Hinton Wood Products

A division of West Fraser Mills Ltd.

Timber Supply Analysis

for the 2014 DFMP

November 15, 2016

EXECUTIVE SUMMARY

Hinton Wood Products (HWP) has had a Forest Management Agreement (FMA) with the Government of Alberta (GoA) since 1951. The latest one was signed in 2008. As a requirement of the Forest Management Agreement, a Detailed Forest Management Plan (DFMP) must be prepared and approved. Preparing the DFMP is a comprehensive process, which includes a landbase classification, yield curve development and subsequently a timber supply analysis. This document described the timber supply analysis for HWP's 2014 DFMP.

The HWP landbase is dominated by mature lodgepole pine. There is an epidemic of mountain pine beetle in British Columbia which has spread into Alberta and is having an impact on HWP. Due to the potential losses that could be seen from an outbreak of mountain pine beetle, the proposed preferred management scenario will reduce the ecological and economic impact associated with a mountain pine beetle epidemic in Alberta. This will be undertaken by targeting lodgepole pine stands that have a high biological breeding potential and are of high fire risk. At the same time, potential resistance to insect, disease and the effects of a changing climate will be maximized through the deployment of improved seed.

The preferred forest management scenario is the final product of the timber supply analysis process described in this document. The preferred forest management scenario is created based on a number of assumptions and inputs. It is the result of balancing a large number of targets and indicators in the model to achieve what is believed to be a biologically, socially, and economically viable harvest pattern. HWP wishes to follow this harvest pattern for at least the next 10 years.

Prior to the creation of the preferred forest management scenario (PFMS), a number of sensitivity analyses were completed. Issues that were explored included harvest flow constraints, volume commitments, MPB-susceptible stand harvest targeting, seral stage targets and spatial harvest constraints. These sensitivities were completed during plan development and are documented in a manner which allows the decision process to be followed.

Approximating natural disturbance is one of the key strategies driving HWP's Detailed Forest Management Plan. HWP's Riparian Management Strategy (RMS) is an integral part of HWP's Natural Disturbance Strategy; of which both are described in detail in Appendix 2 of the DFMP. As part of this RMS, HWP proposed to introduce disturbance (through careful harvesting) back into the riparian areas of the FMA area, including operable ground in what would have commonly been set aside in riparian buffers. In this Timber Supply Analysis, the GoA asked HWP to look at two different Preferred Forest Management Scenarios – the first scenario that was calculated is the PFMS with HWP's Riparian Management Strategy fully implemented (i.e. operable landbase in what were typically riparian buffers have been included in the net landbase); the second scenario that was calculated is the PFMS without implementing HWP's Riparian Management Strategy (i.e. riparian buffers have been removed from the net landbase). Table A and Table B on the following page describe the timber supply implications of each scenario. It should be noted that in Scenario 2, HWP constrained the SHS in such a way as to ensure that the "Old + Late Mature" seral stage did not fall below its Natural Range of Variation (NRV) for any of the five cover types modelled in the NRV analysis.

Also shown in Tables A and B is the unused volume not harvested in HWP's previous 10 year period. HWP is scheduling to harvest this unused volume in the first two years of this plan, with a consistent annual volume scheduled for the remainder of the first period. Therefore, the coniferous AAC being scheduled for the first 10 years of this plan would be 1,849,991m³/year for Scenario 1 and 1,715,141m³/year in Scenario 2, and the deciduous volume being scheduled for the first 10 years of this plan would 385,335m³/year for Scenario 1 and 367,329m³/year in Scenario 2. In both scenarios, the harvest level drops in subsequent periods (periods 2 to 7) before increasing after the end of the spatial harvest schedule (year 70). This harvest level is achieved

from a 200-year spatially explicit scenario, of which the first 20 years are referred to as the spatial harvest sequence and the first 70 years are referred to as the harvest schedule.

Table A – Detailed AAC Summary for Scenario 1 (Tree Length Volume)

Period (10 years per period)	Scheduled periodic volume (m^3/decade) (with unused volume)		Unused volume (m^3)		Scheduled annual volume (m^3/year) (without unused volume)	
	Coniferous	Deciduous	Coniferous	Deciduous	Coniferous	Deciduous
Period 1	18,499,910	3,853,345	2,192,901	386,432	1,630,701	346,691
Period 2	14,538,260	2,817,414			1,453,826	281,741
Period 3	13,833,906	2,574,116			1,383,391	257,412
Period 4	13,614,966	2,741,312			1,361,497	274,131
Period 5	13,480,886	2,857,251			1,348,089	285,725
Period 6	13,795,469	2,858,932			1,379,547	285,893
Period 7	13,582,679	2,860,047			1,358,268	286,005
70 year spatial average					1,416,474	288,228
Long term aspatial value	18,278,959	3,200,630			1,827,896	320,063

Table B – Detailed AAC Summary for Scenario 2 (Tree Length Volume)

Period (10 years per period)	Scheduled periodic volume (m^3/decade) (with unused volume)		Unused volume (m^3)		Scheduled annual volume (m^3/year) (without unused volume)	
	Coniferous	Deciduous	Coniferous	Deciduous	Coniferous	Deciduous
Period 1	17,151,407	3,673,287	2,192,901	386,432	1,495,851	328,685
Period 2	13,814,079	2,695,072			1,381,408	269,507
Period 3	12,717,585	2,455,534			1,271,758	245,553
Period 4	12,714,447	2,733,309			1,271,445	273,331
Period 5	12,730,939	2,688,745			1,273,094	268,874
Period 6	12,926,067	2,720,221			1,292,607	272,022
Period 7	12,927,319	2,649,457			1,292,732	264,946
70 year spatial average					1,325,556	274,703
Long term aspatial value	17,371,056	3,033,083			1,737,106	303,308

TABLE OF CONTENTS

List of Tables

List of Figures

1. Introduction

This document describes the data and processes used to develop the Timber Supply Analysis (TSA) for the Hinton Wood Products (HWP) landbase. The TSA was completed to meet the requirements of the *Alberta Forest Management Planning Standard Version 4.1 – April 2006* (Alberta Sustainable Resource Development, 2006). Separate documents describe the yield curve and landbase classification components of the TSA.

The classified landbase describes the condition of the forest as of May 1st, 2012. The extent of the gross landbase was all lands within the boundaries Forest Management Unit (FMU) E14 that are included within the HWP Forest Management Agreement (FMA) area as shown in FMA8800025 (Alberta Order in Council 565/2007). The landbase classification defines the area available for forest management activities, the active landbase, and area excluded from forest management activities, the passive landbase. The TSA includes all areas of the active landbase within parameters of constraints imposed for various management objectives.

This *Timber Supply Analysis* has four objectives:

1. Establish a new annual allowable cut (AAC) for HWP that minimizes the potential impact of a Mountain Pine Beetle infestation;
2. Provide an overview of the methodology and assumptions used to derive the *Preferred Forest Management Scenario* (PFMS);
3. Develop a 20-year spatial harvest sequence (SHS) that aligns with the PFMS.
4. Assess the potential impacts on key non-timber values.

1.1 Historical TSA

The current annual allowable cut was set following an amendment to the 1999 DFMP completed in 2009 to address the mountain pine beetle epidemic (MPB) in Alberta. The amendment was approved in 2010 and set the coniferous harvest at 1,766,576m³ and the deciduous at 249,832m³. MPB continues to be a threat to the long term timber supply. Following several years of low numbers, the HWP baiting program noted an increase in insect numbers in 2013 and 2014. This Timber Supply Analysis is being completed in support of a new Detailed Forest Management Plan which has been prepared to meet the requirements of the *Alberta Forest Management Planning Standard Version 4.1 – April 2006* (Alberta Sustainable Resource Development, 2006). Separate documents describe the yield curve development and landbase components of the TSA.

1.2 Effective Date

This classified landbase describes the condition of the forest as of the effective date of May 1st, 2012. Spatial data for landuse, harvest and wildfires updated the condition of the forest defined in the approved forest inventory to the effective date. The calculated annual allowable cut (AAC) is proposed from May 1st, 2013 forward.

2. TSA Landbase Summary

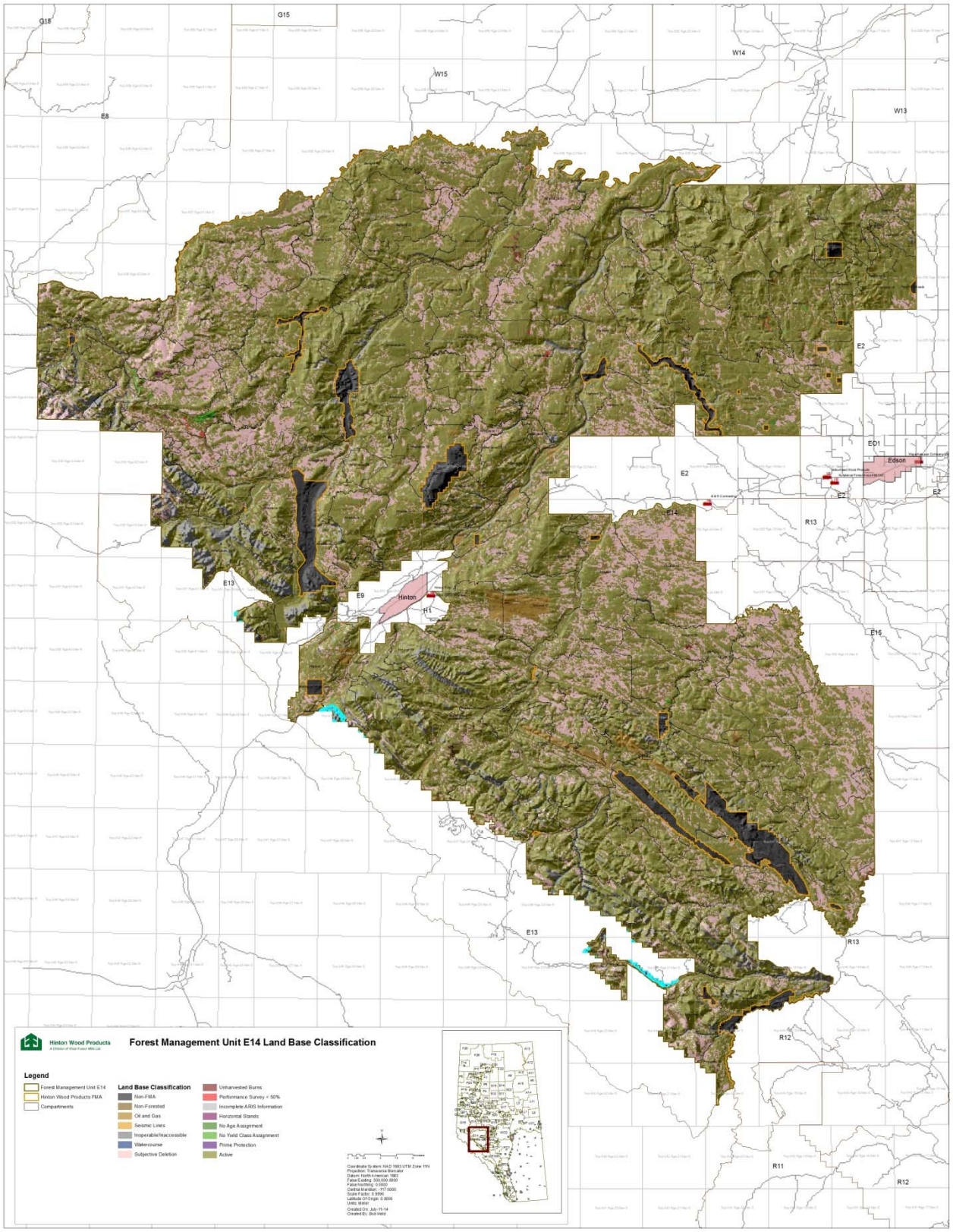
HWP's landbase is a combined landbase, coniferous and deciduous together. The landbase was classified using nine main species groups and the effective date was May 1st, 2012. Details of the landbase classification process may be found in the Landbase Classification appendices in the 2014 DFMP (Hinton Wood Products, 2014a). Table 1 describes the hierarchical deletions from the 2014 HWP Landbase. Figure 1 is map of the FMA landbase.

The landbase development process was conducted in three main steps. First, the datasets were identified and spatially intersected using GIS software. This included forest inventory, operability, disturbance, administrative and ecological data from government and company sources. The associated tabular information was then classified to determine the polygons that will contribute to the active and passive landbases, and to the coniferous or deciduous harvest in the timber supply analysis. Finally, graphical and tabular summaries were compiled and presented. The landbase received agreement-in-principle on 11 July 2014.

Table 1 – Hierarchical deletions from the 2014 HWP Landbase

Landbase Classification	Area (ha)
Total FMU E14 Area	1,022,465
Outside of FMA (LB_Deletion = 1)	33,711
Non-Forested (LB_Deletion = 2)	52,163
Prime Protection (LB_Deletion = 15)	467
Land Use (LB_Deletion = 3)	29,648
Seismic Lines (LB_Deletion = 4)	19,187
Total Non-Forested	135,176
Subjective Deletions (LB_Deletion = 7)	
Wet Sites	149,216
Larch	1,993
Non-Operational Ecosites	-
"A" Crown Closure No UnderStory	4,304
Black Spruce >=80%	5,331
"U" TPR	19,741
Total Subjective Deletions	180,586
Inoperable/Inaccessible (LB_Deletion = 5)	40,237
Watercourse (LB_Deletion = 6)	2,237
Unharvested Burns (LB_Deletion = 8)	390
Horizontal Stands (LB_Deletion = 12)	180
ARIS	
Not Validated (LB_Deletion = 11)	-
<50% Stocking (LB_Deletion = 10)	226
Liability not assumed (LB_Deletion = 9)	-
No Age Assignment (LB_Deletion = 13)	178
No Stratum Assignment (LB_Deletion = 14)	821
Total Passive	**360,031**
Total Active	**662,434**

Figure 1 – Map of the HWP Landbase



3. Yield Analysis

The yield analysis involved:

- **Compilation of permanent sample plot data.**
- **Statistical analysis to develop empirical yield relationships for unmanaged stands.**
- **Compilation of performance survey (RSA) data to develop yield relationships for managed stands.**
- **Long Run Sustained Yield and MAI Standard calculations.**

Details regarding the models and data used are provided in the Yield Analysis appendices in the 2014 DFMP (Hinton Wood Products, 2014b).

3.1 Yield Strata

Table 2 provides the criteria for yield stratum assignment for managed and unmanaged stands. Details regarding the process used to assign strata to harvested blocks are described in the Yield Analysis for the 2014 DFMP (Hinton Wood Products, 2014b).

Table 2 – Summary of yield strata

Yield Stratum	Description	Cover Group	Species Composition
1	RSA Stratum 1 Hwd	Pure Deciduous (D)	Deciduous composition ≥ to 8
2	RSA Stratum 2 Hwd/Pl	Deciduous Coniferous (DC)	Pl/Lt composition ≥Sw/Fb and Pl/Lt composition ≥ to Sb
3	RSA Stratum 3 Hwd/Sw	Deciduous Coniferous (DC)	Sw/Fb composition ≤Pl/Lt and Sw/Fb composition ≥ Sb
4	RSA Stratum 4 Sw/Hwd	Coniferous/Deciduous (CD)	Sw/Fb composition ≤Pl/Lt and Sw/Fb composition ≥Sb
5	RSA Stratum 5 Pl/Hwd	Coniferous/Deciduous (CD)	Pl/Lt composition ≥Sw/Fb and Pl/Lt composition ≥Sb
6	RSA Stratum 6 Sb/Hwd	Coniferous/Deciduous (CD)	Sb composition ≥Sw/Fb and Sb composition ≥ Pl/Lt
7	RSA Stratum 7 Sw	Pure Coniferous (C)	Sw/Fb composition ≤ Pl/Lt and Sw/Fb composition ≥ Sb
8	RSA Stratum 8 Pl	Pure Coniferous (C)	Pl/Lt composition ≥Sw/Fb and Pl/Lt composition ≥Sb
9	RSA Stratum 9 Sb	Pure Coniferous (C)	Sb composition ≥ Sw/Fb and Sb composition ≥ Pl/Lt

Area by yield stratum can be seen in Table 3 and Table 4. Seventy percent of the contributing landbase area contains lodgepole pine strata. The expanding mountain pine beetle infestation being observed across west-central Alberta, particularly in Jasper National Park make the reduction of mountain pine beetle susceptibility a critical objective for this timber supply analysis. The spatial distribution of strata can be seen in Figure 2.

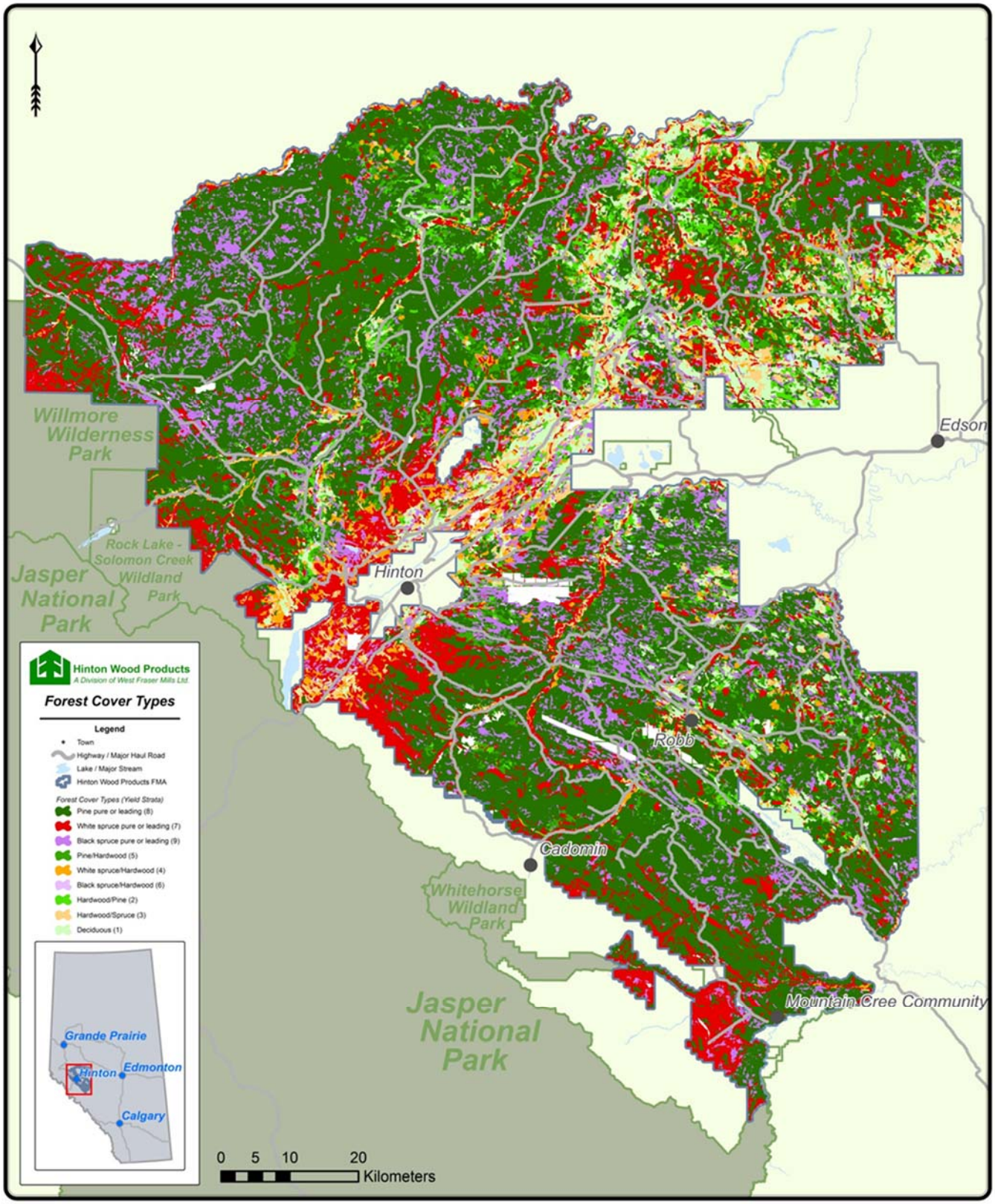
Table 3 – Areas and coniferous volumes for yield strata on the HWP Landbase.

Yield Stratum	State	Net Area	Coniferous Tree Length				Coniferous Cut to Length			
			Vol. m^3/ha	Max MAI $m^3/ha/yr$	Culm. Age	Total MAI m^3	Vol. m^3/ha	Max MAI $m^3/ha/yr$	Culm. Age	Total MAI m^3
1	Regen	2,476	72.1	0.66	110	1,623	70.4	0.64	110	1,584
1	Natural	47,881	72.1	0.66	110	31,391	70.4	0.64	110	30,628
2	Regen	1,120	245.6	2.73	90	3,055	236.3	2.63	90	2,939
2	Natural	24,082	115.2	1.28	90	30,834	110.9	1.23	90	29,667
3	Regen	1,467	256.9	2.57	100	3,770	250.9	2.51	100	3,682
3	Natural	23,748	225.1	1.50	150	35,634	222.2	1.48	150	35,177
4	Regen	3,030	256.9	2.57	100	7,783	250.9	2.51	100	7,601
4	Natural	21,092	225.1	1.50	150	31,649	222.2	1.48	150	31,243
5	Regen	2,848	245.6	2.73	90	7,770	236.3	2.63	90	7,476
5	Natural	40,125	115.2	1.28	90	51,374	110.9	1.23	90	49,431
6	Regen	11	256.9	2.57	100	28	250.9	2.51	100	27
6	Natural	487	225.1	1.50	150	731	222.2	1.48	150	722
7	Regen	18,012	291.7	2.92	100	52,539	281.4	2.81	100	50,678
7	Natural	81,215	155.2	1.55	100	126,051	149.7	1.50	100	121,585
8	Regen	84,683	301.6	3.35	90	283,810	285.8	3.18	90	268,901
8	Natural	306,038	211.6	1.92	110	588,740	201.8	1.83	110	561,356
9	Regen	306	233.4	2.33	100	713	211.0	2.11	100	645
9	Natural	3,816	124.2	1.24	100	4,738	112.3	1.12	100	4,284
Total		**662,434**	**199.4**	**1.91**	**106**	**1,262,234**	**190.9**	**1.82**	**106**	**1,207,626**

Table 4 – Areas and deciduous volumes for yield strata on the HWP Landbase

Yield Stratum	State	Net Area	Deciduous			
			Vol. m^3/ha	Max MAI $m^3/ha/yr$	Culm. Age	Total MAI m^3
1	Regen	2,476	193.0	1.75	110	4,345
1	Natural	47,881	193.3	1.76	110	84,132
2	Regen	1,120	79.9	0.89	90	994
2	Natural	24,082	81.6	0.91	90	21,830
3	Regen	1,467	99.9	1.00	100	1,466
3	Natural	23,748	78.9	0.53	150	12,497
4	Regen	3,030	99.9	1.00	100	3,026
4	Natural	21,092	78.9	0.53	150	11,099
5	Regen	2,848	79.9	0.89	90	2,529
5	Natural	40,125	81.6	0.91	90	36,373
6	Regen	11	99.9	1.00	100	11
6	Natural	487	78.9	0.53	150	257
7	Regen	18,012	54.9	0.55	100	9,886
7	Natural	81,215	7.8	0.08	100	6,332
8	Regen	84,683	31.9	0.35	90	30,026
8	Natural	306,038	9.3	0.08	110	25,958
9	Regen	306	-	-	100	-
9	Natural	3,816	-	-	100	-
Total		**662,434**	**40.0**	**0.38**	**106**	**250,759**

Figure 2 – Forest cover types on the HWP Landbase



3.2 Utilization

In order to adjust the AAC to account for fibre losses due to cut-to-length utilization, two different sets of utilization standards were used. All scenarios were run using both tree length and cut-to-length yield curves to provide comparisons and allow operational flexibility. Utilization standards by applicability are provided in Table 5 below.

Table 5 – Utilization standards and applicability

Utilization Standard	Minimum Top Diameter (cm)	Minimum Stump Diameter (cm)	Minimum Stump Height (m)	Minimum Log Length (m)	Acceptable Log Lengths (m)	Application
15/11/15cm/3.76m	11	15	15	3.76	NA	Coniferous Unmanaged Yields - Tree Length
15/11/15cm/3.76m	11	15	15	3.76	4.98,4.37,3.76	Coniferous Unmanaged Yields - Cut To Length
15/10/30cm/2.67m	10	15	30	2.67	NA	Deciduous Unmanaged Yields – Tree Length
15/10/30cm/3.66m	10	15	30	3.66	NA	Regenerated Yields - RSA Compilation and GYPSY Projections
15/11/15cm/3.66m	11	15	15	3.66	NA	Regenerated Yields - FMP Compilation

3.3 Cull

Hinton Wood Products, in cooperation with Alberta Environment and Sustainable Resource Development, sampled stem data from 3 different logging contractors over a five year period to estimate the amount of fibre lost to manufacturing specification changes and to solid wood defects. The data showed an average coniferous cull of 2.5%. This deduction was used applied to coniferous yields for both tree length and cut to length utilization.

Deciduous cull was set at 13.2% based on a study prepared in 1990 for Weldwood of Canada using samples from the HWP FMA area (FORTRENDS Consulting Inc., 1990). The study showed that incipient and advanced decay reduced merchantable volume by 13.2%. This deduction was applied to the deciduous component of all yield curves to estimate the net deciduous yields.

4. Assumptions and Inputs

A series of issues and objectives guided the development of this timber supply analysis. The impacts of proposed changes were evaluated sequentially to develop a preferred forest management strategy that addressed the issues and objectives to the fullest extent possible. Details of the runs are provided in this section to demonstrate the way in which the final spatial harvest sequence was derived.

4.1 Modeling Tools

Remsoft Spatial Planning System, Version 2013.12.1 (RSPS) was the model selected for this TSA. The Woodstock module was used for strategic, non-spatial analysis to test and compare different management assumption. The Spatial Optimizer (formerly Stanley) module dealt with the spatial issues involved with creating management strategies. Where possible, sensitivity analyses were completed using Woodstock as it uses linear optimization which, when feasible, provides the maximum possible solution and is fast at providing optimal solutions compared with Spatial Optimizer. The recommended harvest level and the spatial harvest sequence were set using one scenario, which was developed in Spatial Optimizer.

Woodstock was used for strategic analysis of timber supply and comparisons of alternative strategies and formulations. This strategic analysis provided insight for the resolution of specific issues including growing stock, minimum harvest age and harvest flow. It is completely non-spatial; therefore every unique type is rolled up into forest classes (TSA themes by age class). The model can then apply treatments to all or a portion of that unique forest class. The optimizer selects the optimal combination of treatments throughout the entire planning horizon to solve the objective functions and minimize deviations from goals.

A structured, progressive approach was used in the development and analysis of harvesting scenarios. Increasing levels of constraints were applied in successive scenarios to meet forest management objectives and to answer specific management questions and issues. Linear programming is a mathematical tool used in forest management because of its speed and accuracy in finding the 'optimal' solution with regards to a single objective and several constraints. MOSEK's Linear Programming Solver (MOSEK Version 7.0.0.114 Build date: 2014-4-27 22:05:04) is used in RSPS. The end result of the first stage was a scenario that met all of the non-spatial key objectives.

Woodstock runs and reports in 10-year periods in this analysis.

Spatial Optimizer is a spatially-explicit wood supply modeling tool designed to provide the user with operational-scale decision-making capacity within a strategic analytical environment. The tool is fully spatial through time and the impact on an adjacent polygon 200 years into the future is considered in the first year of the simulation. It is a heuristic model that attempts to achieve close to an optimal solution for the defined goals. Its modeling objective is to minimize deviation from the modeling targets. Unlike Woodstock, spatial relationships can be applied in the objective function.

In this analysis, a variety of goals were defined such as harvest levels, minimum growing stock levels, minimum seral stage areas, maximum block size, risk reduction and improved stock deployment by period. Spatial Optimizer was set up to model and report in seven 10-year increments to match Woodstock for this analysis. The model begins in 2013 and plans up to 2213.

4.2 Natural Disturbance

All areas within natural disturbances are assumed to have occurred after the landbase cutoff date, are non-forested and assigned to the passive landbase.

4.3 Mountain Pine Beetle

Recent surveys have shown that large scale MPB infestations are occurring in Jasper National Park, immediately west of the HWP FMA area. Given the potential for catastrophic loss of timber and habitat which would result from an infestation on the HWP landbase, reducing the amount of mature pine and creating breaks in areas of continuous pine forest, remain important goals in this timber supply analysis.

There were three components to the Mountain Pine Beetle rating system that was used to assess the PFMS. The first component to the rating system was the 'Pine Rating' or SSI of the stands. The second component of the rating system was the 'Climate Factor'. The final component to the risk assessment was the compartment risk. All three of these were combined to find the rank of the stand.

4.4 Productivity Losses Accounted

There are a number of different mechanisms to account for productivity losses on the landbase. The first is the AAC recalculation trigger, when the harvest level or managed landbase is reduced by more than 2.5% from the current level, HWP would need to recalculate the harvest level based on the new reduced landbase. The second mechanism that exists is a result of the historical method of dealing with fire. When a fire burns on the landbase it has typically been removed from the managed landbase in the next TSA; until the area is inventoried or surveyed to show regeneration. Though these areas are out of the managed landbase they are very likely to regenerate to forested stands, as most of the forest types in Alberta are adapted to fires. It may be assumed that, as fires are burning on the landbase, area is 'removed from the landbase' due to fire for the next recalculation, and that other areas that have previously been burned and removed from the landbase will be returning to the landbase.

4.5 Yield Curves

4.5.1 Volume

The final volume yield curves used in the TSA are described in Yield Analysis for the 2014 DFMP (Hinton Wood Products, 2014b). Both tree length and cut-to-length curves were used for all of the analyses. Cull factors were applied to the yield curves as described in Section 3.3.

4.5.2 Regeneration Lag

The regeneration lags are implicit in the data collected for performance surveys. These data were used in the development of yield curves for the regenerating strata and reflect the results of the silvicultural treatments conducted across the landbase. They were not stratified by treatment.

4.5.3 Improved Stock Deployment

Improved Stock has been deployed on the landbase as orchards have come into production. HWP will continue to deploy improved stock, as it becomes available to the fullest extent possible. Where deployment data are linked to a spatial file, the polygon is assumed to produce more volume at maturity than a polygon in the same stratum regenerated with wild seed. A multiplier of 4% or 8% has been used to create yield curves for certain improved stock types, and is also applied to regenerated volumes for any polygon shown to have been reforested with improved seed in the timber supply model. The volume gain used is double the approved height gain for each CPP region as shown in Table 6. The volume multiplier is applied to all coniferous volume in pine and white spruce strata. Although improved stock may be planted in mixedwood blocks, densities vary, increasing the modeling parameters unacceptably. In order to capture the overall

genetic gain in the model, all planting will be assumed to be in pine-leading or spruce-leading stands, as appropriate. The genetic gain realized in mixedwood stands will be captured by assigning separate yield strata and targets and measuring the results with performance surveys.

Seed will be deployed in accordance with the Guidelines for Deployment of Stream 2 Material (Improved Seed) and the applicable Controlled Parentage Program. Areas reforested with improved seed will receive the same silvicultural treatments as areas with wild seed. While genetic volume gain has yet to be definitively quantified, it is generally accepted that there may be other gains e.g. insect or disease resistance, that make the deployment of improved stock a prudent management choice.

Table 6 – Improved seed sources and gain for the HWP FMA area

Species	CPP Region*	Approved Height Gain	Volume Gain	Orchard codes	Approved operational elevations (metres) as of May 1,2013
Lodgepole Pine	Region A	2%	4%	WWG801 (Presslee)	1050 -1350
Lodgepole Pine	Region B2	2%	4%	HASOCIG303	1200-1600
Logepole Pine	Region B1	4%	8%	G147 orchard	800-1200 (north of the Athabasca River Only)
White Spruce	Region I	2%	4%	HASOCIG333	800-1200
Black Spruce	Region L1	0%	0%	WWG802 (Lanaria)or WWG806 (Presslee)	800-1200

4.6 Structure Retention

The Alberta government requires that companies include structural retention in their harvesting activities. Target #13 - Stand Level Structure in the 2014 DFMP (Hinton Wood Products, 2014b) describes HWP's strategy for meeting the 1% merchantable volume retention target. No structure retention reductions are shown in this document.

4.7 Seral Stages

Seral stage definitions for the HWP landbase are explained in *An Ecosystem-Based Riparian Management Strategy* (Jones, 2013). They are different for the regenerating areas and for the unmanaged areas. The definitions of seral stages used in this TSA may be seen in Table 7. For setting seral stage targets, the Late Mature and Old stages were combined.

Table 7 – Seral stages definitions used in the HWP TSA.

