TISC CARIBOO REGION
STAND TREATMENTS ANALYSIS

WILLIAMS LAKE TSA
TIMBER SUPPLY ANALYSIS REPORT

Prepared for:
Timber Investments Strategy Committee
Cariboo Forest Region

Prepared by:
Timberline Forest Inventory Consultants Limited
Prince George, B.C.

December 18, 1998

Reference: 9740038.6.1

Timberline
Forest Inventory Consultants

EXECUTIVE SUMMARY

This is a study of the availability of timber on the crown forest component of the Williams Lake Timber Supply Area (TSA). The analysis reviews a number of opportunities to improve the available timber supply by application of silviculture treatments. All analysis simulations were completed with FSSIM3.0, the Ministry of Forests' (MoF) forest level simulation model.

The "Base Case" analysis scenario includes assumptions and inputs closely resembling current management on the TSA based on the MoF *Williams Lake Timber Supply Area Timber Supply Review Data Package* (April 1993). Additional scenarios were evaluated in the analysis.

The analysis and results are subdivided into clearcut for the main TSA and the Three Western Supply Blocks. The Main TSA include a drybelt Douglas-fir selection harvest profile.

The Base Case results show an initial harvest rate of 2,670,000 m^3/year for the first decade, then decline at 10 percent per decade to 1,861,000 m3/yr in period 5. The harvest level can then be increased in decade 10 to a long-term harvest level of 1,971,000 m3/yr for the remainder of the 250 year planning horizon. The harvest level includes the Fd Drybelt selection harvest that ranges from 0 to 541,800 m^3/year and averages to 120,475 m3/yr over the 250 year planning horizon. All analysis simulations included estimates of non-recoverable losses (NRLs), in addition to reported harvest levels (39,000 m3/yr in the Main TSA and 15,000 m3/yr in the Three Western Supply Blocks).

Treatment scenario results indicate that the critical period for achieving the harvest rate is approximately 130 to 150 years into the future. During this period the inventory of available merchantable timber (stands in the net operable land base above minimum harvest age and not constrained by forest cover requirements) reaches a minimum level in the Main TSA. In the Three Western Supply Blocks a minimum inventory level occurs in periods 16 through 20, as a result of a significant gap in the age distribution.

Scenario results indicate that any treatments that make managed stands available earlier (decreased regeneration delay, reduced minimum harvest age) or provide more volume from managed stands (fertilization, tree improvement) will improve the long term harvest level predicted for the Base Case. Alternatively, changes to disturbance forest cover constraints, commercial thinning and utilization of problem forest types impact the short and mid term harvest levels significantly with proportional impacts on long term harvest levels.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This is a report of timber supply analysis completed on behalf of the Cariboo Forest Region Timber Investments Strategy Committee (TISC). Timber supply is the quantity of timber available for harvest over time. The methodology includes use of a forest-level simulation model which predicts the development of a forest over a 250-year planning horizon given a description of initial forest conditions, expected patterns of growth, and a set of rules related to harvesting and regenerating the forest. In addition, management assumptions related to non-timber forest resources are included in the analysis process.

Timber supply analysis involves three main steps:

- Collection and preparation of information and data. This information has been summarized and documented in *TISC Cariboo Region Stand Treatments Analysis Williams Lake Information Package*. Land base information was provided by MoF Cariboo Region (FIP data) and the Williams Lake District (ISIS data). The majority of the assumptions used to develop the Base Case option are based on the *Williams Lake Timber Supply Area Timber Supply Review Data Package* (April 1993) (MoF Data Package).
- Using the data in FSSIM3.0 (version released 98.09.24), the MoF's computer forest estate model, to develop harvest forecasts. A number of treatment scenarios are also performed to test the impact of alternative inputs on timber supply during this step.
- Interpretation and reporting of results.

2.0 DESCRIPTION OF OPTIONS

A number of analysis scenarios were identified for evaluation. The Williams Lake TSA is unique in nature, as it includes Three Western Supply Blocks and dry belt Douglas Fir selection harvest areas. A list of analysis scenarios is described below.

Base Case

The management assumptions, land base netdowns, general growth and yield parameters and forest cover requirements outlined in the MoF Data Package were used in this scenario. Some changes to the development of analysis units were made in the current analysis.

Old Growth Site Index (OGSI) Adjustments

Old growth site index (OGSI) adjustment equations are now available for interior spruce and lodgepole pine. These adjustments reflect the fact that site index estimates on old growth (>140 years old) stands are underestimated for managed stands of the same species on the same site. Since the commencement of this analysis MoF Research Branch have published updated adjustment equations which define eligible stands by inventory site index range and biogeoclimatic ecological classification (BEC). Therefore the full OGSI adjustment has been applied to eligible old growth interior spruce and lodgepole pine stands for this scenario.

Reduced Time to Green-up

The IRM and Visual disturbance constraint areas had the years to green-up reduced by 3 years to 13 and 12 years, respectively. This was intended to reflect stand treatments (brushing, fertilization) that enhance early stand growth and thereby reduce the time required to achieve green-up.

Reduced Regeneration Delay

In this scenario regeneration delays defined for the Base Case were reduced by two years and to 0 years. This included all existing NSR (current and backlog).

Genetically-Improved Planting Stock (Tree Improvement)

Tree improvement gains were included in this scenario based on an estimated maximum 12% volume gain at rotation age. In this treatment scenario site index adjustments were made to each of the regeneration analysis unit TIPSY yield Tables to achieve a 12% volume gain at culmination. Two candidate groups were reviewed in this scenario – one including lodgepole pine, the other without lodgepole pine.

Alternative Spacing Intensities

Alternative spacing densities for managed stands were included in this set of treatment scenarios. Revised TIPSY managed stand yield tables were developed for all TSA clear-cut Douglas-fir, lodgepole pine and interior spruce managed stands.

Fertilization & Spacing

In these scenarios all eligible lodgepole pine managed stands were given a volume increase of 15m3/ha at rotation age to represent gains from one fertilization treatment during the rotation.

Eliminate Backlog NSR

This scenario evaluates the impact on timber supply of eliminating backlog NSR (areas harvested prior to 1987 that do not meet stocking requirements) in 5 and 0 years compared to 10 years in the Base Case scenario.

Commercial Thinning

Commercial thinning scenarios were examined looking at one time, 50 m3/ha and 70 m3/ha volume recovery up to 20 years prior to the minimum harvest age. The commercially harvested stands do not impact on adjacency constraints and were then available for harvest at the respective minimum harvest age.

Combination Scenarios

Various combination scenarios were examined. They included reductions in regen delay combined with reductions in green up ages and commercial thinning.

3.0 INFORMATION PREPARATION

Many pieces of information are required to conduct a timber supply analysis. Each piece falls into one of three categories:

- Land base inventory;
- Timber growth and yield; or
- Management practices.

3.1 Land base Inventory

Land base inventory information used in this analysis comes from the MoF's forest inventory data (FIP), Integrated Silviculture Information System (ISIS) and additional digital data for non-standard inventory types including Cariboo-Chilcotin Land Use Plan (CCLUP) zones and a revised roads inventory. All mapped information (FIP and non-standard inventory data) was unioned using ARC/INFO GIS software.

ISIS data was used to develop MSYT attributes for the existing component of the forest that is currently growing under managed stand conditions. Initially, it was planned to replace FIP stand attribute information with attributes from the ISIS database for the appropriate component of the inventory. However, the two data sets did not have matching forest cover polygon identification data and a direct merge was not possible.

The net operable land base (also called the working forest or timber harvesting land base) consists of all the productive forest within the TSA and excludes the area of PA16 that is, or will be available for timber management over the long term. This land base is determined by reducing the total land base according to specified management assumptions. Complete details of the reductions made in developing the net operable land base are provided in the Information Package. Table 3.1 summarizes the land base netdowns for the Base Case option.

Table 3.1: Timber Harvesting Land base Determination – Base Case

Land Classification	Net Reduction	
	Area (ha)	**% of total**
Total Area	4,561,292	100.0
Non-crown land	263,713	5.8
Non-prod forest & Non-forest	1,077,363	23.6
Productive Forest	**3,220,215**	**70.6**
Productive reductions:		
Non-commercial (NCBr)	1,603	0.0
ESAs:	114,103	2.5
Steep slopes	59,112	1.3
Eastern caribou	125,245	2.7
Chilko deferred planning area	13,614	0.3
Problem forest types[1]	1,393,177	30.5
Mule deer	10,656	0.2
Roads, trails and landings	22,200	0.5
Not satisfactorily restocked areas	123,508	2.7
Total Productive Forest Reductions	1,863,247	40.8
Current Net Operable Land base	**1,356,968**	**29.7**
Additions to Productive Forest		
NSR	123,508	2.7
Total Productive Land Base	**1,480,476**	**32.5**
Future Reductions		
Future roads, trails and landings	37,576	0.8
Long-term Net Operable Land base	1,442,900	31.6

3.2 Inventory Aggregation

In order to reduce the complexity of the forest description for the purposes of timber supply analysis simulation, aggregation of individual forest stands is necessary. However, it is critical that this aggregation does not obscure either the biological differences in forest stand productivity or differences in management objectives and prescriptions.

Two levels of aggregation were used in preparing the inventory for analysis:

- Forest cover constraint groups are the areas with similar non-timber resource concerns. Visually sensitive areas and general IRM are examples of disturbance groups included in the analysis database. Specific forest cover constraints related to green-up and disturbance, and old growth were assigned to five constraint groups for the analysis.
- Analysis Units (AUs) were assigned to stands with similar biological (species composition and site productivity), management and/or silviculture regimes to model the growth of individual stands during the analysis process. VDYP

natural stand yield tables and TIPSY managed stand yield tables were used to represent the growth of the various stands included in the analysis.

Other reporting and harvest target groups were also defined for various aspects of the analysis. A complete description of the land base aggregates listed above are provided in the Information Package.

3.3 Timber Growth and Yield

Timber growth and yield refers to the prediction of growth and development of individual forest stands over time. Stand volumes are estimated by using stand attributes (species composition, site productivity, density/crown closure and allowances for decadence) in various growth models.

MoF Variable Density Yield Prediction model (VDYP version 6.4) was used to develop natural stand yield tables (NSYTs) for the following stand types:

- Existing stands assumed to have been established naturally (30 years and older);
- All existing and regeneration yields for selection harvest areas (Drybelt Fd selection areas); and
- All existing and regeneration yields for deciduous-leading types.

Existing managed stands (1 – 30 years old) and the majority of future managed stand yields were estimated with the MoF model Table Interpolation Program for Stand Yields (BatchTIPSY Version 2.0 Beta5) (TIPSY). A number of TIPSY yield tables were developed to address various analysis scenarios (OGSI adjustments, fertilization, tree improvement, *etc*.).

3.4 Management Practices

Timber supply is directly linked to forest management activities. In all analysis scenarios the timber supply is investigated using many current management practices. FPC requirements including riparian management zones and stand-level biodiversity, exclusions for wildlife habitat, visual sensitivity requirements and old growth objectives have all been included in the analysis, as done in TSR 1.

Non-recoverable losses (NRLs - expected timber losses due to fire, pest, and wind damage) were included in all harvest simulations. These estimated losses are added to the target harvest level for modeling.

Utilization levels reflect B.C. interior close utilization standards. Natural and managed stand yield Tables typically use the approximate age of culmination of mean annual increment (MAI) and minimum diameter requirements as the basis for establishing minimum harvest age.

Cutblock "adjacency" and green-up objectives are addressed by including maximum disturbance limits and minimum green-up ages within each constraint group defined for the land base (visually sensitive areas and IRM areas are examples). Selection harvest areas maintain a required level of forest cover by allowing only partial removal of mature stands.

For all analyses the harvest rule of "relative-oldest first" was used.

Recent inventory information was collected on the Williams Lake TSA for both timber and non-timber resources. Coupled with updated management guidelines, these non-timber resources can be more thoroughly addressed in timber supply analysis compared to previous analyses.

4.0 ANALYSIS METHODS

MoF's timber supply simulation model FSSIM 3.0 (Forest Service Simulator) was used to assess timber supply in this analysis. A forest projection model such as FSSIM 3.0 allows a harvest level to be imposed on a forest. The forest is grown according to a set of rules and age-based relationships. A timber supply analyst can determine if a chosen harvest level can be sustained or, by modifying some of the inputs, determine the timing, duration and nature of management programs required to maintain or improve a given level of harvest. In addition, FSSIM 3.0 has the ability to impose forest cover constraints on harvesting.

In FSSIM 3.0 the existing state of the forest is assessed on input to the model. This initial state impacts on all future activities and available timber. The existing forest may contain areas to which access is limited from the beginning of the planning horizon by virtue of the forest cover constraints assigned in the modeling process. This may be the outcome of assigning a set of cover constraints on a forest that has never been modeled under specific cover constraints in the past. In this situation, parts of the forest remain unavailable for harvest until such time that sufficient growth has taken place to achieve acceptable levels of green-up, disturbance, or retention.

The following objectives were used in developing harvest schedules during the modeling simulations:

- To sustain a harvest level as high as the current AAC of 3,095,000 m3/year (which includes 2,670,000 m3/year for the Main TSA and 425,000 m3/year for the Three Western Supply Blocks) plus non-recoverable losses of 39,000 m3/year for the main TSA and 15,000 m3/year for the Three Western Supply Blocks;
- Decrease the periodic harvest rate in acceptable steps (up to 10%) during the periods when declines are required to meet all objectives associated with the various resources on the entire TSA;

- Achieve an essentially even-flow of timber that approaches the long-term sustainable level that considers forest cover requirements;
- Avoid merchantable volume shortfalls during the 250-year planning horizon;
- Achieve stable inventory levels in the long-term; and
- Explore opportunities to increase the harvest rate by implementing management strategies while maintaining the requirements of non-timber resources.

In addition, forest cover requirements must be met within each of the forest cover constraint groups during each period of the 250-year planning horizon. If forest cover requirements are not satisfied, the harvest level may be forced to decline. This ensures that integrated resource management issues are properly addressed.

5.0 ANALYSIS RESULTS

Results of the various analyses are presented in tabular form. Additional graphic results display trends in timber inventory (stock) and harvest levels. Tables provide the actual harvest levels achieved during each period of the simulation. For each of the analysis scenarios presented the tabular results include a breakdown of the following harvest components:

- Main TSA;
- Fd-Drybelt selection; and
- Three Western Supply Blocks clearcut;

Graphic presentations of the periodic harvest typically include only the TSA clearcut and Fd-Drybelt selection component. All harvest levels reported are net of non-recoverable losses, estimated at 39,000 m3/year for the Main TSA and 15,000 m3/year for the Three Western Supply Blocks.

5.1 Base Case

Inputs for the Base Case have been described briefly in the previous sections and in more detail in the Information Package.

