# Forest Management Plan

# 2010 Mountain Pine Beetle Amendment


## Hinton Wood Products
## A Division of West Fraser Mills Ltd.

## FMA 8800025 – O.C. 565/2007
## April 30, 2010

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## Table of Contents

## List of Tables

## List of Figures

# 1 INTRODUCTION

This is the first of two forest management plan documents that will be completed for the Hinton FMA over the course of the next five years. Hinton Wood Products has prepared this plan in response to the Government of Alberta's directive to reduce the amount of Mountain Pine Beetle (MPB) susceptible stands within the Hinton FMA. Although this is an amendment to the currently approved 1999 Forest Management Plan, several significant tasks have been completed in preparation of this plan. The following are of particular significance:

- A new landbase assessment, based on a new forest inventory, has been completed.
- New yield curves have been developed reflecting the utilization standards currently in effect for the FMA
- A re-assessment of the annual allowable cuts has been completed.

This Mountain Pine Beetle Forest Management Plan Amendment is focussed on MPB risk reduction and includes the recommendation of a new AAC and addresses water, caribou, trumpeter swan and grizzly bear issues. A 10 year spatial harvest sequence has also been produced. The effective date of this plan is May 1, 2008.

## 1.1 Plan Development Process

The planning process was initiated with the approval (June 2, 2005) of a Terms of Reference for the development of a new forest management plan for the Hinton Wood Products Forest Management Agreement (FMA) area. In 2007, after a few key personnel and forest management direction changes were introduced, a revised Terms of Reference was prepared and approved. A final amendment to the Terms of Reference was submitted in September of 2009 to reflect changes in submission timelines (Appendix A).

This document is the first of two that are planned for the FMA over the course of the next five years. This "Mountain Pine Beetle Amendment", due April 30 2010, is focussed on MPB risk reduction and includes the recommendation of a new AAC and addresses water, caribou, trumpeter swan and grizzly bear issues. A 10 year spatial harvest sequence has also been produced.

The second document, currently scheduled for submission by September 30, 2014, will meet the requirements of the Alberta Forest Management Planning Standard (version 4.1 – April 2006). The previous submission timeline for this document was September 30, 2010. However, HWP and the Government of Alberta reviewed the submission timeline in light of several significant strategic planning initiatives currently planned for the region. These include the land-use framework, the water for life strategy and grizzly bear and caribou recovery plans. Given the potential implications that these initiatives may have on forest management planning, and the significant resources that will likely be required to participate in these processes, the revised timeline was adopted.

## 1.2 Plan Development Team

Hinton Wood Products and Alberta Sustainable Resource Development have assembled a Plan Development Team (PDT) that was the central group responsible for development of the DFMP. The following table describes PDT membership.

**Table 1-1. Plan Development Team Core Members**

| Name | Affiliation | Position |
|---|---|---|
| Frazer Butt<br>Vicky Bossé<br>Stephen Wills<br>Brad Epp | ASRD—Forest Management Branch | Forest Management Planning Forester |

| Name | Affiliation | Position |
|---|---|---|
| Kevin Vander Haeghe<br>Bill Tinge | ASRD—Foothills Area | Integrated Operational Planning Forester |
| Chad Yurich<br>Tracy McLean | ASRD—Foothills Area | Area Forester |
| Jeff Kneteman | ASRD— Foothills Area Fish and Wildlife | Senior Wildlife Biologist |
| George Sterling | ASRD— Foothills Area Fish and Wildlife | Senior Fisheries Biologist |
| Dan Rollert | Hinton Wood Products | Woodlands Manager |
| Richard Briand | Hinton Wood Products | Management Forester |
| Rick Bonar | Hinton Wood Products | Chief Biologist & Planning Coordinator |
| Glenn Buckmaster | Hinton Wood Products | Planning Forester |

Other technical experts from the Alberta government and Hinton Wood Products were consulted on an as needed basis to address specific areas of concern (see table below).

**Table 1-2. Additional Technical Experts**

| Name | Affiliation | Position | Function |
|---|---|---|---|
| Karl Peck | ASRD—Resource Analysis Section | Senior Resource Analyst | Timber supply |
| Darren Aitkin | ASRD—Resource Analysis Section | Growth and Yield Forester | Growth and Yield |
| Jamie Bruha | ASRD— Timber Operations Harvesting and Renewal Section | Senior Forester | Operating Ground Rules Lead |
| Aaron Jones | Hinton Wood Products | Stewardship/Public Affairs Coordinator | Public/Aboriginal Referral |
| Diane Renaud | Hinton Wood Products | Senior Silviculture Forester | Tree improvement and silviculture |
| Bruce Alexander<br>Peter Andrews | Hinton Wood Products | Operations Coordinator | Harvest Operations |
| Lynn Bergeron | Hinton Wood Products | Landuse Coordinator | Landuse |

## 1.3 Description of the Company

West Fraser Timber Company Ltd. is a Canadian owned integrated forest products company producing lumber, wood chips, medium density fibreboard (MDF), plywood, pulp, laminated veneer lumber (LVL), linerboard, kraft paper, and newsprint. Today, the Company carries on its operations in Alberta, British Columbia, Arkansas, and Louisiana through subsidiary companies and joint ventures owned directly or indirectly by the Company's principal operating subsidiary West Fraser Mills Ltd.

The Hinton manufacturing facilities include a sawmill, Hinton Wood Products (HWP), with an annual capacity of 281 million board feet of dimension lumber and a northern bleached softwood kraft pulp mill, Hinton Pulp, with an annual capacity of 365,000 air-dried tonnes. The Hinton mills are supplied predominantly with wood harvested from the Forest Management Area (FMA).

## 1.4 History of the Hinton FMA

The Hinton Wood Products Forest Management Agreement (Appendix B) was renewed on May 1, 2008 with the Government of Alberta (O.C. 565/2007 - FMA 8800025) for a twenty-year period.

On December 31, 2004, the Hinton operation was acquired by West Fraser Mills Ltd. The Forest Management Area (FMA) that Hinton Wood Products manages has been in existence since 1951, making it the oldest FMA in Alberta. The Hinton FMA was unprecedented in many respects. It marked the first binding commitment of its kind by a major Canadian forest industry to sustained yield forest management. It established a unique co-operative relationship between government and industry for sharing costs and responsibilities, and it provided a landscape for scientists to apply their knowledge on a large scale.

## 1.5 Changes in Management Philosophy from 1999 FMP

In 2006, West Fraser's management paradigm for the FMA changed. The change was to shift the focus from a pulpwood standard to a sawlog standard. This resulted in the closure of the pulp mill woodroom and an amendment of the conifer utilization standard from 10/8/15 to 15/10/15.

In the 1999 DFMP, the Company had a stated objective of maintaining an annual allowable cut of 2.2 million cubic metres. Significant investments in enhanced forest management research were made in pursuit of this AAC objective. With the change to the sawlog standard, this impetus for this research was removed. Nonetheless, the Company has followed through on the research trials to ensure that the information is collected. In light of the impending MPB outbreak on the FMA, this research may prove to be extremely valuable for mitigating AAC fall down post-beetle attack.

The other primary shift in management of the FMA is the intent to mitigate impacts of the mountain pine beetle outbreak. Lodgepole pine, the target host of the MPB, accounts for approximately 70% of the coniferous annual allowable cut on the Hinton FMA. HWP's forest management activities are driven by the objective to reduce the susceptibility of the FMA to a catastrophic MPB outbreak.

## 1.6 Mountain Pine Beetle Management on the Hinton FMA

In the 2007 General Development Plan, HWP's strategy for addressing the MPB risk was described. The strategies outlined at that time remain in effect today and can be summarized as follows:

- Concentrate harvest operations in pine dominant stand types
- Where possible, avoid harvest of non-pine species, except where required to meet other business commitments (e.g. harvest of deciduous timber for exchange/sale with other operators)
- Cooperate with SRD to control known beetle attack areas, where economically feasible
- Concentrate harvest operations in the northern portion of the FMA, where the MPB threat appears to be the highest. When required, maintain operations in other areas of the FMA for economic or other business reasons.

Lodgepole pine is the most dominant commercial species on the FMA (Figure 1-1). The FMA is also dominated by mature and overmature stands (Figure 1-2). The prevalence of contiguous, mature pine on the FMA provides an ideal environment for a catastrophic MPB outbreak.

**Figure 1-1. Merchantable Growing Stock (Gross)**

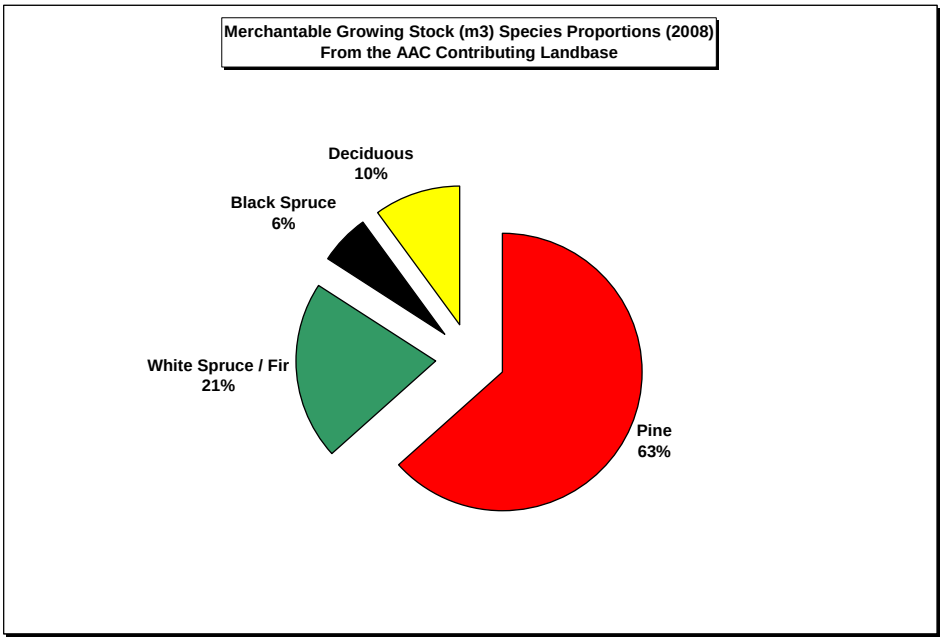



**Figure 1-2. FMA Age Class Distribution**

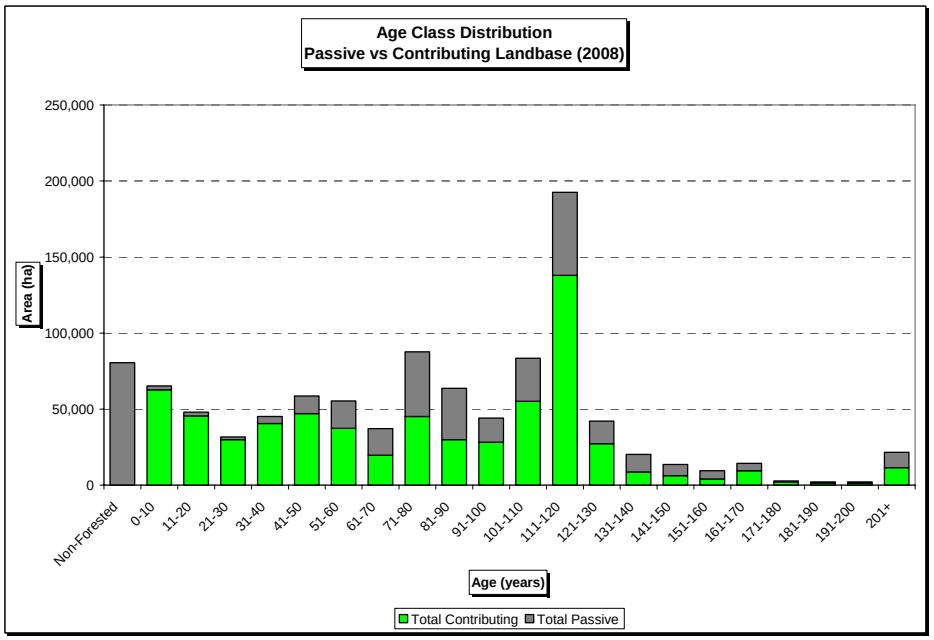



Figure 1-3 and Figure 1-4 illustrate the age class distribution of the passive (areas excluded from the AAC) and the contributing (areas included in the AAC) landbases, respectively. Pine stands make up approximately half of the passive landbase, with the balance being predominantly white spruce and black spruce. Pine stands comprise approximately two-thirds of the contributing landbase.

**Figure 1-3. Age Class Distribution for the Passive Landbase**

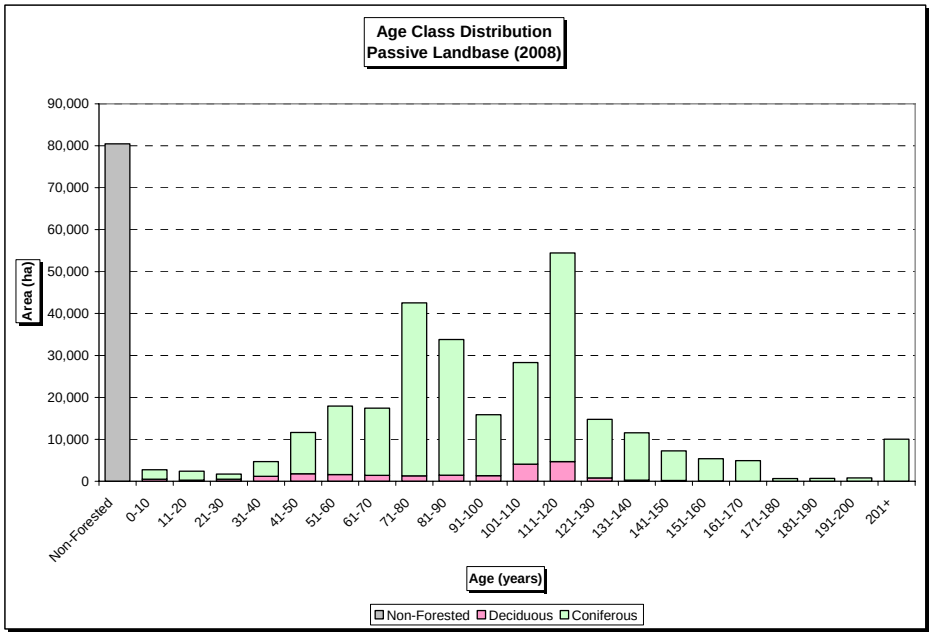
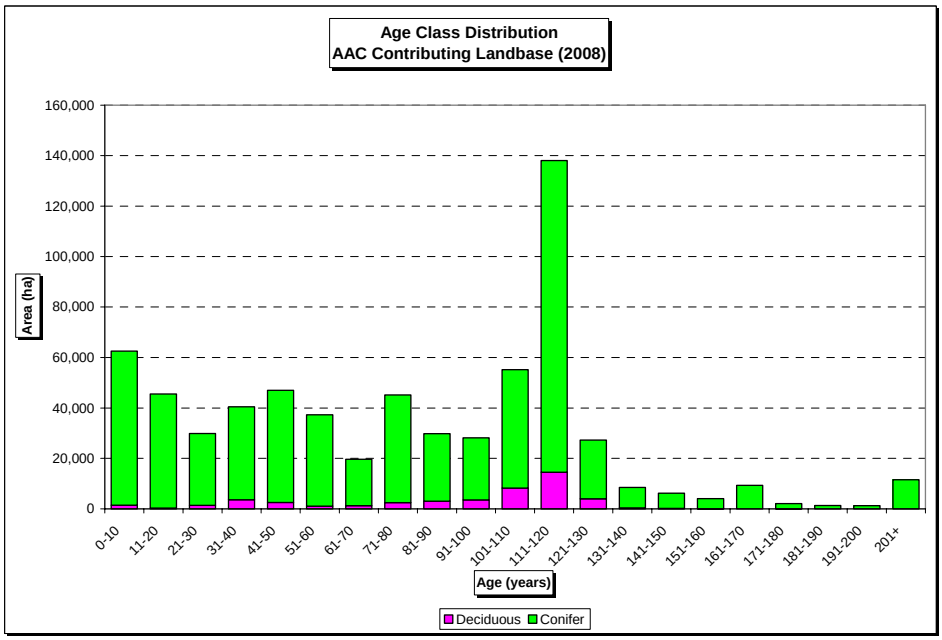



**Figure 1-4. Age Class Distribution for the AAC Contributing Landbase**



Alberta Sustainable Resource Development adopted a method of ranking the MPB risk associated with individual stand types. As per the SRD MPB interpretive bulletin[1] (Appendix C), the stand MPB ranking is based on:

- Pine Rating. The physical characteristics of the stand, without considering the climate, or location of the particular stand. The Pine Rating is a factor of the percentage of susceptible pine basal area, stand age, and a stand density factor.
- Compartment Risk The probability that a compartment will be attacked based on the location of existing MPB populations.
- Climate Factor: Ranks the potential for successful MPB development.

These factors are combined as per the following table to assign stand MPB ranking:

**Figure 1-5. SRD MPB Stand Ranking Matrix**

| Climate Factor (per stand) | 0 to 30 | 31 to 50 | 51 to 80 | 81 to 100 | Compartment Risk |
|---|---|---|---|---|---|
| Very Suitable 1.0 | Rank 1 | Rank 1 | Rank 1 | Rank 1 | High |
| | Rank 2 | Rank 1 | Rank 1 | Rank 1 | Moderate |
| | Rank 2 | Rank 2 | Rank 1 | Rank 1 | Low |
| Highly Suitable 0.8 | Rank 1 | Rank 1 | Rank 1 | Rank 1 | High |
| | Rank 2 | Rank 2 | Rank 1 | Rank 1 | Moderate |
| | Rank 2 | Rank 2 | Rank 2 | Rank 1 | Low |
| Moderately Suitable 0.5 | Rank 2 | Rank 1 | Rank 1 | Rank 1 | High |
| | Rank 2 | Rank 2 | Rank 2 | Rank 1 | Moderate |
| | Rank 3 | Rank 2 | Rank 2 | Rank 2 | Low |
| Low Suitability 0.2 | Rank 2 | Rank 1 | Rank 1 | Rank 1 | High |
| | Rank 3 | Rank 2 | Rank 2 | Rank 2 | Moderate |
| | Rank 3 | Rank 2 | Rank 2 | Rank 2 | Low |
| Very Low Suitability 0.1 | Rank 3 | Rank 2 | Rank 2 | Rank 2 | High |
| | Rank 3 | Rank 3 | Rank 2 | Rank 2 | Moderate |
| | Rank 3 | Rank 3 | Rank 3 | Rank 3 | Low |
| | Pine Rating | | | | |

The ranking classes are described by SRD as follows:

- Rank 1 stands are the highest priority for susceptibility reduction. These stands provide the best habitat for MPB to produce brood and spread MPB to other stands. Rank 1 stands have the following general characteristics, comprised of large old pine, are close to existing MPB populations and/or are in areas that are very climatically suitable for beetle development.
- Rank 2 stands are also important, but, because of their lower pine component, lower climate suitability, and/or greater distance from existing MPB populations, they are a lower priority.
- Rank 3 stands can be attacked and MPB can survive in these stands. However, the brood produced from these areas, at least right now, is significantly lower than that produced in Rank 1 and Rank 2 stands.

The Hinton FMA is comprised of stands which have high pine ratings (also referred to as Stand Susceptibility Rating (SSI)). Please refer to Figure 1-6. HWP received direction from the regional Forest Health Officer to assess compartment risk as high for the northern portion of the FMA (Berland, Athabasca and Marlboro Working Circles) and medium for the southern portion of the FMA (Embarras and McLeod

1 Alberta SRD Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations v2.6

Working Circles). The resulting Hinton FMA rank assignments are shown in Figure 1-7 and Table 1-3. The table provides an area summary by broad stand type for the contributing landbase.

