of high water yield and greater in areas of low water yield.

Hydrologic recovery, the time for increased water yield to return to pre-disturbance levels, was assumed to occur when increases were ≤5%.

4.3.2 Summary of Results

Simulated maximum increases in annual water yield in the Drayton Valley FMA were small to modest in magnitude, ranging from <1% up to 25% (Table 4-2). Average water yield increase for all watersheds in the FMA was 8.4% with minimum and maximum values of < 1% to 25% in Stevens Creek. Watersheds with ≤ 1% increases in water yield were considered to be “unharvested”.

Maximum water yield increases occurred in watersheds with more harvesting. Harvesting in watersheds with water yield increases ≥15% ranged from 40-72%. Average area harvested in watersheds was ~28% with minimum and maximum values of 1.4% and 72%. Increases in water yield of 15-25% are expected to have recurrence intervals less than 5 years and to fall within the range of natural variability for the region (i.e. mean water yield ± 0.5 standard deviations).

Watershed disturbance in the Drayton Valley FMA ranged from an annual maximum of 45% to minimums of less than 1%. Watersheds with %ECA <1% were considered as undisturbed (i.e. unharvested). Average %ECA for all watersheds in the FMA with values >1% was 17%. Median %ECA among the 55 watersheds was ~ 11%. The maximum annual water yield response corresponding to the average %ECA was ~8%.

Water yield increases and %ECA expressed by decade provide a long term view of changes in water yield and watershed disturbance. Average decadal water yield increases and % watershed ECA (for each decade year - 10, 20, 30, 40, 50, 60, 65) from the start of the proposed harvest plan for all watersheds indicated low responses in the FMA with values of 2.45-4.4% and 4.6-10.7% respectively. These low values reflect "average conditions" in the FMA, where a mix of watersheds ranging from newly harvested to well advanced towards hydrologic recovery exists. A pattern of spatially and temporally dispersed harvesting tends to reduce the hydrologic effects of harvesting at the landscape scale.

Examination of maximum decadal changes in water yield increases (i.e. increases >15%) and % watershed ECA illustrates the effects of harvesting at the watershed scale. Maximum decadal changes in water yield increases and %ECA among the 55 watersheds ranged from 13-19% and 29-43% respectively. Maximum increases in water yield are driven primarily by the extent and frequency of harvesting in a watershed.

Hydrologic recovery is the time for water yield increases to approach pre-disturbance levels. It was defined to occur when water yield increases were < 5%. Hydrologic recovery in the Drayton Valley FMA varied from 0 to 58 years, with an average time of 19 years. Hydrologic recovery in 28 watersheds was zero because of low levels of harvesting and low water yield responses (i.e. < 5%).

Table 4-2 Water Yield Responses to Harvesting Drayton Valley FMA Ranked Maximum to Minimum