Harvest Schedule

The Base Case harvest schedule was chosen after reviewing various harvest flow alternatives and comparing to harvest flow chosen in TSR 1. Forest-level modeling can offer many possible solutions given various harvest flow strategies. The results for the Main TSA are summarized in Figure 5.1 and Table 5.1.

Figure 5.1: Base Case Harvest Levels, Main TSA

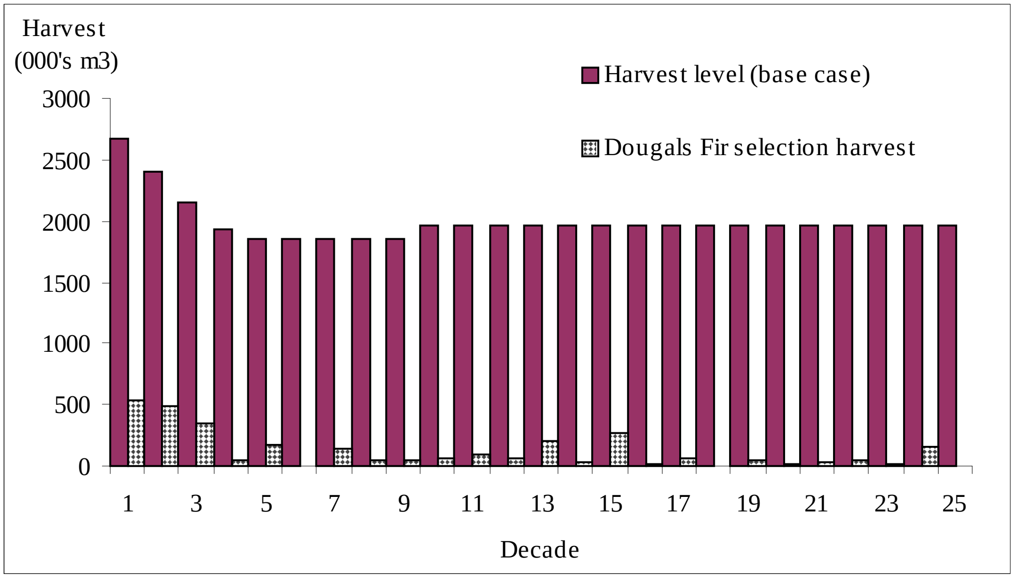


Table 5.1: Base Case Harvest Levels, Main TSA

Simulation Period	Annual Harvest by Land base Component (m3)	
	Base Case	Douglas Fir selection harvest
1	2,670,000	541,800
2	2,399,100	487,600
3	2,155,290	339,200
4	1,935,861	41,900
5	1,861,000	175,100
6	1,861,000	-
7	1,861,000	140,600
8	1,861,000	45,200
9	1,861,000	42,800
10	1,971,000	69,700
11	1,971,000	96,300
12	1,971,000	61,500
13	1,971,000	203,900
14	1,971,000	25,800
15	1,971,000	260,300
16	1,971,000	15,900
17	1,971,000	66,500
18	1,971,000	-
19	1,971,000	51,600
20	1,971,000	17,100
21	1,971,000	24,100
22	1,971,000	53,800
23	1,971,000	23,000
24	1,971,000	160,800
25	1,971,000	-

The current AAC of 2,670,000 m3/year can only be maintained in the first decade, then declines at 10 percent per decade to 1,861,000 m3/year in decade 5. The harvest level can then be increased to the long term harvest level of 1,971,000 m3/year in decade 10 for the remainder of the 250 year planning horizon. The Fd-Drybelt selection ranges to 541,800 m3/yr and averages 120,000 m3/yr annual harvest from the TSA component.

The Base Case scenario is the basis for all subsequent analysis results discussed in the following sections.

Figure 5.3 provides the initial age class distribution for both the net operable forest and productive forest area that does not contribute to the annual harvest (classified as "I" inoperable in the analysis data set).

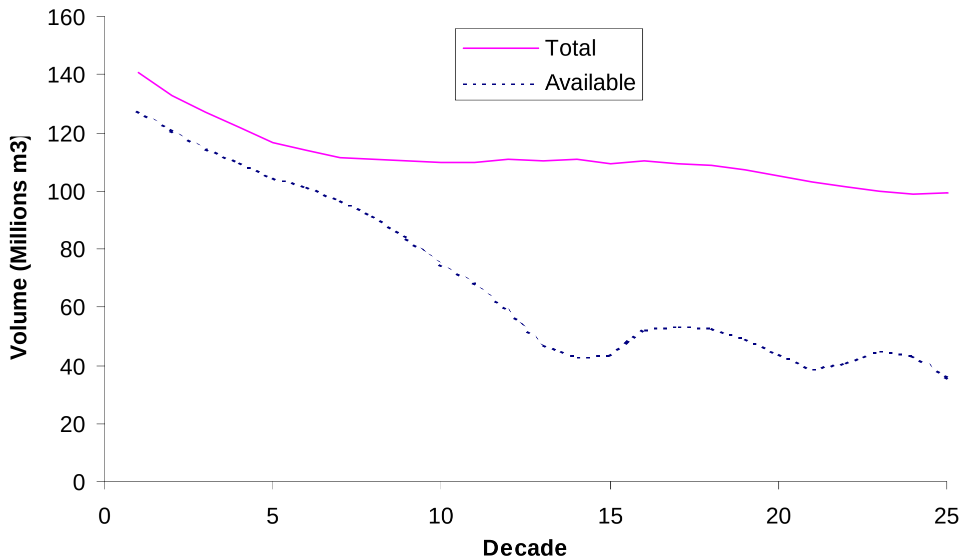


Figure 5.2: Base Case Inventory Levels, Main TSA

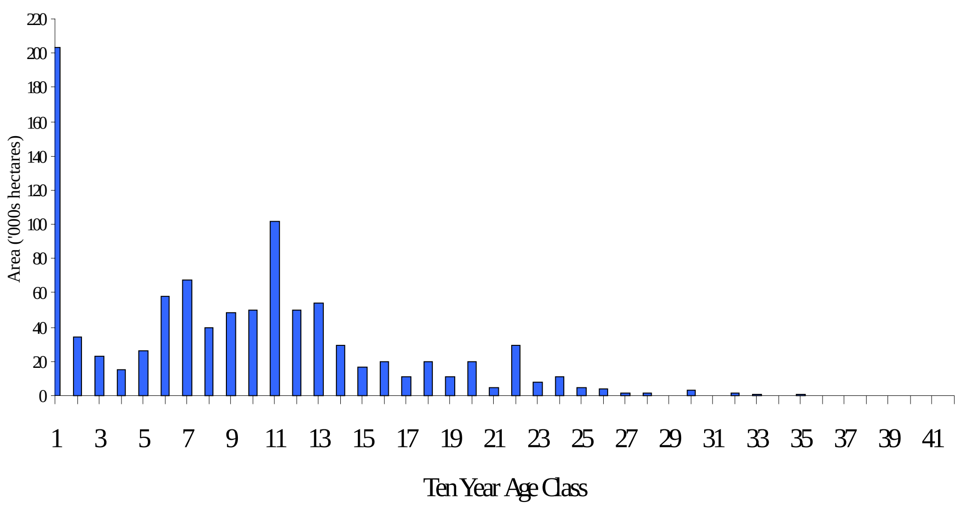


Figure 5.3: Base Case Initial Age Class Distribution, Main TSA

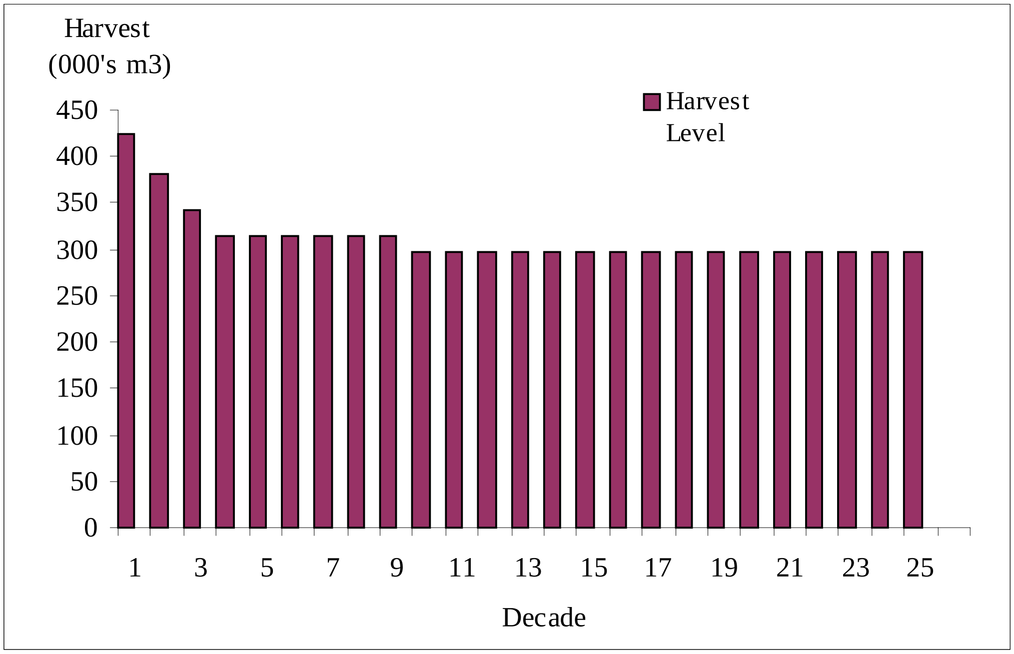


Figure 5.4: Base Case Harvest Level, Three Western Supply Blocks

Table 5.2: Base Case Harvest Schedule , Three Western Supply Blocks

Simulation Period	Annual Harvest (m3/year)
1	425,000
2	381,000
3	341,400
4	315,000
5	315,000
6	315,000
7	315,000
8	315,000
9	315,000
10+	297,000

The current apportion of 425,000 m3/year can only be maintained in the first decade, then declines at 10 percent per decade to 315,000 m3/year in decade 4. The harvest level then further decreases to the long term harvest level of 297,000 m3/year in decade 10 for the remainder of the 250 year planning horizon. Figure 5.5 displays inventory levels over the planning horizon. In periods 16 to 20 the available inventory levels are at a critical low caused primarily by the uneven age distribution of the Three Western Supply Blocks. (Figure 5.6)

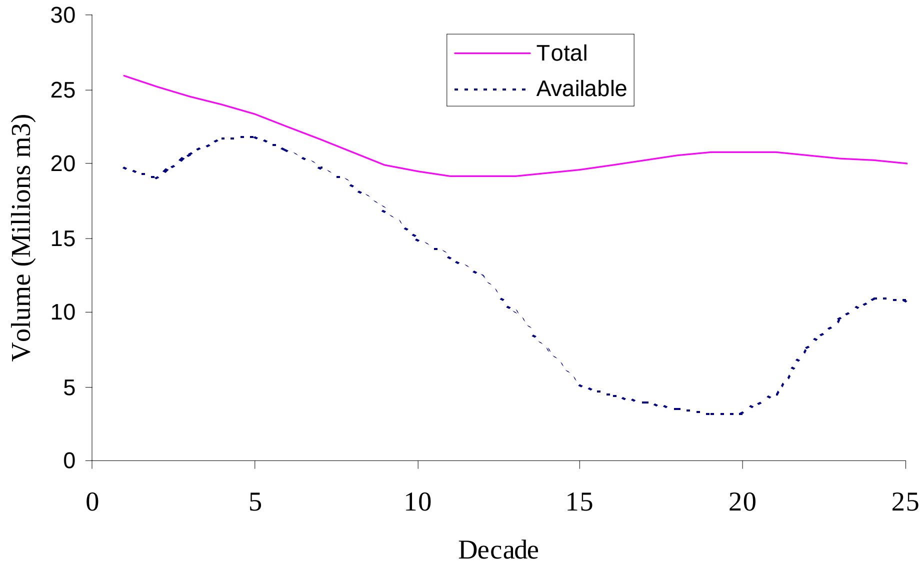


Figure 5.5: Base Case Inventory Levels, Three Western Supply Blocks

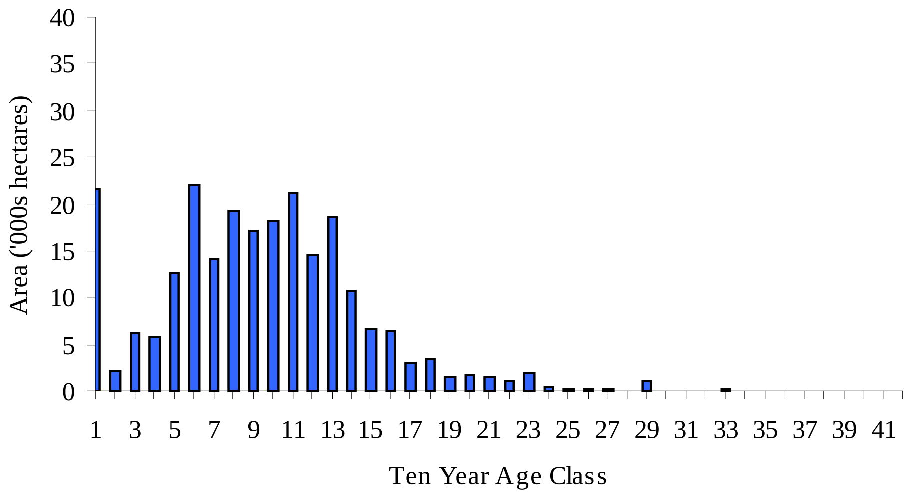


Figure 5.6: Base Case Initial Age Class Distribution, Three Western Supply Blocks

5.2 Base Case + OGSI Adjustments

As stated in Section 2, this scenario evaluated the impacts of including OGSI adjustments for eligible sites when regenerated to managed stand conditions. Lodgepole pine and interior spruce are the eligible species. Table 5.3 and Figure 5.7 summarize the harvest forecast developed for the Main TSA, and Table 5.4 and Figure 5.8 summarize the harvest forecast for the Three Western Supply Blocks.