**Figure 1-6. MPB Pine Rating Map (2008)**

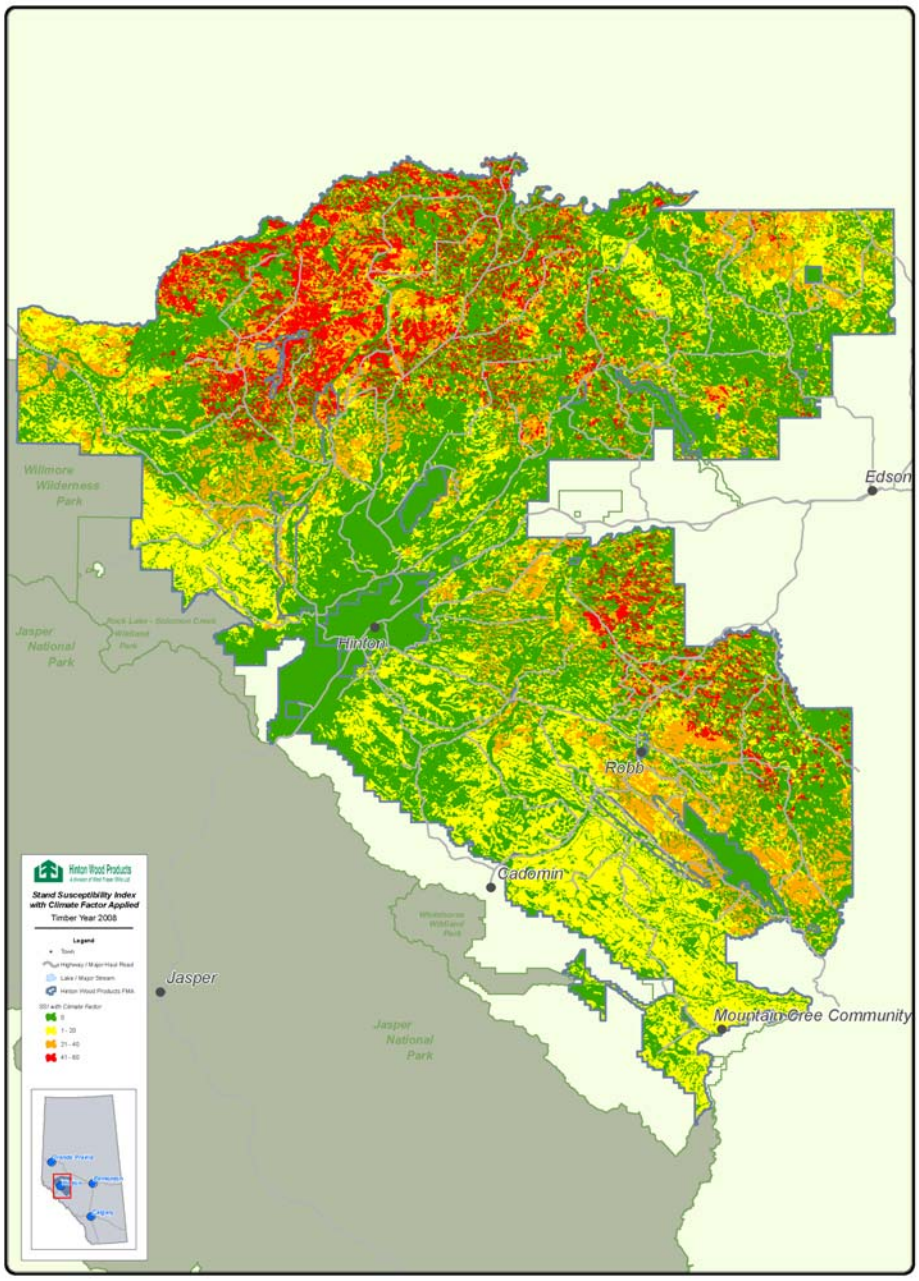


**Figure 1-7. MPB Rank Map (2008)**

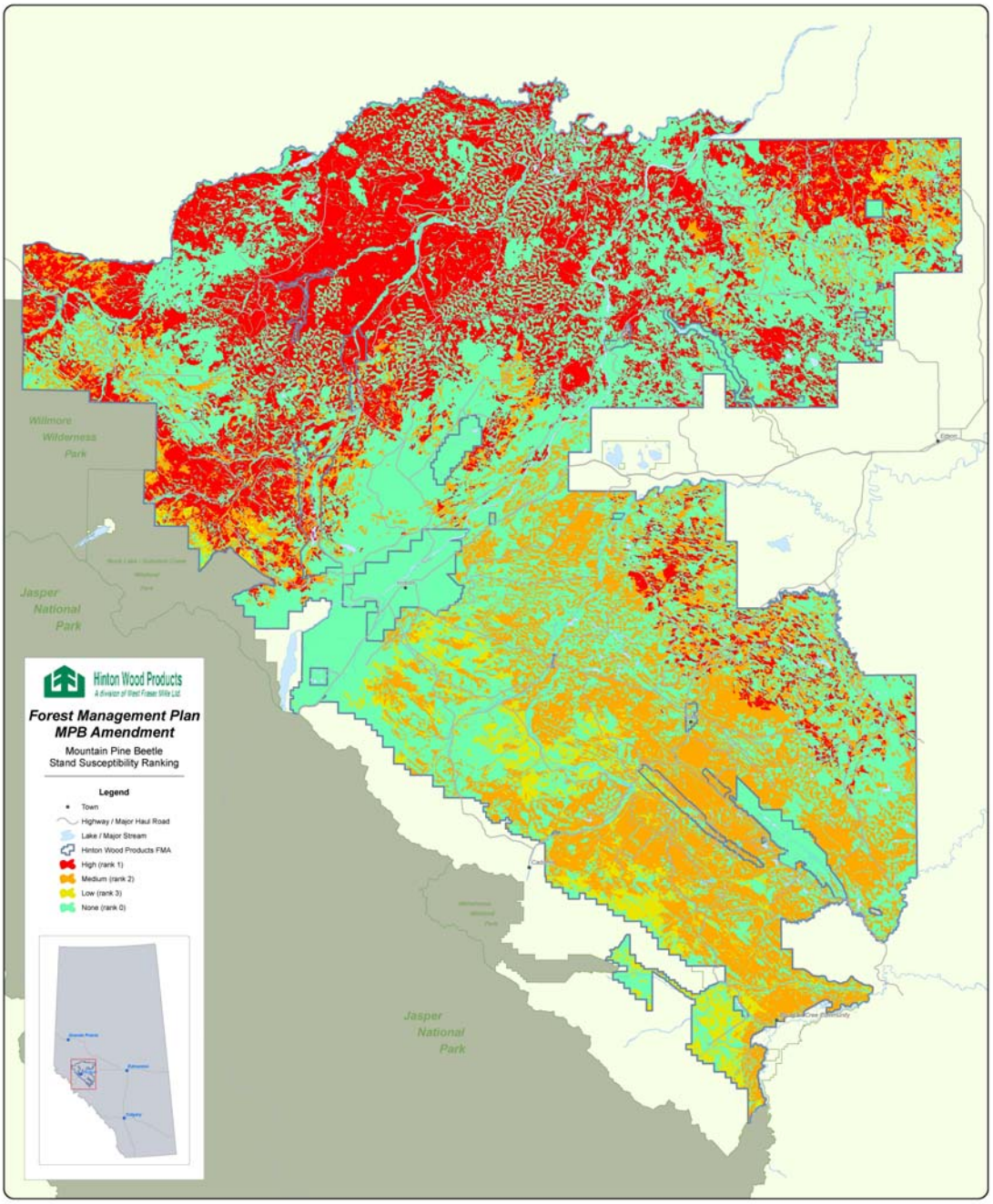


**Figure 1-8. MPB Stand Ranking Proportions (2008)**

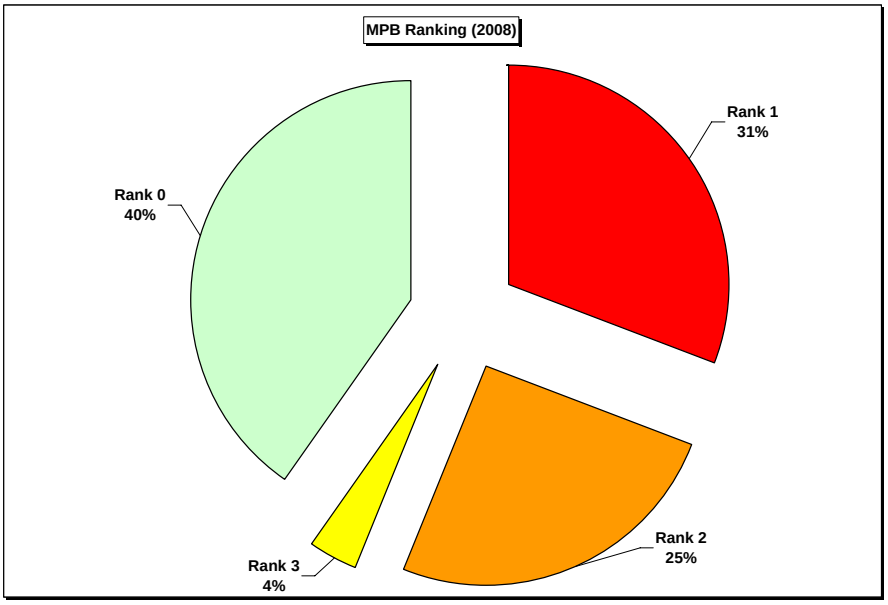



**Table 1-3. MPB Ranking by Broad Yield Strata (contributing landbase only)**

| Broad Yield Strata | MPB Ranking | | | | Total Area (ha) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | None | |
| 1 - Pure Deciduous | 6,762 | 5,383 | 69 | 39,016 | 51,230 |
| 2 - DC (Pine) | 7,745 | 5,905 | 302 | 4,375 | 18,326 |
| 3 - DC (Other Conifer) | 2,557 | 3,534 | 124 | 13,424 | 19,639 |
| 4 - CD (White Spruce) | 1,415 | 2,779 | 113 | 12,162 | 16,469 |
| 5 - CD (Pine) | 10,489 | 6,877 | 380 | 7,586 | 25,331 |
| 6 - CD (Black Spruce) | 179 | 61 | 0 | 315 | 555 |
| 7 - Pure Conifer (White Spruce) | 9,316 | 19,878 | 10,902 | 66,576 | 106,673 |
| 8 - Pure Conifer (Pine) | 157,023 | 114,762 | 12,196 | 111,943 | 395,925 |
| 9 - Pure Conifer (Black Spruce) | 4,869 | 5,093 | 398 | 5,655 | 16,016 |
| Total Area (ha) | 200,356 | 164,270 | 24,484 | 261,052 | 650,163 |

### *1.6.1 The Current Mountain Pine Beetle Outbreak*

During the first half of 2009, the status of mountain pine beetle (MPB) on the Hinton Forest Management Area (FMA) appeared quite positive – the cold snap Hinton residents endured in December of 2008 resulted in a high level of mortality of MPB in the general area of the Hinton FMA.

The Hinton FMA has seen the benefits of cold weather over the past two winters as well as the provincial government's aggressive cut and burn control tactics for infected trees. In fact, in 2009 Alberta Sustainable Resource Development (ASRD) had to control about 60% less MPB infested trees as compared to the previous year. In addition, mortality sampling conducted by ASRD in the spring of 2009 in the Grande Cache/Willmore area indicated that beetle success was low with declining populations, and that there was a low probability of spread from the Grande Cache and Willmore areas.

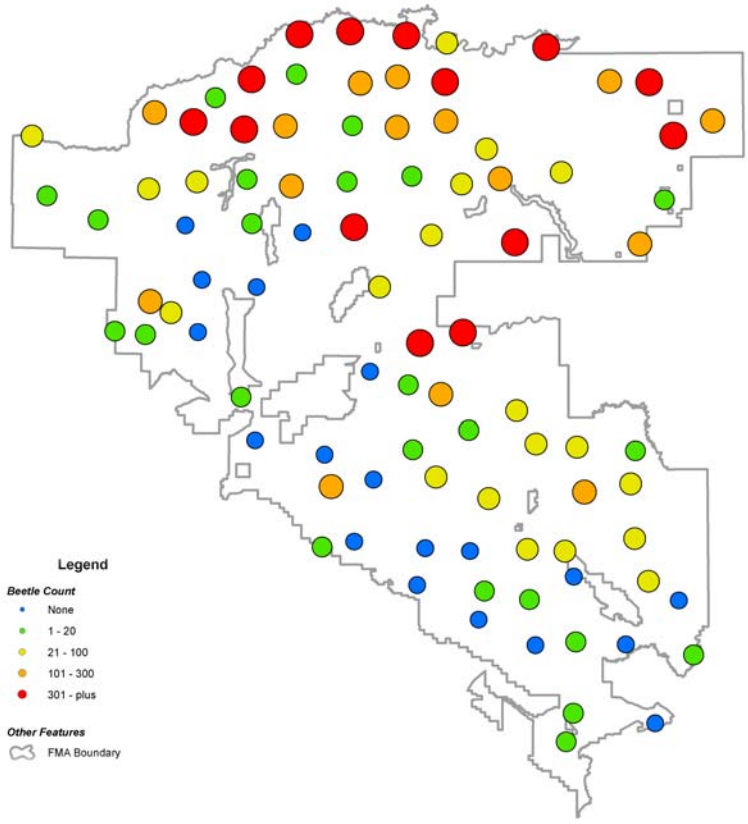
In late July 2009 the situation changed for the worse when Alberta received another large influx of MPB from British Columbia. These beetles were brought significant distances (hundreds of kilometres) by the wind. They rained down on Alberta in a wide swath from Grand Prairie to south of Hinton, with the highest

concentrations to the north of the FMA; however, the effects of this flight have been seen to a lesser extent in Grande Cache, Hinton and Edson areas. New MPB attack has been confirmed as far east as Chip Lake and as far south as the Brazeau River. This large MPB wind driven event appears to be worse than a similar event seen in 2006. This 2009 flight was also earlier, allowing more time for the beetle's larvae to develop, which often leads to increased over-wintering survivability.

Since 2006, HWP has placed pheromone baits on a grid system (one pheromone site per township) across the FMA (see Figure 1-9). Each site has three trees with chemical baits that lure MPB in from a distance of a few hundred meters. This has allowed the Company to monitor the level of MPB attack on the FMA.

From 2006 to 2008, MPB attack of these pheromone baited trees remained very low; however, all that changed in 2009. Previously HWP had been able to count the number of individual beetles that had attacked the pheromone baited trees – the most individual beetle hits found over the entire Hinton FMA was 90 in 2007, which decreased to 48 in 2008. However, in 2009, the amount of individual hits on HWP pheromone baited trees were in the thousands (too many to count) and for the first time there was spill over of MPB attack into the non-baited trees adjacent to the trees with the pheromone baits.

**Figure 1-9. Location of the 2009 Pheromone Bait Sites on HWP's FMA.[2]**




This indicates a never before seen level of MPB attack within the Hinton FMA. Not only were the levels of individual MPB hits significantly higher than anything seen in the past, there were also many more pheromone baited sites that were hit. HWP is now seeing some level of MPB activity across a significant portion of the FMA, although the highest concentrations are still in the north. In addition, ASRD aerial surveys in late fall 2009 detected hundreds of sites with trees starting to die because of natural MPB attack on the FMA, again mostly along the northern edge. Survey and control of all known MPB sites on the FMA is underway for winter 2009-2010. However it is certain that there are other MPB infestations on the FMA that are yet unknown.

One thing appears to be certain; mountain pine beetle is firmly established on the Hinton FMA and it is not likely that it will ever go away entirely. There is some reason for optimism, however, because when local climate data over the last 10 years is examined, it is encouraging to see that each year the Hinton area has undergone at least one day where temperatures have dropped below -40C (which is fatal to MPB), and in the middle of December 2009 the Hinton/Grande Cache area did experience a cold snap with temperatures plummeting to as low as -43 in some areas. This provides some optimism that MPB may still have a difficult time reaching epidemic levels.

[2] *Each coloured circle indicates the number of individual MPB hits at each site. The warmer the colour and the larger the circle, the higher the number of individual MPB hits.*

## 1.7 Current Tenure Allocations

The Hinton sawmill and pulp mill are supplied predominantly with wood harvested from the Forest Management Agreement area (FMA). The Woodlands department of Hinton Wood Products manages the FMA and the supply of wood to the two mills. The approved annual cut for the FMA currently stands at 1,535,000 $m^3$ of softwood at the 15/10/15 utilization standard and 169,449 $m^3$ of deciduous at the 10/8/15 utilization standard.

There are no overlapping quota holders within the Hinton Wood Products FMA. A small amount of the FMA annual allowable cut (8,500 $m^3$ conifer and 1,500 $m^3$ deciduous) is available to be issued by Alberta.

**Table 1-4: FMA Tenure Allocations**

| Disposition Holder | Conifer AAC (15/10/15 - $m^3$/yr) | Deciduous AAC (10/8/15 - $m^3$/yr) |
|---|---|---|
| Hinton Wood Products | 1,526,500 | 167,949 |
| Available for allocation by SRD as per FMA Agreement | 8,500 | 1,500 |
| Total | 1,535,000 | 169,449 |

## 1.8 Document Structure

This document has been developed in 4 sections

- Section 1 contains a description of the intent, people and process.
- Section 2 summarizes the stakeholder communication activities undertaken for this plan.
- Section 3 contains summaries of the landbase, growth and yield and timber supply analysis.
- Section 4 contains a summary of the preferred pine management strategy.

# 2 COMMUNICATION

This section contains a summary of the communications activities undertake by Hinton Wood Products to solicit and incorporate input from the general public and from Aboriginal communities (with traditional use within or adjacent to the FMA) in the development of the Company's FMP amendment This document summarizes the different strategies the Company has employed to gather public and Aboriginal input, and also describes what type of issues have been raised (to date) and how the Company has responded to those issues. Communication efforts were initiated several years ago as the Company began work on a new Forest Management Plan, which then evolved into the MPB FMP amendment. As previously discussed, the FMP submission date has been amended to September 30, 2014.

These communications efforts are consistent with the Company's Communications Plan, which has been approved by Alberta Sustainable Resource Development.

See Appendix D for a detailed communications log.

## 2.1 Public Communications Summary

Hinton Wood Products has used four main communication strategies for seeking and incorporating public input into the development of the FMP and Beetle Plan:

1. Open Houses
2. Stakeholder Letters
3. Public Notices
4. A public advisory group

### *2.1.1 Open Houses*

Hinton Wood Products has been holding annual open houses in local communities for over a decade. At these open houses, posters and maps are displayed that provide information on each component of HWP's operation including information on planning, certification, recreation, silviculture, operations, mountain pine beetle management, and access management. For each open house since 2001, HWP has also compiled and printed a "Summary Document". This Summary Document describes in plain language, HWP's harvesting plans for the upcoming 5 year period. In 2010, a more detailed Summary Document was prepared – it was titled the "*Mountain Pine Beetle Plan and General Development Plan Summary Document*" (copy provided in Appendix D. This document described in easy to understand language the following:

1. HWP's Mountain Pine Beetle (MPB) Plan – including information on: a new gross and net landbase for the FMA, new forest growth relationships, a new Annual Allowable Cut, a five year spatial harvest sequence, and strategies for major non-timber values on the FMA
2. HWP's 2010-2011 General Development Plan (GDP) – showing the location of compartments to be harvested within for the next five years.
3. HWP's Stand Tending Plan – showing the block locations of chemical and manual tending operations for the next operating season.

At all open houses, HWP staff is on hand to answer any questions that the public might have and to respond to any issues or complaints. Forms are provided so that people can provide written feedback either immediately at the open house, or by taking the form away and later sending it back to HWP. Each form specifically asks whether or not the person would like a written response to their question, comment, or concern.

For each open house, advertisements are placed in two or three local newspapers (i.e. Edson Leader, Hinton Parklander, and the Grande Cache Mountaineer) notifying the public of the location and time of the open house. In addition, the ads note specifically what type of input the Company may be looking for.

Since 2007, part of the advertised reasoning for the Company's open houses was to "provide feedback regarding the development of a new Forest Management Plan".

### 2.1.2 Stakeholder Letters

While open houses are planned to give the general public an opportunity to provide feedback, ask questions, and acquire information about the Company's plans, this type of public involvement by its very nature is not that targeted. To better target specific individuals or organizations, the Company also sent out letters to a list of stakeholders that HWP knows or thinks might have a particular interest within the FMA, specifically asking for their input in the development of the FMP and inviting them to participate in the process. By sending out these stakeholder letters, HWP is providing those individuals or organizations that really want to be involved in the forest management planning process, a very real opportunity to provide input and become involved. In 2010, each stakeholder letter either contained a "MPB Plan & GDP Summary Document" or provided the stakeholder with a link to HWP's website to download the document.

### 2.1.3 Public Notices

In April of 2005 Hinton Wood Products also placed a public notice in three local newspapers– the Hinton Parklander, the Edson Leader, and the Edson Anchor. This notice advertised the fact that HWP was soliciting input into the development and implementation of a new SFM system (required under the Company's CSA Z809 certification) and a new Forest Management Plan. The notice pointed out that HWP's Forest Resources Advisory Group (FRAG) was the Company's main avenue for public input, but noted that anyone could provide input into the Forest Management Planning process. The public notice specifically identified what HWP was looking to be advised on, which was described as follows:

- The identification and/or setting of Values, Objectives, Indicators, or Targets related to the Company's FMA
- The implementation and continual improvement of the SFM System and/or Forest Management Plan

The notice provided contact information for anyone to ask questions or for anyone interested in providing feedback regarding the SFM System and/or the FMP.

Public notices also go out annually to announce HWP's open house dates and locations.

### 2.1.4 Public Advisory Group

Since 1989, Hinton Wood Products has maintained a public advisory group that meets on a regular basis (about 10 times per year) – this advisory group is called the Forest Resources Advisory Group or FRAG for short. FRAG is a multi-stakeholder public advisory group with the following purpose:

- To provide organized and regular public input into HWP's Woodlands Department's planning and operations.
- To select or respond to issues, and to consider and recommend actions and policies to HWP's Woodlands staff.

FRAG is HWP's main avenue for public participation. The following organizations are represented on FRAG:

- Hinton & District Chamber of Commerce
- Steel Workers
- Hinton Ministerial Association
- Coal Assoc. of Canada
- Town of Hinton
- Canadian Forest Service
- Hinton Good Companions
- Alberta Teachers Association
- Hinton Environmental Association

- Alberta Trappers Association
- Fish & Game Association
- Yellowhead County
- Jasper National Park
- Hinton All Terrain Vehicle Society
- Communications, Energy and Paperworkers Union of Canada
- Neighbour Link
- Whisky-Jack Bird Club
- Fox Creek Development Association

## 2.2 Aboriginal Engagement Summary

The duty to consult with Aboriginal communities rests with the Crown (Alberta). Alberta has acknowledged that while the key goal in all circumstances is to avoid or mitigate potential adverse impacts and to come to an agreeable solution, the agreement of all parties is not a requisite component of adequate consultation. The Guidelines state that ASRD will assist a forest company by "advising the forest industry which First Nations need to be consulted".

HWP has made a significant effort to consult with Aboriginal communities within and adjacent to the FMA – this effort started before the government's Aboriginal Consultation Guidelines came into effect (September 2006) and continue to this day. The government sanctioned list of which communities HWP must contact has changed a number of times over the last three years, resulting in some inconsistent referral activities (i.e. some communities have been dropped and others added). However, HWP has had a long consultative relationship with the five Aboriginal communities that are closest to the Hinton FMA and that have documented traditional use sites – this includes the Alexis Nakota Sioux Nation, Aseniwuche Winewak Nation, Foothills Ojibway, Nakcowinewak Nation, and the Mountain Cree (Smallboys camp).

The current communities which HWP contacts are presented in the following table:

**Table 2-1. Current HWP Aboriginal Engagement List**

| Aboriginal Community | Status | Mandatory/Voluntary |
|---|---|---|
| Alexis Nakota Sioux Nation | First Nation | Mandatory |
| Aseniwuche Winewak Nation (AWM) | Non-Status | Mandatory |
| Ermineskin Tribe | First Nation | Mandatory |
| O'Chiese First Nation | First Nation | Mandatory |
| Foothills Ojibway | Non-Status | Voluntary |
| Nakcowinewak Nation | Non-Status | Voluntary |
| Mountain Cree (Small Boys) | Non-Status | Voluntary |
| Sunchild First Nation | First Nation | Voluntary |
| Bighorn Chiniki | Non-Status | Voluntary |

Appendix D contains summaries of the engagement activities undertaken.

# 3 TECHNICAL ANALYSIS

Since the 1999 FMP was completed and approved HWP has acquired new data sources, which include: a new forest inventory, a new watercourse layer, an ecological land classification inventory, MPB stand susceptibility indices, and LIDAR data. These new data along with changes in the timber utilization from a 10/8 pulp standard to a 15/11 sawlog standard has required HWP to complete much of the technical work required for a complete revision to the FMP; this includes: classifying a new landbase, building new yield curves, and constructing new TSA models.

This section contains summaries of the FMA landbase assessment, the development of forest growth and yield age relationships and the timber supply analyses undertaken:

- **Landbase assessment** – this is a detailed evaluation of which areas are available and suitable for forest management activities such as timber harvesting.
- **Growth and Yield** – an assessment of how the forest grows over time
- **Timber Supply Analysis** – an assessment of how much timber can be harvested in a sustainable manner, including a detailed assessment of the impacts on other values.

Detailed documentation of the methods and results are provided in ***Volume II – Technical Analyses*** of this FMP Amendment.

## 3.1 Landbase Assessment

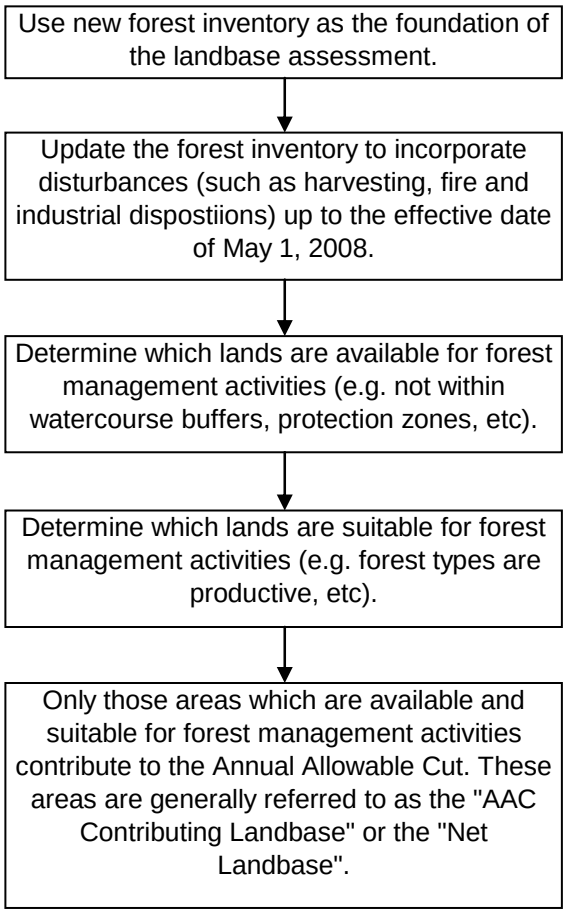
The classification of the FMA landbase is the first of three technical tasks required in the determination of a new annual allowable cut for the Hinton FMA. The landbase classification has three primary objectives:

- Determine the current condition of the Hinton FMA landbase by classifying each polygon in the FMA as either part of the contributing or passive landbase and assigning all forested areas to a yield stratum;
- Identify pine stands that are particularly vulnerable to MPB infestation;
- Create a layer that is compliant to the *Alberta Forest Management Planning Standard* which can be used within a timber supply model to revise the AAC for the Hinton FMA.

