TIMBER SUPPLY ANALYSIS
INFORMATION PACKAGE

KAMLOOPS TSA
TIMBER SUPPLY REVIEW 4

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We would like to acknowledge the significant contribution made by the MoFR team assembled to provide direction for the Kamloops TSR 4. Barry Snowden from Forest Analysis Branch provided significant technical contribution. Barry and John McQueen (Kamloops Forest District) kept the process moving along and very diligently delved into many of the details/assumption going into the analysis. The Forest Districts were well represented by Jeff Leahy (Kamloops Forest District) and Ron Van der Zwan (Headwater District).

1.0 INTRODUCTION

This Information Package has been prepared by Timberline Natural Resource Group Ltd. (Timberline) as a source document for timber supply review (TSR) 4. The TSR 4 analysis is being carried out in parallel to the Kamloops Type 2 Silviculture Analysis.

This document serves as a summary of the inputs and assumptions made in preparing the timber supply analysis data model used for TSR 4 and the Type 2 Silviculture Analysis. Included are inventory and land base summaries and management assumptions for timber and non-timber resources as they relate to timber supply. The analysis involves modeling a Base Case which is intended to represent current management practices. In addition, a number of sensitivity analyses will also be conducted to test the impact of different assumptions on timber supply. All analysis simulations will be completed using CASH6, Timberline's proprietary forest estate model.

Upon acceptance by the British Columbia Ministry of Forests and Range (MoFR) Timber Supply Analyst, the assumptions and methodology provided in the Information Package will be used to prepare and submit a timber supply analysis to the MoFR. All analysis results will be provided to the Chief Forester of British Columbia, or designate, for allowable cut determination.

2.0 TIMBER SUPPLY ANALYSIS PROCESS

Multiple management options will be considered and modeled in this analysis. The main models considered are:

- Base Case - current management practice; and
- Sensitivity analyses.

2.1 Missing Data

There is no missing data at this time.

3.0 TIMBER SUPPLY OPTIONS

This section provides an overview of the options that will be evaluated in the timber supply analysis.

3.1 TSR 4 Base Case

3.1.1 Changes from the previous TSR

Many inputs into the analysis process change over time- information is continually updated and legislation changed. The major changes from TSR 2 and TSR 3 are listed below:

- Updated land base summary (see section 6.0).
- OGMAs are used instead of aspatial seral requirements;
- New VQO coverage used;
- Disturbances are modeled in the non-THLB productive land base;
- MPB modeling methodology has been refined; and

3.2 Sensitivity Analyses

Sensitivity analysis provides a measure of the reasonable upper and lower bounds of the harvest forecast, reflecting the uncertainty of assumptions made in the base case. The magnitude of the increase and decrease in the sensitivity variable reflects the degree of uncertainty surrounding the assumption associated with that given variable. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most influence results. To allow meaningful comparison of sensitivity analyses, they are usually performed using the base case (*i.e.* current performance) and varying only the assumption being tested (*i.e.* all other assumptions remain the same as in the base case). The sensitivities that will be carried out for this analysis are listed in Table 3.1. Several additional scenarios will be provided through the Kamloops Type 2 Silviculture Analysis.

Table 3.1 Sensitivity analyses

Title
Basecase
Harvest doesn't exceed 75% of Available Timber
Harvest 100% Pl leading MPB
Harvest 0% Pl leading MPB
Increase Uplift by 500,000m3/year
Alternative Cedar/Hemlock Partition Harvest Flow
SIBEC Basecase
Harvest 100% MPB with SIBEC
SARCO Caribou Requirements
2% Retention on Large Scale MPB Salvage
Harvest Green Attack First
Worst Case Forest Health
35% of Young Pine Mortality
Worst Case Combination Scenario
TSR2 THLB Benchmarking Scenario

3.3 Alternative Harvest Flows

A number of different harvest flows will be explored, based on tradeoffs between short and medium-term harvest levels. Forest cover objectives and the biological capacity of the net timber harvesting land base (THLB) ultimately dictate the harvest level. However, a number of alternative harvest flows are possible. In this analysis, the main objective was:

- Identify the amount of mountain pine beetle (MPB) affected pine able to be harvested to determine an appropriate initial harvest level;
- To mediate the impact of MPB on the mid-term timber supply; and
- Have a sustainable long run harvest level that reflects managed stand yields.

3.4 Other Options

There are no scenarios additional to this timber supply analysis identified at this time.

4.0 FOREST ESTATE MODEL

4.1 Model description

The analyses will be carried out using CASH6 (Critical Analysis of Schedules for Harvesting) version 6.2l, a proprietary timber supply model developed by Timberline Forest Inventory Consultants. The model uses a geographic approach to land base and inventory in order to adhere as closely as possible to the intent of forest cover requirements on harvesting. Maximum disturbance and minimum thermal and old growth retention forest cover requirements are explicitly implemented.

A variable degree of spatial vs. aspatial resolution is available depending on inventory and resource emphasis area definitions. Forested stands in the non-timber harvesting land base (THLB) can be included to better model forest structure and contribute to forest cover objectives. These may be areas classed as environmentally sensitive or inoperable areas to name a few.

In their current implementation, forest cover objectives require an area over which to operate. The control area for an objective should correspond to a realistic element in the landscape. For example, the requirements associated with visual quality objectives (VQOs) are designed to operate on the scene visible from discrete sets of viewpoints. Disturbance requirements are calculated for each identified VQO polygon as described in section 11.2.

CASH6 contains a hierarchical land base organization to assist in implementing control areas. Numerous levels of land aggregation are used to define both geographically separate areas and areas of similar management regime. Forest cover constraints can be applied at up to 5 overlapping levels. CASH6 functionality includes the capability to model both height-based and age-based green-up.

4.2 Timber Supply Analysis

Timber supply analysis for the 250-year planning horizon will be carried out using CASH6. In the base case, a 400-year time from will be modelled to ensure complete understanding of the factors influencing timber supply well into the long term.

5.0 CURRENT FOREST COVER INVENTORY

This section describes the base mapping, forest cover inventory and other data used in the analysis.

5.1 Base Mapping

All spatial information is registered to the Terrain Resource Inventory Mapping (TRIM), North American Datum (NAD) 83 base. Inventory data has been prepared using the ARC/INFO™ Geographic Information System (GIS). Use of GIS ensures that spatial relationships between the various inventory attributes are maintained throughout the analysis process. One example is existing roads and streams have been buffered to provide specific area reductions from the THLB. Another example is the classification of THLB vs. non-THLB productive land base. Forest on the non-THLB productive land base is not available for harvesting but can contribute to forest cover objectives for non-timber resources (depending on its structural state).

5.2 Vegetation Resource Inventory

The Vegetation Resource Inventory (VRI) was downloaded from the LRDW in August 2006 and has been updated for disturbance and projected to 2006 by the Ministry. In order to complete the disturbance updated RESULTS blocks and licensee forest development plan information has been incorporated into the resultant database. VDYP has been run to determine species and net volume for forested stands.

5.2.1 Missing Species in the Inventory

73,239 ha in the productive land base had no species data associated with it. The process of obtaining a default species for this area is as follows:

- For those areas with an inventory type group (ITG), species was defaulted to 100% leading species by ITG (total area of 29,707 ha); and
- For those areas with no ITG, species was defaulted to 100% leading species by BEC zone (total area of 43,533 ha).

5.3 Data Sources

Many sources of data were compiled to provide input to this timber supply analysis- these are documented in Table 5.1

Table 5.1 Source Data

Coverage Description	Coverage Name	Source	Date
Analysis Units	kam_au	TNRG	12-Jan-07
BEC	abec_bc	LRDW	1-Feb-06
BEO	beo	LRDW	21-Jan-03
Bonapart NRFL	Bon_nrfl	MoF	1-Apr-07
Caribou	acaribou_tka	Ron Vanderzwan	25-Feb-04
Caribou Cells	car_cells	Ron Vanderzwan	25-Feb-04
Caribou Corridors	car_cor	Ron Vanderzwan	25-Feb-04

Coverage Description	Coverage Name	Source	Date
Community Forests	cfor	Ron Vanderzwan	5-Dec-06
North Thompson Community Forest	K1Z	Perry Lambkin	11-Jun-06
Community Watershed - Blackpool	blackpool	Ron Vanderzwan	11-Jun-03
Community Watershed Intakes	intakes	TNRG	31-Mar-06
Community Watersheds	tcws_tka	LRDW	11-Jun-03
Deer Habitat	adeer_tka	MOF	9-Aug-05
Environmentally Sensitive Areas	esa	LRDW	18-Jan-03
FDP - Combined	kam_fdp	TNRG	9-Aug-05
FDP - Licencee	tolko_blocks	Tolko	15-Nov-06
FDP - Licencee	tolko_nt_blks	Tolko	15-Nov-06
FDP - Licencee	wey_prop	Weyerhaueser	9-Nov-06
FDP - Licencee	wey_log	Weyerhaueser	9-Nov-06
FDP - Licencee	gsfp_blk_bnd	Gilbert-Smith	1-Nov-06
FDP - Licencee	blk_status	Canfor	1-Nov-06
Headwaters VQO	Avqo_dcl	Ron Vanderzwan	1-Jan-07
Hudson Bay Trail	hbt	LRDW	21-Mar-03
Kamloops Parks	tpas_bc	MOE	20-Dec-01
Kamloops VQO	dka_rvli_final	Ron Vanderzwan	8-Mar-05
Landscape Units	lu	LRDW	26-Mar-04
Moose Winter Range	mwr06_tka	MOE	1-Oct-01
MPB Projection	grids	Mof, Meng	18-Jan-06
Mule Deer Winter Range	tuwr06_tka	MOE	22-Apr-03
Netdown	kam_class	TNRG	9-Jan-07
Ogma	fogma_tka	LRDW	3-Mar-06
Operability	oper	Ron Vanderzwan	1-Oct-03
Ownership	own	MOF	12-Mar-03
Pulpwood Boundaries	pa16	LRDW	18-Feb-03
Results Depletions	results	RESULTS	Jun, 2007
Riparian	j_rip	JST	12-Oct-06
Roads - Licencee	tolko_nt_rds	Tolko	15-Nov-06
Roads - Licencee	tolko_rp_rds	Tolko	15-Nov-06
Roads - Licencee	wey_nstrds	Weyerhaueser	9-Nov-06
Roads - Licencee	wey_strds	Weyerhaueser	9-Nov-06
Roads - Licencee	gsfp_rds	Gilbert-Smith	1-Nov-06
Roads - Licencee	roads	Canfor	1-Nov-06
Roads - Licencee	rd_status	Canfor	1-Nov-06
Roads Buffered	kam_roads	TNRG	15-Nov-06
Roads Combined	kam_roads	TNRG	15-Nov-06
Terrain Stability	ttsm_tka	Arclib	1-Oct-01
TFL	tfl_bc	LRDW	2-Dec-03
TOD Mountain	tod_mtn	LRDW	1-Oct-01
TRIM Roads	ttrn	TRIM	30-Sep-05
TRIM water	twtr	TRIM	30-Sep-05
TSA Boundary	tsa_bc	LRDW	22-Mar-05
VRI	vri	LRDW	15-Oct-03
Woodlots	woodlots	LRDW	17-May-05

6.0 DESCRIPTION OF LAND BASE

This section describes the Kamloops 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.

