

**TISC
CARIBOO REGION STAND
TREATMENTS ANALYSIS**

**100 MILE HOUSE TSA
INFORMATION PACKAGE**

**Prepared for:
Timber Investments Strategy Committee
Cariboo Forest Region**

**Prepared by:
Timberline Forest Inventory Consultants Limited
Victoria, B.C.**

October 1998

TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
2.0 DESCRIPTION OF LAND BASE.....	2
2.1 FOREST INVENTORY.....	2
2.2 TIMBER HARVESTING LAND BASE DETERMINATION.....	3
2.3 TOTAL AREA.....	4
2.4 NON-CROWN LAND.....	5
2.5 PARKS.....	5
2.6 NON-PRODUCTIVE FOREST & NON-FOREST.....	5
2.7 NON-COMMERCIAL COVER.....	5
2.8 ENVIRONMENTALLY SENSITIVE AREAS (ESAs).....	5
2.9 INOPERABLE AREAS.....	6
2.10 ROADS AND TRAILS.....	7
2.10.1 Existing Roads and Trails.....	7
2.3.2 Future Roads, Trails & Landings.....	7
2.11 RIPARIAN RESERVE & MANAGEMENT ZONES (RRZs & RMZs).....	7
2.12 WILDLIFE HABITAT.....	7
2.13 VOLUME RETENTION IN CUTBLOCKS.....	8
2.14 PA16 FIBRE SOURCE.....	8
3.0 INVENTORY ORGANIZATION.....	10
3.1 OLD GROWTH RETENTION GROUPS.....	11
3.2 DISTURBANCE/GREEN-UP FOREST COVER CONSTRAINT GROUPS.....	13
3.3 REPORTING GROUPS.....	14
3.4 ANALYSIS UNITS.....	14
3.4.1 Existing Natural Stand Analysis Units.....	15
3.4.2 Existing Managed Stands Analysis Units.....	16
3.5 AGE CLASS DISTRIBUTIONS.....	18
4.0 GROWTH AND YIELD.....	20
4.1 SITE INDEX.....	20
4.2 SITE INDEX FOR REGENERATED STANDS.....	20
4.3 CROWN CLOSURE.....	21
4.4 UTILIZATION LEVELS.....	21
4.5 DECAY, WASTE AND BREAKAGE.....	21
4.6 OPERATIONAL ADJUSTMENT FACTORS.....	22
4.7 VOLUME EXCLUSIONS FOR MIXED SPECIES STANDS.....	22
4.8 YIELD TABLES FOR NATURAL STANDS.....	22
4.9 REGENERATION SCHEME AND REGENERATION DELAY.....	24
4.10 YIELD TABLES FOR MANAGED STANDS.....	24
4.11 SILVICULTURE SYSTEMS.....	27
4.12 SILVICULTURE HISTORY.....	28
4.13 NON-SATISFACTORILY RESTOCKED (NSR).....	28
5.0 MANAGEMENT ASSUMPTIONS.....	29
5.1 NON-RECOVERABLE LOSSES.....	29
5.2 FOREST COVER REQUIREMENTS.....	29
5.3 MINIMUM HARVEST AGES.....	31
5.4 HARVEST PROFILE AND HARVEST RULES.....	35
5.5 HARVEST FLOW STRATEGY.....	36
6.0 SENSITIVITIES AND TREATMENTS.....	37

6.1	OLD GROWTH SITE INDEX ADJUSTMENTS	37
6.2	REDUCE TIME TO GREEN-UP	39
6.3	REDUCED REGENERATION DELAY	39
6.4	GENETICALLY IMPROVED PLANTING STOCK	39
6.5	FERTILIZATION & SPACING.....	41
6.6	ALTERNATIVE THINNING DENSITIES.....	42
6.7	ELIMINATE BACKLOG NSR	44
6.8	MAXIMIZE PA16 HARVEST RATE.....	44

LIST OF TABLES

TABLE 2.1 – NON-STANDARD INVENTORY DATA.....	3
TABLE 2.2 - TIMBER HARVESTING LANDBASE DETERMINATION – BASE CASE	4
TABLE 2.3 –INOPERABLE REDUCTIONS.....	6
TABLE 2.4 – PA16 FIBRE SOURCE STAND DESCRIPTIONS	9
TABLE 3.1 – BU-BEC/NDT AREA DISTRIBUTION.....	11
TABLE 3.2 – DISTURBANCE/GREEN-UP FOREST COVER CONSTRAINT GROUPS	13
TABLE 3.3 – OTHER REPORTING GROUPS.....	14
TABLE 3.4 – EXISTING NATURAL STAND ANALYSIS UNIT DEFINITIONS.....	15
TABLE 3.5 – EXISTING MANAGED STAND ANALYSIS UNIT DEFINITIONS	17
TABLE 3.6 – AREA DISTRIBUTION BY AGE CLASS	18
TABLE 3.7 – VOLUME DISTRIBUTION BY AGE CLASS	19
TABLE 4.1 - DEFAULT CROWN CLOSURE FOR STANDS UNDER 50 YEARS.....	21
TABLE 4.2 - UTILIZATION LEVELS	21
TABLE 4.3 – VOLUME EXCLUSIONS FOR MIXED SPECIES STANDS	22
TABLE 4.4 – VDYP INPUTS - EXISTING NATURAL STAND ANALYSIS UNITS	23
TABLE 4.5 - REGENERATION STRATEGIES.....	24
TABLE 4.6 – TIPSYP INPUTS - EXISTING MANAGED STAND ANALYSIS UNITS.....	25
TABLE 4.7 – TIPSYP INPUTS - FUTURE MANAGED STAND ANALYSIS UNITS.....	26
TABLE 4.8 – VDYP INPUTS - FUTURE MANAGED STAND ANALYSIS UNITS	27
TABLE 4.9 – SELECTION HARVESTING STRATEGIES.....	27
TABLE 4.10 – EXISTING NSR REGENERATION ASSUMPTIONS	28
TABLE 5.1 - UNSALVAGED LOSSES (M ³ /YR).....	29
TABLE 5.2 – DISTURBANCE FOREST COVER CONSTRAINTS	30
TABLE 5.3 – LANDSCAPE-LEVEL BIODIVERSITY (OLD SERAL) FOREST COVER CONSTRAINTS	31
TABLE 5.4 – MINIMUM MERCHANTABILITY ATTRIBUTES – NATURAL STANDS	32
TABLE 5.5 – MINIMUM MERCHANTABILITY ATTRIBUTES – EXISTING MANAGED STANDS	33
TABLE 5.6 – MINIMUM MERCHANTABILITY ATTRIBUTES – FUTURE MANAGED STANDS	34
TABLE 5.7 – MINIMUM MERCHANTABILITY ATTRIBUTES – SELECTION HARVEST AREAS.....	35
TABLE 6.1 - STAND TREATMENTS	37
TABLE 6.2 – OGSII ADJUSTMENT EQUATIONS	38
TABLE 6.3 – MINIMUM MERCHANTABILITY ATTRIBUTES - OGSII ADJUSTED STANDS.....	38
TABLE 6.4 – MINIMUM MERCHANTABILITY ATTRIBUTES - OGSII ADJUSTED STANDS.....	38
TABLE 6.5 – REDUCED REGENERATION DELAYS	39
TABLE 6.6 – TIPSYP INPUTS – GENETICALLY IMPROVED FUTURE MANAGED STANDS	40
TABLE 6.7 – MINIMUM MERCHANTABILITY ATTRIBUTES - GENETICALLY IMPROVED STANDS ..	41
TABLE 6.8 – PINE FERTILIZATION ASSUMPTIONS.....	41
TABLE 6.9 – MINIMUM MERCHANTABILITY ATTRIBUTES - FERTILIZATION STANDS.....	42
TABLE 6.10 – ALTERNATIVE THINNING DENSITIES FOR MANAGED STANDS.....	42
TABLE 6.11 – MINIMUM MERCHANTABILITY ATTRIBUTES - INCREASED THINNING DENSITY	43
TABLE 6.12 – MINIMUM MERCHANTABILITY ATTRIBUTES - DECREASED THINNING DENSITY ...	44

1.0 INTRODUCTION

A review of potential impacts of various stand level treatments on forest level timber productivity is underway for each of the three TSAs in the Cariboo Forest Region. The information developed in this set of analyses is intended to assist the Chief Forester of B.C. in future AAC determinations and provide direction to forest managers in prescribing future forest management treatments.

This Information Package has been prepared on behalf the Cariboo Forest Region Timber Investments Strategy Committee (TISC) as a source document prior to the completion of the Incremental Silviculture and Stand Treatments Timber Supply Analysis for the 100 Mile House TSA. TISC have determined that it is necessary to evaluate the short and long-term timber supply impacts of implementing silvicultural and stand management treatments in the TSA.

The Information Package serves as a summary of the inputs and assumptions made in preparing for the analysis. The analysis process is a dynamic one and inputs and assumptions may change. Included are inventory and landbase summaries, growth and yield information and management assumptions for timber and non-timber resources related to timber supply. The Information Package will use similar inputs to those described for the on-going Ministry of Forests (MoF) TSR II timber supply analysis of the 100 Mile House TSA (Data Package dated April 1998). This TSR II information is provided in the *100 Mile House Timber Supply Area Timber Supply Review Data Package* (April 1998).

A number of silvicultural and management treatments will be included in the analysis to determine the impacts on timber supply. These treatments include:

- Reducing time to green-up
- Utilization of alternative silvicultural systems to reduce adjacency concerns;
- Increased site index for managed stands;
- Alternative densities for managed stands;
- Use of genetically-improved planting stock;
- Juvenile spacing and fertilization; and
- Managing low to non-producing timber types.

Baseline analysis inputs will reflect current management as outlined in the MoF Data Package. Modified silviculture and management inputs will be revised for each of the additional scenarios. MoF *Integrated Silviculture Information System* (ISIS) data will be used in conjunction with conventional (FIP) inventory data to develop more accurate growth and yield information for the analysis. Management guidelines will reflect Forest Practices Code (FPC) requirements as closely as possible given the inventory data provided. In addition, management guidelines associated with the Cariboo-Chilcotin Land Use Plan (CCLUP) will be included where possible.

Analysis of options will use FSSIM Version 3.0, the MoF's forest estate simulation model. FSSIM is capable of explicitly simulating integrated resource management by regulating forest cover. Initially, Timberline's in-house forest estate model CASH6 was to be used for this analysis. However, after discussions with MoF the decision to use to FSSIM was made. Use of FSSIM limits the ability to evaluate economic indicators in the timber supply analysis.

This analysis is not intended to provide a review of TSR I or anticipate TSR II. The project is intended to provide insight into timber supply impacts of various silvicultural stand treatments. Such impacts as are demonstrated should be considered incremental changes and the results are not to be interpreted as actual values.

Section 2.0 describes the forest inventory used in this analysis and documents the definition of the timber harvesting land base.

Section 3.0 describes how the inventory data is organized for analysis including analysis units and management zones and groupings.

Section 4.0 provides assumptions for growth and yield.

Section 5.0 describes management assumptions.

Section 6.0 lists treatments that will be evaluated.

2.0 DESCRIPTION OF LAND BASE

This section describes the TSA land base and the methodology used to determine the way in which land contributes to the analysis. Some portions of the productive land base, while not contributing to harvest, may be available to meet other resource needs, namely forest cover requirements.

2.1 Forest Inventory

Provided to Timberline for this analysis were updated FIP files for all mapsheets wholly or partially included in the 100 Mile House TSA. The forest cover inventory is updated for disturbance to between 1994 and 1997 and projected for growth to January 1998. For analysis purposes the inventory will be assigned to 10-year age classes.

Non-standard GIS data coverages were also provided for non-timber resources such as wildlife habitat, biodiversity units (surrogates for landscape units), visually sensitive areas and operability. Table 2.1 summarizes the non-standard data used in the analysis database.

Table 2.1 – Non-Standard Inventory Data

Data	Source	Vintage	Scale
Resource management zones (CCLUP)	LUCO	1995	1:250 000
Parks (from CCLUP)	LUCO	1995	1:20 000
Caribou habitat	MoELP	1985	1:50 000
Road atlas	MoF	1997	1:20 000
Mule deer winter ranges	MoELP	1989	1:20 000
Clinton Creek watershed	CCLUP	1995	1:250 000
Class A lakes	MoF	1997	1:20 000
Draft landscape units	MoF	1997	1:20 000
Biogeoclimatic zones	MoF	1996	1:20 000
Draft scenic areas	MoF	1996	1:50 000
Operability classes	MoF	1995-1996	1:30 000

MoF = Ministry of Forests;

MoELP = Ministry of Environment, Lands and Parks;

LUCO = Land Use Coordination Office.

The analysis will also include information from the MoF ISIS database. This information will assist in developing managed stand yield tables and identifying NSR lands. The complete ISIS database was downloaded by MoF 100 Mile House District staff July 31, 1997.

2.2 Timber Harvesting Land Base Determination

This Section describes the 100 Mile House TSA landbase and the methodology used to determine the way in which land contributes to the analysis. Some portions of the productive landbase, while not contributing to harvest, may be available to meet other resource needs. Table 2.2 presents the results of the netdown process to identify the timber harvesting or net operable landbase.

Table 2.2 - Timber Harvesting Landbase Determination – Base Case

Land Classification	Total Area ¹ (ha)	Net Reduction		Net Remainder	
		Area (ha)	Volume ² (1000s m ³)	Area (ha)	Volume ² (1000s m ³)
Total Area	1,234,386			1,234,386	145,301
Non-crown land		142,854	8,498		
Parks		50,324	6,263		
Non-prod forest & Non-forest	133,442	133,442	427		
Non-commercial (NCBr)	366	366	25		
Productive Forest				907,400	130,088
Productive reductions:					
ESAs:					
Soils	17,889	14,301	1,613		
Regeneration	5,096	3,246	334		
Avalanche hazard	64	56	6		
Inoperable	153,339	11,843	2,040		
Roads, trails & landings		18,675	1,397		
Riparian reserves:					
Class A lakes	51,922	2,286	501		
Streams, wetlands, lakes		57,333	8,309		
Caribou habitat	20,549	6,959	1,617		
Wildlife tree patches		73,433	11,899		
Productive Forest Reductions		188,132	27,716		
Current Net Operable Landbase PA16 ³					
Forested land	120,202			93,460	6,898
NSR	5,962			4,575	
TSA					
Forested land	741,735			590,722	95,474
NSR	39,500			30,511	
Total				719,268	102,372
Less future roads					
PA16		2,341	262		
TSA		17,607	3,620		
Long-term Net Operable Landbase					
PA16				95,694	6,636
TSA				605,768	92,142
Total				701,462	98,778

¹ Total area includes all crown area (total area less non-crown & parks) for a given land.

