Integrated Stewardship Strategy for the Merritt TSA

Data Package

Version 1.1

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Project 419-36

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BRITISH COLUMBIA

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List of Acronyms

AU	Analysis Units
BCMPB	BC Mountain Pine Beetle Model
BEC	Biogeoclimatic Ecosystem Classification
BMP	Best Management Practice
CFLB	Crown Forested Land Base
CTF	Coastal Tailed Frog
ECA	Equivalent Clearcut Area
ESA	Environmentally Sensitive Area
FLNRO	BC Ministry of Forests, Lands and Natural Resource Operations
FPPR	Forest Planning and Practices Regulation
FREP	Forest and Range Evaluation Program
FRPA	Forest and Range Practices Act
FSP	Forest Stewardship Plan
FSW	Fisheries Sensitive Watershed
FTA	Forest Tenure Administration
GAR	Government Action Regulation
GIS	Geographic Information System
ISS	Integrated Stewardship Strategy
IWAP	Interior Watershed Assessment Procedure
MPB	Mountain Pine Beetle
NDT	Natural Disturbance Type
NRL	Non-Recoverable Losses
NSR	Not Satisfactorily Restocked
OAF	Operational Adjustment Factor
OGMA	Old Growth Management Area
PHR	Post-Harvest Regenerated
RESULTS	Reporting Silviculture Updates and Land status Tracking System
SIBEC	Site Index Biogeoclimatic Ecosystem Classification correlation
SIC	Snow Interception Cover
THLB	Timber Harvesting Land Base
TIPSY	Table Interpolation Program for Stand Yields
TRIM	Terrain and Resource Information Mapping
TSA	Timber Supply Area
TSR	Timber Supply Review
TSS	Temperature Sensitive Stream
UWR	Ungulate Winter Range
VAC	Visual Absorption Capability
VDYP	Variable Density Yield Prediction
VEG	Visually Effective Green-up
VQO	Visual Quality Objective
VRI	Vegetation Resources Inventory
WHA	Wildlife Habitat Area
WISA	Williamson's Sapsucker
WTR	Wildlife Tree Retention

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Document Revision History

Version	Date	Notes/Revisions
1.0	August 31, 2017	First version distributed to project team for review and comment.
1.1	March 31, 2018	Included various edits throughout the document for clarification and context. Updated document title from "Integrated Stewardship Strategy" to "Integrated Stewardship Strategy" Added List of Acronyms, Acknowledgments, Document Revision History, plus: • Section 6 - Reserve Scenario (merged from separate, edited Reserve Scenario report, version 1.1) • Section 7 - Harvest Scenario • Section 8 - Silviculture Scenario • Section 9 - Combined Scenario

1 Introduction

The British Columbia Ministry of Forests, Lands and Natural Resource Operations initiated an Integrated Stewardship Strategy (ISS) for the Merritt Timber Supply Area (TSA). The data package describes the information that is material to the analysis including the model used, data inputs and assumptions.

1.1 Project Area

The Merritt TSA is situated in south-central BC (Figure 1) and is approximately 1.13 million hectares in size. It is within the Thompson Okanagan Forest Region and is administered from the Cascades Natural Resource District office located in the town of Merritt. It is bounded on the north by the Kamloops TSA, on the west by the Lillooet and Fraser TSAs, and on the east by the Okanagan TSA. Manning Park, Cathedral Park and the border between Canada and the United States of America are on the south.

The Merritt TSA includes the mountainous terrain and steep river valleys of the Cascade Mountains in the west and the relatively dry, flat Thompson Plateau in the east. The TSA encompasses two major river systems: the Similkameen and the Nicola.