6.1 Timber Harvesting Land base Determination

Table 6.1 presents the results of the land base classification process to identify the timber harvesting or net operable land base. Individual areas may have several classification attributes. For example, stands within riparian boundaries might also be classified as non-commercial. These areas would have been classified on the basis of this latter attribute, prior to the riparian classification. Therefore, in most cases the net reduction will be less than the total area in the classification.

Table 6.1 THLB determination

Land Classification	TSR 3 Reduction (ha)	TSR 4 no harvest reduction
Total Area	**2,666,375**	**2,770,266**
Wells Gray Provincial Park	528,000	539,102
Total Area Without Wells Gray Park	**2,138,375**	**2,231,164**
Non-crown	364,894	367,187
Non-productive, non-forest	364,371	356,420
Existing Roads	24,045	28,553
Non-productive Reductions	**753,310**	**752,159**
Productive Forest	**1,385,065**	**1,479,005**
Parks	0	68,021
Non-commercial brush	2,466	1,650
Inoperable	95,709	96,471
Environmentally Sensitive	108,967	66,656
Deciduous	37,878	0
Low Site Growing Potential	31,141	30,138
Non-merchantable stands	45,938	79,435
Riparian	21,841	21,527
Hudson's Bay Trail	103	342
Tod Mountain (Sun Peaks)	159	2,148
Community Watershed Intakes	2	4
Wells Gray Community Forest	0	11,128
Old Growth Management Areas	0	92,177
Total Productive Reductions	344,204	469,700
Long Term THLB	**1,040,861**	**1,009,305**

6.2 Total Area

The total area of Kamloops TSA is 2,770,266 ha, of which 1,479,005 ha are classified as productive TSA forest land. In TSR 3 the gross area of the TSA was determined to be 2,666,375 ha. The difference of

approximately 104,000 ha cannot be explained but the current area of 2,770,266 ha has been confirmed by MoFR, ILMB and Timberline using data sourced from both the LRDW and MoFR archives.

6.3 Wells Gray Provincial Park

Wells Gray Provincial Park is taken out first because it is largely a separate landscape unit and does not contribute to biodiversity targets within the TSA and therefore should not be considered part of the productive land base. Wells Gray Park has been identified using the tpas_bc coverage updated by the Ministry of Environment.

6.4 Non-crown Land

Non-crown land includes selected ownership classes, woodlots and tree farm licenses (TFLs). The ownership classes were identified using the ownership code in the MoFR's ownership layer. The following ownership codes were removed from the productive land base: 0,1,40,50,52,54,75,76,77, 99. Woodlots were identified using a compiled woodlot layer provided by the Ministry of forest to include the most recent additions to the woodlot layer after direction from the Kamloops and Headwaters District Office[1]. All TFLs removed were identified from the MoFR database. The Non-crown land removal is approximate 2,300 ha more than TSR 3- reflective of updated information and additional woodlots.

6.5 Non-forest and Non-productive Forest

Traditionally non-productive non-forest land would have been identified using the non-productive descriptor field from the forest cover, however, in the VRI additional fields are required to completely identify these areas. In addition to removing NP, U, L, SWAMP, M, NPBR, R, C, GR, CL, G, RIV, NPBU, AF, A, P identified in the non-productive descriptor field, all vegetated non-treed land identified by the BC land classifications 1 and 2 were removed. The only exception to these removals is where logging history is present. Both VRI and RESULTS logging history were taken into consideration. A total of 356,420 ha were removed from the productive land base using these criteria. This value is about 8,000 ha greater than TSR 3 but can be explained due to the increase in total TSA area and the difference in selection criteria identifying non-forest, non-productive land.

6.6 Parks

Parks reductions are summarized in Table 6.2. Parks were not removed from the THLB in the TSR 3. The Ministry of Environments' tpas_bc coverage was used to identify provincial parks.

Table 6.2 Parks Netdown

Park Name	Area Removed (ha)
Adams Lake Marine Park	207
Adams Lake Park	59
Arrowstone Park	5,976
Banana Island Park	4

[1] W0300, W0301, W0302, W0303, W0304, W0305, W0307, W0309, W0310, W0311, W0312, W0313, W0314, W0315, W0316, W0318, W0319, W0370, W0380, W0382, W0385, W0386, W0387, W0389, W0710, W1424, W1434, W1589, W1590, W1591, W1594, W1595, W1596, W1597, W1598, W1599, W1600, W1601, W1602, W1603, W1604, W1605, W1606, W1607, W1608, W1609, W1667, W1836, W1839, W1857

Park Name	Area Removed (ha)
Bedard Aspen Park	161
Blue Earth Lake Park	648
Blue River Black Spruce Park	96
Blue River Pine Park	22
Bonaparte Park	10,196
Buse Lake Protected Area	172
Caligata Lake Park	34
Castle Rock Hoodoos Park	12
Chu Chua Cottonwood Park	37
Cornwall Hills Park	1,211
Dunn Peak Park	12,205
Eakin Creek Canyon Park	8
Eakin Creek Floodplain Park	107
Elephant Hill Park	342
Emar Lakes Park	1,298
Finn Creek Park	254
Greenstone Mountain Park	106
Harbour-Dudgeon Lakes Park	195
Harry Lake Aspen Park	226
High Lakes Basin Park	466
Juniper Beach Park	5
Lac Le Jeune Park	103
Lac du Bois Grasslands Park	12,587
McConnell Lake Park	67
McQueen Creek Ecological Reserve	18
Momich Lakes Park	1,130
Mount Savona Park	379
Mud Lake Delta Park	107
Niskonlith Lake Park	212
North Thompson Islands Park	36
North Thompson Oxbows East Park	209
North Thompson Oxbows Manteau Park	205
North Thompson River Park	109
OREGANA CREEK	230
Oregon Jack Park	201
Ownership Parks (parks with no name)	1,522
Painted Bluffs Park	81
Paul Lake - Recreation Area	6
Paul Lake Park	635
Porcupine Meadows Park	2,176
Pritchard Park	10
Pyramid Creek Falls Park	11
Roche Lake Park	1,566
Roderick Haig-Brown Park	322
Six Mile Hill Protected Area	143
Steelhead Park	43
Taweel Park	3,382
Tranquille Ecological Reserve	234
Tsintsunko Lake Park	261
Tunkwa Park	4,146

Park Name	Area Removed (ha)
Upper Adams River Park	3,748
Walhachin Oxbows Park	18
Walloper Lake Park	52
Wire Cache Park	23
Total	**68,021**

6.7 Non-Commercial Brush

The area of non-commercial area (type identity = 5) was excluded from the net THLB is shown in Table 6.3. Areas identified as previously logged were not removed as non-commercial; there are 1,650 ha of previously logged NCBR. In this table, as for all following netdown tables; gross, productive and removed area are shown. Area removed is productive area that has not yet been moved from the THLB to the non-THLB by prior reductions. In most cases the area removed will be lower than the productive area.

Table 6.3 Non-Commercial Brush Netdown

	Area (ha)		
	Gross	**Productive**	**Removed**
Non Commercial Brush	2,268	1,815	1,650

6.8 Operability

The operability information has been updated in the Headwaters District since TSR 3. Table 6.4 shows the operability reductions by gross, productive and net area removed.

Table 6.4 Operability Netdown

	Area (ha)		
	Gross	**Productive**	**Removed**
Inoperable	323,001	98,859	96,471

6.9 Environmentally Sensitive Areas and Unstable Terrain

Environmentally sensitive areas (ESAs) were identified using a combination of terrain stability mapping ESA mapping from previous forest cover. The reductions associated with ESAs are soils (S), regeneration (P), recreation (R), avalanche (A) and water (W). Where available terrain stability mapping classifications U, and V were net out. Table 6.5 provides a summary of the ESA reductions in the Kamloops TSA. In all cases previously logged stands are exclude from the ESA, and terrain netdown.

Table 6.5 ESA Netdown

	Area (ha)		
	Gross	**Productive**	**Removed**
ESA- Terrain (U/V)	25,622	20,184	20,328
ESA- ESA	114,837	90,652	46,328
Total	140,460	110,836	66,656

6.10 Low Site Potential

Table 6.6 shows the low site reductions for the Kamloops TSA by gross, productive and net area removed. Low site 1 stands are characterized by site index <= 8. Low site 2 stands have a site index <= 15 and are classified as residual stocking class (R). In all cases previously logged stands are excluded from the low site netdown.

Table 6.6 Low Site Netdown

	Area (ha)		
	Gross	**Productive**	**Removed**
Low Site 1	593,729	63,981	30,127
Low Site 2	12	12	11
Total	593,741	63,993	30,138

6.11 Non-merchantable Stands

Problem forest types (PFT) are stands that are operable but not currently utilized for harvest. Table 6.7 outlines the characteristics by which these types were identified. The deciduous component of the non-merchantable netdown has been omitted because deciduous stands are being harvested. In all cases logged stands were excluded from the non-merchantable netdown.

Table 6.7 Characteristics of Non-Merchantable Forest Types

PFT Number	Species	Characteristics	Age	Height	Crown Closure	Stocking Class	SI Limit
PFT 1	All except Pl	Excluding PA 16	> 80	< 19.5			
PFT 2	Bl and Sx	Excluding PA 16	> 140	<28.5	< 36%	< 36%	
PFT 3	Pl	Excluding PA 16	> 80	< 19			
PFT 4- 310	Pl	Excluding PA 16, classified as 310	41-60	0.1-10.4		0	<=10
PFT 4- 420	Pl	Excluding PA 16, classified as 420	61-80	10.5-19.4		0	<=10
PFT 5	All except Pl	In PA 16	> 100	<10.5			
PFT 6	Pl	In PA 16	> 80	< 10.5			

Table 6.8 summarizes the area removed from the net THLB as non-merchantable stands by PFT.