² Volumes include some Py and deciduous for specific components of the landbase.

³ PA16 area is modeled as a partition within the net operable landbase in the timber supply analysis.

2.3 Total Area

The total area of the 100 Mile House TSA is 1,234,386 hectares. Total volume is 145,301,000m³.

2.4 Non-Crown Land

Only lands on which the MoF can predict or determine the future condition are included in the analysis landbase, regardless of their condition as forest or other land classification. All non-Provincial forest lands that are not classified ownership code 62, 63 or 69 are removed during this step of the netdown process. Private lands and Indian Reserves are excluded from the analysis landbase for contribution to timber supply or any non-timber considerations (biodiversity, habitat, etc.). Productive forest lands not labelled ownership 40 (private) or 52 (Indian Reserve) may contribute to forest cover requirements during the analysis.

2.5 Parks

The CCLUP identified a number of new parks (protected areas) within the TSA that will no longer be available for timber harvesting. Some of the parks excluded during this stage of the netdowns were established prior to CCLUP implementation and may have been expanded as part of CCLUP recommendations. Productive forest areas within the new parks, plus the remainder of other parks will contribute to landscape level biodiversity requirements and visually quality requirements during the analysis.

2.6 Non-Productive Forest & Non-Forest

All lands classified as non-forest or non-productive forest, such as lakes, swamps, rock, alpine, *etc.* are excluded from the timber harvesting landbase. These areas will not contribute to either the landscape level biodiversity requirements or the annual harvest in the analysis.

2.7 Non-Commercial Cover

Land classified as being occupied by non-commercial species (coded type identity = 5 in the inventory) is excluded.

2.8 Environmentally Sensitive Areas (ESAs)

ESAs are identified based on a number of inventory attributes having special management requirements. In the context of timber supply analysis, management constraints are reflected in the designation of high sensitivity ESAs as non-contributing to harvest.

High sensitivity ESA designations exist in the inventory for the following concerns:

- Avalanche concerns;
- Regeneration problems;
- Recreation concerns;
- Sensitive soils; and
- Wildlife concerns.

High soils and avalanche concern areas are completely removed from the timber harvesting landbase. High regeneration problem areas are reduced by 90%. This is the same approach as used during the TSR I analysis of the 100 Mile House TSA.

Significant wildlife and hydrologic areas are no longer addressed with ESA netdowns. Individual inventories are now included for Caribou habitat, Mule Deer winter range, Mountain Sheep and for the Clinton Creek Community Watershed. Forest cover objectives for these wildlife species will be addressed by including forest cover constraints in the timber supply analysis. In addition, riparian netdowns are intended to address some wildlife requirements.

Recreation and visual concerns are addressed by imposing forest cover constraints in the analysis on areas identified in the most recent scenic areas (VQO) inventory for the District.

2.9 Inoperable Areas

Since the TSR I timber supply analysis was completed in October 1994, a new operability classification has been completed for the 100 Mile House TSA. Five classes based on slope, harvesting methodology and timber potential were used to develop the new classification. Table 2.3 summarizes the new classification and the area reductions associated with each class.

Table 2.3 –Inoperable Reductions

Operability Class	Gross Area (ha)		Operability Reductions		
	Total ¹	Productive	%	Area (ha)	Volume (1000s m ³)
1 – Slope <= 50%	887,869	880,774	0		
2 – Slope 51 – 70% (cable yarding)	8,819	8,775	100	8,199	1,503
3 – Slope > 70% (no harvest/inoperable)	14,238	14,144	100	1,986	268
4 – MoF heli-log defined areas	2,487	2,468	100	652	136
5 – No forest crop potential	127,795	1,239	100	1,005	134

¹ All crown land excluding parks

Classes 2 and 4 have some potential for contributing to the timber supply but additional review is necessary to determine this final contribution. Class 5 is removed mainly during reductions for non-productive as outlined in Section 2.6.

2.10 Roads and Trails

2.10.1 Existing Roads and Trails

Existing roads and trails are based on a Ministry review of the road atlas map using GIS. Losses associated with roads are based on the most current data from the post-harvest reports in the ISIS and MLSIS databases. A reduction factor of 1.1% is applied to all areas to account for existing roads. Previously harvested areas (< 61 years of age) are reduced by an additional 3.8% to account for existing trails and landings.

2.3.2 Future Roads, Trails & Landings

Future road development is also based on the ISIS and MLSIS information. The average loss attributed to roads, trails and landings for the entire 100 Mile House District is 3.8%. All areas with stands older than 60 years of age (assumes no previous harvesting) are reduced by this fraction during the analysis simulations.

2.11 Riparian Reserve & Management Zones (RRZs & RMZs)

A new lake classification was recently completed for the TSA. MoF identified eight lakes requiring 200 metre RRZs. Other lakes larger than 3 ha in size require 10 metre RRZs. These reserve areas are generated in the GIS. Reserve areas will contribute to forest cover objectives associated with the management zone or biodiversity unit assigned to the area.

A recent MoF GIS exercise determined the percentage reductions to apply to the landbase to account for stream and wetland riparian management areas (RMAs). Landbase reductions are made to account for both RRZs and RMZs. RMZs are assumed to be managed with 50% basal area retention. Based on the MoF study a reduction of 6.69% is applied to all areas remaining in the net operable landbase at this stage of the netdown. This reduction is comprised of 1.3% for riparian reserve zones (RRZs) and 5.39% for RMZs.

2.12 Wildlife Habitat

Eastern caribou ranges were recently mapped for the Boss-Deception Special Resource Development Zone (SRDZ). At present there is a moratorium on harvesting in this area as outlined in Option A of the CCLUP draft *Caribou*

Management Strategy Report. This report suggests no volume removal from this area for at least the next five years. However, the limited harvest areas within the Boss-Deception SRDZ are outside the 100 Mile House TSA. Therefore all of the eastern caribou range is excluded from the timber harvesting landbase.

Mule deer winter range (MDWR) is maintained in the net operable landbase and modeled with selection management. This management approach is based on the draft *Regional Mule Deer Winter Range Strategy*. Section 4.11 outlines the methods used to model selection harvesting in MDWR areas.

2.13 Volume Retention in Cutblocks

In addition to all previous netdowns to the productive forest, other areas may be required to provide sufficient reserves of productive timber for wildlife across the TSA. These small reserves are also referred to as wildlife tree patches (WTPs) and wildlife trees (WTs). In conjunction with the riparian study WTP requirements were reviewed for the TSA. Reductions of 6.0% and 6.3% are applied to all clearcut harvest areas to account for WTPs and WTs, respectively. MDWR and Douglas-fir drybelt (Fd-drybelt) selection harvest areas are not reduced to accommodate stand level biodiversity.

2.14 PA16 Fibre Source

The PA16 Fibre Source is based on problem forest type (PFT) descriptions from the 1981 timber supply analysis for the TSA. Stands that are included in the PA16 Fibre Source are listed in Table 2.4.

Table 2.4 – PA16 Fibre Source Stand Descriptions

Stand Description	Inventory Type Group	SI50 Range	Age / Stocking	Height Class	PSYU	Percent Available ¹
“L” site conifer (non-PI)	1-8, 9-26, 32	<= 7.6			141, 142, 159, 261	100
“L” site PI	28 – 31	<= 7.6			141, 142, 159, 261	100
“L” site deciduous	35, 36, 40 – 42	<= 7.6			141, 142, 159, 261	100
“GMP” site deciduous	35, 36, 40 – 42	> 7.6			141, 142, 159, 261	100
“GMP” site Fd	1-8	> 7.6	121+		142	3
	1-8	> 7.6	Stk 2	<=2	159	85
	32	> 7.6	Stk 2	<=2	261	50
“GMP” site Cw Hw	9-17	> 7.6	>110			20
	9-17	> 7.6	<=110			50
	9-17	> 7.6	Stk 2	<=2	159	85
	9-17	> 7.6	Stk 2	<=2	261	50
“GMP” site Bl Sx	18-20	> 7.6	<=110			10
	18-26	> 7.6	>110	<=2	141	60
	18-26	> 7.6	Stk 2	<=2	159	85
	18-26	> 7.6	Stk 2	<=2	261	50
“GMP” site PI	28-31	> 7.6	>80	<=2	141	10
	28-31	> 7.6	Stk 4		142	95
	28-31	> 7.6	>80	<=2	142	10
	28-31	> 7.6	<=90			5
	28-31	> 7.6	<=100			10
	28-31	> 7.6	Stk 2	<=2	159	85
	28-31	> 7.6	Stk 2	<=2	261	50
	28-31	> 7.6	Stk 3		159	60
	28-31	> 7.6	Stk 3		261	10
	28-31	> 7.6	Stk 4		159, 261	90

¹ Percent available refers to the component assigned to PA16

The “site classes” referred to in Table 2.4 are the general descriptions used in old MoF inventory classification. Site index (SI50) is now used to define site productivity categories.

Due to growth and disturbance of the landbase since the establishment of PA16 the landbase meeting the PA16 definition may have changed since the last timber supply analysis for the TSA. The PA16 area will be modeled with separate analysis units from the remainder of the TSA landbase. A separate harvest target will be applied to the PA16 landbase during the analysis.

3.0 INVENTORY ORGANIZATION

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. It is important to note that aggregation of the landbase will be consistent in all options and sensitivity analyses. This is to ensure that differences in results reflect differences in management decisions and not inventory aggregation.

The use of forest cover constraints allows management objectives for non-timber resources to be included in timber supply analysis simulations. For forest level modeling purposes areas requiring the same management regime, that is having the same forest cover constraints, are assigned to a common group or zone. Within this landbase aggregate specific forest cover constraints are implemented. Groups and zones defined for the TSA are based on forest management to address timber and non-timber resources.

Combining stands into analysis units on the basis of similar species composition, site productivity and silviculture regime captures similarities in growth and response to silvicultural treatments.

Unique management characteristics are modeled by combining areas into two FSSIM landbase aggregates:

- Groups are used to facilitate the simulation of different and sometimes overlapping management controls. Any combination of zones, analysis units and/or ages may be organized into groups based on the control requirement. Groups are required if reporting is needed for either a zone or group. Therefore many zones are also identified as groups in the analysis data set.
- Zones are landbase aggregates over which specific management criteria are imposed. These areas typically define objectives for wildlife, visual quality or silvicultural green-up. Zones may be mutually exclusive, contiguous areas.

FSSIM groups were defined for the TSA clearcut, TSA MDWR Selection, Fd-Drybelt Selection areas and PA-16 harvest targets. Forest cover requirements have been assigned to a number of groups in order to model old growth requirements and maximum disturbance/green-up (community watershed, VQOs, etc.).

The following sections describe the various landbase aggregates used in the analysis to model forest cover constraints and for yield table assignments. Only productive forest areas (including include parks or other crown reserves) are included in the analysis data set.

3.1 Old Growth Retention Groups

Old growth forest cover requirements will be modeled within Biodiversity Unit-Biogeoclimatic Ecological Classification/Natural Disturbance Types (BU-BEC/NDTs). 24 BUs have been recommended as part of the CCLUP process. BEC classification (to the variant level) is based on MoF Biogeoclimatic mapping and NDT definitions are outlined in the FPC Biodiversity Guidebook. Constraints applied at the broad BU-BEC/NDT level are intended to address landscape level biodiversity requirements (old growth) by imposing a desired forest state. Table 3.1 summarizes the 114 BU-BEC/NDTs for the 100 Mile House analysis.

Table 3.1 – BU-BEC/NDT Area Distribution

BU-BEC/NDT	Area (ha)	
	Gross Productive ¹	Net Operable
108 MILE LK-ESSFwk/1	421	61
108 MILE LK-IDFdk/4	14,716	11,886
108 MILE LK-SBPSmk/3	21,074	17,534
108 MILE LK-SBSdw/3	4,322	3,660
108 MILE LK-SBSmc/3	2,607	1,960
108 MILE LK total	43,140	35,101
BIG BAR-AT p/5	289	8
BIG BAR-BGxh/4	16	
BIG BAR-BGxw/4	551	43
BIG BAR-ESSFxc/3	1,004	165
BIG BAR-IDFdk/4	35,024	27,732
BIG BAR-IDFxm/4	4,690	2,963
BIG BAR-IDFxm/4	884	260
BIG BAR-MSxk/3	5,458	2,270
BIG BAR total	47,915	33,442
BONAPARTE LK-ESSFdc/3	115	93
BONAPARTE LK-IDFdk/4	7,631	5,828
BONAPARTE LK-MSxk/3	5,211	4,206
BONAPARTE LK-SBPSmk/3	39,967	32,137
BONAPARTE LK-SBSdw/3	2,521	1,905
BONAPARTE LK-SBSmm/3	319	247
BONAPARTE LK total	55,765	44,416
BRADLEY-ESSFwc/1	1,678	1,345
BRADLEY-ESSFwk/1	4,864	3,791
BRADLEY-ICHdk/3	16,653	12,892
BRADLEY-IDFmw/4	1,832	1,542
BRADLEY-SBPSmk/3	4,980	4,041
BRADLEY-SBSdw/3	22,626	14,681
BRADLEY-SBSmc/3	1,072	754
BRADLEY total	53,705	39,044
BRIDGE CR-IDFdk/4	43,947	35,254
BRIDGE CR-SBPSmk/3	6,147	5,083
BRIDGE CR total	50,095	40,337
BRIDGE LAKE-ESSFdc/3	2,114	1,562
BRIDGE LAKE-SBPSmk/3	15,586	11,746
BRIDGE LAKE-SBSdw/3	14,065	10,251
BRIDGE LAKE-SBSmc/3	4,683	3,678
BRIDGE LAKE-SBSmm/3	1,334	1,052
BRIDGE LAKE total	37,782	28,290
CANIM LAKE-ESSFdc/3	12,303	9,612
CANIM LAKE-ICHmk/2	2,484	1,995
CANIM LAKE-IDFmw/4	1,210	795
CANIM LAKE-SBSdw/3	11,858	8,862
CANIM LAKE-SBSmc/3	7,817	6,123
CANIM LAKE-SBSmm/3	2,025	1,516
CANIM LAKE total	37,698	28,902
CANIM RED-ESSFdc/3	2,162	1,607
CANIM RED-ICHdk/3	1	1