Watershed Name	Total Watershed Area km^2	% of Total Watershed Area Harvested	Maximum % Increase Water Yield	Year of Maximum Increase	Maximum % Watershed ECA	Years to Hydrologic Recovery = $\Delta Q \leq 5\%$
Stevens	49.47	64	25	2019	46%	28
Colt	16.543	60.54	21	2029	44%	17
Blanchard	42.156	63.35	19	2024	45%	17
Wawa	97.4	61	18.3	2019	41%	28
Tallpine	213.47	40	17.9	2024	24%	21
Rehn	21.592	72.07	16.9	2063	37%	14
Big Beaver	85.74	39.93	15.3	2059	23%	16
Blackstone	113.78	52.42	14	2018	26%	58
Ryhannan	13.64	59	12.6	2013	39%	15
Marshybank	19.807	36.43	12.3	2028	26%	17
Wilson	222.33	20	11	2055	14%	37
Rapid	94.058	28.85	10.9	2023	18%	12
Nordegg	640.95	38	10.8	2029	20%	37
Rundell	245.911	35.8	10.4	2017	20%	19
Open	187.037	29.03	9.9	2049	17%	18
Penti	50.894	36.89	9.4	2028	22%	15
Brazeau	221.67	34	9.2	2029	23%	43
Lookout	57.757	45.87	9	2019	24%	11
Baptiste	62.414	32	8.8	2034	18%	18
Chambers	157.89	32	8.8	2034	18%	18
Hansen	14.1	65	6.9	2064	35%	4
Brewster	170.38	23	6.8	2029	13%	12
North Saskatchewan	1105.16	27	6.2	2044	12%	10
Dismal	436.48	18	6.2	2024	11%	5
Mink	63.358	14.99	6	2057	9%	2
Negraiff	717.745	17.73	5.3	2029	11%	0
Grey Owl	53.58	31	3.7	2029	17%	0
Slater	362.85	17.5	3.7	0	0%	0
Horseshoe	76.05	8.6	3.5	2060	5.40%	0
Sturrock	57.75	11	3	2065	6%	0
Brown	70.616	10.61	2.9	2029	7%	0
Broken Arm	219.758	7.81	2.7	2029	5%	0
South Chungo	19.67	17	2.2	2063	11%	0
Wapiabi	104.87	11	2	2029	6%	0
Wolf north	174	3	1.7	2064	3%	0
Wolf south	417.03	3	1.7	2064	3%	0
Sutherland	11.363	6	1.6	2030	4%	0
Pembina	818.692	5.03	1.4	2024	2%	0
Welch	179.05	3	1.4	2049	2%	0
East Pembina	84.394	5.86	1.4	2063	3%	0
Elk	325.002	7.06	1.3	2029	3%	0
Chief	43.764	9.57	1.3	2029	7%	0
East Lobstick	58.46	1.35	0.8	2062	1%	0
Haven	67.09	0.2	0.6	2064	0.21%	0
Goff	18.35	0.2	0	2059	0.16%	25
Gonika	33.53	2.7	0	2056	0.08%	0
McCormick	21.412	0.07	0	2021	0%	0
Opabin	58.468	0.04	0	2062	0%	0
Lower Chungo	82.564	0.08	0	2062	0%	0
Lower Brown	114.278	0.04	0	2062	0%	0
Middle Colt	18.914	0.02	0	2027	0%	0
Shunda	288.03	0	0	2063	15%	7
Upper Blackstone	65.05	1	0	0	0%	0
Upper Chungo	67.86	0	0	0	0%	0
Upper Saskatchewan	513.46	0	0	0	0%	0

4.4 Grazing

In June of 2006, ASRD released the Grazing Timber Integration Manual (Appendix 7). Weyerhaeuser follows this manual on all planning and harvesting areas overlapped by grazing dispositions (permits and leases) being managed by Weyerhaeuser Pembina Forestlands staff.

Timber operators and the grazing disposition holder(s) will develop joint Grazing-Timber Agreements (GTA). These agreements set periods and/or conditions for the integration of harvesting and grazing. These agreements also provide several principles to assist in integration; as well as cost sharing of any activities (cross fencing projects) that would assist in mitigating any impacts on either party, and scheduled joint inspections (before, during, and after operations). These agreements are signed off by both parties prior to commencing operations and become part of the operating conditions for each disposition holder.

Recently a Regional Grazing Plan was approved which covers a large portion of the FMA area as well as the quota area. This plan will direct the issuance of all new grazing applications within the plan area and provide a dispute resolution mechanism.

4.5 Forest Protection and Health – Insects and Disease

Weyerhaeuser is part of the Northern East Slopes Region Integrated Pest Management Working Group. Weyerhaeuser has an insect and disease coordinator that participates in provincial meetings on insects and disease. These forums provide an opportunity for discussion of issues related to insects and disease. This is especially important because of the gap that has been created because the Canadian Forest Service's Forest Insect and Disease Survey (FIDS) has been stopped. This puts an onus on the forest industry and ASRD to address insect and disease monitoring.

ASRD has supplied Weyerhaeuser with a number of "Insect & Disease Report Card" forms (FP213A) to be used by field crews undertaking a number of surveys on the FMA. This would include the establishment of permanent sample plots, temporary sample plots, and regeneration surveys. The insect and disease coordinator will collect all reports as they are completed. Significant outbreaks are reported to ASRD as encountered.

Weyerhaeuser will also work with the Forest Management Branch in a co-operative effort as they implement their forest pest monitoring program, which has been strengthened to fill the gap left by the cessation of FIDS. Aerial surveys for defoliation and surveys with pheromones have been the main monitoring tools used by the Forest Health Branch.

In 2007, Weyerhaeuser, in cooperation with ASRD, placed a total of 27 baits on the Pembina FMA's (20 in Edson, 7 in Drayton Valley) based on the Provincial grid pattern. No Mountain Pine Beetle hits were recorded.

During the 2007/08 block layout season, pitch tubes were noted on two trees, one on each FMA (Edson and Drayton Valley). Both were checked, and it was determined that neither was a result of Mountain Pine Beetle attack.