Table 6.8 Non-Merchantable Netdown

Non-Merchantable Stands	Area (ha)		
	Gross	Productive	Removed
PFT 1	96,439	77,532	44,565
PFT 2	26,990	26,538	4,298
PFT 3	48,584	42,194	30,101
PFT 4	580	545	471
Total	172,594	146,808	79,435

6.12 Riparian Management Areas- Streams, Wetlands and Lakes

Riparian management areas are designed to minimize the impacts of harvesting in areas immediately adjacent to water bodies, including streams, lakes, swamps and wetlands. A riparian management area consists of a riparian management zone (RMZ) in which harvesting activity is restricted through basal area retention requirements, and may also include a riparian reserve zone (RRZ) immediately adjacent to the water body in which harvesting is fully excluded. The presence of a RRZ is dependent on the classification assigned to the water body in question. Due to the completeness of the riparian buffer layer used in TSR 2 a new riparian buffering exercise was deemed unnecessary for TSR 4. The TSR 2 estimates for RRZs and RMZs are shown in Table 6.9 (MoFR, 2001).

Table 6.9 Estimates for RRZ and RMZs

Riparian classification	Reserve zone (RRZ) width (metres each side)	Management zone (RMZ) width (metres each side)	RMZ average basal area retention[a]	Combined riparian zone width (metres each side)
S1 streams	50	20	25	55
S2 streams	30	20	25	35
S3 streams	20	20	25	25
S4 streams — Kamloops (all) and Clearwater (fish bearing or community watershed)	10	20	12	12
S4 streams — Clearwater	0	30	12	4
S5 streams	0	30	12	4
S6 streams	0	20	3	0
All 'A' lakes	200	0	N/A	200
All other lakes — Kamloops	10	190 for 'B'-'E' lakes	0	10
All lakes > 1000 ha — Clearwater	0	200 for 'B'-'E' lakes	0	0
L1 lakes — Clearwater (> 5 ha and < 1000 ha)	10	190 for 'B'-'E' lakes	0	10
L3 lake — Clearwater (1-3 ha)	0	30	12	4
L3 lakes — Clearwater (3-5 ha)	0	200	0	0
W1/W5 wetlands (> 5 ha) all BEC zones	10	40	12	15
W2 wetlands (1 to 5 ha) PP, BG, IDFxh, xw, xm	10	20	12	12
W3/W4 wetlands (0 to 1 ha) PP, BG, IDFxh, xw, xm	0	30	12	3
W3/W4 wetlands (1 to 5 ha) all BEC zones	0	30	12	3

A summary of the resulting lake and wetland riparian classifications and associated land base reductions is provided in Table 6.10.

Table 6.10 Riparian Management Netdown

Riparian Netdowns	Area (ha)		
	Gross	Productive	Removed
Stream Type 1 (S1)	18,355	4,440	2,565
Stream Type 2 (S2)	10,961	6,443	4,249
Stream Type 3 (S3)	27,215	16,835	12,431
Stream Type 4 (S4)	111	69	60
Stream Type 5 (S5)	0	0	0
Stream Type 6 (S6)	0	0	0
Wetland Type 1 (W1_5)	3,913	3,074	2,043
Wetland Type 2 (W2)	136	49	34
Lake Type 1 (L1)	616	265	144
Total	61,307	31,176	21,527

6.13 Hudson Bay Trail

A 200 meter buffer was applied to the designated portion of the Hudsons Bay Trail as per TSR 2, however, the area removed has increased due to the incompleteness of the previous Hudsons Bay Trail coverage. Table 6.11 shows the reductions associated with the Hudson Bay Trail.

Table 6.11 Hudson Bay Trail Netdown

	Area (ha)		
	Gross	Productive	Removed
Hudson's Bay Trail	486	412	342

6.14 Sun Peaks Ski Area

The Sun Peaks ski area, previously referred to as the Tod Mountain exclusion, has increased in TSR 4. A new boundary of the recreation site has been utilized because it has been designated as a controlled recreation area. This area is managed under the ministry of tourism, sport and arts (MOTSA) and the data was provided by the MoFR. Table 6.12 shows the reductions associated with the Sun Peaks ski area.

Table 6.12 Sun Peaks Netdown

	Area (ha)		
	Gross	Productive	Removed
Tod Mountain (Sun Peaks)	4,109	3,160	2,148

6.15 Community Watershed Intakes

Table 6.13 shows the reductions associated with community watershed intakes. As in TSR 2, xommunity watershed intakes were identified from community watershed maps with a 100-metre upland buffer applied.

Table 6.13 Community Watershed Intakes Netdown

	Area (ha)		
	Gross	Productive	Removed
Community Watershed Intakes	51	17	4

6.16 Wells Gray Community Forest

Three community forests have been created within the Kamloops TSA: Wells Gray Community Forest, Lower North Thompson Community Forest and Logan Lake Community Forest. While all community forests will no longer be part of the Kamloops TSA crown forested land base only Wells Gray Community Forest was removed. This was because the Wells Gray Community Forest is further along the planning stages than Logan Lake. Table 6.14 shows the reductions associated with the Wells Gray community forest.

Table 6.14 Wells Gray Community Forest Netdown

	Area (ha)		
	Gross	Productive	Removed
Wells Gray Community Forest	13,149	12,268	11,128

6.17 Old Growth Management Areas (OGMAs)

OGMAs were removed last in order to provide flexibility in the modeling environment. The fogma_tka was obtained from ILMB and OGMAs identified where ogma is classified as 'y'. The OGMA area netted out is comparable to 9.3% of the THLB. Table 6.15 shows the reductions associated with OGMAs.

Table 6.15 OGMA Netdown

	Area (ha)		
	Gross	Productive	Removed
Old Growth Management Areas	235,760	219,881	92,177

6.18 Not Satisfactorily Restocked Areas

Backlog NSR could not be reliably identified and therefore has not been treated differently from any other forested stand in this analysis.

6.19 Roads, Trails and Landings

6.19.1 Existing Roads, Trails and Landings

23,811 ha of existing roads, trails and landings are removed from the productive land base. The roads included major and minor highways, regional access, forest service roads and minor logging roads and spurs. Road, trail and landing data was complied through TRIM and licensee roads (Gilbert Smith, Weyerhaeuser, Tolko and Canfor).

A buffer width of 13 meters was used on all roads except minor logging roads and spurs where a 10 meter buffer was used. An overlay of the roads with previously logged blocks indicated that most blocks had roads either accessing or passing through them. Due to the completeness of the supplied licensee road data it was determined that the existing buffer widths were sufficient to account for landings and in block disturbances. This differs from TSR 3 where a further 4.9% aspatial netdown was applied to stands less than 31 years old to account for existing landings and in-block disturbances

6.19.2 Future Roads, Trails and Landings

Upon harvesting, a component of each stand is placed into a category that will remain in a disturbed state for perpetuity. If the area harvested is included in an area associated with forest cover constraints relating to integrated resource management, the road area will become part of the disturbance area permanently. These stands will provide harvest volume on the first entry but not on further entries and the area contributing to the long-term sustainable harvest is net of this area. Consistent with the previous TSR, 6.5% is used in this analysis.

6.20 Stand-level Biodiversity (Wildlife Tree Patches)

The retention of wildlife tree patches (WTPs) is modeled by applying a percentage reduction to stand yields at the time they are harvested by the model. This modeling approach means that WTPs are not counted for their contribution toward landscape level biodiversity requirements, although in reality some WTPs may contribute to both landscape level forest structure and old growth habitat. Based on information provided by licensees, current practice indicates that 1.9% of the THLB area is being retained for WTPs.

6.21 Timber License Reversions

Timber licenses (TLs) are old tenure arrangements that allow timber harvest within the TL without contributing to the TSA AAC. Once these areas have been harvested and regenerated to free-growing, the TL area reverts back into the Kamloops TSA. In this analysis, there is a TL area of 13,073 ha that will be included in the THLB after the estimated first harvest. Consistent with TSR 2, an approximate reversion rate of 200 ha per year for 5 decades was assumed and therefore 3,074 ha were assumed to be already reverted. The TL reversion schedule is shown in Table 6.16 below.

Table 6.16 Timber License Reversion Schedule

Time	Area (ha)
Already Reverted	3,074
Decade 1	1,999

Decade 2	1,989
Decade 3	2,007
Decade 4	2,005
Decade 5	2,000

6.22 Area Distributions by Leading Age and Leading Species

Figure 6.1 and

Table 6.17 summarize the distribution of area by age for both the productive and net harvesting land base[2].