BU-BEC/NDT	Area (ha)	
	Gross Productive ¹	Net Operable
CANIM RED-ICHmk/2	1,704	1,364
CANIM RED-IDFmw/4	1,228	868
CANIM RED-SBSdw/3	2,245	1,777
CANIM RED-SBSmm/3	3,999	3,050
CANIM RED total	11,339	8,666
CHASM-AT p/5	34	
CHASM-ESSFxc/3	1,443	140
CHASM-IDFdk/4	55,502	45,487
CHASM-IDFxm/4	7,619	2,874
CHASM-MSxk/3	3,391	549
CHASM total	67,989	49,050
CLINTON-AT p/5	155	104
CLINTON-ESSFxc/3	2,019	472
CLINTON-IDFdk/4	13,278	9,894
CLINTON-IDFxm/4	9,951	7,108
CLINTON-MSxk/3	6,098	3,226
CLINTON total	31,501	20,804
CUNNINGHAM LK-IDFdk/4	63,960	49,393
DEADMAN-IDFdk/4	19,638	15,340
DEADMAN-IDFxm/4	15	1
DEADMAN-MSxk/3	4,684	2,779
DEADMAN-SBPSmk/3	12,286	9,864
DEADMAN total	36,622	27,985
DECEPTION MT-AT p/5	637	
DECEPTION MT-ESSFwc/1	5,048	571
DECEPTION MT-ESSFwk/1	6,467	3,616
DECEPTION MT-ICHdk/3	2,480	1,901
DECEPTION MT-ICHmk/2	2,620	1,782
DECEPTION MT total	17,252	7,871
DOG CREEK-IDFdk/4	49,254	40,518
DOG CREEK-IDFxm/4	933	777
DOG CREEK-SBPSmk/3	163	119
DOG CREEK total	50,350	41,415
FOREST GROVE-ESSFdc/3	1,054	804
FOREST GROVE-ICHmk/2	52	42
FOREST GROVE-IDFdk/4	4,775	3,944
FOREST GROVE-IDFmw/4	458	324
FOREST GROVE-SBPSmk/3	9,822	7,518
FOREST GROVE-SBSdw/3	17,053	12,800
FOREST GROVE total	33,214	25,432
GREEN LAKE-IDFdk/4	16,503	13,112
GREEN LAKE-SBPSmk/3	35,310	28,644
GREEN LAKE-SBSdw/3	264	212
GREEN LAKE total	52,077	41,968
HELENA LK-IDFdk/4	38,623	33,135
HELENA LK-SBPSmk/3	8,862	7,260
HELENA LK total	47,485	40,395
HENDRIX LK-AT p/5		
HENDRIX LK-ESSFwc/1	4,862	3,637
HENDRIX LK-ESSFwk/1	11,323	8,818
HENDRIX LK-ICHdk/3	7,312	5,743
HENDRIX LK-ICHmk/2	5,236	4,105
HENDRIX LK-IDFmw/4	453	390
HENDRIX LK total	29,187	22,693
KELLY LAKE-AT p/5	43	5
KELLY LAKE-BGxh/4	337	
KELLY LAKE-ESSFxc/3	1,224	160
KELLY LAKE-IDFdk/4	6,088	1,856
KELLY LAKE-IDFxm/4	2,361	82
KELLY LAKE-MSxk/3	6,386	778
KELLY LAKE total	16,437	2,881
LOON-IDFdk/4	40,997	33,025
LOON-IDFxm/4	2,509	978
LOON total	43,506	34,003

BU-BEC/NDT	Area (ha)	
	Gross Productive ¹	Net Operable
MCKINLEY-AT p/5	46	
MCKINLEY-ESSFwc/1	2,055	498
MCKINLEY-ESSFwk/1	4,125	2,509
MCKINLEY-ICHmk/2	4,016	2,646
MCKINLEY total	10,242	5,653
MEADOW LAKE-BGxh/4		
MEADOW LAKE-BGxw/4	350	129
MEADOW LAKE-IDFdk/4	44,162	36,401
MEADOW LAKE-IDFxm/4	3,045	1,941
MEADOW LAKE-SBPSmk/3	563	434
MEADOW LAKE total	48,120	38,906
MURPHY LK-AT p/5		
MURPHY LK-ESSFwc/1	2,661	2,132
MURPHY LK-ESSFwk/1	4,748	3,782
MURPHY LK-SBPSmk/3	10,657	8,632
MURPHY LK-SBSdw/3	20,949	16,508
MURPHY LK-SBSmc/3	5,399	4,329
MURPHY LK total	44,414	35,382
SPANISH-AT p/5	580	
SPANISH-ESSFwc/1	5,115	930
SPANISH-ESSFwk/1	7,261	4,868
SPANISH-ICHdk/3	11,877	9,106
SPANISH-IDFmw/4	504	409
SPANISH-SBSmm/3	3,734	1,926
SPANISH total	29,072	17,238
Total	958,873	719,268

¹ Includes productive forest area from parks, crown reserves and woodlots.

Parks, crown reserves and woodlots have been included in the BU-BEC/NDTs. These areas are completely contained within the TSA boundary and may therefore factor into the assessment of old growth for modeling purposes. All of these ownership categories have been classified as “inoperable” (I) in the FSSIM data set and will therefore never contribute to the periodic harvest. Note that all BU-BEC/NDTs associated with the Alpine Tundra (AT) BEC zone are included for reporting purposes only. No old growth forest cover constraints will be assigned to these BU-BEC/NDTs in the analysis.

3.2 Disturbance/Green-up Forest Cover Constraint Groups

A number of instances of a given forest cover constraint type may occur in different locations throughout the TSA. These are grouped for timber supply modeling because they are managed in this approach operationally. Disturbance/Green-up forest cover constraint groups are summarized in Table 3.2.

Table 3.2 – Disturbance/Green-up Forest Cover Constraint Groups

Constraint Group	Area (ha)	
	Gross Productive ¹	Net Operable
IRM	654,438	483,414
Visual Areas	77,874	52,680
Clinton Creek Community Watershed	5,690	3,479

¹ Includes productive forest area from parks, crown reserves and woodlots.

Productive forest stands removed during the “parks” netdown step and other productive crown land removals (ESAs, inoperable, etc.) can influence the state of the forest within the visually sensitive areas, but not within the Clinton Creek Community Watershed (CCCWS) or IRM areas. Visually sensitive areas and CCCWS areas may overlap and will be required to meet the forest cover constraints assigned to both groups during analysis simulation. These two constraint groups may also include the selection harvest types (MDWR and Fd-Drybelt). The IRM group is mutually exclusive; it is the residual of all non-visually sensitive and non-CCCWS constraint areas. In addition no selection harvest areas are included in the IRM constraint group.

3.3 Reporting Groups

Reporting groups were defined to allow for reporting and establishing harvest targets. These groups are summarized in Table 3.3.

Table 3.3 – Other Reporting Groups

Group	Area (ha)	
	Gross Productive ¹	Net Operable
TSA Clearcut Harvest	606,066	444,624
TSA Fd-Drybelt Selection Harvest	142,802	117,740
TSA MDWR Selection Harvest	79,331	59,140
PA16 Harvest	130,665	98,035

¹ Includes productive forest area from parks, crown reserves and woodlots.

3.4 Analysis Units

Aggregation of forest stands is necessary to facilitate forest level modeling and reporting. Stands with similar biological (species composition and site productivity), management and silviculture regimes are grouped to reduce complexity. This must be balanced with creating small enough groups to allow accurate modeling of stand yields. It is also important to ensure that analysis units are consistent between various options of the timber supply analysis so that aggregation methodology is not the reason for differences between analysis results.

Analysis unit descriptions were provided in the MoF *100 Mile House Timber Supply Review Data Package*. However, alternative approaches to aggregating the land base have been adopted for this analysis to allow review of the various stand treatments. Subdivisions have been made to reflect existing natural versus managed stands, old growth (> 140 years old) versus thrifty stands and clearcut

versus selection harvest areas. These subdivisions apply to both the TSA and PA16 land base components.

3.4.1 Existing Natural Stand Analysis Units

Existing natural stand analysis units reflect all stands 33 years of age and older that are assumed to have had no management since establishment. All of the yields for these stands were developed with MoF VDYP. All existing natural stands were assigned to an analysis unit after review of the following:

- TSA versus PA16;
- Thrifty (33 – 140 years old) versus old growth (> 140 years old); and
- Clearcut versus selection harvest;

After assignment to each of the categories listed above a review of the inventory type groups was completed. Species groups were then defined for each category based on inventory type group.

Fd-Drybelt selection harvest analysis units include only Douglas-fir leading (inventory type groups 1 – 8) within the IDF and SBPS BEC zones. MDWR selection harvest analysis units are assigned only to stands with at least 40% Douglas-fir (> 40% Fd) within the MoELP MDWR areas.

Site productivity is defined by the inventory SI50 included in the FIP data provided by MoF. Site index break points are chosen to balance the area in each class while keeping the spread in site index in each class to a minimum. This is of concern since the relationship between site index and volume is not linear. The final analysis units are based on species group-site class combinations. Table 3.4 summarizes the definitions for the existing natural stand analysis units.

Table 3.4 – Existing Natural Stand Analysis Unit Definitions

Analysis Unit	Net Area (ha)	Inventory Type Groups	SI50 Range
TSA Old Growth AUs (age > 140)			
1 Fd-G	864	1-8, 32-34	> 15.4
2 Fd-M	2,587	1-8, 32-34	11.5-15.4
3 Fd-P	1,624	1-8, 32-34	< 11.5
5 CwHw-M	651	9-17	> 12.4
6 CwHw-P	398	9-17	< 12.5
7 SeBI-G	1,169	18-26	> 18.4
8 SeBI-M	4,218	18-26	12.5-18.4
9 SeBI-P	14,826	18-26	< 12.5
11 PISe-M	4,136	27-29	> 12.4
12 PISe-P	8,355	27-29	< 12.5
13 PIFd-G	222	30	>18.4
14 PIFd-M	772	30	13.5-18.4
15 PIFd-P	625	30	< 13.5
17 PIDec-M	513	31, 35-42	8.5-21.5
19 Fd_Dry-G	6,323	1-8 (IDF & SBPS)	>15.4
20 Fd_Dry-M	45,874	1-8 (IDF & SBPS)	10.5-15.4
21 Fd_Dry-P	6,128	1-8 (IDF & SBPS)	< 10.5
22 Fd_Deer-G	2,013	1-34 (> 40% Fd)	>15.4
23 Fd_Deer-M	19,836	1-34 (> 40% Fd)	10.5-15.4
24 Fd_Deer-P	2,754	1-34 (> 40% Fd)	<10.5
TSA Thrifty AUs (age 33-140)			

Analysis Unit	Net Area (ha)	Inventory Type Groups	SI50 Range
101 Fd-G	3,055	1-8, 32-34	>20.4
102 Fd-M	10,592	1-8, 32-34	16.5-20.4
103 Fd-P	2,748	1-8, 32-34	<16.5
105 CwHw-M	230	9-17	7.7-21.5
107 SeBl-G	7,772	18-26	>20.4
108 SeBl-M	22,910	18-26	14.5-20.4
109 SeBl-P	4,559	18-26	<14.5
110 PlSe-G	42,888	27-29	>18.4
111 PlSe-M	92,439	27-29	14.5-18.4
112 PlSe-P	64,549	27-29	<14.5
113 PlFd-G	9,812	30	>19.4
114 PlFd-M	18,440	30	14.5-19.4
115 PlFd-P	3,913	30	<14.5
116 PlDec-G	10,145	31, 35-42	>18.4
117 PlDec-M	17,480	31, 35-42	13.5-18.4
118 PlDec-P	4,576	31, 35-42	<13.5
119 Fd_Dry-G	10,842	1-8 (IDF & SBPS)	>16.4
120 Fd_Dry-M	34,350	1-8 (IDF & SBPS)	11.5-16.4
121 Fd_Dry-P	11,871	1-8 (IDF & SBPS)	<11.5
122 Fd_Deer-G	7,729	1-34 (> 40% Fd)	>17.4
123 Fd_Deer-M	15,789	1-34 (> 40% Fd)	12.5-17.4
124 Fd_Deer-P	10,828	1-34 (> 40% Fd)	<12.5
PA16 Old Growth AUs (age > 140)			
1602 PA16_Con-M	261	1-26, 32	>10.4
1603 PA16_Con-P	2,969	1-26, 32	<10.5
1606 PA16_Pl-P	5,543	28-31	4.5-14.4
1621 PA16_Fd_Dry-P	631	1-8 (IDF & SBPS)	3.5-13.4
1622 PA16_Fd_Deer-P	82	1-34 (> 40% Fd)	4.5-15.4
PA16 Thrifty AUs (age 33-140)			
1701 PA16_Con-G	197	1-26	>14.4
1702 PA16_Con-M	850	1-26	9.5-14.4
1703 PA16_Con-P	309	1-26	<9.5
1704 PA16_Pl-G	1,485	28-31	>15.4
1705 PA16_Pl-M	13,194	28-31	9.5-15.4
1706 PA16_Pl-P	12,490	28-31	<9.5
1707 PA16_Dec-G	1,208	35-42	>21.4
1708 PA16_Dec-M	15,290	35-42	16.5-21.4
1709 PA16_Dec-P	15,982	35-42	11.5-16.4
1710 PA16_Dec-L	1,468	35-42	<11.5
1721 PA16_Fd_Dry-P	14,200	1-8 (IDF & SBPS)	3.5-8.4
1722 PA16_Fd_Deer-P	3,776	1-34 (> 40% Fd)	3.5-13.4

3.4.2 Existing Managed Stands Analysis Units

Existing managed stands are defined as all productive, fully stocked stands up to 32 years old. These stands have been managed since establishment (stocking and density control). For the 100 Mile House analysis MoF ISIS data was used to review the stand characteristics for the existing managed component of the inventory.