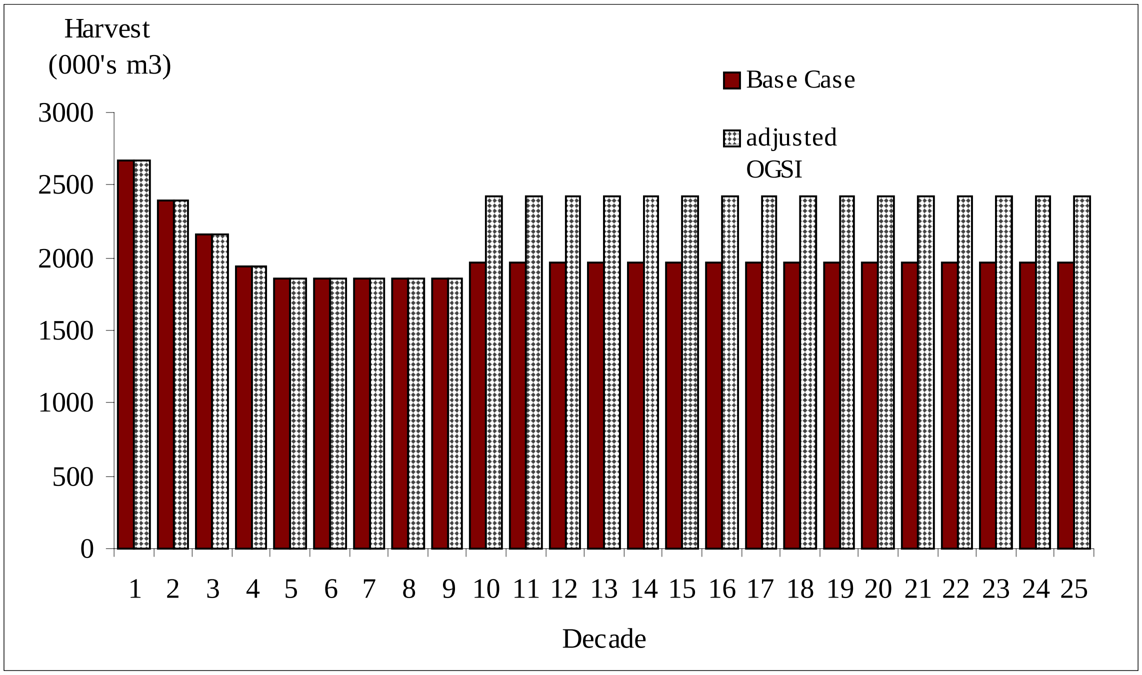


Figure 5.7: Base Case + OGSI Adjustments Harvest Levels, Main TSA

Table 5.3: Base Case + OGSI Adjustments Harvest Schedule, Main TSA.

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Adjusted OGSI	
		Harvest	% Change
1	2,670,000	2,670,000	0.00
2	2,399,100	2,399,100	0.00
3	2,155,290	2,155,290	0.00
4	1,935,861	1,935,861	0.00
5	1,861,000	1,861,000	0.00
6	1,861,000	1,861,000	0.00
7	1,861,000	1,861,000	0.00
8	1,861,000	1,861,000	0.00
9	1,861,000	1,861,000	0.00
10+	1,971,000	2,416,000	+22.58

The long-term harvest gain is approximately 22.58% over the Base Case in this scenario for the Main TSA.

Selection areas were not given an OGSI adjustment because they regenerate to natural stands. The OGSI adjustment on MSYTs reduces the impact of the critical period 130 – 150 years into the future because there is more merchantable volume available for harvest at that time. In addition some of the affected stands have reduced minimum harvest ages and green up delays when OGSI adjustments are incorporated.

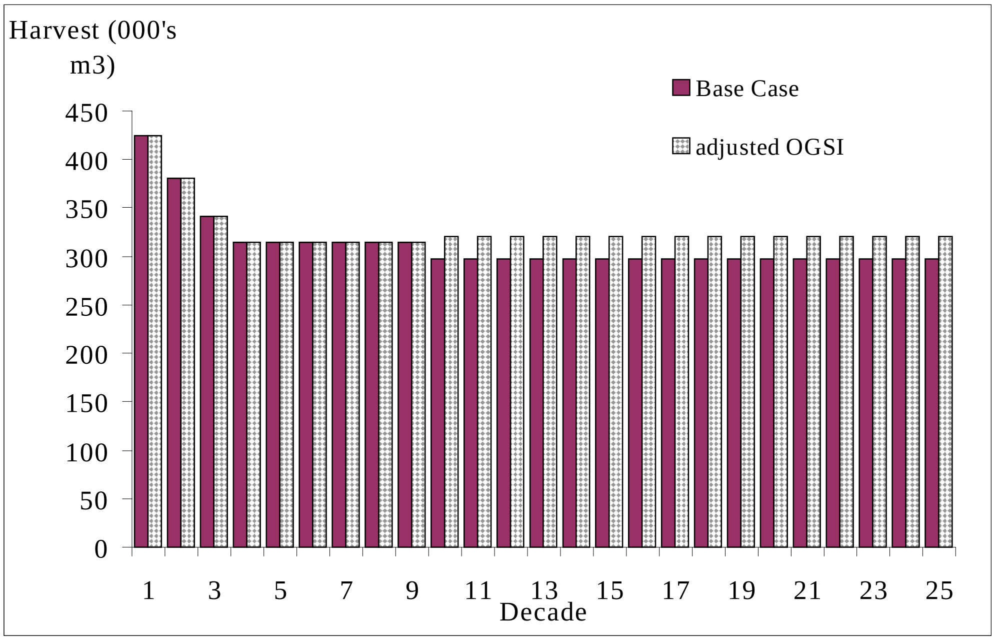


Figure 5.8: Base Case + OGSI Adjustment, Three Western Supply Blocks.

Table 5.4: Base Case + OGSI Adjustment, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Adjusted OGSI	
		Harvest	% change
1	425,000	425,000	0.00
2	381,000	381,000	0.00
3	341,400	341,400	0.00
4	315,000	315,000	0.00
5	315,000	315,000	0.00
6	315,000	315,000	0.00
7	315,000	315,000	0.00
8	315,000	315,000	0.00
9	315,000	315,000	0.00
10+	297,000	321,000	+8.08

The long-term harvest gain is approximately 8% over the Base Case in this scenario on the Western Supply Blocks. Selection areas were not given an OGSI adjustment because they regenerate to natural stands. The OGSI adjustment on MSYT reduces the impact of the critical period 150 – 180 years into the future because there is more merchantable volume at that time. In addition some of the affected stands have reduced minimum harvest ages and green up delays with OGSI adjustments.

5.3 Reduced Time to Regenerate Backlog NSR

In this scenario it is assumed that all backlog NSR will be regenerated during the first 5 years of the planning horizon. Figure 5.9 and Table 5.5 report results for the Main TSA. Figure 5.10 and Table 5.6 report results for the Three Western Supply Blocks.

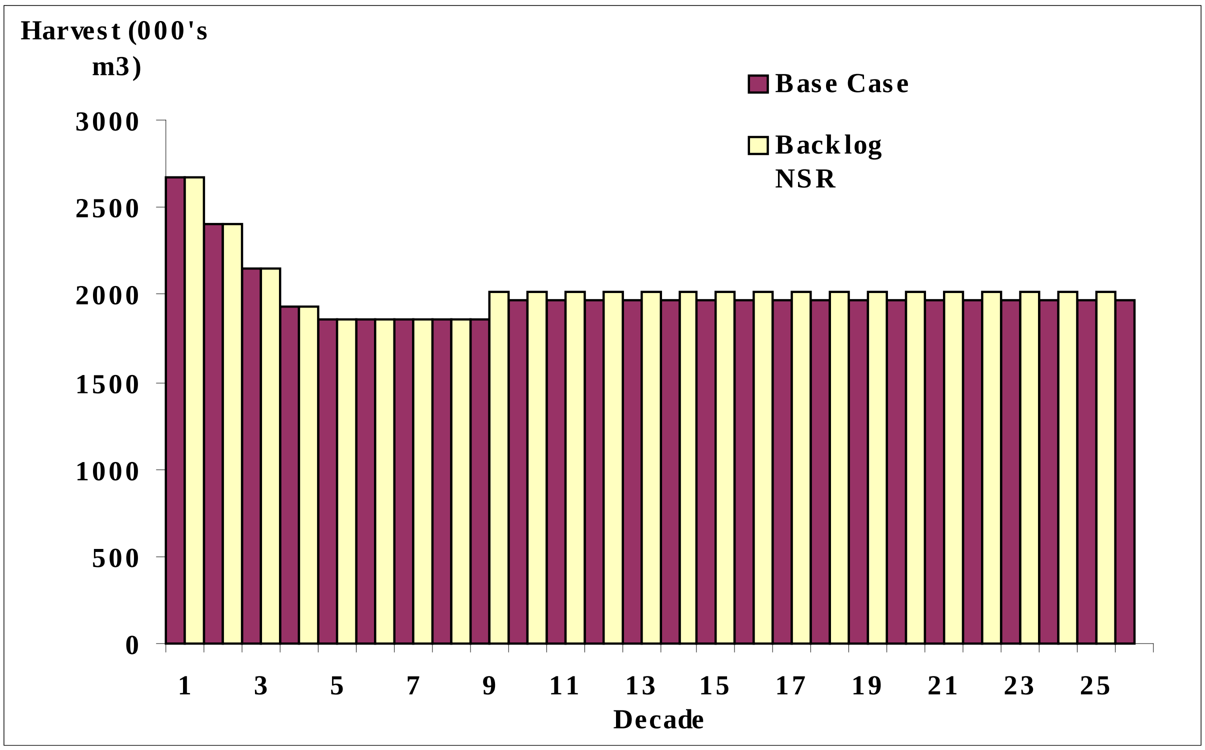


Figure 5.9: Rehabilitate Backlog NSR, Main TSA

Table 5.5: Rehabilitate Backlog NSR, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Backlog NSR	
		Harvest	% change
1	2,670,000	2,670,000	0.00
2	2,399,100	2,399,100	0.00
3	2,155,290	2,155,290	0.00
4	1,935,861	1,935,861	0.00
5	1,861,000	1,861,000	0.00
6	1,861,000	1,861,000	0.00
7	1,861,000	1,861,000	0.00
8	1,861,000	1,861,000	0.00
9	1,861,000	2,011,000	+8.06
10+	1,971,000	2,011,000	+2.03

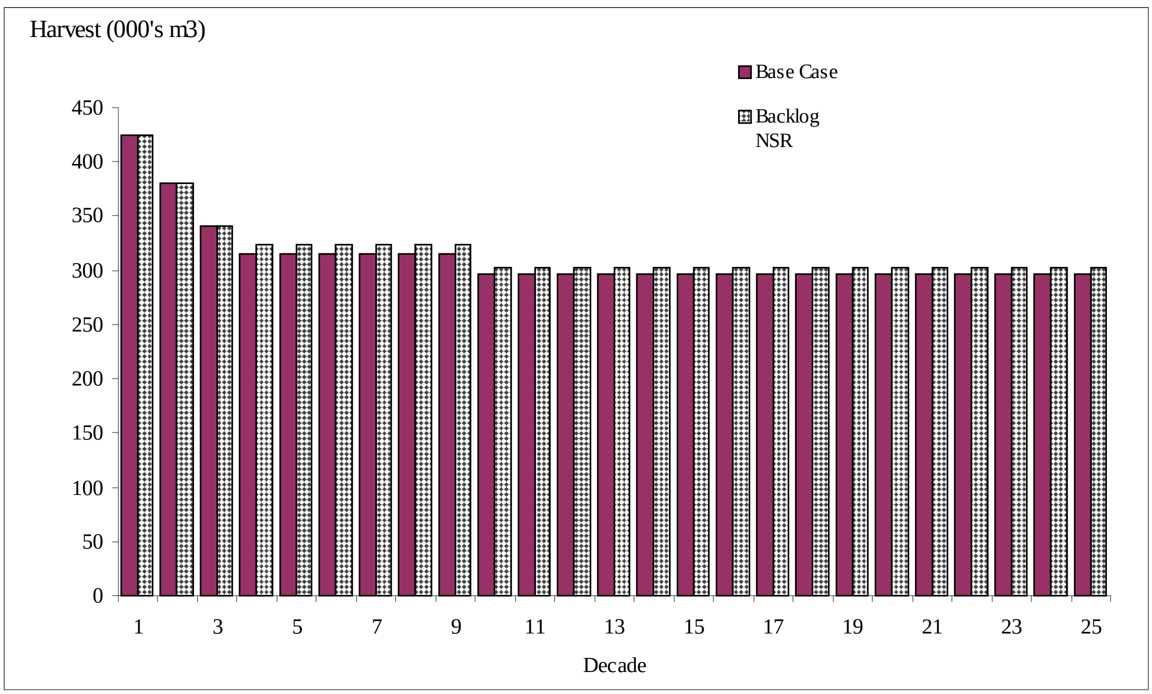


Figure 5.10: Rehabilitate Backlog NSR, Three Western Supply Blocks.

Table 5.6: Rehabilitate Backlog NSR, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Backlog NSR	
		Harvest	% Change
1	425,000	425,000	0.00
2	381,000	381,000	0.00
3	341,400	341,400	0.00
4	315,000	323,000	+2.54
5	315,000	323,000	+2.54
6	315,000	323,000	+2.54
7	315,000	323,000	+2.54
8	315,000	323,000	+2.54
9	315,000	323,000	+2.54
10+	297,000	302,000	+1.68

5.4 Reduced Regeneration Delay

The expected time for stands to become established after harvest was reduced by two years in one simulation completed for this scenario. In addition regeneration delays were set to 0 in another simulation. Selection harvest areas are not modified for this scenario. Figure 5.11 and Table 5.7 report harvest forecasts developed for this scenario in the Main TSA, and Figure 5.12 and Table 5.8 report results for the Three Western Supply Blocks.

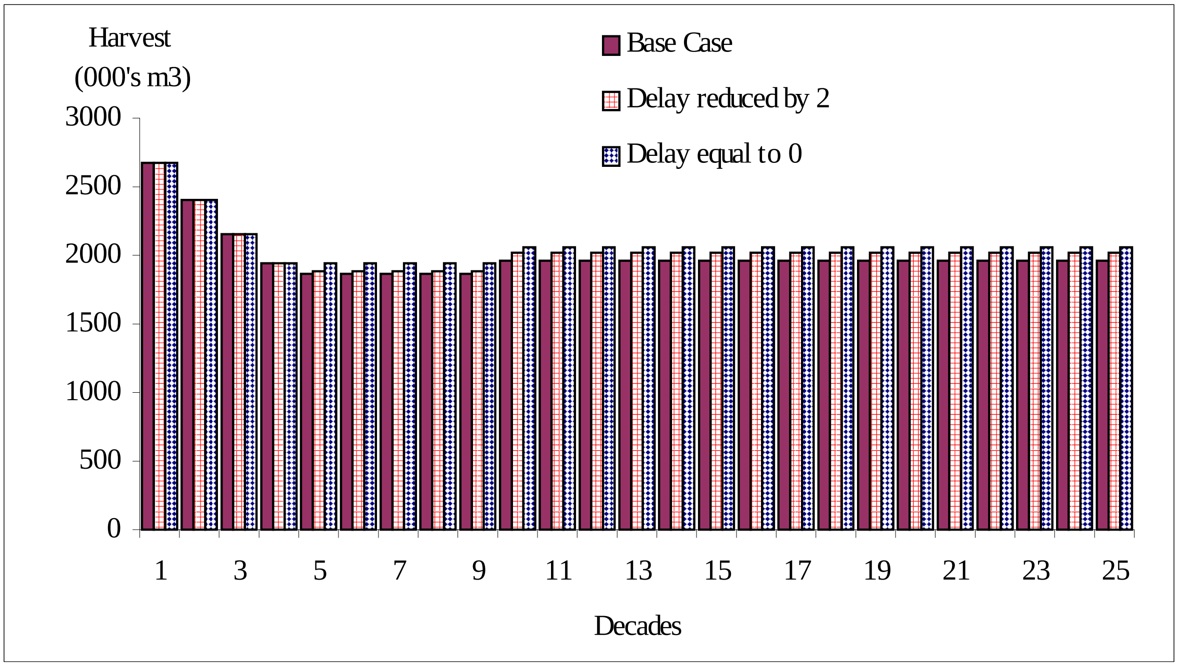


Figure 5.11: Reductions in Regeneration Delays, Main TSA

Table 5.7: Reductions in Regeneration Delays, Main TSA.