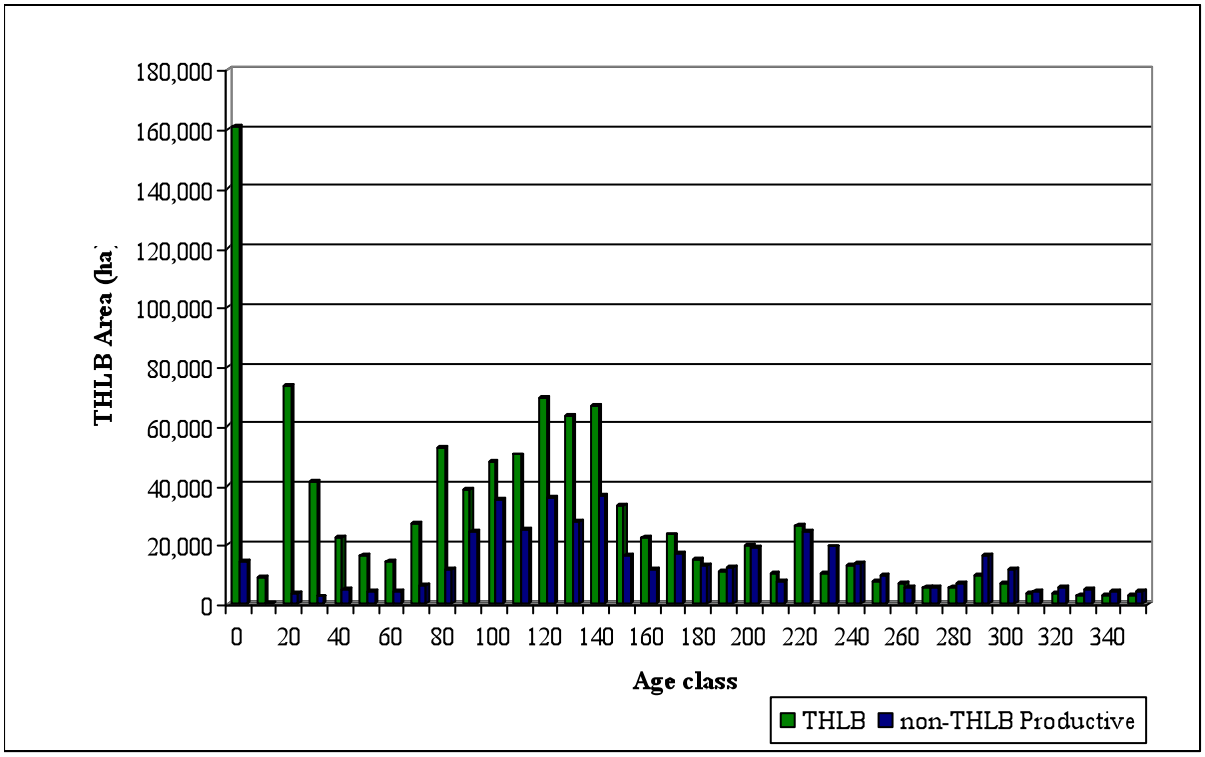

Figure 6.1 Initial Age distribution

Table 6.17 Initial Age distribution

Ageclass	Area (ha)	
	THLB	non-THLB Productive
0	160,726	14,321
10	8,888	418

[2] Stands with a harvest history were reset to age 0 if they were not recently harvested (i.e. > 30 years).

20	73,235	3,565
30	41,298	2,554
40	22,309	4,732
50	16,320	4,273
60	14,475	4,564
70	27,261	6,013
80	52,679	11,636
90	38,842	24,471
100	47,696	35,396
110	50,325	24,946
120	69,521	35,953
130	63,290	27,607
140	66,628	36,828
150	32,903	16,069
160	22,371	11,590
170	23,425	16,848
180	15,187	13,301
190	11,002	12,113
200	19,437	18,778
210	10,205	7,832
220	26,169	24,279
230	10,109	19,379
240	13,142	13,476
250	7,877	9,755
260	6,993	5,656
270	5,360	5,281
280	5,539	6,637
290	9,632	16,496
300	7,109	11,576
310	3,670	4,482
320	3,823	5,417
330	2,601	4,924
340	3,050	4,308
350	3,148	4,205
Total	**996,247**	**469,679**

Table 6.19 and Figure 6.3 summarize the distribution of area by leading species for both the productive and THLB. As with the leading age distributions, NSR or TL land is not included in the summaries.

Table 6.19 Leading species distribution

Species	Area (ha)	
	THLB	**non-THLB Productive**
Douglas-fir	331,213	156,670
Pine	299,411	94,663

Spruce	181,543	101,816
Balsam	91,502	67,317
Deciduous	40,221	23,112
Cedar	31,473	16,246
Hemlock	20,882	9,855
Total	**996,246**	**469,679**

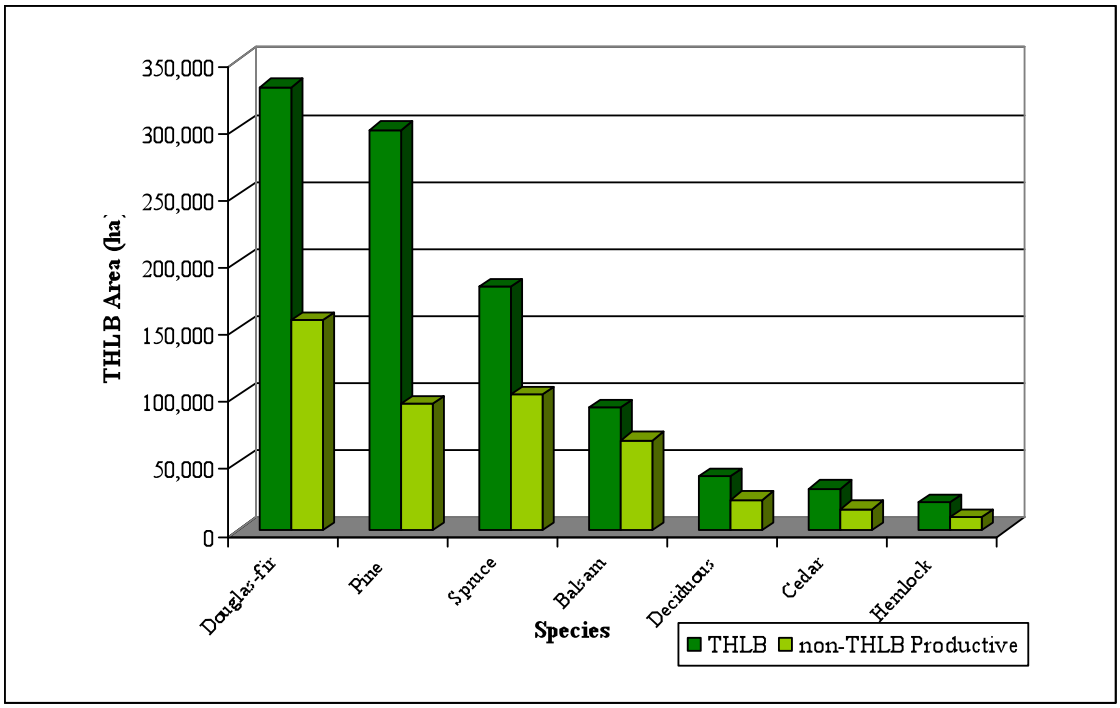

Figure 6.3 Leading Species Distribution

7.0 INVENTORY AGGREGATION

7.1 Introduction

In order to reduce the complexity of the forest description for the purposes of timber supply analysis, aggregation of individual forest stands is necessary. However, it is critical that this aggregation obscures neither differences in biological productivity nor differences in management objectives and prescriptions. It is important to note that aggregation of the land base 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.

Grouping stands into analysis units (AUs) 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 modelled by grouping areas into resource management zones (RMZs), which are aggregates of area with similar non-timber resource concerns. These include visual sensitivity, wildlife habitat and community watersheds. Maximum disturbance (based on green-up height requirements) and minmum mature and old growth forest cover objectives will be assigned to each RMZ forest cover group to address needs of the resource. RMZs are aggregated within each landscape unit to reflect operational management of the resource. Where RMZ classifications overlap, areas must meet all overlapping forest cover objectives before harvesting.

7.2 Analysis Unit Definitions

The same approach as TSR 3 was used to define AUs. AUs were defined by combination of inventory type group (ITG), biogeoclimatic unit (BEC), site index range (SI) and stand age as outlined in Table 7.1.

Table 7.1 AU definitions

AU	Description	ITG	BEC	SI range	Age
1	Fir Dry Selection	1,5,6,32	PPxh,IDFxh,IDFxw, IDFdk1,IDFdk3, BG	All	All
2	Fir Dry Small Patch	1,6,7,8,32	IDFdk2 & MSxk (excluding Sx,Hw, Cw,Bl & Pl 2nd sp)	All	All
3	Fir Wet <140 G/M	1-8,27,32-34,37,38	All except those in AU 1&2	>15	<140
4	Fir Wet <140 G/M 8+	1-8,27,32-34	All except those in AU 1&2	≤15	≥140
5	Fir Wet <140 P/L	1-8,27,32-34,37,38	All except those in AU 1&2	≤15	<140
6	Fir Wet >140 P/L	1-8,27,32-34,37,38	All except those in AU 1&2	≤15	≥140
7	Cedar <140 G/M	9,10,11	All	>17	<140
8	Cedar <140 P/L	9,10,11	All	≤17	<140
9	Hemlock <140 G/M	12-17	All	>16	<140
10	Hemlock <140 P/L	12-17	All	≤16	<140
11	Balsam <140 G/M	18-20,(30)	All	>13	<140
12	Balsam >140 G/M 8+	18-20,(30)	All	>13	≥140
13	Balsam <140 P/L	18-20,(30)	All	≤13	<140
14	Balsam >140 P/L 8+	18-20,(30)	All	≤13	≥140

AU	Description	ITG	BEC	SI range	Age
15	Spruce <140 G/M	21-26,(30)	All	>14	<140
16	Spruce >140 G/M	21-26,(30)	All	>14	≥140
17	Spruce <140 P/L	21-26,(30)	All	≤14	<140
18	Spruce >140 P/L	21-26,(30)	All	≤14	≥140
19	Pine <140 G/M	27-32	All	>14	<140
20	Pine >140 G/M	27-32	All	>14	≥140
21	Pine <140 P/L	27-32	All	≤14	<140
22	Pine >140 P/L	27-32	All	≤14	≥140
23	Fir Dry Selection PA16	1,5,6,32	PPxh,IDFxh,IDFxw, IDFdk1,IDFdk3, BG	Ht >10.5 & ≤20	≥80
24	Fir Dry Small Patch PA16	1,6,7,8,32	IDFdk2 & MSxk (excluding Sx,Hw, Cw,Bl & Pl 2nd sp)	Ht ≥10.5 & ≤20	≥80
25	Fir Wet PA16	1-8,27,32-34	All except those in AU 1&2	Ht ≥10.5 & ≤20	≥80
26	Cedar PA16	9-11	All	Ht ≥10.5 & ≤20	80-140
27	Hemlock PA16	12-17	All	Ht ≥10.5 & ≤20	80-140
28	Balsam PA16	18-20	All	Ht ≥10.5 & ≤20	≥80
29	Spruce PA16	21-26	All	Ht ≥10.5 & ≤20	≥80
30	Pine PA16	28-31	All	Ht ≥10.5 & ≤20	≥80
31	Deciduous PA16	35-42	All	All	All
32	Cedar CHPtn G/M 8+	9-11	All	>17	≥140
33	Cedar CHPtnP/L 8+	9-11	All	≤17	≥140
34	Hemlock CHPtn G/M 8+	12-17	All	>16	≥140
35	Hemlock CHPtn P/L 8+	12-17	All	≤16	≥140

7.3 Landscape Units

Table 7.2 shows the distribution of area by landscape unit (LU) for the Kamloops TSA. TLs were not shown in this summary.