Initially, the ISIS data was to be linked to the FIP inventory database using mapsheet and polygon number. This would have provided a complete understanding of the location of managed stands with respect to all other data base attributes. However, the FIP and ISIS data sets were not properly matched so a complete link was not possible.

Inclusion of the ISIS data was still possible but it was done on the basis of average attributes. Inventory type group and site index range were used to define existing managed stand analysis units on the FIP inventory data in the same manner as for the existing natural stands.

Inventory type group was then assigned to the ISIS forest cover data using existing species composition. Site index is an existing ISIS attribute. Existing managed stand analysis units were then assigned to the ISIS data using the same inventory type group (species group) and site index range as used for the FIP managed stands.

Development of the managed stand yield tables using MoF BatchTIPSY included area-weighted average stand attributes from the ISIS forest cover data. This approach is based on the assumption that ISIS has the best classification of the managed stand forest cover attributes. Only ISIS polygons with a complete set of attributes related to analysis unit definitions were included in the development of the average attributes. Table 3.5 summarizes analysis unit definitions for the existing managed stands

Table 3.5 – Existing Managed Stand Analysis Unit Definitions

Analysis Unit	Net Area (ha)	Inventory Type Groups	SI50 Range
TSA - ISIS Attributes			
201 Fd-G	379	1-8, 27,34	> 18.4
202 Fd-M	1,700	1-8, 27,34	15.5-18.4
203 Fd-P	92	1-8, 27,34	< 15.5
204 SeBI-G	1,608	9-26	> 17.4
205 SeBI-M	5,497	9-26	13.5 - 17.4
206 SeBI-P	1,022	9-26	< 13.5
207 PI-G	2,047	28	> 17.4
208 PI-M	14,876	28	14.5 - 17.4
209 PI-P	9,779	28	< 14.5
210 PIFd-G	272	29	> 17.4
211 PIFd-M	2,834	29	14.5-17.4
212 PIFd-P	2,431	29	< 14.5
213 PISe-G	1,491	30	> 17.4
214 PISe-M	3,955	30	14.5-17.4
215 PISe-P	366	30	< 14.5
216 PIDec-G	477	31	> 17.4
217 PIDec-M	5,807	31	14.5-17.4
218 PIDec-P	4,684	31	< 14.5
PA16 - FIP Attributes			
1801 PA16_SeBIFd-G	330	1-27, 34	> 15.4
1802 PA16_SeBIFd-M	83	1-27, 34	10.5-15.4
1803 PA16_SeBIFd-P	196	1-27, 34	< 10.5
1805 PA16_PiSe-M	1,417	28, 30	4.0-20.0
1808 PA16_PIFd-M	935	29	4.0-20.0
1810 PA16_PIDec-G	219	31	> 15.4
1811 PA16_PIDec-M	147	31	10.5-15.4
1812 PA16_PIDec-P	201	31	< 10.5

FIP attributes were used for the PA16 component of the managed stand land base. There was no way to confirm whether managed stands included in the ISIS database were part of the PA16 land base.

3.5 Age Class Distributions

Table 3.6 summarizes the distribution of area by age class (age in 10s) for the gross productive, PA16 net operable and TSA net operable components of the inventory. All ages are projected to January 1998.

Table 3.6 – Area Distribution by Age Class

Age in 10s	Area (ha)		
	Gross Productive ¹	PA16 Net Operable	TSA Net Operable
0	47,114	4,575	30,511
10	20,475	1,790	13,876
20	45,364	4,038	31,059
30	33,277	3,592	22,714
40	32,348	8,775	18,200
50	19,390	5,626	11,222
60	50,750	8,136	30,563
70	5,127	528	3,704
80	90,396	16,870	52,403
90	3,808	387	2,623
100	144,831	16,027	90,443
110	4,478	113	3,415
120	192,308	13,756	133,122
130	5,076	128	3,837
140	72,553	4,148	49,652
150	1,085	2	896
160	18,087	909	11,045
170	629	15	539
180	907	0	761
190	964	8	853
200	617	4	500
210	663	25	531
220	3,105	332	2,218
230	150,160	6,908	95,735
240	199	14	168
250	107	10	81
260+	15,054	1,318	10,564
Total	958,873	98,035	621,233

¹ Includes productive forest area from parks, crown reserves and woodlots

Figure 3.1 summarizes the current age class distribution graphically.

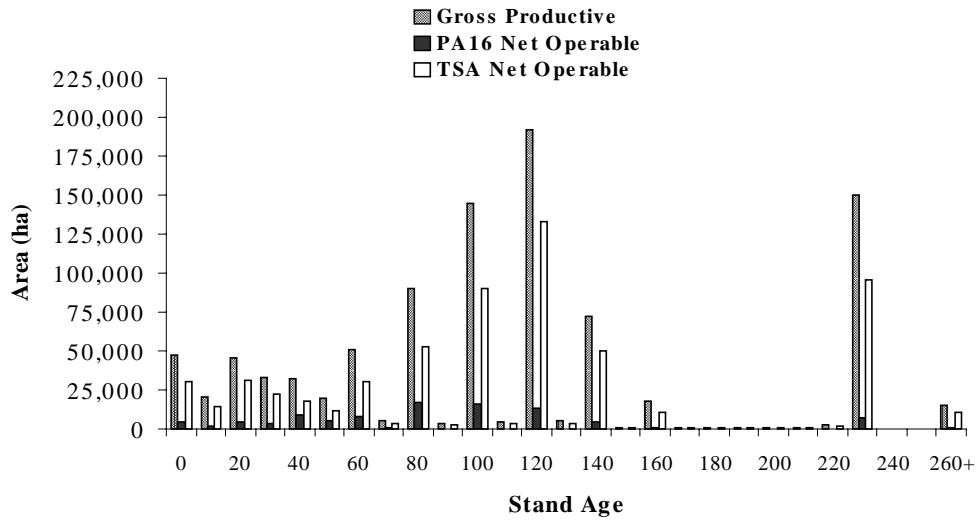


Figure 3.1 – Current Age Class Distribution

Table 3.7 provides the volume distribution (net decay, waste and breakage (DWB)) by age class for the gross productive, PA16 net operable and TSA net operable components of the inventory. All ages are projected to January 1998.

Table 3.7 – Volume Distribution by Age Class

Age in 10s	Volume (1000s m3)		
	Gross Productive	PA16 Net Operable	TSA Net Operable
0	0	0	0
10	0	0	0
20	0	0	0
30	0	0	0
40	1	0	1
50	85	1	70
60	184	6	139
70	409	5	308
80	10,346	711	7,251
90	629	48	429
100	29,396	2,252	19,680
110	965	24	704
120	43,341	1,891	31,442
130	1,361	23	1,040
140	15,446	560	10,957
150	259	0	209
160	3,721	116	2,496
170	90	2	76
180	177	0	146
190	187	1	163
200	38	1	30
210	136	5	110
220	167	10	131
230	28,086	970	17,903
240	52	1	47
250	36	2	29
260	3,054	270	2,115
Total	138,167	6,898	95,474

4.0 GROWTH AND YIELD

Yield curves for stands of natural origin have been prepared using the MoF program Variable Density Yield Prediction (VDYP) version 6.4. These are referred to as natural stand yield tables and are used to model the growth of existing natural stands defined in Table 3.4. VDYP yields will also be used to estimate the volume from selection harvest areas during future stand entries.

Managed stand yields have been prepared for stands regenerated and conforming to minimum stocking standards. These managed stand yield tables were created using the Table Interpolation Program for Stand Yields (BatchTIPSY Version 2 Beta 5) (TIPSY). All existing managed stands described in Table 3.5 and future managed stands will be modeled using TIPSY yield tables, with the exception of deciduous (PA16 only) and selection harvest areas.

4.1 Site Index

The forest cover inventory assigns site index to all stands less than 30 years of age and an age and height data pair for all other stands.

For stands 30 years of age and older site index numbers are assigned using the inventory age and height based on current MoF site curves. They are therefore consistently base age 50 years.

Analysis unit site index is derived as the area-weighted average of the polygon site indices in that analysis unit (pooled species group and site index range). Polygons are assigned to site classes good, medium, poor and low. This classification is based on site index break points listed in Tables 3.4 and 3.5. These break points are chosen to balance the area in each class while keeping the spread in site index in each class to a minimum. This is of concern since the relationship between site index and volume is not linear. These site classes are not to be confused with historic MoF G, M, P and L.

4.2 Site Index for Regenerated Stands

Existing natural species groups are split by age at 140 years into separate analysis units in order to isolate known negative site index bias in the older stands.

When these old growth stands are harvested the site index of the regenerating stand must be adjusted to properly reflect the site productivity. Stands undergoing species conversion at regeneration will have site index recalculated using published MoF conversion factors. This approach will be included in all analysis scenarios with the exception of the Base Case. Section 6.1 summarizes the adjustments to site index for the OGSi and other treatment scenarios.

4.3 Crown Closure

Crown closure is a major driving input for natural stand yields. Analysis unit crown closure values input to VDYP are area-weighted averages of the crown closure attribute of stands assigned to that analysis unit. Stands less than 50 years of age are assigned default crown closure values (taken from VDYP documentation) according to Table 4.1.

Table 4.1 - Default crown closure for stands under 50 years

Leading Species	Default Crown Closure
Douglas-fir	48
Balsam	42
Spruce	46
Lodgepole pine	50
Aspen	52
Cottonwood	61

4.4 Utilization Levels

Utilization levels that will be used in the development of the yield tables are documented in Table 4.2.

Table 4.2 - Utilization levels

Stand Types	Utilization		
	Minimum DBH (cm)	Stump Height (cm)	Top DIB (cm)
Pine	12.5	30	10.0
All other species	17.5	30	10.0
PA16 stands	10.0	30	8.0

Note that current volume estimates for PA16 reported in this Information Package are the same as the remainder of the TSA (12.5cm PI, 17.5cm others). For the analysis simulations, yield tables were adjusted to reflect the utilization levels stated in Table 4.2.

4.5 Decay, Waste and Breakage

VDYP-generated volumes are net DWB using appropriate forest inventory zone (FIZ), D, G or H, and special cruise (PSYU) 141, 142, 159 or 261.

4.6 Operational Adjustment Factors

Deductions for decay waste and breakage are inherent in VDYP forecasts based on the factors for the assigned FIZ and special cruise.

When using TIPSYS operational adjustment factors (OAFs) will be 10% (OAF1) and 5% (OAF2).

4.7 Volume Exclusions for Mixed Species Stands

Volumes reported in this Information Package (Tables 2.1, Table 2.3, Table 3.7) have been reduced for the non-merchantable component, deciduous and Ponderosa pine (Py), within various components of the land base. Table 4.3 summarizes the volume deductions made to both the volumes reported in this report and to the analysis unit volumes.

Table 4.3 – Volume Exclusions for Mixed Species Stands

Land Base Component	Species	Volume Exclusion (%)
TSA Clearcut	Deciduous & Py	100
TSA Fd-Drybelt Selection	Deciduous & Py	100
TSA MDWR Selection	Py	100
PA16	None	0

4.8 Yield Tables for Natural Stands

Volumes reported in this Information Package are based on individual polygon estimates developed with the MoF program VDYP. For forest estate modeling, VDYP will be used for predicting existing stand yields at the analysis unit level. Inventory type group and site index range have been used to define analysis units.

The methods used to generate VDYP natural stand yield tables are:

- Assign each polygon in the net land base to an analysis unit on the basis of inventory type group and site index, as well as factors discussed in Section 3.4.1.
- Extract area-weighted average site index, crown closure and species composition attributes for each analysis unit (pooled are stands over 32 years of age, stands between 32 and 50 years have default values for crown closure).
- Use these attributes, in addition to decay, waste and breakage factors associated with forest inventory zone and special cruise are used to drive VDYP.
- Compile yields to 12.5 cm dbh, 10.0 cm top and 30.0 cm stump for pine and 17.5 cm dbh for all other species. Additional yield adjustments are made to reflect PA16 utilization levels.

Yield curves are reduced by the deciduous and/or Py component before use in modeling based on the species compositions in Table 4.4. During the analysis, selection harvest yield tables are reduced to reflect partial harvesting. Details of the partial harvesting strategies are provided in Section 4.11. Inputs used to develop the VDYP natural stand yield tables are presented in Table 4.4.