Forest Type	Yield Class	Origin	Seral Stage Ages				
			Young	Pole	Early Mature	Late Mature	Old
Pine Leading	8	Unmanaged	0-20	21-69	70-119	120-159	160+
		Regenerating	0-20	21-49	50-99	100-159	160+
Spruce Leading	7	Unmanaged	0-20	21-49	50-99	100-159	160+
		Regenerating	0-20	21-49	50-99	100-159	160+
Wetland Spruce	9	Unmanaged	0-30	31-89	90-109	100-189	190+
		Regenerating	0-30	31-89	90-109	100-189	190+
Mixed Wood	2,3,4,5,6	Unmanaged	0-20	21-59	60-109	110-149	150+
		Regenerating	0-20	21-49	50-99	100-149	150+
Deciduous	1	Unmanaged	0-20	21-59	60-109	110-149	150+
		Regenerating	0-20	21-59	60-109	110-149	150+

4.8 Minimum Harvest Ages

The minimum harvest ages used in this FMP were 70 years for coniferous or coniferous-leading mixedwoods and 60 years for deciduous or deciduous-leading mixedwoods.

4.9 Planning Horizon

For this TSA the planning horizon was 200 years. In this report all of the results show the 200 years of the planning horizon from 2013 to 2213.

4.10 Transitions

It is the intent of HWP to balance the regenerating stand structure to the original stand structure assessed in the forest inventory supporting the TSA. It is assumed that regenerating stand composition will be quantitatively and compositionally the same as shown in the original inventory. No pre-commercial thinning, commercial thinning, fertilization, under-planting, stand density management, pruning or drainage activities are planned at this time. The silviculture matrix is shown in Table 8.

All areas planted with improved stock will receive the same silvicultural treatments as other areas in the stratum, as described in the matrix.

4.11 Understory management

No understory protection harvesting is planned at this point in time. Harvest of some pine stands with spruce understory may be delayed during operational planning as part of a response to the threat of a full scale mountain pine beetle infestation.

4.12 Access schedule

Compartments were scheduled to address operational and biological objectives. The decisions are explained in Section 5.

4.13 Existing Spatial Harvest Sequence

The cumulative variance, as of April 2013, compared to the 2009 Spatial Harvest Sequence is shown in Appendix 2. The classification of changes to the former SHS cannot be compared to the SHS described in this timber supply analysis as they use two different landbases. For example, areas that were deleted in the last plan as being hydrologic buffers may now be in the active landbase if they have forest cover. Similarly, areas that were additions are now inside of cutblocks and assigned to regenerating yield curves. In order to minimize variances going forward, all approved planned cutblocks were used to create the SHS. Operational variance will be measured and reported, based on the SHS developed in this plan, once it is approved.

Table 8 – Silviculture Matrix

1	2	3	4	5	6	7	8	9	10
Regenerated Yield Trajectory	**Strata Standard**	**Transition Toward Climax**	**Species Proportions**	**Limitations to Crop Establishment**	**Silviculture System**	**Site Prep**	**Silviculture Tactic & Seedling Establishment (includes LFN)**	**Seedling Density (stems/ha)**	**Reforestation Stage Intervention**
Deciduous	D	No transition assumed	80% Deciduous	elevation, soil moisture, soil temperature, soil porosity & grass competition	clear cut; clear cut with retention	no site prep unless sucker response is poor; then could be mechanical or chemical	LFN - deciduous	3,000	chemical or mechanical stand tending; SPP or fill-in plant as required
Hardwood/Pine	DC	No transition assumed	50% Deciduous, 30% Pine Leading Coniferous	elevation, soil moisture, soil temperature, soil porosity, browsing & grass competition	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	SFN or planting pine; Planting white spruce or spruce/pine mixtures when ecologically suited; LFN deciduous	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
Hardwood/Spruce	DC	No transition assumed	50% Deciduous, 30% Spruce Leading Coniferous	elevation, soil moisture, soil temperature, soil porosity, winter desiccation & grass competition	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	LFN deciduous; Planting white spruce or pine/spruce mixtures when ecologically suited. Take advantage of understory where feasible.	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
White Spruce/Hardwood	CD	No transition assumed	50% White Spruce Leading Coniferous, 30% Deciduous	elevation, soil moisture, soil temperature, winter desiccation, soil type, grass & aspen competition	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	Planting white spruce, planting pine or pine/spruce mixture when ecologically suited; LFN deciduous	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
Pine/Hardwood	CD	No transition assumed	50% Pine Leading Coniferous, 30% Deciduous	grass & aspen competition, soil temperature, elevation, duff depth, winter desiccation, slope	clear cut; clear cut with retention	mineral soil exposure/elevated microsite, chemical, raw planting	SFN; Planting pine or planting pine/spruce mixtures when ecologically suited; LFN deciduous	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
Black Spruce/Hardwood	CD	No transition assumed	50% Black Spruce Leading Coniferous, 30% Deciduous	elevation, soil moisture, cold soils, winter desiccation, soil type, grass & aspen competition, cold air pondage	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	Plant black spruce; plant pine or plant pine/black spruce mixtures when ecologically suited; LFN deciduous	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
White Spruce pure or leading	C	No transition assumed	80% White Spruce Leading Coniferous	elevation, soil moisture, cold soils, winter desiccation, soil type, grass & aspen competition, slope	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	Planting white spruce, planting pine or pine/spruce mixture when ecologically suited; LFN deciduous	1,600	chemical or mechanical stand tending; SPP or fill-in plant as required
TI Improved Spruce or spruce leading	C	No transition assumed	80% White Spruce Leading Coniferous	elevation, soil moisture, cold soils, winter desiccation, soil type, grass & aspen competition, slope	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	SPP; P	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
Pine pure or leading	C	No transition assumed	80% Pine Leading Coniferous	grass & aspen competition, cold soils, elevation, duff depth, cone load and distribution, soil moisture, browsing, slope	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	SFN Pine or planting pine or pine/spruce mixtures when ecologically suited	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
TI2 Improved Pine or pine leading	C	No transition assumed	80% Pine Leading Coniferous	elevation, soil moisture, cold soils, winter desiccation, soil type, grass & aspen competition, slope	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	SPP; P	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
TI4 Improved Pine or pine leading	C	No transition assumed	80% Pine Leading Coniferous	elevation, soil moisture, cold soils, winter desiccation, soil type, grass & aspen competition, slope	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	SPP; P	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required

1	2	3	4	5	6	7	8	9	10
Regenerated Yield Trajectory	**Strata Standard**	**Transition Toward Climax**	**Species Proportions**	**Limitations to Crop Establishment**	**Silviculture System**	**Site Prep**	**Silviculture Tactic & Seedling Establishment (includes LFN)**	**Seedling Density (stems/ha)**	**Reforestation Stage Intervention**
Black Spruce pure or leading	C	No transition assumed	80% Black Spruce Leading Coniferous	elevation, soil moisture, soil temperature, winter desiccation, cold air pondage, soil type, grass & aspen competition	clear cut; clear cut with retention	elevated microsite/mineral soil exposure, soil mixing, chemical, raw planting	Plant black spruce; Plant pine or plant pine/black spruce mixtures when ecologically suited	1,800	chemical or mechanical stand tending; SPP or fill-in plant as required
Roads and Landings				puddling, lack of organic, compaction	clear cut; clear cut with retention	road roll-back; SFN or SPP in conjunction with opening level treatments when needed; raw planting when suited	SFN, SPP; Raw planting of conifer		chemical or mechanical stand tending; SPP or fill-in plant as required

- **The Regenerated Yield Trajectory (column 1)** as approved in the TSA.
- **Broad Cover Groups (column 2)** C (pure coniferous), CD (mixedwood – conifer leading), DC (mixedwood – deciduous leading) and D (pure deciduous).
- **Transitions Toward Climax (column 3)** whether the regenerating stand's composition or stand structure is intended to deviate from the original as it grows towards its objective.
- **Stand Structure (column 4)** each of the tree species that are intended or expected to make up the climax stand and their proportions.
- **Climatic/Site Limitations (column 5)** climatic and site limitation factors that are anticipated to affect seedling survival and short-term productivity.
- **Silviculture System (column 6)** Choices include clearcut, clearcut with retention, partial cut, shelterwood, seed-tree, patch cut or understory protection.
- **Site Preparation (column 7)** operational strategies chosen to create a suitable microsite for germination of seed, promotion of suckering or optimum growth of planted stock.
- **Silviculture Tactic & Seedling Establishment (column 8)** the operational strategies for establishing the tree species of choice on a site to be reforested.
- **Seedling Density (column 9)** planting density or the density of regeneration desired to be achieved and maintained in the Reforestation Phase.
- **Reforestation Phase Intervention (column 10)** any silviculture-driven intervention planned on a regenerating stand, after initial treatment and establishment during the Reforestation Phase.
- **Roads, Landings and Processing Areas** If these areas are being site prepared, or the soil decompacted, then they may be amalgamated into the rest of the cutblock or strata, after having been reforested accordingly.

5. Issues and Decisions

There were many decisions that needed to be made throughout the TSA process to create the preferred forest management Strategy (PFMS). These decisions covered a wide range of topics, including harvest levels, special management areas and improved stock deployment. Many of these issues were related, and decisions were made throughout the process of developing the PFMS.

These issues are laid out to first identify a question posed by HWP, a stakeholder, or government through the planning standard or other communications. Subsequently, background information is presented along with the methodology used to analyze the problem. The results of the scenario are then shown along with any other indicators that were affected by the analysis. The decisions made are presented along with a discussion of the decision process.

5.1 Establish a Baseline

Background

In order to set objectives for the TSA, three scenarios were created. The first scenario (Run 1) was an unconstrained run which was to maximize total harvest with no constraints on growing stock or flows. All special management areas (SMA's) were available for harvest. The result was a harvest level that was unrealistic in both the short and long terms.

The forested growing stock is the volume that is on the managed landbase and within stands greater than the minimum harvest age, i.e. all volume currently available for harvest. The planning standard (Alberta Sustainable Resource Development, 2006) specifies that the growing stock must be stable, or non-declining over the final 50 years of the planning horizon. The second scenario (Run 2) was constrained by a requirement to even flow the coniferous volumes and produce an even growing stock in the last five periods. The SMA's were included in the land available for harvest.

In the third scenario (Run 3), both the coniferous and deciduous volumes were produced on an even flow basis. All other parameters were the same as Run 2. Results of all 3 scenarios are shown in Table 9 below.

Results

The unconstrained scenario resulted in a very large volume being harvested in the first period as the model attempted to reduce the amount of mature and over mature forest on the landbase. The volume proposed for harvest is too high to be sustainable or even useable in the short term. When the coniferous volume was required to be at an even flow and the final growing stock constrained, harvest levels decreased, as expected. Changing the objective to even flow both conifer and deciduous further reduced the harvest level for both species groups.

Table 9 – Results from the scenarios used to establish baseline harvest levels (m^3/year) CTL

Scenario	Constraints	First Period		Remaining Periods	
		Conifer	Decid	Conifer	Decid
Run 1 (HWP_v1)	• Unconstrained	6,901,764	1,446,427	1,824,114	344,594
Run 2 (HWP_v2)	• Even flow Conifer • Even GS last 50 years	1,577,183	458,903	1,577,183	326,500
Run 3 (HWP_v3)	• Even flow Conifer & Decid • Even GS last 50 years	1,573,026	320,712	1,573,026	320,712

Analysis of the other outputs from these runs showed that there was no large difference between these scenarios for the other indicators. One exception was a higher level of old seral stages on the active landbase with the even flow runs.

Decision
It was decided that the base coniferous and deciduous harvest levels would be modeled at an even flow over the length of the planning horizon with non-declining growing stock in the last 5 periods.

All of the remaining scenarios investigated as part of this timber supply analysis will be presented using a consistent format. Each table has a bulleted list with the parameters that are unchanged having "●" in front and any new parameters added in that scenario are prefaced with a "➢".

5.2 Improved Stock

Issue
Apply spatial goals and evaluate the impact of deploying improved stock.

Background
In order to direct the development of the spatial harvest sequence, a goal was added to harvest all of the area currently within approved plans in Period 1.

Large areas of the HWP FMA area are currently under a HRS (Holding Reservation) disposition for potential recreation and tourism development. Although the disposition does not preclude harvesting, an agreement was made with Alberta that nothing would be scheduled for harvest during the first 2 periods of the timber supply analysis. A constraint was added to not harvest within the HRS dispositions during Periods 1 and 2.

HWP has had an active tree improvement program for the past 20 years. In addition to operating its own orchard, the company is a partner in the Huallen Seed Orchard Company (HASOC) which has an orchard near Beaverlodge. While the full volume genetic gain of each seedlot has not yet been assessed, it is agreed that the work completed to date will result in the height and volume gains shown in Table 6. Formal approval of the improved stock gains is included in Appendix 1. A 4% or 8% increase was applied as appropriate to the regenerated yield curve for any area where improved stock was assigned.

The model was given a goal to deploy as much improved stock as possible given the available seed and areas harvested within the appropriate Controlled Parentage Program Plan areas. If there was insufficient area of a particular stratum (i.e. pine or white spruce) logged to accommodate all the available seed, the seed was not carried over to the next period.

Results
The harvest level for both species groups declined slightly when improved stock deployment was added as a goal, 700 m³ less for conifer and 1,100 m³ less for deciduous (Table 10). This appears to be due to the model scheduling white spruce leading stands in order to utilize the available Region I seed. White spruce stands have a lower coniferous mean annual increment than pine, resulting in a decreased harvest of both timber types.

Table 10 – Results from improved stock deployment (m³/year) CTL.

Scenario	Constraints	First Period		Remaining Periods	
		Conifer	Decid	Conifer	Decid
Run 4 (HWP_v4)	• Even flow Conifer & Decid • Even GS last 50 years ➢ Harvest planned blocks ➢ No harvest in HRS for Periods 1 & 2 ➢ Improved Stock	1,572,322	319,595	1,572,322	319,595

Analysis of the other outputs from this run showed that there was no large difference between these scenarios for the other indicators.

Decision
The full suite of benefits to the forest and to HWP of improved stock have not yet been fully described or agreed upon. In addition to increased volume, it is thought that other genetic traits such as insect or disease resistance as well as the ability to adapt to a changing climate may also result from selective breeding. As this issue is likely to receive more attention in the future and the potential benefits may prove to be more important as our understanding increases, it was decided to leave the improved stock in the model. This will allow HWP to easily evaluate changes to Provincial policies and to assess the impacts of new scientific knowledge it evolves.

5.3 Biological Constraints

Issue
Evaluate the impact of mountain pine beetle, wildlife and wildfire management requirements on the timber supply.

Background
Mountain pine beetle continues to be a threat to pine trees on the HWP landbase. By reducing the amount of susceptible pine, it is hoped that the impact of the epidemic will be mitigated and the young pine forests will be able to grow to maturity for harvest at a later date. Provincial targets have been set to reduce the amount of susceptible pine by 75% over 20 years. In Run 5, a goal was added to reduce the area of susceptible pine by 75% in the first 2 periods.

Special management areas (SMAs) have been defined for certain species that are present on the HWP FMA area. Two caribou herds, high elevation sheep and goats and trumpeter swans all have SMAs included in the landbase. Much of these areas have mature forest on them and would be eligible for harvest without an explicit constraint. The effect of excluding or restricting harvest in these areas is assessed.

Harvesting within the areas identified as part of the caribou zone was limited to parts of Berland 3 and 21 for Period 1 and 40% of the mature pine in Berland 1 and 20 during Period 2. No other harvest was allowed outside of specified compartments until Period 3 at which time, 20% of the available landbase became available per period for the remainder of the analysis. The forest within the caribou zones contains mostly late mature and old seral stages, and would be heavily harvested by the model without the applied constraints.

All areas within 800 m of identified trumpeter swan lakes were identified in the landbase and removed from harvesting for this analysis. Individual lakes will be assessed during operational planning and the areas may be logged if conditions allow.

Results
Adding a goal to harvest 75% of the susceptible pine forest and 100% of the planned blocks in the first two periods while making the HRS dispositions unavailable (Run 5) reduced the coniferous AAC by about 67,000 m^3 and the deciduous by about 3,800 m^3 as compared to Run 4. The goal of reducing susceptible pine by 75% was not met by the end of Period 2. There is 157,808 ha of the original 341,166 ha of susceptible pine remaining after two periods, a reduction of 53.7%. The area of susceptible pine remaining does not fall below 25% until Period 4 in Run 5.

Removing the Trumpeter Swan SMA's and restricting access to the caribou ranges (Run 6) slightly increased the available volume.

Adding a goal to reduce fire risk by 50% in the first two periods also slightly increases the scheduled harvest. It should be noted that the ability to achieve this goal is limited by the presence or 4,349 ha of HRS dispositions within the Community Protection Zones. The HRS areas are not available for harvest in Periods 1 & 2, making the fire risk goal reduction more difficult to achieve. However, the fire risk reduction goal is met in Run 7, with only 11,374 ha of the original 27,109 ha remaining after two periods, a reduction of 58.0%.

Table 11 – Results from biological constraints (m³/year) CTL

Scenario	Constraints	First Period		Remaining Periods	
		Conifer	Decid	Conifer	Decid
Run 5 (HWP_v5)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock ➢ Reduce MPB 75%	1,504,857	309,110	1,504,857	309,110

Run 6 (HWP_v6)	• Even flow Conifer & Decid
	• Even GS last 50 years
	• Harvest planned blocks
	• No harvest in HRS for Periods 1 & 2
	• Improved Stock
	• Reduce MPB 75%
	  ➢ Caribou constraints
	  ➢ Swan SMAs excluded
		1,512,354	309,433	1,512,354	309,433

Run 7 (HWP_v7)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded ➢ Reduce fire risk by 50%	1,512,650	309,447	1,512,650	309,447

Analysis of the other outputs from these runs (Table 11) showed that there was no large difference between these scenarios for the other indicators. Alberta staff has advised that the trumpeter swan buffers are to remain intact with no scheduled harvest.

Decision

Include mountain pine beetle, fire risk reduction and caribou constraints. No harvest in trumpeter swan SMA's.

5.4 Operational Considerations

Question

Explore the effects of changing compartment availability to help operationalize the analysis and test the effect of improved stock deployment again.

Background

In order to address some habitat values, incorporate reconciliation volumes, and develop a spatial harvest sequence that is more realistic operationally, several additional scenarios were run. Run 8 was done to ensure that the volume allocated to another West Fraser division was available from the C and CD landbase in the assigned compartments. It was also used to limit harvest in certain compartments with the intent to force more area to be scheduled in fewer compartments for operational efficiency and biological reasons.

Run 9 was a second test of the impact of improved stock deployment. This time, the use of improved stock was removed as a goal to compare the result to the Run 8.

Results

Constraining the harvest in certain compartments (Run 8) increased the coniferous and deciduous AAC slightly. The increase was only 5,000 m³ annually for conifer and less than 2,000 m³ for conifer, so the result was not investigated any further.

Cancelling the requirement to deploy improved stock in Run 9 increased the coniferous and deciduous harvest by about 555 m³ each. At shown in Table 12, once again, the model demonstrated that the deployment of improved stock decreased harvest levels.

Table 12 – Results from compartment constraints and no improved stock (m³/year) CTL

Scenario	Constraints	First Period		Remaining Periods	
		Conifer	Decid	Conifer	Decid
Run 8 (HWP_v8)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% ➢ Compartment constraints	1,517,531	311,108	1,517,531	311,108
Run 9 (HWP_v9)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 ➢ No Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% • Compartment constraints	1,518,086	311,661	1,518,086	311,661

Decision

The compartment constraints are required to guide the spatial phase of the timber supply analysis. Without them, the AAC can be achieved with a dispersed harvesting pattern that is not operationally or financially feasible. For this reason, operational constraints will remain in some form. They will be adjusted further in the spatial phase of the analysis.

The improved stock, as previously discussed, is expected to have other benefits which have not yet been identified and which are expected to outweigh the slight loss of AAC caused by deployment.

5.5 Reconciliation Volume

Question

Evaluate the impact of adding reconciliation volumes (now called “unused volume” by the GoA) to the first period.

Background

Extensive improvements to the HWP sawmill, planer and energy plant were completed in 2011 and 2012 during which time mill consumption was reduced. Systems were aligned and coordinated in 2013, and with

the addition of a new continuous kiln in 2014, all areas of manufacturing are now balanced. The reduced capacity during upgrades resulted in a portion of the Periodic Allowable Cut not being utilized. As of April 2013, a total of 2,192,901 m³ of coniferous timber and 386,432 m³ of deciduous timber available during the quadrant had not been harvested. Approval in principle was given to add a reconciliation volume to the Periodic Allowable Cut for the May 2013 to April 2018 period subject to the volume being included in this Timber Supply Analysis. Reconciliation volume from the quadrant ending in April 2013 was added into the model in Run 10 for both coniferous and deciduous timber.

HWP has been instructed by Alberta to utilize the reconciliation volume from the quadrant ending April 2013 within the first quadrant of this FMP. In order to demonstrate incorporation of the volume into this analysis, which uses 10 year periods, the first period has been broken down into 2 quadrants, i.e. Period 1 Years 1 to 5 and Period 1 Years 6 to 10. The coniferous reconciliation volume was completely utilized during the first 2 years of the first period as was most of the deciduous volume.

As shown in Table 13, the addition of the reconciliation volume (Run 10) increased the AAC's in Period 1 and slightly reduced the long term coniferous and deciduous AAC's. The reduced mill consumption in 2011 and 2012 has been incorporated into the AAC for Period 1 by using actual harvest levels for the first year and the increased levels for the remaining 9 years. When averaged, the AAC for Period 1 Years 1 to 5 is 1,682,527 m³ conifer and 322,166 m³ deciduous.

The harvest forecast for periods 2 through 20 were 94% of the even flow conifer and 95% of the even flow deciduous forecasts shown in Run 3 and are acceptable reductions.

Table 13 – AAC with reconciliation volume (m³/year) CTL

Scenario	Constraints	First Period years 1 to 5		First Period years 6 to 10		Remaining Periods	
		Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 10 (HWP_v10)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% • Compartment constraints ➢ Add reconciliation volumes	1,682,527	322,166	1,776,334	365,641	1,472,646	306,133

Decision
The reconciliation volumes will be harvested in the first period and the long term impact demonstrated to be acceptable, so the reconciliation volumes will remain in the analysis.

5.6 Spatial Constraints

Question
Adjustments to the constraints and goals of Run 10 were made to further operationalize the analysis and facilitate development of an acceptable spatial harvest sequence.

Background
As the HWP FMA area is a single landbase, with no imbedded quotas, comprised of mostly pine-leading stands, the calculated AAC could be realized in an infinite number of spatial distributions. In order to guide future planning and achieve other, non-timber objectives, the spatial harvest sequence was constrained in a

stepwise fashion. Compartment availability was reduced in order to limit the area harvested in some compartments and to force remaining conifer stands to be harvested in others. Compartments within the caribou range planning area had specified volumes scheduled to align with the commitments made in the DFMP (page 14 of the DFMP document), in HWP's Species Conservation Strategy for caribou (Appendix 16a of the DFMP document), and the Plan Development Team process.

Results

Table 14 – Results from spatial and operational constraints (m^3/year) CTL

Scenario	Constraints	First Period years 1 to 5		First Period years 6 to 10		Remaining Periods	
		Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 11 (HWP_v11)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% • Compartment constraints • Add reconciliation volume ➢ Changes to compartment availability for McL 19 ➢ Target total removal for select comparts, and only harvest planned blocks in others.	1,678,575	322,166	1,771,394	365,641	1,483,981	307,483
Run 12 (HWP_v12)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% • Compartment constraints • Add reconciliation volume • Changes to compartment availability for McL 19 • Target total removal for select compartments and only harvest planned blocks in others. ➢ Closed additional compartments (except for planned). ➢ Added logging 33% of available contributing merchantable timber in two compartments (Berland 1 and 20) in period 2 in the Caribou Area.	1,679,064	322,166	1,772,005	365,641	1,481,803	307,372

Decision

HWP accepts the spatial and operational constraints as described above and has incorporated them into the PFMS.

5.7 Sensitivity Analysis

Question

Examine the effect of eliminating the transitions from fire origin yield curves to regenerating stand yield curves.

Background

The regenerated curves in this analysis were developed using data from 888 blocks (1,093 unique polygons) covering 17,576 hectares of harvested land. The data collected represent areas that were harvested to both sawlog and pulp standards more than 14 years ago. Results of the surveys were analyzed using a model developed by Alberta to quantify and project growth rates. Details on development of the yield curves may be found in *Yield Analysis for the 2014 DFMP* (Hinton Wood Products, 2014b). In order to assess the effect of regenerating stand yield curves and the increased growth assigned to improved stock, an additional run was completed. In this scenario, as each stand was logged by the model, it remained on the same yield trajectory, with the age reset to simulate harvesting.

Table 15 – Results with no yield curve transitions (m³/year) CTL

Scenario	Constraints	First Period years 1 to 5		First Period years 6 to 10		Remaining Periods	
		Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 13 (HWP_v14)	• Even flow Conifer & Decid • Even GS last 50 years • Harvest planned blocks • No harvest in HRS for Periods 1 & 2 • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% • Compartment constraints • Add reconciliation volume • Changes to compartment availability for McL19 • Target total removal for select compartments and only harvest planned blocks in others. • Closed additional compartments (except for planned). • Added logging 33% of available in Caribou Area in period 2. ➢ All stands return to the same yield curve following harvest.	1,681,945	322,166	1,775,606	365,641	1,106,956	226,395

Results

As expected, the long run coniferous AAC dropped to approximately 75% of the result in Run 12 (Table 15). This clearly shows the impact of current and past silvicultural practices of controlling density and competition, particularly in lodgepole pine cutovers.

Decision

Performance targets are set based on regenerating stand yield curve to allow assessment of performance over time. This allows for regular comparison of actual results to DFMP assumptions. Regenerating stand yield curves will be used to develop the preferred forest management strategy in this analysis.

5.8 Preliminary Spatial Harvest Sequence

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

Stand Susceptibility Index

- Assessment of compartment SSI ranking

Field knowledge

- Areas containing significant non-pine conifer composition, or conifer understory suitable for future timber supply value, were deferred to later in the harvest sequence.
- Experience has shown that pine/aspen stands are frequently attacked. For this reason, mixedwood stands in the Marlboro working circle are included in the SHS.

Current distribution of MPB on the FMA

- HWP has taken part in a dispersal monitoring program since 2006. Areas known to be recently attacked are included in the SHS.

Aspen

- 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.

Natural Disturbance Management

- In an effort to mimic large disturbance events, all of the remaining merchantable volume was scheduled in select compartments. These areas will subsequently be undisturbed by timber harvesting for several decades.

Economics

- Haul distance, isolated stands, piece size and reforestation costs were all considered when selecting compartments available for harvest sequencing.

Commitments to other operators

- A volume allocation to the local Community Timber Program as well as commitments to other local companies and West Fraser divisions influenced the SHS.

Table 16 – Preliminary Spatial Harvest Sequence (m³/year) CTL

Scenario	Constraints	First Period years 1 to 5		First Period years 6 to 10		Remaining Periods	
		Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 14 (HWP_v15)	• Even flow Conifer & Decid • Even GS last 50 years • Improved Stock • Reduce MPB 75% • Caribou constraints • Swan SMAs excluded • Reduce fire risk by 50% • Initial compartment constraints • Add reconciliation volume • Changes to compartment availability for McL 19 • Target total removal for select comparts, and only harvest planned blocks in others • Closed additional compartments (except for planned). • Logging 33% of available in Caribou Area in period 2.	1,718,392	368,654	1,821,166	423,751	1,476,537	301,638

After consideration of the factors listed above, the list of compartments which were open for development of the Preliminary Spatial Harvest Sequence is shown in Table 17. The sequencing of low levels of harvest in other compartments was allowed in order to facilitate model development of an optimal spatial solution.

Table 17 – Compartments included in the Preliminary Spatial Harvest Sequence (m³/year) CTL

Working Circle	Compartments Scheduled
Athabasca	1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 15, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
Marlboro	1, 2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25,
Embarras	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22,
McLeod	3, 4, 5, 6, 7, 8, 9, 12, 13, 16, 17, 18, 19, 20, 23, 24, 25, 27, 28
Berland	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 33, 34,

6. Preferred Forest Management Strategy (PFMS)

To develop the PFMS, the spatial data generated for the first two periods was based on the results of Run 14. The results of the 10 year SHS from Run 14 were input into Woodstock to drive subsequent analyses and refine the long range forecast. The mountain pine beetle infestation in Jasper National Park, immediately west of the HWP landbase increases the urgency to harvest mature pine while it is still viable, and is a primary focus of the PFMS. The end result of this process is a biologically, socially, and economically reasonable management scenario to be implemented for the next 20 years. The SHS is shown in .

The harvest volumes for the first 5 years included coniferous and deciduous reconciliation volumes from the quadrant that ended April 30th, 2013. Period 1 has been divided into two 5-year quadrants with volume allocations as shown in Table 18 below.

Table 18 – Harvest volume for the Preliminary SHS (m³/year) CTL

Scenario	Period 1				Remaining Periods	
	1 May 2013 to 30 April 2018		1 May 2018 to 30 April 2023		1 May 2023 to 30 April 2213	
	Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 14 (HWP_v15)	1,718,392	368,654	1,821,166	423,751	1,476,537	301,638

6.1 Sensitivity Analysis

When the reconciliation volume is not added to the Period 1 harvest, the even flow harvest levels drop to 1,522,803 m³ conifer and 311,773 m³ deciduous (HWP_v16). The long term harvest levels proposed for the remaining periods, as shown in Table 19 represent 97% of both the even flow conifer and deciduous harvests. Adding the reconciliation volume does not have a large impact on the long term forecast.

Table 19 – Harvest volume with reconciliation volume removed (m³/year) CTL

Scenario	Period 1				Remaining Periods	
	1 May 2013 to 30 April 2018		1 May 2018 to 30 April 2023		1 May 2023 to 30 April 2213	
	Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 15 (HWP_v16)	1,498,858	293,605	1,546,748	329,941	1,522,803	311,773

6.2 NRV Targets

In order to meet long term NRV targets on the contributing landbase, additional constraints were placed on harvest levels in Periods 3 through 20. The result was a decrease in AAC to 1,370,121 m³ conifer and 285,974 m³ deciduous from May 2023 onward (HWP_v18).

Table 20 – Harvest volume with NRV targets added - HWP PFMS (m^3/year) CTL

Scenario	Period 1				Remaining Periods	
	1 May 2013 to 30 April 2018		1 May 2018 to 30 April 2023		1 May 2023 to 30 April 2213	
	Conifer	Decid	Conifer	Decid	Conifer	Decid
Run 16 (HWP_v18)	1,718,392	368,654	1,821,166	423,751	1,370,121	285,974

After implementing the NRV targets, the SHS was rerun for periods 2 to 7. Period 2 was changed to remove volume only from the schedule to match to the revised harvest levels. Periods 3 to 7 were allowed to be replaced by the model to achieve the optimal spatial harvest sequence for these periods.

The updated SHS was then input back into the Woodstock model, replacing the aspatial schedule for periods 1 to 7 (the first 70 years of the planning horizon) and generating a new aspatial schedule for the remaining periods. The remainder of the planning horizon was set to even flow conifer and deciduous harvests (HWP_v20). The results are shown in Table 21 below.

Table 21 – Harvest volume after input of Spatial Harvest Schedule - HWP PFMS (m^3/year) CTL

Period 1				Period 2		Periods 3-7		Remaining Periods	
1 May 2013 to 30 April 2018		1 May 2018 to 30 April 2023		1 May 2023 to 30 April 2033		1 May 2033 to 30 April 2083		1 May 2083 to 30 April 2213	
Conifer	Decid	Conifer	Decid	Conifer	Decid	Conifer	Decid	Conifer	Decid
1,719,900	358,694	1,823,050	411,301	1,391,109	281,189	1,312,783	277,581	1,741,176	320,063

6.3 Harvest Volume

The coniferous harvest level increased slightly in the final scenario to an average of 1,771,475 m^3/year in a cut-to-length form from 2013-2023. The coniferous harvest level decreased to 1,391,109 m^3/year in a cut-to-length form for Period 2 (2023-2033). The deciduous harvest level from 2013-2023 averages 384,997 m^3/year, falling to 281,189 m^3/year in Period 2.

The midterm harvest levels (Periods 3 to 7) decrease further for conifer harvest to an average of 1,312,783 m^3/year in a cut-to-length form and for deciduous harvest to an average of 277,581 m^3/year from 2033-2083.

Including the mid-term portion of the SHS (Periods 3 to 7) in the Woodstock harvest schedule and setting the even flow time period to start at the beginning of Period 8 results in an increase in harvest levels during the remainder of the planning horizon (following the spatially allocated portion of the schedule). The long-term aspatial harvest levels (Periods 8 to 20) increase for conifer harvest to 1,741,176 m^3/year in a cut-to-length form and for deciduous harvest to 320,063 m^3/year from 2083-2213.