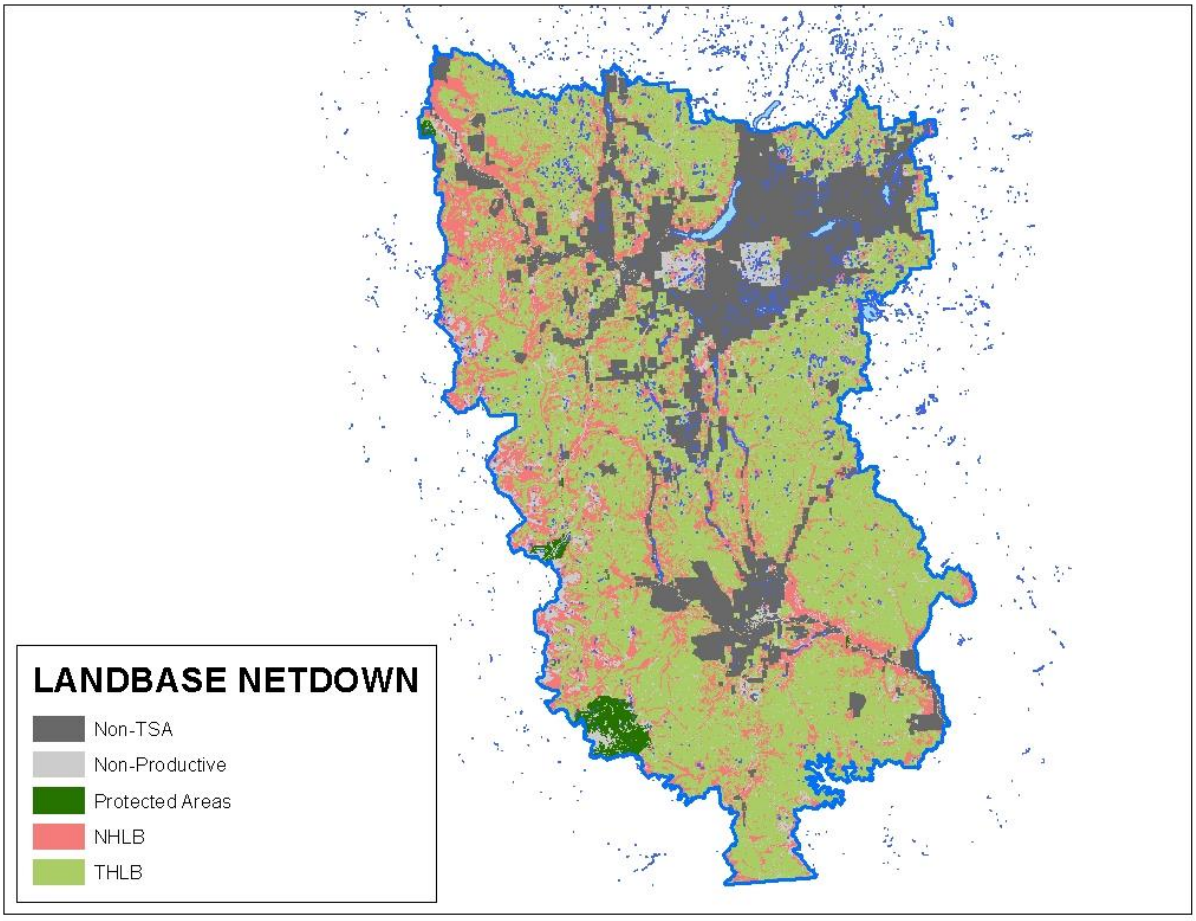

Figure 1 Merritt TSA

Approximately 71 % of the TSA is forested crown land, and about 49% is considered to be the current THLB (46% future THLB). Lodgepole pine comprises approximately half of the forested land base, with Douglas-fir, spruce, ponderosa pine, subalpine fir, and trembling aspen making up the majority of the remainder. There are also minor amounts of western red cedar, western larch, and western hemlock.

1.2 Context

The data package is the fifth of nine documents developed through the ISS process:

1. Situation Analysis – describes in general terms the situation for the unit – this could be in the form of a PowerPoint presentation with associated notes or a compendium document.
2. Landscape Reserve Strategy – review and analyze existing and proposed management zonation and develop strategy options that provide for the sustainable management of non-timber values.
3. Landscape Harvest Strategy – review and analyze current and planned timber harvesting plans, infrastructure, and capabilities in the context of the distribution of MPB-killed pine salvage opportunities and the landscape reserve strategy. This must consider the current salvage period and the transition into the mid-term timber supply.
4. Silviculture Strategy –provides treatment options, associated targets, timeframes and benefits to minimize the impact of the MPB infestation over the mid-term timber supply.
5. **Data Package** - describes the information that is material to the analysis including the model used, data inputs and assumptions.
6. Analysis Report –provides modeling outputs and rationale for choosing a preferred scenario.
7. Operational plan – direction for the implementation of the preferred scenario.
8. Final Report – summary of all project work completed.
9. Monitoring Plan – direction on monitoring the implementation of the ISS; establishing a list appropriate performance indicators, developing monitoring responsibilities and timeframe and a reporting format and schedule.