Simulation Period	Annual Harvest by Scenario (m3/year)				
	Base Case	Delay reduced by 2 years		Delay equal to 0	
		Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,399,100	0.00	2,399,100	0.00
3	2,155,290	2,155,290	0.00	2,155,290	0.00
4	1,935,861	1,935,861	0.00	1,946,000	+0.52
5	1,861,000	1,891,000	+1.61	1,946,000	+4.57
6	1,861,000	1,891,000	+1.61	1,946,000	+4.57
7	1,861,000	1,891,000	+1.61	1,946,000	+4.57
8	1,861,000	1,891,000	+1.61	1,946,000	+4.57
9	1,861,000	1,891,000	+1.61	1,946,000	+4.57
10+	1,971,000	2,011,000	+2.03	2,066,000	+4.82

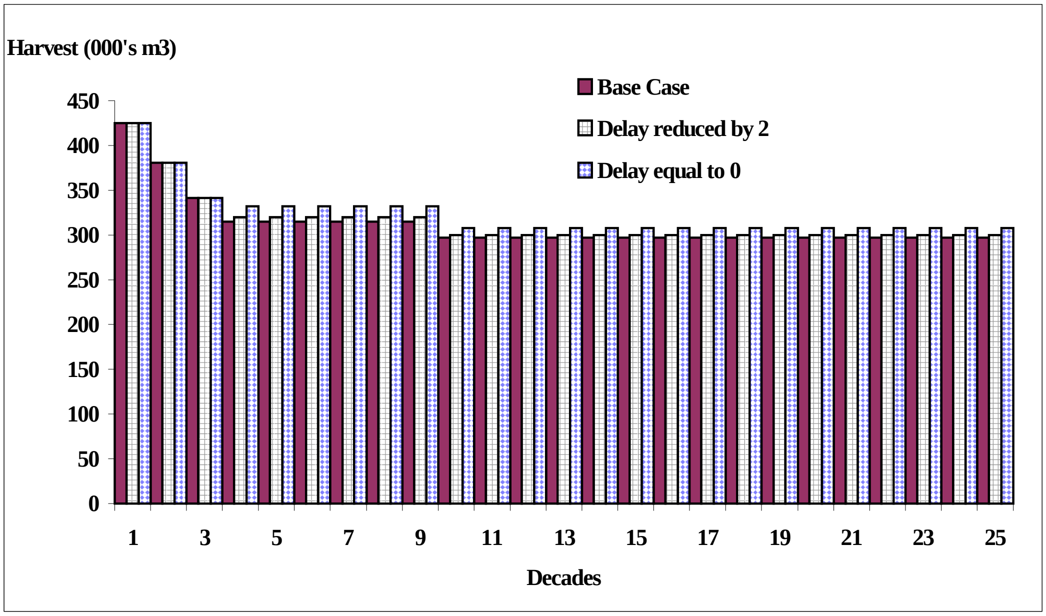


Figure 5.12: Reductions in Regeneration Delay, Three Western Supply Blocks.

Table 5.8: Reductions in Regeneration Delay, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)				
	Base Case	Delay reduced by 2		Delay equal to 0	
		Harvest	% Change	Harvest	% Change
1	425,000	425,000	0.00	425,000	0.00
2	381,000	381,000	0.00	381,000	0.00
3	341,400	341,400	0.00	341,400	0.00
4	315,000	320,000	+1.59	332,000	+5.40
5	315,000	320,000	+1.59	332,000	+5.40
6	315,000	320,000	+1.59	332,000	+5.40
7	315,000	320,000	+1.59	332,000	+5.40
8	315,000	320,000	+1.59	332,000	+5.40
9	315,000	320,000	+1.59	332,000	+5.40
10+	297,000	300,000	+1.01	308,000	+3.70

5.5 Utilization of Problem Forest Types (PFT)

These scenarios explore the implications of utilizing stand types currently excluded from timber harvesting due to merchantability. The stand types are identified using the criteria for exclusion, refer to the Information Package.

5.5.1 Cedar Hemlock PFT

The utilization of Cedar/Hemlock PFTs in the Main TSA has no impact on timber supply, mainly due to the relatively small area associated with Cedar/Hemlock PFTs in the Main TSA. In the Three Western Supply Blocks, three levels of inclusion were explored (100%, 50% and 25%). Figure 5.13 and Table 5.9 display harvest levels for the three levels of Cedar/Hemlock PFT inclusion.

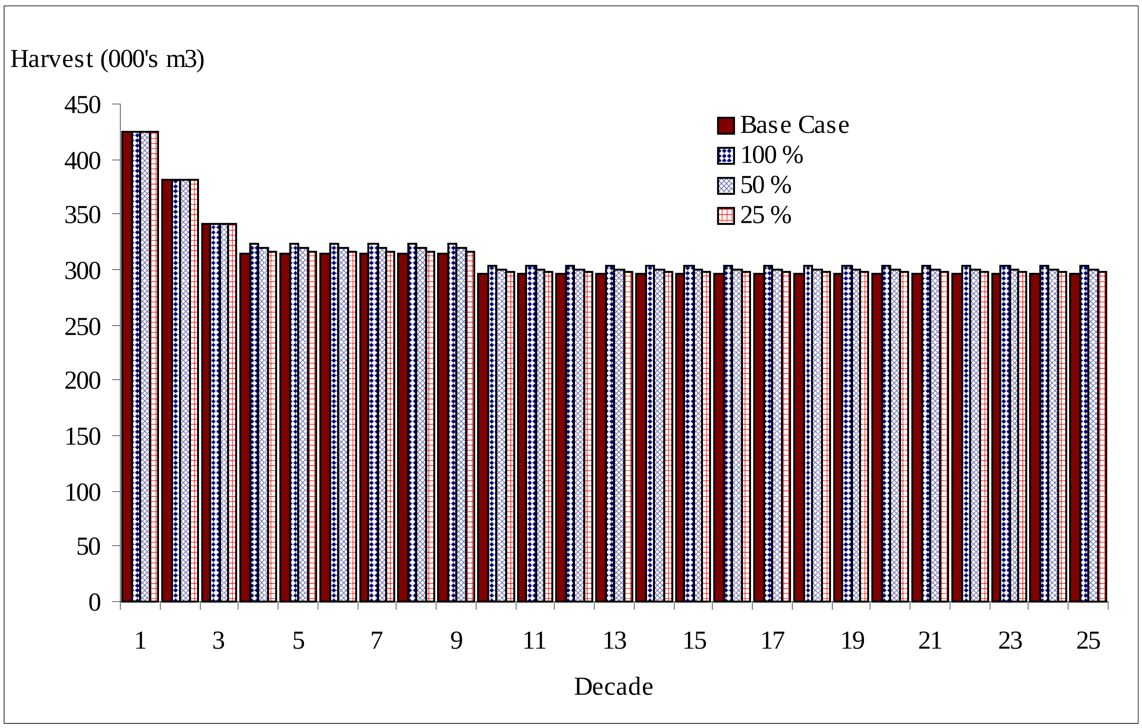


Figure 5.13: Utilizing Cedar/Hemlock PFTs, Three Western Supply Blocks.

Table 5.9: Utilizing Cedar/Hemlock PFTs, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	425,000	425,000	0.00	425,000	0.00	425,000	0.00
2	381,000	381,000	0.00	381,000	0.00	381,000	0.00
3	341,400	341,400	0.00	341,400	0.00	341,400	0.00
4	315,000	323,000	+2.54	319,000	+1.27	317,000	+0.63
5	315,000	323,000	+2.54	319,000	+1.27	317,000	+0.63
6	315,000	323,000	+2.54	319,000	+1.27	317,000	+0.63
7	315,000	323,000	+2.54	319,000	+1.27	317,000	+0.63
8	315,000	323,000	+2.54	319,000	+1.27	317,000	+0.63
9	315,000	323,000	+2.54	319,000	+1.27	317,000	+0.63
10+	297,000	303,000	+2.02	300,000	+1.01	299,000	+0.67

5.5.2 Balsam PFT

The utilization of Balsam PFT in the Main TSA and the Three Western Supply Blocks has little impact on timber supply. Three levels of inclusion were explored (100%, 50% and 25%). Figures 5.14 and 5.15, and Table 5.10 and 5.11 display harvest levels for the three balsam pft inclusion for each of the respective sub-units.

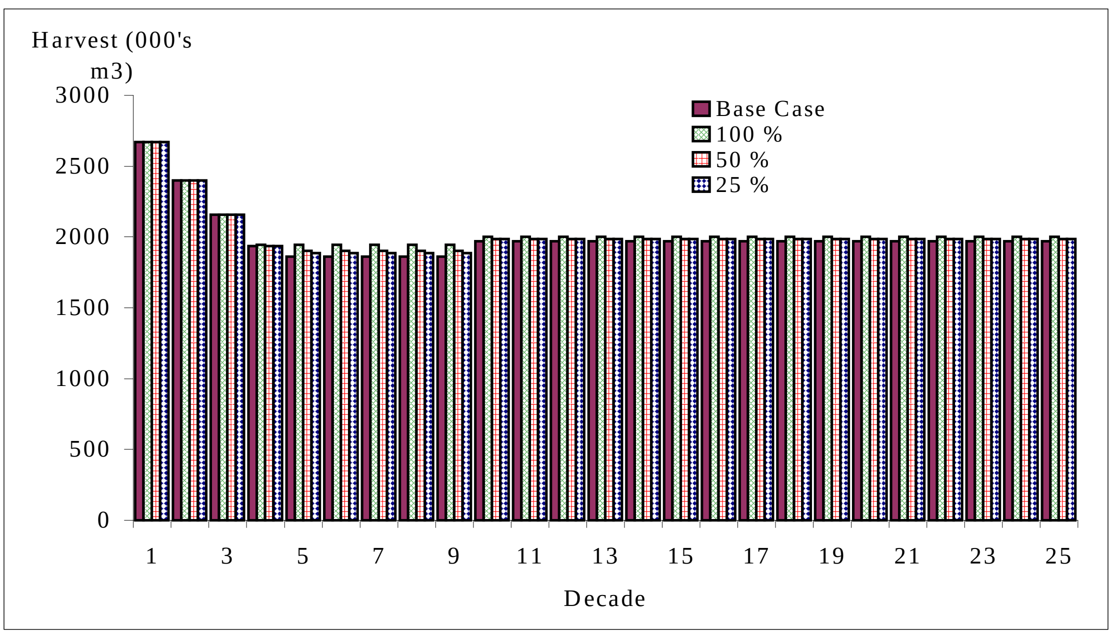


Figure 5.14: Utilizating Balsam PFTs, Main TSA

Table 5.10: Utilizing Balsam PFTs, Main TSA.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,399,100	0.00	2,399,100	0.00	2,399,100	0.00
3	2,155,290	2,155,290	0.00	2,155,290	0.00	2,155,290	0.00
4	1,935,861	1,946,000	+0.52	1,935,861	0.00	1,935,861	0.00
5	1,861,000	1,946,000	+4.57	1,901,000	+2.15	1,886,000	+1.34
6	1,861,000	1,946,000	+4.57	1,901,000	+2.15	1,886,000	+1.34
7	1,861,000	1,946,000	+4.57	1,901,000	+2.15	1,886,000	+1.34
8	1,861,000	1,946,000	+4.57	1,901,000	+2.15	1,886,000	+1.34
9	1,861,000	1,946,000	+4.57	1,901,000	+2.15	1,886,000	+1.34
10+	1,971,000	2,001,000	+1.52	1,986,000	+0.76	1,986,000	+0.76

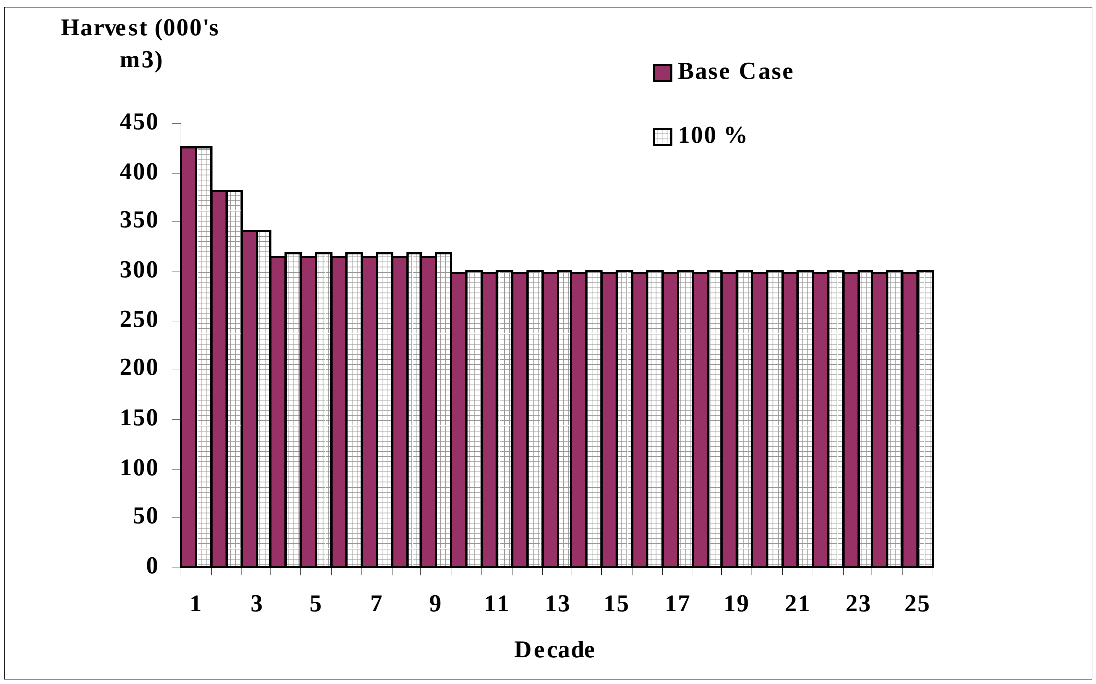


Figure 5.15: Utilizing Balsam PFTs, Three Western Supply Blocks.