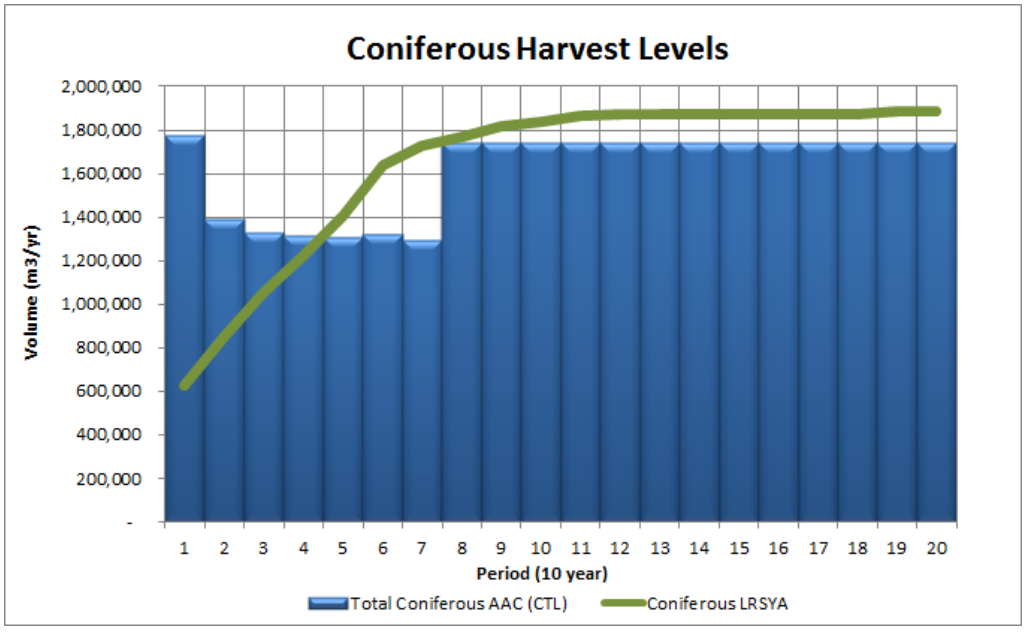
The increase in harvest volume in the PFMS beyond Period 7 corresponds with an increase in area harvested in the PFMS compared to prior scenarios. Compared to Run 16 (HWP_v18), there is an increase in the area harvested between Periods 3 to 20 of 150,340 ha, with a larger increase when the time frame is limited to Periods 8 to 20 (157,665 ha). Compared to the preliminary PFMS (Run 14 [HWP_v15]), there is an increase in the area harvested between Periods 3 to 20 of 55,444 ha, and a 96,253 ha increase in the area harvested between Periods 8 to 20. The minimum NRV targets had not yet been implemented in Run 14. These constraints decreased both the volume and area harvested in Run 16 which results in a larger increase in the difference in area harvested between the last aspatial run (Run 16) and the PFMS with the 70 year SHS included in the model's harvest schedule.

Before adding the NRV constraints in Run 16, virtually all of the original unmanaged forest was scheduled to be harvested by the end of the Period 8 (Run 14); there is only 129 ha of unmanaged forest remaining at year 80. Converting the forested landbase to regenerating yield curves exclusively would generate higher yields towards the end of the planning horizon when these stands would be available to harvest again. After constraining the model to maintain a minimum area of late mature and old seral stages, there is less area in regenerating stands at the end of each period, resulting in lower yields for the remainder of the planning horizon. In Run 16, there are 41,061 ha of unmanaged forest remaining at the end of Period 8 which slowly declines to 29,232 ha by the end of Period 20. In the PFMS, the higher levels of harvest beginning after 70 years reduce the area of unmanaged forest remaining from 41,122 ha at the end of Period 8 to 10,321 ha at the end of Period 11 and to 208 ha at the end of the planning horizon. More area in regenerating forests would increase yields compared to Run 16 and contribute to the increased harvest levels once these regenerating stands reach harvest age during the last 50 years of the planning horizon. The increased yields on this portion of the landbase (when compared to Run 16) would have a much smaller effect than the much larger increase in area harvested between the two scenarios. There would be no gain in yield when comparing the PFMS to Run 14, as the entire landbase is converted to regenerating forest by the end of Period 8 in Run 14. The increase in volume from Period 8 to 20 in the PFMS is a result of harvesting more area over this time period.

6.3.1 Coniferous Harvest

As previously discussed, a coniferous reconciliation is included in the PFMS for the first period. The coniferous harvest level target graph can be seen in Figure 3, indicating that the coniferous harvest target was achieved for all periods. The majority of the harvest throughout the planning horizon is from the pine stratum. The first decade also has a lower proportion of pine harvested than the second decade due to other spatial constraints, such as targeting pine mixedwood stands, white spruce within caribou ranges and FireSmart community zones. Pine volumes fluctuate throughout the remainder of the planning horizon. Harvesting non-pine yield strata does not help reduce the MPB threat, but is necessary to make operationally feasible harvest patterns and to deploy improved seed.

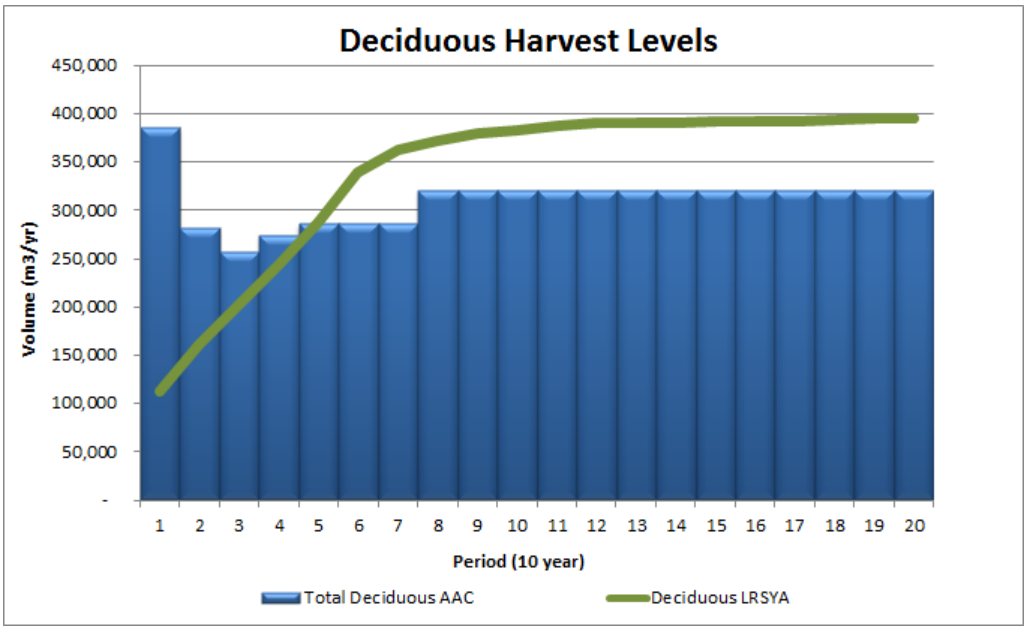
Figure 3 – Coniferous harvest target from HWP PFMS



6.3.2 Deciduous Harvest

Figure 4 shows the deciduous harvest throughout the planning horizon and the average annual harvest for the first 2 decades. The deciduous harvest volume comes from deciduous, mixedwood and coniferous yield strata. In the first 10 years, a large amount of the deciduous volume is from incidental coniferous harvest and mixedwood strata.

Figure 4 – Deciduous harvest target from HWP PFMS



6.3.3 Compartment Volumes

The final PFMS has harvesting scheduled to take place across the landbase in most compartments. The dominance of a single yield stratum (Pine) across the FMA area means that there are an infinite number of ways that the required volume could be obtained. The PFMS has volume scheduled in Period 1 as shown in Table 22. This may change with changing circumstances such as a mountain pine beetle infestation, a major land withdrawal or some other unexpected event.

Table 22 – Cut-to-Length Coniferous Volumes by Compartment for Period 1

Compartment	Volume (m^3)
Athabasca 1	294,319
Athabasca 2	88,407
Athabasca 3	19,385
Athabasca 6	9,422
Athabasca 8	29,045
Athabasca 9	14,833
Athabasca 10	30,490
Athabasca 11	427
Athabasca 12	5,027
Athabasca 15	31,776
Athabasca 17	7,592
Athabasca 18	38,269
Athabasca 19	12,694
Athabasca 20	3,567
Athabasca 21	37,159
Athabasca 22	71,564
Athabasca 24	598,276
Athabasca 26	163,424
Athabasca 27	57,992
Athabasca 28	202,539
Athabasca 29	79,899
Athabasca 30	305,417
Athabasca 31	313,543
Athabasca 32	7,741
Athabasca 33	59,737
Athabasca 34	26,278
Athabasca 35	207,352
Berland 1	305,685
Berland 3	272,002
Berland 6	10,199
Berland 9	32,418
Berland 10	1,308
Berland 12	8,811
Berland 21	350,852
Berland 22	20,814
Berland 23	235,604
Berland 24	58,825
Berland 25	141,329
Berland 26	143,352
Berland 27	89,832
Berland 28	6,091
Berland 29	145,375
Berland 30	70,543
Berland 33	10,123
Berland 34	2,663
Coalspur	2,177
Embarras 2	841,409
Embarras 3	913,501
Embarras 4	1,157,614
Embarras 6	170,066
Embarras 7	346,169
Embarras 8	15,320
Embarras 9	945,752
Embarras 10	316,968
Embarras 11	125,788
Embarras 12	439,966
Embarras 14	727,492
Embarras 19	117,193
Embarras 20	666,129
Marlboro 2	106,042
Marlboro 4	1,311,637
Marlboro 5	479,808
Marlboro 6	121,692
Marlboro 7	4,142
Marlboro 8	102,075
Marlboro 9	3,687
Marlboro 10	89,058
Marlboro 12	8,092
Marlboro 13	193,744
Marlboro 14	325,526
Marlboro 15	24,563
Marlboro 16	467,999
Marlboro 17	78,027
Marlboro 18	337,916
Marlboro 19	52,499
Marlboro 20	54,022
Marlboro 21	410,778
Marlboro 22	132,781
Marlboro 23	4,326
Marlboro 24	899
Marlboro 25	1,100
McLeod 3	360,025
McLeod 5	121,199
McLeod 6	52,553
McLeod 7	18,113
McLeod 8	44,148
McLeod 9	59,985
McLeod 12	218,880
McLeod 13	45,861
McLeod 16	18,226
McLeod 17	28,654
McLeod 18	10,942
McLeod 20	161,986
McLeod 21	310
McLeod 23	517,767
McLeod 24	199,103
McLeod 25	50,208
McLeod 27	81,149
McLeod 28	7,376

* Note: Compartments with less than 100m^3 conifer volume scheduled are not included in table

6.4 Harvest Area

The area harvested varied throughout the planning horizon. This section shows the area harvested from a number of different attributes such as stratum and age class.

6.4.1 Yield Strata

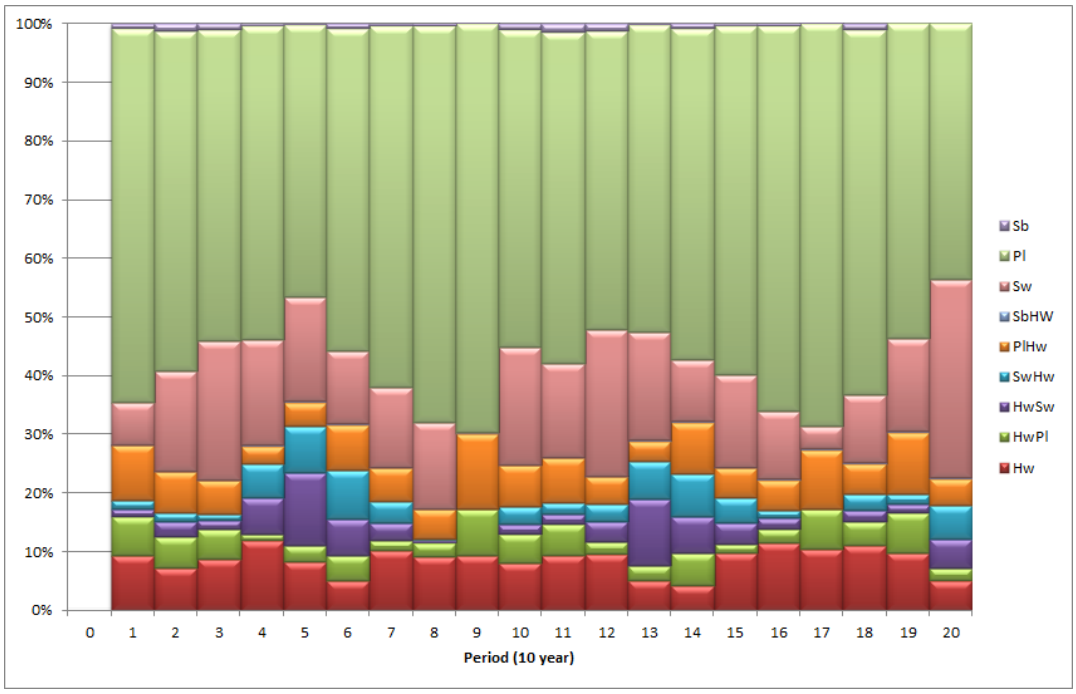
The area harvested by stratum can be seen in Table 23. There is a larger amount of area harvested from 2013 to 2023 than in the remainder of the planning horizon, corresponding to the coniferous reconciliation. Also, there is a slight decrease in the area harvested through periods 3 to 7 (the remainder of the SHS). This decrease is associated with modelled (aspatial) harvest levels not being fully achieved in the SHS (harvest schedule). The area harvested stabilizes after about 100 years (period 10) when a fully managed forest state is close to being achieved.

Figure 5 shows the relative proportion of each stratum in the area harvested during each period. Pine represents most of the area harvested during the first period due to mountain pine beetle susceptibility reduction targets. White spruce represents a greater proportion of the area for the next 2 periods.

Table 23 – Area harvested by yield stratum from HWP PFMS

Period	Yield Class									Total
	Hw	HwPl	HwSw	SwHw	PlHw	SbHW	Sw	Pl	Sb	
1	9,371	6,670	1,264	1,520	9,484	40	7,336	64,051	740	100,476
2	5,867	4,188	2,140	1,212	5,646	15	13,742	46,704	1,053	80,565
3	6,112	3,481	1,056	721	4,128	14	16,505	36,857	765	69,641
4	7,457	664	3,919	3,598	1,912	106	11,306	33,466	194	62,621
5	5,352	1,846	8,116	5,149	2,557	141	11,606	30,267	54	65,087
6	4,121	3,605	5,164	6,841	6,386	141	10,244	45,516	678	82,696
7	7,053	1,225	2,056	2,645	3,951	27	9,499	42,967	222	69,644
8	7,492	1,915	239	202	4,099	15	12,137	54,907	291	81,297
9	7,650	6,501	32	37	10,480	0	100	57,178	0	81,979
10	6,136	3,808	1,200	2,311	5,505	0	15,356	41,294	746	76,356
11	7,068	4,000	1,264	1,529	5,640	40	12,099	42,525	1,058	75,222
12	7,216	1,562	2,697	2,174	3,520	64	18,845	38,501	947	75,525
13	3,801	1,846	8,392	4,842	2,557	61	13,778	39,007	54	74,338
14	3,305	4,141	4,828	5,700	6,666	133	8,081	43,480	678	77,011
15	7,403	1,225	2,754	3,243	3,951	84	12,095	45,507	222	76,485
16	9,115	1,915	1,477	1,028	4,099	71	9,208	51,981	291	79,185
17	7,944	5,136	24	27	7,716	21	2,929	52,249	0	76,046
18	8,152	3,056	1,483	1,994	3,943	11	8,737	46,215	746	74,337
19	7,467	5,249	1,074	1,271	8,158	13	12,099	41,049	0	76,381
20	3,801	1,562	3,793	4,315	3,521	64	25,565	32,982	0	75,602

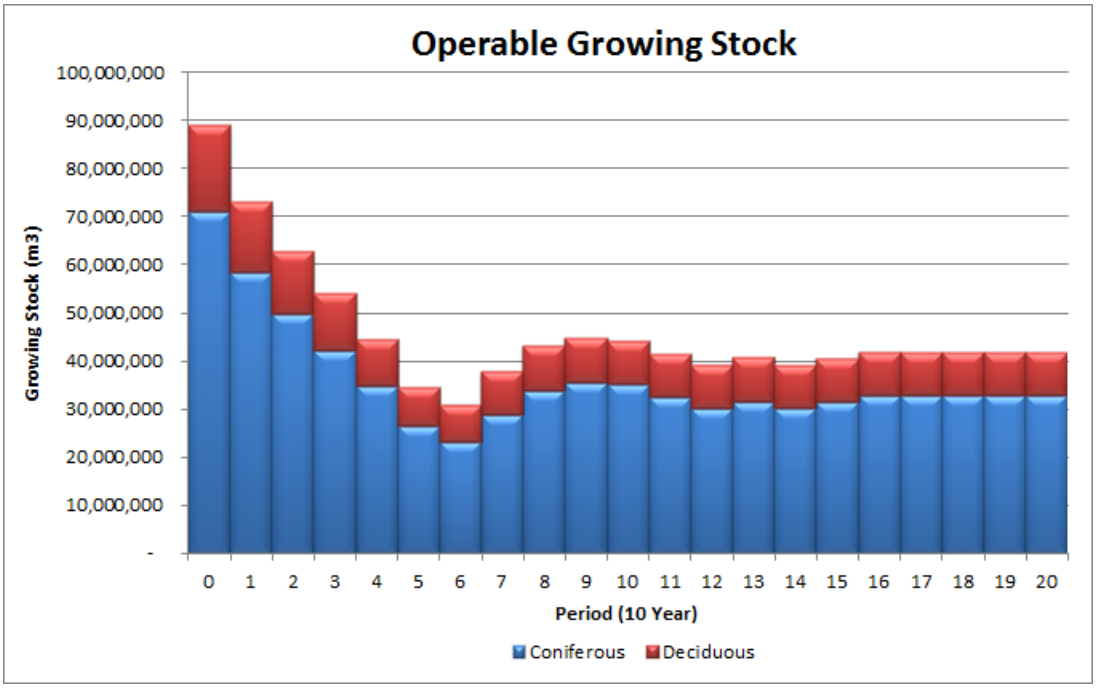
Figure 5 – Relative contribution of each yield stratum to harvested area



6.5 Growing Stock

Growing stock represents all volume on the landbase within forested stands that have managed components (Figure 6). There is an initial decrease over the first 60 years in both coniferous and deciduous growing stock. Volumes gradually increase over the next 30 to 40 years and level out for the remainder of the planning horizon.

Figure 6 – Growing stock by type on the landbase from the HWP PFMS



6.6 Age Class

Figure 7 through Figure 11 demonstrate how the age class distribution changes though the planning horizon. The largest area represented at Time 0 is in the 120 year age class. This area is reduced in the active landbase, but may be seen to continue in the passive landbase as a proportionally large area in the 130, 170 and 220 age classes in successive figures. The age class distribution then stabilizes for the remainder of the planning horizon.

Figure 7 – Age class distribution at Time 0

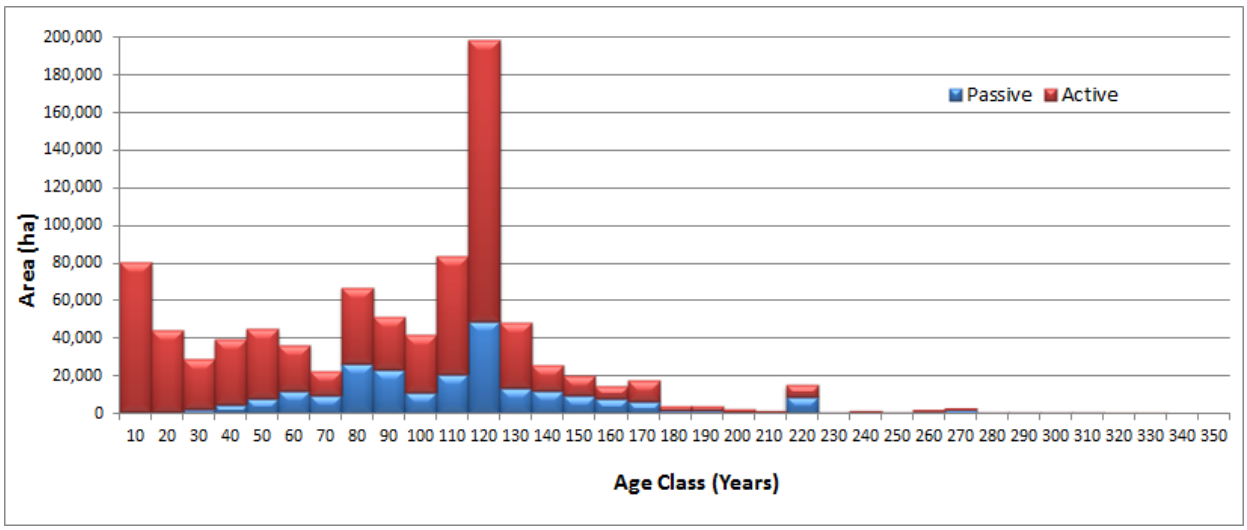


Figure 8 – Age class distribution after Period 1

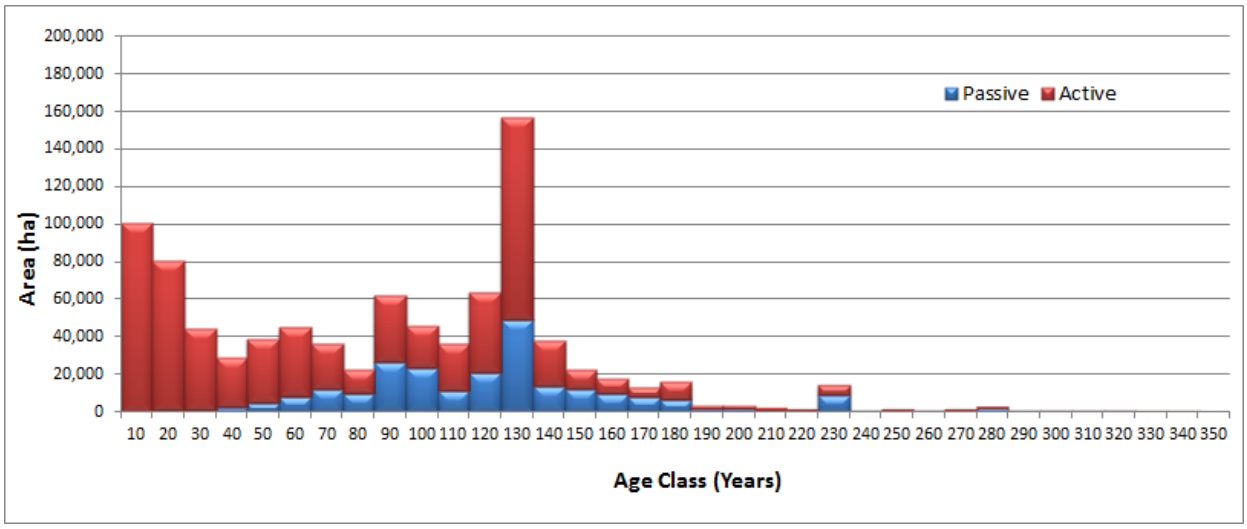


Figure 9 – Age class distribution after 5 periods

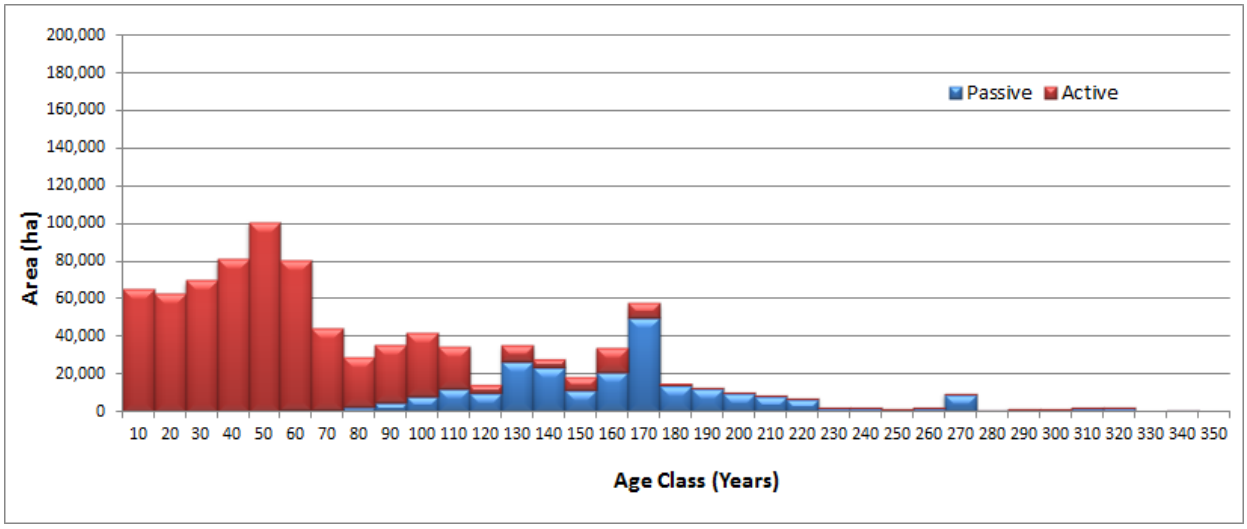


Figure 10 – Age class distribution after 10 periods

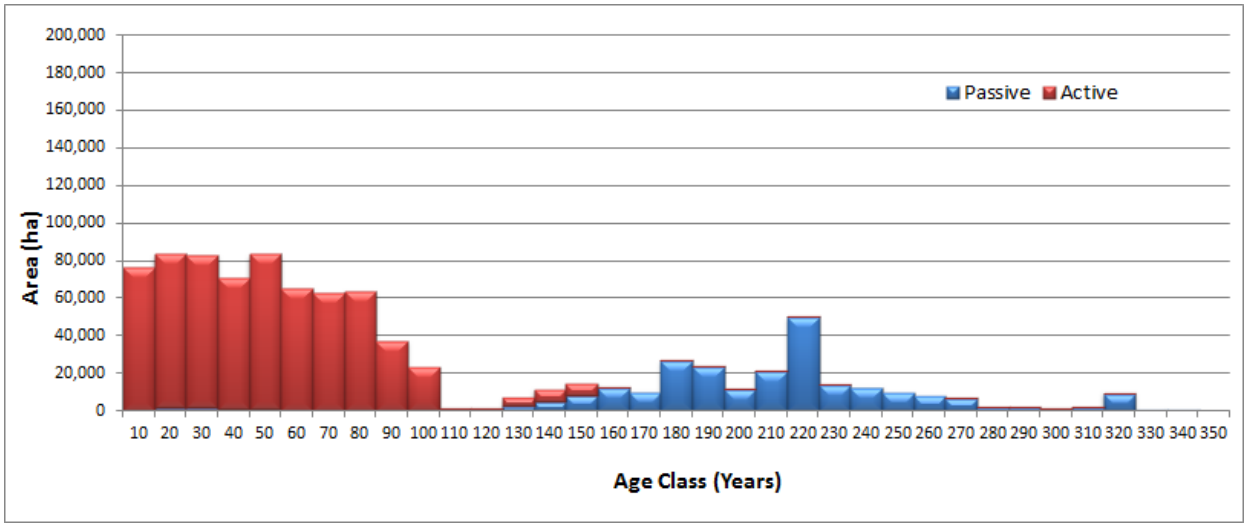
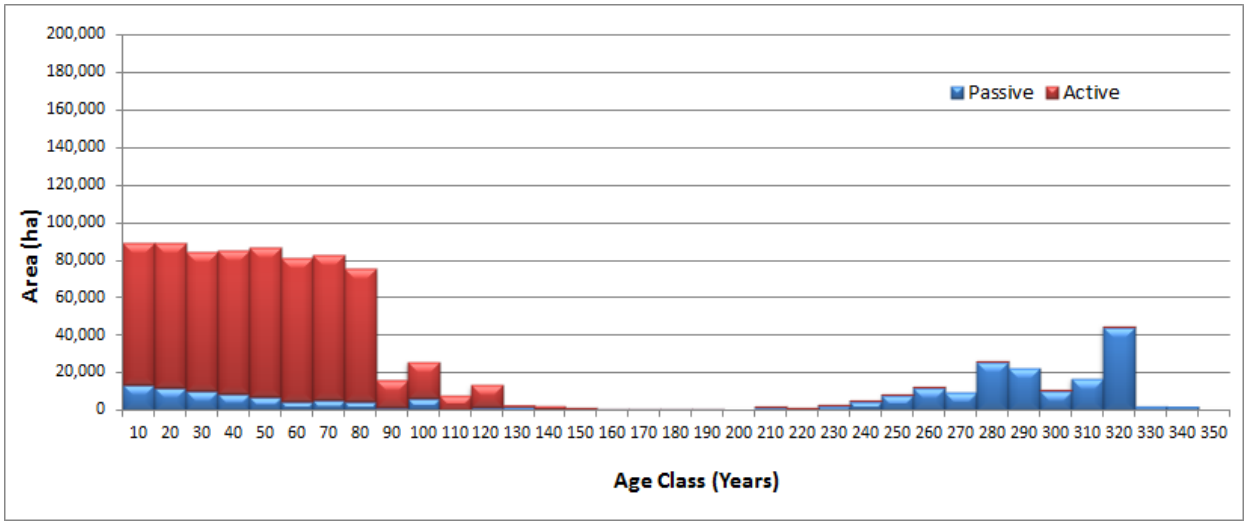


Figure 11 – Age Class Distribution at the end of the Planning Horizon (Period 20)



6.7 Seral Stage

The seral stage distribution on the passive and managed landbase follows similar trends as the age class distribution. The amount of regenerating area on the passive landbase decreases for the first 60 years, then increases over the remainder of the planning horizon; the same general trend is followed by the young seral stage. The area of mature on the passive landbase decreases throughout the planning horizon, with a stabilization in the area towards the end of the planning horizon (Figure 13). The area of early old growth increases from the beginning to middle of the planning horizon and then decreases towards the end of the planning horizon. The area of late old growth increases throughout the planning horizon before beginning to decrease towards the end of the planning horizon.

The active landbase seral stage distribution (Figure 12) differs from the passive landbase. Both the regeneration and young seral stages increase early in the planning horizon then stabilize. The area of mature decreases early in the planning horizon then stabilizes. The area of early and late old growth decreases during the first 80 years then stabilizes for the remainder of the planning horizon.