4.6 Ground Rule Development

During 2006, Weyerhaeuser, overlapping timber operators, and ASRD developed a new set of Operating Ground Rules for the Pembina (Edson and Drayton Valley) FMA's. The new Provincial template was used to develop the Ground Rules. The final set of ground rules were approved for use on March 1, 2007.

5 Performance Monitoring – VOIT's

Performance monitoring will be undertaken that reflects current Values, Objectives, Indicators and Targets (VOIT's) as identified by Provincial minimums or objectives within the approved DFMPs.

The following VOITs were updated based on the MPB TSA;

Drayton Valley: 1, 2, 3, 5 and 50. (See Appendix 8)

Performance reporting occurs in two formats; an annual report, and a five-year stewardship report.

5.1 Annual Performance Monitoring Reports

The annual performance report presents the planning and operating activities in the previous year. It also tracks cumulative results from the time of DFMP implementation (May 1, 2006). The stewardship report will be due November 1, 2011.

The content of the annual performance report may be adjusted from time to time, at the start of a tracking year, upon mutual agreement between Weyerhaeuser, ASRD, and the other timber operators.

Information summarized below will also be provided by ASRD and other timber operators on the Drayton Valley FMA.

The report will include, but will not be limited to, the following:

1. Summary of reforestation activities (area of site preparation, number of seedlings planted, area of stand tending, area of chemical treatments (by application type)) by operating year.
2. Cumulative variance of the SHS by LMU (from GDP) by operating year
3. Summary of inventory work (timber and non-timber) including PSP's and TSP's, wildlife and fisheries, by calendar year.
4. List of research (includes annual report of summary of expenditures of $0.25 per meter of drain by Weyerhaeuser) by operating period.
5. Summary of public involvement initiatives.

5.2 Stewardship Report Contents

5.2.1 Purpose

The purpose of the Stewardship Report is to:

1. Summarize the previous five annual reports;
2. Discuss opportunities for change or adjustments in forest management practices that have been identified;
3. Provide the public with an overall assessment of the DFMP progress, i.e. “Are we doing what we said we would do?”
4. Identify deviations to the approved plan;
5. Undertake analysis of unacceptable deviations as identified by the Company and Alberta; and
6. Provide corrective actions.

5.2.2 Content

The content of the Stewardship Report may be adjusted over time with mutual agreement between ASRD and the Company. Therefore, the Report will include, but may not be limited to the following DFMP indicators and the TSA assumptions:

1. Identify emerging trends or issues;
2. Identify deviations from the approved plan;
3. Track all variances to the SHS from the effective date of May 1, 2007; where the 20% threshold (by LMU, by decade) is exceeded, an assessment will be made to identify the impacts to the affected objectives and resulting AAC implications;
4. Describe any analysis that has been undertaken of deviations; and
5. Describe the corrective actions to be taken.

6 Future Considerations – Alternative Regeneration Standards

Weyerhaeuser has communicated a commitment to pursue alternative regeneration standards (ARS) for FMA operations in Alberta. Weyerhaeuser is actively pursuing the development of ARS in cooperation with Canadian Forest Products and in consultation with Alberta Sustainable Resource Development. Incremental components of an ARS will be applied as they are developed and approved by ASRD. Completion of ARS by May 1, 2010 has been agreed to with ASRD. In accordance with agreements with ASRD, once these alternative regeneration standards are approved, they will be used to evaluate regeneration performance until 2010. Any adjustment in harvest levels associated with regeneration performance will be deferred until 2010.

7 References

ASRD 2006a. Mountain Pine Beetle Action Plan for Alberta. A publication by Alberta Sustainable Resource Development. ISBN 0-7785-4819-8. September 2006.

ASRD 2006b. Interpretive Bulletin, Planning Mountain Pine Beetle Response Operations. A publication by Alberta Sustainable Resource Development. Version 2.6. September 2006.

Weyerhaeuser. November 2006. Detailed Forest Management Plan. Volume II.

Appendix 1: Woodstock™ Setup

Appendix 2: Determining Harvest Levels in MPB PFMS

Appendix 3: Watershed Analysis

Appendix 4: Map of Spatial Harvest Sequence

Appendix 5: Timber Allocation Tables

Appendix 6: Data Dictionary

Appendix 7: Grazing and Timber Integration Manual – June 2006

Appendix 8: VOITs

Appendix 9: Adjustment Factor for Conifer 15/13 Utilization in the Drayton Valley FMA

Appendix 10: Supporting Maps