Table 7.2 Landscape Units on the Kamloops TSA

Landscape Unit	Area (ha)		
	THLB	non-THLB Productive	Total Productive
AdamsLake	69,834	16,034	85,868
Albreda	15,823	11,015	26,837
Ashcroft	44,815	40,119	84,933
Avola	35,565	13,805	49,370
Barriere	73,408	23,738	97,146
Bonaparte	22,944	4,799	27,743
Campbell	59,181	18,680	77,861
Cayenne	20,348	14,583	34,931
Clearwater	23,160	18,468	41,628
Darfield	24,597	4,774	29,371
Deadman	62,048	26,134	88,181
Dewdrop	9,597	9,430	19,027
Dunn	14,527	14,401	28,927
HatCreek	34,464	20,432	54,896
Heffley	31,608	7,344	38,952
LacduBois	5,324	15,280	20,604

LouisCreek	31,909	11,425	43,334
LowerAdams	14,138	5,658	19,796
LowerBonaparte	30,283	19,391	49,674
Mad	43,439	11,342	54,781
Mica	36,532	11,682	48,214
Mud	13,251	12,595	25,845
Nehalliston	29,303	10,495	39,798
Raft	41,400	19,967	61,367
S.Kamloops	28,168	14,254	42,422
Skull	11,235	5,101	16,336
StumpLake	17,708	2,816	20,523
ThunderBlue	19,450	16,021	35,471
Tranquille	24,689	5,240	29,929
TumTum	27,248	22,430	49,678
UpperGuichon	44,136	15,270	59,406
UpperN.Thompson	16,625	22,964	39,589
Vavenby	19,493	3,990	23,483
Total	**996,246**	**469,679**	**1,465,926**

7.4 Resource Emphasis Areas

The resource emphasis areas defined for this analysis are listed in Table 7.3. Where RMZ classifications overlap, areas must meet all overlapping forest cover objectives before harvesting. RMZs in Kamloops TSA can be summarized as:

- Community Watersheds (CWS) and East Blackpool Watershed (EBW);
- Caribou Habitat;
- Caribou Corridors;
- Critical Deer Winter Range (DWR);
- Visual Quality Objectives (VQOs); and
- Integrated Resource Management (IRM).

Table 7.3 Resource emphasis areas

REA	Area (ha)		
	THLB	**Total Productive**	**non-THLB Productive**
Caribou Corridors	4,471	6,531	2,060
Caribou Habitat- Early	69,328	96,874	27,546
Caribou Habitat- Late	24,959	61,660	36,701
Deer	59,173	107,868	48,695
VQO- Headwaters	154,679	197,242	42,562
VQO- Kamloops	292,943	438,043	145,100
Watersheds	54,308	79,562	25,254
Disturbing the Inoperable		468,839	468,839

8.0 GROWTH AND YIELD

8.1 Utilization Levels

The utilization levels modeled are listed in Table 8.1. They are unchanged from TSR2 and reflect current standards and performance.

Table 8.1 Utilization levels

Analysis Unit/Species	Utilization		
	Min. DBH (cm)	Max. Stump ht (cm)	Min. Top DIB (cm)
Pine	12.5	30	10
Cedar > 140 years	17.5	30	15
All other Coniferous Species	17.5	30	10
PA 16 Coniferous	12.5	30	10
PA 16 Deciduous	12.5	30	10

8.2 Decay, Waste and Breakage

Decay waste and breakage (DWB) has been included in this analysis via VDYP, which is set for each forest inventory zone (FIZ) and public sustained yield units (PSYU).

8.3 Genetic Gains

A three year average of genetic gains for the Kamloops TSA has been provided by Barry Snowden of Forest Analysis Branch.

Table 8.2 Genetic Gains

Species	Genetic Gain (%)
Lodgepole Pine	3
Larch	8
Spruce	9
Douglas-fir	0

8.4 Volume Reductions

When a portion of a stand is not normally utilized and is therefore not harvested, the un-harvested portion is excluded from the stand volume estimate. In the Kamloops TSA, all yield tables will be reduced to account for the deciduous volume in conifer leading stands and wildlife tree patches.

8.5 VDYP Natural Stand Yield Tables

Natural stand yield tables (NSYTs) were developed using the batch version of VDYP (Version 6.6d). Deciduous areas are kept as an input into VDYP and are then dealt with by applying an appropriate reduction OAF by AU further into the analysis. The AU description, area, inventory site index and species composition (up to species 6) is shown below in Table 8.3. The natural stand yield tables are created specifically for each inventory polygon and the yield curves are area weighted into a representative curve. The attributes in Table 8.3 are averages for reporting purposes only.

Table 8.3 Average natural stand attributes by analysis unit

AU	Description	Area	SI	Sp 1	%	Sp 2	%	Sp 3	%	Sp 4	%	Sp 5	%	Sp 6	%
1	Fir Dry Selection	59,128	14	Fd	81	Pl	11	Sx	4	At	4				
2	Fir Dry Small Patch	8,413	16	Fd	79	Pl	9	At	7	Sx	4	Bl	1		
3	Fir Wet <140 G/M	93,357	19	Fd	66	Pl	14	At	9	Sx	5	Cw	4	Hw	1
4	Fir Wet <140 G/M	21,601	17	Fd	69	Pl	9	Sx	9	Cw	7	At	4	Hw	3
5	Fir Wet <140 P/L	24,192	13	Fd	82	Pl	9	At	5	Sx	3	Cw	2	Bl	1
6	Fir Wet >140 P/L	30,990	13	Fd	85	Pl	9	Sx	2	At	2	Cw	1	Hw	1
7	Cedar <140 G/M	2,873	20	Cw	51	Sx	12	Fd	12	Hw	11	At	9	Bl	5
8	Cedar <140 P/L	2,826	14	Cw	51	Fd	12	Hw	12	At	11	Sx	10	Pl	4
9	Hemlock <140 G/M	3,294	19	Hw	52	Cw	18	Fd	10	Pl	9	Sx	8	At	4
10	Hemlock <140 P/L	1,507	14	Hw	51	Cw	16	Sx	11	Fd	10	Pl	6	Bl	5
11	Balsam <140 G/M	29,534	16	Bl	65	Sx	26	Pl	5	Fd	1	Cw	1	At	1
12	Balsam >140 G/M	4,193	14	Bl	66	Sx	28	Pl	2	Fd	1	Cw	1		
13	Balsam <140 P/L	10,052	11	Bl	72	Sx	24	Pl	2	Cw	1	Hw	1	Fd	1
14	Balsam >140 P/L	21,714	11	Bl	67	Sx	31	Pl	1	Cw	1				
15	Spruce <140 G/M	37,410	17	Sx	70	Bl	13	Pl	8	Fd	3	Cw	3	At	2
16	Spruce >140 G/M	17,153	17	Sx	67	Bl	19	Pl	5	Cw	4	Fd	3	Hw	1
17	Spruce <140 P/L	6,978	12	Sx	69	Bl	15	Pl	9	Fd	3	At	2	Cw	2
18	Spruce >140 P/L	45,521	11	Sx	65	Bl	24	Pl	5	Cw	2	Fd	2	Hw	1
19	Pine <140 G/M	127,290	18	Pl	75	Sx	8	Fd	8	At	4	Bl	3		
20	Pine >140 G/M	13,804	16	Pl	73	Sx	13	Fd	7	Bl	4	At	1		
21	Pine <140 P/L	22,641	13	Pl	80	Fd	9	Sx	6	At	2	Bl	2		
22	Pine >140 P/L	12,848	12	Pl	76	Sx	11	Fd	10	Bl	3	At	1		
23	Fir Dry Selection PA16	12,804	12	Fd	84	Pl	13	At	2	Sx	2				
24	Fir Dry Small Patch PA16	360	14	Fd	81	At	15	Pl	3	Sx	1				
25	Fir Wet PA16	16,720	11	Fd	90	Pl	7	At	2	Sx	1				
26	Cedar PA16	631	13	Cw	52	Fd	14	Sx	10	At	9	Bl	8	Hw	6
27	Hemlock PA16	187	11	Hw	53	Cw	30	Bl	9	Sx	5	Pl	2	Fd	1
28	Balsam PA16	5,384	11	Bl	73	Sx	23	Pl	2	Cw	1	At	1		
29	Spruce PA16	1,103	12	Sx	61	Bl	19	Pl	9	Fd	5	At	5	Cw	1
30	Pine PA16	14,218	13	Pl	85	Fd	7	Sx	5	At	2	Bl	1		
31	Deciduous PA16	32,104	18	At	65	Fd	14	Pl	11	Sx	6	Cw	3	Bl	1
32	Cedar CHPtn G/M	1,921	18	Cw	61	Hw	18	Sx	13	Fd	5	Bl	2	At	1
33	Cedar CHPtn P/L	16,347	14	Cw	59	Hw	19	Sx	12	Fd	5	Bl	3	At	1
34	Hemlock CHPtn G/M	1,430	18	Hw	63	Cw	25	Fd	6	Sx	4	Pl	1		
35	Hemlock CHPtn P/L	11,565	12	Hw	60	Cw	23	Fd	7	Sx	6	Pl	3	Bl	2

8.5.1 Existing Timber Volume Check

Table 8.4 shows the inventory volume on the THLB compared to the yield curve volume. The yield curve volume is 82.6% of the polygon volume. This is because the yield curve volume is net of:

- WTPs (1.9% reduction);
- Deciduous component reduction area weighted average of 3.9% (variable from 0 to 15% reduction depending on AU);

- Yield curve reduction for STS stands (AU 1 and 23) 60% reduction for the first pass and 70% subsequently (area weighted THLB average of 5.3%); and
- Volume loss from resetting logged age and volume to 0 (area weighted THLB average of 10.8%).

Table 8.4 Timber volume check

Polygon Volume	Yield Curve Volume	% Concurrent (yield curve/polygon)
186,788,094	154,240,640	82.6%

8.6 Silviculture Management Regimes

8.6.1 TIPSY Managed Stand Yield Tables

Managed stand yield tables (MSYTs) were modeled using *Batch*TIPSY. Table 8.5 presents the managed stand AUs, species and site index values that were input to TIPSY. These assumptions are consistent with TSR 2. AUs 101 and 123 do not have TIPSY inputs because they are managed by selection uneven aged management and are therefore never planted. Operational adjustment factors (OAFs) of 15% (OAF1) and 5% (OAF2) are applied to all managed stand yield curves to account for patchiness, decay, waste and breakage. Note that the species % indicated in the table below are those expected at rotation. Genetic gains have been applied by species at levels indicated in Section 8.3.