Figure 12 – Area by seral stage on the active landbase from the HWP PFMS

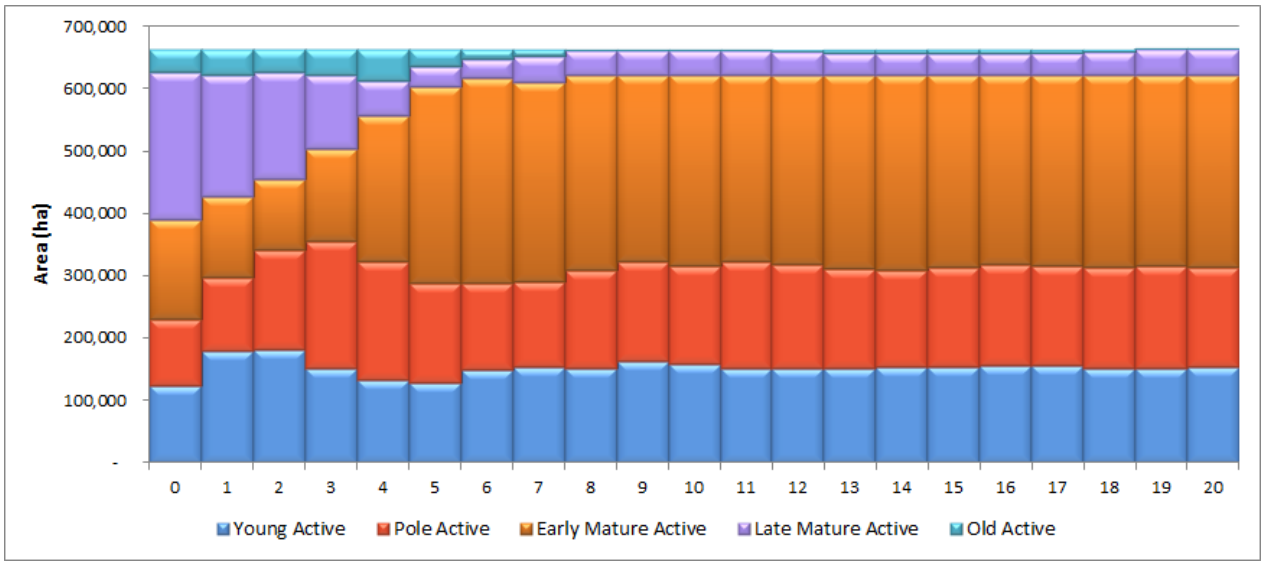
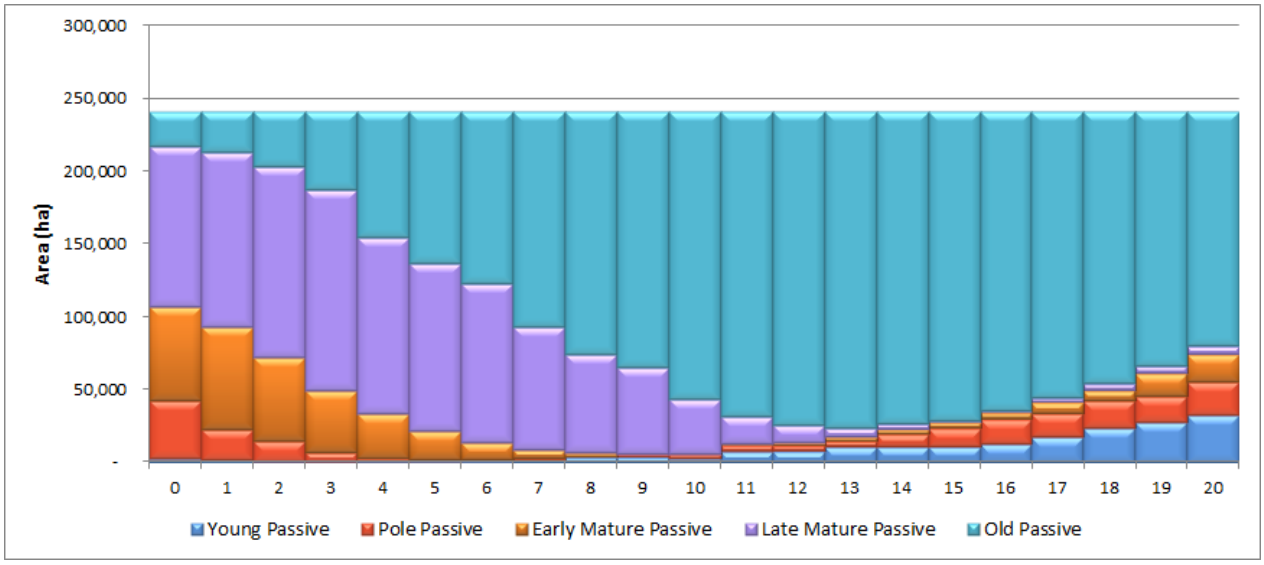


Figure 13 – Area by seral stage on the passive landbase from the HWP PFMS

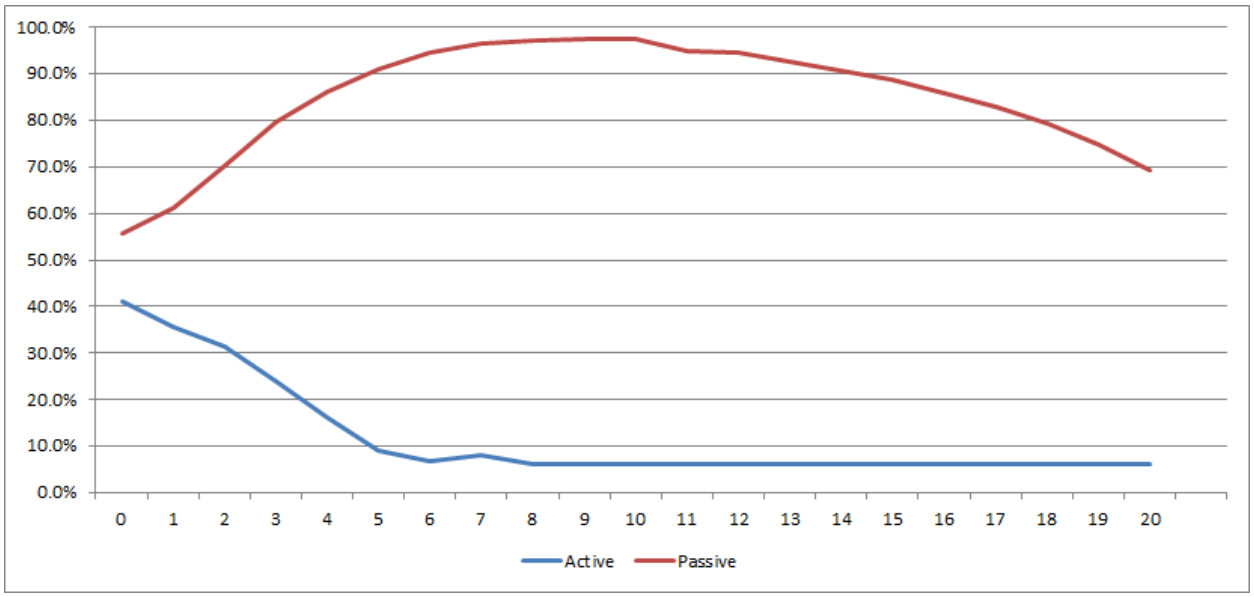


6.7.1 Old Growth

The area of old growth (Late Mature plus Old seral stages) on the active landbase decreases from 41.3% at Time 0 to 6.2% in Period 8 where it remains through the end of the planning horizon.

On the passive landbase, area of old growth (Late Mature plus Old seral stages) steadily increases to a maximum of 97.6% in 100 years after which it begins a constant decline down to 69.3% at the end of the planning horizon. The changes in relative percent are shown in Figure 14.

Figure 14 – Old growth proportions on the landbase from the HWP PFMS



6.8 Riparian Areas

As part of HWP's Riparian Management Strategy, harvesting has been scheduled within areas previously designated as buffers (Table 24). The PFMS shows approximately 5,000 hectares of traditional buffers as being harvested during the first period. It has been agreed that this change in strategy will be implemented gradually in conjunction with a monitoring program. Areas that have been sequenced in the Spatial Harvest Sequence but are not logged will be classified as retention during operational planning.

Table 24 – Riparian areas scheduled for harvest

Period	Riparian Area Accessed (ha)			
	Fluvial	Seepage	Wetland	Traditional Buffer
1	6,420	11,405	458	5,024
2	8,024	11,694	454	5,396
3	7,321	9,513	358	5,377
4	9,050	9,309	476	7,007
5	8,082	8,608	388	4,870
6	4,819	9,295	440	2,632
7	2,414	5,263	310	828
8	2,836	6,506	496	1,347
9	3,849	8,733	386	2,809
10	5,895	10,006	336	3,899
11	7,293	8,177	227	4,880
12	9,550	10,484	586	7,195
13	7,700	9,051	346	4,813
14	4,574	8,673	457	2,763
15	4,686	8,078	468	3,000
16	4,028	7,067	512	2,109
17	4,683	9,515	504	3,382
18	5,739	9,898	252	3,952
19	6,206	8,069	336	4,086
20	7,927	8,841	403	5,628

6.9 Risk Reduction

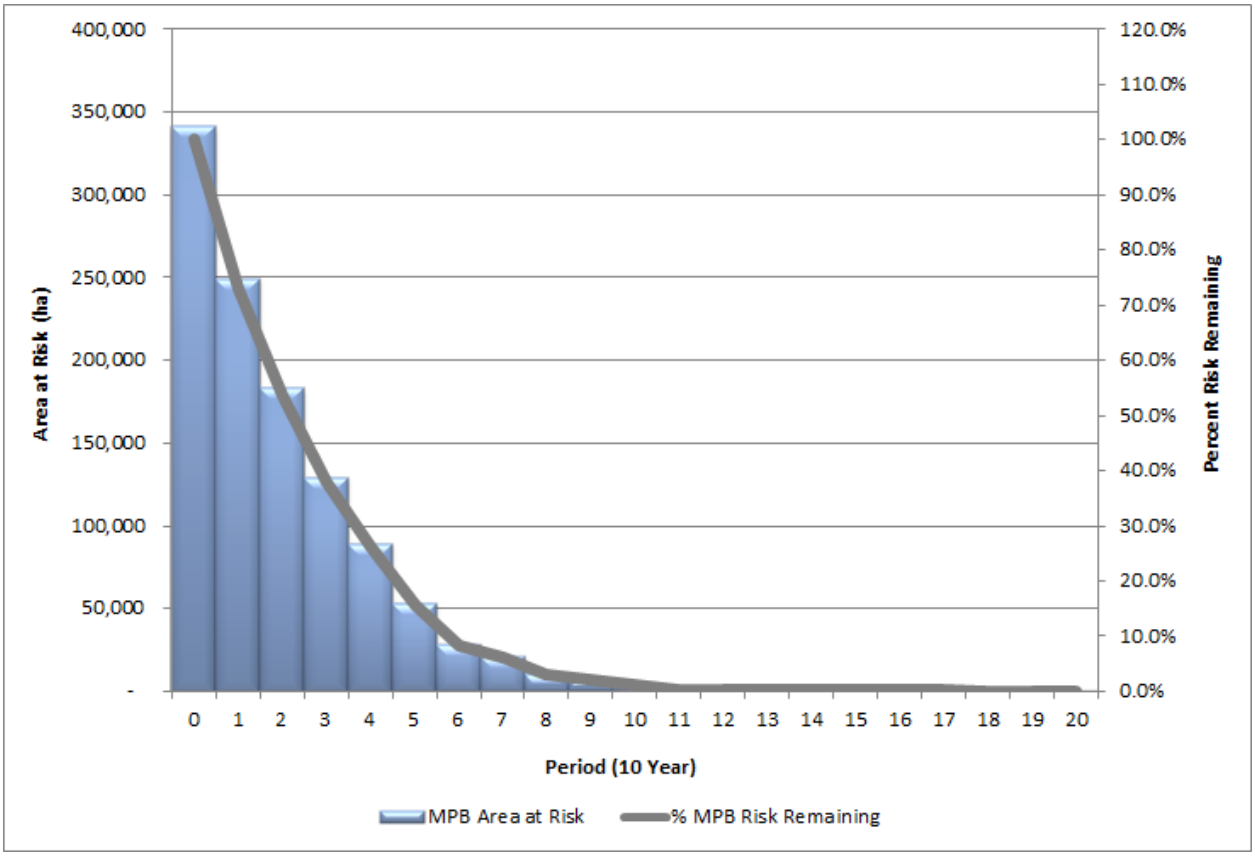
Development of the PFMS included objective functions to address social values in addition to economic and environmental targets. Mature forest in the vicinity of residential developments cause communities to be more at risk to the effects of large wildfires. This potential may be increased when areas of standing dead timber, such as those caused by mountain pine beetle (MPB) infestations, are present. The PFMS addresses both MPB and fire risk.

6.9.1 Mountain Pine Beetle

MPB has been a large component of this FMP. Mountain pine beetle poses a threat to all pine trees in Alberta and possible across the entire boreal forest. The reduction of biological, social and economic risks from MPB is important. The largest effect HWP can have on mountain pine beetle is by reducing the habitat for, and losses from MPB.

Alberta has a ranking system that classifies stands by their ability to produce viable populations of MPB's in one year. The system takes into account three components, climate factor, compartment risk, and stand susceptibility index. Figure 15 shows the area of susceptible stands through time.

Figure 15 – Area of MPB pine on the managed landbase from HWP PFMS



Due to the very large amount of area at the beginning of the planning horizon, it takes several periods to reduce the risk. The goal of reducing MPB susceptible pine stands by 75% after 20 years was not met. Table 25 shows the susceptible pine area and percent of susceptible pine area remaining by period.

After Period 2, there are 182,802 ha of the original 341,166 ha of susceptible pine remaining, representing a reduction of 46.4%. By the end of Period 4, the area of susceptible pine is reduced to 88,932 ha, representing a reduction of 73.9%. The goal of a 75% reduction of susceptible pine took a little more than 40 years to achieve in the PFMS.

Adding the requirement to preserve Late Mature and Old Seral Stages for all yield strata (including pine) has slowed down the reduction of susceptible pine as well. The MPB reduction amount prior to adding the NRV constraints was 52.7% after Period 2, with 161,293 ha of the original 341,166 ha of susceptible pine remaining (Run 14 [HWP_v15]). The goal of a 75% reduction of susceptible pine took between 30 and 40 years to achieve in Run 14.

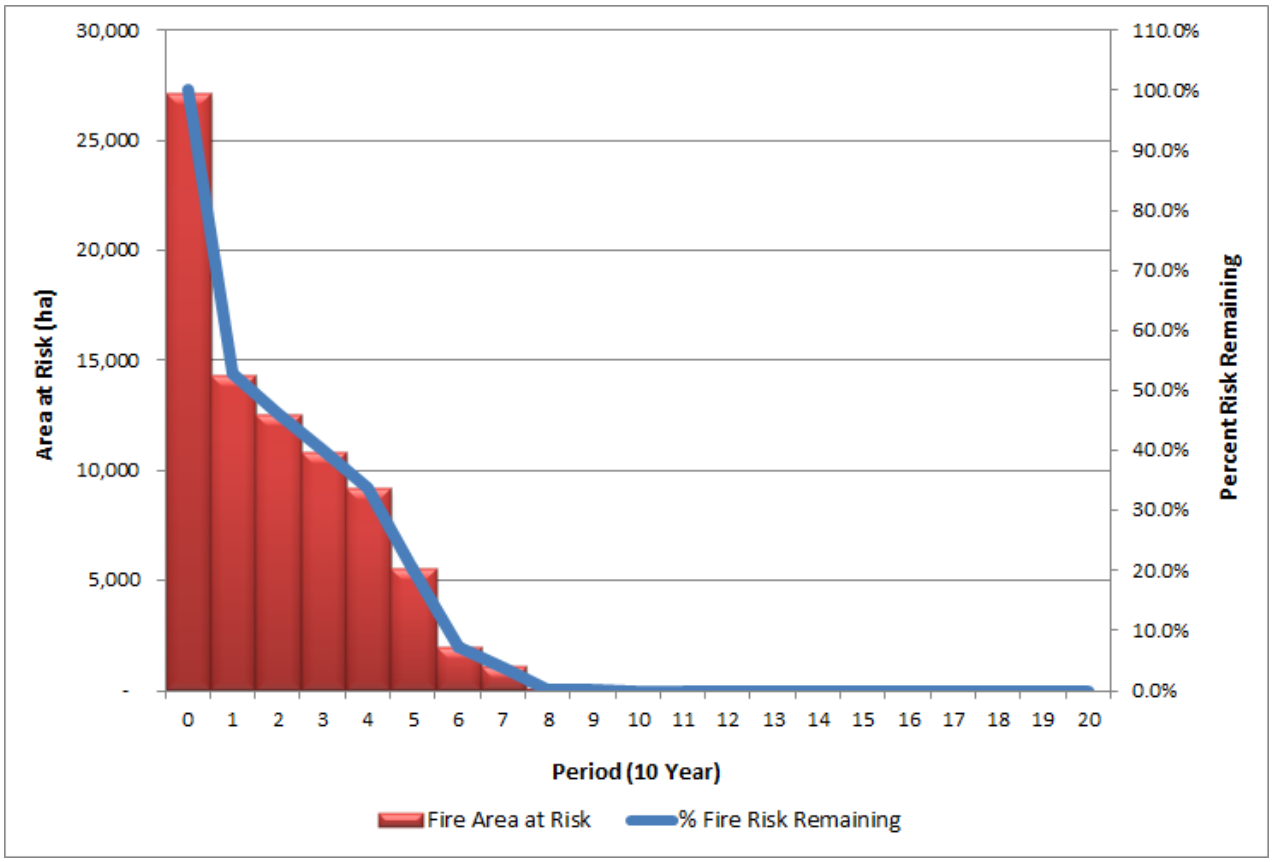
Table 25 – MPB Risk remaining from HWP PFMS

Period	MPB Risk Area (ha)	% MPB Risk Remaining
0	341,166	100.0%
1	249,408	73.1%
2	182,802	53.6%
3	129,093	37.8%
4	88,932	26.1%
5	53,321	15.6%
6	28,350	8.3%
7	20,988	6.2%
8	10,333	3.0%
9	7,272	2.1%
10	4,607	1.4%
11	976	0.3%
12	613	0.2%
13	612	0.2%
14	580	0.2%
15	555	0.2%
16	555	0.2%
17	545	0.2%
18	196	0.1%
19	27	0.0%
20	26	0.0%

6.9.2 Fire Risk

Large areas around communities within the E14 Management Unit have been designated as FireSmart Community Planning Zones. One of the objectives of this plan is to reduce the fire risk within these zones. Figure 16 shows the progress made over the first part of the planning horizon.

Figure 16 – Area of high fire risk in the Community FireSmart Zones from HWP PFMS.



6.10 Improved Stock

HWP currently only undertakes one basic harvest and regeneration regime, a basic clearcut action. Meaning that for each stand harvested there will be only one resulting transition in the TSA model. Subsequent to the clearcutting, all stands are regenerated to their pre-harvest stratum. Improved stock will be deployed as seed becomes available and as harvesting takes place in the corresponding Controlled Parentage Program Region. Table 26 described the area of improved stock that will be deployed by period.

Table 26 – Area of improved stock deployed by period.

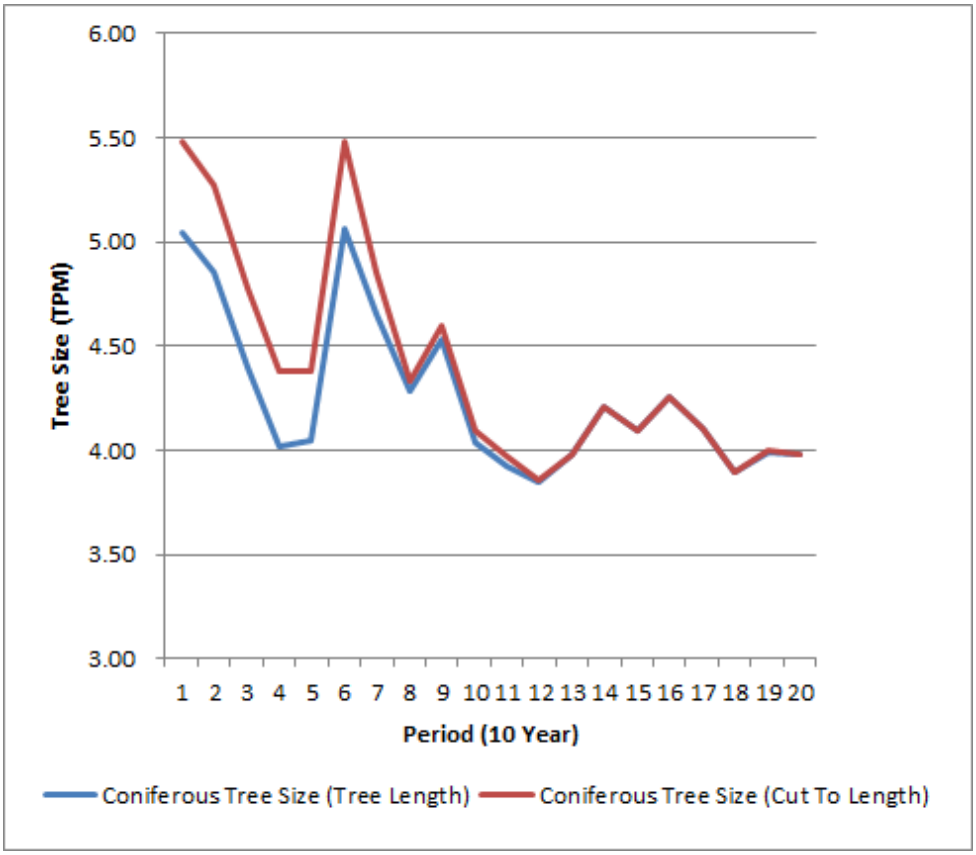
Period	Improved Stock Deployment (ha.)				
	B1	B2	A	I	Total
1	1,500	2,000	1,000	3,635	8,135
2	1,500	3,000	4,000	5,728	14,228
3	1,500	7,000	7,000	5,081	20,581
4	1,500	7,000	7,000	3,351	18,851
5	1,500	7,000	7,000	2,581	18,081
6	1,500	7,000	7,000	494	15,994
7	1,500	7,000	7,000	5,549	21,049
8	1,500	7,000	7,000	6,731	22,231
9	1,500	7,000	7,000	81	15,581
10	1,500	7,000	7,000	5,823	21,323
11	1,500	7,000	7,000	5,379	20,879
12	1,500	7,000	7,000	7,407	22,907
13	1,500	7,000	7,000	2,581	18,081
14	1,500	7,000	7,000	494	15,994
15	1,500	7,000	7,000	5,549	21,049
16	1,500	7,000	7,000	4,079	19,579
17	1,500	7,000	7,000	-	15,500
18	1,500	7,000	7,000	5,823	21,323
19	1,500	7,000	7,000	8,113	23,613
20	1,500	7,000	7,000	7,407	22,907

6.11 Piece Size

Harvest volume is one component of operational considerations when assessing a PFMS. Mills are often designed to optimally run on a certain size distribution of wood. Therefore piece size is an important criterion to consider. The coniferous piece size increases through the first portion of the planning horizon, falling at year 60, gradually recovering over the next 40 years (Figure 17).

Deciduous products currently are all composites, not dependent upon a log profile. Due to this fact as well as the assumed 13.2% cull and the difficulty in predicting deciduous piece size, an estimate has not been included as part of this analysis.

Figure 17 – Coniferous piece size from the HWP PFMS

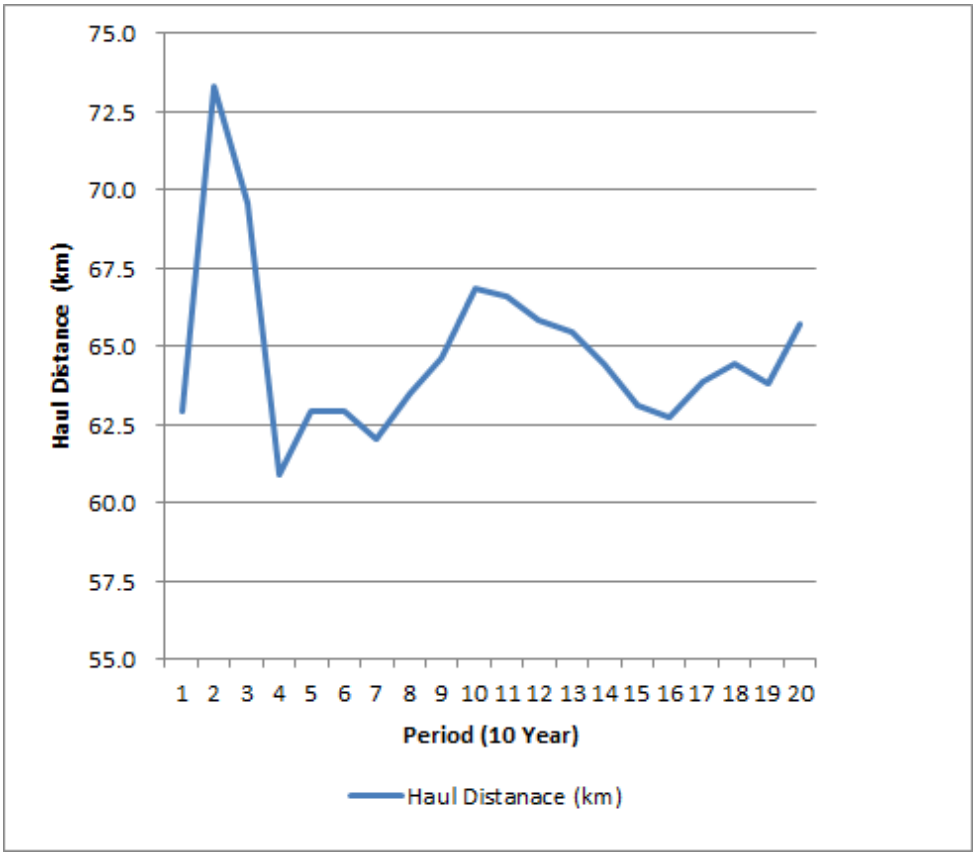


6.12 Haul Distance

Haul distance affects all aspects of forest management. It influences the economic viability of a wood processing facility by affecting the cost of trucking timber to the yard and equipment to the cutblocks for harvesting and site preparation activities. In addition to the per kilometer cost of moving raw material and products, more people are needed as travel time increases. HWP is fortunate that the facility is situated roughly in the center of the landbase. This gives the company the potential to average out haul distance to stabilize costs and staffing requirements.

Average haul distance for the PFMS increases from 62.9 km in Period 1 to 73.3 km in Period 2 before declining below 70 km for the remainder of the planning horizon (Figure 18).

Figure 18 – Haul distance from the HWP PFMS



7. Implementation

HWP was required to undertake a timber supply analysis as part of the 2014 Detailed Forest Management Plan. The timber supply analysis required the development of a large number of inputs and assumptions. Many of these had sensitivity analyses run on them to test the sensitivity of the timber supply model to changes to the inputs and assumptions. There were additional sensitivities completed to test the effect of constraints on the timber supply model. These decisions, inputs, and constraints were all brought together with operational considerations to create a preferred forest management scenario (PFMS), referred to as Scenario 1, which will be operationally implemented through a Spatial Harvest Sequence (referred to as HWP_SHS_V2 and shown in Figure 19).

HWP was also asked to look at the impact of not harvesting within the riparian areas included in the active landbase within watercourse buffers restricted from harvesting by the current HWP Timber Harvest Planning and Operating Ground Rules. An alternate PFMS (referred to as Scenario 2) was developed for Alberta Agriculture and Forestry's consideration and is also described in the following section. HWP prepared a second Spatial Harvest Sequence (referred to as HWP_SHS_V3 and shown in Figure 20) to accompany the alternate PFMS.

7.1 Final Preferred Forest Management Scenario

The preferred forest management scenario (PFMS) is the final product of the timber supply process described in previous sections. The PFMS is created based on a number of assumptions and inputs. It is the result of balancing a large number of targets and indicators in the model to achieve what is believed to be a biologically, socially, and economically viable harvest pattern. HWP wishes to follow this harvest pattern for at least the next 10 years.

Prior to the creation of the PFMS, a number of sensitivity analyses were completed. Issues that were explored included harvest flow constraints, volume commitments, MPB susceptible stand harvest targeting, seral stage targets and spatial harvest constraints. These sensitivities were completed during plan development and were documented in a manner which allows the decision process to be followed. A reconciliation volume is scheduled for logging in the first 2 years of the plan, with a consistent annual volume scheduled for the remainder of the first period. The harvest level drops after the first period once the reconciliation volume has been harvested, then increases after the end of the spatial harvest schedule (year 70). The AAC associated with this PFMS, which is outlined in Table 27, is achieved from a 200-year spatially explicit scenario, of which the first 20 years are referred to as the spatial harvest sequence, and the first 70 years are referred to as the harvest schedule.

In PFMS Scenario 1, the harvest level of coniferous tree length volume from 2013 to 2023 is 1,847,381m³/yr and the deciduous harvest level is 384,997m³/yr for the same period.

In PFMS Scenario 2, the harvest level of coniferous tree length volume from 2013 to 2023 is 1,712,880m³/yr and the deciduous harvest level is 367,043m³/yr for the same period.

Figure 19 - Spatial Harvest Sequence Scenario 1

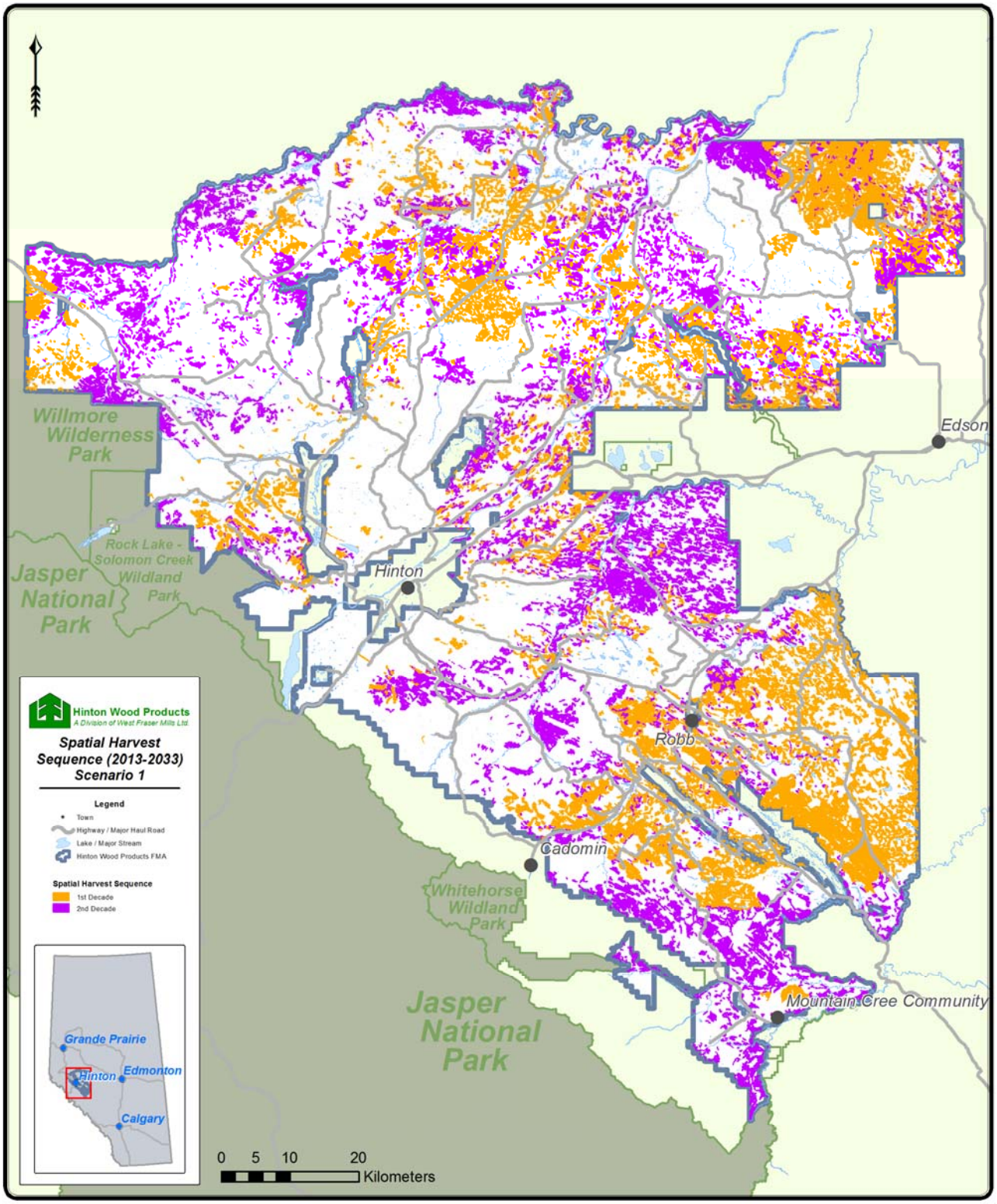


Figure 20 – Spatial Harvest Sequence Scenario 2

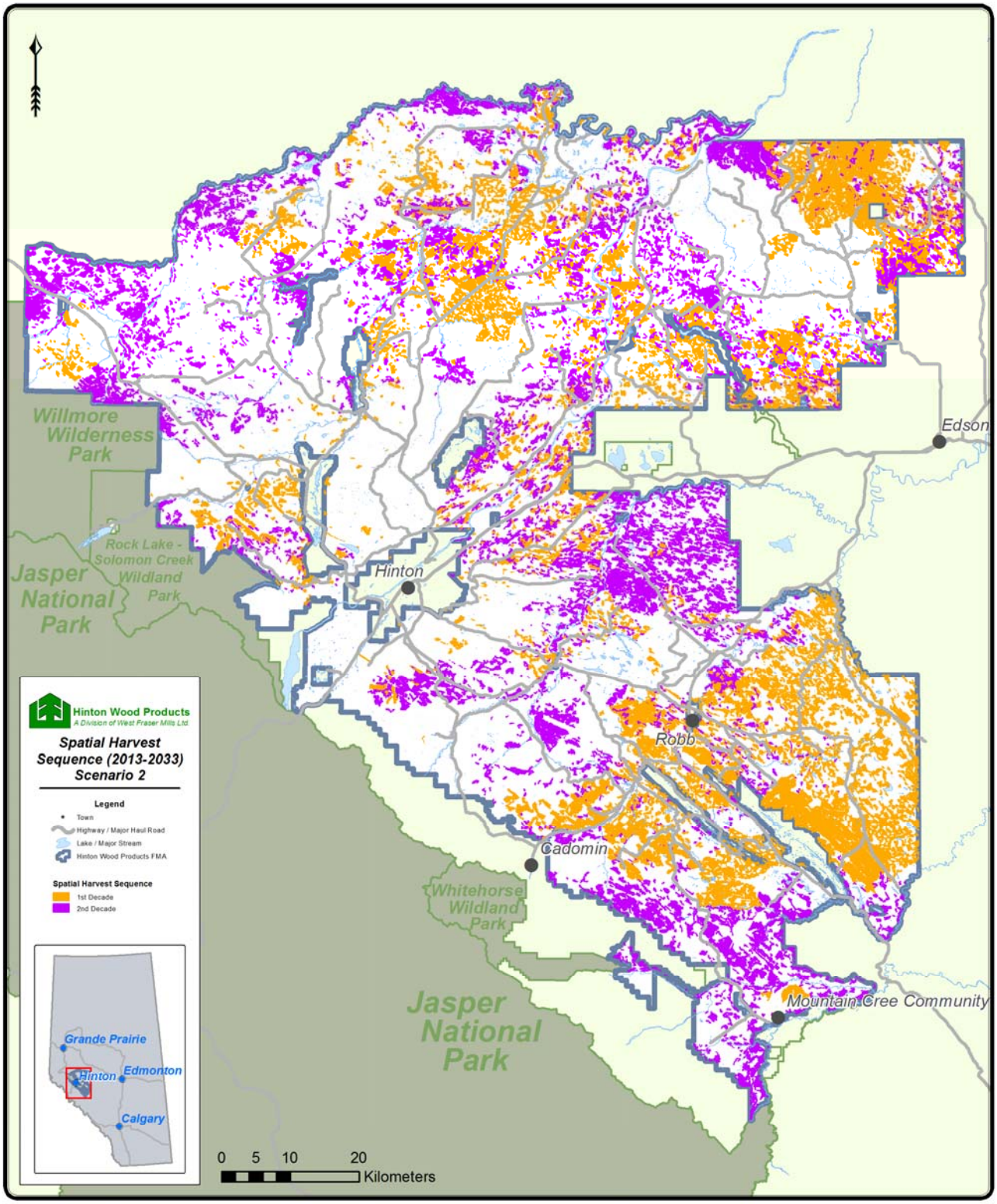


Table 27 – Harvest levels for the Preferred Forest Management Scenario

Scenario 1

Utilization	Period 1				Period 2		Remaining Periods	
	May 2013 - April 2018		May 2018 - April 2023		May 2023 - April 2033		May 2033 - April 2213	
	Conifer	**Decid**	**Conifer**	**Decid**	**Conifer**	**Decid**	**Conifer**	**Decid**
15/11/15/3.76m CTL Conifer 15/10/30/3.66m Decid	1,719,900	358,694	1,823,050	411,301	1,391,109	281,189	1,622,178	308,262
15/11/15/3.76m TL Conifer 15/10/30/3.66m Decid	1,793,546	358,694	1,901,217	411,301	1,449,719	281,189	1,699,202	308,262

Scenario 2

Utilization	Period 1				Period 2		Remaining Periods	
	May 2013 - April 2018		May 2018 - April 2023		May 2023 - April 2033		May 2033 - April 2213	
	Conifer	**Decid**	**Conifer**	**Decid**	**Conifer**	**Decid**	**Conifer**	**Decid**
15/11/15/3.76m CTL Conifer 15/10/30/3.66m Decid	1,604,910	342,734	1,679,312	391,351	1,321,652	268,985	1,536,637	292,595
15/11/15/3.76m TL Conifer 15/10/30/3.66m Decid	1,673,989	342,734	1,751,771	391,351	1,377,530	268,985	1,609,819	292,595

7.2 Spatial Harvest Sequence Summary

The PFMS includes a 20 year Spatial Harvest Sequence (SHS) which HWP will follow until the next TSA is completed. The PFMS also includes the 70 year harvest schedule. The PFMS balances all of the values of the forest to the best of the model's ability given current forest management issues, and the goals of the forest managers and stakeholders involved in the planning process. The PFMS includes coniferous and deciduous reconciliation volumes.