Table 5.11: Utilizing Balsam PFTs, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	100 %	
		Harvest	% Change
1	425,000	425,000	0.00
2	381,000	381,000	0.00
3	341,400	341,400	0.00
4	315,000	318,000	+0.95
5	315,000	318,000	+0.95
6	315,000	318,000	+0.95
7	315,000	318,000	+0.95
8	315,000	318,000	+0.95
9	315,000	318,000	+0.95
10+	297,000	299,000	+0.67

5.5.3 Wet Belt Douglas-fir PFT

The utilization of Wet Belt Douglas-fir PFTs in the Main TSA has no impact on timber supply, mainly due to the relatively small area they occupy. In the Three Western Supply Blocks, three levels of inclusion were explored (100%, 50% and 25%). Table 5.12 and Figure 5.16 display harvest levels for the Three Western Supply Blocks with Wet Belt Douglas-fir PFT inclusion.

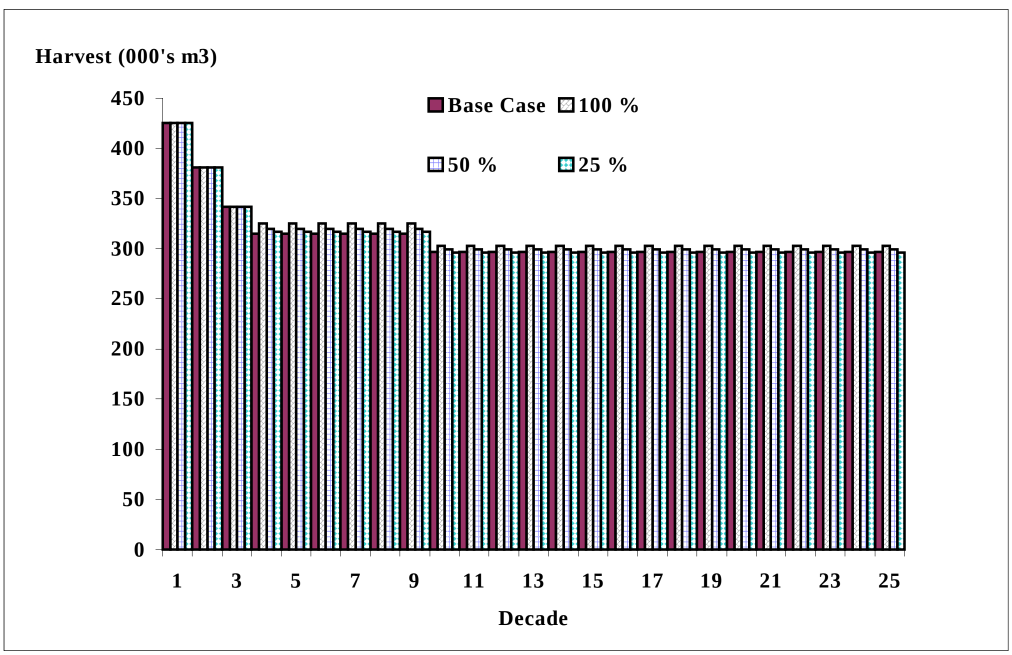


Figure 5.16: Utilizing Wet Belt Douglas-fir PFTs, Three Western Supply Blocks.

Table 5.12: Utilizing Wet Belt Douglas-fir PFTs, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	425,000	425,000	0.00	425,000	0.00	425,000	0.00
2	381,000	381,000	0.00	381,000	0.00	381,000	0.00
3	341,400	341,400	0.00	341,400	0.00	341,400	0.00
4	315,000	325,000	+3.17	320,000	+1.59	317,000	+0.63
5	315,000	325,000	+3.17	320,000	+1.59	317,000	+0.63
6	315,000	325,000	+3.17	320,000	+1.59	317,000	+0.63
7	315,000	325,000	+3.17	320,000	+1.59	317,000	+0.63
8	315,000	325,000	+3.17	320,000	+1.59	317,000	+0.63
9	315,000	325,000	+3.17	320,000	+1.59	317,000	+0.63
10+	297,000	303,000	+2.02	299,000	+0.67	298,000	+0.34

5.5.4 Spruce PFT

The utilization of spruce PFTs in the Main TSA has little impact on timber supply, mainly due to the relatively small area associated with spruce PFTs in the Main TSA. In both the Main TSA and the Three Western Supply Blocks, three levels of inclusion were explored (100%, 50% and 25%). Table 5.13 and Figure 5.17 display harvest levels for the three spruce PFT inclusions for the Main TSA. Figure 5.18 and Table 5.14 report results for the Three Western Supply Blocks.

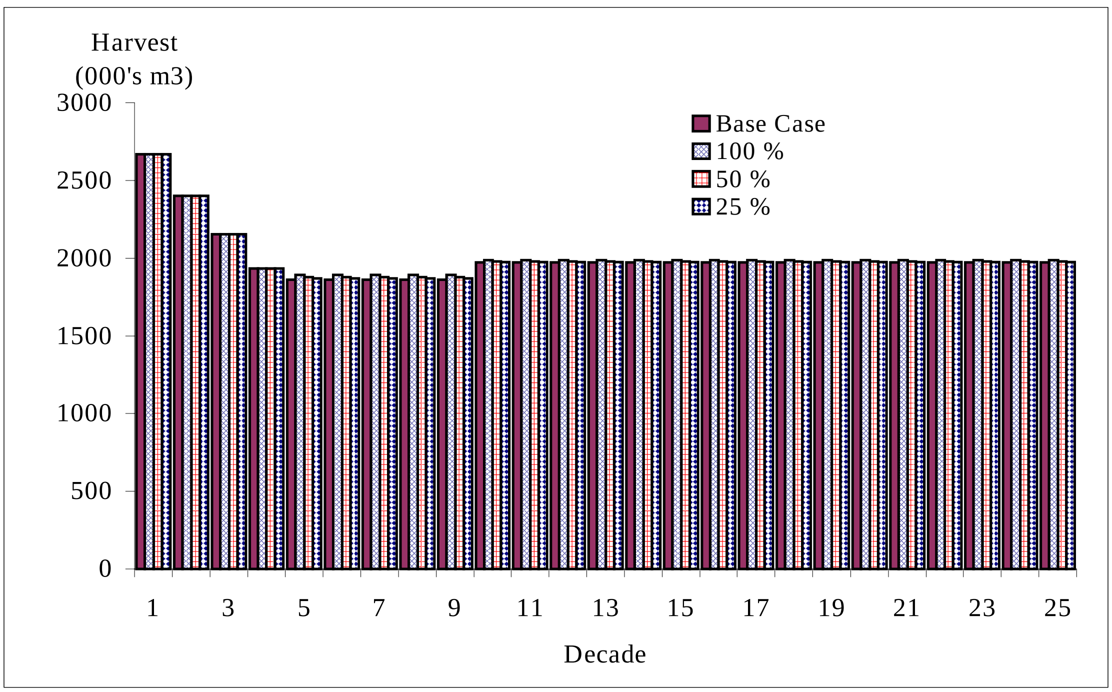


Figure 5.17: Utilizing Spruce PFTs, Main TSA.

Table 5.13: Utilizing Spruce PFTs, Main TSA.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,399,100	0.00	2,399,100	0.00	2,399,100	0.00
3	2,155,290	2,155,290	0.00	2,155,290	0.00	2,155,290	0.00
4	1,935,861	1,935,861	0.00	1,935,861	0.00	1,935,861	0.00
5	1,861,000	1,891,000	+1.61	1,876,000	+0.81	1,871,000	+0.54
6	1,861,000	1,891,000	+1.61	1,876,000	+0.81	1,871,000	+0.54
7	1,861,000	1,891,000	+1.61	1,876,000	+0.81	1,871,000	+0.54
8	1,861,000	1,891,000	+1.61	1,876,000	+0.81	1,871,000	+0.54
9	1,861,000	1,891,000	+1.61	1,876,000	+0.81	1,871,000	+0.54
10+	1,971,000	1,986,000	+0.76	1,981,000	+0.51	1,976,000	+0.25

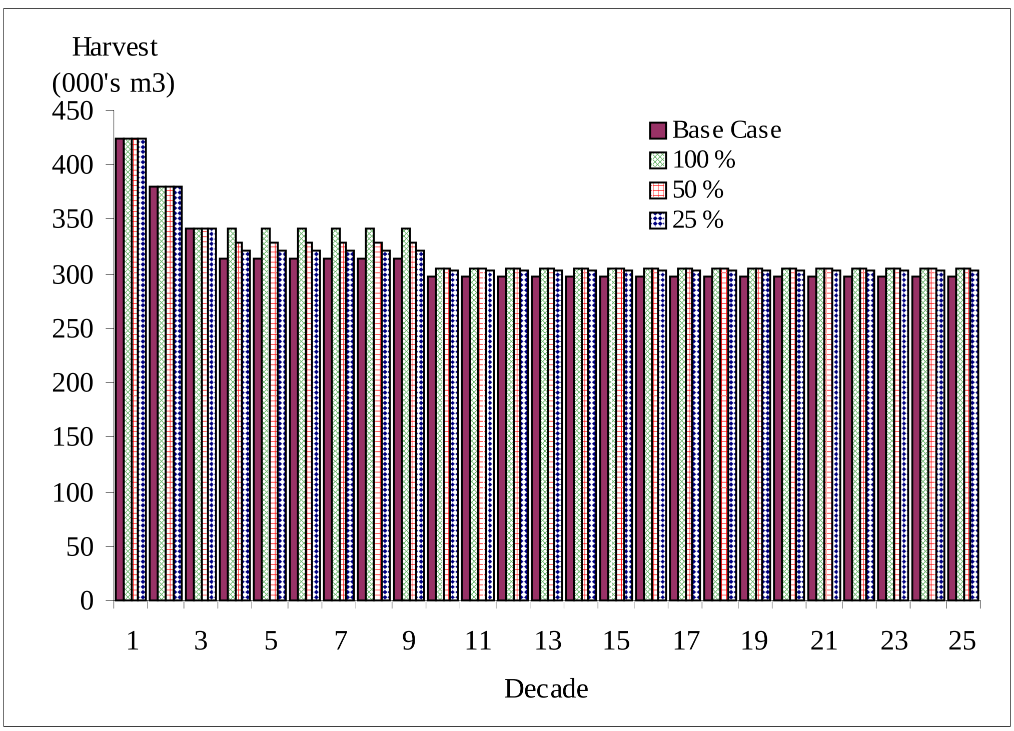


Figure 5.18: Utilizing Spruce PFTs, Three Western Supply Blocks.

Table 5.14: Utilizing Spruce PFTs, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	425,000	425,000	0.00	425,000	0.00	425,000	0.00
2	381,000	381,000	0.00	381,000	0.00	381,000	0.00
3	341,400	342,000	+0.18	341,400	0.00	341,400	0.00
4	315,000	342,000	+8.57	328,000	+4.13	322,000	+2.22
5	315,000	342,000	+8.57	328,000	+4.13	322,000	+2.22
6	315,000	342,000	+8.57	328,000	+4.13	322,000	+2.22
7	315,000	342,000	+8.57	328,000	+4.13	322,000	+2.22
8	315,000	342,000	+8.57	328,000	+4.13	322,000	+2.22
9	315,000	342,000	+8.57	328,000	+4.13	322,000	+2.22
10+	297,000	305,000	+2.69	304,000	+2.36	303,000	+2.02

5.5.5 Lodgepole Pine PFT

In both the Main TSA and the Three Western Supply Blocks, three levels of pine PFT inclusion were explored (100%, 50% and 25%). Table 5.15 and Figure 5.19 report results for the Main TSA, and Figure 5.20 and Table 5.16 report results for the Three Western Supply Blocks. In both sub-units the inclusion of pine PFT has a significant impact on timber supply, primarily due to the relatively large area associated with pine PFTs.

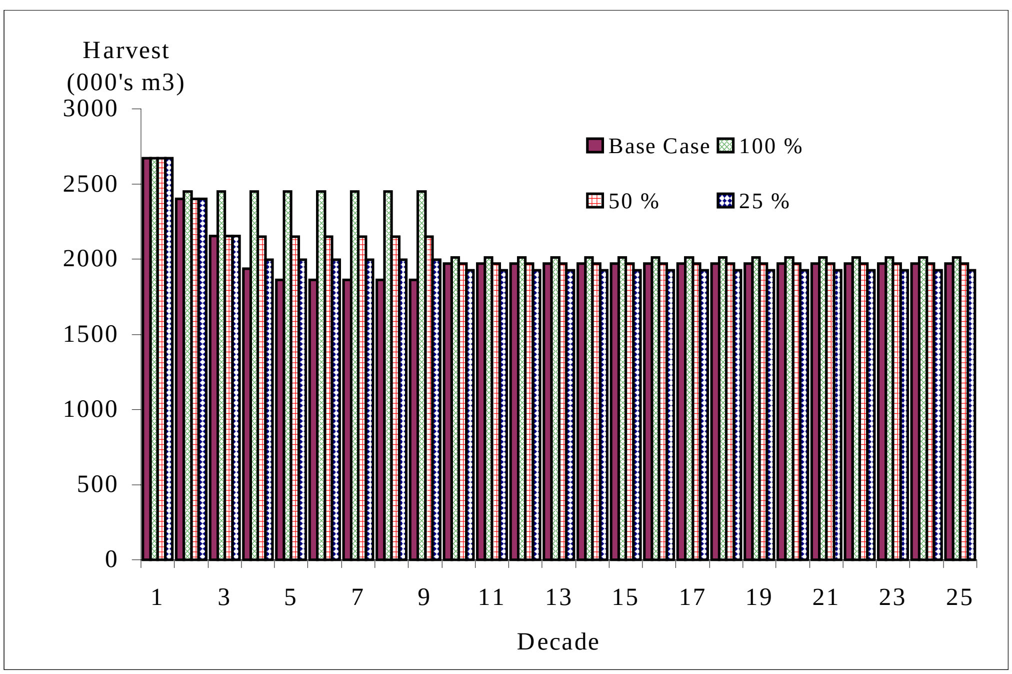


Figure 5.19: Utilizing Pine PFTs, Main TSA.