The landbase assessment was completed using several data sources, including:

- Alberta Vegetation Inventory (AVI)
- FMA boundary (May 1, 2008 Forest Management Agreement O.C. 565/2007)
- Compartments
- Cutblock history and silviculture records
- Fire history
- Ecological land classification
- Mountain pine beetle susceptibility index
- Natural sub-region
- Hydrology (Watercourses and Lakes)
- Watersheds
- Eastern Slopes Prime Protection zones
- HWP wildlife zones
- Steep slopes
- Dispositions
- Seismic lines
- Planned blocks

These data sources were combined and updated to a base date of May 1, 2008. In simple terms, the landbase assessment process is as follows:




The following table summarizes the new net landbase and provides a comparison to the 1999 forest management plan.

A report entitled 2009 Mountain Pine Beetle Forest Management Plan Technical Report #1 - Landbase Classification is provided in Section 1 of ***Volume II – Technical Analyses*** of this FMP Amendment. It contains a detailed description of the landbase assessment methods and results.

**Table 3-1. Hinton FMA Landbase Classification (compared to the 1999 FMP)**

| Landbase Category | | 1999 Area (ha) *10/8 Utilization* | 2009 Area (ha) *15/11 Utilization †* | 2009 *% of Total Area** |
|---|---|---|---|---|
| **Total Landscape (Including OB Areas)** | | **1,038,564** | **1,034,067** | |
| **Outside the FMA** | | | | |
| OB | Townsites, Patented Land, Parks, and Mines | 36,093 | 45,293 | |
| **Total FMA Area** | | **1,002,471** | **988,774** | **100.00%** |
| **Non-Forested Area Reductions** | | | | |
| NN | Naturally Non-Vegetated | 18,733 | 5,280 | **0.53%** |
| NV | Naturally Non-Forested | 47,175 | 21,834 | **2.21%** |
| AN | Anthropogenic Non-Vegetated | | 17,542 | **1.77%** |
| AV | Anthropogenic Vegetated | | 5,334 | **0.54%** |
| | ***Sub-Total*** | ***65,909*** | ***49,991*** | ***5.06%*** |
| **Dispositions and Other Area Removals** | | | | |
| EP | Eastern Slopes Land Use Zones (Prime Protection) | | 962 | **0.10%** |
| DR | Disposition Reservation | 22,044 | 22,341 | **2.26%** |
| | ***Sub-Total*** | ***22,044*** | ***23,303*** | ***2.36%*** |
| **Subjective and Ecosite Deletions** | | | | |
| WT | Wet Site | | 152,694 | **15.44%** |
| LR | Larch Subjective Deletion | | 2,954 | **0.30%** |
| EC | Non-Operational Ecosites | 94,524 | 6,600 | **0.67%** |
| AO | "A" Crown Closure Overstory with No Understory | | 3,924 | **0.40%** |
| SB | Black Spruce Composition >=80% | 24,559 | 28,690 | **2.90%** |
| PP | Potentially Productive | | 2,355 | **0.24%** |
| | ***Sub-Total*** | ***119,083*** | ***197,217*** | ***19.95%*** |
| **Water course buffers / Steep Slopes** | | | | |
| SS | Steep Slopes | 10,303 | 37,794 | **3.82%** |
| WB | Watercourse Removals | 53,648 | 16,737 | **1.69%** |
| | ***Sub-Total*** | ***63,951*** | ***54,531*** | ***5.52%*** |
| **Seismic Lines** | | | | |
| CL | Cutlines / Seismic | 16,144 | 13,528 | **1.37%** |
| | Non-Managed Portions of Horizontal Stands | 0 | 41 | **0.00%** |
| | ***Sub-Total*** | ***16,144*** | ***13,569*** | ***1.37%*** |
| **Total Deletion Area (Excluding OB Areas)** | | **287,130** | **338,611** | ***34.25%*** |
| Total AAC Contributing Landbase | | 715,340 | 650,163 | 65.75% |

* - Percentages exclude out of bounds areas (Del = "OB"); † - UTZ = Utilization Standard - 15/11 for coniferous; 15/10 for deciduous

### *3.1.1 Yield Strata Definitions*

Yield strata are groupings of forest stands into categories with similar forest growth expectations. Every hectare of the contributing landbase is assigned to a yield stratum. Two broad strata were also created for productive stand types in the passive landbase; however, they were not used in this FMP Amendment. The yield stratum assignments were based on four key forest inventory attributes:

1. Stand origin: fire origin (natural) stands were stratified separately from post-harvest managed stands.
2. Site Quality: Each stand was identified as being located on either a Good, Medium, or Poor site.
3. Crown Closure: Each stand was identified as having either high ("C" & "D") or low ("A" & "B") crown closure.

4. Overstory versus Understory managed: Used for fire origin stands only. Some stands are planned to be managed based on the understory composition.

Fire origin stands and cutblocks harvested prior to 1991 were assigned to a yield stratum based on the stand attributes from the forest inventory classification. Yields for these strata were based on HWP's permanent growth sample (PGS) data. Cutblocks harvested since the beginning of the 1991 timber year were assigned to a yield strata based on field surveys and silviculture declarations; yields for these strata were projected using performance survey data modeled through Alberta's forest growth model (GYPSY).

Twenty seven yield strata were identified for the 2009 MPB FMP using the above mentioned variables. A description of the FMP Yield Strata and the variables used to assign the strata are presented in the following table.

There are 555 hectares of the "black spruce-hardwood" type in the AAC contributing landbase on the FMA. Due to data limitations for yield curve development and the low number of hectares, this type was merged into the "white spruce-hardwood" stratum.

**Table 3-2. FMP Yield Strata and Area Summary**

| Yield Stratum Number | Landbase | Origin Type | Story Managed | Yield Stratum Name | Yield Stratum Code | AAC Contributing Area (ha) |
|---|---|---|---|---|---|---|
| 1 | Contributing | Fire origin stands, Pre-91 cutblocks, or cutblocks without an opening number | Overstory | Pure deciduous, A/B crown closure | E_B1_XL | 11,251 |
| 2 | | | | Pure deciduous, C/D crown closure | E_B1_XH | 35,465 |
| 3 | | | | Deciduous dominated pine mixedwood | E_B2_XX | 16,015 |
| 4 | | | | Deciduous dominated spruce mixedwood | E_B3_XX | 13,276 |
| 5 | | | | Spruce dominated mixedwood | E_B4_XX | 9,239 |
| 6 | | | | Pine dominated mixedwood | E_B5_XX | 21,057 |
| 7 | | | | Pure conifer white spruce leading, poor & medium sites | E_B7_MX | 43,671 |
| 8 | | | | Pure conifer white spruce leading, good sites, A/B crown closure | E_B7_GL | 11,766 |
| 9 | | | | Pure conifer white spruce leading, good sites, C/D crown closure | E_B7_GH | 6,866 |
| 10 | | | | Pure conifer pine leading, poor & medium sites, A/B crown closure | E_B8_ML | 38,092 |
| 11 | | | | Pure conifer pine leading, poor & medium sites, C/D crown closure | E_B8_MH | 131,841 |
| 12 | | | | Pure conifer pine leading, good sites, A/B crown closure | E_B8_GL | 33,808 |
| 13 | | | | Pure conifer pine leading, good sites, C/D crown closure | E_B8_GH | 103,589 |
| 14 | | | | Pure conifer black spruce leading | E_B9_XX | 7,392 |
| 15 | | | Understory | Pure deciduous and mixedwoods | E_UN_DM | 15,843 |
| 16 | | | | Pure conifer | E_UN_CX | 51,955 |
| 17 (same as 1) | Contributing | Cut blocks Harvested since the start of the 1991 timber year with an opening number | All | Pure deciduous, A/B crown closure | E_B1_XL | 6 |
| 18 (same as 2) | | | | Pure deciduous, C/D crown closure | E_B1_XH | 1,510 |
| 19 (same as 3) | | | | Deciduous dominated pine mixedwood | E_B2_XX | 1,180 |
| 20 (same as 4) | | | | Deciduous dominated spruce mixedwood | E_B3_XX | 968 |
| 21 | | | | Spruce dominated mixedwood | G_B4_XX | 2,315 |
| 22 | | | | Pine dominated mixedwood | G_B5_XX | 3,424 |
| 23 | | | | Pure conifer white spruce leading | G_B7_XX | 12,336 |
| 24 | | | | Pure conifer pine leading | G_B8_XX | 76,615 |
| 25 (same as 14) | | | | Pure conifer black spruce leading | E_B9_XX | 682 |
| **Total** | | | | | **Contributing** | **650,163** |
| 26 | Passive | All | All | Pure deciduous and mixedwoods | E_PAS_D | 25,086 |
| 27 | | | | Pure conifer | E_PAS_C | 278,276 |
| Total | | | | | Passive | 303,362 |

Figure 3-1 and Table 3-3 summarize the area by the minimum stratification levels described in the Forest Management Planning Standard.

**Figure 3-1. Net Area Age Class Distribution by Broad Yield Strata**

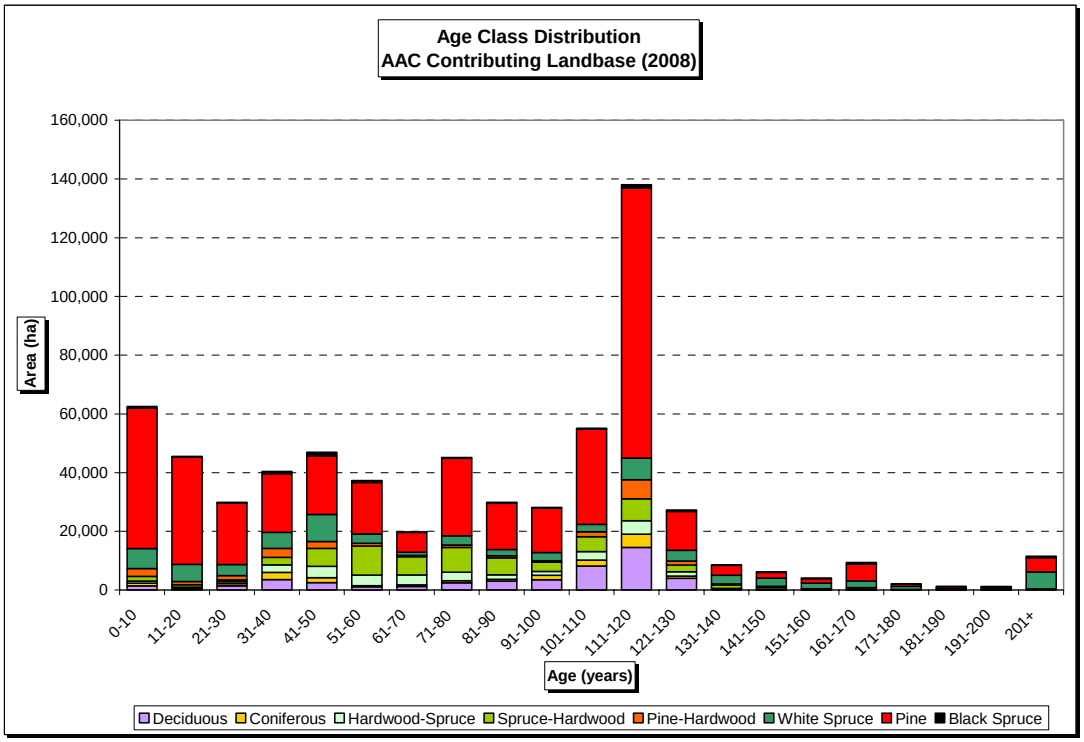



**Table 3-3. Broad Yield Strata Area Summary**

| Broad Yield Strata | Net Area (ha) | % of Net Area |
|---|---|---|
| 1 - Pure deciduous | 51,230 | 7.88% |
| 2 - Deciduous dominated pine mixedwood | 18,326 | 2.82% |
| 3 - Deciduous dominated spruce mixedwood | 19,638 | 3.02% |
| 4 - Spruce leading conifer dominated mixedwood[3] | 17,024 | 2.62% |
| 5 – Pine leading conifer dominated mixedwood | 25,331 | 3.90% |
| 6 - Black spruce leading conifer dominated mixedwood | Allocated to Stratum 4 | 0.00 |
| 7 - Pure conifer white spruce leading | 106,673 | 16.41% |
| 8 - Pure conifer pine leading | 395,925 | 60.90% |
| 9 - Pure conifer black spruce leading | 16,016 | 2.46% |
| Total | 650,163 | 100.0% |

[3] Includes 555 hectares of black spruce leading conifer dominated mixedwood types.

## 3.2 Forest Growth & Yield

Yield curves describe the growth expectations for each yield stratum. They are applied to the landbase and used to forecast stand conditions in the determination of annual allowable cuts. This section provides a brief summary of the yield curves and related information that are used in this FMP amendment.

The report entitled *Mountain Pine Beetle Forest Management Plan Amendment Technical Report #2 – Yield Projections* provided in Section 2 of *Volume II – Technical Analyses* of this FMP Amendment contains a detailed description of the methods used for creating the volume-age yield curves, including rules for stratification, plot attribute assignment, plot deletions, volume compilation methods, and modelling techniques. Resulting yield curves, volume tables, model parameters and fit statistics are also included in the report. Additional growth and yield related FMP information including cull deductions, methods for development of piece size curves (trees/$m^3$), and calculation of regeneration lag are also provided.

### *3.2.1 Utilization Standards*

Coniferous and deciduous yields were compiled to several different utilization standards. The annual allowable cut will be determined using the utilization standard #1, which is summarized as follows:

For coniferous species:

- 15.0 cm stump height
- minimum 15.0 cm diameter outside bark at stump height
- minimum 11.0 cm top diameter inside bark
- minimum log length of 3.76 m.

For deciduous species (Aw & Pb):

- 15.0 cm stump height
- minimum 15.0 cm diameter outside bark at stump height
- minimum 10.0 cm top diameter inside bark
- cut to length with a target length of 2.56 m and minimum log length of 1.78 m.

Yield curves were also developed for several other standards to facilitate recalculation of the AAC in the event of a request to change the utilization standard. The selected standards were identified as those that would most likely be considered.

- The second utilization (Utilization 2) for coniferous was the same as the first utilization with the exception of the top diameter inside bark that was changed to 13.0 cm. For deciduous the standards were the same as the first utilization with the exception of the minimum log length set to 2.56 m.
- The third utilization for coniferous (Utilization 3) was cut to length with a 15.0 cm diameter at a stump height of 15.0 cm, a top diameter inside bark of 13.0 cm and the following allowable lengths: 4.98 m, 4.37 m, and 3.76 m. The tree was segmented, if possible, into logs of 4.98 m, with the last piece of 4.98 m. If the last piece was shorter then 4.98 m then a log length of 4.37 m was taken. If 4.37 m was not available then a log of 3.76 m was taken (Table 3-6). The deciduous merchantability criteria for utilization 3 are the same as the criteria for utilization 1 but only aspen is included in the compilation.
- The merchantability criteria for the deciduous fourth utilization (Utilization 4) are the same as for utilization 2, however only aspen is included in the compilation: a minimum diameter of 15.0 cm at a stump height of 15.0 cm, a top diameter of 10.0 cm and a minimum log length of 2.56 m.

The various utilization standards are summarized in Table 3-4 and Table 3-5.

**Table 3-4. Coniferous Utilization Standards**

| Utilization Characteristic | Utilization Standard #1 (UT1) | Utilization Standard #2 (UT2) | Utilization Standard #3 (UT3) |
|---|---|---|---|
| Stump Height | 15.0 cm | 15.0 cm | 15.0 cm |
| Minimum Log Length | 3.76 m | 3.76 m | 3.76 m |
| Cut-To-Length | Tree Length | Tree Length | 4.98/4.37/3.76[4] |
| Minimum Stump Diameter Outside Bark | 15.0 cm | 15.0 cm | 15.0 cm |
| Minimum Top Diameter Inside Bark | 11.0 cm | 13.0 cm | 13.0 cm |

**Table 3-5. Deciduous Utilization Standards**

| Utilization Characteristic | Utilization Standard #1 (UT1) | Utilization Standard #2 (UT2) | Utilization Standard #3 (UT3) | Utilization Standard #4 (UT4) |
|---|---|---|---|---|
| Stump Height | 15.0 cm | 15.0 cm | 15.0 cm | 15.0 cm |
| Minimum Log Length | 1.78 m | 2.56 m | 1.78 m | 2.56 m |
| Cut-To-Length | 2.56 m | 2.56 m | 2.56 m | 2.56 m |
| Minimum Stump Diameter Outside Bark | 15.0 cm | 15.0 cm | 15.0 cm | 15.0 cm |
| Minimum Top Diameter Inside Bark | 10.0 cm | 10.0 cm | 10.0 cm | 10.0 cm |
| Species Included in Yield Curve | Aspen & Balsam Poplar | Aspen & Balsam Poplar | Aspen | Aspen |

### *3.2.2 Volume Compilation Methods*

The HWP Permanent Growth Sample (PGS) plots and recent performance survey data were compiled separately as the key data sources for development of the yield curves. The PGS data were used to create empirical volume – age yield curves, while the performance survey data were compiled and analyzed using GYPSY. Table 3-6 summarizes the species which are included in the annual allowable cut. These species are acceptable for harvest area regeneration. Detailed compilation Methods are provided in Volume II – Section 2 of the FMP amendment.

**Table 3-6. Acceptable Species**

| Acceptable Deciduous Species | Acceptable Coniferous Species | Species Not Chargeable to AAC |
|---|---|---|
| Aspen<br>Balsam Poplar | Pine,<br>White Spruce<br>Black Spruce<br>Engelmann Spruce<br>Balsam Fir<br>Alpine Fir<br>Sub-Alpine Fir | White Birch<br>Tamarack<br>All dead trees |

### *3.2.3 Cull Deductions*

Cull deductions are applied to yield curves to reflect losses for portions of trees that are rotten or of poor form. The Alberta Forest Management Planning Standard (SRD 2006) requires that cull be applied as a percent reduction to yield curves, rather than as a reduction to the harvest level in timber supply analysis. This section describes the methods by which the cull factors were derived.

4 First log and all subsequent logs are 4.98 m, if not available then 4.37 m, if not available then 3.76 m.

Conifer cull was separated into two components: a solid wood defect component and a rot component. A study from 1997, "Conifer Cull and Defect Study" (The Forestry Corp. 1997) was conducted on the current HWP FMA area with the objective of quantifying percent rot for the coniferous species. The objective of this study was to determine levels of rot within merchantable coniferous trees. The mean percent rot across the coniferous species identified in this report was 0.31%. A total 5% will be deducted from merchantable conifer volumes to account for the solid wood defect component and rot. This percentage will be monitored until the 2012/2013 timber year. The results from the monitoring program will inform deduction levels for solid wood defects in the 2014 FMP.

A deciduous cull study was completed on the Hinton FMA in 1990. The mean percent rot for deciduous species was found to be 13.2% (Fortrends Consulting Inc, 1990).

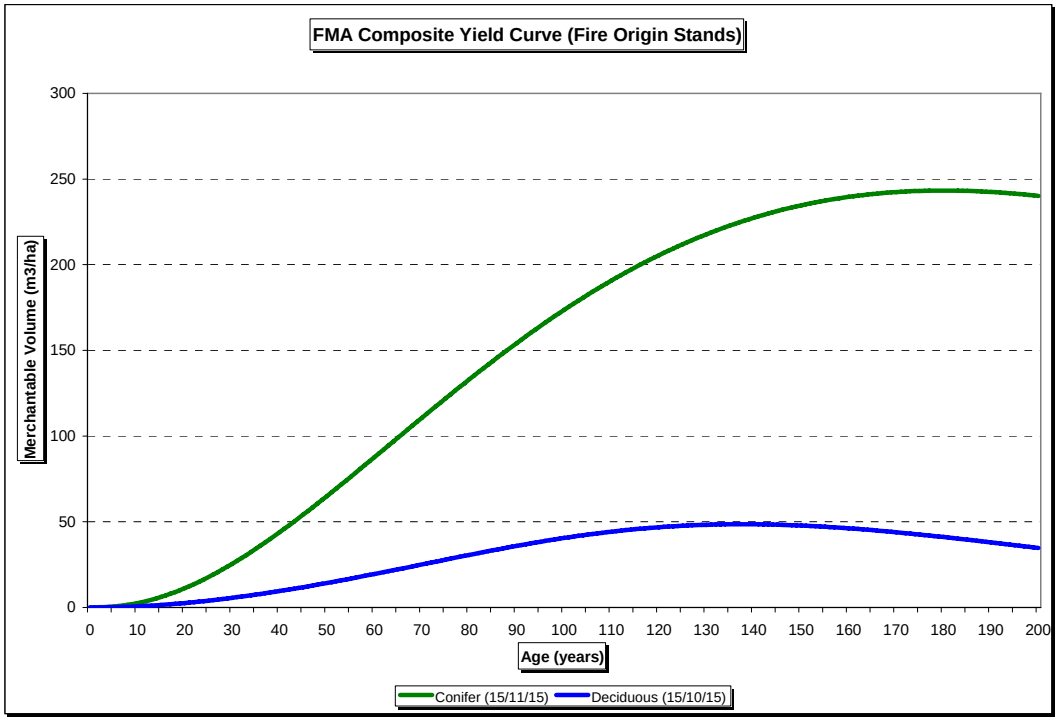
A total 5% coniferous cull and 13.2% deciduous cull will be deducted from the merchantable volume of the coniferous yield curves in the timber supply analysis.

### *3.2.4 Yield Curves and Yield Tables*

Yield curves and yield tables for individual strata are included in the report entitled *Mountain Pine Beetle Forest Management Plan Amendment Technical Report #2 – Yield Projections* provided in Section 2 of *Volume II – Technical Analyses* of this FMP Amendment.

The FMA-wide area-weighted composite yield curve is presented in Figure 3-2.

**Figure 3-2: FMA Composite Yield Curve**




### *3.2.5 Regenerated Yield Transitions*

Yield transitions describe how harvested stands were regenerated in the timber supply analysis. The 1999 FMP regeneration assumptions were too complex to translate to operational silviculture activities. Consequently, the default stratum-level regeneration decisions were to regenerate the same broad types as those which were harvested. . HWP has two targets which are assessed and reported in annual stewardship reports. The targets are:

- 90% of blocks surveyed annually (establishment surveys) will be Satisfactorily Restocked (SR) on the first survey. This target has been consistently met for several years. It was met again in 2009, as the first

legislated establishment survey was performed on a total of 7,444.3 hectares; of this 93.8 % were surveyed to be Satisfactorily Restocked (SR).

- 90% of post-91 blocks surveyed (establishment surveys) will be Satisfactorily Restocked (SR). A total of 8,136.2 hectares were surveyed in the 2009 calendar year, of which 94.3% were surveyed SR or declared "Retreated" (RTD). As of January 30th, 2010 the cumulative percent SR area was 97%.