Table 8.5 Managed stand analysis unit descriptions (TIPSY Inputs)

AU	Description	Area	SI	Rege Delay	Stems	sp1	%	sp2	%	sp3	%	sp4	%	sp5	%
101	**Fir Dry Selection**	13,604	14	0						N/A					
102	**Fir Dry Small Patch**	2,860	16	2	1,200	Fd	70	Pl	30						
103	**Fir Wet <140 G/M**	24,225	19	2	1,450	Fd	60	Pl	25	Sx	15				
104	**Fir Wet <140 G/M**	3,321	17	2	1,450	Fd	60	Pl	25	Sx	15				
105	**Fir Wet <140 P/L**	16,406	13	2	1,430	Pl	65	Fd	25	Sx	10				
106	**Fir Wet >140 P/L**	2,455	13	2	1,430	Pl	65	Fd	25	Sx	10				
107	**Cedar <140 G/M**	3,210	20	2	1,390	Sx	45	Cw	20	Fd	15	Pl	10	Hw	10
108	**Cedar <140 P/L**	1,257	14	2	1,320	Sx	30	Fd	30	Cw	20	Pl	10	Hw	10
109	**Hemlock <140 G/M**	1,155	19	2	1,400	Sx	40	Fd	30	Cw	10	Pl	10	Hw	10
110	**Hemlock <140 P/L**	989	14	2	1,360	Sx	40	Pl	25	Cw	15	Fd	10	Hw	10
111	**Balsam <140 G/M**	12,941	16	3	1,400	Se	80	Bl	20						
112	**Balsam >140 G/M**	530	14	3	1,400	Se	80	Bl	20						
113	**Balsam <140 P/L**	6,366	11	3	1,330	Se	60	Bl	25	Pl	15				
114	**Balsam >140 P/L**	1,607	11	3	1,330	Se	60	Bl	25	Pl	15				
115	**Spruce <140 G/M**	57,240	17	3	1,450	Sx	60	Bl	25	Pl	15				
116	**Spruce >140 G/M**	2,128	17	3	1,450	Sx	60	Bl	25	Pl	15				
117	**Spruce <140 P/L**	12,135	12	2	1,320	Sx	70	Bl	20	Pl	10				
118	**Spruce >140 P/L**	6,148	11	2	1,320	Sx	70	Bl	20	Pl	10				
119	**Pine <140 G/M**	63,488	18	2	1,560	Pl	80	Sx	10	Fd	10				
120	**Pine >140 G/M**	3,513	16	2	1,560	Pl	80	Sx	10	Fd	10				
121	**Pine <140 P/L**	38,592	13	2	1,480	Pl	90	Sx	10						
122	**Pine >140 P/L**	1,156	12	3	1,480	Pl	90	Sx	10						
123	**Fir Dry Selection PA16**	754	12	0						N/A					
124	**Fir Dry Small Patch PA16**	53	14	2	1,200	Fd	70	Pl	30						

125	**Fir Wet PA16**	1,185	11	2	1,430	Pl	65	Fd	25	Sx	10				
126	**Cedar PA16**	56	13	2	1,320	Sx	30	Fd	30	Cw	20	Pl	10	Hw	10
127	**Hemlock PA16**	26	11	2	1,360	Sx	40	Pl	25	Cw	15	Fd	10	Hw	10
128	**Balsam PA16**	914	11	3	1,330	Se	60	Bl	25	Pl	15				
129	**Spruce PA16**	262	12	2	1,340	Sx	70	Pl	20	Bl	10				
130	**Pine PA16**	2,944	13	2	1,480	Pl	90	Sx	10						
131	**Deciduous PA16**	8,262	18	2	2,500	At	100								
132	**Cedar CHPtn G/M**	546	18	2	1,390	Sx	45	Cw	20	Fd	15	Pl	10	Hw	10
133	**Cedar CHPtn P/L**	3,407	14	2	1,320	Fd	30	Sx	30	Cw	20	Pl	10	Hw	10
134	**Hemlock CHPtn G/M**	677	18	2	1,400	Sx	40	Fd	30	Pl	10	Cw	10	Hw	10
135	**Hemlock CHPtn P/L**	2,807	12	2	1,360	Sx	40	Pl	25	Cw	15	Fd	10	Hw	10

8.6.2 Regeneration Delay

Regeneration delay is the time elapsed between harvesting and the establishment of a new stand of trees. The end of the regeneration delay is time zero for a yield table; it is the point in time when measurable stand growth begins. For this analysis, regeneration delays will be applied in the timber supply model, rather than in the yield curve construction. A review of the RESULTS data gave an average regeneration delay of 1.71 years. Because trees are 1 year old at planting, the regeneration delay used is 1 year for all AUs.

8.7 Silviculture History

8.7.1 Immature Managed Stands

As in the previous analysis, it was assumed that all stands established since 1974 are managed stands and are therefore assigned to a managed stand yield curve. The area of these stands initially is shown by AU in Table 8.5.

8.7.2 Not Satisfactorily Restocked Areas

As mentioned before, backlog NSR could not be reliably identified and therefore has not been treated differently from any other forested stand in this analysis.

9.0 PROTECTION

9.1 Non Recoverable Losses

Damage to timber caused by fire, wind, insects, diseases and other pests contribute to loss in harvestable volumes. This volume loss is difficult to quantify, although losses to insect and disease that normally occupy stands (endemic losses) are accounted for in empirical yield curve estimates. Depending on the type of damage and stand accessibility, losses due to catastrophic or epidemic events may be either salvageable or unsalvageable. These non-recoverable losses are not accounted for in the yield curves. Estimates of annual unsalvaged losses are summarized in Table 9.1.

Table 9.1 Estimated non-recoverable losses

Cause	Annual Unsalvaged loss (m3/year)
Bark Beetles	3,900
Defoliators	36,130
Wind damage	9,250
Fire	12,210
Miscellaneous	1,100
Total	62,590

10.0 MPB MODELLING

In the Kamloops TSA, it is expected that up to 80% of the pine volume will be killed by 2013 (Eng et.al., 2006). This section details the MPB modeling assumptions. These only apply during the first 10 years of modeling.

10.1.1 MPB Projections

Since 1999, the MoFR has been projecting the spread of MPB throughout the province and recalibrating the projections each year with the forest health overview. The projections have been made using raster based stochastic modelling in SELES. The output provided from the MoFR are two 400m X 400m (16 ha) grids for each year projected. The first grid has the percent of the pine affected by MPB and the second has the percent of the stand that is pine. The percent of each grid that is affected is calculated by multiplying the percent pine MPB affected by the percent pine.

To provide consistency in reporting the percent of the stand affected has been classified using the forest health overview (FHO) classification system. This classification system is shown in Table 10.1.

Table 10.1 MoFR Severity Class Definition

Classification	Classification abbreviation	% of stand attacked by MPB
Trace	T	0 – 1 %
Light	L	1 – 10 %
Moderate	M	10 -30 %
Severe	S	30 – 50 %
Very Severe	V	> 50 %

One important variance from the FHO classification system is that the MoFR MPB projections are reported showing the accumulative impact of MPB instead of the annual impact. This was done because the MPB projections rarely showed annual impacts beyond the trace and low classes and because the overall impact is more important for making strategic level decisions.

10.1.2 Shelf Life

The analysis will use a two year shelf life for solid wood products in the base case. The two year shelf life is based on licensees experience in Kamloops.

10.1.3 Large Scale Salvage Retention

In areas that are heavily infested with MPB it is appropriate to have large scale salvage, which increase the size of openings (Eng, 2004). In such cases it is recommended that stand level retention is increased. The retention percentage recommended is 20% (Eng, 2004).

The 20% retention is offset by the existing retention in areas such as OGMAs, riparian reserves, unmerchantable stands, ESAs, and deciduous stands. Summaries have been completed for the 20 landscape units most affected by MPB. On average in the Kamloops TSA it was calculated that there is already 18% retained. In this analysis no additional retention is being modelled in the basecase. There will be a sensitivity analysis done to identify the impact of including the additional 2% retention required to achieve the 20% retention target.

10.1.4 Non-pine Harvest

Due to economic realities associated with mill consumption there is a need for non-pine volume to be harvested. The volume of non-pine assumed to be harvested will be 1.4 million m^3/year during the first 5 years of MPB epidemic, which is consistent with the 2006 harvest billings. There will be sensitivity analyses completed to test the impact of reducing the non-pine harvest.

10.1.5 MPB Harvest Queuing

Harvest queuing is the order in which the stands are prioritized for harvest. In the base case the harvest queuing is controlled for the first two five year periods: specifically 2006-2010 and 2011-2015.

In years 2006-2010 the areas severely affected by MPB in years 2004-2008 will be targeted for harvest. In years 2011-2015 the areas severely affected in years 2009-2013 will be targeted for harvest.

Stands not harvested in the years identified will be assumed to be unavailable for harvest and the volume will be lost. When stands are prioritized for harvest:

1. Minimum harvest age is reduced to age 40 to ensure that stands are not inappropriately limited from harvest;
2. Spatial adjacency is not enforced;
3. Visual requirements are not enforced for targeted stands; and
4. All other land base requirements are enforced (*e*.g. Caribou and OGMAs).

10.1.6 Unharvested MPB stands

Once the shelf life has expired, pine that was harvested regenerates on a managed stand yield curve. Pine that was not harvested is removed (according to the rules below) and land base requirements are restored to normal.

If a stand is not harvested, it is treated according to the following rules:

1. MPB affected pine leading stands:
    a. 100% of their volume removed (regardless of severity class). This captures 14,000 ha of area under 50% pine and 2,182 ha of area under 40% pine;
    b. 15 year regeneration delay;
    c. Grow back on a natural stand yield curve.
2. Non-pine leading stands with severe, moderate or low MPB infestation continue growing on the natural stand yield curve with volume reductions according to level of infestation (severe- 40%, moderate - 20% and low - 5%).
3. On non-THLB productive land, pine leading stands that are projected to be very severe impacted by 2015 are all reduced by 100% in 2015.

The visual, IRM and disturbances in the non-THLB are returned to normal after 2015.

11.0 INTEGRATED RESOURCE MANAGEMENT

This section provides details on how modeling methodology addresses non-timber resource requirements.

11.1 Forest Resource Inventories

The status of the forest resource inventories are provided in section 5.3 "Data Sources".