Table 5.15: Utilizing Pine PFTs, Main TSA.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,451,000	+2.17	2,399,100	0.00	2,399,100	0.00
3	2,155,290	2,451,000	+13.73	2,155,290	0.00	2,155,290	0.00
4	1,935,861	2,451,000	+26.60	2,151,000	+11.11	1,996,000	+3.10
5	1,861,000	2,451,000	+31.70	2,151,000	+15.58	1,996,000	+7.25
6	1,861,000	2,451,000	+31.70	2,151,000	+15.58	1,996,000	+7.25
7	1,861,000	2,451,000	+31.70	2,151,000	+15.58	1,996,000	+7.25
8	1,861,000	2,451,000	+31.70	2,151,000	+15.58	1,996,000	+7.25
9	1,861,000	2,451,000	+31.70	2,151,000	+15.58	1,996,000	+7.25
10+	1,971,000	2,011,000	+2.03	1,971,000	+0.00	1,926,000	-2.30

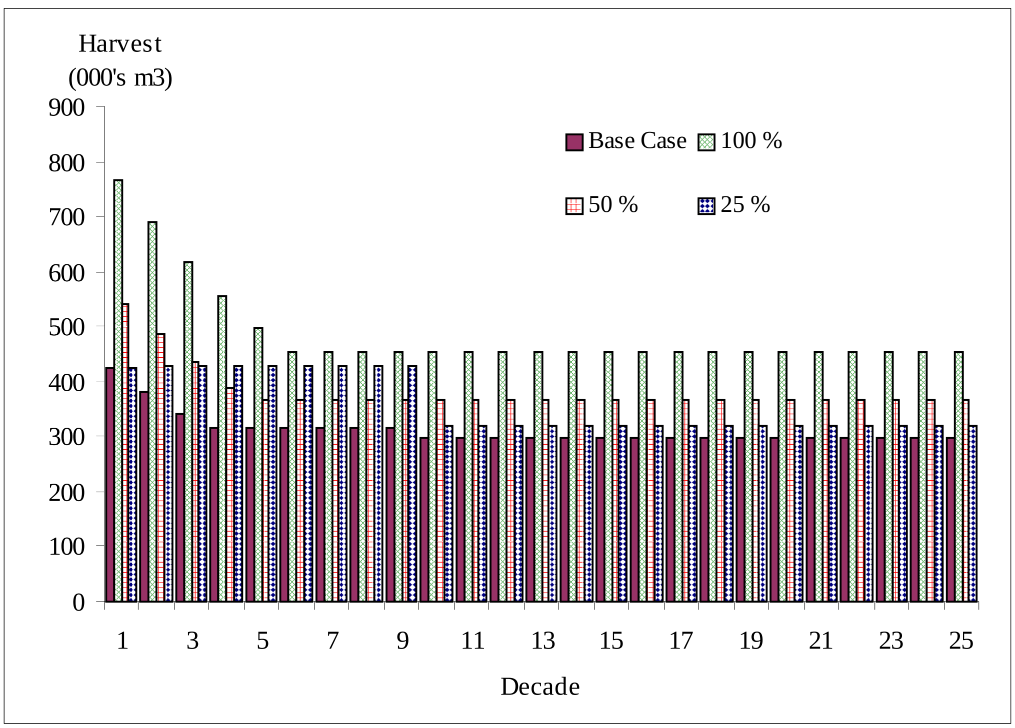


Figure 5.20: Utilizing Pine PFTs, Three Western Supply Blocks.

Table 5.16: Utilizing Pine PFTs, Three Western Supply Blocks.

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	100 %		50 %		25 %	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	425,000	766,000	+80.24	540,000	+27.06	425,000	0.00
2	381,000	687,900	+80.55	484,500	+27.17	428,000	+12.34
3	341,400	617,610	+80.91	434,550	+27.28	428,000	+25.37
4	315,000	554,349	+75.98	389,595	+23.68	428,000	+35.87
5	315,000	497,414	+57.91	367,000	+16.51	428,000	+35.87
6	315,000	452,000	+43.49	367,000	+16.51	428,000	+35.87
7	315,000	452,000	+43.49	367,000	+16.51	428,000	+35.87
8	315,000	452,000	+43.49	367,000	+16.51	428,000	+35.87
9	315,000	452,000	+43.49	367,000	+16.51	428,000	+35.87
10+	297,000	452,000	+52.19	367,000	+23.57	321,000	+8.08

5.6 Alternative Spacing Intensities

Alternative spacing intensities were reviewed in this series of analysis simulations for managed stands the Main TSA. Three levels of spacing programs were examined, with treatments of 18,000 ha/year, 12,000 ha/year and 6,000 ha/year. Results are reported in Figure 5.21 and Table 5.17 for the main TSA.

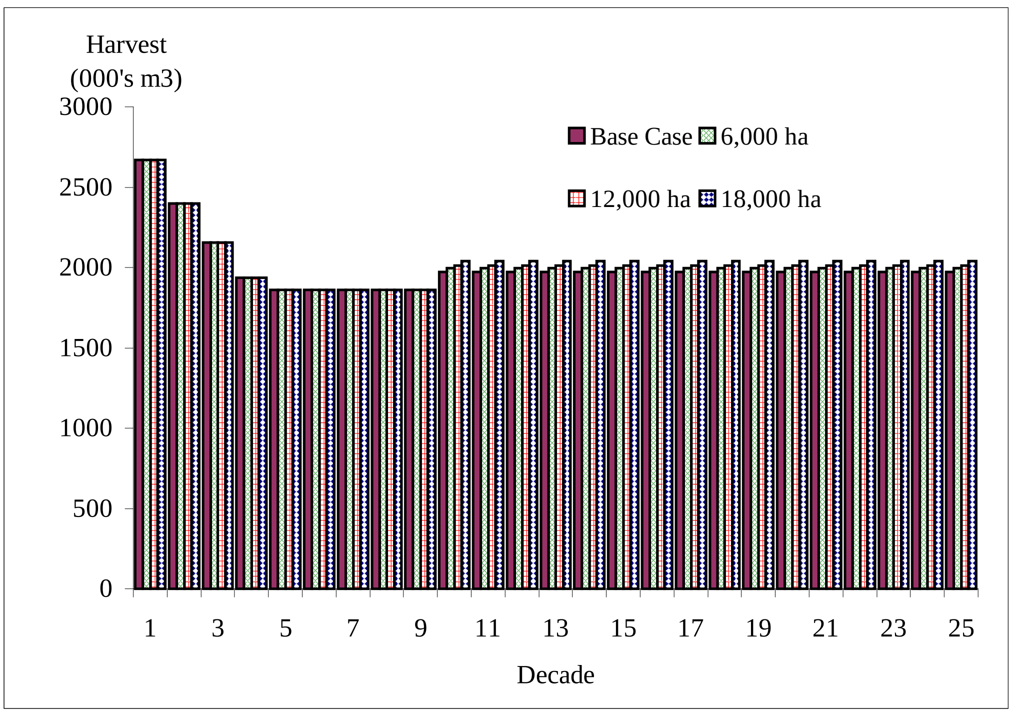


Figure 5.21: Alternative Spacing Intensities, Main TSA

Table 5.17: Alternative Spacing Intensities, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)						
	Base Case	6,000 ha		12,000 ha		18,000 ha	
		Harvest	% Change	Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,399,100	0.00	2,399,100	0.00	2,399,100	0.00
3	2,155,290	2,155,290	0.00	2,155,290	0.00	2,155,290	0.00
4	1,935,861	1,935,861	0.00	1,935,861	0.00	1,935,861	0.00
5	1,861,000	1,861,000	0.00	1,861,000	0.00	1,861,000	0.00
6	1,861,000	1,861,000	0.00	1,861,000	0.00	1,861,000	0.00
7	1,861,000	1,861,000	0.00	1,861,000	0.00	1,861,000	0.00
8	1,861,000	1,861,000	0.00	1,861,000	0.00	1,861,000	0.00
9	1,861,000	1,861,000	0.00	1,861,000	0.00	1,861,000	0.00
10+	1,971,000	1,996,000	+1.27	2,011,000	+2.03	2,041,000	+3.55

In the Three Western Supply Blocks, spacing treatment intensity for all eligible stands was explored. For a definition of eligible stands please refer to Section A.3.3 in the Information Package. Results of this scenario are reported in Figure 5.22 and Table 5.18 below.

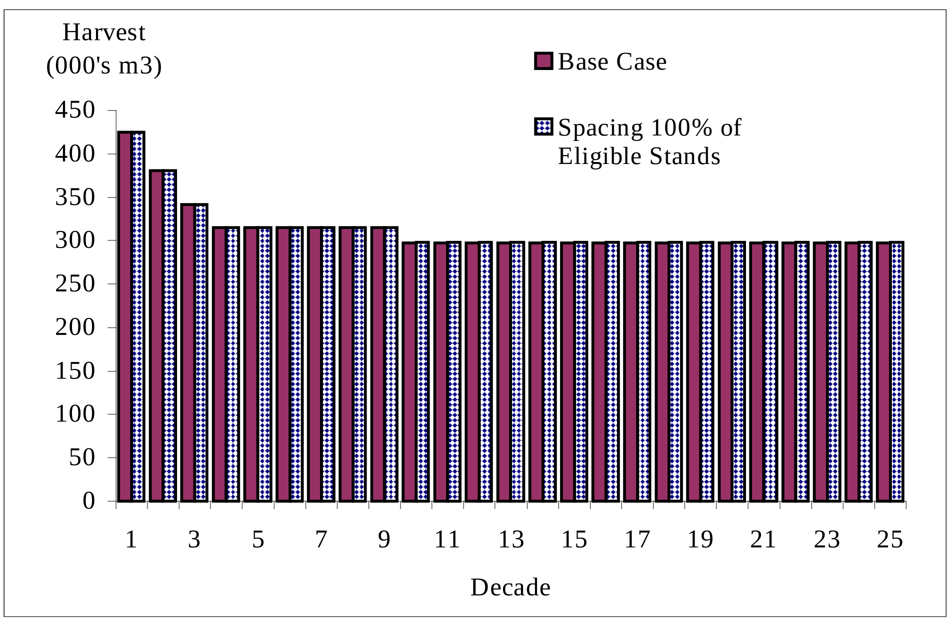


Figure 5.22: Alternative Spacing Intensities, Three Western Supply Blocks

Table 5.18: Alternative Spacing Intensities, Three Western Supply Blocks

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Spacing 100% of Eligible Stands	
		Harvest	% Change
1	425,000	425,000	0.00
2	381,000	381,000	0.00
3	341,400	341,400	0.00
4	315,000	315,000	0.00
5	315,000	315,000	0.00
6	315,000	315,000	0.00
7	315,000	315,000	0.00
8	315,000	315,000	0.00
9	315,000	315,000	0.00
10+	297,000	298,000	+0.34

5.7 Commercial Thinning

Commercial thinning regimes were reviewed in this series of analysis simulations for the main TSA only. No commercial thinning opportunities were explored in the Three Western Supply Blocks. Two levels of volume recovery, 70 m3/ha and 50 m3/ha, are reported. A third level of volume recovery (30 m3/ha) was examined but had no impact on timber supply. Two treatment intensities, 1000 ha/year 2400 ha/year, were examined.

For a definition of eligible commercial thinning stands, please refer to the Information Package. Results for the Main TSA of 50m3/ha volume recovery with reduced ages at treatments of a 1000 ha/year and 2400 ha/year are reported below in Figure 5.23 and Table 5.19. Minimum harvest ages were reduced as a result of fertilizing and achieving a minimum merchantable size rather than using culmination age.

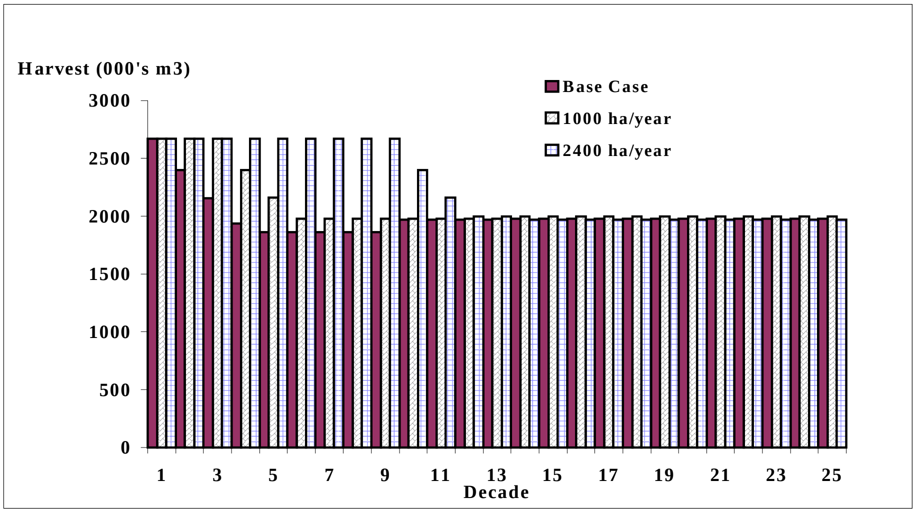


Figure 5.23: 50 m3/ha CT Recovery with Reduced Harvest Ages, Main TSA

Table 5.19: 50 m3/ha CT Recovery with Reduced Harvest Ages, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)				
	Base Case	1000 ha/year		2400 ha/year	
		Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,670,000	+11.29	2,670,000	+11.29
3	2,155,290	2,670,000	+23.88	2,670,000	+23.88
4	1,935,861	2,399,000	+23.92	2,670,000	+37.92
5	1,861,000	2,158,000	+15.96	2,670,000	+43.47
6	1,861,000	1,980,000	+6.39	2,670,000	+43.47
7	1,861,000	1,980,000	+6.39	2,670,000	+43.47
8	1,861,000	1,980,000	+6.39	2,670,000	+43.47
9	1,861,000	1,980,000	+6.39	2,670,000	+43.47
10	1,971,000	1,980,000	+0.46	2,399,000	+21.71
11	1,971,000	1,980,000	+0.46	2,158,000	+9.49
12	1,971,000	1,980,000	+0.46	1,995,000	+1.22
13	1,971,000	1,980,000	+0.46	1,995,000	+1.22
14+	1,971,000	1,995,000	+1.22	1,971,000	0.00

Results from the inclusion of commercial thinning scenario, assuming a 70 m3/ha volume recovery and 1000 ha/year and 2400 ha/year of treatment are reported below in Figure 5.24 and Table 5.20.