The achievement of SR indicates that the harvest opening was satisfactorily regenerated to the required stratum. This well-established track record of regeneration success supports the following regeneration transition assumptions in this FMP amendment:

- No species group transitions
- Pure deciduous: regenerate to fully stocked natural stand yield
- Deciduous dominant pine mixedwood: regenerate to average stocking natural stand yield
- Deciduous dominant spruce mixedwood: regenerate to average stocking natural stand yield
- Spruce dominant mixedwood: regenerate to fully stocked managed stand yield
- Pine dominant mixedwood: regenerate to fully stocked managed stand yield
- Pure conifer – white spruce leading: regenerate to fully stocked managed stand yield
- Pure conifer – pine leading : regenerate to fully stocked managed stand yield
- Pure conifer – black spruce leading : regenerate to average stocking natural stand yield
- Understorey strata – transition as above, based on current understory composition.

Table 3-7 provides a detailed listing of the regenerated yield transitions used in the timber supply analysis.

**Table 3-7. Regeneration Transitions**

| Harvested Yield Strata (Yield Strata#/Yield Strata Code) | | Regenerated Yield Strata (Yield Strata #/Yield Strata Code/Description) | | |
|---|---|---|---|---|
| 1 | E_B1_XL | 2 | E_B1_XH | Natural stand - Pure deciduous, fully stocked |
| 2 | E_B1_XH | 2 | E_B1_XH | Natural stand - Pure deciduous, fully stocked |
| 3 | E_B2_XX | 3 | E_B2_XX | Natural stand - Deciduous dominated pine mixedwood, average stocking |
| 4 | E_B3_XX | 4 | E_B3_XX | Natural stand - Deciduous dominated spruce mixedwood, average stocking |
| 5 | E_B4_XX | 21 | G_B4_XX | Managed stand - Spruce dominated mixedwood |
| 6 | E_B5_XX | 22 | G_B5_XX | Managed stand - Pine dominated mixedwood |
| 7 | E_B7_MX | 23 | G_B7_XX | Managed stand - Pure conifer white spruce leading |
| 8 | E_B7_GL | 23 | G_B7_XX | Managed stand - Pure conifer white spruce leading |
| 9 | E_B7_GH | 23 | G_B7_XX | Managed stand - Pure conifer white spruce leading |
| 10 | E_B8_ML | 24 | G_B8_XX | Managed stand - Pure conifer pine leading |
| 11 | E_B8_MH | 24 | G_B8_XX | Managed stand - Pure conifer pine leading |
| 12 | E_B8_GL | 24 | G_B8_XX | Managed stand - Pure conifer pine leading |
| 13 | E_B8_GH | 24 | G_B8_XX | Managed stand - Pure conifer pine leading |
| 14 | E_B9_XX | 14 | E_B9_XX | Natural stand - Pure conifer black spruce leading, average stocking |
| 15 | E_UN_DM (transition based on understory composition) | 2 | E_B1_XH | Natural stand - Pure deciduous, fully stocked |
| | | 3 | E_B2_XX | Natural stand - Deciduous dominated pine mixedwood |
| | | 4 | E_B3_XX | Natural stand - Deciduous dominated spruce mixedwood |
| | | 21 | G_B4_XX | Managed stand - Spruce dominated mixedwood |
| | | 22 | G_B5_XX | Managed stand - Pine dominated mixedwood |
| 16 | E_UN_CX (transition based on understory composition) | 23 | G_B7_XX | Managed stand - Pure conifer white spruce leading |
| | | 24 | G_B8_XX | Managed stand - Pure conifer pine leading |
| | | 14 | G_B9_XX | Managed stand - Pure conifer black spruce leading |
| 17 (1) | E_B1_XL | 2 | E_B1_XH | Natural stand - Pure deciduous, fully stocked |
| 18 (2) | E_B1_XH | 2 | E_B1_XH | Natural stand - Pure deciduous, fully stocked |

| Harvested Yield Strata (Yield Strata#/Yield Strata Code) | | Regenerated Yield Strata (Yield Strata #/Yield Strata Code/Description) | | |
|---|---|---|---|---|
| 19 (3) | E_B2_XX | 3 | E_B2_XX | Natural stand - Deciduous dominated pine mixedwood, average stocking |
| 20 (4) | E_B3_XX | 4 | E_B3_XX | Natural stand - Deciduous dominated spruce mixedwood, average stocking |
| 21 | G_B4_XX | 21 | G_B4_XX | Managed stand - Spruce dominated mixedwood |
| 22 | G_B5_XX | 22 | G_B5_XX | Managed stand - Pine dominated mixedwood |
| 23 | G_B7_XX | 23 | G_B7_XX | Managed stand - Pure conifer white spruce leading |
| 24 | G_B8_XX | 24 | G_B8_XX | Managed stand - Pure conifer pine leading |
| 25 (14) | E_B9_XX | 14 | E_B9_XX | Natural stand - Pure conifer black spruce leading, average stocking |

Pre-blocked stands are regenerated based on the yield strata declarations reported to ARIS.

### *3.2.6 Regeneration Lag*

Regeneration lag is the time in years following harvesting that is required for seedlings to become established in the harvest openings. Regeneration lag was calculated using the performance survey data from 2006, 2007, and 2008 by FMP yield stratum.

Regeneration lag was applied during timber supply modeling as a shift to all yield curves representing managed stands used in the 2010 MPB FMP amendment.

- The regeneration lag by opening was calculated as the difference between the block age and the oldest species group's mean total age;
- The FMP yield stratum regeneration lag was calculated as the average block regeneration lag from all the blocks within a particular FMP Yield Stratum.

The regeneration lag was calculated for all FMP Yield Strata that had at least one surveyed block. Regeneration lag and the number of openings used to calculate the regeneration lag are presented by FMP yield strata in Table 3-8.

**Table 3-8. Regeneration Lag by FMP Yield Stratum.**

| Yield Stratum Number | Yield Stratum Name | Number of Openings | Regeneration Lag (years) |
|---|---|---|---|
| 18 (2) | Natural stand - Pure deciduous, fully stocked | 2 | 1.57 |
| 19 (3) | Natural stand - Deciduous dominated pine mixedwood, average stocking | 3 | 1.55 |
| 20 (4) | Natural stand - Deciduous dominated spruce mixedwood, average stocking | 4 | 2.37 |
| 21 | Managed stand - Spruce dominated mixedwood | 10 | 1.72 |
| 22 | Managed stand - Pine dominated mixedwood | 16 | 2.19 |
| 23 | Managed stand - Pure conifer white spruce leading | 103 | 2.35 |
| 24 | Managed stand - Pure conifer pine leading | 450 | 2.04 |
| 25 (14) | Natural stand - Pure conifer black spruce leading, average stocking | 1 | 2.00 |

### *3.2.7 Alternative Regeneration Standards*

MAI targets were developed by strata and broad cover group using the newly developed FMP yield curves. The following table summarizes the target coniferous and deciduous mean annual increment for the regeneration strata to be used in the timber supply analysis.

**Table 3-9. Regeneration Standards Target MAI**

| Yield Strata Number | Yield Strata Description | Primary Management Species | Regeneration Delay (years) (rounded) | MAI Culmination Age (years) | Target Conifer Gross MAI (15/11/15 utilization standard – $m^3$/ha/yr) | Target Deciduous Gross MAI (15/10/15 utilization standard – $m^3$/ha/yr) |
|---|---|---|---|---|---|---|
| 18 (2) | Pure Deciduous | Deciduous | 2.0 | 100 | 0.71 | 2.20 |
| 19 (3) | Deciduous Dominated Pine Mixedwood | Conifer | 2.0 | 64 | 1.34 | 0.35 |
| 20 (4) | Deciduous Dominated Spruce Mixedwood | Conifer | 2.0 | 69 | 1.41 | 1.39 |
| 21 | Spruce Dominated Mixedwood | Conifer | 2.0 | 105 | 2.39 | 0.46 |
| 22 | Pine Dominated Mixedwood | Conifer | 2.0 | 94 | 2.98 | 0.67 |
| 23 | White Spruce Dominated Pure Conifer | Conifer | 2.0 | 103 | 2.52 | 0.54 |
| 24 | Pine Dominated Pure Conifer – High Site | Conifer | 2.0 | 90 | 3.23 | 0.35 |
| 25 (14) | Black Spruce Dominated Pure Conifer | Conifer | 2.0 | 105 | 1.11 | 0.11 |

### *3.2.8 Long Run Sustained Yield Average*

One simple measure of the productivity of a forest area is the long run sustained yield average (LRSYA). It is a simple calculation of the sum of projected growth (expressed as mean annual increment ($m^3$/ha/yr) multiplied by the area (ha)). The LRSYA using regenerated growth is presented in the following table. LRSYA assuming current stand growth rates is included in *Volume II – Section 3*.

**Table 3-10. Long Run Sustained Yield Average**

| Yield Strata Number | Yield Strata Description | MAI Culmination Age (years) | Conifer MAI – (m3/ha/yr) | Deciduous MAI – (m3/ha/yr) | Area (ha) | Conifer LRSYA (m3/ yr) | Deciduous LRSYA (m3/ yr) |
|---|---|---|---|---|---|---|---|
| 18 (2) | Pure Deciduous | 100 | 0.71 | 2.20 | 51,116 | 36,292 | 112,455 |
| 19 (3) | Deciduous Dominated Pine Mixedwood | 64 | 1.34 | 0.35 | 18,343 | 24,580 | 6,420 |
| 20 (4) | Deciduous Dominated Spruce Mixedwood | 69 | 1.41 | 1.39 | 19,652 | 27,709 | 27,316 |
| 21 | Spruce Dominated Mixedwood | 105 | 2.39 | 0.46 | 17,070 | 40,797 | 7,852 |
| 22 | Pine Dominated Mixedwood | 94 | 2.98 | 0.67 | 25,313 | 75,433 | 16,960 |
| 23 | White Spruce Dominated Pure Conifer | 103 | 2.52 | 0.54 | 106,693 | 268,866 | 57,614 |
| 24 | Pine Dominated Pure Conifer – High Site | 90 | 3.23 | 0.35 | 395,961 | 1,278,954 | 138,586 |
| 25 (14) | Black Spruce Dominated Pure Conifer | 105 | 1.11 | 0.11 | 16,014 | 17,776 | 1,762 |
| Total | | | | | 650,163 | 1,770,407 | 368,966 |
| FMA Average MAI (m3/ha/yr) | | | | | | 2.72 | 0.57 |

## 3.3 Timber Supply Analysis

The SRD MPB Interpretive Bulletin describes four timber supply scenarios which are required for the MPB FMP amendment. The four scenarios are intended to illustrate the sensitivity of the annual allowable cut to the various assumptions regarding MPB attack. The scenarios can be summarized as follows:

1. Baseline
    a. The intent of this scenario is to ensure that the previously established annual allowable cut (AAC) is still sustainable. In the case of HWP, a new AAC was established as the baseline due to the significant changes in management philosophy introduced since the last FMP. In 2006, an operational adjustment to the conifer AAC was approved by SRD which changed the utilization standard on the FMA from the 10/8/15 pulp standard to the 15/10/15 sawlog standard. The new baseline was established using to the 15/11/15 standard. The 15/10/15 AAC was 1,535,000 $m^3$/yr and the new baseline was determined to be approximately 1,550,000 $m^3$/yr at the 15/11/15 standard – which is a higher AAC at a marginally lower utilization standard. The end results of this analysis were two-fold 1) confirmation that the previously established AAC was still sustainable and 2) establishment of a new baseline to which the other scenarios will be evaluated.
2. Healthy pine (prevention strategy)
    a. The intent of this scenario is to alter the ageclass of the pine dominated forest types on the FMA. SRD described the goal as "to reduce the area of susceptible pine stands in the Rank 1 and Rank 2 categories in the Sustained Yield Unit (SYU) to 25% of that projected in the currently approved FMP at a point twenty years into the future." The baseline scenario was used to evaluate the targeted reduction in the area of Rank 1 and Rank 2 stands on the FMA. The area of these stands after 20 years in the baseline scenario was approximately 218,000 ha. Consequently, the target area for the healthy pine scenario was to have approximately 54,500 ha after 20 years. The current age class distribution of the pine types on the Hinton FMA limited the opportunity to achieve this goal. The outcome of this scenario was a conifer AAC of ~2.9 million $m^3$/yr for 20 years. The AAC fall-down was to ~0.98 million $m^3$/yr. A ~65% reduction in the amount of Rank 1 and Rank 2 stands on the FMA was achieved.
3. Disaster scenario
    a. The intent of this scenario was to evaluate a "worse-case" outcome for the FMA. Key assumptions for this scenario were:
        i. Harvest at an accelerated level for 20 years.
        ii. Assume massive pine mortality after 10 years, at which time:
            1. Pine volume was set to zero for all strata for all stands with a pine component of <=60% (based on AVI crown closure proportions).
            2. All live tree volume (not just pine volume) was set to zero and ages reset if the pine component was >=70% (based on AVI crown closure proportions). In the timber supply analysis, entire stand mortality was assumed (mortality applied to stands that are 20 years and older). For these stands, the age was reset to 0 years and it was regenerated on the lowest density yield curve (e.g. AB density) for its specific stratum, with a 15-year regeneration lag.
    b. The outcomes for this scenario were drastic. The accelerated conifer harvest evaluated was ~2.3 million $m^3$/yr. The AAC fall-down after 20 years was to ~ 400,000 $m^3$/yr.

4. Preferred Pine Strategy

    a. This scenario was selected as the best practically feasible option for reducing the risk of the FMA to a catastrophic MPB outbreak. The accelerated harvest was constrained to reflect anticipated limitations for utilization of the fibre as well as providing a reasonable AAC fall-down. The 20-year accelerated conifer harvest level was determined to be 1,766,576 $m^3$/yr. The AAC after the accelerated harvest period was determined to be 1,399,724 $m^3$/yr.

    b. As per the approved Terms of Reference, the following non-timber values were required to be assessed:

        i. Water flow

        ii. Trumpeter swans

        iii. Woodland caribou

        iv. Grizzly bear

    c. Detailed reports for this scenario are provided in Section 4 of this document.

A summary of the major timber supply model constraints for each of these four scenarios is described in Table 3-11. Figure 3-3 illustrates the harvest levels for each of the scenarios.

**Figure 3-3. TSA Scenario Outcomes**

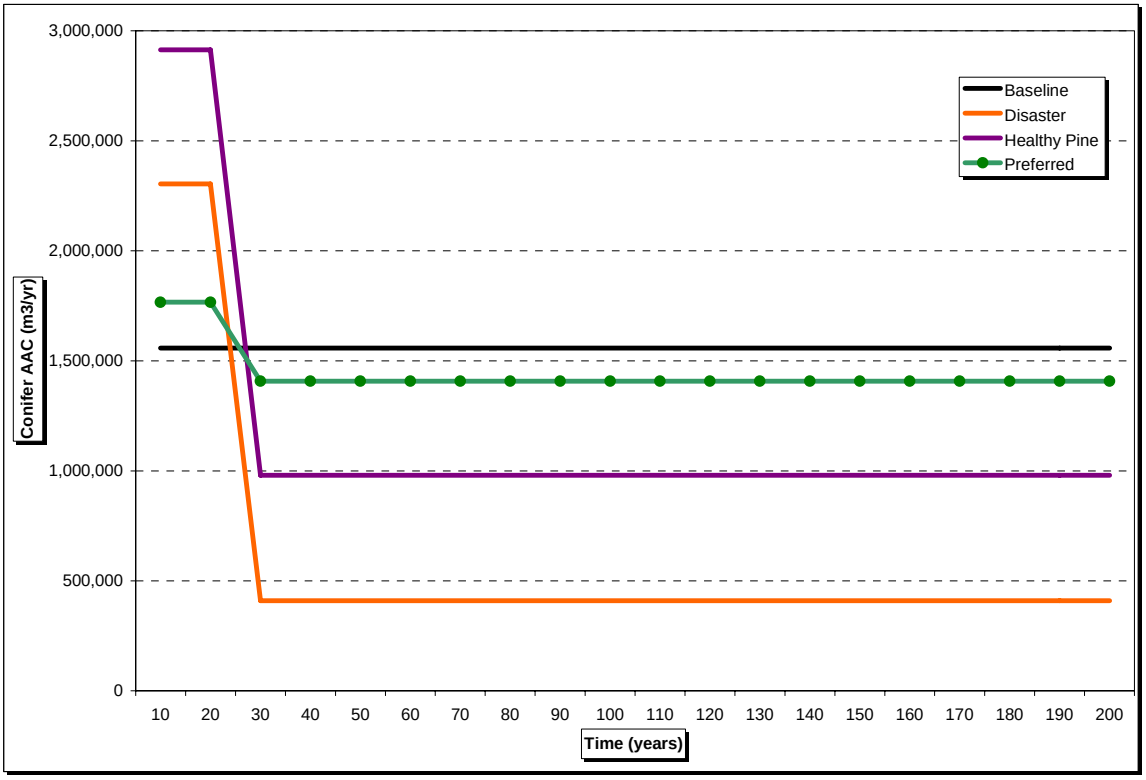


**Table 3-11. Major Timber Supply Model Constraints**

| Run Control Parameter | New Baseline | Healthy Pine | Disaster | Preferred |
|---|---|---|---|---|
| **Timber Supply Model Constraints** | | | | |
| Objective Function | Maximize total volume harvest | | | |
| Planning Horizon | 200 years | | | |
| Conifer Harvest Flow | Even flow | Accelerated harvest for yr 1-20, drop down to even flow for yr 21-200. | | |
| Deciduous Harvest Flow | Mitigate variability: allow 5% variability on Pure deciduous stands, allow up to 10% variability on entire landbase | | | |
| Merchantable Growing Stock | Stable over the last 50 years of the planning horizon | | | |
| Minimum Harvest Age | Conifer – 80 years (C, CD and DC broad cover groups)<br>Deciduous – 60 years (D broad cover group) | | | |
| **Landbase** | | | | |
| Administrative Unit | HWP FMA | | | |
| Landbase | Single | | | |
| **Yields** | | | | |
| Utilization Standard | 15/11/15 conifer TL<br>15/10/15 deciduous CTL | | | |
| Yield curves | 2010 – Net | | | |
| Cull Deductions | 5.0% conifer; 13.2% deciduous | | | |
| Regeneration Transition | Fully Stocked | | | |
| Regeneration Lag | As per Table 3-7 | As per Table 3-7 | As per Table 3-7 with exceptions. See footnote[5] | As per Table 3-7 |
| **Spatial Constraints** | | | | |
| Create SHS | No | | | Yes |
| Maximum arvest Opening Size | None | | | |
| Adjacency / Green-up | Not applied | | | |
| **Non-Timber Values** | | | | |
| Grizzly Bear Habitat Assessment | Not to be completed for this scenario | | | Completed by SRD. |
| Woodland Caribou Assessment | Not to be completed for this scenario | | | No stands scheduled for harvest in the mapped caribou area for the first decade. |
| Water Flow Assessment | Not to be completed for this scenario | | | Completed by HWP. |

[5] Assume massive pine mortality at Year 10:
- Pine volume was set to zero for all strata if the pine component is <=60% (based on AVI crown closure proportions).
- All live tree volume (not just pine volume) will be set to zero and ages reset if the pine component is >=70% (based on AVI crown closure proportions). In the timber supply analysis, entire stand mortality will be assumed (mortality applies to stands that are 20 years and older). For these stands, the age will be reset to 0 years and it will regenerate on the lowest density yield curve (e.g. AB density) for its specific stratum, with a 15-year regeneration lag.

# 4 PREFERRED PINE MANAGEMENT STRATEGY

This section contains summaries of the preferred pine management strategy for the Hinton FMA. This scenario was selected as the best practically feasible option for reducing the risk of the FMA to a catastrophic MPB outbreak. The accelerated harvest was constrained to reflect anticipated limitations for utilization of the fibre as well as providing a reasonable AAC fall-down. The 20-year accelerated conifer harvest level was determined to be 1,766,576 $m^3$/yr. The AAC after the accelerated harvest period was determined to be 1,399,724 $m^3$/yr.

## 4.1 Timber Values

### *4.1.1 MPB Risk Reduction*

The key timber values to be addressed in this FMP amendment is the reduction of the amount of pine on the FMA that is at risk to MPB. Alberta suggested a targeted reduction of in the amount of Rank 1 and Rank 2 stands to 25% of the amount currently expected to be present in 20 years.

The preferred strategy resulted in a 39% reduction in Rank 1 stands, a 27% reduction in Rank 2 stands, for a combined reduction of 33% (Figure 4-1). Figure 4-2 demonstrates the 20-year ageclass resulting from the scheduled harvest. Figure 4-3 provides a comparison of the change in the distribution of Rank 1 and Rank 2 stands across the FMA over a twenty year period. The accelerated harvest level also results in a reduction in the amount of mature and overmature growing stock. This reduction is, as intended, heavily weighted to pine (Figure 4-4).