Table 4.4 – VDYP Inputs - Existing Natural Stand Analysis Units

Analysis Unit	Net Area (ha)	Average SI50	Average CC	Species Composition
TSA Old Growth AUs (age > 140)				
1 Fd-G	864	17.5	55	Fd80 Se12 Pl5 At3
2 Fd-M	2,587	13.7	56	Fd76 Pl14 Se8 At2
3 Fd-P	1,624	9.6	42	Fd68 Py16 Pl10 Se6
5 CwHw-M	651	13.9	59	Cw79 Se12 Hw6 Fd3
6 CwHw-P	398	10.9	47	Cw77 Se14 Fd8 Pl1
7 SeBl-G	1,169	22.8	43	Se84 Bl6 Pl5 Fd5
8 SeBl-M	4,218	15.5	52	Se81 Pl8 Bl8 Cw3
9 SeBl-P	14,826	10.5	42	Se64 Bl30 Pl4 Fd2
11 PlSe-M	4,136	14.6	49	Pl91 Fd8 At1
12 PlSe-P	8,355	11.3	43	Pl92 Fd7 At1
13 PlFd-G	222	20.8	63	Pl60 Se34 At3 Fd3
14 PlFd-M	772	14.9	50	Pl62 Se36 Bl1 At1
15 PlFd-P	625	11.6	56	Pl63 Se31 Bl3 Fd3
17 PlDec-M	513	13.3	54	Pl65 At30 Se3 Fd2
19 Fd_Dry-G	6,323	15.5	52	Fd84 Pl13 Se3
20 Fd_Dry-M	45,874	11.9	43	Fd80 Pl18 Py1 Se1
21 Fd_Dry-P	6,128	8.9	43	Fd77 Pl20 Py2 Se1
22 Fd_Deer-G	2,013	15.2	51	Fd84 Pl10 Se6
23 Fd_Deer-M	19,836	11.5	42	Fd83 Pl14 Se2 At1
24 Fd_Deer-P	2,754	9.1	35	Fd79 Py14 Pl6 Se1
TSA Thrifty AUs (age 33-140)				
101 Fd-G	3,055	23.0	63	Fd63 Se17 Pl14 At6
102 Fd-M	10,592	18.5	61	Fd66 Pl18 Se12 At4
103 Fd-P	2,748	13.0	50	Fd69 Pl24 Se4 At3
105 CwHw-M	230	16.5	36	Cw75 Se14 Fd6 Bl5
107 SeBl-G	7,772	23.6	57	Se67 Pl11 Fd11 Bl11
108 SeBl-M	22,910	16.9	55	Se64 Pl19 Bl11 Fd6
109 SeBl-P	4,559	11.8	47	Se58 Bl26 Pl11 At5
110 PlSe-G	42,888	20.0	59	Pl89 Fd7 At2 Se2
111 PlSe-M	92,439	15.8	54	Pl91 Fd6 At2 Se1
112 PlSe-P	64,549	11.4	50	Pl92 Fd7 At1
113 PlFd-G	9,812	21.6	56	Pl61 Se32 Fd4 At3
114 PlFd-M	18,440	17.2	56	Pl64 Se29 At4 Fd3
115 PlFd-P	3,913	12.7	48	Pl69 Se23 At6 Fd2
116 PlDec-G	10,145	20.1	54	Pl60 At31 Se5 Fd4
117 PlDec-M	17,480	15.9	51	Pl63 At31 Se4 Fd2
118 PlDec-P	4,576	11.8	48	Pl64 At28 Se4 Fd4
119 Fd_Dry-G	10,842	18.3	45	Fd72 Pl21 Se4 At3
120 Fd_Dry-M	34,350	13.5	39	Fd76 Pl20 At3 Se1
121 Fd_Dry-P	11,871	9.4	24	Fd84 Pl13 Se1 At2
122 Fd_Deer-G	7,729	18.9	50	Fd68 Pl25 At4 Se3
123 Fd_Deer-M	15,789	15.4	38	Fd69 Pl25 At4 Se2
124 Fd_Deer-P	10,828	10.8	32	Fd77 Pl19 Se2 At2
PA16 Old Growth AUs (age > 140)				
1602 PA16_Con-M	261	13.0	54	Cw76 Se12 Fd8 Hw4
1603 PA16_Con-P	2,969	6.6	40	Se61 Bl29 Pl6 Fd4
1606 PA16_Pl-P	5,543	7.4	44	Pl90 Fd7 Se2 At1
1621 PA16_Fd_Dry-P	631	7.5	27	Fd75 Pl23 At1 Py1
1622 PA16_Fd_Deer-P	82	7.1	52	Fd73 Pl14 Se12 At1
PA16 Thrifty AUs (age 33-140)				
1701 PA16_Con-G	197	17.2	47	Bl36 Cw30 Se25 Pl9
1702 PA16_Con-M	850	10.9	48	Se59 Bl22 Pl10 At9
1703 PA16_Con-P	309	5.8	20	Bl39 Se30 Fd16 Py15

Analysis Unit	Net Area (ha)	Average SI50	Average CC	Species Composition
1704 PA16_Pl-G	1,485	18.4	51	Pl87 At6 Fd4 Se3
1705 PA16_Pl-M	13,194	11.6	51	Pl90 Fd6 At3 Se1
1706 PA16_Pl-P	12,490	6.1	45	Pl90 Fd7 At2 Se1
1707 PA16_Dec-G	1,208	24.1	57	At52 Ep19 Pl14 Se15
1708 PA16_Dec-M	15,290	19.7	53	At65 Pl19 Se9 Ep7
1709 PA16_Dec-P	15,982	13.0	57	At72 Pl20 Se5 Fd3
1710 PA16_Dec-L	1,468	8.0	54	At75 Pl18 Fd4 Se3
1721 PA16_Fd_Dry-P	14,200	6.0	22	Fd79 Pl16 At3 Se2
1722 PA16_Fd_Deer-P	3,776	5.4	23	Fd69 Pl28 At2 Se1

4.9 Regeneration Scheme and Regeneration Delay

This section describes the regeneration strategy for the 100 Mile House TSA. Regeneration delays are not inherent in the yield curves, but are assigned in forest estate modeling. Table 4.5 describes the regeneration scheme incorporated into the timber supply analyses, which is based on TSR II assumptions.

Table 4.5 - Regeneration Strategies

Existing Leading Species	Regen delay (years)	Regeneration Type & Percent		Species Composition	Initial Density	Thinned Density
		Type	Percent			
Fdi (ICH, SBPS) (G/M/P)	4	Plant	100	Fdi100	4800	1500
Cw, Hw (G/M/P)	4	Plant	90	Pli50 Se25 Fdi15	4000	1500
	7	Natural	10	Hw10	9000	1500
Se, Ba (G/M/P)	4	Plant	100	Sx100	4000	2200
Pl (G/M/P)	7	N/P	90/10	Pli100	6000	2300
Dry belt (IDF and SBPS)	–	Natural	100	Fdi100	–	–
Mule deer selection	–	Natural	100	Fdi100	–	–
Mule deer even-aged	4	Plant	100	Fdi100	4800	1500
PA16 Fdi, Ba, Se (G/M/P/L)	7	Natural	100	Fdi40 Se40 Ba20	2000	1500
PA16 Pli (G/M/P/L)	7	N/P	90/10	Pli100	2000	1500
PA16 Cot, A (G/M/P/L)	7	Natural	100	Cot50 At50	2000	1500

4.10 Yield Tables for Managed Stands

All stands age 32 or less are assigned to managed stand yield curves. The exceptions to this are selection harvest areas (MDWR and Fd-Drybelt) and deciduous-leading stands, which are always modeled on VDYP natural stand yield tables.

Managed stand yields are developed using TIPSYP which incorporates the following inputs to derive a yield curve for each analysis unit:

- Leading species;
- Initial planting density;
- Treatments, *i.e.* thinnings;
- Site index;

- Operational adjustment factors; and
- Regeneration delay - 0 (delays are incorporated in forest level analysis).

Specific inputs to TIPSYS other than species and site index are:

- Utilization: 17.5 cm dbh for all species, 12.5 for pine, special utilization for PA16 managed stands;
- OAF1 of 10%, OAF2 of 5% for all species;
- Initial stocking based on TSR II; and
- Regeneration type (planted or natural).

Multiple TIPSYS yield tables were developed for some of the managed stand yield tables used in the analysis. These tables were merged into the final analysis unit yield table for input to FSSIM. This was required where natural and planted regeneration types were included in a single regeneration strategy.

Table 4.6 presents the TIPSYS inputs used to develop the yield tables for existing managed stands. As outlined in Section 3.4.2, some of the attributes included in these inputs are from the ISIS database.

Table 4.6 – TIPSYS Inputs - Existing Managed Stand Analysis Units

Analysis Unit	Net Area (ha)	Average SI50	Average Density	Thinned Density	Species Composition ¹
ISIS Attributes					
201 Fd-G	379	20.0	2888	1500	Fd60 Se27 P110 B13
202 Fd-M	1,700	17.0	1975	1500	Fd51 Se26 B113 P110
203 Fd-P	92	12.0	3507	1500	Fd66 P116 Se13 B15
204 SeBl-G	1,608	18.9	3071	2200	Se75 B116 P17 Cw2
205 SeBl-M	5,497	15.0	2979	2200	Se61 B124 P111 Fd4
206 SeBl-P	1,022	10.3	2550	2200	Se65 B119 P112 Fd4
207 P1-G	2,047	20.0	2398	2300	P194 Se4 Fd1 At1
208 P1-M	14,876	16.0	2851	2300	P194 Se3 Fd2 At1
209 P1-P	9,779	11.0	2512	2300	P196 Se2 Fd1 At1
210 P1Fd-G	272	20.0	4157	2300	P169 Fd16 Se9 At6
211 P1Fd-M	2,834	16.0	3250	2300	P171 Fd20 Se6 At3
212 P1Fd-P	2,431	11.0	2056	2056	P170 Fd24 Se4 At2
213 P1Se-G	1,491	20.0	3017	2300	P168 Se23 B17 At2
214 P1Se-M	3,955	16.0	3011	2300	P170 Se20 B17 At3
215 P1Se-P	366	11.0	3581	2300	P167 Se21 B18 At4
216 P1Dec-G	477	19.8	3180	2300	P156 At38 Se4 Fd2
217 P1Dec-M	5,807	16.0	5138	2300	P171 At23 Se5 Fd1
218 P1Dec-P	4,684	11.0	4811	2300	P170 At26 Se2 Fd2
FIP Attributes					
1801 PA16_SeBIFd-G	330	18.2	6437	1500	B138 Cw35 Se16 Fd11
1802 PA16_SeBIFd-M	83	12.4	8244	1500	B144 Cw33 Se18 Fd5
1803 PA16_SeBIFd-P	196	5.0	2471	1500	Se48 B125 Fd18 P19
1805 PA16_P1Se-M	1,417	11.3	2151	1500	P193 At3 Se2 Fd2
1808 PA16_P1Fd-M	935	7.2	2467	1500	P164 Fd33 At2 Se1
1810 PA16_P1Dec-G	219	16.3	4612	1500	P168 At25 Se4 Fd3
1811 PA16_P1Dec-M	147	11.0	4347	1500	P168 At29 Fd2 Se1
1812 PA16_P1Dec-P	201	4.0	2298	1500	P166 At21 Fd6 Se7

¹ Balsam (Bl) is modeled as interior spruce (Se) in TIPSYS.

Table 4.7 presents the future regeneration analysis units and the species and site index values that are input to TIPSy for future managed stand yield tables. These inputs are based on the preferred strategies presented in Table 4.5. Site index is calculated based on current site index and any adjustment for species conversion.

Also included in Table 4.7 are the original analysis units. Note that the regeneration analysis unit designation is the original (existing) analysis unit +300.

PA16 existing managed stands (analysis units 1801 – 1812) will regenerate to the same analysis unit and yield table after harvest during the FSSIM modeling.

Table 4.7 – TIPSy Inputs - Future Managed Stand Analysis Units

Analysis Unit	Original Analysis Unit	Net Area (ha)	SI50	Initial Density	Thinned Density	Species Composition
TSA Old Growth AUs						
301 Fd-G	1	874	17.5	4444	1500	Fdi100
302 Fd-M	2	2,621	13.7	4444	1500	Fdi100
303 Fd-P	3	1,645	9.6	4444	1500	Fdi100
305 PlSeFd-M	5	655	13.9	4000	1500	Pli50 Se25 Fdi15 Hw10
306 PlSeFd-P	6	398	10.9	4000	1500	Pli50 Se25 Fdi15 Hw10
307 Se-G1,169	7		22.8	4000	2200	Se100
308 Se-M4,238	8		15.5	4000	2200	Se100
309 Se-P14,858	9		10.5	4000	2200	Se100
311 Pl-M	11	4,135	14.6	6000	2300	Pli100
312 Pl-P	12	8,355	11.3	6000	2300	Pli100
313 Pl-G	13	222	20.8	6000	2300	Pli100
314 Pl-M	14	771	14.9	6000	2300	Pli100
315 Pl-P	15	624	11.6	6000	2300	Pli100
317 Pl-M	17	513	13.3	6000	2300	Pli100
TSA Thrifty AUs						
401 Fd-G	101 201	3,056	23.0	4444	1500	Fdi100
402 Fd-M	102 202	10,742	18.5	4444	1500	Fdi100
403 Fd-P	103 203	2,748	13.0	4444	1500	Fdi100
405 PlSeFd-M	105	230	16.5	4000	1500	Pli50 Se25 Fdi15 Hw10
407 Se-G	107 204	7,798	23.6	4000	2200	Se100
408 Se-M	108 205	22,910	16.9	4000	2200	Se100
409 Se-P	109 206	4,558	11.8	4000	2200	Se100
410 Pl-G	110 207 210 213 216	42,980	20.0	6000	2200	Pli100
411 Pl-M	111 208 211 214 217	92,453	15.8	6000	2300	Pli100
412 Pl-P	112 209 212 215 218	64,548	11.4	6000	2300	Pli100
413 Pl-G	113	9,825	21.6	6000	2300	Pli100
414 Pl-M	114	18,603	17.2	6000	2300	Pli100
415 Pl-P	115	3,912	12.7	6000	2300	Pli100
416 Pl-G	116	10,154	20.1	6000	2300	Pli100
417 Pl-M	117	17,479	15.9	6000	2300	Pli100
418 Pl-P	118	4,575	11.8	6000	2300	Pli100
PA16 Old Growth AUs						
1902 PA16_Con-M	1602	262	13.0	2000	1500	Fdi40 Se40 Hw20
1903 PA16_Con-P	1603	2,969	6.6	2000	1500	Fdi40 Se40 Hw20
1906 PA16_Pl-P	1606	5,542	7.4	2000	1500	Pli100
PA16 Thrifty AUs						
2001 PA16_Con-G	1701	197	17.2	2000	1500	Fdi40 Se40 Hw20
2002 PA16_Con-M	1702	849	10.9	2000	1500	Fdi40 Se40 Hw20
2003 PA16_Con-P	1703	350	5.8	2000	1500	Fdi40 Se40 Hw20
2004 PA16_Pl-G	1704	1,485	18.4	2000	1500	Pli100
2005 PA16_Pl-M	1705	13,193	11.6	2000	1500	Pli100
2006 PA16_Pl-P	1706	12,490	6.1	2000	1500	Pli100

All existing PA16 deciduous-leading stands will regenerate to deciduous after harvest. The minor deciduous component in coniferous-leading stands is regenerated to pure conifer after harvest for the remainder of the land base. Table 4.8 summarizes the VDYP inputs for future deciduous-leading stands.

Table 4.8 – VDYP Inputs - Future Managed Stand Analysis Units

Analysis Unit	Original Analysis Unit	Net Area (ha)	SI50	Species Composition
2007 PA16_Dec-G	1707	1,208	24.1	Ac50 At50
2008 PA16_Dec-M	1708	15,299	19.7	Ac50 At50
2009 PA16_Dec-P	1709	16,033	13.0	Ac50 At50
2010 PA16_Dec-L	1710	1,467	8.0	Ac50 At50

No density values are included with VDYP inputs. Therefore the default crown closure values specified in Table 4.1 were used to approximate density.