The primary focus of the PFMS and its associated 20 year SHS is to reduce the amount of susceptible pine on the active landbase within the FMA area by 75% over a twenty-year time frame. An accelerated harvest in the first two periods of this TSA attempts to meet this target. However, even with the accelerated harvest, this goal is not met within the 20 year time period as discussed in section 6.9.1 above. The SHS targets the removal of pine, which is at risk of mountain pine beetle attack, in order to reduce the impact of any future MPB outbreaks in terms of biological and economic value.

Table 28, Table 29 and Table 30 summarize the coniferous harvest levels (tree length volume only) and Table 31, Table 32 and Table 33 summarize the deciduous harvest levels as described by the Spatial Harvest Sequence datasets developed within the PFMS Scenarios 1 and 2. The volumes are shown with the reconciliation volume (also referred to as unused volume) included and also removed in order to calculate the average 70 year spatial harvest volume without the reconciliation volume. Note that there is a slight difference in periodic volumes in the following tables compared to previous values reported (Table 27 and earlier) in this document from the Woodstock model. The following volumes were calculated directly on the SHS shapefile areas using a separate process (hence the slight differences).

The coniferous proposed harvest level (tree length volume) for Scenario 1 is 1,416,474m³/year, which is the average of the annual volume for each decade within the spatial harvest schedule after the reconciliation volume is removed. In Scenario 2, the coniferous proposed harvest level (tree length volume) drops to 1,325,556m³/year.

The long term harvest levels show the average annual harvest levels forecast in the Woodstock model after year 70. The coniferous long term harvest level (tree length volume) is 1,827,896m³/year in Scenario 1 and drops to 1,737,106m³/year in Scenario 2.

Table 28 – Summary of proposed coniferous harvest levels for two PFMS Scenarios (Tree Length)

Scenario	Proposed harvest level (m3/yr)	Associated unused volume	Long term harvest level
Scenario 1: PFMS without contributing riparian buffers	1,416,474	2,192,901	1,827,896
Scenario 2: PFMS with contributing riparian buffers	1,325,556	2,192,901	1,737,106

Table 29 – Detailed spatial summary for Scenario 1 (Conifer Tree Length Volume)

Period (10 years per period)	Scheduled periodic volume (m³/decade)	Unused volume (m³)	Scheduled annual volume (m³/year)	Spatial variance reporting (%)	Period within +/- 5% of 70 year spatial average Yes/No
Period 1	18,499,910	2,192,901	1,630,701	15.1%	No
Period 2	14,538,260		1,453,826	2.6%	Yes
Period 3	13,833,906		1,383,391	-2.3%	Yes
Period 4	13,614,966		1,361,497	-3.9%	Yes
Period 5	13,480,886		1,348,089	-4.8%	Yes
Period 6	13,795,469		1,379,547	-2.6%	Yes
Period 7	13,582,679		1,358,268	-4.1%	Yes
70 year spatial average			1,416,474		
Long term aspatial value	18,278,959		1,827,896		

Table 30 - Detailed spatial summary for Scenario 2 (Conifer Tree Length Volume)

Period (10 years per period)	Scheduled periodic volume (m³/decade)	Unused volume (m³)	Scheduled annual volume (m³/year)	Spatial variance reporting (%)	Period within +/- 5% of 70 year spatial average Yes/No
Period 1	17,151,407	2,192,901	1,495,851	12.8%	No
Period 2	13,814,079		1,381,408	4.2%	Yes
Period 3	12,717,585		1,271,758	-4.1%	Yes
Period 4	12,714,447		1,271,445	-4.1%	Yes
Period 5	12,730,939		1,273,094	-4.0%	Yes
Period 6	12,926,067		1,292,607	-2.5%	Yes
Period 7	12,927,319		1,292,732	-2.5%	Yes
70 year spatial average			1,325,556		
Long term aspatial value	17,371,056		1,737,106		

The deciduous proposed harvest level for Scenario 1 is 288,228m³/year, which is the average of the annual volume for each decade within the spatial harvest schedule after the reconciliation volume is removed. In Scenario 2, the deciduous proposed harvest level drops to 274,703m³/year.

The deciduous long term harvest level is 320,063m³/yr in Scenario 1 and drops to 303,308m³/year in Scenario 2.

We did not apply a constraint on the deciduous harvest level variation between periods when we created the SHS. Adding this constraint would have limited our flexibility to effectively schedule coniferous volumes during the duration of the 70 year spatial harvest schedule. After the first period, there is one period in the

harvest schedule (Period 3) in both Scenario 1 and 2 where the deciduous harvest level varies more than 5% from the average harvest level.

In addition, it should be noted that in Scenario 2, HWP constrained the SHS in such a way as to ensure that the "Old + Late Mature" seral stage did not fall below its Natural Range of Variation (NRV) for any of the five cover types modelled in the NRV analysis (see VOIT #1 in the DFMP document for a more in-depth discussion around NRV).

Table 31 – Summary of the proposed deciduous harvest levels for the two variants of the PFMS (m3/yr)

Scenario	Proposed harvest level	Associated unused volume	Long term harvest level
Scenario 1: PFMS without contributing riparian buffers	288,228	386,432	320,063
Scenario 2: PFMS with contributing riparian buffers	274,703	386,432	303,308

Table 32 - Detailed spatial summary for Scenario 1 (Deciduous Volume)

Period (10 years per period)	Scheduled periodic volume (m^3/decade)	Unused volume (m^3)	Scheduled annual volume (m^3/year)	Spatial variance reporting (%)	Period within +/- 5% of 70 year spatial average Yes/No
Period 1	3,853,345	386,432	346,691	20.3%	No
Period 2	2,817,414		281,741	-2.3%	Yes
Period 3	2,574,116		257,412	-10.7%	No
Period 4	2,741,312		274,131	-4.9%	Yes
Period 5	2,857,251		285,725	-0.9%	Yes
Period 6	2,858,932		285,893	-0.8%	Yes
Period 7	2,860,047		286,005	-0.8%	Yes
70 year spatial average			288,228		
Long term aspatial value	3,200,630		320,063		

Table 33 - Detailed spatial summary for Scenario 2 (Deciduous Volume)

Period (10 years per period)	Scheduled periodic volume (m^3/decade)	Unused volume (m^3)	Scheduled annual volume (m^3/year)	Spatial variance reporting (%)	Period within +/- 5% of 70 year spatial average Yes/No
Period 1	3,673,287	386,432	328,685	19.7%	No
Period 2	2,695,072		269,507	-1.9%	Yes
Period 3	2,455,534		245,553	-10.6%	No
Period 4	2,733,309		273,331	-0.5%	Yes
Period 5	2,688,745		268,874	-2.1%	Yes
Period 6	2,720,221		272,022	-1.0%	Yes
Period 7	2,649,457		264,946	-3.6%	Yes
70 year spatial average			274,703		
Long term aspatial value	3,033,083		303,308		

Also shown in Table 29, Table 30, Table 32 and Table 33 are the unused volumes not harvested in HWP's previous 10 year period. HWP is scheduling to harvest this unused volume in the first two years of this plan, with a consistent annual volume scheduled for the remainder of the first period. Therefore, the coniferous AAC being scheduled for the first 10 years of this plan would be 1,849,991m^3/yr for Scenario 1 and 1,715,141m^3/yr in Scenario 2, and the deciduous volume being scheduled for the first 10 years of this plan would 385,335m^3/yr for Scenario 1 and 367,329m^3/yr in Scenario 2. In both scenarios, the harvest level

drops in subsequent periods (periods 2 to 7) before increasing after the end of the spatial harvest schedule (year 70).

Table 34 shows the area and volume summary by Yield Stratum for the first decade of the SHS in Scenarios 1 and 2.

Table 34 – 2013-2023 SHS Stratum Summary

Scenario 1 (HWP_SHS_V2)

Yield Stratum	Area Scheduled for Harvest (ha)	SHS Conifer Volume (15/11/15 CTL m^3)	SHS Conifer Volume (15/11/15 TL m^3)	SHS Deciduous Volume (15/10/15 CTL m^3)
Hwd	9,371	635,073	650,513	1,559,651
Hwd/Pl	6,670	838,518	866,134	609,118
Hwd/Sw	1,264	187,651	191,558	85,938
Sw/Hwd	1,520	268,813	273,288	103,053
Pl/Hwd	9,484	1,240,347	1,278,507	933,476
Sb/Hwd	40	7,009	7,132	2,759
Sw	7,336	1,345,120	1,392,982	37,830
Pl	64,051	13,093,385	13,704,963	517,255
Sb	740	130,216	134,835	4,266
Total	100,476	17,746,131	18,499,910	3,853,345

Scenario 2 (HWP_SHS_V3)

Yield Stratum	Area Scheduled for Harvest (ha)	SHS Conifer Volume (15/11/15 CTL m^3)	SHS Conifer Volume (15/11/15 TL m^3)	SHS Deciduous Volume (15/10/15 CTL m^3)
Hwd	9,133	618,855	633,896	1,519,932
Hwd/Pl	6,409	805,910	832,428	585,696
Hwd/Sw	1,175	174,023	177,652	79,820
Sw/Hwd	1,332	233,901	237,820	90,164
Pl/Hwd	8,860	1,157,985	1,193,617	871,454
Sb/Hwd	37	6,440	6,555	2,559
Sw	5,530	994,489	1,029,762	30,206
Pl	60,639	12,343,505	12,922,475	489,706
Sb	647	113,184	117,203	3,750
Total	93,762	16,448,290	17,151,407	3,673,287

7.3 Factors with Operationalizing the SHS Implementation

There are several known issues, challenges, and factors that were considered around the operationalization of the spatial harvest sequence (SHS). Following is a description of the most significant:

Lack of conifer understory identification within conifer dominated stand types:

When implementing this beetle-focused DFMP and any subsequent salvage harvest operations (of dead MPB killed trees) the maintenance of non-pine species on the FMA will contribute significantly to volume availability after pine salvage operations are halted and before regenerating pine stands become merchantable again (i.e. mid-term timber supply). AVI identification of non-pine species, particularly in the understory, is difficult. Pine

stands identified in the SHS which, during layout, turn out to have a thrifty non-pine coniferous understory may be deferred from harvest. This will affect the accuracy and variance of the SHS.

Stand heights, species composition and level of resolution

The coarseness of the inventory specification provides challenges for operational implementation of the SHS. Within stands, height and species composition variability may be problematic, particularly when striving for mitigation of MPB risk. Stands, or portions thereof, with significant non-pine conifer composition may be deferred to later in the SHS to mitigate any potential mid-term timber supply fall down.

Mountain Pine Beetle Attack

Recent events have demonstrated that MPB spread patterns are not predictable. 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 continue to be prioritized for harvest.

Mountain Pine Beetle Susceptibility

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:

- Stands with total merchantable stem density less than 650 or greater than 1,500 stems/ha.
- Stands with ≥ 30 % non-merchantable (excluding understory).
- Stands with few pine sawlogs. 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.
- Young and very old pine stands. MPB reproduction success tends to be lower in these stands. Target stand ages will be 80-150 years old.

HWP's Riparian Management Strategy

The Riparian Management Strategy (RMS), a component of the Natural Disturbance Strategy proposed in the DFMP, is being implemented gradually over the term of this plan. After submission of the DFMP in October 2014, HWP was also told by Alberta that at this time the RMS could not be implemented in any streams identified as Athabasca rainbow trout (ARTR) streams or identified as having ecologically significant ARTR habitat.

This means that some riparian areas close to streams or waterbodies that were part of the operable landbase (and therefore in this TSA) may not currently be eligible for harvest. These areas will be assessed on a case-by-case basis as implementation of the RMS occurs. Some areas may be deferred from harvest until the RMS is finalized, while others may not ever be harvested.

Riparian areas that that are being harvested and have a separate silvicultural prescription from the associated block may be tracked separately (depending on the prescription). HWP has yet to work out these details and will need to work with Alberta to do this as there currently is no silviculture administrative system in place to track partial cutting.

Minimum Block Size

The minimum block size allowed by the model was two hectares, and the target block size was 40 hectares.

Access

Before running the model, decisions were made by HWP staff to not go into, or to go into, certain compartments for access reasons (e.g. caribou, grizzly bears, Aboriginal issues, etc.); however, the model itself had no access related restrictions (e.g. there was no restriction that available wood had to be within a certain distance from a road).

Steep Slopes

Any slope above 45% was excluded from the landbase (and thus this timber analysis). LiDAR data were used to delineate areas greater than 45%. These areas were then buffered 75 m to capture areas that are inaccessible.

7.4 Variance Tracking

Variance to the approved SHS will be tracked as per the current requirements of Alberta. Trends in deferrals and deletions will be used to help develop a new landbase and SHS for the next Forest Management Plan.

8. References

Alberta Sustainable Resource Development. 2006. *Alberta Forest Management Planning Standard Version 4.1 – April 2006*. Forest Management Branch, Public Lands and Forest Division, Alberta Sustainable Resource Development, Edmonton, Alberta.

FORTRENDS Consulting Inc. 1990. Results from a study of defect in aspen trees. Prepared for Weldwood of Canada, Hinton Alberta. TMT File No. 2661. TMT Report No. R9055. November 3, 1990.

Hinton Wood Products.2014a. *Development of the Landbase for the 2014 DFMP*. Prepared September 30, 2014 in support of the Detailed Forest Management Plan for Hinton Wood Products, a division of West Fraser Mills Ltd. Hinton, Alberta.

Hinton Wood Products.2014b. *Yield Analysis for the 2014 DFMP*. Prepared September 30, 2014 in support of the Detailed Forest Management Plan for Hinton Wood Products, a division of West Fraser Mills Ltd. Hinton, Alberta.

Jones, A.J. 2013. *An Ecosystem-Based Riparian Management Strategy*. Prepared by Aaron Jones, Hinton Wood Products, December 2013 in support of the Detailed Forest Management Plan for Hinton Wood Products, a division of West Fraser Mills Ltd. Hinton, Alberta.

Appendix 1 Approved Genetic Gains

Alberta Agriculture and Forestry

Forestry Division
Forest Management Branch
7th floor, Great West Life Building
9920 – 108 Street
Edmonton, Alberta T5K 2M4
Canada
Telephone: 780-427-8474
www.agriculture.alberta.ca

File: 06322-F02 04
06322-R01 01

June 9, 2015

Ms. Pat Golec
Forestry Manager
Edson & Hinton Woodlands
756 Switzer Drive
Hinton AB T7V 0A2

Dear Ms. Pat Golec:

Subject: APPROVED HEIGHT GENETIC GAINS FOR HINTON WOOD PRODUCTS DETAILED FOREST MANAGEMENT PLAN 2014

In your letter dated February 19, 2015, West Fraser Mills (WFM) Ltd applied for approval of a 2 percent height genetic gain accruing from its planned deployment of genetically improved seed. Subsequent follow up by Agriculture and Forestry showed that the requested genetic gain is based on controlled parentage program (CPP) plans where WFM is either a proponent (Region A, B2 and I) or a seed buyer (Region B1). These CPP plans are listed below with clarification.

Region A with seed orchard G801

This lodgepole pine program started as provenance trial series in which two (G800A & G800B) of the six trials retained a family structure which allows for prediction of breeding values and expected genetic gain. On September 30, 2011, the Reforestation Section (Forest Management Branch) and Hinton Wood Products (HWP) Ltd held a discussion on the possibility of using the two trials for genetic analysis to allow HWP to claim genetic gain on the phase I seed orchard. Two conditions are essential for approving genetic gain from the G801 seed orchard as listed below:

i. In calculating genetic gain, families from outside the CPP region that may be in the seed orchard (Sally and Diane indicated very few are present) will be included only if they performed well at the Athabasca site (G800A); the test site located within the CPP region.
ii. Families in the orchard production population which have not been tested in the Athabasca test will be assigned a breeding value of "0" until their genetic values are confirmed from a new trial series (Phase 4)

Following these agreements, the Forest Management Branch (FMB) did the analysis and provided HWP with the breeding values for all families included in the trials. After confirming that in calculating genetic gain HWP has abided by previous agreements on the use of these breeding values, the height genetic gain of 2 percent is hereby approved by FMB.

.../2

Region B2 with seed orchard G303

This is a lodgepole pine program in which superior parent trees were selected and grafted into the seed orchard. According to the Alberta Forest Genetic Resource Management and Conservation Standards (FGRMS), trees selected by a comparison tree method and grafted into the seed orchard are eligible for a 2 percent height genetic gain in addition to gain from the breeding values that are predicted from the progeny trial. Given that WFM has not applied for genetic gain beyond the parent tree selection phase, the height gain of 2 percent is hereby approved by FMB

Region I with seed orchard G333

This is a white spruce program in which superior parent trees were selected and grafted into the seed orchard. According to the Alberta Forest Genetic Resource Management and Conservation Standards (FGRMS), trees selected by a comparison tree method and grafted into the seed orchard are eligible for a 2 percent height genetic gain in addition to gain from the breeding values that are predicted from the progeny trial. Given that WFM has not applied for genetic gain beyond the parent tree selection phase, the height gain of 2 percent is hereby approved by FMB

Region B1 with seed orchard G303

As previously stated, WFM has applied for genetic gain due to its purchase of Region B1 seed (seed orchard G147) from Canadian Forest Products (Canfor) Ltd. Although WFM has applied for approval of a 2 percent height genetic gain, Canfor has an existing height genetic gain approval of 4.0 percent for the G147 lodgepole seed orchard. Therefore, to be consistent with the genetic gain approval between the seed seller and seed buyer, 4.0 percent height genetic gain approval is hereby extended to WFM and approved by FMB.

Please note that the height genetic gains approved in this letter are specific to the named seed orchards and the conditions the seed orchards were in at the time of the current approval (G801, G303 and G333) or original approval (G147) even if the composition of the seed orchard may have since changed in a manner that increase expected genetic gain. If at any time in the future the expected genetic gains from these seed orchard change due to removal from and/or addition of trees into the orchard, WFM shall submit the application for review and approval of new genetic gain expectations prior to using those values in the DFMP.

Yours truly,

Robert J. Popowich, RPF
Senior Manager, Forest Resource Management Section

cc: Diane Renaud, West Fraser Mills
Erica Samis, Senior Manager, Forest Health & Adaptation, FMB
Deogratias Rweyongeza, Senior Geneticist, ATISC, FMB
Darren Aitken, Manager, Forest Biometrics, FMB
Donna Palamarek, Acting Site Manager, ATISC, FMB
Seena Handel, Forest Resource Management Lead, FMB

Appendix 2 SHS Variance

Table 3. Spatial Harvest Sequence Variance

Compartment	Additions	Deletion	Variance
Athabasca 1	-	2,388.0	-
Athabasca 3	0.1	0.2	-
Athabasca 15	118.3	649.4	611.3
Athabasca 16	0.3	0.0	-
Athabasca 19	3.1	109.0	33.4
Athabasca 21	-	0.0	-
Athabasca 22	56.5	522.9	180.6
Athabasca 23	-	0.4	-
Athabasca 24	-	2,314.7	-
Athabasca 26	60.1	1,568.4	1,042.4
Athabasca 27	31.5	1,430.8	610.2
Athabasca 28	41.6	2,359.8	221.1
Athabasca 29	-	814.1	-
Athabasca 30	0.9	2,511.2	62.0
Athabasca 31	-	975.3	-
Athabasca 35	74.5	1,216.4	360.7
Berland 4	0.1	-	-
Berland 6	8.5	54.3	277.6
Berland 7	0.4	2.5	31.8
Berland 9	41.7	449.0	101.0
Berland 10	21.5	2.2	261.0
Berland 11	58.0	43.7	1,219.6
Berland 12	80.7	75.1	1,022.7
Berland 18	16.3	1.4	119.8
Berland 22	249.3	0.6	-
Berland 23	-	3,447.2	-
Berland 24	0.3	8.3	-
Berland 25	66.6	646.5	380.5
Berland 26	0.1	1,458.7	-
Berland 27	-	665.4	-
Berland 29	208.7	1,245.2	848.9
Berland 30	171.4	1,431.1	712.6
Berland 31	0.0	1.0	-
Berland 33	38.6	1,208.5	253.7
Berland 34	-	0.0	-
Embarras 3	-	9.1	-
Embarras 4	-	13.8	-
Embarras 5	-	0.7	-
Embarras 6	-	1,429.9	-
Embarras 7	122.9	1,933.2	856.0
Embarras 8	224.4	0.1	5.6
Embarras 9	38.4	9.0	76.7
Embarras 10	25.4	2,111.0	49.3
Embarras 11	21.3	1,736.7	163.8
Embarras 12	-	2,891.0	-
Embarras 14	-	0.3	-
Embarras 20	8.1	4,955.1	268.7
Marlboro 2	70.0	887.5	214.8
Marlboro 4	90.7	4,590.6	345.5
Marlboro 5	96.7	1,049.8	212.7
Marlboro 6	42.5	-	-
Marlboro 7	31.0	0.8	-
Marlboro 8	2.7	492.1	58.8
Marlboro 10	428.5	-	-
Marlboro 13	404.2	3,159.0	738.2
Marlboro 16	504.5	3,097.6	540.3
Marlboro 17	4.5	623.1	112.7
Marlboro 18	240.4	1,943.6	4.2
Marlboro 19	110.9	-	-
Marlboro 20	1.0	0.2	-
Marlboro 21	-	1,921.3	-
Marlboro 22	13.0	331.9	198.9
McLeod 2	-	6.3	-
McLeod 3	-	3,893.6	-
McLeod 4	1.6	1.1	1.0
McLeod 5	21.9	1,420.1	433.5
McLeod 6	0.2	211.8	-
McLeod 7	8.7	1,092.8	98.8
McLeod 8	107.1	472.2	-
McLeod 9	0.2	4.8	-
McLeod 10	-	0.0	-
McLeod 12	315.6	1,685.0	489.7
McLeod 13	-	746.0	-
McLeod 15	-	0.1	-
McLeod 16	32.4	139.0	46.8
McLeod 17	50.2	865.9	255.2
McLeod 18	62.8	1.1	34.1
McLeod 20	-	1,216.0	-
McLeod 21	-	0.3	-
McLeod 23	11.0	2,167.5	71.1
McLeod 24	-	1,154.2	-
McLeod 25	168.9	0.1	19.7
McLeod 27	36.5	775.5	317.7
McLeod 28	25.4	-	-
	4,672.9	76,642.0	13,964.9

Appendix 3 Strata Description Table for SHS Periods 1 & 2

Strata Description Table for Periods 1 & 2 of the HWP PFMS

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
Athabasca 1																																	
7 - Sw						0.1		0.2	0.3	13.8		41.2	68.3	27.6	75.4						13.4												240.2
8 - Pl				1.0		0.3	0.1	4.8	23.3	45.5	89.0	646.6	73.6	167.1	91.5	0.8				7.8		0.0											1,151.3
Athabasca 1 Total				1.0		0.4	0.1	4.9	23.6	59.2	89.0	687.8	141.9	194.7	166.9	0.8				7.8	13.4	0.0											1,391.5
Athabasca 2																																	
1 - Aw											29.4	15.8																					45.1
2 - Hw/Pl												0.2																					0.2
5 - Pl/Hw								17.2				10.7																					27.9
7 - Sw								50.5				34.4																					84.9
8 - Pl								31.8				310.2																					342.0
Athabasca 2 Total								99.5			29.4	371.2																					500.1
Athabasca 3																																	
1 - Aw											4.0																						4.0
5 - Pl/Hw								12.5				16.2																					28.7
7 - Sw								7.0	0.4			11.7		9.4																			28.6
8 - Pl			0.2	1.0	49.9	7.9		0.3	0.7			35.2			0.7																		95.6
9 - Sb														0.1																			0.1
Athabasca 3 Total			0.2	1.0	49.9	7.9		19.8	1.1		4.0	63.1		9.6	0.7																		157.0
Athabasca 6																																	
7 - Sw								78.8				2.8																					81.6
Athabasca 6 Total								78.8				2.8																					81.6
Athabasca 8																																	
1 - Aw										33.9	8.1	53.3																					95.4
2 - Hw/Pl									4.5	29.0		43.9																					77.4
3 - Hw/Sw								9.1																									9.1
5 - Pl/Hw								52.3				7.5																					59.8
7 - Sw								1.6		5.3				5.6																			12.4
8 - Pl								4.3			11.1	3.7																					19.1
Athabasca 8 Total								67.3	4.5	68.3	19.2	108.3		5.6																			273.1
Athabasca 9																																	
2 - Hw/Pl										8.7		1.2																					9.9
3 - Hw/Sw								23.9																									23.9
4 - Sw/Hw								16.7																									16.7
5 - Pl/Hw								21.8	0.3			8.1																					30.2
7 - Sw								23.7			6.3	8.0																					38.0
8 - Pl								9.6	2.0																								11.6
Athabasca 9 Total								95.7	2.4	8.7	6.3	17.3																					130.4
Athabasca 10																																	
1 - Aw									15.2																								15.2
2 - Hw/Pl								5.1	10.4	77.3																							92.8
3 - Hw/Sw								13.1																									13.1
4 - Sw/Hw					1.9																												1.9
5 - Pl/Hw								1.8	7.3	35.7																							44.8
7 - Sw											6.6	18.9		13.4																			38.9
8 - Pl								7.8	28.1																								35.9
Athabasca 10 Total					1.9			27.8	60.8	113.1	6.6	18.9		13.4																			242.5
Athabasca 11																																	
2 - Hw/Pl								4.5																									4.5
5 - Pl/Hw								0.0																									0.0
Athabasca 11 Total								4.5																									4.5
Athabasca 12																																	
7 - Sw												22.2																					22.2
8 - Pl												5.6																					5.6
Athabasca 12 Total												27.8																					27.8
Athabasca 13																																	
3 - Hw/Sw				1.3	0.0																												1.3
7 - Sw			0.1		0.0			0.2																									0.4
8 - Pl					0.3																												0.3
Athabasca 13 Total			0.1	1.3	0.3			0.2																									1.9
Athabasca 14																																	
7 - Sw				0.2																													0.2
8 - Pl				0.2																													0.2
Athabasca 14 Total				0.4																													0.4
Athabasca 15																																	
1 - Aw											21.7			13.8																			35.5
2 - Hw/Pl										12.4																							12.4
4 - Sw/Hw								13.0																									13.0
5 - Pl/Hw									12.5	6.2		100.1																					118.9
8 - Pl										11.5	0.2	39.3	0.1																				51.1
9 - Sb											0.0																						0.0
Athabasca 15 Total								13.0	12.5	30.1	22.0	139.4	13.9																				230.9
Athabasca 16																																	
7 - Sw				0.1	0.0																												0.1
Athabasca 16 Total				0.1	0.0																												0.1
Athabasca 17																																	
1 - Aw								3.6	9.2		5.0																						17.8
2 - Hw/Pl									37.8																								37.8
5 - Pl/Hw									15.1			0.7																					15.8
8 - Pl									4.7																								4.7
Athabasca 17 Total								3.6	66.7		5.0	0.7																					76.0