**Figure 4-1. Change in Rank 1 & 2 Area**

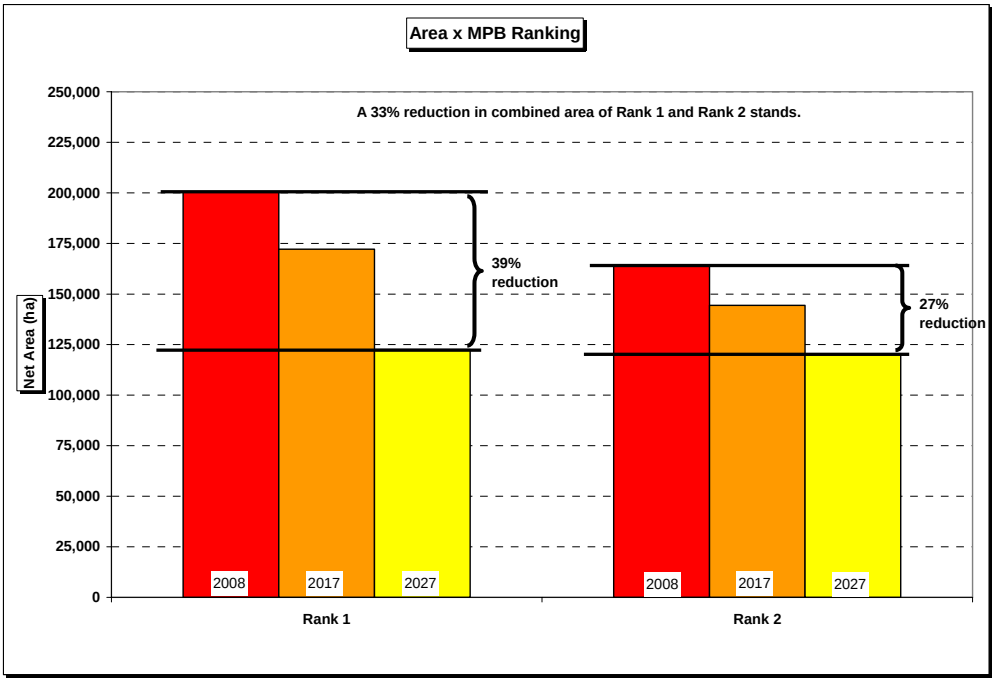
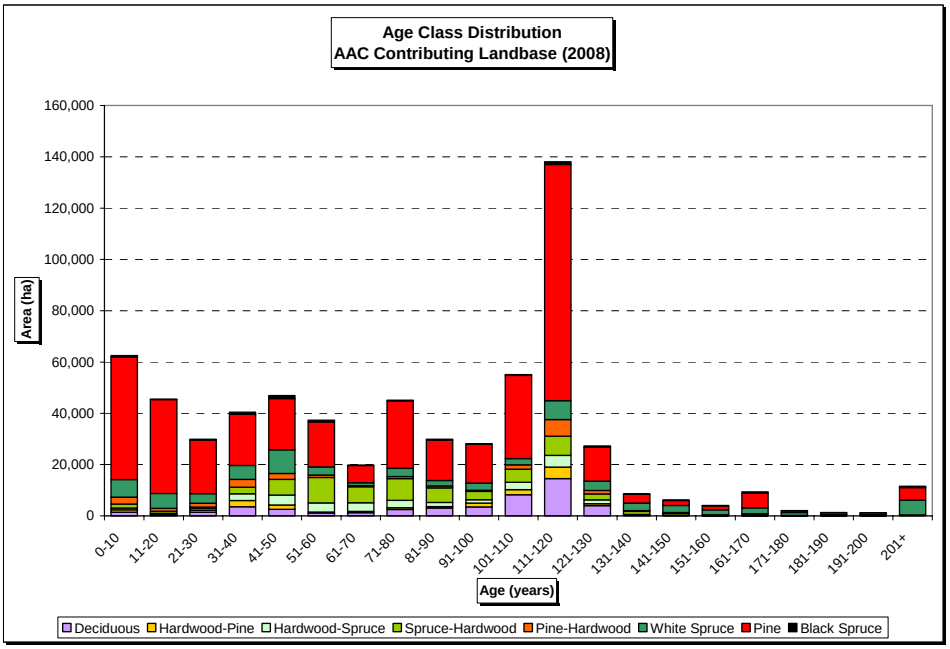


**Figure 4-2. Contributing Area Age Class Distribution 2008 vs. 2027**

**2008**




**2027**

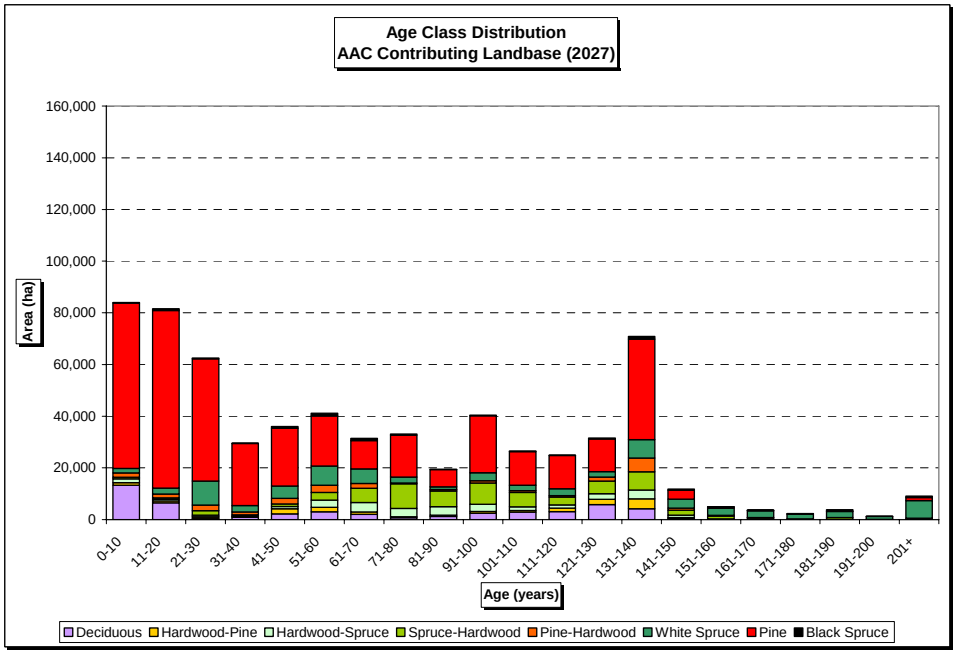
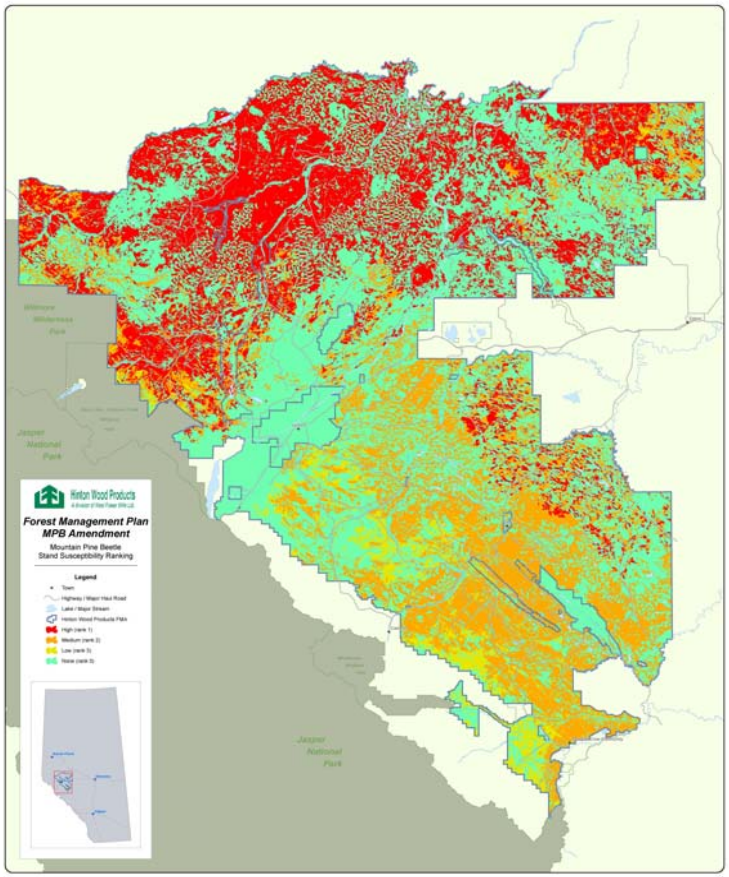


**Figure 4-3. Rank 1 and Rank 2 Stands 2008 vs. 2027**

**2008** **2027**



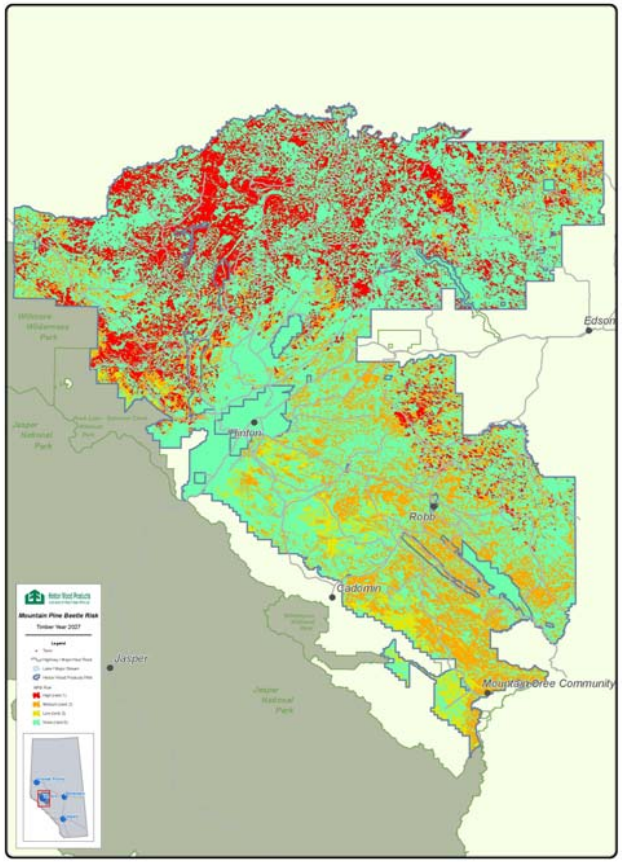
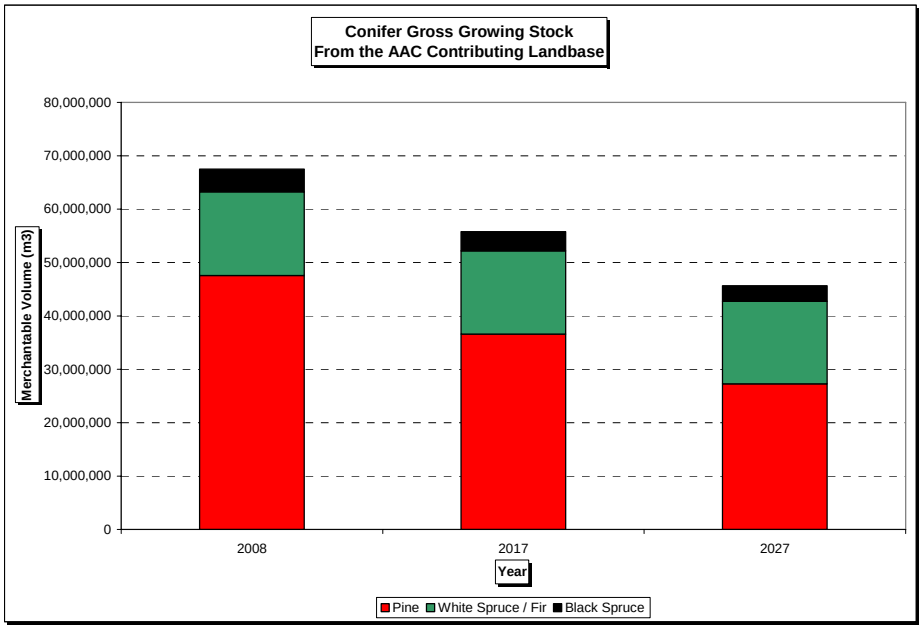



**Figure 4-4. Change in Conifer Growing Stock**




## *4.1.2 Timber Supply*

The 20-year accelerated conifer harvest level was determined to be 1,766,576 $m^3$/yr. The AAC after the accelerated harvest period was determined to be 1,399,724 $m^3$/yr. These harvest levels were selected due to current limitations in capacity to utilize additional fibre while balancing the need to reduce the risk of the FMA to MPB and providing opportunities for near-term and mid-term business needs. The deciduous AAC was determined to be 249,831 $m^3$/yr during the 20-year accelerated harvest period, after which the AAC is projected to be 229,714 $m^3$/yr. Reconciliation volume from the previous quadrant was incorporated with the 20-year accelerated harvest level. The following graphs summarize the preferred scenario:

**Figure 4-5. Harvest Flow**

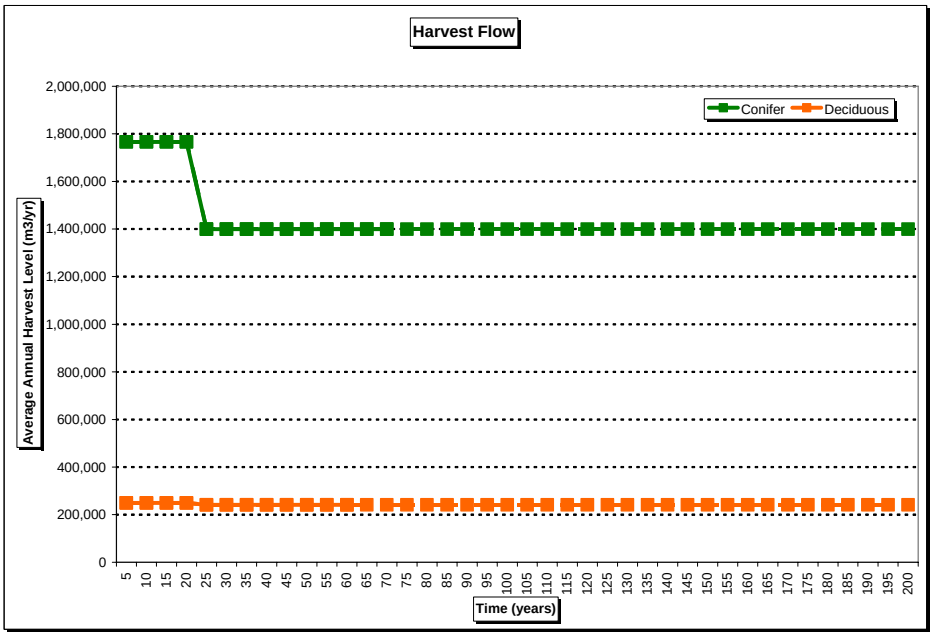


**Figure 4-6. Conifer Harvest Flow Composition Trend**

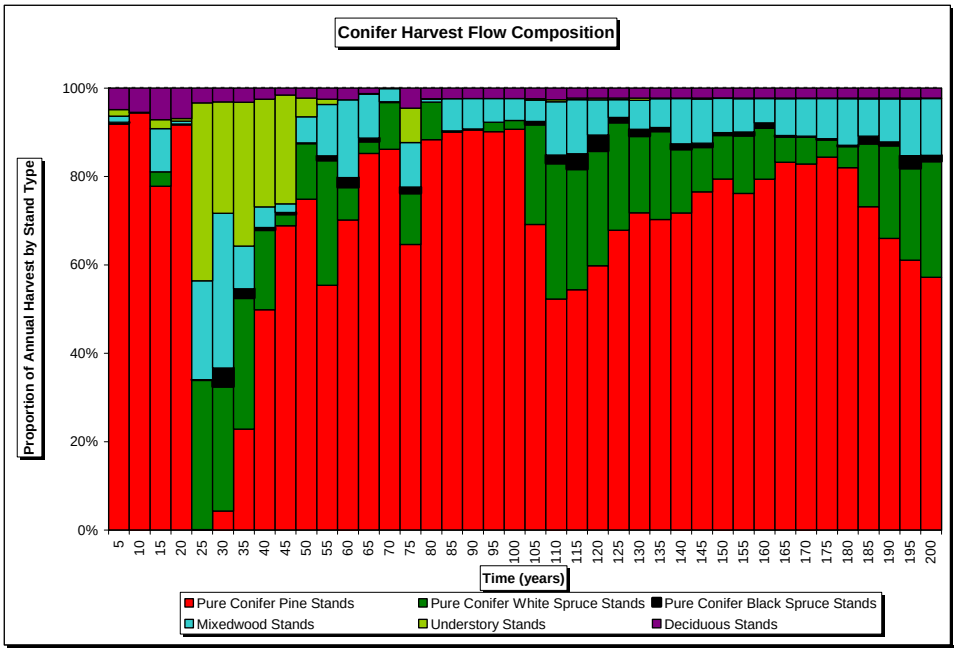



**Figure 4-7. Growing Stock Trend**

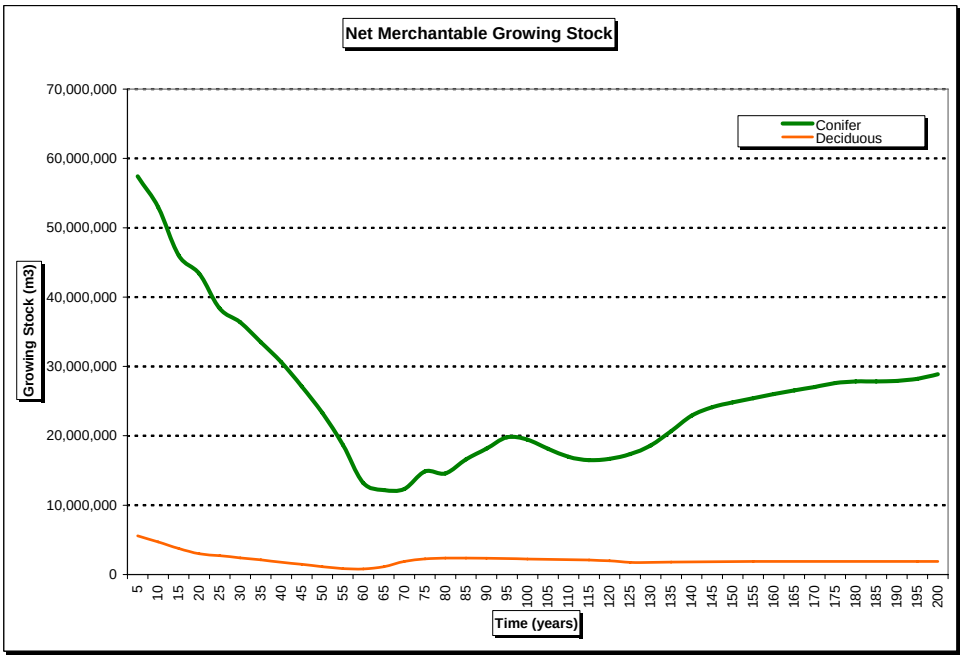


**Figure 4-8. Tree Size Trend**

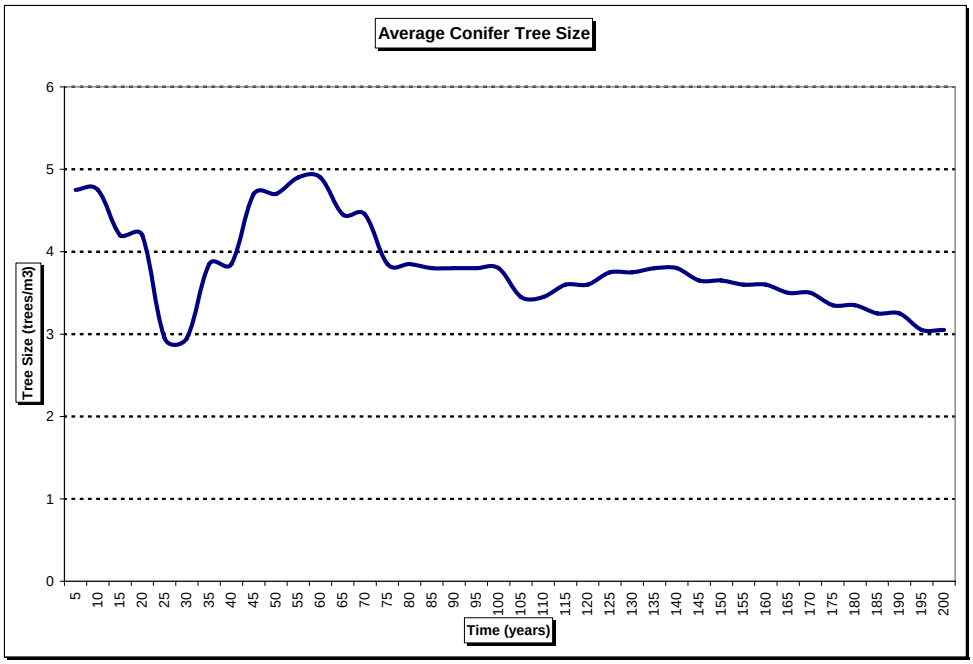
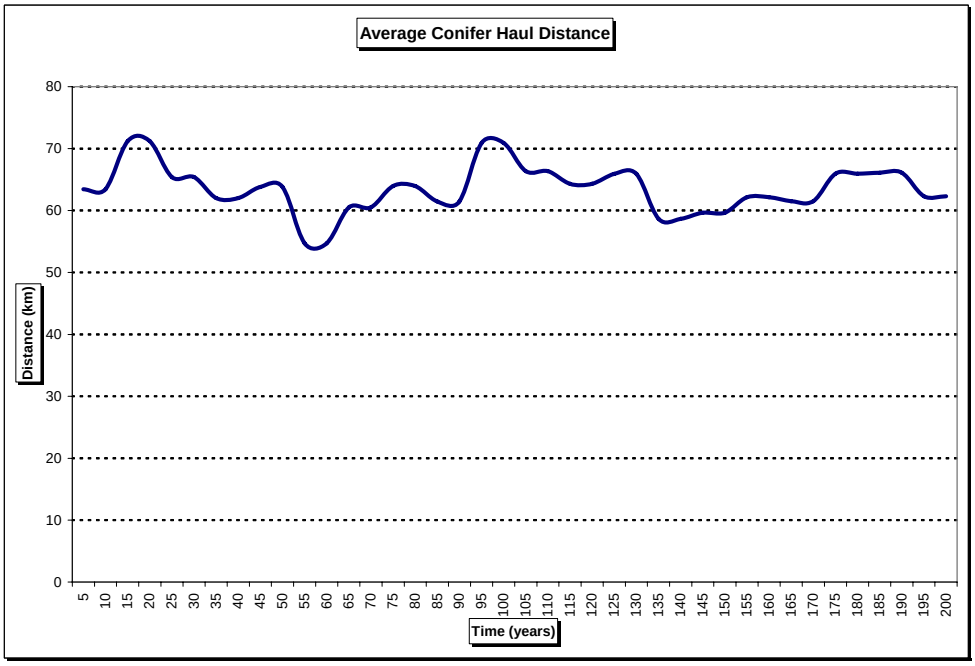



**Figure 4-9.Average Haul Distance Trend**



### *4.1.3 Spatial Harvest Sequence*

#### 4.1.3.1 Considerations Guiding Development of the Spatial Harvest Sequence

The following factors were considered at the compartment level during the development of the spatial harvest sequence (SHS).

1. Stand Susceptibility Index (see Appendix E for summaries)
    a. Assessment of compartment SSI ranking
2. Field knowledge
    a. Age class. In some areas our field experience is not consistent with the current AVI age classification. Consequently, the SSI rating of these stands may be overstated. Compartments such as these were deferred to later in the planning horizon.
    b. Areas containing significant non-pine conifer composition, or conifer understory suitable for future timber supply value, were deferred to later in the harvest sequence:
3. Current distribution of MPB on the FMA
    a. In the late summer/fall of 2009 the HWP FMA was hit with a significant natural MPB attack. Aerial and ground assessments were completed to determine the initial extent of the infestation.
4. Aspen
    a. HWP has volume supply agreements for deciduous fibre with mills in the region. The SHS includes the scheduling of harvest areas within the economic sphere of operations for these agreements.
5. Economics
    a. Haul distance, isolated stands, piece size and reforestation costs were all considered when selecting compartments available for harvest sequencing.

After consideration of the factors listed above, the final list of compartments which were open for development of the SHS is as follows:

- Athabasca – 1, 15, 19, 22, 24, 26, 27, 28, 29, 30, 31, 35
- Marlboro – 2, 4, 5, 8, 13, 16, 17, 18, 21, 22
- Embarras – 6, 7, 9, 10, 11, 12, 20
- McLeod – 2, 3, 5, 6, 7, 8, 12, 13, 16, 17, 18, 20, 23, 24, 25, 27
- Berland – 6, 7, 9, 10, 11, 12, 18, 23, 25, 26, 27, 29, 30, 33

The sequencing of low levels of harvest in other compartments was allowed in order to facilitate model development of an optimal spatial solution.

#### 4.1.3.2 Known Issues Impacting SHS Implementation

There are several known issues with the spatial harvest sequence (SHS). Following is a description of the most significant areas of concern. HWP is exploring strategies to resolve these issues with the goal to developing a more robust SHS for the 2014 Forest Management Plan.