4.11 Silviculture Systems

Approximately 80% of the harvesting within the land base will use even-aged silviculture systems with varying levels of retention. Selection harvesting is used in the Fd-Drybelt and MDWR areas of the TSA. Yields for both existing and regenerated stands will be developed with VDYP as noted in previous sections. Table 4.9 summarizes the selection harvesting strategies for these areas.

Table 4.9 – Selection Harvesting Strategies

Land Base Component	Initial Retention	Harvest in Subsequent Entries	Harvest Interval (years)
Fd-Drybelt ($\geq 40\%$ Fd in IDF SBPS BEC zones)	50% - 1 st entry	Mean periodic increment of interval period	30
MDWR (areas from MoELP mapping data)	80% of gross volume	20% of the gross merchantable volume	50

During the analysis simulations, existing (natural stand) yield tables representing selection harvest areas will be assigned a volume reduction (OAF) in FSSIM. Fd-Drybelt volumes will be reduced by 50% at initial entry. MDWR selection volumes will be reduced by 80%.

Subsequent entries will remove either the periodic increment of 30 years (Fd-Drybelt) or 20% of the gross merchantable volume as stated in Table 4.9. Section 5.3 provides the volumes for the initial and subsequent entries for the selection harvest areas.

4.12 Silviculture History

Existing stands under 33 years of age are assumed to be managed based on modern stocking standards.

4.13 Non-Satisfactorily Restocked (NSR)

A comparison of the NSR areas within the ISIS and FIP databases was conducted and the current, backlog (disturbed prior to 1987) and total areas were very similar. For the timber supply analysis FIP areas will be used because they include other classification for non-timber resources, selection harvest area, *etc.*

NSR regenerates to the appropriate managed stand or selection harvest analysis unit based on the regeneration delay prescribed for the regeneration type, either 4 or 7 years. Backlog NSR will regenerate in 10 years.

Due to the uncertainty of the site productivity of the NSR lands, they will regenerate to the “medium” site class of each thrifty regeneration species group. The distribution of NSR to each species group is based on the current distribution of those species groups within the thrifty inventory of the timber harvesting land base (TSA or PA16). Table 4.10 summarizes the regeneration assumptions for NSR.

Table 4.10 – Existing NSR Regeneration Assumptions

Analysis Unit Assignment	Initial Age	NSR Area (ha)		
		Current	Backlog	Total
TSA				
120 Fd_Dry-M	0	2,081		2,081
123 Fd_Deer-M	0	189		189
402 Fd-M	-4	1,243	232	1,475
408 Se-M	-4	2,655	508	3,163
411 Pl-M	-7	15,019	2,824	17,843
414 Pl-M	-7	2,428	452	2,880
417 Pl-M	-7	2,428	452	2,880
TSA Total		26,043	4,468	30,511
PA16				
1721 PA16 Fd_Dry-P	0	344		344
1722 PA16 Fd_Deer-P	0	43		43
2002 PA16 Con-M	-7	168	29	197
2005 PA16 Pl-M	-7	3,359	632	3,991
PA16 Total		3,914	661	4,575
Grand Total		29,957	5,129	35,086

5.0 MANAGEMENT ASSUMPTIONS

This Section provides details on management assumptions and how modeling methodology will address non-timber resource requirements.

5.1 Non-Recoverable Losses

Fire, insects, disease and other natural factors can cause catastrophic losses of whole stands of trees. Over the long term the probability of losses to natural causes can be predicted. Where losses occur in merchantable stands some of the dead or dying timber may be salvageable. When modeling the timber supply, the non-recoverable losses (NRLs) are added to the desired harvest forecast and then subtracted from the forecast upon completion of the modeling exercise. NRLs will be based on TSR II values as shown in Table 5.1.

Table 5.1 - Unsalvaged Losses (m³/yr)

Cause of Loss	Annual Loss
Insects	11,170
Wind Damage	21,830
Fire	1,370
PA16 component	2,826
TSA component	31,544
Total	34,370

5.2 Forest Cover Requirements

The analysis will apply "cover class constraints" to model watershed guidelines, biodiversity, green-up and visual quality objectives. Cover class constraints place maximum and minimum limits on the amount of young second growth and/or old growth found in zones or groups of the productive land base. Forest stands such as environmentally sensitive areas that do not contribute to harvest can be included to better model forest structure and disturbance levels.

Two forest cover constraint classes will be used for modeling:

- Disturbance - the maximum area that can be younger than a specified age or shorter than a specified height. This is intended to model cutblock adjacency and green-up requirements.
- Retention - the minimum area that must be older than, or as old as, a specified age. This is intended to model both retention of cover and retention of old growth.

The use of forest cover constraints as described above improves forest management modeling by ensuring that non-timber resources are given appropriate consideration.

Green up period (3m height) is derived from the height growth curves. The curves are adjusted for OGSi or other growth improvements in the appropriate analysis scenarios. The green up period for each constraint group is the area-weighted average of the time to achieve green-up for the analysis units in that group. Table 5.2 summarizes the disturbance forest cover constraints for the analysis based on the MoF 100 Mile House Data Package.

Table 5.2 – Disturbance Forest Cover Constraints

Constraint Group	Green-up Requirements		Maximum Disturbance
	Height (m)	Age (years)	
IRM (Multiple Use Areas)	3	17	35%
Visual Areas	3	16	15%
Clinton Creek Community Watershed	n/a	10	10%

The MoF 100 Mile House Data Package specified a maximum disturbance of 1% per year for the Clinton Creek Community Watershed. However, this was adjusted to 10% over 10 years because 10-year period lengths will be used in the analysis simulations.

The disturbance forest cover constraint for the Visual Areas applies to the entire productive forest landbase within the visual areas defined in the database. IRM and CCCWS constraints apply only to the timber harvesting landbase.

Landscape level biodiversity constraints (Table 5.3) are based on the MoF 100 Mile House Data Package. The Biodiversity Guidebook provided background for the old growth retention requirements for each BEC-NDT. Constraints for the old seral stage are based on a 45/45/10 proration of low, moderate and high emphasis requirements respectively. The low requirement is phased-in in thirds in decades one, seven and 14. A complete listing of the BU-BEC/NDTs is provided in Table 3.1.

Table 5.3 – Landscape-Level Biodiversity (old seral) Forest Cover Constraints

Biogeoclimatic Unit	NDT	Old Seral Stage			
		Minimum Old Growth Retention by Decade (%)			Minimum Old Growth Age (years)
		1	7	14	
ESSF	1	14	17	20	250
ICH	2	7	8	9	250
ESSF	3	11	13	15	140
MS	3	11	13	15	140
SBPS	3	5	6	7	140
SBS	3	8	10	12	140
ICH	3	11	13	15	140
IDF	4	10	12	14	250
AT	5	n/a	n/a	n/a	None

As it is unknown at this time which BUs will be declared lower-, intermediate- or higher-biodiversity emphasis objectives, a single weighted constraint for the old-seral stage was developed based on the anticipated distribution of 45% lower-, 45% intermediate- and 10% higher-emphasis.

The values shown in Table 5.3 above reflect the weighted *Biodiversity Guidebook* values. The values in Table 5.3 are initially based on achieving one-third of the *Biodiversity Guidebook* old-seral stage constraint in the lower-emphasis portion. As seen in the Table, this is built up over time to ensure that the full minimum retention of old-seral forest will be met by the end of three rotations.

Constraints are calculated on the productive land base within each BU-BEC/NDT. This includes parks and other crown reserves. Non-forest, non-productive forest and non-commercial make no contribution to the analysis. A “class-type” is assigned to all other areas prior to input to FSSIM. Stands contribute either to harvest and forest cover constraints (net harvesting landbase) or cover constraints only. This allows full and appropriate contribution of the productive forests of the TSA to integrated resource management.

5.3 Minimum Harvest Ages

TSR I and II both define minimum harvest ages at 120 years for all species except pine which is 80 years. Such a standard approach to merchantability denies a significant portion of the benefits that may result from silvicultural treatments. Minimum harvest ages are based on culmination of mean annual increment (MAI), minimum merchantability based on diameter (12.5cm DBH for Pl, 17.5cm DBH for other species) and volume for each analysis unit.

Table 5.4 provides the minimum merchantability attributes for the VDYP existing natural stand yield tables.

Table 5.4 – Minimum Merchantability Attributes – Natural Stands

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m3/ha)	MAI (m3/ha/year)
TSA Old Growth AU						
1 Fd-G	864	100	24.9	30.0	189.4	1.9
2 Fd-M	2,587	110	20.7	28.0	142.5	1.3
3 Fd-P	1,625	200	19.1	32.0	91.0	0.5
5 CwHw-M	651	80	17.1	25.0	145.4	1.8
6 CwHw-P	398	120	17.0	27.0	119.1	1.0
7 SeBl-G	1,169	80	27.6	30.0	292.2	3.7
8 SeBl-M	4,218	100	23.2	28.0	230.3	2.3
9 SeBl-P	14,826	130	20.9	28.0	168.6	1.3
11 PlSe-M	4,136	90	19.1	21.0	172.9	1.9
12 PlSe-P	8,355	110	17.0	21.0	148.6	1.4
13 PlFd-G	222	60	21.3	20.0	206.5	3.4
14 PlFd-M	772	80	18.3	20.0	161.9	2.0
15 PlFd-P	625	110	17.4	20.0	166.7	1.5
17 PlDec-M	513	120	20.2	22.0	121.9	1.0
19 Fd_Dry-G	6,323	110	23.5	30.0	89.1	0.8
20 Fd_Dry-M	45,874	130	19.6	29.0	58.8	0.5
21 Fd_Dry-P	6,128	200	17.7	30.0	50.0	0.3
22 Fd_Deer-G	2,013	110	23.0	30.0	33.6	0.3
23 Fd_Deer-M	19,836	140	19.7	30.0	24.0	0.2
24 Fd_Deer-P	2,754	200	18.1	32.0	18.3	0.1
TSA Thrifty AUs						
101 Fd-G	3,055	80	28.9	29.0	303.0	3.8
102 Fd-M	10,592	90	25.0	28.0	207.8	2.3
103 Fd-P	2,748	120	20.6	28.0	144.7	1.2
105 CwHw-M	230	80	20.4	29.0	181.2	2.3
107 SeBl-G	7,772	80	28.5	29.0	322.3	4.0
108 SeBl-M	22,910	100	25.0	28.0	267.6	2.7
109 SeBl-P	4,559	120	21.5	28.0	166.7	1.4
110 PlSe-G	42,888	60	20.5	19.0	182.5	3.0
111 PlSe-M	92,439	80	19.3	20.0	170.8	2.1
112 PlSe-P	64,549	110	17.2	20.0	154.4	1.4
113 PlFd-G	9,812	60	22.1	21.0	215.1	3.6
114 PlFd-M	18,440	70	19.4	20.0	170.7	2.4
115 PlFd-P	3,913	100	17.9	20.0	152.4	1.5
116 PlDec-G	10,145	70	22.5	21.0	122.5	1.8
117 PlDec-M	17,480	100	21.6	23.0	125.1	1.3
118 PlDec-P	4,576	140	19.7	23.0	119.4	0.9
119 Fd_Dry-G	10,842	100	26.3	30.0	104.6	1.1
120 Fd_Dry-M	35,278	120	21.4	30.0	70.8	0.6
121 Fd_Dry-P	11,871	200	18.7	33.0	52.5	0.3
122 Fd_Deer-G	7,730	100	27.2	30.0	47.8	0.5
123 Fd_Deer-M	15,873	110	23.3	30.0	34.4	0.3
124 Fd_Deer-P	10,829	150	19.1	30.0	23.7	0.2
PA16 Old Growth AUs						
1602 PA16_Con-M	261	80	15.9	18.0	160.9	2.0
1603 PA16_Con-P	2,969	150	16.2	19.0	141.1	0.9
1606 PA16_Pl-P	5,543	130	13.2	17.0	121.8	0.9
1621 PA_Fd_Dry-P	631	200	14.8	22.0	44.9	0.2
1622 PA_Fd_Deer-P	82	200	14.0	19.0	19.3	0.1
PA16 Thrifty AUs						
1701 PA16_Con-G	197	70	19.2	20.0	221.7	3.2
1702 PA16_Con-M	850	110	18.7	20.0	175.1	1.6
1703 PA16_Con-P	309	200	13.3	21.0	91.1	0.5

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m3/ha)	MAI (m3/ha/year)
1704 PA16_Pl-G	1,485	60	18.8	18.0	178.6	3.0
1705 PA16_Pl-M	13,194	100	16.6	18.0	166.8	1.7
1706 PA16_Pl-P	12,490	160	12.7	17.0	116.6	0.7
1707 PA16_Dec-G	1,208	60	25.9	22.0	216.3	3.6
1708 PA16_Dec-M	15,290	70	23.0	21.0	182.7	2.6
1709 PA16_Dec-P	15,982	90	17.5	19.0	125.2	1.4
1710 PA16_Dec-L	1,468	200	15.4	19.0	90.6	0.5
1721 PA_Fd_Dry-P	14,544	200	11.7	19.0	21.5	0.1
1722 PA_Fd_Deer-P	3,819	200	10.5	17.0	7.6	0.0

Fd-Drybelt volumes represent 50% of the total stand volume

MDWR volumes are 20% of the total stand volume.

Table 5.5 provides the minimum merchantability attributes for the TIPSy existing managed stand yield tables.