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
Athabasca 18																																	
1 - Aw										64.2																							64.2
2 - Hw/Pl										93.3																							93.3
3 - Hw/Sw								63.5																									63.5
4 - Sw/Hw								48.8																									48.8
5 - Pl/Hw								11.6	19.6																								31.2
7 - Sw																							7.9										7.9
8 - Pl								59.9																									59.9
Athabasca 18 Total								183.8	19.6	157.5													7.9										368.8
Athabasca 19																																	
5 - Pl/Hw			0.1																														0.1
7 - Sw												1.7	0.1																				1.8
8 - Pl			0.0		0.0						27.7	31.0																					58.7
9 - Sb											0.0		2.2																				2.2
Athabasca 19 Total			0.1		0.0						27.7	32.6	2.3																				62.8
Athabasca 20																																	
3 - Hw/Sw					0.1																												0.1
4 - Sw/Hw												0.2																					0.2
5 - Pl/Hw					0.2							17.2																					17.4
8 - Pl			1.7					0.1				4.6																					6.4
9 - Sb								0.8				0.3																					1.1
Athabasca 20 Total			1.7		0.3			0.9				22.3																					25.2
Athabasca 21																																	
1 - Aw				1.8					19.6	29.2	21.2	105.0																					176.8
2 - Hw/Pl								15.7	37.3	34.9		40.2																					128.1
5 - Pl/Hw									17.9	57.1		6.7																					81.7
Athabasca 21 Total				1.8				15.7	74.8	121.2	21.2	152.0																					386.6
Athabasca 22																																	
1 - Aw									15.2		45.0	35.2	10.1																				105.4
2 - Hw/Pl								1.5	24.3	7.9		42.9																					76.6
3 - Hw/Sw																	0.0																0.0
5 - Pl/Hw		1.1	0.5					6.5	7.1	100.0	14.0	32.4																					161.7
6 - Sb/Hw												0.0																					0.0
8 - Pl			0.6							0.1	70.1	98.0																					168.7
9 - Sb											0.2	0.2			0.0																		0.4
Athabasca 22 Total		1.1	1.1					8.1	46.5	108.0	129.3	208.6	10.1		0.0		0.0																512.8
Athabasca 24																																	
1 - Aw												5.6			1.8																		7.3
2 - Hw/Pl												23.3			13.5																		36.7
5 - Pl/Hw											12.3	104.2	89.8		31.1																		237.4
7 - Sw								3.4			22.6	30.2	14.7		61.1	7.8	25.2		2.0	11.5													178.6
8 - Pl								13.2	0.1		746.9	1,457.2	226.8		38.0		10.5																2,492.7
9 - Sb												2.1																					2.1
Athabasca 24 Total								16.6	0.1		781.8	1,622.6	331.4		145.4	7.8	35.7		2.0	11.5													2,954.9
Athabasca 26																																	
1 - Aw										207.0		14.7																					221.7
2 - Hw/Pl									14.2	316.4		8.0																					338.6
5 - Pl/Hw										72.0		23.9																					95.9
8 - Pl						0.0	0.1	0.2			56.8	220.2	76.4	87.0		0.0																	440.7
9 - Sb												0.0																					0.0
Athabasca 26 Total						0.0	0.1	0.2	14.2	595.4	56.8	266.8	76.4	87.0		0.0																		1,096.9
Athabasca 27																																	
1 - Aw										17.5																							17.5
2 - Hw/Pl										170.6																							170.6
5 - Pl/Hw										16.2		52.8																					69.0
8 - Pl		1.9	0.1							0.2		104.7	20.3																				127.1
Athabasca 27 Total		1.9	0.1							204.5		157.4	20.3																				384.2
Athabasca 28																																	
1 - Aw											136.3	162.2																					298.5
2 - Hw/Pl								11.0	5.1	10.5	2.1	14.9	2.6																				46.1
3 - Hw/Sw												2.0																					2.0
5 - Pl/Hw										21.4	5.6	83.4	8.1																				118.5
7 - Sw												0.3	1.9	0.7																			2.9
8 - Pl						0.1	0.2	0.0		0.3	114.1	579.6	40.2	10.2	0.5	0.1	0.1																745.4
9 - Sb										0.3	0.6	0.1	0.2	0.4	1.8	0.1		0.0															3.5
Athabasca 28 Total						0.1	0.2	11.0	5.1	32.5	258.6	842.4	53.0	11.3	2.3	0.2	0.1	0.0																1,216.9
Athabasca 29																																	
1 - Aw											5.8	11.6																					17.5
2 - Hw/Pl												21.9	0.1																				22.1
3 - Hw/Sw													0.3																				0.3
5 - Pl/Hw		0.4										29.2	0.5																				30.0
7 - Sw						0.0								2.4	3.1																		5.6
8 - Pl		1.8	0.1	0.0						2.0	18.0	236.2	64.3	0.1																			322.5
9 - Sb												0.1	1.5	4.7	0.6	1.0	0.0																7.9
Athabasca 29 Total		2.2	0.1	0.0		0.0				2.0	23.8	299.1	66.6	7.3	3.7	1.0	0.0																405.9
Athabasca 30																																	
1 - Aw							64.0	39.4		39.3	4.7	160.3																					307.5
2 - Hw/Pl							0.1	42.2	44.8	37.9																							124.9
5 - Pl/Hw							8.5	64.0	51.6	12.8		17.3	3.8																				157.9
8 - Pl				0.0	0.2		53.1	373.3	48.5	12.6	203.6	675.8	37.9	1.4								0.1											1,406.5

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
Stratum	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
9 - Sb							0.1					0.3																				0.4
Athabasca 30 Total				0.0	0.2		125.7	518.8	144.9	102.6	208.3	853.6	41.7	1.4								0.1										1,997.3
Athabasca 31																																	
1 - Aw									2.4	13.7	55.9	24.2																					96.1
2 - Hw/Pl										8.7	63.7	40.2																					112.6
3 - Hw/Sw										11.6	12.5																						24.1
4 - Sw/Hw												22.1	16.3	12.0																			50.4
5 - Pl/Hw		1.0									92.2	129.6																					222.8
7 - Sw										2.9		11.2	29.9	64.6	7.9																		116.5
8 - Pl		1.5					0.3	0.1			334.9	734.6	15.0																				1,086.4
9 - Sb					0.1						0.1			0.9	5.0	0.1	0.3																6.5
Athabasca 31 Total		2.6			0.1		0.3	0.1	2.4	36.9	559.3	961.8	61.3	77.4	12.9	0.1	0.3																1,715.4
Athabasca 32																																	
1 - Aw										3.5	24.9	6.5																					34.9
2 - Hw/Pl										21.3		17.2																					38.5
5 - Pl/Hw										3.3																							3.3
Athabasca 32 Total										28.0	24.9	23.7																					76.6
Athabasca 33																																	
1 - Aw								3.5		55.6	197.5	78.8																					335.5
2 - Hw/Pl								6.2		95.5		19.1																					120.8
5 - Pl/Hw										70.5		97.3																					167.9
Athabasca 33 Total								9.7		221.6	197.5	195.2																					624.1
Athabasca 34																																	
1 - Aw								7.0	9.7	26.9	3.1																						46.7
2 - Hw/Pl									16.7																								16.7
3 - Hw/Sw								7.0																									7.0
4 - Sw/Hw								31.0																									31.0
5 - Pl/Hw								97.5	12.5	17.6		4.4																					132.0
7 - Sw								17.6																									17.6
8 - Pl								19.3																									19.3
9 - Sb											2.6																						2.6
Athabasca 34 Total								179.4	38.9	44.5	5.7	4.4																					273.0
Athabasca 35																																	
1 - Aw											74.4																						74.4
2 - Hw/Pl							1.0				8.3	0.1																					9.3
3 - Hw/Sw					0.8						0.7	3.0																					4.5
4 - Sw/Hw											0.8			1.0																			1.8
5 - Pl/Hw												166.9				0.1																	167.1
7 - Sw								4.5				0.0		2.5																			7.1
8 - Pl			0.5		2.8	1.1	2.5	0.6	0.4		2.3	815.9	0.0				0.0																826.0
9 - Sb								0.1	0.2	0.4		0.2			0.1																		1.0
Athabasca 35 Total			0.5		3.5	1.1	3.4	5.2	0.6	0.4	86.4	986.1	0.0	3.5	0.1	0.1	0.0																1,091.2
Berland 1																																	
7 - Sw												0.3			0.0	16.8	73.2				0.2	141.7											232.3
8 - Pl		4.1	0.2		0.1	0.3						24.6			20.3	73.5	871.9	6.9	2.4			32.9											1,037.2
9 - Sb						0.2											4.1					0.0											4.2
Berland 1 Total		4.1	0.2		0.1	0.4						24.9			20.3	90.3	949.2	6.9	2.4		0.2	174.7											1,273.7
Berland 3																																	
4 - Sw/Hw																						3.8											3.8
7 - Sw												5.9					0.2	2.1			3.0	138.0				227.4	128.7			26.0			531.1
8 - Pl								1.4		177.3		154.6						9.2	9.6		8.8	340.7			8.6	71.7							781.9
9 - Sb																									4.3								4.3
Berland 3 Total								1.4		177.3		160.5					0.2	11.3	9.6		11.8	482.5			13.0	299.0	128.7			26.0			1,321.1
Berland 5																																	
7 - Sw																										0.1							0.1
8 - Pl				0.1																													0.1
Berland 5 Total				0.1																						0.1							0.2
Berland 6																																	
7 - Sw																						0.8											0.8
8 - Pl				0.1		0.0						44.2																					44.3
9 - Sb												2.5					0.1					1.3											3.9
Berland 6 Total				0.1		0.0						46.7					0.1					2.1											49.0
Berland 9																																	
1 - Aw											26.6																						26.6
2 - Hw/Pl									4.2			13.4																					17.7
4 - Sw/Hw								11.5			1.0																						12.4
5 - Pl/Hw								5.7		5.6		19.4																					30.7
6 - Sb/Hw								0.1																									0.1
7 - Sw												0.1					0.0																0.1
8 - Pl		0.2				0.1						107.8																					108.0
9 - Sb							0.1						0.0	0.2																			0.3
Berland 9 Total		0.2				0.1	0.1	17.2	4.2	5.6	27.5	140.8	0.0	0.2			0.0																195.8
Berland 10																																	
1 - Aw									7.8			3.4																					11.2
5 - Pl/Hw												4.4																					4.4
8 - Pl		0.0																															0.0
Berland 10 Total		0.0							7.8			7.8																					15.6
Berland 12																																	
8 - Pl												40.8																					40.8
9 - Sb												0.5																					0.5

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
Stratum	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
Berland 12 Total												41.4																				41.4
Berland 16																																	
8 - Pl												0.0																				0.0
Berland 16 Total												0.0																				0.0
Berland 18																																	
8 - Pl												0.1																				0.1
9 - Sb													0.0																			0.0
Berland 18 Total												0.1	0.0																			0.1
Berland 21																																	
8 - Pl		2.5			0.0			0.1				323.8	79.0	160.8			93.6	4.6	443.3			418.9				9.0							1,535.7
Berland 21 Total		2.5			0.0			0.1				323.8	79.0	160.8			93.6	4.6	443.3			418.9				9.0							1,535.7
Berland 22																																	
2 - Hw/Pl												23.9																				23.9
5 - Pl/Hw								13.1				9.6																				22.7
8 - Pl								14.7				57.2					1.4			1.9												75.3
Berland 22 Total								27.8				90.7					1.4			1.9												121.8
Berland 23																																	
1 - Aw								2.8																								2.8
2 - Hw/Pl				0.8				2.3	2.2			4.8																				10.1
3 - Hw/Sw								14.3																								14.3
4 - Sw/Hw								0.4																								0.4
5 - Pl/Hw								42.2	12.0	4.6		30.5																				89.3
7 - Sw												0.3								2.7												3.0
8 - Pl			0.1			2.4		316.4	159.1	87.8		648.5								14.7												1,228.9
9 - Sb								0.0				0.1							0.1													0.2
Berland 23 Total			0.1	0.8		2.4		378.5	173.3	92.4		684.2							0.1	17.4												1,349.1
Berland 24																																	
1 - Aw							15.2	94.5	76.9			75.3																				261.9
2 - Hw/Pl								187.5	58.2			20.6																				266.2
5 - Pl/Hw								40.9	81.2			27.8																				149.9
Berland 24 Total							15.2	322.9	216.3			123.6																				678.0
Berland 25																																	
1 - Aw									0.4	1.1	0.1	0.6																				2.2
2 - Hw/Pl											3.8	7.0			0.0																	10.8
3 - Hw/Sw										0.6																						0.6
5 - Pl/Hw		0.9	0.8						5.6		15.4	111.8	13.0																			147.5
8 - Pl		6.8						0.0	6.6	0.0	17.2	502.1	33.1																			565.9
9 - Sb									0.4		0.1	0.0																				0.6
Berland 25 Total		7.7	0.8					0.0	13.0	1.7	36.6	621.6	46.1		0.0																	727.6
Berland 26																																	
1 - Aw									8.5	3.8	26.1	33.5	22.9																			94.8
2 - Hw/Pl		0.3								39.1	21.2	31.6																				92.2
5 - Pl/Hw		0.9									62.5	47.7																				111.0
7 - Sw													6.9	0.1																		7.0
8 - Pl		3.8		0.2					0.1	15.9	263.6	197.7	48.8	0.8	0.1		0.1															531.1
9 - Sb										0.1	0.1	0.4	0.1	1.0	1.0			0.0														2.7
Berland 26 Total		5.0		0.2					8.6	58.9	373.5	310.9	78.7	1.8	1.2		0.1	0.0														838.8
Berland 27																																	
1 - Aw												9.9																				9.9
5 - Pl/Hw										26.6																						26.6
8 - Pl								0.8	0.7	101.8	152.9	168.8	1.3	3.6	1.9																	431.9
Berland 27 Total								0.8	0.7	128.4	152.9	178.7	1.3	3.6	1.9																	468.4
Berland 28																																	
2 - Hw/Pl									5.4																							5.4
5 - Pl/Hw									50.9																							50.9
9 - Sb					0.0																											0.0
Berland 28 Total					0.0				56.3																							56.3
Berland 29																																	
1 - Aw										7.8		115.2						12.2														135.2
2 - Hw/Pl									6.7			70.4																				77.2
5 - Pl/Hw								4.9	12.4			96.4																				113.7
8 - Pl						0.1			45.0	0.0		475.0						4.8		0.1												525.1
Berland 29 Total						0.1		4.9	64.2	7.9		757.1						17.0		0.1												851.1
Berland 30																																	
1 - Aw									6.0			57.3																				63.3
2 - Hw/Pl												30.0																				30.0
5 - Pl/Hw												71.8																				71.8
7 - Sw																				0.0												0.0
8 - Pl			1.8								3.7	238.3	0.4																			244.3
Berland 30 Total			1.8						6.0		3.7	397.3	0.4							0.0												409.3
Berland 33																																	
1 - Aw												22.1								16.2												38.3
2 - Hw/Pl												28.8																				28.8
5 - Pl/Hw										0.1		3.1																				3.2
7 - Sw												0.8																				0.8
8 - Pl		0.8										11.6								0.2												12.6
9 - Sb												0.9																				0.9
Berland 33 Total		0.8								0.1		67.3								16.4												84.6
Berland 34																																	
5 - Pl/Hw								7.6				13.8																				21.4

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
8 - Pl												0.1																				0.1
Berland 34 Total								7.6				13.9																				21.5
Coalspur																																
8 - Pl											11.1																					11.1
Coalspur Total											11.1																					11.1
Embarras 2																																
1 - Aw									2.1	64.1	20.2	3.6	19.4																			109.4
2 - Hw/Pl									0.3	3.9	54.5	40.6	100.3																			199.5
3 - Hw/Sw									2.8		4.3	0.8	8.9																			16.7
4 - Sw/Hw												12.9	46.3	7.7																		66.9
5 - Pl/Hw											35.9	195.4	152.8			20.6																404.7
6 - Sb/Hw													9.8																			9.8
7 - Sw										14.5		67.3	119.5	69.1	5.2	18.5																294.1
8 - Pl										123.7	246.9	1,870.1	836.2	9.2	20.1	32.6																3,138.8
9 - Sb										2.2		4.1						4.5														10.9
Embarras 2 Total									5.2	208.4	361.7	2,194.8	1,293.2	86.0	25.3	71.7		4.5														4,250.8
Embarras 3																																
1 - Aw									5.6	37.1	23.0	164.1	188.3	3.4																		421.6
2 - Hw/Pl										7.0		119.2	113.1																			239.2
3 - Hw/Sw									4.1	7.2	10.8	37.7	44.3	2.0																		106.1
4 - Sw/Hw												8.4	25.6	11.9	20.1	19.2																85.2
5 - Pl/Hw									3.8		11.3	59.0	210.3	81.6	1.2	43.6																410.9
6 - Sb/Hw									4.8			3.6	8.8																			17.1
7 - Sw								0.3	0.4	44.1		58.2	60.5	234.1	60.1	36.5	30.9															525.0
8 - Pl								9.3	19.7		29.0	511.2	1,365.2	606.5	68.1	203.1	7.8															2,819.9
9 - Sb										1.9		28.4	13.6	5.8		3.1																52.8
Embarras 3 Total								9.6	38.3	97.2	74.1	989.9	2,029.6	945.4	149.6	305.5	38.7															4,677.8
Embarras 4																																
1 - Aw								67.0	150.7	135.5	398.5	759.9	17.9	15.1																		1,544.6
2 - Hw/Pl									3.4	10.0	76.0	147.5		6.0																		242.9
3 - Hw/Sw								8.9	9.1	11.3	42.7	162.7	7.5																			242.1
4 - Sw/Hw								2.7				121.9	21.1																			145.8
5 - Pl/Hw								11.2	6.8	5.5	43.5	482.6	10.1	40.5																		600.3
7 - Sw											6.1	125.0	260.1	86.8	0.4	0.0	0.9															479.3
8 - Pl								5.5			367.4	2,965.4	266.5	36.7	19.4	5.9																3,666.7
9 - Sb											11.6	3.9		1.2																		16.7
Embarras 4 Total								95.4	169.9	162.3	945.8	4,769.0	583.2	186.3	19.8	5.9	0.9															6,938.5
Embarras 6																																
2 - Hw/Pl									4.7	12.4																						17.0
5 - Pl/Hw								23.3		22.2	5.8	1.4																				52.7
8 - Pl								106.9	26.2	6.2	641.7	80.3																				861.3
9 - Sb									3.8																							3.8
Embarras 6 Total								130.2	34.6	40.8	647.5	81.7																				934.8
Embarras 7																																
1 - Aw							111.3		33.8		63.3	101.9	34.8																			345.1
2 - Hw/Pl							7.8	12.1	3.6		0.7	67.8																				92.0
3 - Hw/Sw							1.2	8.8				3.3																				13.3
4 - Sw/Hw												11.6	4.4																			16.0
5 - Pl/Hw							1.3				1.6	75.2	1.1																			79.2
6 - Sb/Hw												0.3																				0.3
7 - Sw			0.1									0.1	1.6																			1.7
8 - Pl							13.3		31.8		315.0	1,048.5	14.9				0.4															1,423.8
9 - Sb							0.4				6.4	7.5																				14.3
Embarras 7 Total			0.1				135.3	20.8	69.2		387.0	1,316.2	56.7				0.4															1,985.7
Embarras 8																																
1 - Aw								17.8	12.1																							29.9
2 - Hw/Pl								16.0	2.3	15.3																						33.7
5 - Pl/Hw								20.8		52.6		12.7																				86.1
8 - Pl												0.2																				0.2
Embarras 8 Total								54.7	14.4	67.9		12.9																				149.9
Embarras 9																																
1 - Aw							17.3			25.7	18.7	374.1	296.0	34.1																		765.8
2 - Hw/Pl								2.2		45.8	27.1	276.9	111.0	17.5																		480.5
3 - Hw/Sw									3.6	10.8	11.2	174.5	91.9	6.5																		298.4
4 - Sw/Hw									3.7	0.6	11.4	84.5	99.8	25.2	14.1	4.6																243.8
5 - Pl/Hw											26.1	403.4	166.2	57.0	123.7																	776.4
6 - Sb/Hw									1.0				5.9																			6.9
7 - Sw								3.2		9.9	6.1	79.5	127.7	69.9	40.7	9.8																346.8
8 - Pl								4.8	1.4	19.9	194.3	1,363.8	721.9	19.7	157.5		19.1															2,502.4
9 - Sb										18.5	4.5	5.4			8.1																	36.5
Embarras 9 Total							17.3	10.3	9.7	131.0	299.2	2,762.2	1,620.5	229.9	344.1	14.4	19.1															5,457.6
Embarras 10																																
1 - Aw			0.0								0.8	83.3	1.4	1.3																		86.7
2 - Hw/Pl		0.2										62.4	7.1																			69.7
3 - Hw/Sw								0.1	0.2			0.1																				0.3
4 - Sw/Hw		0.3										4.1		1.3																		5.8
5 - Pl/Hw	0.1			0.2								3.1	31.6																			35.1
6 - Sb/Hw												0.1																				0.1
7 - Sw		1.3						0.3				0.5	0.1	0.2																		2.4
8 - Pl		3.8	0.1							4.6	2.7	427.7	857.6	20.8	0.9																	1,318.3

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
9 - Sb									0.5		0.5	2.9	2.8																				6.8
Embarras 10 Total	0.1	5.6	0.2	0.2				0.4	0.7	4.6	4.1	584.1	900.6	23.6	0.9																		1,525.2
Embarras 11																																	
1 - Aw									14.9	12.3	44.4	109.9																					181.4
2 - Hw/Pl										4.9	19.6	52.8																					77.3
3 - Hw/Sw											0.1																						0.1
5 - Pl/Hw	0.0								10.9			38.3	0.6																				49.8
6 - Sb/Hw													0.0																				0.0
8 - Pl											195.8	266.5	2.2																				464.4
9 - Sb												0.0																					0.0
Embarras 11 Total	0.0								25.8	17.2	259.8	467.5	2.8																				773.1
Embarras 12																																	
1 - Aw										25.8	8.2																						34.0
2 - Hw/Pl										285.8																							285.8
3 - Hw/Sw				0.2					0.7	0.1																							1.0
4 - Sw/Hw						1.7																											1.7
5 - Pl/Hw								32.9		18.7	11.3	6.7																					69.6
7 - Sw										15.2	7.9																						23.1
8 - Pl								75.4	3.0	23.9	1,348.4	523.4	1.0		1.8																		1,976.8
9 - Sb									0.1	0.0	0.8																						0.9
Embarras 12 Total				0.2		1.7		108.3	3.8	369.5	1,376.6	530.1	1.0		1.8																		2,393.1
Embarras 13																																	
7 - Sw															0.1	0.0																	0.1
8 - Pl		0.3																															0.3
9 - Sb															0.0																		0.0
Embarras 13 Total		0.3													0.1	0.0																	0.5
Embarras 14																																	
2 - Hw/Pl										23.1																							23.1
5 - Pl/Hw								10.2			17.1																						27.3
7 - Sw								0.5	14.1	11.5	19.9	8.3			13.9	1.6																	69.7
8 - Pl								422.2	69.3	254.5	2,799.5	1.9			206.6				1.6		0.1												3,755.6
Embarras 14 Total								432.8	83.5	289.1	2,836.4	10.2			220.5	1.6			1.6		0.1												3,875.7
Embarras 19																																	
7 - Sw											8.5																						8.5
8 - Pl										25.3	233.4	306.2																					564.8
Embarras 19 Total										25.3	241.8	306.2																					573.3
Embarras 20																																	
2 - Hw/Pl										12.0																							12.0
5 - Pl/Hw								17.3	15.5	10.0																							42.9
7 - Sw											0.9					0.5																	1.4
8 - Pl						8.6	191.0	415.7	25.8	181.9	2,782.6	22.2				0.2																	3,628.0
9 - Sb							0.1	0.0	1.1																								1.2
Embarras 20 Total						8.6	191.1	433.1	42.4	203.8	2,783.6	22.2				0.6																	3,685.4
Marlboro 2																																	
4 - Sw/Hw														14.5																			14.5
5 - Pl/Hw												14.6	4.1																				18.7
7 - Sw												4.0		12.7																			16.7
8 - Pl				0.3				0.2		0.4	114.7	269.4	62.3	1.6	9.9																		458.8
Marlboro 2 Total				0.3				0.2		0.4	114.7	288.1	66.4	28.8	9.9																		508.7
Marlboro 3																																	
7 - Sw				0.3										0.1																			0.4
Marlboro 3 Total				0.3										0.1																			0.4
Marlboro 4																																	
4 - Sw/Hw													11.2																				11.2
5 - Pl/Hw											11.4	90.3																					101.8
7 - Sw											80.6	497.4	169.4	223.7	118.9	48.1	25.7																1,163.8
8 - Pl			0.2	0.4			0.1			2.5	1,221.6	3,708.8	63.3	5.3	7.3																		5,009.6
9 - Sb											28.3	59.5	122.5			21.2																	231.5
Marlboro 4 Total			0.2	0.4			0.1			2.5	1,342.0	4,356.0	366.4	229.1	126.2	69.2	25.7																6,517.8
Marlboro 5																																	
2 - Hw/Pl											0.2																						0.2
4 - Sw/Hw												1.6	14.1	3.6	80.3	14.2																	113.7
5 - Pl/Hw										36.2	4.5	23.4	86.8																				150.8
7 - Sw											35.1	124.6	94.0	29.9	7.5	83.0	16.6	195.2															586.0
8 - Pl					0.4	2.5	0.4	0.5		108.1	572.5	412.5	95.8	72.0	27.7	15.3		130.3	48.8			8.6											1,495.6
9 - Sb										0.5		3.2	25.1				4.0		2.0														34.9
Marlboro 5 Total					0.4	2.5	0.4	0.5		144.8	612.3	565.2	315.7	105.5	115.5	112.5	20.6	325.6	50.9			8.6											2,381.1
Marlboro 6																																	
4 - Sw/Hw													4.1	3.8		3.5																	11.4
5 - Pl/Hw											34.6	128.0																					162.6
6 - Sb/Hw																3.6																	3.6
7 - Sw											41.7	23.7	2.0	69.9		14.0																	151.3
8 - Pl											195.8	128.1	0.0																				324.0
9 - Sb											3.8	2.7				13.0																	19.5
Marlboro 6 Total											276.0	282.4	6.1	73.7		34.0																	672.3
Marlboro 7																																	
1 - Aw			23.3	13.4	4.3	25.4				1.8	2.2	0.6																					71.0
2 - Hw/Pl				0.4	0.5					3.1		0.2																					4.2
3 - Hw/Sw						3.5	0.3		3.0			0.9																					7.7
4 - Sw/Hw							1.5																										1.5

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
Stratum	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
5 - Pl/Hw			0.7		1.7																												2.3
6 - Sb/Hw											0.2																						0.2
7 - Sw				18.9									0.0																				18.9
8 - Pl		20.9			0.1																												21.0
9 - Sb											0.0																						0.0
Marlboro 7 Total		20.9	24.0	32.8	6.5	28.9	1.8		3.0	4.9	2.5	1.7	0.0																				127.0
Marlboro 8																																	
1 - Aw		0.0	1.7																														1.8
2 - Hw/Pl				0.2																													0.2
3 - Hw/Sw				3.8								9.8																					13.6
4 - Sw/Hw													4.4	17.9	1.8																		24.1
5 - Pl/Hw				4.2				0.1																									4.3
7 - Sw				1.0			1.7				3.6	3.8	33.4	99.8																			143.3
8 - Pl		0.0		4.8				0.0		2.9	14.1	91.6	159.7	37.5																			310.6
9 - Sb				0.0		0.1	1.2					0.2			0.0																		1.6
Marlboro 8 Total		0.0	1.7	13.9		0.1	3.0	0.2		2.9	17.6	105.3	197.4	155.2	1.9																		499.4
Marlboro 9																																	
1 - Aw												0.1	7.9																				8.0
2 - Hw/Pl			7.4	7.8																													15.2
3 - Hw/Sw				0.1																													0.1
5 - Pl/Hw			6.4																														6.4
7 - Sw								9.9	2.7																								12.6
8 - Pl		2.6	9.3	1.3									0.6																				13.7
9 - Sb								4.1				3.0																					7.1
Marlboro 9 Total		2.6	23.0	9.2				14.0	2.7			3.1	8.5																				63.1
Marlboro 10																																	
1 - Aw										17.0	10.2	21.3	0.2																				48.7
2 - Hw/Pl									74.6	63.0	3.7	30.8	0.0	6.7																			178.9
5 - Pl/Hw									34.0	6.0		3.2																					43.1
7 - Sw									12.9	8.3	6.0	10.9	3.9	6.2			0.4																48.6
8 - Pl				0.2	0.3		0.9		15.8	19.3	26.2	186.6	3.0																				252.3
Marlboro 10 Total				0.2	0.3		0.9		137.3	113.6	46.2	252.8	7.1	12.9			0.4																571.7
Marlboro 11																																	
4 - Sw/Hw			1.5											0.0																			1.5
5 - Pl/Hw			0.1																														0.1
7 - Sw														0.0																			0.0
Marlboro 11 Total			1.6											0.0																			1.7
Marlboro 12																																	
1 - Aw										2.7	9.8	31.3	2.4																				46.2
2 - Hw/Pl								5.1		8.5		13.1																					26.6
4 - Sw/Hw								2.4																									2.4
5 - Pl/Hw									9.2			1.8																					11.0
Marlboro 12 Total								7.4	9.2	11.2	9.8	46.2	2.4																				86.2
Marlboro 13																																	
1 - Aw								0.1		2.6	234.6	616.1	184.8	13.8																			1,052.1
2 - Hw/Pl								8.1		12.3	21.5	206.6	45.9																				294.4
3 - Hw/Sw			0.2						0.0	1.3	0.6	20.9	0.9																				23.9
4 - Sw/Hw					0.0							4.2	0.1																				4.3
5 - Pl/Hw												65.7	3.1	0.1																			68.9
7 - Sw									0.1	0.2			1.5	0.3																			2.1
8 - Pl				0.3				0.0		0.3	151.0	110.9	17.1	18.8																			298.4
9 - Sb									0.1	0.0	0.1	0.6	0.1	0.4	2.5		0.1																3.7
Marlboro 13 Total			0.2	0.3	0.0			8.3	0.2	16.7	407.8	1,025.0	253.4	33.4	2.5		0.1																1,747.9
Marlboro 14																																	
1 - Aw										3.7	6.7	10.5		16.0																			36.8
2 - Hw/Pl								5.3	23.1	5.3	33.0	102.0	2.3																				171.1
3 - Hw/Sw											8.9	54.6																					63.5
4 - Sw/Hw								3.0	2.8	2.1	7.5	47.1		36.9																			99.4
5 - Pl/Hw								2.8	4.4	1.5	40.4	89.1	26.1	35.5																			199.8
7 - Sw								4.2	36.6	5.5	25.0	152.3	28.1	169.2	17.5	2.3																	440.8
8 - Pl								29.7	3.1	72.1	176.4	292.1	95.0	96.8	2.9																		768.2
9 - Sb													17.7	28.3	3.5																		49.5
Marlboro 14 Total								45.1	70.1	90.1	298.0	747.7	169.1	382.6	24.0	2.3																	1,829.0
Marlboro 15																																	
1 - Aw											26.5																						26.5
2 - Hw/Pl								2.6		13.1	48.8	33.8																					98.3
4 - Sw/Hw								12.5																									12.5
5 - Pl/Hw								11.0		2.2	35.7	19.6																					68.4
Marlboro 15 Total								26.1		15.3	111.0	53.4																					205.7
Marlboro 16																																	
1 - Aw							35.9	17.2	67.5		83.3	329.4	236.7		81.9	0.2																	852.1
2 - Hw/Pl						0.1	0.3	100.7	47.2	136.7	89.0	542.1	241.9		37.2																		1,195.1
3 - Hw/Sw							3.6	0.2			0.1	37.8	38.9																				80.6
4 - Sw/Hw							0.0	6.9	0.7				29.3		12.5																		49.5
5 - Pl/Hw		0.2			0.0			209.7	59.5	7.4	145.9	215.7	305.9	18.6	212.7	10.1																	1,185.7
7 - Sw								6.2	0.5		0.1		3.5		1.3	0.2																	11.8
8 - Pl		22.8		18.8	0.0	2.6	0.4	27.2	7.2	8.3	53.6	49.5	62.6	0.6	94.1																		347.7
9 - Sb									0.3				1.7		0.1																		2.2
Marlboro 16 Total		23.1		18.8	0.1	2.7	40.2	368.1	183.0	152.4	372.0	1,174.5	920.5	19.1	439.8	10.4																	3,724.7
Marlboro 17																																	