- Forest Inventory: lack of conifer understory identification within conifer dominated stand types
    - **Concern:** A key learning from British Columbia regarding MPB harvest operations is the critical importance of protecting non-pine structure. The maintenance of non-pine species on the FMA during pine prevention and salvage harvest operations will contribute significantly to what has been called the "mid-term timber supply". In this context, "mid-term" refers to the period after pine salvage operations are halted and before regenerating pine stands become merchantable again. AVI identification of non-pine species, particularly in the understory, is poor.
    - **Action:** HWP has completed some trials using LiDAR signatures to identify areas likely to have understory. Further work is expected in this area. Until an acceptable inventory of these stand types is completed, and the SHS can be enhanced to reflect this new information, these stands will be identified in the field and deferred from harvest.
- Forest Inventory: stand heights, species composition and level of resolution
    - **Concern:** Although the inventory is more than sufficient for strategic planning purposes, the coarseness of the inventory specification provides challenges for operational implementation of the SHS. Efforts completed to date have demonstrated that within-stand height and species composition variability is problematic, particularly when striving for mitigation of MPB risk. In some cases, this has resulted in incorrect stand MPB risk ratings.
    - **Action:** HWP is working with another industry partner on a trial to enhance the identification of pine areas within AVI polygons using colour aerial imagery. HWP will consider extending the project to planned area of operations across the FMA, should the trial results prove to be positive and cost-effective. Stands, or portions thereof, with significant non-pine conifer composition will be deferred to later in the SHS to mitigate the mid-term timber supply fall down.
    - **Action:** HWP is exploring the use of LiDAR data to enhance the height inventory across the FMA. Preliminary work in this area has been encouraging. Stands, or portions thereof, with inaccurate heights will be deferred to later in the SHS.
- Mountain Pine Beetle Attack
    - **Concern:** Recent events have demonstrated that MPB spread patterns are not predictable. Two major wind-driven events in the past five years have resulted in unanticipated MPB infestation levels across Alberta. After the most recent, in late July 2009, HWP and SRD staff have found MPB natural attack across the FMA. In the Hinton FMA, the most heavily hit areas identified to date are in the north.
    - **Action:** Where economically and operationally feasible, HWP will alter operational plans to focus on areas where timber harvesting will be the most effective regarding MPB control. Attacked stands outside of the SHS will be prioritized for harvest

In addition to the concerns identified above, several site-specific factors may lead to a decision to defer an area from harvest, predominantly to reflect accepted strategies for mitigation of MPB infestation impacts. These include:

- Stem Density
    - Stands with total merchantable stem density less than 650 or greater than 1500 stems/ha will be deferred from harvest. The rationale for these deferrals is that MPB spread rates tend to be lower in open and dense stands.
- Non-merchantable Stems Proportions
    - Stands with ≥ 30 % non-merchantable (excluding understory) stems will be deferred. The rationale for these deferrals is that MPB spread rates tend to be lower in these types of stands. Stands with high proportions of non-merchantable stems also tend to result in higher levels of harvest residual material.
- Pine size
    - Stands with few pine sawlogs will be deferred. Larger pine trees produce more beetles than smaller pine trees. Stands generally targeted for harvest will average ≤ 5 trees/$m^3$ of merchantable stems. This translates to stand height of ~17 metres or greater and average merchantable stem DBH of ~19 cm or greater.
- Pine age
    - Young and very old pine stands will be deferred from harvest as MPB reproduction success tends to be lower in these stands. Target stand ages will be 80-150 years old.

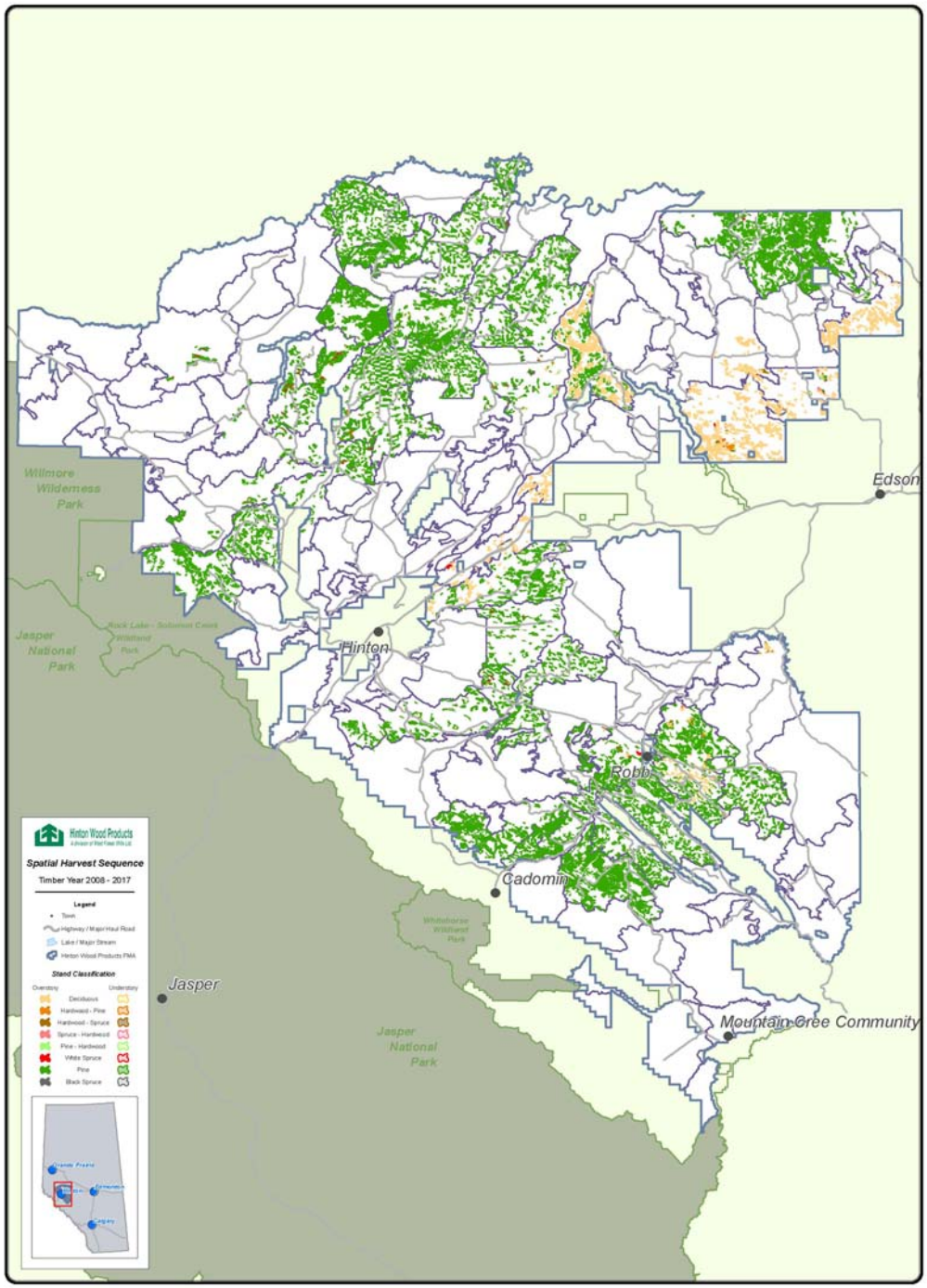
#### 4.1.3.3 SHS Summary

The following table summarizes the 2008-2017 spatial harvest sequence. Figure 4-10 illustrates the location and type of stands sequenced for harvest. A full size copy of the map is provided at the end of this section.

**Table 4-1. 2008-2017 SHS Stratum Summary**

| Stand Type | Area Scheduled for Harvest (ha) | SHS Conifer Volume (15/11/15 TL $m^3$) | SHS Deciduous Volume (15/10/15 CTL $m^3$) |
|---|---|---|---|
| Pure Deciduous | 10,701.7 | 915,685 | 1,677,489 |
| Understorey: Deciduous & Mixedwood | 673.4 | 33,603 | 91,656 |
| Deciduous Dominated Pine Mixedwood | 214.5 | 22,438 | 21,007 |
| Deciduous Dominated Spruce Mixedwood | 146.5 | 17,627 | 15,963 |
| Spruce Dominated Mixedwood | 29.5 | 3,784 | 1,367 |
| Pine Dominated Mixedwood | 373.8 | 80,431 | 14,596 |
| Understorey: Conifer | 597.7 | 115,453 | 14,315 |
| Pure Conifer - White Spruce | 144.9 | 26,753 | 2,664 |
| Pure Conifer - Pine | 76,094.2 | 16,517,737 | 701,175 |
| Pure Conifer - Black Spruce | 106.0 | 12,429 | 972 |
| Total | 89,082.2 | 17,745,940 | 2,541,204 |

**Figure 4-10. 10 Year SHS**



## 4.2 Non-Timber Values

As per the approved Terms of Reference, the following assessments were required to be incorporated into this MPB amendment:

1. Water yield impacts
2. Wildlife Species of Management Concern:
    a. Woodland Caribou
    b. Trumpeter Swans
    c. Grizzly bear

### *4.2.1 Water Yield Impacts*

Water yield impacts of timber harvesting were modelled for the period between 2008 and 2027[6].

Projected water yield changes were assessed using three different sizes of watersheds:

- 27 major basins (average: 38,361 ha - maximum: 77,360 ha - minimum: 4,676 ha)
- 67 watershed groups (average: 15,419 ha - maximum: 33,315 ha - minimum: 4,676 ha)
- 222 watersheds (average: 4,653 ha - maximum: 11,977 ha - minimum: 5 ha)

The watershed groups are the most appropriate for the purposes of the FMP amendment water yield assessment. The major basins are too large and the watersheds tend to be too small for the scale of assessment completed. As the name suggests, the watershed groups were created by grouping smaller watersheds together with the intent to create units of approximately 10,000 ha in size. Groupings were limited to adjacent units that contained watercourses which flowed to a common outlet. For some watersheds along very large watercourses (e.g. Athabasca River), the groups were simply the smaller watersheds that flowed into the larger watercourse. Particular attention was focused on creating reasonable watershed groups in locations impacted during the first ten-years of the spatial harvest sequence. The watershed group results are presented in this section. Figure 4-11 illustrates the geographic extent of the 67 watershed groups within the Hinton FMA.

The results for all three sizes of watersheds are presented in *Volume II – Section 3: Annual Allowable Cut Projection*.

#### 4.2.1.1 Water Yield Assessment Tool

The Alberta ECA model was used to evaluate potential impacts of the spatial harvest sequence on water yield. Base precipitation and base yield estimates were obtained from a report completed for the Hinton FMA area (Strategic Planning Tools for Hydrologic Resources Phase 2 Study, Golder Associates Ltd. 1999.) Base yield estimates were provided for three hydrologic zones, which covered the extent of the FMA:

- Front Range: 279 mm
- Upper Foothills: 267 mm
- Lower Foothills: 112 mm

Base precipitation estimates were provided for ten selected basins. These estimates were extended to all 222 watersheds in this assessment, based on the relative proximity of each watershed to the original ten (from the Golder study). See the following diagrams for an illustration of the assignments of yield and precipitation to the individual watersheds.

6 HWP was required to create a ten-year spatial harvest sequence for the FMP amendment. However, the water yields were assessed using a projected twenty-year sequence.

**Figure 4-11. Watershed Groups**

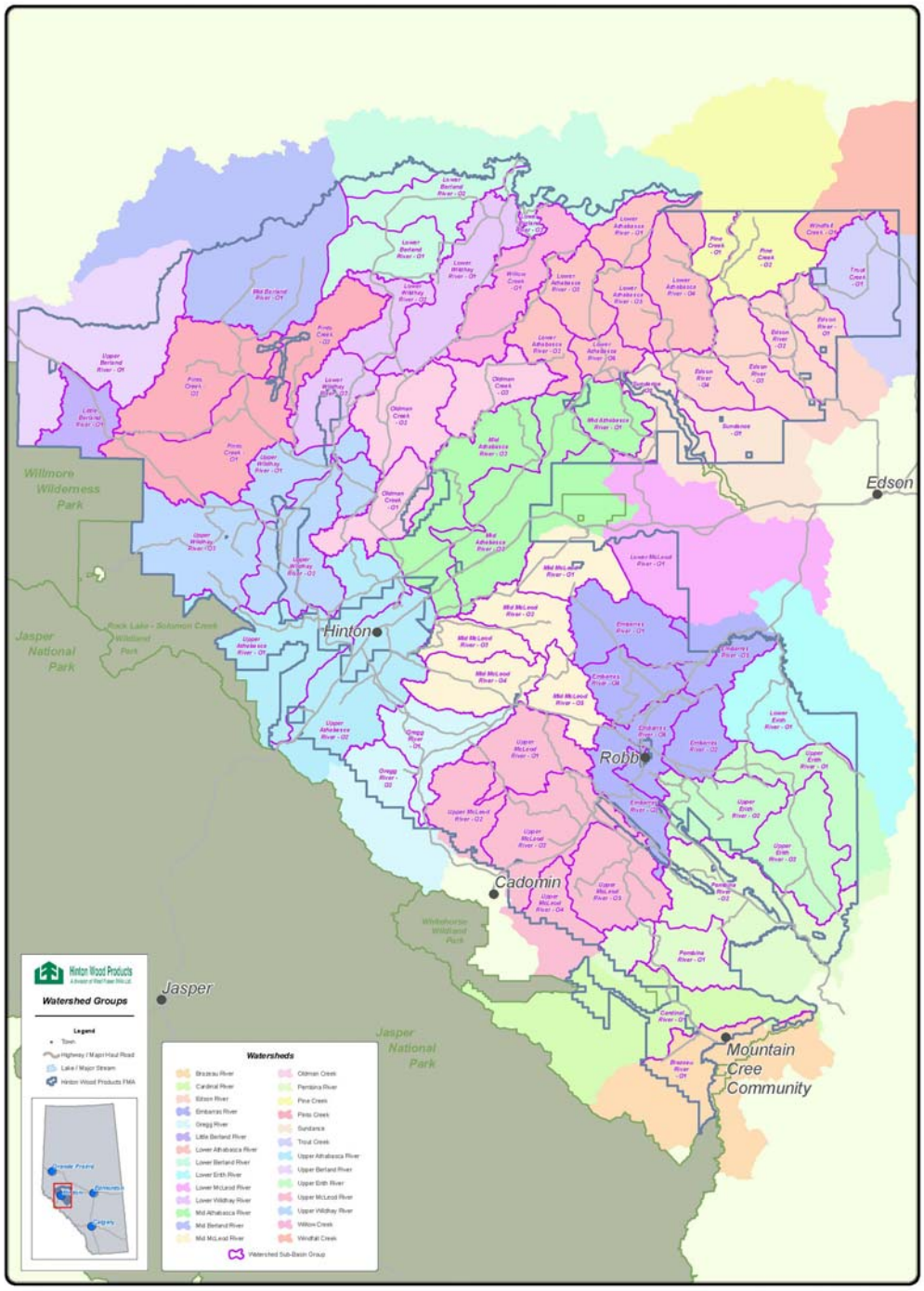


**Figure 4-12. Base Yield Estimates**[7]

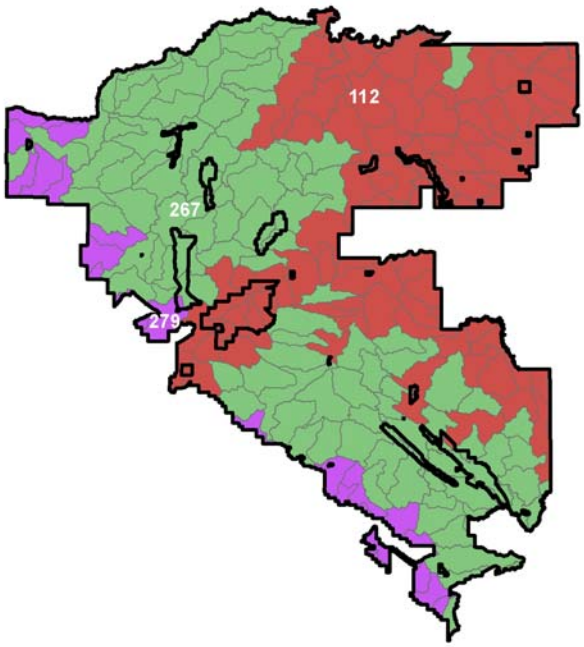
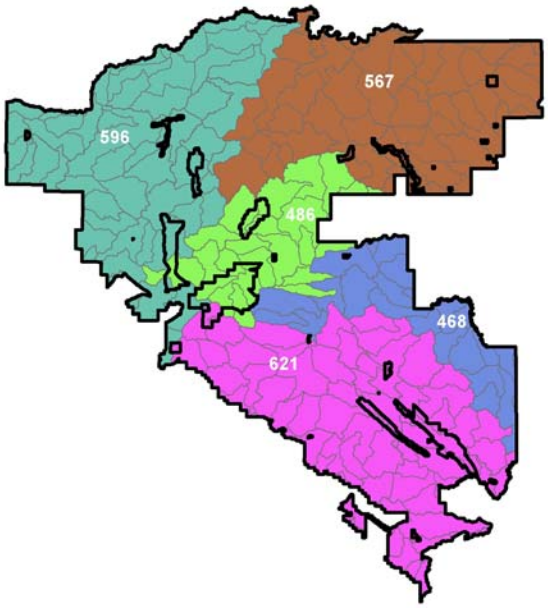



**Figure 4-13. Base Precipitation Estimates**




[7] Regions where base precipitation and yield estimates were applied are identified by colour.

#### 4.2.1.2 Water Flow Assessment Results

A summary of the Alberta ECA results for the watershed groups is provided in Table 4-2. "Pine Creek – G2" and "Windfall Creek – G1" show projected yield increases above 15%. These watersheds are on the edge of the FMA; hence the analysis does not include the entire watershed area. Figure 4-14 shows the location of these two watershed groups. These areas were attacked by MPB in 2009.

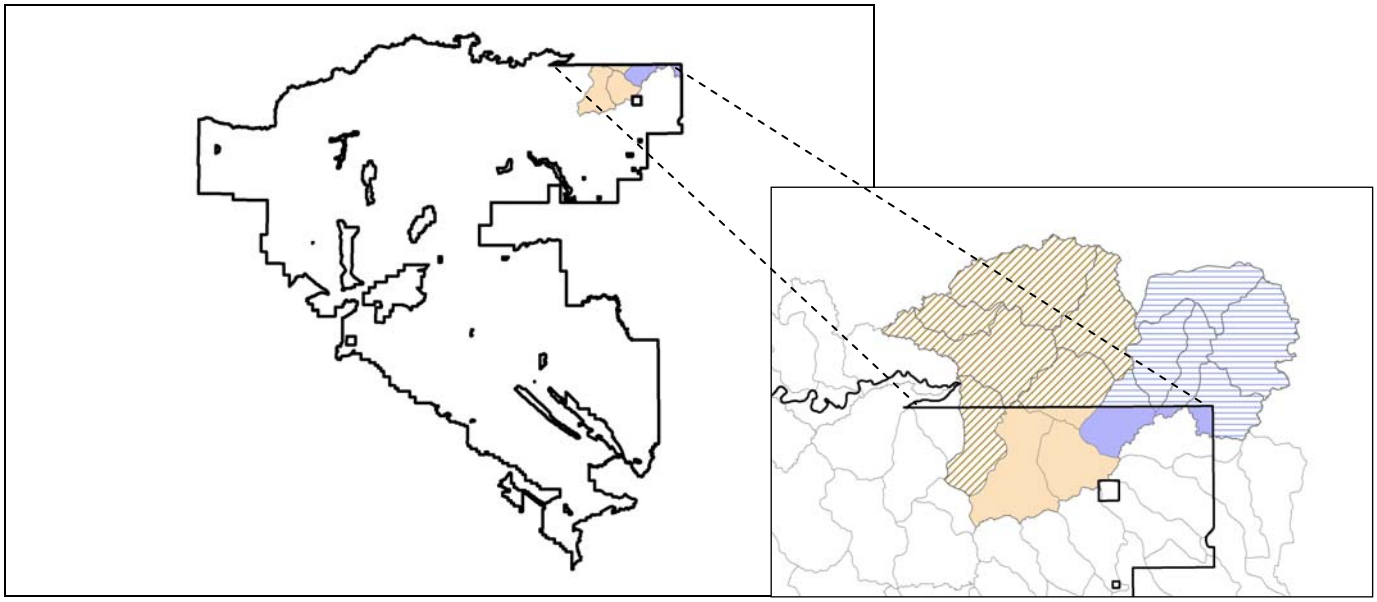
**Table 4-2. Water Flow Assessment: Watershed Groups**

| Watershed | Base Precipitation (mm) | Base Water Yield (mm) | Total Area (ha) | Total Harvest (ha) | Percent Harvest | Maximum Water Yield Increase | |
|---|---|---|---|---|---|---|---|
| | | | | | | Amount (%) | Year |
| Brazeau River - G1 | 621 | 273 | 10,189 | 536 | 5% | 1.3% | 2027 |
| Cardinal River - G1 | 621 | 272 | 18,595 | 817 | 4% | 0.9% | 2027 |
| Edson River - G1 | 567 | 112 | 7,675 | 1,930 | 25% | 8.6% | 2018 |
| Edson River - G2 | 567 | 112 | 9,820 | 924 | 9% | 3.3% | 2027 |
| Edson River - G3 | 567 | 112 | 14,751 | 2,322 | 16% | 5.4% | 2022 |
| Edson River - G4 | 567 | 112 | 8,876 | 2,110 | 24% | 10.3% | 2027 |
| Embarras River - G1 | 468 | 112 | 17,420 | 1,831 | 11% | 4.8% | 2027 |
| Embarras River - G2 | 621 | 267 | 9,831 | 3,177 | 32% | 4.4% | 2013 |
| Embarras River - G3 | 621 | 267 | 11,326 | 2,690 | 24% | 3.8% | 2017 |
| Embarras River - G4 | 621 | 267 | 11,039 | 977 | 9% | 1.5% | 2027 |
| Embarras River - G5 | 468 | 112 | 7,238 | 807 | 11% | 4.3% | 2023 |
| Embarras River - G6 | 621 | 112 | 9,654 | 1,787 | 19% | 10.5% | 2017 |
| Gregg River - G1 | 621 | 267 | 15,280 | 1,144 | 7% | 1.3% | 2018 |
| Gregg River - G2 | 621 | 271 | 8,243 | 949 | 12% | 2.2% | 2026 |
| Little Berland River - G1 | 596 | 279 | 9,911 | 981 | 10% | 1.7% | 2026 |
| Lower Athabasca River - G1 | 567 | 112 | 11,357 | 1,623 | 14% | 6.4% | 2027 |
| Lower Athabasca River - G2 | 567 | 112 | 9,368 | 2,811 | 30% | 8.5% | 2018 |
| Lower Athabasca River - G3 | 567 | 112 | 10,973 | 3,313 | 30% | 7.8% | 2027 |
| Lower Athabasca River - G4 | 567 | 112 | 15,792 | 346 | 2% | 1.0% | 2027 |
| Lower Athabasca River - G5 | 567 | 112 | 8,311 | 760 | 9% | 5.3% | 2027 |
| Lower Athabasca River - G6 | 567 | 112 | 6,247 | 1,719 | 28% | 9.2% | 2017 |
| Lower Berland River - G1 | 596 | 267 | 14,328 | 4,333 | 30% | 4.1% | 2018 |
| Lower Berland River - G2 | 594 | 254 | 15,313 | 3,914 | 26% | 2.6% | 2017 |
| Lower Berland River - G3 | 579 | 174 | 10,515 | 2,598 | 25% | 5.5% | 2027 |
| Lower Erith River - G1 | 468 | 112 | 19,990 | 2,144 | 11% | 4.6% | 2023 |
| Lower McLeod River - G1 | 469 | 112 | 11,016 | 463 | 4% | 1.6% | 2027 |
| Lower Wildhay River - G1 | 567 | 112 | 22,083 | 5,934 | 27% | 12.2% | 2013 |
| Lower Wildhay River - G2 | 596 | 267 | 9,754 | 2,715 | 28% | 4.7% | 2013 |