2 *Modelling Approach*

2.1 Model

The PATCHWORKS ™ modeling software was used for forecasting and analysis. This suite of tools is sold and maintained by Spatial Planning Systems Inc. of Deep River, Ontario (Tom Moore - www.spatial.ca).

PATCHWORKS is a fully spatial forest estate model that can incorporate real world operational considerations into a strategic planning framework. It utilizes a goal seeking approach and an optimization heuristic to schedule activities across time and space in order to find a solution that best balances the targets/goals defined by the user. Targets can be applied to any aspect of the problem formulation. For example, the solution can be influenced by issues such as mature/old forest retention levels, young seral disturbance levels, patch size distributions, conifer harvest volume, growing stock levels, snag densities, Coarse Woody Debris levels, Equivalent Clearcut Areas, specific mill volumes by species, road building/hauling costs, delivered wood costs, net present values, etc. The PATCHWORKS model continually generates alternative solutions until the user decides a stable solution has been

found. Solutions with attributes that fall outside of specified ranges (targets) are penalized and the goal seeking algorithm works to minimize these penalties – resulting in a solution that reflects the user objectives and priorities. Patchworks' flexible interactive approach is unique in several respects:

- PATCHWORKS' interface allows for highly interactive analysis of trade-offs between competing sustainability goals.
- PATCHWORKS software integrates operational-scale decision-making within a strategic-analysis environment: realistic spatial harvest allocations can be optimized over long-term planning horizons. Patchworks can simultaneously evaluate forest operations and log transportation problems using a multiple-product to multiple-destination formulation. The model can identify in precise detail how wood flows to mills over a complex set of road construction and transportation alternatives.
- Allocation decisions can be made considering one or many objectives simultaneously and objectives can be weighted for importance relative to each other. (softer vs. harder constraints)
- Allocation decisions can include choices between stand treatment types (Clearcut vs. selection cut, fertilization, rehabilitation, etc.).
- Unlimited capacity to represent a problem – only solution times limit model size.
- Fully customizable reporting on economic, social, and environmental conditions over time.

Reports are built web-ready to share analysis results easily – even comparisons of multiple indicators across multiple scenarios.

2.2 Data Sources

Table 1 lists the spatial data and sources used for this analysis.