11.2 Forest Cover Requirements

The analysis will apply forest cover objectives to model wildlife habitat guidelines, biodiversity, hydrologic green-up, and visual quality objectives. Forest cover objectives place maximum and minimum limits on the amount of young second growth and/or old growth found in RMZs.

Timberline's proprietary simulation model CASH6 has the option of using a pseudo-geographic or full spatial approach to modeling timber availability, giving considerable flexibility depending on data structure and analysis objectives. This allows the analysis to mirror, as closely as possible, the intent of forest cover objectives on harvesting in operations.

Maximum disturbance and minimum retention objectives on forest cover are explicitly implemented. Productive forest stands such as inoperable and uneconomic forest types that have been excluded from the timber harvesting land base may be included to better model forest structure and disturbance levels. These non-harvesting areas are referred to as non-contributing forest.

Any number of forest cover groups may be used to aggregate forest stands for the purpose of modeling forest cover objectives. For example, a forest cover group will be created to model deer winter range habitat within a specific region of the TSA and this may overlap with a VQO.

There are three forest cover constraint classes available for modeling within each forest cover group:

- 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;
- Old growth 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; and
- Mature Retention - the minimum proportion of area that must be retained over a lower retention age. This is intended to model thermal cover for wildlife.

The use of forest cover objectives as described above improves forest management modeling by ensuring that non-timber resources are given appropriate consideration. Spatial adjacency will be modeled for 20 years in place of traditional IRM requirements. Consistent with TSR2 and 3, moose requirements will not be modeled. There are no wildlife habitat areas (WHAs) in place and therefore these will not be modeled.

11.2.1 Caribou

Caribou is modelled in the same manner as in TSR 2, according to guidelines in the Kamloops land and resource management plan (KLRMP), Appendix 10. There are two type of caribou constraints that are modelled; habitat and corridors- these are detailed in the sections below. At the time of this analysis, the

species at risk coordination office (SARCO) is developing a draft caribou recovery strategy. The timber supply impact of implementing this caribou strategy will be investigated in a sensitivity analysis.

11.2.1.1 Caribou Habitat

Table 11.1 shows the retention requirements that are implemented on each caribou area that is identified as either early or late winter habitat. Area by early and late caribou habitat is shown in Table 7.3.

Table 11.1 Caribou Habitat

Caribou Habitat	Retention Requirements (% > age)	
	Percentage	Age
Early Winter Habitat (Transitional)	20	140
Late Winter Habitat	33	140

11.2.1.2 Caribou Corridors

Table 11.2 shows the retention and disturbance requirements that are implemented on each caribou corridor.

Table 11.3 shows the THLB, non-THLB productive and total productive area by caribou corridor.

Table 11.2 Caribou Corridor Requirements

	Retention Requirements (% > ht)		Disturbance Limits (max%<ht)	
	Percentage	Height	Percentage	Height
Each Caribou Corridor	30	20	20	3

Table 11.3 Caribou Corridors

Corridor Name	Area (ha)		
	THLB	Total Productive	non-THLB Productive
Albreda-Allen	578	736	157
Blue River	1,182	1,584	402
Mad River	752	1,122	369
Moonbeam	212	332	119
Serpentine	293	388	94
Upper Adams	1,453	2,370	918
Total	4,471	6,531	2,060

11.2.2 Visuals

Disturbance requirements (maximum disturbance percentage greater than a given height) are applied to each individual visual quality objective (VQO) polygon. These two parameters are calculated for each VQO polygon according to *Procedures for Factoring Visual Resources into Timber Supply Analyses* (MoFR, 1998b). The disturbance percentage is dependent on the recommended visual quality class (RVQC) for each polygon. A RVQC of modification (M) has a maximum disturbance percentage of 25%, partial retention (PR) has 15% and retention (R) has 5%. Table 11.4 shows the total area by district under VQO requirements. The height for each polygon is calculated in a GIS exercise that finds the THLB area weighted average slope and assigns a green-up height based upon that calculated slope (MoFR, 1998b).

Table 11.4 Visuals Area

VQO	Area (ha)		
	THLB	Total Productive	non-THLB Productive
VQO- Headwaters	154,679	197,242	42,562
VQO- Kamloops	292,943	438,043	145,100
Total	447,622	635,284	187,662

11.2.3 Community and Domestic Watersheds

An equivalent clearcut area (ECA) of 20% of the gross land base applies to the upper 60% of all community watersheds. The upper 60% (snowpack area) is considered hydrologically recovered upon reaching 9 m in height. The lower 40% of the watershed is subject to standard management. In each community watershed, on average, no more than 25.2% of the gross area can be less than 6.6 m in height (MoFR, 2001). Table 11.5 shows the watershed requirements that are applied to each watershed listed.

Table 11.5 Watershed Requirements

Watersheds	Disturbance Limits (max%<ht)	
	Percentage	Height
East Blackpool Watershed	25.2	6.6
All Community Watersheds	25.2	6.6

Table 11.6 shows the area by watershed in Kamloops TSA.

Table 11.6 Area by Watershed

Watershed Name	Area (ha)		
	THLB	Total Productive	non-THLB Productive
Blackpool Watershed	1,354	5,028	3,674
cws-120.009	4,627	5,562	936
cws-120.015	940	1,314	375
cws-120.028	27,505	38,795	11,290
cws-128.008	7	9	1
cws-129.003	28	234	206
cws-129.007	1	684	682
cws-129.009	2,413	2,678	265
cws-129.011	2	1,353	1,351
cws-129.012	855	996	140
cws-129.014	7,392	9,395	2,003
cws-129.015	2,472	3,237	765
cws-129.018	5,530	7,382	1,852
cws-129.021	150	150	0
cws-129.022	2	1,643	1,641
cws-129.023	1,030	1,104	74
Total	54,308	79,562	25,254

11.2.4 Critical Deer Winter Range (DWR)

Table 11.7 shows the requirements that are applied to each critical DWR zone identified. There are 31 critical DWR zones identified within the Kamloops TSA totalling an area of 59,173 ha THLB.

Table 11.7 Critical DWR Requirements

	Retention Requirements (% > ht)		Disturbance Limits (max%<ht)	
	Percentage	Height	Percentage	Height
Each Critical DWR zone	25	20	20	3

11.2.5 Integrated Resource Management (IRM)

IRM requirements control areas that do not fall into 1 or more RMZs. Consistent with the previous TSR, IRM requires that no more than 33% of each LU-BEC combination can be below 3 m height on the THLB.

11.3 Biodiversity

11.3.1 Landscape level Biodiversity

The Integrated Land Management Bureau (ILMB) has proposed a series of OGMAs that have been removed from the THLB.

11.3.2 Forest Connectivity Corridors

Connectivity corridors were considered when locating the spatially defined OGMAs. Connectivity objectives are assumed to be met through the netdown process and retention requirements.

11.3.3 Stand Level Biodiversity - WTPs

The practice of leaving wildlife tree patches (WTPs) was modeled by reducing the average volume per hectare that is harvested, to account for trees that must be left within cutblocks. As described in Section 6.20, this results in a reduction of 1.9% for WTPs.

11.4 Cultural Heritage Resources

Cultural heritage resources include archaeological sites and traditional uses of the land. Within the Kamloops TSA all known archaeological sites are removed from the THLB.

11.5 Timber Harvesting

11.5.1 Minimum Harvest Age

Minimum harvest age (MHA) was assessed for each AU, as the age at which the stand volume reaches 90% MAI (mean annual increment) with a minimum volume of 100 m^3/ha. The MHA by AU is shown in two columns (natural AUs and managed AUs) in Table 11.8 below.

Table 11.8 Minimum harvest ages, at 90% of culmination MAI

AU	MHA	MAI	DBH	Volume	AU	MHA	MAI	DBH	Volume
1	100	1.2	27.6	124	**101**	100	1.2	27.6	124
2	90	1.8	28.0	158	**102**	70	2.2	20.7	154
3	80	2.4	27.3	194	**103**	70	3.8	22.5	265
4	90	2.2	28.4	194	**104**	70	3.1	21.2	215
5	100	1.1	27.6	113	**105**	90	1.9	20.4	168
6	110	0.9	28.4	100	**106**	100	1.6	20.3	164
7	70	2.9	27.8	202	**107**	70	5.6	26.0	393
8	80	2.0	26.4	157	**108**	90	2.7	22.8	246
9	70	3.5	26.7	243	**109**	70	4.8	24.7	338

AU	MHA	MAI	DBH	Volume	AU	MHA	MAI	DBH	Volume
10	80	2.3	25.6	186	**110**	90	2.9	23.1	258
11	80	2.2	26.3	176	**111**	90	3.2	23.5	286
12	80	1.7	25.2	135	**112**	100	2.8	23.4	279
13	90	1.4	24.9	127	**113**	120	1.7	21.9	201
14	110	1.1	26.0	125	**114**	120	1.7	21.9	201
15	80	2.5	26.4	203	**115**	80	4.6	25.5	368
16	80	2.2	26.0	177	**116**	80	4.6	25.4	364
17	110	1.8	27.2	193	**117**	110	2.9	25.3	320
18	120	1.4	27.5	171	**118**	120	2.7	25.4	322
19	70	2.7	20.3	187	**119**	60	3.8	20.6	229
20	70	2.3	19.6	158	**120**	60	3.1	19.5	188
21	90	1.7	20.3	149	**121**	80	2.1	19.6	169
22	90	1.5	20.2	135	**122**	80	1.9	19.0	152
23	110	1.0	27.4	105	**123**	110	1.0	27.4	105
24	100	1.1	28.1	111	**124**	70	1.7	18.0	121
25	140	0.8	30.9	106	**125**	80	1.6	17.4	129
26	80	1.8	25.2	141	**126**	90	2.8	21.8	253
27	90	1.8	25.9	165	**127**	100	2.4	21.5	243
28	90	1.4	24.9	123	**128**	100	1.9	20.3	192
29	110	1.6	27.6	180	**129**	100	3.2	24.0	317
30	90	1.6	19.4	144	**130**	70	2.2	18.5	156
31	80	1.7	26.1	134	**131**	60	3.2	18.7	190
32	70	3.0	27.7	207	**132**	80	5.1	26.3	404
33	70	2.0	24.4	137	**133**	90	2.8	23.0	249
34	70	3.1	26.1	217	**134**	80	4.3	24.9	347
35	90	1.8	25.4	161	**135**	100	2.4	22.8	243

It should be recognized that the application of cover constraints in particular zones may delay stand entry well beyond these minimum ages. This will result in realized long-term harvest levels that are lower than the theoretical Long Run Sustained Yield (LRSY), which is based on harvesting all stands at culmination age. LRSY values calculated on the basis of both natural and managed stand yield curves are shown in Table 11.9.