Table 5.5 – Minimum Merchantability Attributes – Existing Managed Stands

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m3/ha)	MAI (m3/ha/yr)
TSA						
201 Fd-G	379	80	25.8	23.2	331.7	4.1
202 Fd-M	1,700	90	23.4	21.6	272.4	3.0
203 Fd-P	92	130	20.0	18.8	165.5	1.3
204 SeBl-G	1,608	80	24.5	22.7	360.8	4.5
205 SeBl-M	5,497	100	23.4	21.5	317.5	3.2
206 SeBl-P	1,022	130	21.0	19.3	234.6	1.8
207 Pl-G	2,047	60	20.4	21.0	266.2	4.4
208 Pl-M	14,876	80	19.5	19.9	240.5	3.0
209 Pl-P	9,779	100	15.8	16.6	141.6	1.4
210 PlFd-G	272	70	21.7	21.2	295.2	4.2
211 PlFd-M	2,834	80	19.5	18.8	228.8	2.9
212 PlFd-P	2,431	100	15.7	16.0	121.4	1.2
213 PlSe-G	1,491	70	22.1	22.2	316.1	4.5
214 PlSe-M	3,955	80	19.3	19.6	236.6	3.0
215 PlSe-P	366	110	18.8	19.1	219.5	2.0
216 PlDec-G	477	60	20.1	20.5	263.8	4.4
217 PlDec-M	5,807	80	19.5	19.9	247.8	3.1
218 PlDec-P	4,684	100	15.8	16.7	149.9	1.5
PA16						
1801 PA16_SeBlFd-G	330	80	22.5	22.9	360.3	4.5
1802 PA16_SeBlFd-M	83	110	20.1	21.0	279.0	2.5
1803 PA16_SeBlFd-P	196	210	17.4	18.2	162.0	0.8
1805 PA16_PlSe-M	1,417	90	15.2	17.6	129.8	1.4
1808 PA16_PlFd-M	935	150	13.6	15.1	85.5	0.6
1810 PA16_PlDec-G	219	70	18.3	20.2	222.2	3.2
1811 PA16_PlDec-M	147	90	14.8	17.6	137.2	1.5
1812 PA16_PlDec-P	201	250	11.1	12.8	44.0	0.2

Table 5.6 provides the minimum merchantability attributes for the TIPSY future managed stand yield tables.

Table 5.6 – Minimum Merchantability Attributes – Future Managed Stands

Analysis Unit	Net Area (ha)	Minimum Harvest Age Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m3/ha)	MAI (m3/ha/yr)
TSA Old Growth						
301 Fd-G	864	100	25.4	21.4	271.0	2.7
302 Fd-M	2,587	120	21.9	18.9	177.3	1.5
303 Fd-P	1,625	170	18.0	16.0	77.1	0.5
305 PlSeFd-M	651	100	20.2	21.0	252.9	2.5
306 PlSeFd-P	398	110	17.1	18.8	175.1	1.6
307 Se-G	1,169	60	23.8	22.4	344.5	5.7
308 Se-M	4,218	100	24.3	22.9	353.0	3.5
309 Se-P	14,826	150	24.0	22.6	335.3	2.2
311 Pl-M	4,136	80	17.9	18.4	205.1	2.6
312 Pl-P	8,355	90	15.2	16.2	141.1	1.6
313 Pl-G	222	60	21.3	21.5	309.3	5.2
314 Pl-M	772	80	18.3	18.7	215.1	2.7
315 Pl-P	625	80	14.5	15.6	124.2	1.6
317 Pl-M	513	90	17.6	18.2	196.5	2.2
TSA Thrifty						
401 Fd-G	3,434	80	29.4	24.7	388.4	4.9
402 Fd-M	13,766	90	25.3	21.3	268.8	3.0
403 Fd-P	2,840	130	21.6	18.6	169.6	1.3
405 PlSeFd-M	230	70	18.9	20.0	222.5	3.2
407 Se-G	9,380	60	24.6	23.2	370.8	6.2
408 Se-M	31,569	90	24.2	22.9	354.0	3.9
409 Se-P	5,580	110	20.9	19.8	243.8	2.2
410 Pl-G	47,175	60	20.5	20.9	286.0	4.8
411 Pl-M	137,759	70	17.9	18.4	204.0	2.9
412 Pl-P	81,808	90	15.4	16.3	143.9	1.6
413 Pl-G	9,812	50	19.7	20.1	264.0	5.3
414 Pl-M	21,320	60	17.6	18.2	198.8	3.3
415 Pl-P	3,913	80	15.8	16.7	154.5	1.9
416 Pl-G	10,145	60	20.6	20.9	288.8	4.8
417 Pl-M	20,360	70	18.0	18.5	206.6	3.0
418 Pl-P	4,576	90	15.8	16.8	155.3	1.7
PA16 Old Growth						
1902 PA16_Con-M	261	110	19.3	19.2	194.4	1.8
1903 PA16_Con-P	2,969	250	11.2	10.3	30.6	0.1
1906 PA16_Pl-P	5,543	140	13.7	16.2	94.2	0.7
PA16 Thrifty						
2001 PA16_Con-G	197	90	23.1	22.8	297.3	3.3
2002 PA16_Con-M	1,047	140	18.6	18.6	174.2	1.2
2003 PA16_Con-P	309	250	6.2	6.3	13.9	0.1
2004 PA16_Pl-G	1,485	60	18.8	21.1	222.5	3.7
2005 PA16_Pl-M	17,185	80	14.5	17.1	114.2	1.4
2006 PA16_Pl-P	12,490	170	13.1	15.4	79.0	0.5
2007 PA16_Dec-G	1,208	60	26.3	23.0	166.7	2.8
2008 PA16_Dec-M	15,289	70	24.1	22.0	147.6	2.1
2009 PA16_Dec-P	15,982	90	20.6	21.0	115.2	1.3
2010 PA16_Dec-L	1,468	110	16.8	18.0	74.4	0.7

Note: PA16 deciduous analysis units (2007 – 2010) “managed” stand yield tables were developed with VDYP.

Table 5.7 summarizes the volume available during secondary and all subsequent entries for the selection harvest areas.

Table 5.7 – Minimum Merchantability Attributes – Selection Harvest Areas

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes	
		Age	Volume (m3/ha)
TSA Old Growth AU			
319 Fd_Dry-G	6,323	30 years after initial entry	50.6
320 Fd_Dry-M	45,874		28.0
321 Fd_Dry-P	6,128		15.3
TSA Deer AU			
322 Fd_Deer-G	2,013	50 years after initial entry	76.3
323 Fd_Deer-M	19,836		42.8
324 Fd_Deer-P	2,754		20.0
TSA Thrifty AUs			
419 Fd_Dry-G	10,842	30 years after initial entry	66.4
420 Fd_Dry-M	35,278		37.4
421 Fd_Dry-P	11,871		16.1
422 Fd_Deer-G	7,730	50 years after initial entry	119.5
423 Fd_Deer-M	15,873		78.3
424 Fd_Deer-P	10,829		39.5
PA16 Old Growth AUs			
1921 PA_Fd_Dry-P	631	30 years after initial entry	13.5
1922 PA_Fd_Deer-P	82	50 years after initial entry	24.1
PA16 Thrifty AUs			
2021 PA_Fd_Dry-P	14,544	30 years after initial entry	6.5
2022 PA_Fd_Deer-P	3,819	50 years after initial entry	9.5

In the selection harvest areas regeneration ages are not set to zero (below zero with the regeneration delay in place) as in the clearcut areas. This is because the selection areas are not considered disturbed after a harvesting entry as with clearcut areas. Regeneration ages are set below the age of minimum old growth so that the harvested areas will not be considered old growth forest immediately after harvesting.

5.4 Harvest Profile and Harvest Rules

No harvest profiles are modeled.

Harvest rules are used by the simulation model to rank stands for harvest. For this analysis “relative oldest first” will be used. Under this rule, older stands are queued for harvest ahead of younger stands, but oldest is relative to maturity characteristics. Harvest rules interact with forest cover constraints to determine the actual order of harvesting. If a higher ranked stand is in a constrained zone and cannot be harvested then the model will choose the next highest ranked stand that can be harvested.

5.5 Harvest Flow Strategy

The initial harvest rate for each analysis option will be determined during analysis.

In all phases of the analysis, the harvest flow objectives will be to:

- Begin the analysis at as high a harvest level as possible;
- Sustain the initial harvest level for as long as possible;
- Achieve short and midterm harvest levels which do not drop below a minimum long term sustainable harvest;
- Raise the long run sustainable harvest levels to reflect managed stand yields; and
- Keep shifts in harvest level to less than 10% per decade.

Forest cover constraints and biological capacity of the net operable land base will dictate the harvest level. If opportunities exist to increase the harvest at given points during the modeling horizon, those opportunities will be taken.

The partition cut for PA16 is held constant at 112,000m³/year, plus 2,826m³/year for NRLs for all analysis unless otherwise indicated.

6.0 SENSITIVITIES AND TREATMENTS

Table 6.1 describes the strategies or treatments to be modeled and how each will be implemented.

Table 6.1 - Stand Treatments

Strategy or Treatment	Target Stands	Modeling Technique
Old growth site index bias adjustments	Existing PI & Se stands over 140 years of age	Application of MoF standard OGSi adjustment equations.
Reduced green-up ages through initial treatments.	All regenerating stands	Decrease green-up time by 3 years; this reduces the green-up time to 12 years for Visual areas and 13 years for IRM areas.
Reduced regeneration delay through prompt site preparation and planting.	All regenerating stands	Decrease delay by 2 years; this reduces the range of values to 2 to 5 years from 4 to 7 as indicated in TSR II; NSR establishment is also reduced by 2 years.
Plant genetically improved stock	Fd, PI and Se stands	Site index adjustment to reflect 12% volume gain at culmination age
Stand density management (same as juvenile spacing)	Fd, PI & Se stands	Managed stand yield tables with various initial densities (1000, 1200, 3000, 3600) will be used. (Original yield curves must retain a reasonable number of stems including planted stock and volunteers).
Juvenile spacing and fertilization	PI	Managed stand yield tables that reflect improved performance after spacing, plus volume increase from fertilization
Eliminate backlog over 5 years	All	Backlog NSR establishment set at 5 years
Maximize PA16 harvest	PA16 landbase	Explore opportunities to increase PA16 harvest rate over required 112,000m ³ /year

The following sections summarize the modified inputs and assumptions for each of the treatment scenarios listed in Table 6.1.

6.1 Old Growth Site Index Adjustments

Site index of areas currently occupied by old growth (> 140 years) natural lodgepole pine and interior spruce stands will be adjusted based on results from the MoF old growth project (*Site Index Adjustments for Old Growth Stands Based on Paired Plots, Research Branch 1998*).

Equations from that report will be used to calculate the alternate site index value which will then be used to calculate a new area-weighted analysis unit site index value. Table 6.2 summarizes the OGSi adjustment equations applied to some of the old growth species groups upon regeneration to managed stand conditions.

Table 6.2 – OGSi Adjustment Equations

Species	BEC Zone	Inventory SI50 Range	OGSI Adjustment Equation
Pl	IDF	7.3 – 26.7	$7.83 + (0.8399 * \text{InvSI50})$
Pl	MS SBPS	7.3 – 26.7	$15.12 + (0.290 * \text{InvSI50})$
Pl	ESSF ICH SBS	7.3 – 26.7	$17.65 + (0.1740 * \text{InvSI50})$
Se	All	5.7 – 25.4	$17.46 + (0.1948 * \text{InvSI50})$

Table 6.3 summarizes the revised TIPSy inputs for the analysis units adjusted for OGSi.

Table 6.3 – Minimum Merchantability Attributes - OGSi Adjusted Stands

Analysis Unit	Net Area (ha)	OGSI Adjusted SI50	Initial Density	Thinned Density	Species Composition
TSA Old Growth					
307 Se-G	1,169	21.9	4000	2200	Se100
308 Se-M	4,238	20.4	4000	2200	Se100
309 Se-P	14,858	18.0	4000	2200	Se100
311 Pl-M	4,135	19.8	6000	2300	Pli100
312 Pl-P	8,355	17.5	6000	2300	Pli100
313 Pl-G	222	21.2	6000	2300	Pli100
314 Pl-M	771	19.6	6000	2300	Pli100
315 Pl-P	624	18.3	6000	2300	Pli100
317 Pl-M	513	18.8	6000	2300	Pli100
PA16 Old Growth					
1903 PA16_Con-P	2,969	14.4	2000	1500	Fd40 Se40 Bl20
1906 PA16_Pl-P	5,542	8.5	2000	1500	Pli100

All treatment scenarios will include the OGSi adjustments for appropriate managed stand yields. The minimum merchantability attributes for the OGSi-modified yield tables are listed in Table 6.4.

Table 6.4 – Minimum Merchantability Attributes - OGSi Adjusted Stands

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m3/ha)	MAI (m3/ha/yr)
TSA Old Growth						
307 Se-G	1,169	70	25.6	24.0	397.6	5.7
308 Se-M	4,218	70	24.0	22.0	349.3	5.0
309 Se-P	14,826	80	23.5	22.0	333.1	4.2
311 Pl-M	4,136	60	20.3	20.0	280.1	4.7
312 Pl-P	8,355	60	17.9	18.0	206.2	3.4
313 Pl-G	222	50	19.3	19.0	251.4	5.0
314 Pl-M	772	60	20.1	20.0	274.3	4.6
315 Pl-P	625	60	18.7	19.0	231.6	3.9
317 Pl-M	513	60	19.2	19.0	248.1	4.1
PA16 Old Growth						
1903 PA16_Con-P	2,969	110	21.8	21.0	257.6	2.3
1906 PA16_Pl-P	5,543	120	14.1	16.0	103.5	0.9

6.2 Reduce Time to Green-up

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

6.3 Reduced Regeneration Delay

In this scenario regeneration delays defined for the Base Case will be reduced by two years. This includes all existing NSR (current and backlog). Table 6.5 summarizes the regeneration delays that will be used in this scenario.

Table 6.5 – Reduced Regeneration Delays

Regeneration Species	Regeneration Delay	
	Base Case	Reduced Scenario
Pl	7	5
Se	4	2
Fd	4	2
PA16 (all)	7	5
Backlog NSR	10	8

6.4 Genetically Improved Planting Stock

Recent MoF documentation indicates that a 12% yield gain may be possible from the use of genetically improved planting stock. These gains apply to lodgepole pine, Douglas-fir and interior spruce stands. In this treatment scenario site index adjustments were made to each of the regeneration analysis unit TIPSYS yield tables to gain 12% in volume at culmination. Table 6.6 summarizes the modified TIPSYS inputs used to develop the yield tables for genetically improved planting stock.