| Watershed | Base Precipitation (mm) | Base Water Yield (mm) | Total Area (ha) | Total Harvest (ha) | Percent Harvest | Maximum Water Yield Increase | |
|---|---|---|---|---|---|---|---|
| | | | | | | Amount (%) | Year |
| Lower Wildhay River - G3 | 596 | 267 | 12,780 | 3,061 | 24% | 3.0% | 2013 |
| Mid Athabasca River - G1 | 567 | 112 | 10,034 | 1,791 | 18% | 5.6% | 2027 |
| Mid Athabasca River - G2 | 486 | 112 | 28,468 | 4,368 | 15% | 3.8% | 2022 |
| Mid Athabasca River - G3 | 486 | 229 | 30,435 | 1,962 | 6% | 0.8% | 2022 |
| Mid Berland River - G1 | 596 | 267 | 33,316 | 6,740 | 20% | 3.1% | 2023 |
| Mid McLeod River - G1 | 472 | 112 | 11,557 | 1,807 | 16% | 5.2% | 2017 |
| Mid McLeod River - G2 | 478 | 159 | 10,988 | 1,745 | 16% | 3.5% | 2013 |
| Mid McLeod River - G3 | 468 | 267 | 8,148 | 322 | 4% | 0.3% | 2013 |
| Mid McLeod River - G4 | 545 | 224 | 14,934 | 1,962 | 13% | 1.9% | 2016 |
| Mid McLeod River - G5 | 621 | 267 | 9,909 | 1,022 | 10% | 1.1% | 2012 |
| Oldman Creek - G1 | 486 | 267 | 13,039 | 48 | 0% | 0.1% | 2022 |
| Oldman Creek - G2 | 572 | 267 | 17,927 | 3,254 | 18% | 2.2% | 2013 |
| Oldman Creek - G3 | 567 | 267 | 13,533 | 1,492 | 11% | 1.5% | 2013 |
| Pembina River - G1 | 621 | 266 | 10,483 | 155 | 1% | 0.4% | 2027 |
| Pembina River - G2 | 621 | 269 | 32,690 | 2,653 | 8% | 1.4% | 2023 |
| Pine Creek - G1 | 567 | 267 | 4,974 | 1,230 | 25% | 3.6% | 2018 |
| Pine Creek - G2 | 567 | 112 | 15,595 | 5,930 | 38% | 20.4% | 2018 |
| Pinto Creek - G1 | 596 | 267 | 28,496 | 4,135 | 15% | 2.5% | 2027 |
| Pinto Creek - G2 | 596 | 267 | 25,545 | 5,565 | 22% | 4.1% | 2027 |
| Pinto Creek - G3 | 596 | 267 | 14,005 | 5,590 | 40% | 4.1% | 2013 |
| Sundance - G1 | 567 | 112 | 10,715 | 4,035 | 38% | 11.0% | 2023 |
| Sundance - G2 | 567 | 112 | 10,483 | 2,034 | 19% | 6.5% | 2027 |
| Trout Creek - G1 | 567 | 112 | 19,057 | 4,588 | 24% | 8.3% | 2023 |
| Upper Athabasca River - G1 | 553 | 161 | 28,515 | 781 | 3% | 0.9% | 2027 |
| Upper Athabasca River - G2 | 573 | 133 | 30,893 | 1,132 | 4% | 1.0% | 2027 |
| Upper Berland River - G1 | 596 | 273 | 32,405 | 9,724 | 30% | 6.3% | 2023 |
| Upper Erith River - G1 | 508 | 152 | 16,226 | 2,424 | 15% | 3.4% | 2022 |
| Upper Erith River - G2 | 621 | 192 | 17,301 | 4,650 | 27% | 5.8% | 2018 |
| Upper Erith River - G3 | 591 | 267 | 19,531 | 4,521 | 23% | 3.4% | 2027 |
| Upper McLeod River - G1 | 621 | 267 | 16,021 | 1,274 | 8% | 1.3% | 2013 |
| Upper McLeod River - G2 | 621 | 267 | 12,237 | 1,807 | 15% | 2.7% | 2013 |
| Upper McLeod River - G3 | 621 | 269 | 22,874 | 4,649 | 20% | 3.2% | 2013 |

| Watershed | Base Precipitation (mm) | Base Water Yield (mm) | Total Area (ha) | Total Harvest (ha) | Percent Harvest | Maximum Water Yield Increase | |
|---|---|---|---|---|---|---|---|
| | | | | | | Amount (%) | Year |
| Upper McLeod River - G4 | 621 | 279 | 6,978 | 623 | 9% | 1.2% | 2012 |
| Upper McLeod River - G5 | 621 | 267 | 19,292 | 5,873 | 30% | 7.0% | 2013 |
| Upper Wildhay River - G1 | 596 | 267 | 11,977 | 1,978 | 17% | 2.3% | 2013 |
| Upper Wildhay River - G2 | 555 | 267 | 21,502 | 974 | 5% | 0.4% | 2027 |
| Upper Wildhay River - G3 | 596 | 271 | 31,023 | 6,882 | 22% | 2.3% | 2013 |
| Willow Creek - G1 | 567 | 112 | 19,644 | 3,975 | 20% | 7.6% | 2017 |
| Windfall Creek - G1 | 567 | 112 | 4,676 | 1,575 | 34% | 17.0% | 2017 |

**Figure 4-14. Watershed Groups with Projected Increase in Water Yield > 15% (Pine Creek and Windfall Creek)**



## *4.2.2 Wildlife Species of Management Concern*

### 4.2.2.1 Woodland Caribou

Woodland Caribou are a Threatened Species in Alberta. Many of the 19 Alberta caribou populations (herds) are declining in numbers for a complex mix of reasons. The ranges of two Alberta caribou herds overlap the Hinton Wood Products Forest Management Area in the northwest corner. Most of the overlap consists of about 7% of the range of the A la Peche caribou herd, which has about 150 caribou and is ranked "stable" by the Alberta Government. Some caribou from the Little Smoky caribou herd occasionally cross onto the FMA, although most of the Little Smoky herd range is north of the FMA. The Little Smoky herd of about 80 caribou was declining until recently and is ranked "immediate risk of extirpation" by the Alberta Government.

HWP has maintained a voluntary deferral of timber harvesting in all of the currently recognized caribou range on the FMA since 1997. The deferral area is approximately 50,000 ha (see Figure 4-15). This includes a core area

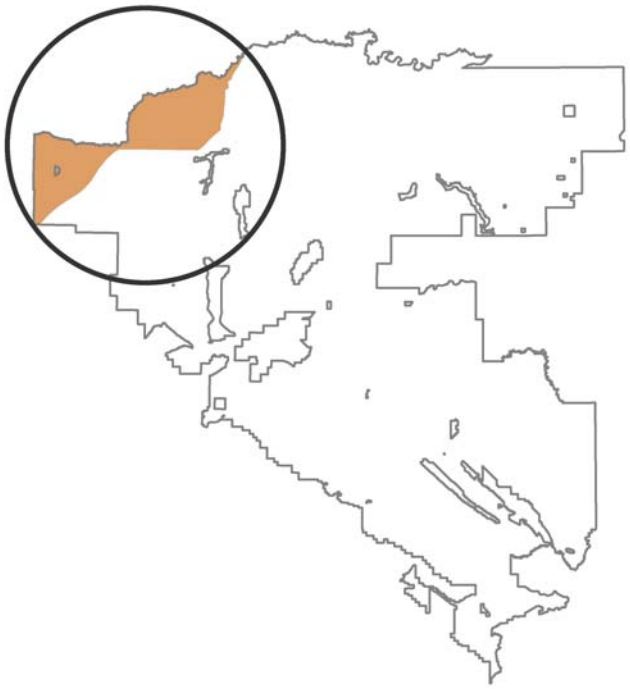
used regularly by A la Peche herd caribou and other areas used periodically by A la Peche caribou and Little Smoky caribou. The deferral period is intended to allow time for a recovery plan to be developed and approved by Alberta.

HWP has not sequenced any harvest in the caribou range for the term of the current spatial harvest sequence (ending April 30, 2018), although the area contains significant areas of pine stands which are of high risk to mountain pine beetle (MPB) attack. The mountain pine beetle risk in the deferral area places an even greater sense of urgency on the need for a recovery plan. MPB control activities will be required to a) protect caribou habitat and b) protect the FMA from MPB spread to areas outside of the caribou range. HWP expects that SRD will remain aggressive and conduct appropriate MPB control activities throughout the caribou range. HWP will not implement Level II[8] harvesting of green-attack stands in caribou range except under strictly limited conditions. The triggers for consideration will be:

1. Level I control implemented by Alberta is judged insufficient to reduce pine mortality and protect caribou habitat.
2. Level I control implemented by Alberta is judged insufficient to mitigate the spread of MPB from the caribou range into other regions of the FMA.
3. An assessment by Alberta that Level II harvests may achieve MBP eradication or control to achieve the same objectives.

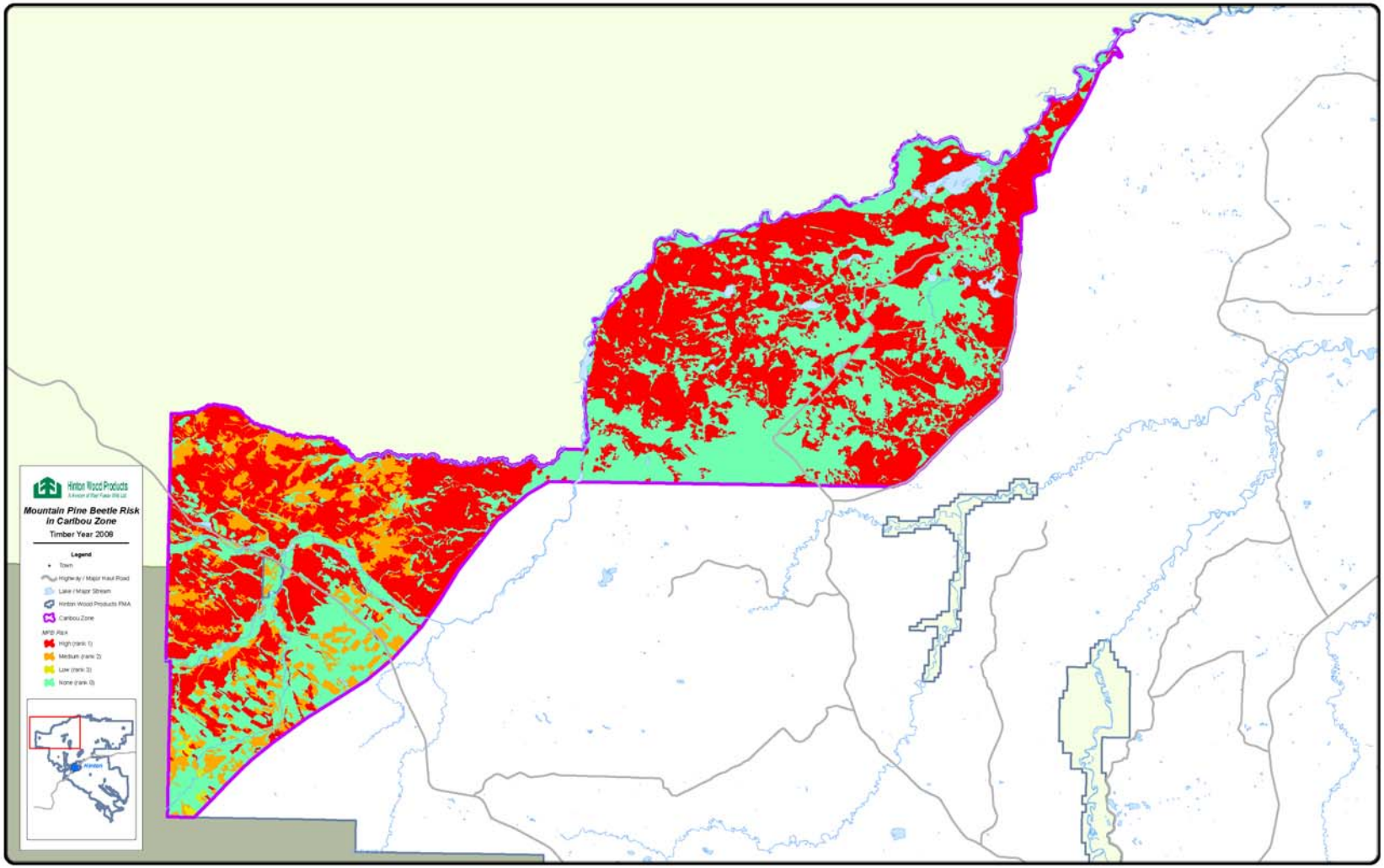
Any consideration of Level II activity will be discussed with Alberta and other stakeholders before implementation. Figure 4-16 illustrates the pine stands that are at risk within the caribou range.

**Figure 4-15. Location of Caribou Range**



8 Alberta SRD Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations v2.6 (Appendix C)

**Figure 4-16. Rank 1 and Rank 2 Stands within the Caribou Range**



#### 4.2.2.2 Trumpeter Swans

Trumpeter Swans are classified as a Threatened Species in Alberta. SRD's direction for mitigating risk to Trumpeter Swans is to restrict harvesting activity for a distance of 200 metres, and to limit timing of other activities within an area of 800 metres, around identified nesting ponds. Three nesting ponds have been identified on the HWP FMA.

The requested buffer of 200 metres has been applied to the three nesting ponds and no harvest operations have been scheduled for these areas. The timing restrictions will be adhered to operationally in the event that activities are planned in the area from 201-800 metres from these ponds. HWP is developing a site-specific conservation proposal for the area surrounding each nesting pond that will be discussed with Alberta at a later date.

**Figure 4-17. Location of Trumpeter Swan Ponds**

#### 4.2.2.3 Grizzly Bear

Grizzly bear has not been officially designated "at risk" under the Alberta Wildlife Act. In 2002, the Endangered Species Conservation Committee recommended designation as a Threatened species and this recommendation was reaffirmed in 2010. As of April 30, 2010, the Alberta government has not made a designation status decision. DNA-based grizzly bear population studies have been underway in Alberta since 2004 and a Recovery Plan was approved in 2008.

In Alberta, six Grizzly Bear Population Units have been identified. Grizzly Bear Population Units are management units based on genetic distinctions within the Alberta grizzly bear population. These population units are generally separated by major highway corridors. The population units are further subdivided into Grizzly Bear Watershed Units (GBWU), a management unit based on major watersheds subdivided along heights of land and occasionally along watercourses, to approximate the size of an adult female grizzly bear home range (~700 km2).

Each GBWU is characterized as being either Core or Secondary grizzly bear habitat based on current landscape conditions. Core Areas are areas of high habitat value (as measured by Resource Selection Function) and generally low mortality risk currently measured through Open Route Densities. Secondary Areas are areas of good habitat, reflecting the broader range of grizzly bears. The Hinton FMA is comprised of approximately:

- Core area: 48%
- Secondary area: 37%
- Not classified grizzly bear habitat: 15%

Alberta SRD conducted the necessary grizzly bear analysis and provided much of the information contained in this section of the FMP amendment. Four key values were analyzed and the results are reported for individual Grizzly Bear Watershed Units (Figure 4-18).

- Resource Selection Function: Resource Selection Functions (RSF) can be used as a surrogate for grizzly bear habitat and supply. Research shows a clear relationship between high RSF values and the current presence and distribution of grizzly bears as determined by DNA population inventory work. SRD's RSF objectives are:
    - In Core GBWUs the objective is to maintain or increase the current maximum RSF values.
    - In Secondary GBWUs the objective is to increase current maximum RSF values.
- Mortality Risk: Mortality Risk is a spatial model that represents the relative probability of human-caused grizzly bear mortality. The mortality risk should be used in conjunction with the open route density information to understand how access and habitat variables interact to impact grizzly bear survival rates. SRD's mortality risk objectives are:
    - In Core GBWUs the objective is to maintain or reduce current levels of mean mortality risk as determined through the mortality risk model.
    - In Secondary GBWUs the objective is to reduce current levels of mean mortality risk.
- Open Route Density: Open Route Densities are defined as the total length of all open routes divided by the area of each grizzly bear watershed unit. Research conducted in both Alberta and many other parts of grizzly bear range in North America, have found that the key to maintaining grizzly bear populations is to keep human caused grizzly bear mortality rates low. Regulating human use of access (specifically motorised vehicle routes) in grizzly bear range reduces the risk of human-caused mortality. Because human use of access is difficult to measure, the Recovery Plan recommends using Open Route Densities as a surrogate for the amount of human use. SRD's open route density objectives are:
    - In Core GBWUs the open route density threshold is 0.6 km/km$^2$.
    - The open route density threshold in Secondary GBWUs is 1.2 km/km$^2$.

- In both Core and Secondary GBWUs the objective is to maintain or reduce current levels of open route density.

- Safe Harbour: Safe Harbour is a combination of habitat quality and risk. A safe harbour is an area of good habitat (high RSF values), to which bears are attracted by an abundance of resources, but also where the bear faces a low risk of human caused mortality (low Mortality Risk). SRD's safe harbour objectives are:
  - In all Core GBWUs the objective is to maintain or increase both the quantity (area) and quality (mean safe harbour value) that is currently present.
  - In Secondary GBWUs the objective is to increase current values of safe harbour quantity and quality.

The results of the resource selection function (RSF), mortality risk and safe harbour analyses are presented in Table 4-3 and Table 4-4. The open route density analysis results are presented in Table 4-5 and Table 4-6.

HWP is committed to working with Alberta on the development and implementation of practical, cost-effective grizzly bear recovery strategies.

**Figure 4-18. Grizzly Bear Watershed Units**

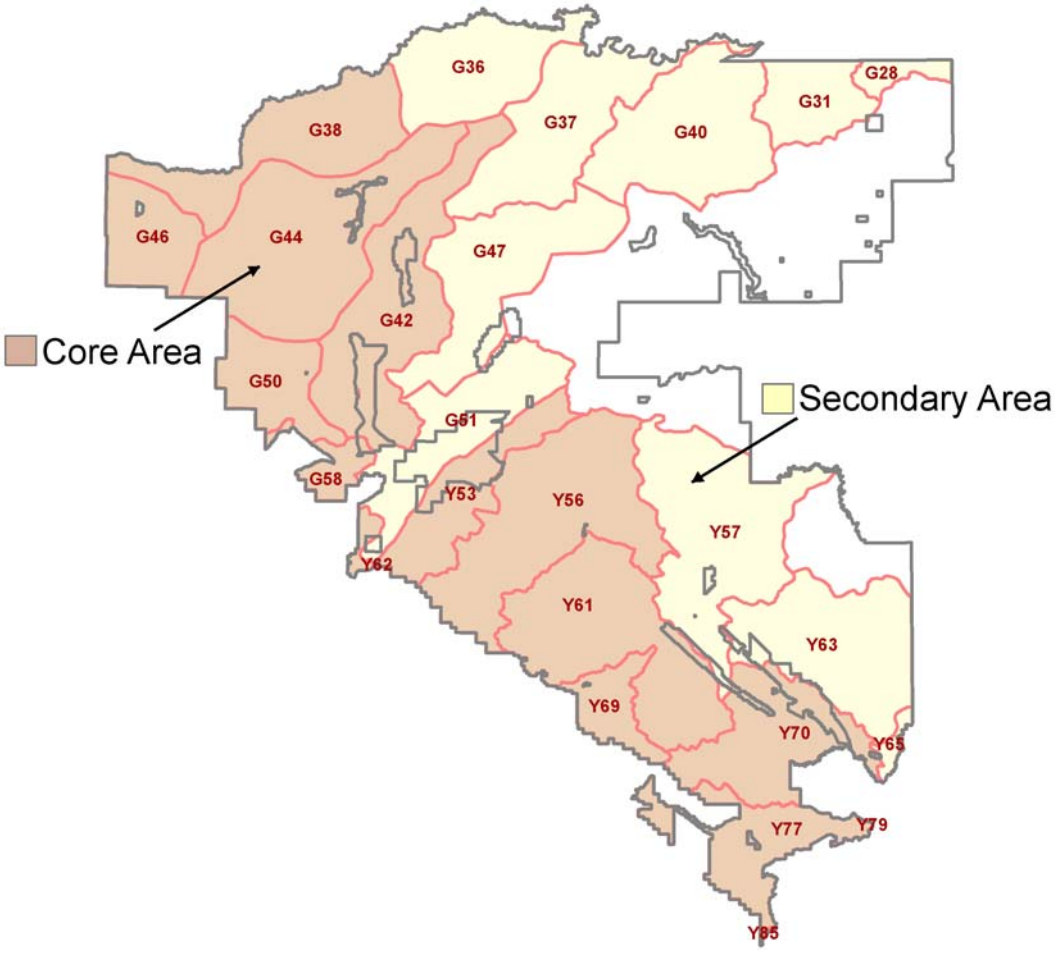


**Table 4-3. RSF, Mortality Risk and Safe Harbour Summary – Grande Cache Population**

| Grizzly Bear Unit | Habitat | Area Km Sq | Current Mean | Future Mean | Difference +/- | % Change |
|---|---|---|---|---|---|---|
| Resource Selection Function (max) | | | | | | |
| G42 | Core | 537.3 | 7.54 | 7.88 | 0.34 | 4.5% |
| G44 | Core | 728.6 | 8.02 | 8.22 | 0.20 | 2.5% |
| G50 | Core | 232.1 | 7.98 | 8.48 | 0.50 | 6.3% |
| G58 | Core | 107.0 | 7.51 | 7.57 | 0.06 | 0.8% |
| G28 | Secondary | 58.0 | 6.46 | 7.64 | 1.18 | 18.3% |
| G31 | Secondary | 204.2 | 6.66 | 7.74 | 1.08 | 16.2% |
| G36 | Secondary | 376.7 | 7.05 | 7.32 | 0.27 | 3.8% |
| G37 | Secondary | 477.8 | 6.19 | 6.51 | 0.32 | 5.2% |
| G40 | Secondary | 539.9 | 5.46 | 5.66 | 0.20 | 3.7% |
| G47 | Secondary | 475.7 | 8.01 | 8.12 | 0.11 | 1.4% |
| G51 | Secondary | 289.6 | 5.94 | 5.96 | 0.02 | 0.3% |
| Mortality Risk | | | | | | |
| G42 | Core | 537.3 | 6.29 | 6.64 | 0.35 | 5.6% |
| G44 | Core | 728.6 | 5.76 | 5.97 | 0.21 | 3.6% |
| G50 | Core | 232.1 | 3.29 | 3.67 | 0.38 | 11.6% |
| G58 | Core | 107.0 | 4.50 | 4.52 | 0.02 | 0.4% |
| G28 | Secondary | 58.0 | 3.60 | 4.49 | 0.89 | 24.7% |
| G31 | Secondary | 204.2 | 5.91 | 6.67 | 0.76 | 12.9% |
| G36 | Secondary | 376.7 | 6.44 | 6.78 | 0.34 | 5.3% |
| G37 | Secondary | 477.8 | 6.45 | 6.51 | 0.06 | 0.9% |
| G40 | Secondary | 539.9 | 5.12 | 5.37 | 0.25 | 4.9% |
| G47 | Secondary | 475.7 | 7.54 | 7.70 | 0.16 | 2.1% |
| G51 | Secondary | 289.6 | 6.18 | 6.20 | 0.02 | 0.3% |
| Safe Harbour | | | | | | |
| G42 | Core | 537.3 | 75.45 | 78.77 | 3.33 | 4.4% |
| G44 | Core | 728.6 | 80.22 | 82.17 | 1.95 | 2.4% |
| G50 | Core | 232.1 | 79.84 | 84.76 | 4.92 | 6.2% |
| G58 | Core | 107.0 | 75.15 | 75.73 | 0.58 | 0.8% |
| G28 | Secondary | 58.0 | 64.60 | 76.43 | 11.83 | 18.3% |
| G31 | Secondary | 204.2 | 66.64 | 77.44 | 10.80 | 16.2% |
| G36 | Secondary | 376.7 | 70.53 | 73.18 | 2.65 | 3.8% |
| G37 | Secondary | 477.8 | 61.92 | 65.09 | 3.17 | 5.1% |
| G40 | Secondary | 539.9 | 54.60 | 56.63 | 2.02 | 3.7% |
| G47 | Secondary | 475.7 | 80.09 | 81.23 | 1.14 | 1.4% |
| G51 | Secondary | 289.6 | 59.45 | 59.56 | 0.11 | 0.2% |