Table 11.9 LRSY values for natural and managed stands

	THLB Area (hectares)			CMAI		LRSY	
	Natural	**Managed**	**Total**	**Natural**	**Managed**	**Natural**	**Managed**
Totals	712,093	297,220	1,009,313	2.12	2.94	2,138,214	2,966,045

11.5.2 Silviculture Systems

There are two harvest methods that will be employed across Kamloops TSA:

1. Conventional clear cut and
2. Single tree selection (AUs 1/101 and 23/123).

11.5.3 Initial Harvest Rate

The current AAC for the Kamloops TSA is 4.352 million m^3/yr which included 670,000m^3/year for fire salvage and 1,000,000m^3/year for MPB salvage. With the expiration of the fire salvage uplift, the majority of this volume was assumed to have swung into MPB salvage. Because of this, a starting point of 4.2 million m^3/year was assumed. The base case initial harvest rate will be affected by the amount of pine able to be harvested while still fulfilling land base requirements. The initial non-pine volume will be set at the 2006 harvest billing rate of 1.4 million m^3/year. The non pine volume will include: the cedar-hemlock partition of 200,000 m^3/year (for 20 years), the deciduous partition of 20,000 m^3/year, and the pulpwood PA16 partition of 86,000 m^3/year (for 10 years).

11.5.4 Harvest Rule

Harvest rules are used by the simulation model to rank stands for harvest. The rule used in this analysis is highest volume first. With this rule, stands with a higher volume are queued for harvest ahead of lower volume stands. Harvest rules interact with forest cover constraints to determine the actual order of harvesting within the model. 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 is unconstrained to be harvested. During the first 10 years of modeling, pine leading MPB affected stands (in order of severity) will be prioritized for harvest first.

11.5.5 Harvest Flow Objectives

Forest cover objectives and the biological capacity of the net timber harvesting land base (THLB) ultimately dictate the harvest level. However, a number of alternative harvest flows are possible. In this analysis, the main objective was:

- Identify the amount of pine able to be harvested to determine an appropriate initial uplift harvest level;
- To mediate the impact of MPB on the mid-term timber supply; and
- Have a long run harvest level that reflects managed stand yields and is sustainable.

11.5.6 Disturbing the Non-THLB

When modeling, the entire productive land base is available to fulfill various land base requirements (i.e. seral requirements, retention requirements and thermal requirements). The productive area that is not part of the THLB (non-THLB) will continuously age throughout the planning horizon because harvesting is traditionally the only form of disturbance modeled. This causes concern because eventually, in the model, all the non-THLB becomes old. This can lead to the non-THLB fulfilling an unrealistic portion of forest cover requirements, thereby reducing the impact on the timber harvest land base. In reality, there will be some level of natural disturbance within the non-THLB, but there is much debate around the frequency, location, and size of these disturbances.

This Section describes the process of disturbing the non-THLB used for this analysis. The intentions are to achieve the early, mature and old seral percentages for each BEC variant in accordance with the natural range of variation defined in the *Biodiversity Guidebook*. The method used for this analysis is to:

- Impose an annual disturbance to the non-THLB of each BEC zone. The size of the disturbance will be determined from the disturbance frequency in the *Biodiversity Guidebook*; and
- A seral requirement will be imposed on the non-THLB of each BEC variant, which will force the non-THLB to achieve a seral zone distribution similar to the natural rate of variation (NROV) from the *Biodiversity Guidebook*.

This process will achieve the natural range of variation (NROV) for each BEC zone, however, by design, there will be some variations within individual landscape units. The model will recruit the oldest stands in order to achieve the seral requirements as soon as possible and it will disturb the remaining area using the harvest (disturb) oldest first. This will impose the desired disturbance each year and achieve a seral stage distribution compatible with the NROV.

This process has been carried out by:

- Determining the BEC zones and their area breakdown in the Kamloops TSA;
- Using the Biodiversity Guidebook to determine the NDT, disturbance interval, age of mature age and of old for each BEC zone;
- Estimate the seral stage distribution following the Biodiversity Guidebook procedure;
- Determine the appropriate seral requirement (mature and old) for each BEC zone; and
- Determine the annual disturbance for each BEC zone.

Table 11.10 provides the summary information for the BEC zones in the Kamloops TSA.

Table 11.10 Disturbance intervals and age of mature and old by NDT and BEC zone

NDT	BEC	Disturbance Interval	Mature Age	Old Age
4	**BG**	250	100	250
1	**ESSF**	350	120	250
3	**ESSF**	150	120	140
1	**ICH**	250	100	250
3	**ICH**	150	100	140
4	**IDF**	250	100	250
3	**MS**	150	100	140
4	**PP**	250	100	250
3	**SBS**	100	100	140

The seral stage distribution is estimated using the negative exponential equation from Appendix 4 of the *Biodiversity Guidebook*. The negative exponential equation uses disturbance return interval and gives the percent older than the input age:

Percent older than specified age = exp (-[age/return interval])

Table 11.11 shows the seral stage distribution for the four fire return intervals found in the Kamloops TSA.

Table 11.11 Cumulative age distribution using by mean disturbance interval

Age	100		150		250		350	
	>	<	>	<	>	<	>	<
20	82%	18%	88%	12%	92%	8%	94%	6%
40	67%	33%	77%	23%	85%	15%	89%	11%
60	55%	45%	67%	33%	79%	21%	84%	16%
80	45%	55%	59%	41%	73%	27%	80%	20%
100	37%	63%	51%	49%	67%	33%	75%	25%
120	30%	70%	45%	55%	62%	38%	71%	29%
140	25%	75%	39%	61%	57%	43%	67%	33%
160	20%	80%	34%	66%	53%	47%	63%	37%
180	17%	83%	30%	70%	49%	51%	60%	40%
200	14%	86%	26%	74%	45%	55%	56%	44%
220	11%	89%	23%	77%	41%	59%	53%	47%
240	9%	91%	20%	80%	38%	62%	50%	50%
250	8%	92%	19%	81%	37%	63%	49%	51%

Table 11.12 shows the area that will be disturbed each year in each BEC zone and also shows the seral zone requirements that will be placed on the BEC zones in order to achieve the desired NROV.

Table 11.12 Annual disturbance and seral requirement for the non-THLB

						Seral requirements			
NDT	BEC	Disturbance Interval	Non-THLB Prod Area	Annual Disturbance (%)	Annual Disturbance (ha)	Mature Plus Old		Old	
						%	Age	%	Age
4	BG	250	12,932	0.40%	52	67%	100	37%	250
1	ESSF	350	106,064	0.29%	303	71%	120	49%	250
3	ESSF	150	35,281	0.67%	235	45%	120	39%	140
1	ICH	250	43,193	0.40%	173	67%	100	37%	250
3	ICH	150	57,629	0.67%	384	51%	100	39%	140
4	IDF	250	129,315	0.40%	517	67%	100	37%	250
3	MS	150	48,771	0.67%	325	51%	100	39%	140
4	PP	250	26,500	0.40%	106	67%	100	37%	250
3	SBS	100	9,153	1.00%	92	37%	100	39%	140

11.6 Natural Range of Variation

When reporting on environmental trends it is important to provide a baseline for comparison. The current status of our forest does not provide for an appropriate baseline for comparison because it has resulted from anthropogenic pressures. However, much like our inability to predict how nature will disturb the inoperable, we are unable to predict how nature would have disturbed the land base had humans not intervened. For the purpose of this analysis the natural range of variation will be based on the exponential equation used to create Table 11.12.

12.0 SENSITIVITY ANALYSES

This section briefly describes the sensitivity analyses that will be performed on the base case. The sensitivities reflect the stability of the base case in the face of uncertainty surrounding specific analysis assumptions. They also reflect the impact of alternative management or potential changes in forest practices.

12.1 Growth and Yield Assumptions

12.1.1 BEC based SIBEC estimates

An average SIBEC site index will be estimated for each BEC variant. These will be area weight averaged will be applied to each AU to measure the timber supply impact. MHAs will be also altered accordingly.

12.1.2 MHA

The MHA will be defined as 90% MAI with a minimum volume of 150 m^3/ha (the basecase uses a minimum volume of 100 m^3/ha) and the timber supply impact will be investigated.

12.2 Resource Management Zone Assumptions

12.2.1 SARCO Caribou Constraints

The Species at Risk Coordination Office (SARCO) has developed a draft Mountain Caribou Recovery Strategy. The strategy includes a map outlining planning units and management objectives for each planning unit. This sensitivity will investigate the impact of implementing these SARCO caribou constraints.

12.3 Biodiversity Assumptions

12.3.1 Aspatial Seral Requirements

Model landscape level biodiversity requirements through seral constraints (instead of removing OGMAs from the THLB) to evaluate the timber supply impact.

12.4 Forest Health Assumptions

12.4.1 35% Young Pine Mortality

This sensitivity will test the impact of killing 35% of pine < 60 years and > 10cm DBH.

12.4.2 Worst Case Forest Health

This sensitivity will test the impact of the worst case forest health scenario.

12.5 Alternate MPB Assumptions

12.5.1 Large Scale Salvage Retention

As outlined in section 10.1.3 "Large Scale Salvage Retention", this sensitivity will test the timber supply impact of implementing an additional 2% retention for large scale salvage in MPB infested areas.

12.5.2 Alternate Harvest levels

This sensitivity will test various options for harvest levels, including:

- 100% pine harvest;
- 0% pine harvest;
- 100% pine harvest using BEC SIBEC;
- Harvest green attack pine stands first (those very severe in 2009-2014);
- Alternate cedar-hemlock partition modeling;
- Harvest doesn't exceed 75% of available timber; and
- Increase uplift by 500,000 m^3/year.

12.6 Combination Scenarios

Combinations of sensitivity analyses may be utilized to gain insight into the timber supply dynamics of combining factors. The following combination scenarios will be tested:

- Combination worst case scenario: 35% young pine mortality, worst case forest health, SARCO and 0% harvest in pine.
- TSR 2 Benchmark Scenario: TSR 2 THLB, no MPB, aspatial seral and no disturbing the inoperable.

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