Table 6.6 – TIPSY Inputs – Genetically Improved Future Managed Stands

Analysis Unit	Net Area (ha)	Improved SI50	Initial Density	Thinned Density	Species Composition
TSA Old Growth					
301 Fd-G	874	18.4	4444	1500	Fdi100
302 Fd-M	2,621	14.3	4444	1500	Fdi100
303 Fd-P	1,645	9.8	4444	1500	Fdi100
305 PlSeFd-M	655	14.8	4000	1500	Pli50 Se25 Fdi15 Hw10
306 PlSeFd-P	398	11.5	4000	1500	Pli50 Se25 Fdi15 Hw10
307 Se-G	1,169	23.8	4000	2200	Se100
308 Se-M	4,238	22.5	4000	2200	Se100
309 Se-P	14,858	19.8	4000	2200	Se100
311 Pl-M	4,135	20.9	6000	2300	Pli100
312 Pl-P	8,355	18.7	6000	2300	Pli100
313 Pl-G	222	22.5	6000	2300	Pli100
314 Pl-M	771	20.9	6000	2300	Pli100
315 Pl-P	624	19.4	6000	2300	Pli100
317 Pl-M	513	20.0	6000	2300	Pli100
TSA Thrifty					
401 Fd-G	3,056	24.3	4444	1500	Fdi100
402 Fd-M	10,742	19.4	4444	1500	Fdi100
403 Fd-P	2,748	13.6	4444	1500	Fdi100
405 PlSeFd-M	230	17.6	4000	1500	Pli50 Se25 Fdi15 Hw10
407 Se-G	7,798	26.1	4000	2200	Se100
408 Se-M	22,910	18.9	4000	2200	Se100
409 Se-P	4,558	13.0	4000	2200	Se100
410 Pl-G	42,980	21.2	6000	2200	Pli100
411 Pl-M	92,453	16.7	6000	2300	Pli100
412 Pl-P	64,548	12.1	6000	2300	Pli100
413 Pl-G	9,825	22.9	6000	2300	Pli100
414 Pl-M	18,603	18.4	6000	2300	Pli100
415 Pl-P	3,912	13.4	6000	2300	Pli100
416 Pl-G	10,154	21.5	6000	2300	Pli100
417 Pl-M	17,479	17.0	6000	2300	Pli100
418 Pl-P	4,575	12.6	6000	2300	Pli100

Two separate modeling sensitivities will be completed within this treatment scenario:

- All lodgepole pine, Douglas-fir and interior spruce managed stands listed in Table 6.6 will be assigned to yield tables based on genetically improved stock. This assumes that lodgepole pine will be planted, not naturally established as in the Base Case. The regeneration delay for planted pine areas will be reduced from seven to four years.
- Only Douglas-fir and interior spruce managed stands listed in Table 6.6 will be assigned to yield tables based on genetically improved stock. All lodgepole pine areas will be regenerated naturally as in the Base Case.

Table 6.7 summarizes the updated minimum merchantability attributes for the genetically improved managed stand yield tables.

Table 6.7 – Minimum Merchantability Attributes - Genetically Improved Stands

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m ³ /ha)	MAI (m ³ /ha/yr)
TSA Old Growth						
301 Fd-G	864	90	25.2	21.2	264.8	2.9
302 Fd-M	2,587	100	20.7	18.0	149.7	1.5
303 Fd-P	1,625	200	19.6	17.1	115.0	0.6
305 PlSeFd-M	651	70	16.9	18.6	170.9	2.4
306 PlSeFd-P	398	100	16.9	18.7	170.4	1.7
307 Se-G	1,169	50	21.3	20.1	264.3	5.3
308 Se-M	4,218	60	23.4	22.1	333.0	5.6
309 Se-P	14,826	70	23.3	21.9	325.4	4.6
311 Pl-M	4,136	50	19.0	19.4	242.0	4.8
312 Pl-P	8,355	50	16.9	17.6	182.9	3.7
313 Pl-G	222	50	20.6	20.9	290.1	5.8
314 Pl-M	772	50	19.0	19.4	242.0	4.8
315 Pl-P	625	50	17.5	18.1	199.0	4.0
317 Pl-M	513	50	18.1	18.6	214.0	4.3
TSA Thrifty						
401 Fd-G	3,434	70	28.5	23.9	362.6	5.2
402 Fd-M	13,766	80	24.7	20.8	252.5	3.2
403 Fd-P	2,840	110	20.8	18.0	150.2	1.4
405 PlSeFd-M	230	60	18.1	19.4	201.2	3.4
407 Se-G	9,380	50	23.7	22.4	343.9	6.9
408 Se-M	31,569	70	22.2	21.0	289.3	4.1
409 Se-P	5,580	90	19.3	18.5	201.2	2.2
410 Pl-G	47,175	50	19.3	19.9	251.5	5.0
411 Pl-M	137,759	60	17.1	17.8	186.6	3.1
412 Pl-P	81,808	70	13.8	14.9	107.4	1.5
413 Pl-G	9,812	50	21.0	21.2	301.3	6.0
414 Pl-M	21,320	50	16.6	17.4	176.0	3.5
415 Pl-P	3,913	70	15.2	16.2	142.1	2.0
416 Pl-G	10,145	50	19.6	20.0	260.8	5.2
417 Pl-M	20,360	60	17.4	18.0	193.9	3.2
418 Pl-P	4,576	80	15.6	16.6	151.7	1.9

6.5 Fertilization & Spacing

This scenario will evaluate the impacts of fertilizing eligible lodgepole pine stands based on site productivity. Based on information provided by MoF, approximately 15m³/ha of yield gain at rotation age may be realized with fertilization. For this scenario the “good” and “medium” site components of the lodgepole pine managed stand inventory will be considered for fertilization. Table 6.8 summarizes the analysis assumptions for these treatment scenarios.

Table 6.8 – Pine Fertilization Assumptions

Fertilization Candidates	SI50	Net Area (ha)	Area Treated per Year (ha)
Pl “good” site	> 20	67,354	800 - 1200
Pl “medium” site	> 15	252,214	3000 – 4000

The area listed under “Area Treated per Year” indicates the target area that will be included in the FSSIM assumptions. This is to ensure that even distributions of eligible pine stands are treated over time.

Based on the results of the Alternative Density scenarios (Section 6.6) and stand densities assumed in the Base Case, the final thinning regime will be selected for use in this scenario to accompany the volume gains associated with fertilization. Table 6.9 summarizes the modified minimum harvest age attributes for the fertilization and spacing scenario.

Table 6.9 – Minimum Merchantability Attributes - Fertilization Stands

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m ³ /ha)	MAI (m ³ /ha/yr)
TSA Existing Managed						
207 PI-G	2,047	60	20.4	21.0	281.2	4.7
208 PI-M	14,876	80	19.5	19.0	255.5	3.2
210 PIFd-G	272	70	21.7	21.0	310.2	4.4
211 PIFd-M	2,834	80	19.5	18.0	243.8	3.0
213 PISe-G	1,491	70	22.1	22.0	331.1	4.7
214 PISe-M	3,955	80	19.3	19.0	251.6	3.1
216 PIDec-G	477	60	20.1	20.0	278.8	4.6
217 PIDec-M	5,807	80	19.5	19.0	262.8	3.3
TSA Old Growth						
311 PI-M	4,136	60	20.3	20.0	295.1	4.9
313 PI-G	222	50	19.3	19.0	266.4	5.3
314 PI-M	772	60	20.1	20.0	289.3	4.8
317 PI-M	513	60	19.2	19.0	263.1	4.4
TSA Thrifty						
410 PI-G	47,175	60	20.5	20.0	301.0	5.0
411 PI-M	137,759	70	17.9	18.0	219.0	3.1
413 PI-G	9,812	50	19.7	20.0	279.0	5.6
414 PI-M	21,320	60	17.6	18.0	213.8	3.6
416 PI-G	10,145	60	20.6	20.0	303.8	5.1
417 PI-M	20,360	70	18.0	18.0	221.6	3.2

6.6 Alternative Thinning Densities

Alternative thinning densities for managed stands will be included in this set of treatment scenarios. Revised TIPSy managed stand yield tables will be developed for all TSA clearcut Douglas-fir, lodgepole pine and interior spruce managed stands. Table 6.10 summarizes the increases and decreases in thinning stand density for this series of analyses.

Table 6.10 – Alternative Thinning Densities for Managed Stands

Managed Stand Leading Species	Thinning Density (stems/ha)		
	Base Case	Increased	Decreased
Douglas-fir	1,500	3,000	1,000
Lodgepole pine	2,300	3,600	1,200
Interior spruce	2,200	3,600	1,200

All other inputs to TIPSY for the managed stand yield tables will be the same as those used in the Base Case+OGSI scenario. The revised minimum merchantability attributes for the Increased Thinning Density are summarized in Table 6.11. Only yield tables with changes to thinning density are listed in Table 6.11.

Table 6.11 – Minimum Merchantability Attributes - Increased Thinning Density

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m3/ha)	MAI (m3/ha/yr)
TSA Old Growth						
301 Fd-G	864	100	25.4	18.4	255.3	2.6
302 Fd-M	2,587	150	24.4	17.5	218.3	1.5
303 Fd-P	1,625	250	20.7	14.7	120.2	0.5
307 Se-G	1,169	70	25.6	21.1	356.4	5.1
308 Se-M	4,218	70	24.0	19.5	299.2	4.3
309 Se-P	14,826	80	23.5	19.2	283.2	3.5
311 Pl-M	4,136	60	20.3	19.0	278.5	4.6
312 Pl-P	8,355	60	17.9	16.6	205.0	3.4
313 Pl-G	222	50	19.3	18.0	250.1	5.0
314 Pl-M	772	50	17.7	16.5	202.4	4.0
315 Pl-P	625	60	18.7	17.4	230.4	3.8
317 Pl-M	513	60	19.2	17.9	246.8	4.1
TSA Thrifty						
401 Fd-G	3,434	70	27.0	19.7	302.2	4.3
402 Fd-M	13,766	90	25.3	18.3	253.1	2.8
403 Fd-P	2,840	130	21.6	15.5	152.8	1.2
407 Se-G	9,380	60	24.6	21.3	346.6	5.8
408 Se-M	31,569	80	22.2	18.9	262.2	3.3
409 Se-P	5,580	120	22.3	19.0	259.9	2.2
410 Pl-G	47,175	60	20.5	19.2	284.2	4.7
411 Pl-M	137,759	70	17.9	16.6	202.9	2.9
412 Pl-P	81,808	90	15.4	14.5	141.7	1.6
413 Pl-G	9,812	50	19.7	18.4	262.6	5.3
414 Pl-M	21,320	60	17.6	16.4	197.6	3.3
415 Pl-P	3,913	80	15.8	14.9	152.6	1.9
416 Pl-G	10,145	50	18.2	16.9	215.9	4.3
417 Pl-M	20,360	70	18.0	16.7	205.5	2.9
418 Pl-P	4,576	90	15.8	14.9	153.5	1.7

The revised minimum merchantability attributes for the Decreased Thinning Density are summarized in Table 6.12. Only yield tables with changes to thinning density are listed in Table 6.12.

Table 6.12 – Minimum Merchantability Attributes - Decreased Thinning Density

Analysis Unit	Net Area (ha)	Minimum Merchantability Attributes				
		Age	Height (m)	Diameter (cm)	Volume (m ³ /ha)	MAI (m ³ /ha/yr)
TSA Old Growth						
301 Fd-G	864	80	22.2	21.8	190.4	2.4
302 Fd-M	2,587	100	19.8	19.8	135.4	1.4
303 Fd-P	1,625	160	17.5	17.8	81.8	0.5
307 Se-G	1,169	70	25.6	27.6	404.7	5.8
308 Se-M	4,218	70	24.0	26.2	355.3	5.1
309 Se-P	14,826	70	21.2	23.7	264.4	3.8
311 Pl-M	4,136	60	20.3	23.7	260.6	4.3
312 Pl-P	8,355	60	17.9	21.6	188.5	3.1
313 Pl-G	222	60	21.7	25.0	301.1	5.0
314 Pl-M	772	60	20.1	23.6	254.8	4.2
315 Pl-P	625	60	18.7	22.3	213.2	3.6
317 Pl-M	513	60	19.2	22.8	229.3	3.8
TSA Thrifty						
401 Fd-G	3,434	70	27.0	25.8	317.5	4.5
402 Fd-M	13,766	90	25.3	24.4	269.0	3.0
403 Fd-P	2,840	120	20.8	20.6	154.9	1.3
407 Se-G	9,380	60	24.6	26.7	377.2	6.3
408 Se-M	31,569	80	22.2	24.6	293.3	3.7
409 Se-P	5,580	110	20.9	23.5	250.6	2.3
410 Pl-G	47,175	60	20.5	23.9	266.3	4.4
411 Pl-M	137,759	70	17.9	21.5	186.5	2.7
412 Pl-P	81,808	90	15.4	19.5	130.5	1.5
413 Pl-G	9,812	60	22.1	25.3	313.0	5.2
414 Pl-M	21,320	70	19.4	22.9	232.0	3.3
415 Pl-P	3,913	80	15.8	19.9	140.0	1.8
416 Pl-G	10,145	60	20.6	24.0	269.2	4.5
417 Pl-M	20,360	70	18.0	21.6	188.9	2.7
418 Pl-P	4,576	90	15.8	19.9	140.7	1.6

6.7 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 years compared to 10 years in the Base Case+OGSI scenario. Assignments to regeneration types will remain the same as in the Base Case+OGSI.

6.8 Maximize PA16 Harvest Rate

Initially, the analysis was to review the impact of returning some of the problem forest types (PFTs) to the TSA timber harvesting landbase. However, PFTs in the 100 Mile House TSA are assigned to PA16 under the rules of the Licence. Therefore removal of part of the PA16 landbase is not possible. The PA16 harvest target will be maximized in this scenario to estimate the total contribution possible from stands assigned to the Licence. In all other analysis scenarios the PA16 harvest was set to 112,000m³/year for the entire 250 year planning horizon.

100 Mile House TSA
Forest Estate Modeling Analysis Summary November 1998

<i>Scenario</i>	<i>Total Harvest (000) m3/ha</i>	<i>% above base case (Sawlog harvest</i>
Base Case	1291	n/a
OGSI Adjustments	1339	3.7%
Reduced Time to Greenup + OGSI	1339.2	3.7%
Reduced Time to Renerate Backlog NSR +OGSI	1339.5	3.8%
Reduced Regen Delay +OGSI	1367	5.9%
Alternative Spacing Densities Increased densities +OGSI	1323.9	2.5%
Alternative Spacing Densities Decreased densities +OGSI	1301.7	0.8%
Spacing and Fertilizing Good PI Sites only +OGSI	1343.3	4.1%
Spacing and Fertilizing Good and Medium PI Sites only +OGSI	1371.9	6.3%
Genetically Improved Stock (all Species) +OGSI	1500	16.2%
Genetically Improved Stock (Less PI) +OGSI	1376	6.6%