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
1 - Aw			92.3					3.8	4.0		32.3	35.0	34.8	25.4																			227.6
2 - Hw/Pl			41.8			0.2		10.4		17.9		43.3																					113.6
3 - Hw/Sw			0.1		0.1		19.8	15.0	19.6			22.9	6.4	5.3	0.0																		89.3
4 - Sw/Hw			5.9									0.6	1.3	1.0	0.3																		9.1
5 - Pl/Hw								23.3	19.4	1.9	0.4	31.9	23.1	16.4																			116.4
6 - Sb/Hw															0.2																		0.2
7 - Sw		2.1							0.5				1.3	49.8	0.6																		54.2
8 - Pl								3.0		0.0	4.5	23.9	11.1	44.0																			86.4
9 - Sb								0.2			0.1	1.8	0.7	2.6	0.9			0.1															6.3
Marlboro 17 Total		2.1	140.1		0.1	0.2	19.8	55.7	43.4	19.8	37.2	159.4	78.6	144.5	2.0			0.1															703.0
Marlboro 18																																	
1 - Aw									0.7			1.6	1.7																				4.0
2 - Hw/Pl												0.1																					0.1
3 - Hw/Sw							0.6			0.4		15.8																					16.8
4 - Sw/Hw								5.5	5.0		0.2	0.6	91.1	51.4	42.3	74.9		4.8															275.8
5 - Pl/Hw										41.1	198.0	304.8	132.0		23.0	65.7		3.2															767.8
7 - Sw						0.1		7.8	2.5	0.3	12.9	84.9	90.0	37.4	61.5	34.2		19.5															351.1
8 - Pl											139.3	270.7	45.5		25.7	17.5																	498.8
9 - Sb													0.2			2.7		0.0															2.9
Marlboro 18 Total						0.1	0.6	13.3	8.2	41.7	350.5	678.5	360.5	88.7	152.5	195.1		27.6															1,917.3
Marlboro 19																																	
4 - Sw/Hw													22.8			36.4																	59.2
5 - Pl/Hw										20.7	3.3	24.8		17.3		9.7		3.1															78.8
7 - Sw											10.2	3.8	19.0			7.2																	40.2
8 - Pl											18.7	29.5	13.4	23.0		5.6		4.8															95.0
9 - Sb																		3.5															3.5
Marlboro 19 Total										20.7	32.2	58.0	55.1	40.4		58.9		11.4															276.7
Marlboro 20																																	
4 - Sw/Hw													0.2	0.5																			0.6
5 - Pl/Hw										9.9	14.0	21.5		3.9		2.4			4.3														56.0
7 - Sw											8.7	1.9	0.1	0.1		1.3		1.6															13.6
8 - Pl											53.2	134.2	3.9	1.5					12.4														205.2
9 - Sb													3.5																				3.5
Marlboro 20 Total										9.9	75.8	157.5	7.6	6.0		3.7		1.6	16.7														278.9
Marlboro 21																																	
4 - Sw/Hw															0.7																		0.7
5 - Pl/Hw												9.6																					9.6
7 - Sw											22.8	47.7	31.3	52.9		26.6	54.9	12.7															248.9
8 - Pl											744.2	912.0	6.9	1.0			19.1	3.0															1,686.2
9 - Sb											51.8	28.1	9.6	11.8																			101.2
Marlboro 21 Total											818.9	997.3	47.8	65.6	0.7	26.6	74.0	15.7															2,046.6
Marlboro 22																																	
5 - Pl/Hw											3.5	0.3				15.0																	18.8
7 - Sw											1.2	10.7	0.7			40.6	3.4																56.6
8 - Pl							1.9				33.1	458.0	31.3			23.8																	548.1
9 - Sb												6.4																					6.4
Marlboro 22 Total							1.9				37.9	475.4	32.0			79.4	3.4																630.0
Marlboro 23																																	
1 - Aw											15.6	5.4																					21.0
2 - Hw/Pl									8.4																								8.4
3 - Hw/Sw								9.3																									9.3
5 - Pl/Hw									6.3			2.9																					9.2
Marlboro 23 Total								9.3	14.7		15.6	8.3																					47.9
Marlboro 24																																	
2 - Hw/Pl								4.2																									4.2
5 - Pl/Hw												3.6																					3.6
Marlboro 24 Total								4.2				3.6																					7.8
Marlboro 25																																	
1 - Aw															3.6																		3.6
2 - Hw/Pl								8.0																									8.0
3 - Hw/Sw												0.3																					0.3
5 - Pl/Hw					0.1																												0.1
Marlboro 25 Total					0.1			8.0				0.3			3.6																		12.0
McLeod 2																																	
8 - Pl			0.3	0.4	0.0																												0.8
9 - Sb													0.4																				0.4
McLeod 2 Total			0.3	0.4	0.0								0.4																				1.2
McLeod 3																																	
5 - Pl/Hw				0.4							3.2																						3.6
7 - Sw					0.5	0.7	2.3		0.2	0.1	1.8	1.6							13.5														20.5
8 - Pl		15.1	4.2	0.7		0.1	1.2	50.8		27.2	97.2	1,462.8				27.4			19.1														1,706.0
9 - Sb						0.3		0.1	0.4	2.9	0.4	0.7																					4.7
McLeod 3 Total		15.1	4.2	1.1	0.5	1.0	3.5	50.9	0.6	30.1	102.6	1,465.1				27.4			32.6														1,734.8
McLeod 5																																	
4 - Sw/Hw																				9.4													9.4
5 - Pl/Hw				2.2																													2.2
7 - Sw									9.8			47.0				37.3	10.1		2.3														106.6
8 - Pl							0.1				9.0	356.8		12.7		61.7	6.2																446.6
9 - Sb												0.4				4.1																	4.5
McLeod 5 Total				2.2			0.1		9.8		9.0	404.2		12.7		103.2	16.3		2.3	9.4													569.3

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
McLeod 6																																	
1 - Aw												17.7																					17.7
2 - Hw/Pl					0.3							4.7																					5.0
5 - Pl/Hw									0.1																								0.1
7 - Sw												3.5																					3.5
8 - Pl				0.4	0.2				173.5	1.5	7.2	93.6																					276.3
9 - Sb									18.9			0.0				0.1																	18.9
McLeod 6 Total				0.4	0.5				192.5	1.5	7.2	119.5				0.1																	321.6
McLeod 7																																	
8 - Pl		0.1							22.4	81.7		1.2		0.4																			105.8
McLeod 7 Total		0.1							22.4	81.7		1.2		0.4																			105.8
McLeod 8																																	
3 - Hw/Sw								3.3	1.4																								4.8
7 - Sw					0.6			11.4	3.3		2.6	7.5	1.2		3.3																		29.9
8 - Pl								9.3	167.7		40.1	22.2																					239.2
9 - Sb						0.0							0.3																				0.3
McLeod 8 Total					0.6	0.0		24.1	172.4		42.7	29.6	1.4		3.3																		274.1
McLeod 9																																	
1 - Aw								2.5				2.7																					5.2
5 - Pl/Hw					0.1	0.0		28.6	3.1																								31.7
7 - Sw								6.4																									6.4
8 - Pl						0.1		8.4	2.7		6.0	248.5																					265.8
9 - Sb													0.1																				0.1
McLeod 9 Total					0.1	0.2		45.9	5.8		6.0	251.2	0.1																				309.2
McLeod 12																																	
1 - Aw							5.5	24.3			23.6	9.0																					62.5
2 - Hw/Pl								40.3	21.0	67.7		11.7																					140.8
3 - Hw/Sw								37.1		1.4		0.1																					38.6
4 - Sw/Hw								45.6			0.0																						45.6
5 - Pl/Hw				0.1				83.7	88.2	29.3																							201.3
7 - Sw							0.1		10.5	15.2	93.9	20.3		27.3																			167.3
8 - Pl						0.5		142.3	132.6	115.7	334.5	65.9		11.7	0.6																		803.8
9 - Sb							0.0		0.2		3.2		5.0		3.5																		11.9
McLeod 12 Total				0.1		0.5	5.7	373.4	252.6	229.3	455.2	107.1	5.0	39.0	4.0																		1,471.9
McLeod 13																																	
1 - Aw							17.7	64.6	123.3	22.4	175.4	0.2																					403.6
2 - Hw/Pl								61.4	55.2																								116.6
3 - Hw/Sw					0.0		0.1	5.7	1.1		4.5	0.1																					11.6
4 - Sw/Hw							0.0	6.5																									6.5
5 - Pl/Hw								67.9	8.6																								76.6
6 - Sb/Hw																	0.1																0.1
7 - Sw							0.2		0.0																								0.2
9 - Sb									0.3		0.1		0.1																				0.4
McLeod 13 Total					0.0		18.0	206.2	188.4	22.4	180.0	0.3	0.1				0.1																615.6
McLeod 16																																	
1 - Aw							5.3					10.3																					15.6
2 - Hw/Pl								32.3	26.4	14.3																							73.0
3 - Hw/Sw								4.9																									4.9
5 - Pl/Hw								65.2																									65.2
7 - Sw									22.7																								22.7
8 - Pl								0.1																									0.1
McLeod 16 Total							5.3	102.5	49.1	14.3		10.3																					181.5
McLeod 17																																	
1 - Aw											26.4																						26.4
2 - Hw/Pl								4.8	4.8	3.6																							13.2
5 - Pl/Hw								32.9	7.2	17.2		6.8																					64.1
7 - Sw								3.3		15.4	11.8	14.3																					44.9
8 - Pl								0.7	49.1	11.2	10.1	0.1																					71.1
9 - Sb													0.1																				0.1
McLeod 17 Total								41.7	61.1	47.5	48.3	21.2	0.1																				219.9
McLeod 18																																	
1 - Aw		0.2						0.1				6.4																					6.7
2 - Hw/Pl												23.3																					23.3
4 - Sw/Hw												0.9																					0.9
6 - Sb/Hw														0.6																			0.6
8 - Pl							0.1	0.5	11.3			24.1																					36.0
9 - Sb									0.0																								0.0
McLeod 18 Total		0.2					0.1	0.6	11.4			54.7		0.6																			67.5
McLeod 20																																	
1 - Aw												14.0				6.8																	20.8
2 - Hw/Pl										6.2		10.1				3.7																	20.0
3 - Hw/Sw												0.0																					0.0
4 - Sw/Hw															0.7		0.0					4.4											5.1
5 - Pl/Hw		0.0						3.4		9.8		18.6				5.4																	37.2
7 - Sw				0.1			1.5		0.0			3.8			3.7	4.7	0.2					18.4											32.5
8 - Pl		1.0	0.1	0.1	0.6	0.1	0.6	1.5	3.7		58.0	418.1			16.5	103.1	25.1			6.4		14.8											649.8
9 - Sb				0.1			0.4	0.2	2.3	0.3	0.1	10.4				2.5			0.1	0.8		0.8											17.8
McLeod 20 Total		1.1	0.1	0.2	0.6	0.1	2.5	5.1	6.1	16.3	58.1	475.0			20.9	126.2	25.4		0.1	7.2		38.4											783.2
McLeod 21																																	
5 - Pl/Hw			1.4																														1.4

Compartment/ Yield	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
Stratum	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**	**210**	**220**	**230**	**240**	**250**	**260**	**270**	**280**	**290**	**300**	**310**	**320**	**Total**
8 - Pl			1.0						0.1			1.2																					2.3
McLeod 21 Total			2.4						0.1			1.2																					3.6
McLeod 23																																	
1 - Aw						0.8	10.4	23.1	9.8	8.1		23.4																					75.6
2 - Hw/Pl							0.6	6.2	25.6	22.1	1.6	24.8																					80.9
3 - Hw/Sw									0.0	0.9	0.2	1.1																					2.2
4 - Sw/Hw						2.7	3.3					0.0																					6.0
5 - Pl/Hw							0.4	5.9	28.5	19.8	23.8	0.9																					79.2
6 - Sb/Hw														0.6																			0.6
7 - Sw						1.3	0.2	1.7	1.1	0.1	23.7	33.4			0.1	0.4	2.1		1.6														65.9
8 - Pl			0.2	0.2		0.3	4.4	17.4	1,584.1	34.0	827.8	320.4				0.8																	2,789.7
9 - Sb						0.2	0.2		7.4	1.1	1.2	3.8																					14.0
McLeod 23 Total			0.2	0.2		5.4	19.5	54.3	1,656.7	86.0	878.3	407.7		0.6	0.1	1.3	2.1		1.6														3,114.0
McLeod 24																																	
5 - Pl/Hw					0.4		0.0	28.5	77.3	7.8		1.6																					115.7
7 - Sw						2.5	1.6			1.6	4.1	2.1							0.4														12.4
8 - Pl		0.4	1.0	0.2	6.2	9.6	0.2	387.2	44.7	152.0	83.5	397.5							0.1														1,082.6
McLeod 24 Total		0.4	1.0	0.2	6.7	12.1	1.8	415.6	122.0	161.4	87.6	401.2							0.6														1,210.6
McLeod 25																																	
1 - Aw									74.8		42.0	35.5																					152.4
2 - Hw/Pl								44.5	117.9																								162.4
3 - Hw/Sw								21.8																									21.8
5 - Pl/Hw									38.2																								38.2
8 - Pl		1.8				2.3		0.3	6.7			45.6		0.1		25.2																	81.8
McLeod 25 Total		1.8				2.3		66.6	237.6		42.0	81.1		0.1		25.2																	456.7
McLeod 27																																	
2 - Hw/Pl										7.4		4.0																					11.4
4 - Sw/Hw								9.4																									9.4
5 - Pl/Hw								27.9	32.0	71.4	44.7	9.2																					185.2
6 - Sb/Hw															0.0																		0.0
7 - Sw								2.4	12.3	1.7	0.5	22.4																					39.2
8 - Pl						0.0	0.6	46.4	100.2	78.1	25.2	50.1																					300.5
9 - Sb							0.0		0.9			0.0			2.0																		3.0
McLeod 27 Total						0.0	0.6	86.0	145.3	158.6	70.4	85.6			2.0																		548.7
McLeod 28																																	
1 - Aw										3.8																							3.8
3 - Hw/Sw				0.2			1.0		0.4	7.2		21.3		2.7																			32.9
4 - Sw/Hw										0.1																							0.1
7 - Sw										2.0		3.5			2.0							2.7											10.1
9 - Sb								0.7																									0.7
McLeod 28 Total				0.2			1.0	0.7	0.4	13.1		24.8		2.7	2.0							2.7											47.6
Grand Total	0.1	101.3	206.0	88.5	72.8	78.8	615.8	5,455.3	5,172.4	5,533.0	20,351.0	41,485.0	10,414.0	3,490.7	2,028.6	1,375.7	1,307.9	426.2	563.6	71.8	25.4	1,128.0	7.9		13.0	308.2	128.7				26.0		100,475.7

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
Athabasca 1																																	
5 - Pl/Hw													56.8																				56.8
7 - Sw								0.4	13.8			7.0	51.4	80.8	35.8	14.7							15.5										219.3
8 - Pl								1.2	223.4	94.2	71.4	2.9	3.2	80.6		0.8																	477.8
9 - Sb																	4.0																4.0
Athabasca 1 Total								1.6	237.2	94.2	71.4	9.9	111.5	161.4	35.8	15.5	4.0						15.5										758.0
Athabasca 2																																	
1 - Aw													6.0																				6.0
2 - Hw/Pl												33.9	15.8																				49.7
3 - Hw/Sw											4.0		1.5																				5.5
4 - Sw/Hw								0.4					0.4																				0.8
5 - Pl/Hw								5.3				1.0	43.9																				50.3
7 - Sw								5.8	17.2				29.6		32.0																		84.6
8 - Pl								21.6	44.7				12.1		6.3																		84.8
9 - Sb															14.4																		14.4
Athabasca 2 Total								33.2	62.0		4.0	35.0	109.3		52.7																		296.0
Athabasca 3																																	
2 - Hw/Pl												36.8																					36.8
4 - Sw/Hw															0.5																		0.5
7 - Sw									17.7				98.0	4.2	65.2			6.2															191.2
8 - Pl									60.2				33.7			3.5																	97.4
Athabasca 3 Total									77.9			36.8	131.7	4.2	65.7	3.5		6.2															325.9
Athabasca 8																																	
1 - Aw										0.1	0.5		1.1																				1.6
2 - Hw/Pl								5.0				2.2	1.7																				8.8
4 - Sw/Hw								1.8																									1.8
5 - Pl/Hw													3.0		11.4																		14.4
7 - Sw								18.1	23.0	4.8		28.2	1.9		21.5																		97.5
8 - Pl									31.9	8.1				16.8	30.0																		86.9
9 - Sb														2.8	2.6																		5.4
Athabasca 8 Total								24.9	55.0	13.0	0.5	30.4	7.6	19.6	65.6																		216.5
Athabasca 9																																	
1 - Aw										0.1			1.6																				1.7
3 - Hw/Sw											3.8	0.3																					4.1
4 - Sw/Hw								2.7		3.9																							6.7
5 - Pl/Hw								8.0					13.9																				21.9
7 - Sw								3.0	10.8	32.8	8.6	13.1	4.9	12.6	40.5	7.5																	133.8
8 - Pl								19.9							0.3																		20.2
9 - Sb														10.1	4.5																		14.6
Athabasca 9 Total								33.7	10.8	36.9	12.4	13.4	20.3	22.7	45.3	7.5																	202.9
Athabasca 10																																	
1 - Aw													32.5																				32.5
2 - Hw/Pl												17.8																					17.8
3 - Hw/Sw											0.5																						0.5
4 - Sw/Hw										9.9		0.5							32.4														42.8
5 - Pl/Hw								16.1							69.4																		85.5
7 - Sw										28.8	2.8	74.2	36.3	5.3	24.7	10.6			18.5						5.0								206.1
8 - Pl								7.7	4.0	16.5					252.1																		280.4
9 - Sb																19.6		13.2															32.8
Athabasca 10 Total								23.8	4.0	55.3	3.3	92.5	68.8	5.3	346.2	30.2		13.2	51.0						5.0								698.5
Athabasca 11																																	
4 - Sw/Hw										9.0																							9.0
5 - Pl/Hw								0.8																									0.8
7 - Sw										92.9		0.2	5.0	2.8	24.7																		125.6
8 - Pl								85.6	19.3	65.5	10.2		1.0	53.4	265.8																		500.8
9 - Sb													2.7																				2.7
Athabasca 11 Total								86.4	19.3	167.5	10.2	0.2	8.7	56.2	290.5																		638.8
Athabasca 18																																	
1 - Aw								0.0			0.7		161.8																				162.5
2 - Hw/Pl								9.2				45.6																					54.7
3 - Hw/Sw											50.8																						50.8
4 - Sw/Hw								6.7		21.5									1.1														29.2
5 - Pl/Hw								5.0																									5.0
7 - Sw											8.2		0.3												1.3								9.8
8 - Pl								12.6	7.2	6.7																							26.5

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
9 - Sb																1.5																	1.5
Athabasca 18 Total								33.4	7.2	28.2	59.7	45.6	162.0			1.5			1.1						1.3								340.0
Athabasca 21																																	
1 - Aw											0.4		303.5	9.6																			313.5
2 - Hw/Pl												37.5	17.6																				55.1
3 - Hw/Sw								1.7			5.0		0.7																				7.3
4 - Sw/Hw													0.0																				0.0
5 - Pl/Hw												22.2	273.3	14.9	6.2																		316.7
7 - Sw										2.1		7.5	8.5	15.5	87.8	8.3																	129.7
8 - Pl								3.1		36.8	10.3		3.8	106.7	1.8																		162.5
Athabasca 21 Total								4.8		38.9	15.7	67.2	607.4	146.8	95.8	8.3																	984.8
Athabasca 22																																	
1 - Aw													100.5	24.8	7.5																		132.7
2 - Hw/Pl								11.9				200.2	1.9																				214.0
3 - Hw/Sw													0.3					2.5															2.8
5 - Pl/Hw												239.9	36.1	16.1	1.3	0.4																	293.9
6 - Sb/Hw														0.1																			0.1
7 - Sw										11.9		29.6	36.3	35.6	12.7	62.2	22.3				8.4												219.1
8 - Pl									18.8	8.1	40.5	8.3	0.4	51.0	6.2	4.9	3.0																141.3
9 - Sb												8.7		5.5		4.2																	18.4
Athabasca 22 Total								11.9	18.8	20.0	40.5	486.6	175.5	133.2	27.7	71.7	25.3	2.5			8.4												1,022.1
Athabasca 26																																	
2 - Hw/Pl													3.2																				3.2
5 - Pl/Hw													2.0		25.9																		27.9
7 - Sw								17.6					10.0		20.2								29.0										76.8
8 - Pl									0.8	50.6	18.9	0.5	3.3	161.9	66.7		16.0						13.6										332.2
9 - Sb												4.3																					4.3
Athabasca 26 Total								17.6	0.8	50.6	18.9	4.8	18.5	161.9	112.8		16.0						42.5										444.3
Athabasca 27																																	
3 - Hw/Sw											14.2	0.5																					14.7
4 - Sw/Hw											10.6																						10.6
5 - Pl/Hw													12.2																				12.2
7 - Sw											8.1	70.0		53.2	8.0			5.2															144.5
8 - Pl								24.7				0.6	16.7	584.1			2.2																628.3
Athabasca 27 Total								24.7			32.9	71.1	29.0	637.3	8.0		2.2	5.2															810.4
Athabasca 28																																	
1 - Aw							5.7					0.5	167.0	51.5																			224.6
2 - Hw/Pl												120.9	80.5	21.0																			222.4
3 - Hw/Sw												0.2	1.7																				1.9
4 - Sw/Hw												0.8		1.4																			2.2
5 - Pl/Hw												214.4	373.7	119.5																			707.7
7 - Sw											21.0	6.9	47.0	182.3	171.8	14.1	13.2																456.3
8 - Pl											9.9	5.4	43.3	104.2	10.5																		173.3
9 - Sb												2.5		5.9	18.3	7.4		9.7															43.7
Athabasca 28 Total							5.7				30.9	351.6	713.2	485.7	200.6	21.6	13.2	9.7															1,832.2
Athabasca 29																																	
1 - Aw													7.8																				7.8
2 - Hw/Pl													8.4																				8.4
5 - Pl/Hw												2.3		13.2																			15.4
7 - Sw														4.6	0.2																		4.8
8 - Pl											38.0	0.2	9.7	46.6																			94.6
Athabasca 29 Total											38.0	2.4	25.9	64.4	0.2																		131.0
Athabasca 30																																	
1 - Aw													14.9																				14.9
2 - Hw/Pl								204.3				19.1	41.8																				265.2
3 - Hw/Sw													2.5																				2.5
5 - Pl/Hw								191.6				73.7	12.6	26.0																			304.0
7 - Sw								4.7	3.1					4.6		6.9		32.2															51.6
8 - Pl								464.8	502.0	48.3	41.5	4.3	13.1	35.5																			1,109.5
Athabasca 30 Total								865.4	505.2	48.3	41.5	97.1	85.0	66.0		6.9		32.2															1,747.7
Athabasca 33																																	
1 - Aw									1.5				376.5	142.3	26.7																		546.9
2 - Hw/Pl												187.6	218.9	16.9																			423.4
3 - Hw/Sw													0.5	1.0																			1.5
4 - Sw/Hw												0.4	0.2																				0.5

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
5 - Pl/Hw												146.0	64.6	130.6																			341.1
7 - Sw											16.6		39.6	102.9	163.3	7.6																	330.0
8 - Pl											25.1	0.0	32.5	77.8																			135.5
9 - Sb												8.5	9.3																				17.8
Athabasca 33 Total									1.5		41.7	342.5	742.0	471.6	190.0	7.6																	1,796.9
Athabasca 34																																	
1 - Aw											0.4																						0.4
2 - Hw/Pl								3.6				0.0	0.4																				4.0
4 - Sw/Hw								8.6		6.6																							15.2
5 - Pl/Hw								5.1				7.3																					12.4
7 - Sw								8.1	2.4	1.9		2.1	0.8		3.8																		19.1
8 - Pl								83.9	71.2	6.7	5.3	1.7	1.1		0.1																		170.0
9 - Sb									5.1			5.4																					10.5
Athabasca 34 Total								109.4	78.7	15.2	5.7	16.5	2.3		3.8																		231.6
Athabasca 35																																	
2 - Hw/Pl												1.9																					1.9
7 - Sw									0.8																								0.8
8 - Pl													2.6																				2.6
Athabasca 35 Total									0.8			1.9	2.6																				5.4
Berland 1																																	
7 - Sw													3.1			2.3	3.1	157.6	2.1				516.6								78.1		762.9
8 - Pl											9.1		2.7			13.7	29.2	1,306.7	69.7	7.0			185.9	5.4									1,629.4
9 - Sb																		188.9	0.9				0.4								0.6		190.7
Berland 1 Total											9.1		5.9			16.0	32.3	1,653.1	72.7	7.0			702.9	5.4							78.7		2,583.0
Berland 2																																	
7 - Sw															11.0			2.6					81.3		11.1			4.9				47.4	158.4
8 - Pl									1.8	65.2	0.4		15.7					19.1			6.2	1.4	331.7		36.1			26.7				31.4	535.6
9 - Sb																		4.0															4.0
Berland 2 Total									1.8	65.2	0.4		15.7		11.0			25.7			6.2	1.4	413.1		47.2			31.6				78.8	697.9
Berland 4																																	
7 - Sw																4.2		2.1			5.6	5.0	167.7		4.4		131.4	3.7				34.3	358.5
8 - Pl											26.0		16.0		1.4	31.6		3.3				7.9	260.7		17.1	6.5	61.2						431.6
Berland 4 Total											26.0		16.0		1.4	35.7		5.4			5.6	12.9	428.3		21.5	6.5	192.6	3.7				34.3	790.2
Berland 5																																	
7 - Sw													6.8			21.7		8.3					17.9		4.2		5.3	3.8					67.9
8 - Pl													11.9	3.1		75.5		105.7	7.6	3.2			30.2	6.0	156.7		7.9						407.8
Berland 5 Total													18.8	3.1		97.1		114.0	7.6	3.2			48.0	6.0	160.9		13.2	3.8					475.7
Berland 6																																	
7 - Sw													26.7					15.0				11.6	120.2								0.3	173.8
8 - Pl													21.7	11.3	8.6			87.3					43.6								4.9	0.1	177.6
9 - Sb													52.8										3.1										55.9
Berland 6 Total													101.2	11.3	8.6			102.3				11.6	167.0								4.9	0.4	407.4
Berland 7																																	
5 - Pl/Hw													15.0																				15.0
7 - Sw													30.0	3.4							14.1		29.8					10.0					87.2
8 - Pl								5.0			14.5		353.5	256.6	4.8	2.5				3.4	15.1		129.2					471.5	6.1				1,262.2
9 - Sb													27.9																				27.9
Berland 7 Total								5.0			14.5		426.4	260.0	4.8	2.5				3.4	29.2		159.0					481.5	6.1				1,392.4
Berland 8																																	
7 - Sw										5.0					11.3		7.9				18.3												42.4
8 - Pl										11.0			24.9		36.9					40.9	106.7		7.9										228.4
9 - Sb																		10.7															10.7
Berland 8 Total										16.0			24.9		48.2		7.9	10.7		40.9	125.0		7.9										281.5
Berland 10																																	
2 - Hw/Pl												4.5																					4.5
5 - Pl/Hw												71.2	20.1	10.4																			101.7
7 - Sw												58.3	2.9		4.2	2.9				12.1													80.4
8 - Pl									8.4				59.2		39.0		22.7	177.2	54.2	130.3	24.0												514.9
9 - Sb													6.1	32.7					23.0														61.8
Berland 10 Total									8.4			133.9	88.3	43.1	43.1	2.9	22.7	177.2	77.2	142.4	24.0												763.2
Berland 12																																	
1 - Aw													2.7		21.5																		24.2
2 - Hw/Pl													2.5																				2.5
5 - Pl/Hw													6.8																				6.8
7 - Sw													2.1		11.8	3.1		19.1			11.8		94.3										142.2

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
8 - Pl										61.9	0.0		28.7	12.5	16.6						18.3		26.3										164.3
Berland 12 Total										61.9	0.0		42.8	12.5	49.9	3.1		19.1			30.1		120.5										340.0
Berland 13																																	
7 - Sw												0.0		3.9																		3.9
8 - Pl										203.5		3.0	0.4		21.8					20.1	4.5											253.3
Berland 13 Total										203.5		3.0	0.4	3.9	21.8					20.1	4.5											257.3
Berland 14																																	
7 - Sw																							1.2				4.8	42.3			1.7		50.0
8 - Pl										3.3	909.0												39.5					107.6					1,059.4
9 - Sb										2.5	2.2																						4.7
Berland 14 Total										5.8	911.2												40.8				4.8	149.9			1.7		1,114.2
Berland 16																																	
4 - Sw/Hw											0.9												3.9										4.8
7 - Sw																4.0		28.2					142.5								12.2		187.0
8 - Pl											0.8		10.9					128.8					9.8				3.4						153.7
Berland 16 Total											1.7		10.9			4.0		157.1					156.2				3.4				12.2		345.5
Berland 18																																	
2 - Hw/Pl											1.4																						1.4
5 - Pl/Hw												2.2	7.6																				9.9
7 - Sw												30.4	12.1			3.1		0.6					6.5										52.7
8 - Pl												1.1	126.5		5.2	56.8																	189.6
Berland 18 Total											1.4	33.7	146.3		5.2	59.9		0.6					6.5										253.7
Berland 20																																	
1 - Aw											1.7	2.1	12.9																				16.7
2 - Hw/Pl									5.8				7.8																				13.6
3 - Hw/Sw																		5.5															5.5
4 - Sw/Hw																		7.2															7.2
5 - Pl/Hw									4.3				12.9							3.2													20.4
7 - Sw									17.5				1.6				3.4	34.0															56.6
8 - Pl									1,591.9				518.9			11.3	42.5	133.8		12.7			10.3										2,321.3
9 - Sb									9.4				7.8																				17.2
Berland 20 Total									1,628.9		1.7	2.1	562.0			11.3	45.9	180.5		15.9			10.3										2,458.7
Berland 21																																	
2 - Hw/Pl													2.1																				2.1
3 - Hw/Sw																				2.5													2.5
4 - Sw/Hw																							4.2										4.2
7 - Sw																				10.7			17.4										28.2
8 - Pl									0.1									0.1															0.1
Berland 21 Total									0.1				2.1					0.1		13.2			21.6										37.1
Berland 22																																	
4 - Sw/Hw																					12.5												12.5
5 - Pl/Hw													0.9																				0.9
7 - Sw																6.3		3.5		18.0	17.6												45.5
8 - Pl									130.0		30.2		114.9			8.0				21.0													304.1
Berland 22 Total									130.0		30.2		115.8			14.3		3.5		39.0	30.1												363.0
Berland 23																																	
1 - Aw													3.5																				3.5
2 - Hw/Pl													0.1																				0.1
3 - Hw/Sw													0.7																				0.7
4 - Sw/Hw													0.8								2.9												3.7
5 - Pl/Hw													0.5																				0.5
7 - Sw									8.5				7.2		11.0					4.1	26.4		11.6										68.9
8 - Pl									534.5	253.2	66.6		24.5								22.4												901.2
Berland 23 Total									543.0	253.2	66.6		37.3		11.0					4.1	51.7		11.6										978.6
Berland 24																																	
1 - Aw							15.7			0.6						9.3			6.9														32.5
5 - Pl/Hw													91.2																				91.2
8 - Pl								8.2	255.6	441.9			9.2																				714.9
Berland 24 Total							15.7	8.2	255.6	442.6			100.4			9.3			6.9														838.6
Berland 26																																	
1 - Aw													25.6	13.9																			39.5
2 - Hw/Pl								1.2				56.3	3.7																				61.3
4 - Sw/Hw													0.1																				0.1
5 - Pl/Hw												200.8	49.5																				250.3
7 - Sw									1.0					32.5	40.3	3.1																	76.9

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																																
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
8 - Pl										19.0	19.6	8.6	4.3	50.5																			102.0
9 - Sb													8.7																				8.7
Berland 26 Total								1.2	1.0	19.0	19.6	265.6	92.0	96.9	40.3	3.1																	538.7
Berland 27																																	
1 - Aw													0.2																				0.2
2 - Hw/Pl												9.4	3.6																				13.0
7 - Sw												6.0	6.7	32.3	17.7	10.5	8.1																81.4
8 - Pl										27.7	210.3	1.9	5.0																				245.0
9 - Sb									6.5		3.3		5.0																				14.8
Berland 27 Total									6.5	27.7	213.5	17.4	20.5	32.3	17.7	10.5	8.1																354.3
Berland 28																																	
1 - Aw													37.5	2.9																			40.4
2 - Hw/Pl												3.8	3.2	4.6																			11.5
4 - Sw/Hw																					36.8												36.8
5 - Pl/Hw												53.9		51.8																			105.7
7 - Sw										3.9			6.4	39.0	46.3	101.4		73.2			15.7												285.9
8 - Pl										417.6	23.7	0.1	4.8	1,007.3				2.8															1,456.3
9 - Sb										24.8				0.6																			25.4
Berland 28 Total										446.3	23.7	57.8	51.8	1,106.3	46.3	101.4		76.0			52.5												1,962.0
Berland 29																																	
1 - Aw																			12.3														12.3
2 - Hw/Pl													7.1																				7.1
5 - Pl/Hw													22.6						22.9														45.5
8 - Pl									12.5	10.9			1.0																				24.5
Berland 29 Total									12.5	10.9			30.7						35.1														89.4
Berland 33																																	
1 - Aw													1.7								2.1												3.9
2 - Hw/Pl													10.6								9.3												19.9
3 - Hw/Sw																					2.3												2.3
4 - Sw/Hw																		8.7	18.5		4.4												31.6
5 - Pl/Hw												4.4																					4.4
7 - Sw																		3.7			56.5							1.7					61.9
8 - Pl								4.9		6.1			0.7			10.4		2.5			53.7												78.3
Berland 33 Total								4.9		6.1		4.4	13.0			10.4		15.0	18.5		128.4							1.7					202.2
Coalspur																																	
7 - Sw											10.5																						10.5
8 - Pl								4.3																									4.3
Coalspur Total								4.3			10.5																						14.8
Embarras 1																																	
2 - Hw/Pl													4.9																				4.9
5 - Pl/Hw															0.6																		0.6
7 - Sw									12.4		6.9		5.0	10.2	28.9	40.4	39.0	37.8	5.2	6.5													192.3
8 - Pl													0.1	168.7	10.6	188.5	59.4	13.6															440.9
9 - Sb														11.1	10.9	14.2	9.0			2.5													47.8
Embarras 1 Total									12.4		6.9		10.0	190.0	51.0	243.2	107.4	51.4	5.2	9.1													686.6
Embarras 5																																	
7 - Sw								7.6	9.4		4.0	54.6																					75.6
8 - Pl								1,034.8	555.0	49.8	115.6	4.9																					1,760.1
Embarras 5 Total								1,042.4	564.4	49.8	119.6	59.5																					1,835.7
Embarras 6																																	
1 - Aw											0.1																						0.1
5 - Pl/Hw												41.8																					41.8
7 - Sw									6.2											3.0													9.2
8 - Pl									25.2	38.4	34.1	1.5																					99.2
Embarras 6 Total									31.4	38.4	34.2	43.4								3.0													150.3
Embarras 7																																	
1 - Aw							12.2						23.8																				36.0
2 - Hw/Pl								166.5				25.1	143.6	24.1	1.4																		360.7
3 - Hw/Sw								1.6																									1.6
5 - Pl/Hw								89.2				49.1	0.0	0.1																			138.4
7 - Sw													17.0			7.1	16.3																40.4
8 - Pl								235.7		21.0			54.5	87.2			7.7																406.1
9 - Sb												6.2																					6.2
Embarras 7 Total							12.2	493.0		21.0		80.4	238.9	111.4	1.4	7.1	24.0																989.3
Embarras 8																																	