Table 1 Spatial data sources

Spatial Data	Source	Feature Name	Effective
TSA Boundary	WHSE_ADMIN_BOUNDARIES	FADM_TSA	2013
Parks and Protected Areas	WHSE_TANTALIS	TA_PARK_ECORES_PA_SVW	2015
Ownership	WHSE_FOREST_VEGETATION	F_OWN	2015
Managed Licences	WHSE_FOREST_TENURE	FTEN_MANAGED_LICENCE_POLY_SVW	2015
Licencee Operating Areas	FAIB – Merritt_District_Data	Op_Areas	2014
Biogeoclimatic Ecosystems (BECv9)	WHSE_FOREST_VEGETATION	BEC_BIOGEOCLIMATIC_POLY	2015
Biogeoclimatic Ecosystems (BECv5)	Forsite Archives	BECv5	2003
Landscape Units (LU)	WHSE_LAND_USE_PLANNING	RMP_LANDSCAPE_UNIT_SVW	2015
Old Growth Management Areas (OGMA)	FAIB – Merritt_District_Data.gdb	March_2014_Merritt_Pseudo_OGMAS	2014
Ungulate Winter Ranges (UWR)	WHSE_WILDLIFE_MANAGEMENT	WCP_UNGULATE_WINTER_RANGE_SP	2015
Moose Winter Range	Section 7 Notice website	Merritt_TSA_moose.shp	2016
Wildlife Habitat Areas (WHA)	WHSE_WILDLIFE_MANAGEMENT	WCP_WILDLIFE_HABITAT_AREA_POLY	2015
Williamson's Sapsucker Habitat Suitability	GEOBC FTP site	Final_Western_AO_Model.shp	2015
Williamson's Sapsucker Nest Sites	GEOBC FTP site	Western_AO_2012_nests.shp	2012
Coastal Tailed Frog Point Locations	FLNRO	MERR_TSA_Tailed_Frog_Points.shp	2017
Coastal Tailed Frog Watersheds	FLNRO	MERR_TSA_Tailed_Frog_Watersheds.shp	2017
Community Watersheds	WHSE_WATER_MANAGEMENT	WLS_COMMUNITY_WS_PUB_SVW	2015
Fisheries Sensitive Watersheds	LRDW	WHSE_WILDLIFE_MANAGMENT_WCP_FISH_SENS_WS_PROPOSED_SP_polygon	2016
Temperature Sensitive Stream Watersheds	DCS	Nicola_Water_shed.shp	2015
Cumulative Effects Watersheds	FLNRO	Merritt_ISS_watersheds.shp	2017
Cumulative Effects WS H40 line	FLNRO	Merritt_H40.shp	2017
Cumulative Effects WS H60 line	FLNRO	Merritt_H60.shp	2017
Visual Landscape Inventory	WHSE_FOREST_VEGETATION	REC_VISUAL_LANDSCAPE_INVENTORY	2015
Stoyoma Area of Interest	Tolko	Stoyoma area of interest_region.shp	2015
Heritage Trails	WHSE_FOREST_TENURE	FTEN_RECREATION_LINES_SVW	2015
Heritage Trail Buffers	Forsite – Generated from Heritage Trails	Trail Buff	2015
Lakeshore Management Classes	FAIB – Merritt_District_Data	Lake_Class	2014
Wetland Classes	FAIB – Merritt_District_Data	Wetland_Class	2014
Stream Classes	FAIB – Merritt_District_Data	Stream_Class	2014
Lake Buffers	Forsite – Generated from Lake _Class	Lake_Buf	2015
Stream Buffers	Forsite – Generated from Stream_Class	Strm_Buf	2015
Wetland Buffers	Forsite – Generated from Wetland_Class	Wet_Buf	2015
Roads	FAIB – Merritt_District_Data	TME_Custom_Roads_2012_digitized; and TME_roadMerge_atts_2013_proj	2012
Road Buffers	Forsite – Generated from FAIB roads	Road_Buf	2015
Environmentally Sensitive Areas	FAIB – Merritt_District_Data	ESA_High_DCS	1990s
Operability Lines	FAIB – Merritt_District_Data	Inoperable_1991_Selection	1991
Terrain Stability	FAIB – Merritt_District_Data	TSM_Class_5_TME	2014
Slopes Greater Than 65%	FAIB – Merritt_District_Data	Slope_gt_65_TME	2014
Elevation Bands (200m)	Forsite	Elevation	2016
Aspect	Forsite	Aspect	2016
Forest Inventory –VRI	WHSE_FOREST_VEGETATION	VEG_COMP_LYR_R1_POLY	2014
Forest Inventory – Depletions	FAIB	CONSOLIDATED_CUTBLOCKS_2015	2015
Forest Inventory – Cut Blocks	WHSE_FOREST_TENURE	FTEN_CUT_BLOCK_POLY_SVW	2016
Forest Inventory – Results Openings	WHSE_FOREST_VEGETATION	RSLT_OPENINGS_SVW	2016

Spatial Data	Source	Feature Name	Effective
Forest Inventory – Reserves	WHSE_FOREST_VEGETATION	RSLT_FOREST_COVER_RESERVE_SVW	2016
Forest Inventory – Licensee Blocks and Reserves	Various	Various	2016
Forest Inventory – Managed Site Index	FAIB	SPROD_18	2015
Pruned/Fertilized	WHSE_FOREST_VEGETATION	RSLT_ACTIVITY_TREATMENT_SVW	2015
Wildfires – Historic (2010-2015)	WHSE_LAND_AND_NATURAL_RESOURCE	PROT_HISTORICAL_FIRE_POLYS_SP	2015
Wildfires – Current (2016)	WHSE_LAND_AND_NATURAL_RESOURCE	PROT_CURRENT_FIRE_POLYS_SP	2016
Fire Management Planning Units	DCS: TME_FMP_Subunits	Fmp_subunit	2015
Fire Breaks from Merritt FMP	DCS : TME_Proposed_Fuel_Breaks	Fire_breaks	2015
Wildland Urban Interfaces	FLNRO PSTA Data	Wildland_Urban_Interface_Buffer_Area	2015

2.3 Forest Inventory Updates

The forest inventory was initially acquired from the provincial data distribution service. Aerial photography for most of the current forest inventory was taken in 1991. However, the attributes associated with this inventory have been projected to January 1, 2014. The Vegetation Resource Inventory Management System is also used to update the original inventory. In this process, new harvest and free-growing data were extracted from the Reporting Silviculture Updates and Land status Tracking System (RESULTS), verified and integrated into the Vegetation Resources Inventory (VRI). Further updates to these data were required to prepare the inventory for this analysis.