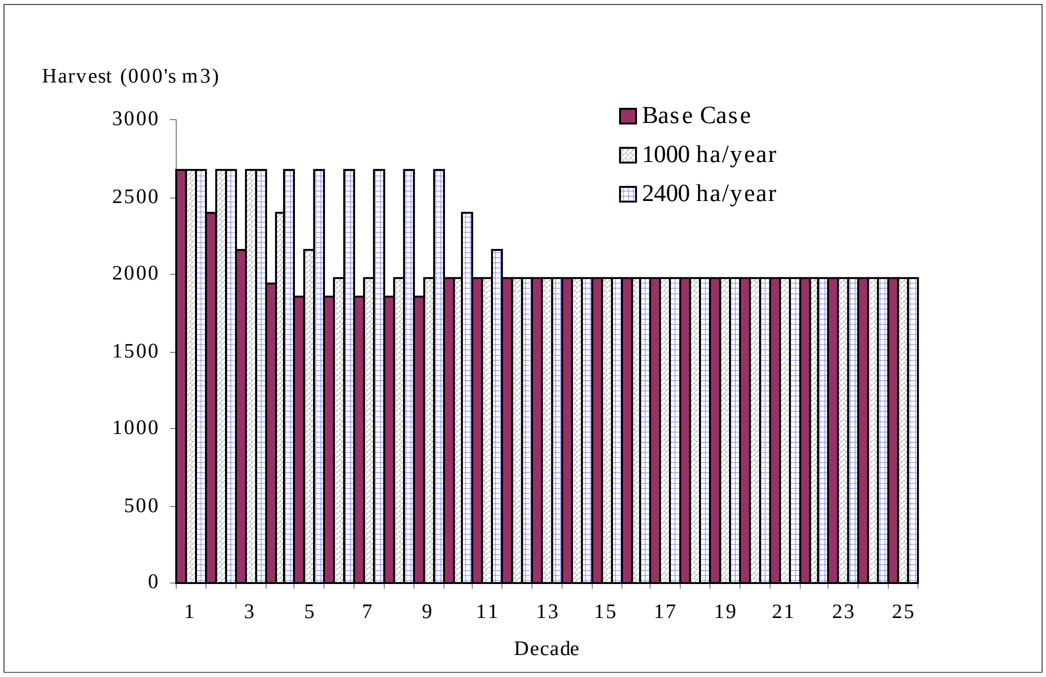


Figure 5.24: 70 m3/ha CT Recovery with Reduced Harvest Ages, Main TSA

Table 5.20: 70 m3/ha CT Recovery with Reduced Harvest Ages, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)				
	Base Case	1000 ha/year		2400 ha/year	
		Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,670,000	+11.29	2,670,000	+11.29
3	2,155,290	2,670,000	+23.88	2,670,000	+23.88
4	1,935,861	2,399,000	+23.92	2,670,000	+37.92
5	1,861,000	2,158,000	+15.96	2,670,000	+43.47
6	1,861,000	1,971,000	+5.91	2,670,000	+43.47
7	1,861,000	1,971,000	+5.91	2,670,000	+43.47
8	1,861,000	1,971,000	+5.91	2,670,000	+43.47
9	1,861,000	1,971,000	+5.91	2,670,000	+43.47
10	1,971,000	1,971,000	0.00	2,399,000	+21.71
11	1,971,000	1,971,000	0.00	2,158,000	+9.49
12+	1,971,000	1,971,000	0.00	1,971,000	0.00

Results from commercial thinning combined with no regeneration delay are reported in Figure 5.25 and Table 5.21.

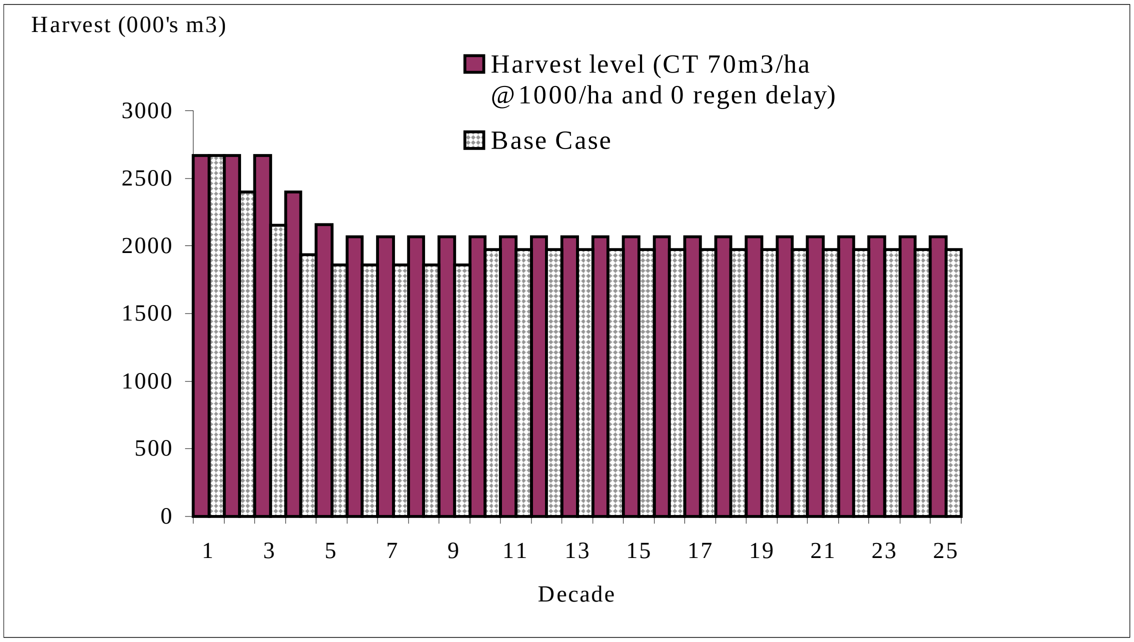


Figure 5.25: 70m3/ha CT Combined with No Regeneration Delay, Main TSA

Table 5.21: 70m3/ha CT Combined with No Regeneration Delay, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	CT 1000 ha/year	
		Harvest	% Change
1	2,670,000	2,670,000	0.00
2	2,399,100	2,670,000	+11.29
3	2,155,290	2,670,000	+23.88
4	1,935,861	2,399,000	+23.92
5	1,861,000	2,158,000	+15.96
6	1,861,000	2,066,000	+11.02
7	1,861,000	2,066,000	+11.02
8	1,861,000	2,066,000	+11.02
9	1,861,000	2,066,000	+11.02
10+	1,971,000	2,066,000	+4.82

5.8 Reduction In Area Lost To Future Road Construction.

Two scenarios were examined for both the Main TSA and the Three Western Supply Blocks, where future road reduction estimates were reduced by 1 and 2 percent. Results of the future road reduction scenarios for the Main TSA are reported below in Figure 5.26 and Table 5.22.

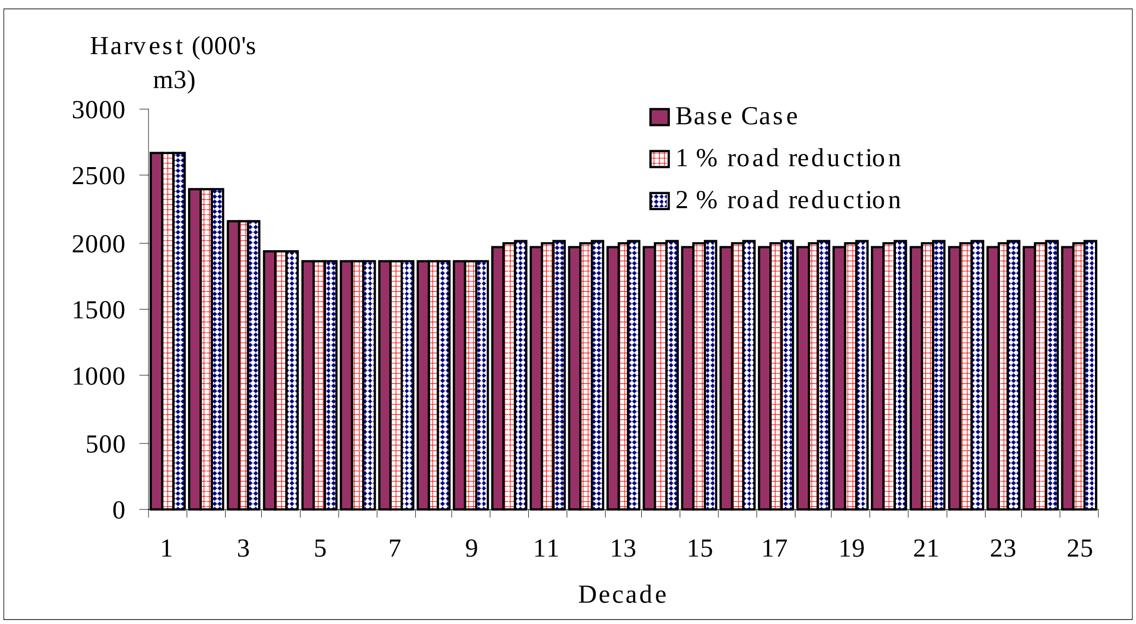


Figure 5.26: Reducing Future Road Losses by 1 and 2 %, Main TSA

Table 5.22: Reducing Future Road Losses by 1 and 2 %, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)				
	Base Case	1 % road reduction		2 % road reduction	
		Harvest	% Change	Harvest	% Change
1	2,670,000	2,670,000	0.00	2,670,000	0.00
2	2,399,100	2,399,100	0.00	2,399,100	0.00
3	2,155,290	2,155,290	0.00	2,155,290	0.00
4	1,935,861	1,935,861	0.00	1,935,861	0.00
5	1,861,000	1,861,000	0.00	1,861,000	0.00
6	1,861,000	1,861,000	0.00	1,861,000	0.00
7	1,861,000	1,861,000	0.00	1,861,000	0.00
8	1,861,000	1,861,000	0.00	1,861,000	0.00
9	1,861,000	1,861,000	0.00	1,861,000	0.00
10+	1,971,000	1,996,000	+1.27	2,011,000	+2.03

Results of the future road reduction scenarios for the Three Western Supply Blocks are reported below in Figure 5.27 and Table 5.23.

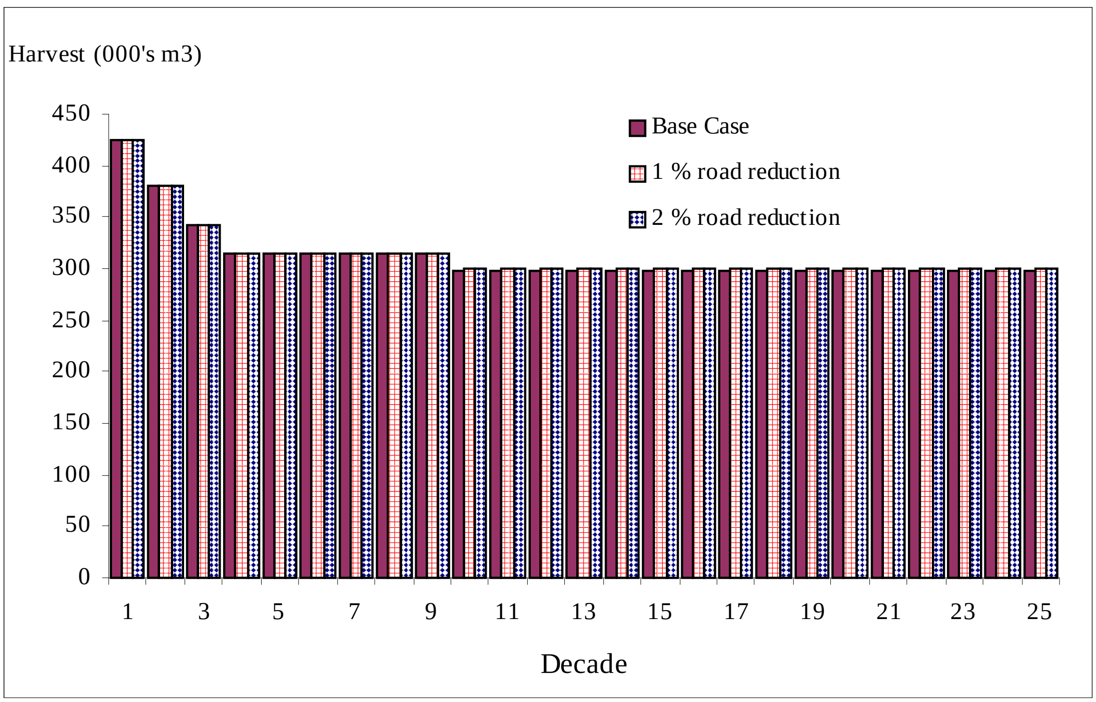


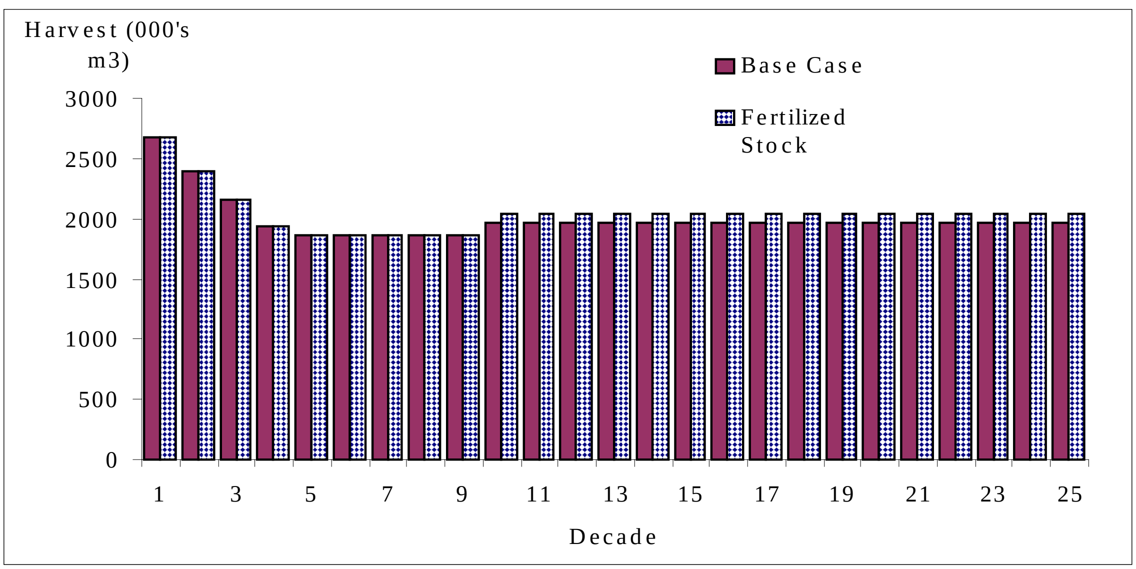
Figure 5.27: Reducing Future Road Losses by 1 and 2 %, Three Western Supply Blocks

Table 5.23: Reducing Future Road Losses by 1 and 2 %, Three Western Supply Blocks

Simulation Period	Annual Harvest by Scenario (m3/year)				
	Base Case	1 % road reduction		2 % road reduction	
		Harvest	% Change	Harvest	% Change
1	425,000	425,000	0.00	425,000	0.00
2	381,000	381,000	0.00	381,000	0.00
3	341,400	341,400	0.00	341,400	0.00
4	315,000	315,000	0.00	315,000	0.00
5	315,000	315,000	0.00	315,000	0.00
6	315,000	315,000	0.00	315,000	0.00
7	315,000	315,000	0.00	315,000	0.00
8	315,000	315,000	0.00	315,000	0.00
9	315,000	315,000	0.00	315,000	0.00
10+	297,000	300,000	+1.01	301,000	+1.35

5.9 Fertilizing Managed Stands

This scenario examined the implication of fertilizing managed stands for both the Main TSA and the Three Western Supply Blocks. Results of fertilizing managed stands in the Main TSA are reported below in Figure 5.28 and Table 5.24. Fertilizing managed stands in the Three Western Supply Blocks had no impact on



timber supply.