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
1 - Aw										0.0			2.9																				2.9
2 - Hw/Pl												8.3		3.9																			12.2
5 - Pl/Hw								0.2				8.4	4.5	0.0																			13.2
6 - Sb/Hw													1.3																				1.3
7 - Sw										7.4			4.9	15.2			2.8																30.3
8 - Pl								2.4	16.4	41.2	183.2	0.5	2.9	28.8				7.1															282.6
9 - Sb									5.6	19.1	3.0		5.5		2.3	2.7																	38.2
Embarras 8 Total								2.7	22.0	67.7	186.2	17.2	22.0	48.0	2.3	2.7	2.8	7.1															380.8
Embarras 10																																	
1 - Aw													45.1	2.6																			47.6
2 - Hw/Pl															0.0																		0.0
5 - Pl/Hw														32.2																			32.2
7 - Sw														9.7	9.1																		18.8
8 - Pl										2.5			0.3	113.0	10.7	6.2																	132.7
Embarras 10 Total										2.5			45.4	157.4	19.8	6.2																	231.3
Embarras 11																																	
1 - Aw							0.8						3.0	1.1																			4.8
2 - Hw/Pl												69.5	1.8	7.4																			78.7
3 - Hw/Sw											1.5	0.2																					1.7
4 - Sw/Hw											4.2		0.5																				4.7
5 - Pl/Hw												59.9	67.6	38.9																			166.4
7 - Sw									31.2	2.6	20.8	30.4	55.0		39.3																		179.3
8 - Pl								4.0	4.2	1.0	5.5	2.7	12.7	60.7	12.4	0.0																	103.2
Embarras 11 Total							0.8	4.0	35.3	3.6	32.0	162.8	140.7	108.1	51.6	0.0																	538.9
Embarras 12																																	
2 - Hw/Pl												13.0	0.1																				13.1
5 - Pl/Hw												99.1	7.2																				106.3
7 - Sw								4.8			3.0	1.8	10.0							2.8													22.3
8 - Pl								46.6	14.1	15.0	16.4	2.9	0.2	12.0	0.1	5.1																	112.5
Embarras 12 Total								51.4	14.1	15.0	19.5	116.8	17.5	12.0	0.1	5.1				2.8													254.2
Embarras 15																																	
1 - Aw											0.3																						0.3
2 - Hw/Pl												0.3																					0.3
7 - Sw								0.8	12.8		16.4	3.3	4.9	21.3	15.9	39.0	2.9	2.0															119.3
8 - Pl									2,455.0	1,245.6	670.9	1.8	1.4		3.5	1.9																	4,380.1
Embarras 15 Total								0.8	2,467.8	1,245.6	687.5	5.4	6.3	21.3	19.4	40.9	2.9	2.0															4,499.9
Embarras 16																																	
7 - Sw									10.9								7.9	9.7				1.1											29.4
8 - Pl									244.4																								244.4
Embarras 16 Total									255.3								7.9	9.7				1.1											273.9
Embarras 18																																	
7 - Sw									2.2	10.9	17.5		1.5	19.0	103.1	26.9	60.6	131.6	24.1	37.8	13.5	16.0		0.0			9.4						474.1
8 - Pl									2.3	14.0	197.0	0.4													16.8		119.9	18.8	48.2				417.4
9 - Sb										0.0						25.1																	25.2
Embarras 18 Total									4.5	25.0	214.5	0.4	1.5	19.0	103.1	52.1	60.6	131.6	24.1	37.8	13.5	16.0		0.0	16.8		129.3	18.8	48.2				916.7
Embarras 19																																	
7 - Sw									0.4	2.6	17.9			11.9	0.9	2.5	16.4										0.3						52.9
8 - Pl									60.1	16.6	1,114.7	3.6															1.6	1.1	0.1				1,197.8
Embarras 19 Total									60.5	19.2	1,132.7	3.6		11.9	0.9	2.5	16.4										1.8	1.1	0.1				1,250.7
Embarras 20																																	
7 - Sw									0.2			40.2					0.6																41.0
8 - Pl								59.0	323.9	37.1	37.6	18.1																					475.7
Embarras 20 Total								59.0	324.0	37.1	37.6	58.3					0.6																516.7
Embarras 21																																	
5 - Pl/Hw											5.9																						5.9
7 - Sw									31.0	8.4		29.7	0.2																				69.3
8 - Pl								0.8	131.2	24.5	354.4	4.9																					515.8
Embarras 21 Total								0.8	162.2	32.9	360.3	34.5	0.2																				590.9
Embarras 22																																	
7 - Sw									3.5		12.3	5.4	1.5		4.1	31.4	2.8	3.1															64.2
8 - Pl									264.4	100.9	1,261.3					8.8											0.0						1,635.4
Embarras 22 Total									267.9	100.9	1,273.6	5.4	1.5		4.1	40.2	2.8	3.1									0.0						1,699.7
Marlboro 2																																	
1 - Aw							4.1				6.2	78.1	541.9	53.2	23.8		24.2																731.4
2 - Hw/Pl								9.4			0.2	14.7	221.6	128.4																			374.3

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
3 - Hw/Sw											29.8	46.7	255.9	148.4	24.8																		505.6
4 - Sw/Hw									1.2		6.9	63.9	35.8	64.7	119.1	43.5																	335.1
5 - Pl/Hw											16.9	75.3	381.4	98.3	21.6	2.5																	596.0
6 - Sb/Hw															2.1																		2.1
7 - Sw											7.4	4.8	11.7	20.8	15.7	13.8	3.2		5.4														82.8
8 - Pl												30.6	33.2	15.9	2.9																		82.6
9 - Sb											1.5		1.5		0.5																		3.5
Marlboro 2 Total							4.1	9.4	1.2		69.0	314.0	1,482.9	529.7	210.6	59.7	27.5		5.4														2,713.5
Marlboro 4																																	
1 - Aw													3.5																				3.5
2 - Hw/Pl									6.3		17.1		22.3																				45.8
3 - Hw/Sw											15.9		23.2																				39.0
4 - Sw/Hw											15.4	5.3	7.0																				27.7
7 - Sw								0.4			11.9																						12.3
8 - Pl								14.2	40.3		4.6	308.8																					367.9
Marlboro 4 Total								14.6	46.6		64.9	314.2	56.0																				496.2
Marlboro 5																																	
1 - Aw							2.0				9.1	3.3	19.7	6.7																			40.8
2 - Hw/Pl								9.1			5.9	80.4	46.7				8.0																150.0
3 - Hw/Sw								4.8			6.6	23.0	79.0	45.0																			158.4
4 - Sw/Hw											13.0		12.4																				25.4
7 - Sw								3.9	0.4	4.8	3.1																						12.3
8 - Pl								5.7	5.2		42.0	18.6																					71.4
Marlboro 5 Total							2.0	23.5	5.6	4.8	79.9	125.2	157.8	51.7			8.0																458.4
Marlboro 6																																	
1 - Aw											10.1	4.1	27.7																				41.9
2 - Hw/Pl												39.3	26.9																				66.2
3 - Hw/Sw								2.3		1.8	1.5	6.8	41.4																				53.9
4 - Sw/Hw											3.1	0.6	1.6																				5.3
7 - Sw								0.5			2.8																						3.3
8 - Pl											8.8	4.2																					13.0
Marlboro 6 Total								2.9		1.8	26.2	55.0	97.6																				183.5
Marlboro 9																																	
1 - Aw													4.0																				4.0
2 - Hw/Pl												6.7	0.2	16.1																			23.0
5 - Pl/Hw												7.5	0.2	95.1																			102.8
7 - Sw								13.7	0.8		13.5	3.5	4.7	54.5	117.7	18.7	5.5		0.3														232.9
8 - Pl								21.1		2.7	2.0	1.9		121.0	23.8	1.3	8.0																181.7
9 - Sb													14.1	12.3	2.1	6.2	2.3																37.1
Marlboro 9 Total								34.8	0.8	2.7	15.5	19.6	23.2	299.1	143.6	26.2	15.7		0.3														581.5
Marlboro 10																																	
1 - Aw													0.1																				0.1
2 - Hw/Pl												1.7																					1.7
4 - Sw/Hw											1.1		1.6																				2.6
5 - Pl/Hw													8.6																				8.6
7 - Sw								0.8	16.4		5.3	78.0	19.4	79.1	168.7	2.6	20.0	3.8															393.9
8 - Pl								111.8	142.4		21.7	1.1	19.9	42.4	10.3																		349.5
9 - Sb											20.5		1.2		32.4			7.5															61.6
Marlboro 10 Total								112.5	158.7		48.6	80.8	50.7	121.5	211.4	2.6	20.0	11.3															818.1
Marlboro 11																																	
1 - Aw													36.3	34.9	2.8																		74.0
2 - Hw/Pl													11.6	12.4																			24.0
3 - Hw/Sw											1.3																						1.3
4 - Sw/Hw								0.5																									0.5
5 - Pl/Hw													4.4	30.0																			34.4
7 - Sw													9.8	152.6	66.6	50.3																	279.2
8 - Pl								37.5			3.8		6.2	199.1	9.1																		255.6
9 - Sb												6.1	23.4																				29.5
Marlboro 11 Total								37.9			5.1	6.1	91.7	429.0	78.5	50.3																	698.5
Marlboro 12																																	
1 - Aw													89.0	29.5	10.7																		129.2
2 - Hw/Pl												9.6	22.3	3.8																			35.7
3 - Hw/Sw																			5.2														5.2
4 - Sw/Hw										9.4									6.2														15.6
5 - Pl/Hw												9.1	2.7	57.2	6.8																		75.8

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
6 - Sb/Hw														1.7																			1.7
7 - Sw								6.0			2.2		9.7	87.8	68.0	198.2	18.3	4.2	80.2		5.4	6.7											486.6
8 - Pl								10.5			10.8		4.5	55.2	27.4																		108.3
9 - Sb																2.6																	2.6
Marlboro 12 Total								16.5		9.4	13.0	18.7	128.2	235.2	112.8	200.7	18.3	4.2	91.6		5.4	6.7											860.7
Marlboro 13																																	
1 - Aw													136.3	32.9	2.1																		171.3
2 - Hw/Pl												80.5	54.0	39.7																			174.3
3 - Hw/Sw													0.2					0.1															0.3
4 - Sw/Hw										6.0				0.0																			6.1
5 - Pl/Hw												11.9	15.9	25.5	25.7																		79.0
7 - Sw									0.1					10.0	15.0	2.3																	27.4
8 - Pl									6.8		12.4	1.6	23.4	42.2	18.0																		104.4
9 - Sb													5.2			5.7																	10.9
Marlboro 13 Total									6.9	6.0	12.4	94.1	235.0	150.3	60.8	8.0		0.1															573.7
Marlboro 15																																	
1 - Aw													227.5	36.2																			263.8
2 - Hw/Pl								6.3																									6.3
3 - Hw/Sw									0.5		5.9																						6.3
4 - Sw/Hw									1.4	2.9																							4.3
7 - Sw									15.9	0.0			4.8	7.8	2.3																		30.9
8 - Pl											13.7		11.2																				24.9
9 - Sb													6.3																				6.3
Marlboro 15 Total								6.3	17.7	3.0	19.6		249.7	44.1	2.3																		342.7
Marlboro 16																																	
1 - Aw								0.1		0.2			323.8	649.2		29.3																	1,002.5
2 - Hw/Pl								26.5																									26.5
3 - Hw/Sw								10.2	1.2	0.2	18.5		0.3	1.3																			31.7
4 - Sw/Hw									1.3	11.2	4.2			1.5																			18.2
5 - Pl/Hw								8.6																									8.6
7 - Sw								18.4	2.2	10.4	2.3	7.3	18.5	178.4	11.0	72.4																	320.9
8 - Pl								2.2	119.6	136.0	5.0		1.1	116.3		18.6			2.7														401.5
9 - Sb												5.3		7.7		4.1																	17.2
Marlboro 16 Total								65.8	124.4	157.9	30.0	12.6	343.7	954.4	11.0	124.4			2.7														1,827.1
Marlboro 17																																	
1 - Aw													1.0	8.0	8.1	1.6																	18.7
2 - Hw/Pl								4.2				37.7	2.0	23.4																			67.3
3 - Hw/Sw											6.2	0.1		0.4																			6.8
4 - Sw/Hw												0.0			0.9																		0.9
5 - Pl/Hw								2.6				0.2	7.4	50.1	14.0	0.3	2.4																76.9
7 - Sw								7.3						52.1	113.1	43.6	1.2		0.2														217.5
8 - Pl								4.0	14.9	35.4	4.6			28.0	42.4																		129.1
9 - Sb																7.5																	7.5
Marlboro 17 Total								18.0	14.9	35.4	10.8	38.0	10.4	162.0	178.4	53.0	3.6		0.2														524.7
Marlboro 18																																	
1 - Aw								6.3	10.1	68.7		164.4	661.4	189.6	3.1		0.0																1,103.5
2 - Hw/Pl								0.1	41.6	1.5		18.6	128.3	4.2																			194.2
3 - Hw/Sw								8.7	10.8	21.1	7.0	10.1	600.0	167.8																			825.4
4 - Sw/Hw									2.7	13.0	23.5	26.2	98.9																				164.3
5 - Pl/Hw										6.0																							6.0
7 - Sw								9.0	2.0	3.1	8.1																						22.2
8 - Pl											16.7	7.2																					23.9
Marlboro 18 Total								24.1	67.1	113.3	55.4	226.4	1,488.6	361.6	3.1		0.0																2,339.6
Marlboro 19																																	
1 - Aw								1.6	2.4		2.6	49.3	5.6																					61.5
2 - Hw/Pl											5.1	57.6	0.6																					63.3
3 - Hw/Sw									6.8	0.7	10.3	38.5	33.3																					89.6
4 - Sw/Hw									5.2	10.1	0.0	0.0	7.4																					22.8
5 - Pl/Hw									2.3																									2.3
7 - Sw									8.2	5.4	5.8																							19.4
8 - Pl								1.7		3.5	141.0																							146.2
Marlboro 19 Total								3.3	24.9	19.6	164.8	145.5	46.9																					405.0
Marlboro 20																																	
1 - Aw							78.3	2.1			0.2	4.6	0.2																					85.4
2 - Hw/Pl								8.0			5.0	4.7	16.7																					34.4

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
3 - Hw/Sw								6.1			15.0	5.5	1.0																				27.6
4 - Sw/Hw											5.8	2.9	0.1																				8.8
5 - Pl/Hw								3.4																									3.4
7 - Sw										0.8	19.2																						20.0
8 - Pl									0.0		109.7	8.5																					118.1
Marlboro 20 Total							78.3	19.5	0.0	0.8	154.8	26.1	18.0																				297.6
Marlboro 21																																	
1 - Aw											1.0																						1.0
2 - Hw/Pl													7.6																				7.6
4 - Sw/Hw											1.1		4.4																				5.5
7 - Sw										2.1	3.7																						5.8
8 - Pl								2.3	3.4		7.9	239.0																					252.6
Marlboro 21 Total								2.3	3.4	2.1	13.8	239.0	11.9																				272.4
McLeod 3																																	
3 - Hw/Sw																				9.8													9.8
4 - Sw/Hw																				17.3													17.3
5 - Pl/Hw												14.8																					14.8
7 - Sw										6.6	0.6	13.7	22.2	2.6	6.4	47.1	6.1		10.4	138.8	6.6	43.6											304.9
8 - Pl								0.1	24.5	34.0	28.6	0.1	92.9	70.4		18.5		5.8		6.8	12.3	66.6			2.7	4.9							368.3
McLeod 3 Total								0.1	24.5	40.7	29.1	28.6	115.2	73.1	6.4	65.6	6.1	5.8	10.4	172.7	18.9	110.2			2.7	4.9							715.1
McLeod 4																																	
4 - Sw/Hw																			2.1														2.1
5 - Pl/Hw														2.8																			2.8
7 - Sw											1.0			71.3	2.6	50.1	29.7	16.8		21.3	0.8	0.3											193.8
8 - Pl								141.5	1,447.6	113.5	26.0		3.5	55.9		27.6	33.1	17.0															1,865.6
McLeod 4 Total								141.5	1,447.6	113.5	27.0		3.5	130.0	2.6	77.7	62.8	33.8	2.1	21.3	0.8	0.3											2,064.3
McLeod 5																																	
1 - Aw													7.9	5.4																			13.3
2 - Hw/Pl										6.3			14.9																				21.2
3 - Hw/Sw										0.3								3.3															3.6
4 - Sw/Hw																		3.2															3.2
5 - Pl/Hw													16.3																				16.3
7 - Sw													53.2	61.6		0.1	173.2	24.2			5.0												317.5
8 - Pl									3.1	44.2			0.5	35.7			163.8																247.2
9 - Sb													7.2				6.5																13.7
McLeod 5 Total									3.1	50.8			100.0	102.7		0.1	343.5	30.6			5.0												635.9
McLeod 7																																	
7 - Sw										0.4			24.2	310.8	7.3	35.9	254.4	42.3		313.8			135.9										1,124.9
8 - Pl										263.2	54.4		3.0	778.1	58.3	59.9	25.1																1,241.9
9 - Sb															4.9		3.0																8.0
McLeod 7 Total										263.6	54.4		27.2	1,088.9	70.5	95.8	282.5	42.3		313.8			135.9										2,374.8
McLeod 8																																	
7 - Sw									0.4	5.7			83.1	136.3		122.7																	348.2
8 - Pl									8.7	492.5	0.5	0.1	0.1	59.2																			561.1
McLeod 8 Total									9.2	498.2	0.5	0.1	83.2	195.5		122.7																	909.4
McLeod 12																																	
1 - Aw									2.2			0.7	99.0																				101.9
2 - Hw/Pl								4.2				71.9	5.6																				81.7
3 - Hw/Sw								7.9	0.1	27.9	19.5	0.5	1.1																				56.9
4 - Sw/Hw								8.3		25.7	117.0																						150.9
5 - Pl/Hw												218.9	10.7	58.2	2.5																		290.3
7 - Sw								53.4	29.4	44.5	41.3	45.8	18.9																				233.2
8 - Pl								28.6	299.8	39.1	3.6	0.9	0.4	33.9	5.6	0.8																	412.6
9 - Sb														5.1																			5.1
McLeod 12 Total								102.2	331.5	137.2	181.3	338.6	135.7	97.2	8.1	0.8																	1,332.5
McLeod 13																																	
1 - Aw										1.3		0.1	58.1																				59.5
2 - Hw/Pl								54.1				104.5																					158.6
3 - Hw/Sw										41.8																							41.8
4 - Sw/Hw								11.0		2.1	2.5																						15.6
5 - Pl/Hw								7.4				16.5																					23.9
6 - Sb/Hw																		9.2															9.2
7 - Sw										7.6					10.5	6.8																	24.8
8 - Pl									19.4				33.6																				53.1
9 - Sb																7.2																	7.2

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																															
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
McLeod 13 Total								72.6	19.4	52.7	2.5	121.1	91.7		10.5	14.0		9.2															393.6
McLeod 16																																	
1 - Aw							15.2																										15.2
2 - Hw/Pl								25.0																									25.0
3 - Hw/Sw								21.8																									21.8
4 - Sw/Hw													0.0																				0.0
5 - Pl/Hw								11.6				12.2																					23.8
7 - Sw								6.1	57.3	4.4	9.7	4.3	62.5		39.6	5.5																	189.4
8 - Pl									20.1		3.3																						23.3
McLeod 16 Total							15.2	64.5	77.4	4.4	13.0	16.5	62.6		39.6	5.5																	298.7
McLeod 17																																	
1 - Aw													20.6																				20.6
2 - Hw/Pl								8.3				32.5	5.5																				46.4
3 - Hw/Sw																		8.5															8.5
4 - Sw/Hw										15.6								7.4															23.0
5 - Pl/Hw												15.0	9.5		21.4					3.8													49.7
7 - Sw									129.1	262.9	10.3	43.3	56.0	10.8	3.9	107.2	55.9	51.9		23.4													754.6
8 - Pl								38.9	447.6	131.5	38.3	0.3	14.6	0.6	18.2	2.9		90.2		11.3													794.4
9 - Sb										4.0				13.5		8.0																	25.4
McLeod 17 Total								47.2	576.7	413.9	48.6	91.1	106.3	24.9	43.5	118.0	55.9	158.0		38.5													1,722.7
McLeod 18																																	
1 - Aw								0.5	3.6	29.1	24.8	5.2	38.4																				101.7
2 - Hw/Pl								67.0	120.7	72.1	13.0	62.2	8.2																				343.2
3 - Hw/Sw								19.7		29.0																							48.7
4 - Sw/Hw								42.1	24.0	16.4			0.0		0.3																		82.8
5 - Pl/Hw								24.0	143.8	60.0	22.4	74.1	0.7		2.6																		327.6
7 - Sw								22.3	33.8	74.8	4.0	100.6	14.6		6.4	30.3																	286.8
8 - Pl								308.9	1,733.0	949.4	108.7	2.1	6.0	220.4	19.0			0.3															3,347.7
9 - Sb									5.5	13.0			17.5		6.0																		42.0
McLeod 18 Total								484.7	2,064.4	1,243.8	172.9	244.2	85.4	220.4	34.2	30.3		0.3															4,580.5
McLeod 19																																	
1 - Aw								4.0	12.8	49.3	4.9		2.1																				73.1
2 - Hw/Pl								16.5	35.4	28.2	23.5	1.1	29.3		0.9																		134.8
3 - Hw/Sw								2.2	8.8	3.7	43.0																						57.8
4 - Sw/Hw									0.3		12.7																						13.0
5 - Pl/Hw									36.5	95.9	2.5		112.1		3.0	2.4																	252.4
6 - Sb/Hw										0.1																							0.1
7 - Sw								4.7	18.5	35.3	3.1		2.9	20.2	69.2	31.5																	185.4
8 - Pl								257.1	1,205.6	1,957.8			12.2		149.0																		3,581.7
9 - Sb										6.4				4.2	5.7																		16.3
McLeod 19 Total								284.6	1,317.8	2,176.6	89.6	1.1	158.6	24.4	227.8	33.9																	4,314.6
McLeod 20																																	
2 - Hw/Pl													16.8																				16.8
3 - Hw/Sw																		20.4															20.4
4 - Sw/Hw													0.9					12.1			0.4												13.5
5 - Pl/Hw												20.9	6.9																				27.8
7 - Sw								2.2		7.0			29.9			31.3	64.0	64.0					62.0										260.4
8 - Pl									20.9		2.3	1.0	38.8				79.6	16.8					17.2										176.6
9 - Sb													2.7				8.8																11.5
McLeod 20 Total								2.2	20.9	7.0	2.3	21.9	96.0			31.3	152.4	113.4			0.4		79.2										526.9
McLeod 23																																	
1 - Aw							0.6			1.7			3.3																				5.6
2 - Hw/Pl								2.7					0.9																				3.6
3 - Hw/Sw								0.4												0.6													1.1
4 - Sw/Hw																				12.0													12.0
5 - Pl/Hw								1.2					2.8																				4.0
7 - Sw									5.8	20.3		2.0	60.6			20.8	110.9	5.8		105.3			8.3										339.8
8 - Pl								98.2		361.0	3.4	0.0	21.6			15.2	13.0	13.4															525.9
9 - Sb								12.8		1.2			2.1																				16.2
McLeod 23 Total							0.6	115.3	5.8	384.3	3.4	2.1	91.4			36.0	123.9	19.2		118.0			8.3										908.2
McLeod 24																																	
7 - Sw											4.2	1.1								0.2													5.4
8 - Pl									13.0	18.1	20.9		0.8																				52.8
McLeod 24 Total									13.0	18.1	25.0	1.1	0.8							0.2													58.2
McLeod 25																																	

Compartment/ Yield Stratum	SHS Area (Ha) by Age Class (Stand Age at beginning of period of scheduled harvest)																														
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	Total
1 - Aw													27.9																				27.9
2 - Hw/Pl												18.5	57.2																				75.7
4 - Sw/Hw											10.0																						10.0
5 - Pl/Hw												52.7	75.0	7.1	17.2		0.6																152.6
7 - Sw									3.3	10.8			31.3	41.5	17.7	23.1	12.6																140.3
8 - Pl									12.9	381.3	55.5	2.2	58.4	28.4	44.7		19.0		9.0				12.7										624.1
9 - Sb										8.9		2.9																					11.7
McLeod 25 Total									16.2	401.0	65.5	76.2	249.9	77.1	79.6	23.1	32.2		9.0				12.7										1,042.4
McLeod 27																																	
1 - Aw													6.1																				6.1
2 - Hw/Pl												13.7																					13.7
3 - Hw/Sw								0.0		10.3		0.3	1.6																				12.2
4 - Sw/Hw												0.1																					0.1
5 - Pl/Hw												39.9	3.5																				43.4
7 - Sw								2.8		15.6	1.5	4.8	35.3			2.7																	62.8
8 - Pl									112.2	71.8	109.7	2.3	11.9																				307.8
9 - Sb																10.4																	10.4
McLeod 27 Total								2.9	112.2	97.6	111.2	61.2	58.4			13.1																	456.5
Grand Total							134.6	4,657.7	14,400.3	10,044.9	7,472.2	5,530.2	11,386.4	10,057.4	3,639.3	2,148.7	1,555.2	3,242.2	421.2	1,006.3	539.9	160.2	2,587.8	11.4	255.2	11.4	345.2	692.1	54.3		95.8	115.2	80,565.2

Appendix 4 SHS Shapefile Data Dictionary

Filename: HWP_SHS_V2.shp
File Type: Shapefile
No of Records: 544,937
Projection: UTM 11
Datum NAD 83
Note:

Arc/Info Coverage Field name	Data Type	Width	# Decimals	DESCRIPTION
FID	Object ID			
Shape	Geometry			Geometry type - polygon
REMSOFT_ID	long integer	9	0	Stanley required system field that indicates the unique identifier for every feature in the source data attribute table (Internal ID)
REASONCODE	character	15	0	Stanley optional system field that indicates the reason why an eligible polygon is not in solution
BESTPERIOD	short integer	3	0	Stanley optional system field that indicates the planning period in which eligible, unallocated polygons are ideally scheduled
ACTION	long integer	9	0	Indicates the Woodstock action applied to a polygon (Conifer harvest = 1, Deciduous harvest = 6)
CUT_PERIOD	long integer	9	0	Indicates the treatment period assigned to a polygon (Period of harvest)
PREBLOCK	character	1	0	Indicates that a polygon is a preblock (Planned block [Y = Yes, N or null = Not planned])
BLOCK	character	10	0	Indicates the block name or unit id assigned to a polygon (TFM Block ID begins with a 'B', Stanley Block ID begins with an 'S')
THEME1	character	10	0	Compartment
THEME2	character	10	0	Deletions (Table 19)
THEME3	character	10	0	Block Status (Planned, Harvested, HarvestedIS, None)
THEME4	character	10	0	Special Management Areas (Table 3)
THEME5	character	10	0	FireSmart Community Zones (Table 4)
THEME6	character	10	0	Improved Stock Deployment (Table 5)
THEME7	character	10	0	Riparian (Table 7)
THEME8	character	10	0	MPB Rank (Table 15)
THEME9	character	10	0	Fire Risk (Table 17)
THEME10	character	10	0	Natural Subregion (Table 6)
THEME11	character	10	0	Seral Stage (Appendix E)
THEME12	character	10	0	Yield Class (Table 14)
THEME13	character	10	0	Status (ST = Standing Timber, RT = Regenerating Timber)
AGE	long integer	9	0	Stores the age associated with features in the source data attribute table (Current Age [Periods])
AREAHA	double precision	18	8	Area (ha)
STANLOCK	character	15	0	Stanley optional system field that indicates the planning periods in which a polygon is under a spatial access lock and ineligible for treatment [Periods in which stands are not available in Stanley]
HCONIFCTL	double precision	18	8	Net Conifer CTL Volume (m3) at time of harvest [Net Conifer CTL Yield multiplied by SHS polygon area]
HCONIFTL	double precision	18	8	Net Conifer TL Volume (m3) at time of harvest [Net Conifer TL Yield multiplied by SHS polygon area]
HDECIDTL	double precision	18	8	Net Deciduous TL Volume (m3) at time of harvest [Net Deciduous TL Yield multiplied by SHS polygon area]
UYCONIFCTL	double precision	18	8	Net Conifer CTL Yield (m3/ha)
UYCONIFTL	double precision	18	8	Net Conifer TL Yield (m3/ha)
UYDECIDTL	double precision	18	8	Net Deciduous TL Yield (m3/ha)
TPMCONCTL	double precision	18	8	Conifer CTL TPM (trees per metre)
TPMCONTL	double precision	18	8	Conifer TL TPM (trees per metre)
TPMDECIDTL	double precision	18	8	Deciduous TL TPM (trees per metre)
HARVAGE	short integer	4	0	Age (at beginning of the period) of the stand at time of harvest

Filename: HWP_SHS_V3.shp
File Type: Shapefile
No of Records: 446,383
Projection: UTM 11
Datum NAD 83
Note:

Arc/Info Coverage Field name	Data Type	Width	# Decimals	DESCRIPTION
FID	Object ID			
Shape	Geometry			Geometry type - polygon
REMSOFT_ID	long integer	9	0	Stanley required system field that indicates the unique identifier for every feature in the source data attribute table (Internal ID)
REASONCODE	character	15	0	Stanley optional system field that indicates the reason why an eligible polygon is not in solution
BESTPERIOD	short integer	3	0	Stanley optional system field that indicates the planning period in which eligible, unallocated polygons are ideally scheduled
ACTION	long integer	9	0	Indicates the Woodstock action applied to a polygon (Conifer harvest = 1, Deciduous harvest = 6)
CUT_PERIOD	long integer	9	0	Indicates the treatment period assigned to a polygon (Period of harvest)
PREBLOCK	character	1	0	Indicates that a polygon is a preblock (Planned block [Y = Yes, N or null = Not planned])
BLOCK	character	10	0	Indicates the block name or unit id assigned to a polygon (TFM Block ID begins with a 'B', Stanley Block ID begins with an 'S')
THEME1	character	10	0	Compartment
THEME2	character	10	0	Deletions (Table 19)
THEME3	character	10	0	Block Status (Planned, Harvested, HarvestedIS, None)
THEME4	character	10	0	Special Management Areas (Table 3)
THEME5	character	10	0	FireSmart Community Zones (Table 4)
THEME6	character	10	0	Improved Stock Deployment (Table 5)
THEME7	character	10	0	Riparian (Table 7)
THEME8	character	10	0	MPB Rank (Table 15)
THEME9	character	10	0	Fire Risk (Table 17)
THEME10	character	10	0	Natural Subregion (Table 6)
THEME11	character	10	0	Seral Stage (Appendix E)
THEME12	character	10	0	Yield Class (Table 14)
THEME13	character	10	0	Status (ST = Standing Timber, RT = Regenerating Timber)
AGE	long integer	9	0	Stores the age associated with features in the source data attribute table (Current Age [Periods])
AREAHA	double precision	18	8	Area (ha)
STANLOCK	character	15	0	Stanley optional system field that indicates the planning periods in which a polygon is under a spatial access lock and ineligible for treatment [Periods in which stands are not available in Stanley]
HCONIFCTL	double precision	18	8	Net Conifer CTL Volume (m3) at time of harvest [Net Conifer CTL Yield multiplied by SHS polygon area]
HCONIFTL	double precision	18	8	Net Conifer TL Volume (m3) at time of harvest [Net Conifer TL Yield multiplied by SHS polygon area]
HDECIDTL	double precision	18	8	Net Deciduous TL Volume (m3) at time of harvest [Net Deciduous TL Yield multiplied by SHS polygon area]
UYCONIFCTL	double precision	18	8	Net Conifer CTL Yield (m3/ha)
UYCONIFTL	double precision	18	8	Net Conifer TL Yield (m3/ha)
UYDECIDTL	double precision	18	8	Net Deciduous TL Yield (m3/ha)
TPMCONCTL	double precision	18	8	Conifer CTL TPM (trees per metre)
TPMCONTL	double precision	18	8	Conifer TL TPM (trees per metre)
TPMDECIDTL	double precision	18	8	Deciduous TL TPM (trees per metre)
HARVAGE	short integer	4	0	Age (at beginning of the period) of the stand at time of harvest