**Table 4-4. RSF, Mortality Risk and Safe Harbour Summary – Yellowhead Population**

| Grizzly Bear Unit | Habitat | Area Km Sq | Current Mean | Future Mean | Difference +/- | % Change |
|---|---|---|---|---|---|---|
| Resource Selection Function (max) | | | | | | |
| Y53 | Core | 230.6 | 5.05 | 5.64 | 0.59 | 11.7% |
| Y56 | Core | 691.7 | 7.49 | 7.85 | 0.36 | 4.8% |
| Y61 | Core | 624.5 | 7.14 | 7.92 | 0.78 | 10.9% |
| Y69 | Core | 138.1 | 7.18 | 7.68 | 0.50 | 7.0% |
| Y70 | Core | 343.4 | 6.83 | 6.89 | 0.06 | 0.9% |
| Y57 | Secondary | 642.8 | 4.41 | 5.04 | 0.63 | 14.3% |
| Y63 | Secondary | 495.1 | 6.27 | 6.51 | 0.24 | 3.8% |
| Mortality Risk | | | | | | |
| Y53 | Core | 230.6 | 5.04 | 5.55 | 0.51 | 10.1% |
| Y56 | Core | 691.7 | 6.59 | 6.83 | 0.24 | 3.6% |
| Y61 | Core | 624.5 | 5.74 | 6.10 | 0.36 | 6.3% |
| Y69 | Core | 138.1 | 4.09 | 4.35 | 0.26 | 6.4% |
| Y70 | Core | 343.4 | 4.02 | 4.04 | 0.02 | 0.5% |
| Y57 | Secondary | 642.8 | 5.82 | 6.32 | 0.50 | 8.6% |
| Y63 | Secondary | 495.1 | 6.99 | 7.08 | 0.09 | 1.3% |
| Safe Harbour | | | | | | |
| Y53 | Core | 230.6 | 50.45 | 56.39 | 5.94 | 11.8% |
| Y56 | Core | 691.7 | 74.87 | 78.45 | 3.59 | 4.8% |
| Y61 | Core | 624.5 | 71.45 | 79.15 | 7.71 | 10.8% |
| Y69 | Core | 138.1 | 71.76 | 76.82 | 5.05 | 7.0% |
| Y70 | Core | 343.4 | 68.29 | 68.93 | 0.64 | 0.9% |
| Y57 | Secondary | 642.8 | 44.07 | 50.42 | 6.35 | 14.4% |
| Y63 | Secondary | 495.1 | 62.70 | 65.12 | 2.43 | 3.9% |

**Table 4-5. Open Route Density – Grande Cache Grizzly Bear Population**

| Grizzly Bear Unit | Habitat | Road Length (Km) Current | Area (Km Sq) | Road Density Km/Km Sq |
|---|---|---|---|---|
| G42 | Core | 354.6 | 537.3 | 0.66 |
| G44 | Core | 335.6 | 728.6 | 0.46 |
| G50 | Core | 131.1 | 232.1 | 0.56 |
| G58 | Core | 67.6 | 107.0 | 0.63 |
| Core Total | | 889.0 | 1605.0 | 0.55 |
| G28 | Secondary | 23.0 | 58.0 | 0.40 |
| G31 | Secondary | 140.1 | 204.2 | 0.69 |
| G36 | Secondary | 326.5 | 376.7 | 0.87 |
| G37 | Secondary | 463.9 | 477.8 | 0.97 |
| G40 | Secondary | 382.2 | 539.9 | 0.71 |
| G47 | Secondary | 340.9 | 475.7 | 0.72 |
| G51 | Secondary | 164.0 | 289.6 | 0.57 |
| Secondary Total | | 1840.6 | 2421.9 | 0.76 |

**Table 4-6. Open Route Density – Yellowhead Grizzly Bear Population**

| Grizzly Bear Unit | Habitat | Road Length (Km) Current | Area (Km Sq) | Road Density Km/Km Sq |
|---|---|---|---|---|
| Y53 | Core | 131.0 | 230.6 | 0.57 |
| Y56 | Core | 493.1 | 691.7 | 0.71 |
| Y61 | Core | 333.3 | 624.5 | 0.53 |
| Y69 | Core | 44.1 | 138.1 | 0.32 |
| Y70 | Core | 200.8 | 343.4 | 0.58 |
| Core Total | | 1202.3 | 2028.3 | 0.59 |
| Y57 | Secondary | 350.7 | 642.8 | 0.55 |
| Y63 | Secondary | 324.2 | 495.1 | 0.65 |
| Secondary Total | | 674.9 | 1137.9 | 0.59 |

**Figure 4-19: Grizzly Bear Safe Harbour (current)**

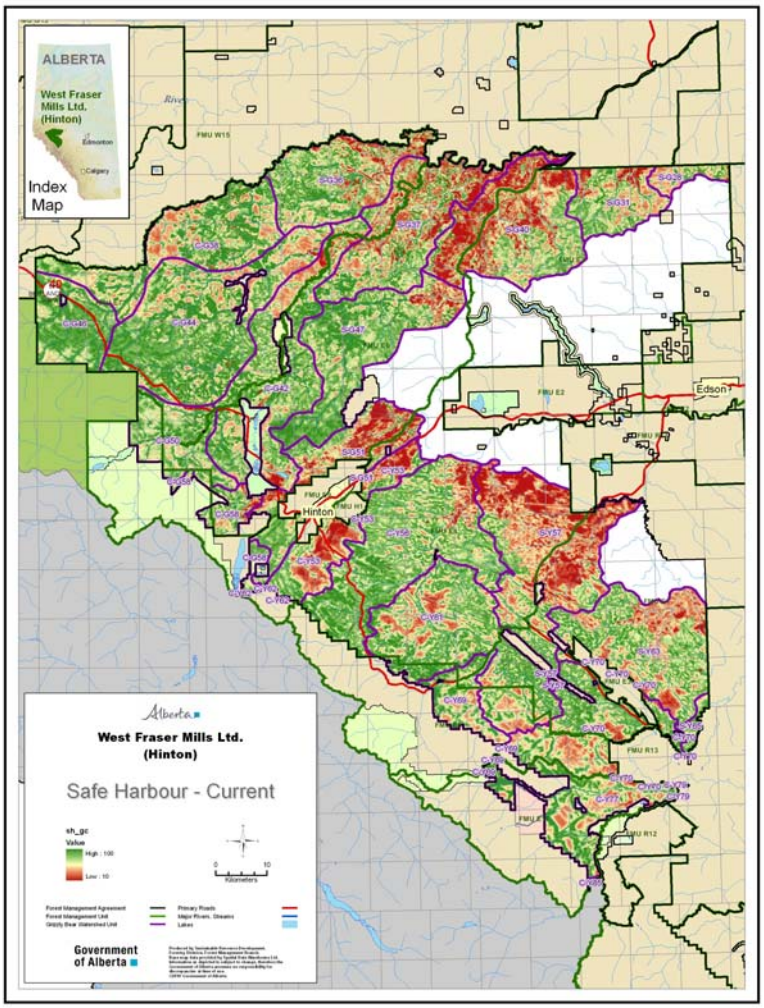
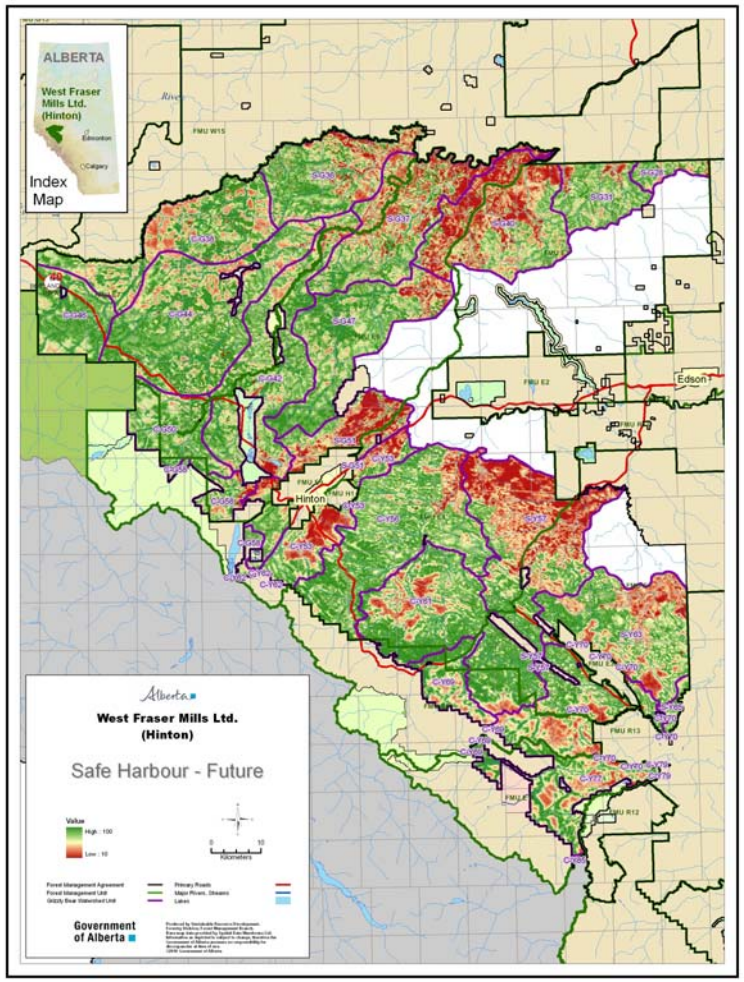
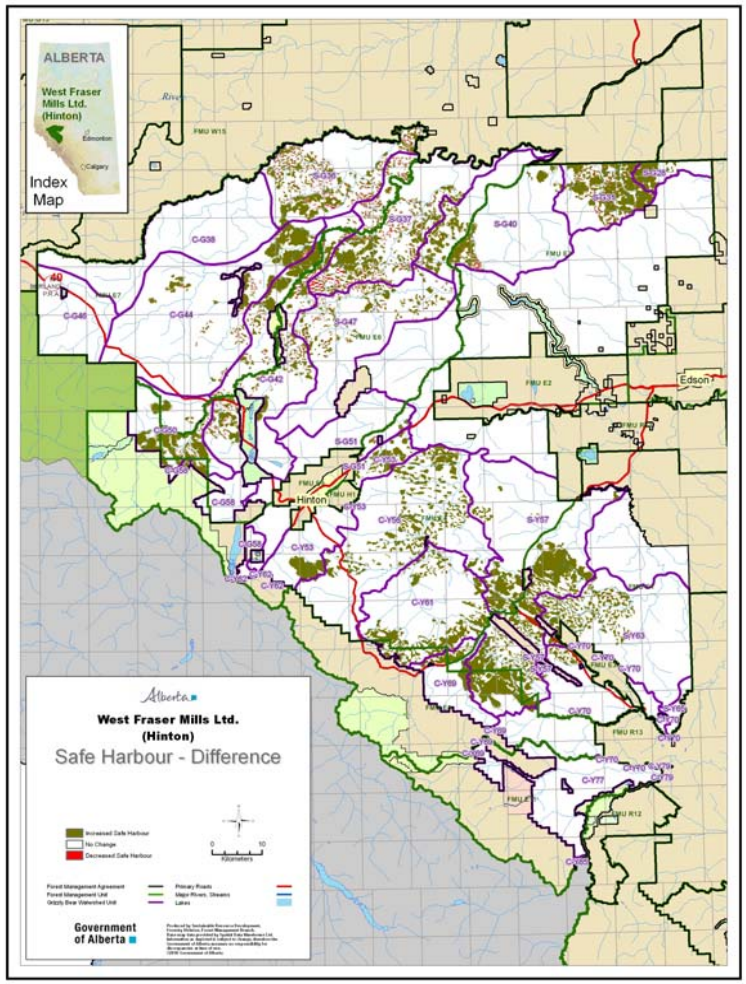


**Figure 4-20: Grizzly Bear Safe Harbour (future)**

**Future** **Change from Current**



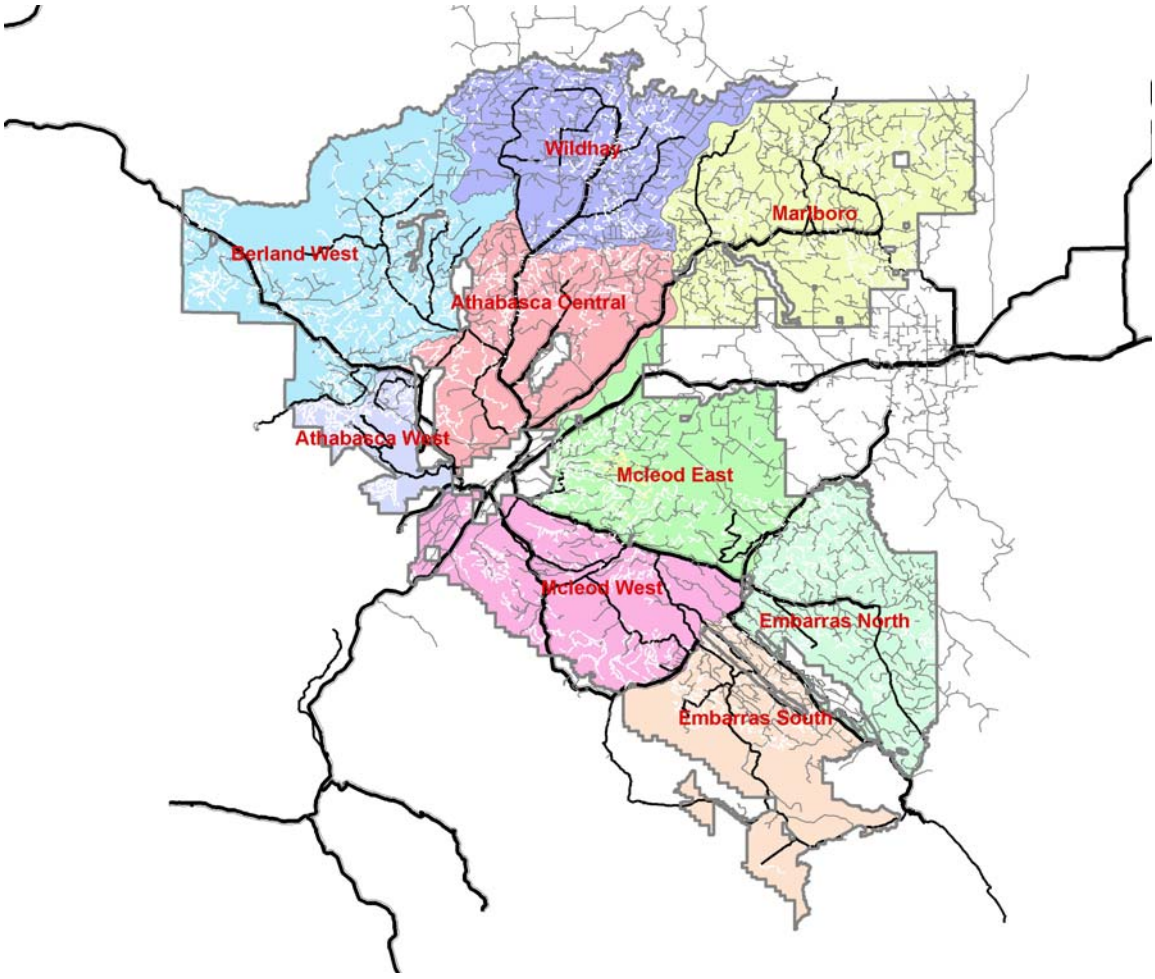
### *4.2.3 Road Corridor Plan*

Long Term Access Plans (LTAP) will define the location and standard for the permanent road network across the FMA. The forest industry eventually needs roads to access all forested lands on Forest Management Areas (FMA) and generally requires high-quality roads to safely support logging truck traffic. The oil and gas industry can also use this road network, with additional minor spur roads to service exploration and development needs.

An LTAP provides opportunity to put new roads in the best locations to access resources and minimize cumulative effects on other values. Existing road networks are being reviewed to determine if they continue to meet current needs. HWP roads that have been identified as not currently required and not required for long-term use will be prioritized for deactivation and/or reclamation. Roads belonging to other industrial users are also being assessed for long-term need.

For the term of the current SHS (up to April 30, 2018), one new permanent HWP road is currently planned for construction. The current road network will provide access to the majority of the scheduled harvest areas. As LTAP areas are completed, they will be submitted to SRD for review and approval. A progress report was submitted to SRD for information in March 2010.

**Figure 4-21: HWP Long-Term Access Plan Regions**



## 4.3 Recommended Annual Allowable Cut

The following tables summarize the recommended annual allowable cut for the Hinton FMA. Please note the following:

- Structure retention will be monitored, reported annually and charged against the AAC. HWP will submit monitoring program procedures under separate cover.
- HWP is the only forest company operating on the FMA. Consequently, all landuse disposition applications are submitted to HWP for review and consent. As per existing practice, all timber lost to other uses will be charged against the AAC upon consent.
- Unless other uses have been identified and approved in the final harvest plan, HWP will reforest all in-block roads, decking and processing areas. These areas will be maintained within the block area and included in establishment and performance surveys.

**Table 4-7. Harvest Level Allocation**

| Disposition Holder | Conifer AAC (15/11/15 TL - $m^3$/yr) | Deciduous AAC (15/10/15 CTL - $m^3$/yr) |
|---|---|---|
| Hinton Wood Products | 1,758,076 | 248,332 |
| Available for allocation by SRD as per FMA Agreement | 8,500 | 1,500 |
| Total | 1,766,576 | 249,832 |

**Table 4-8. Historical Allocations**

| Company Name | Disposition Number | FMU | Landbase Management Type | Effective Date of AAC | Deciduous AAC (%) | Deciduous AAC ($m^3$/yr) | Incidental Deciduous (%) | Incidental Deciduous ($m^3$/yr) | Coniferous AAC (%) | Coniferous AAC ($m^3$/yr) | Incidental Coniferous (%) | Incidental Coniferous ($m^3$/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hinton Wood Products | FMA8800025 | E6, E7 and portions of E1, E3, E4, E5 & E11 | Single | 1-May-06 | | | | | 100.00% | 1,526,500 | n/a | n/a |
| Available for allocation by SRD as per FMA Agreement | N/A | | Single | 1-May-06 | | | | | fixed volume | 8,500 | n/a | n/a |
| Hinton Wood Products | FMA8800025 | | Single | 15-Jun-98 | 100.00% | 167,949 | n/a | n/a | | | | |
| Available for allocation by SRD as per FMA Agreement | N/A | | Single | 15-Jun-98 | fixed volume | 1,500 | n/a | n/a | | | | |
| Total | | | | | | 169,449 | | | | 1,535,000 | | |

**Table 4-9. Proposed Allocations**

| Company Name | Disposition Number | FMU | Landbase Management Type | Effective Date of AAC | Deciduous AAC (%) | Deciduous AAC ($m^3$/yr) | Incidental Deciduous (%) | Incidental Deciduous ($m^3$/yr) | Coniferous AAC (%) | Coniferous AAC ($m^3$/yr) | Incidental Coniferous (%) | Incidental Coniferous ($m^3$/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hinton Wood Products | FMA8800025 | E6, E7 and portions of E1, E3, E4, E5 & E11 | Single | 1-May-10 | 100.00% | 248,332 | n/a | n/a | 100.00% | 1,758,076 | n/a | n/a |
| Available for allocation by SRD as per FMA Agreement | N/A | | Single | 1-May-10 | fixed volume | 1,500 | n/a | n/a | fixed volume | 8,500 | n/a | n/a |
| Total | | | | | | 249,832 | | | | 1,766,576 | | |

**Table 4-10. Timber Utilization**

| Disposition Number | Harvest Method | Top Diameter (cm) | Butt Diameter (cm) | Minimum Length (m) | Stump Height (cm) |
|---|---|---|---|---|---|
| FMA8800025 - Coniferous | Tree Length | 11 | 15 | 3.76 | 15 |
| FMA8800025 - Deciduous | Cut-To-Length | 10 | 15 | 1.78 | 15 |

**Table 4-11. Timber Chargeability**

| Disposition Number | Deciduous Species Used in AAC | Coniferous Species Used in AAC | Species NOT Chargeable to AAC | Rights to Species NOT Chargeable to AAC | Structure Retention Target (%) | Structure Retention (%) Accounted for in AAC | Net Landbase Deletions and Deferrals | Net Landbase Deletions and Deferrals: Rights to Timber | Industrial Salvage Chargeability Strategy |
|---|---|---|---|---|---|---|---|---|---|
| FMA8800025 | Aw, Pb | Pl, Sw, Sb, Se, Fb, Fa | Bw, Lt, all dead trees | Timber rights assigned to HWP in FMA | 1% | Not accounted for in AAC. Retention is tracked, measured and reported at the end of each timber year. | As per Section 3.1 | Timber Rights assigned to HWP in FMA | Each disposition will be charged against the AAC upon consent. |

**Table 4-12. Timber Production**

| Disposition Number | Cut Control Period | 2008/2009 & 2009/2010 Approved AAC ($m^3$/yr) | Periodic Cut Control Volume ($m^3$) | Current Quadrant Term | 2003-2008 Production ($m^3$) | Quadrant Deciduous Under-Production 2003-2008 ($m^3$) | Quadrant Coniferous Under-Production 2003-2008 ($m^3$) | 2010 AAC recommendation ($m^3$/yr) | Proposed 2008-2013 Quadrant Allowable Cut ($m^3$) | Quadrant Allowable Cut Calculation Assumptions |
|---|---|---|---|---|---|---|---|---|---|---|
| FMA8800025 - Coniferous | 1 | 1,535,000 | 7,675,000 (1,535,000 x 5 years) | May 1, 2008 - April 30, 2013 | 10,014,671 | n/a | 229,398 | 1,766,576 | 8,369,728 | = 2.0 yrs x 1,535,000 + 3.0 yrs x 1,766,576. The reconciliation volume was directly incorporated into the accelerated harvest in the recommended AAC. |
| FMA8800025 - Deciduous | 1 | 169,449 | 847,245 (169,449 x 5 years) | May 1, 2008 - April 30, 2013 | 833,543 | 79,434 | n/a | 249,832 | 1,088,394 | = 2.0 yrs x 169,449 + 3.0 yrs x 249,832. The reconciliation volume was directly incorporated into the accelerated harvest in the recommended AAC. |

**Table 4-13. Fibre Assignment Agreements**

| Assignment Type | Directed to | Disposition Number | Species (Coniferous or Deciduous) | Volume ($m^3$) |
|---|---|---|---|---|
| None | n/a | n/a | n/a | n/a |