Figure 5.28: Fertilizing Managed Stands, Main TSA

Table 5.24: Fertilizing Managed Stands, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Fertilized Stock	
		Harvest	% Change
1	2,670,000	2,670,000	0.00
2	2,399,100	2,399,100	0.00
3	2,155,290	2,155,290	0.00
4	1,935,861	1,935,861	0.00
5	1,861,000	1,866,000	+0.27
6	1,861,000	1,866,000	+0.27
7	1,861,000	1,866,000	+0.27
8	1,861,000	1,866,000	+0.27
9	1,861,000	1,866,000	+0.27
10+	1,971,000	2,046,000	+3.81

5.10 Reduction in Minimum Harvest Ages

This scenario examined the impact of reducing minimum harvest ages as a result of intensive silviculture (spacing or fertilizing) or a change in policy for both the Main TSA and the Three Western Supply Blocks. Results of reducing minimum harvest ages by 10 years on the Main TSA are reported in Figure 5.29 and Table 5.25.

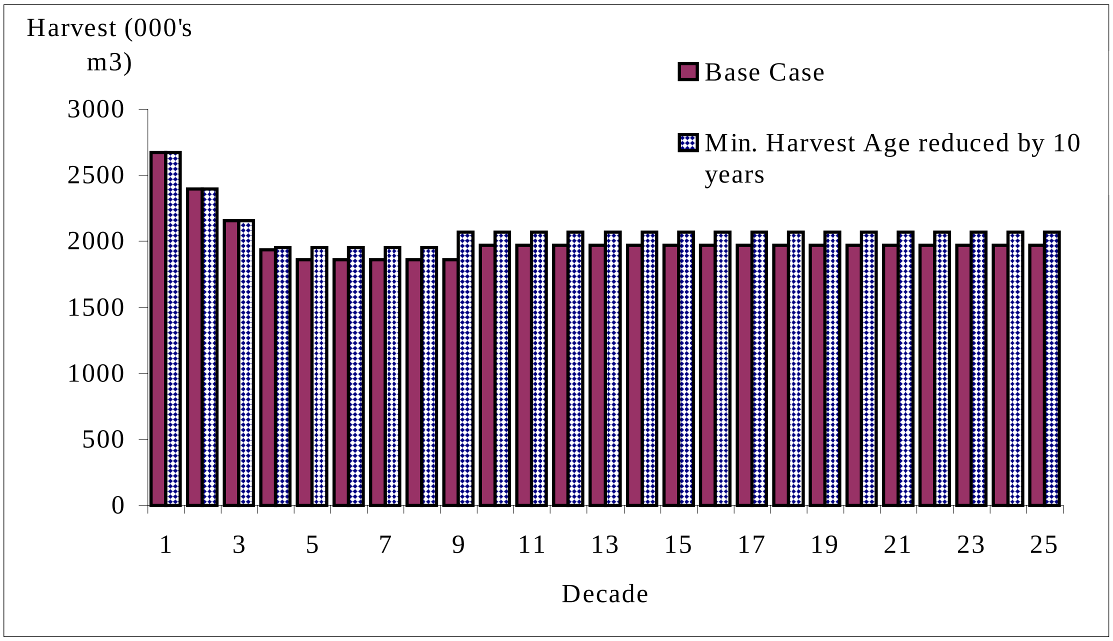


Figure 5.29: Reducing Minimum Harvest Ages by 10 Years, Main TSA

Table 5.25: Reducing Minimum Harvest Ages by 10 Years, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Reduced Minimum Harvest Age	
		Harvest	% Change
1	2,670,000	2,670,000	0.00
2	2,399,100	2,399,100	0.00
3	2,155,290	2,155,290	0.00
4	1,935,861	1,951,000	+0.78
5	1,861,000	1,951,000	+4.84
6	1,861,000	1,951,000	+4.84
7	1,861,000	1,951,000	+4.84
8	1,861,000	1,951,000	+4.84
9	1,861,000	2,066,000	+11.02
10+	1,971,000	2,066,000	+4.82

5.11 Genetically Improved Stock

This scenario examined the implication of planting genetically improved stock for both the Main TSA and the Three Western Supply Blocks. Current expectations are approximately a 12 % gain in regenerated volumes. The expected gain was translated into a site index boost. The adjusted site indexes were then used to generate managed stand yields, new green up ages and minimum harvest ages. Results of planting improved stock in the Main TSA are reported in Figure 5.30 and Table 5.26.

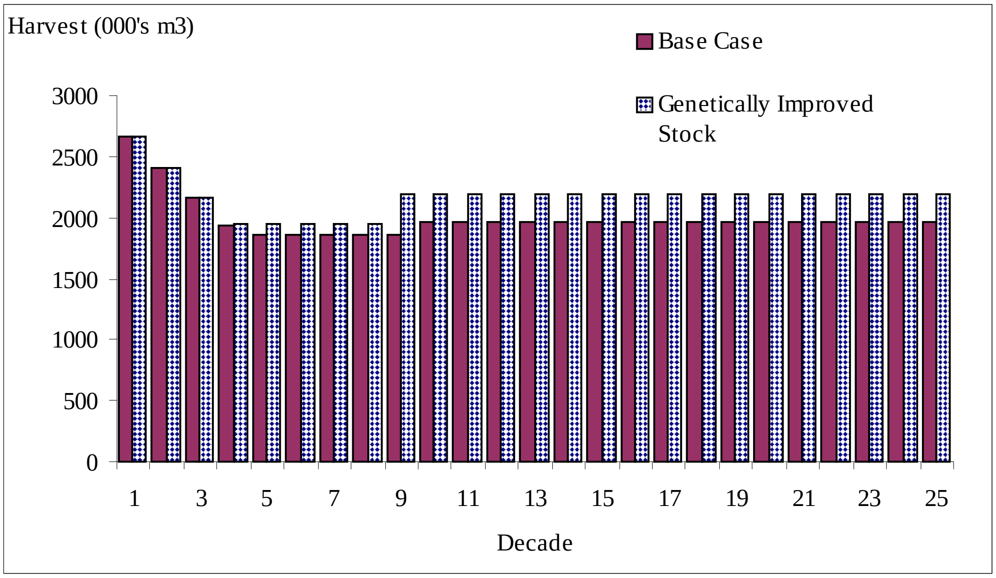


Figure 5.30: Planting Genetically Improved Stock, Main TSA

Table 5.26: Planting Genetically Improved Stock, Main TSA

Simulation Period	Annual Harvest by Scenario (m3/year)		
	Base Case	Genetically Improved Stock	
		Harvest	% Change
1	2,670,000	2,670,000	0.00
2	2,399,100	2,399,100	0.00
3	2,155,290	2,155,290	0.00
4	1,935,861	1,951,000	+0.78
5	1,861,000	1,951,000	+4.84
6	1,861,000	1,951,000	+4.84
7	1,861,000	1,951,000	+4.84
8	1,861,000	1,951,000	+4.84
9	1,861,000	2,195,000	+11.36
10+	1,971,000	2,195,000	+11.36

6.0 SUMMARY

Tables 6.1 and 6.2 report all analysis results.

Table 6.1: All Analysis Results Williams Lake Main TSA

	SHORT TERM								***MID TERM***		***LONG TERM***	
	Decade1		***Decade2***		***Decade3***		***Decade 4***		***Decades 5-9***		***Decade 10+***	
Scenario	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case
Base Case	2670	n/a	2399	n/a	2155	n/a	1936	n/a	1861	n/a	1971	n/a
OGSI Adjustments	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	2416	22.6%
Reduced Time to Regenerate Backlog NSR	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	2011	2.0%
Reduced Regen Delay Reduced by 2 yrs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1891	1.6%	2011	2.0%
Reduced Regen Delay Reduced to 0	2670	0.0%	2399	0.0%	2155	0.0%	1946	0.5%	1946	4.6%	2066	4.8%
Utilization of Cedar PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	1971	0.0%
Utilization of 25 % of Balsam PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1886	1.3%	1986	0.8%
Utilization of 50 % of Balsam PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1901	2.1%	1986	0.8%
Utilization of 100 % of Balsam PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1946	0.5%	1946	4.6%	2001	1.5%
Utilization of 100% of Douglas fir PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	1971	0.0%
Utilization of 25 % of Spruce PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1871	0.5%	1976	0.3%
Utilization of 50 % of Spruce PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1876	0.8%	1981	0.5%
Utilization of 100 % of Spruce PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1891	1.6%	1986	0.8%
Utilization of 25 % of Lodgepole pine PFTs	2670	0.0%	2399	0.0%	2155	0.0%	1996	3.1%	1996	7.3%	1926	-2.3%
Utilization of 50 % of Lodgepole pine PFTs	2670	0.0%	2399	0.0%	2155	0.0%	2151	11.1%	2151	15.6%	1971	0.0%
Utilization of 100 % of Lodgepole pine PFTs	2670	0.0%	2451	2.2%	2451	13.7%	2451	26.6%	2451	31.7%	2011	2.0%
Alternative Spacing Intensities 6000 ha/yr	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	1996	1.3%
Alternative Spacing Intensities 12000 ha/yr	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	2011	2.0%
Alternative Spacing Intensities 18000 ha/yr	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	2041	3.6%
Commercial Thinning 50 m3/ha 1000 ha/yr + Reduced ages	2670	0.0%	2670	11.3%	2670	23.9%	2399	23.9%	1980	6.4%	1995 (14+)	1.2%
Commercial Thinning 50 m3/ha 2400 ha/yr + Reduced ages	2670	0.0%	2670	11.3%	2670	23.9%	2670	37.9%	2670	43.5%	1971 (14+)	0.0%
Commercial Thinning 70 m3/ha 1000 ha/yr + Reduced ages	2670	0.0%	2670	11.3%	2670	23.9%	2399	23.9%	1971	5.9%	1971 (14+)	0.0%
Commercial Thinning 70 m3/ha 2400 ha/yr + Reduced ages	2670	0.0%	2670	11.3%	2670	23.9%	2670	37.9%	2670	43.5%	1971 (12+)	0.0%
Commercial Thinning 70 m3/ha 1000 ha/yr + No regen delay	2670	0.0%	2670	11.3%	2670	23.9%	2399	23.9%	2066	11.0%	2066	4.8%
Road Reductions (reduced by 1%)	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	1996	1.3%
Road Reductions (reduced by 2%)	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1861	0.0%	2011	2.0%
Fertilization of Managed Stands	2670	0.0%	2399	0.0%	2155	0.0%	1936	0.0%	1866	0.3%	2046	3.8%
Reduction in Minimum Harvest Ages	2670	0.0%	2399	0.0%	2155	0.0%	1951	0.8%	1951	4.8%	2066	4.8%
Genetically Improved Stock	2670	0.0%	2399	0.0%	2155	0.0%	1951	0.8%	1951	4.8%	2195	11.4%

Table 6.2: All Analysis Results, Three Western Supply Blocks, Williams Lake TSA

Scenario	SHORT TERM								MID TERM		LONG TERM	
	Decade1		Decade2		Decade3		Decade 4		Decades 5-9		Decade 10+	
	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case	Harvest (000's m3/ha)	Change from base case
Base Case	425	n/a	381	n/a	341	n/a	315	n/a	315	n/a	297	n/a
OGSI Adjustments	425	0.0%	381	0.0%	341	0.0%	315	0.0%	315	0.0%	321	8.1%
Reduced Time to Regenerate Backlog NSR	425	0.0%	381	0.0%	341	0.0%	323	2.5%	323	2.5%	302	1.7%
Reduced Regen Delay Reduced by 2 yrs	425	0.0%	381	0.0%	341	0.0%	320	1.6%	320	1.6%	300	1.0%
Reduced Regen Delay Reduced to 0	425	0.0%	381	0.0%	341	0.0%	332	5.4%	332	5.4%	308	3.7%
Utilization of 25 % of Cedar PFTs	425	0.0%	381	0.0%	341	0.0%	317	0.6%	317	0.6%	299	0.7%
Utilization of 50 % of Cedar PFTs	425	0.0%	381	0.0%	341	0.0%	319	1.3%	319	1.3%	300	1.0%
Utilization of 100 % of Cedar PFTs	425	0.0%	381	0.0%	341	0.0%	323	2.5%	323	2.5%	303	2.0%
Utilization of 100 % of Balsam PFTs	425	0.0%	381	0.0%	341	0.0%	318	1.0%	318	1.0%	299	0.7%
Utilization of 25 % of Douglas fir PFTs	425	0.0%	381	0.0%	341	0.0%	317	0.6%	317	0.6%	298	0.3%
Utilization of 50 % of Douglas fir PFTs	425	0.0%	381	0.0%	341	0.0%	320	1.6%	320	1.6%	299	0.7%
Utilization of 100 % of Douglas fir PFTs	425	0.0%	381	0.0%	341	0.0%	325	3.2%	325	3.2%	303	2.0%
Utilization of 25 % of Spruce PFTs	425	0.0%	381	0.0%	341	0.0%	322	2.2%	322	2.2%	303	2.0%
Utilization of 50 % of Spruce PFTs	425	0.0%	381	0.0%	341	0.0%	328	4.1%	328	4.1%	304	2.4%
Utilization of 100 % of Spruce PFTs	425	0.0%	381	0.0%	342	0.2%	342	8.6%	342	8.6%	305	2.7%
Utilization of 25 % of Lodgepole pine PFTs	425	0.0%	428	12.3%	428	25.5%	428	35.9%	428	35.9%	321	8.1%
Utilization of 50 % of Lodgepole pine PFTs	540	27.1%	484	27.0%	434	27.3%	389	23.5%	367	16.5%	367	23.6%
Utilization of 100 % of Lodgepole pine PFTs	766	80.2%	687	80.3%	617	80.9%	554	75.9%	497	57.8%	452	52.2%
Spacing 100 % of Eligible stands	425	0.0%	381	0.0%	341	0.0%	315	0.0%	315	0.0%	298	0.3%
Road Reductions (reduced by 1%)	425	0.0%	381	0.0%	341	0.0%	315	0.0%	315	0.0%	300	1.0%
Road Reductions (reduced by 2%)	425	0.0%	381	0.0%	341	0.0%	315	0.0%	315	0.0%	301	1.3%