Disturbance

The forest inventory was updated for logging disturbance to 2016 using data from the following sources:

- RESULTs Openings and Reserves
- Forest Tenure Administration (FTA) blocks
- Forest Analysis and Inventory Branch Consolidated Blocks – 2016
- Licensee blocks - 2016

A GIS process was used to identify the best information to use for the update, with the goal of eliminating artifact slivers from the Landsat imagery source in the consolidated blocks data. There were also issues with the data coding for some of the RESULTs openings (e.g. coded as reserves). These were resolved to the degree possible manually using the labels assigned to wildlife tree retention. Areas within wildlife tree patches were excluded from harvested blocks when completing the disturbance update.

Ages in the resultant were updated for areas identified as being disturbed by applying a three year regeneration delay to the date of disturbance. Only polygons meeting the following criteria were updated to minimize the risk of overwriting ages & heights that had already been captured in existing updates to the VRI:

- VRI harvest date was null
- Existing inventory age greater than 40 years

Managed stand site indices

Managed stand site indices were calculated for each forest polygon using its leading species and the 2014 provincial site productivity layer which provides SIBEC estimates for site series identified in the predictive ecosystem mapping for the Merritt TSA. Values were assigned to forest cover polygons using area-weighted averages from the raster dataset. The site index values for pine were increase by 4.87 percent to maintain consistency with TSR 2015.

Past incremental treatments

To assist in developing silviculture strategies, boundaries for past pruning and fertilization activities were extracted from RESULTS then incorporated and flagged into the forest inventory. There may be areas treated in the past that were not included in the RESULTS data. These missing treatments, largely were therefore unavailable for this analysis. No adjustments were made to forest attributes for these stands.

Mountain Pine Beetle

The BC FLNRO conducts annual forest health aerial flights that identify tree mortality from tree foliage colour, and categorizes it according to the severity classes outlined in Table 2. The mountain pine beetle infestation climbed rapidly from 2004 to 2008, after which it has been in decline (Figure 2).

The 2014 update to the Provincial Forest Cover incorporates changes to account for current MPB losses:

- Stand density and volume estimates were adjusted / prorated based on the BCMPB Model and a Year-of-Death data layer. These updates were reflected in the "live" and "dead" attributes in the inventory, either for individual species or for the stand as a whole. For stands where dead volumes for individual species have not been provided, it can be assumed that the dead stand volume is 100% pine (personal communication with Tim Salkeld, 2014).
- Growth and yield projections utilized the dead stand percentage available in the inventory and no additional future mortality from MPB was implemented.

Table 2 Disturbance Classes for Bark Beetles

Intensity Class	Disturbance Description
Trace	<1% of the trees in the polygon recently killed.
Light	1-10% of the trees in the polygon recently killed.
Moderate	11-29% of the trees in the polygon recently killed.
Severe	30-49% of the trees in the polygon recently killed.
Very Severe	50%+ of the trees in the polygon recently killed.

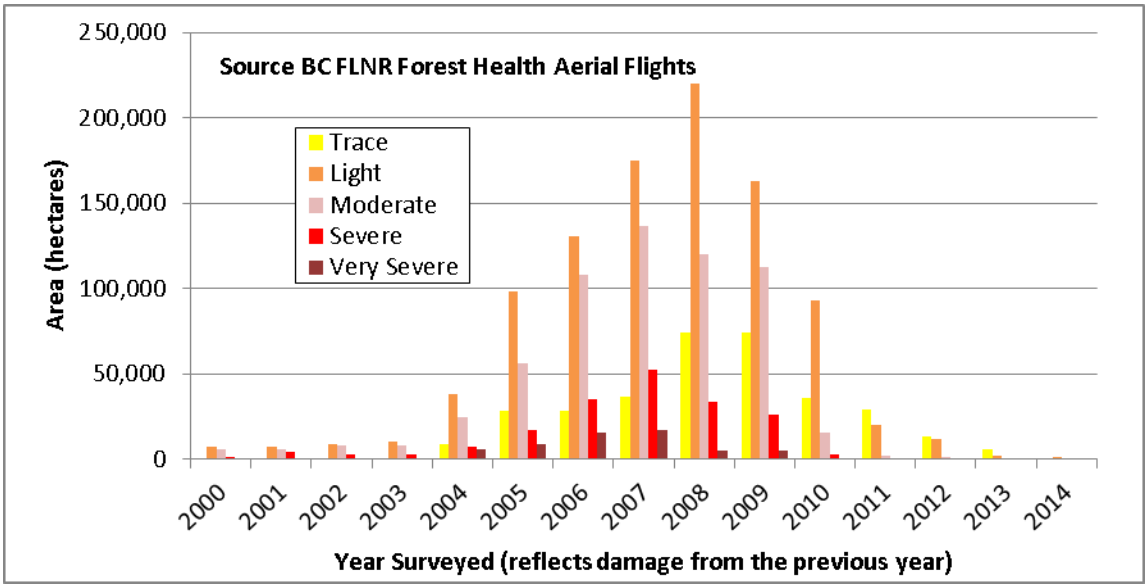

Figure 2 Area impacted by year from Mountain Pine Beetle

Spruce Beetle

Based on the FLNRO annual forest health aerial flights that identify tree mortality from tree foliage colour, it is evident that spruce beetle has been a concern in the Merritt TSA since 2007 (Figure 3), with an average of 2,607 hectares each year showing signs of infestation. The breakdown by severity class as defined in (Table 2) is approximately 32.0% Trace/Light, 53.6% Moderate, and 14.4% Severe/Very Severe. Unlike the mountain pine beetle, spruce beetle infestations can be managed through the application of various forest health measures that utilize trap trees and sanitation harvest. This analysis did not account for volume losses to the inventory beyond those already considered in the natural stand volume projections in VDYP7 (section 3.5.2).

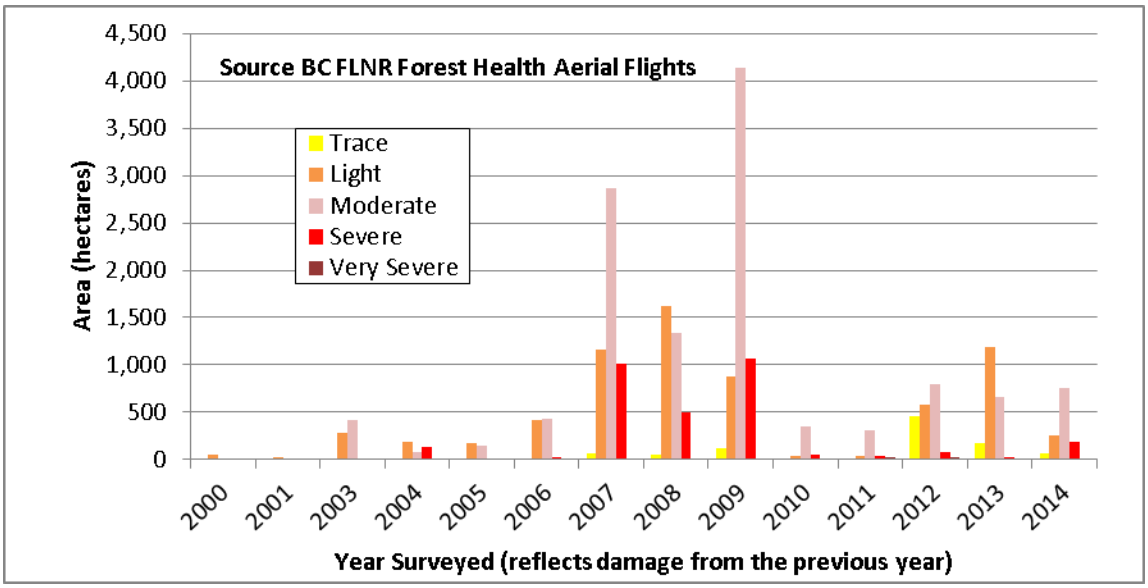

Figure 3 Area impacted by year from Spruce Beetle

Western Balsam Bark Beetle

Figure 4 summarizes the levels of Western Balsam Bark Beetle infestation identified in the annual FLNRO forest health aerial flights. It is evident that there are ongoing endemic infestations with mostly trace or light levels of attack. Therefore, this analysis did not account for volume losses to the inventory beyond those already considered in the natural stand volume projections in VDYP7 (section 3.5.2).

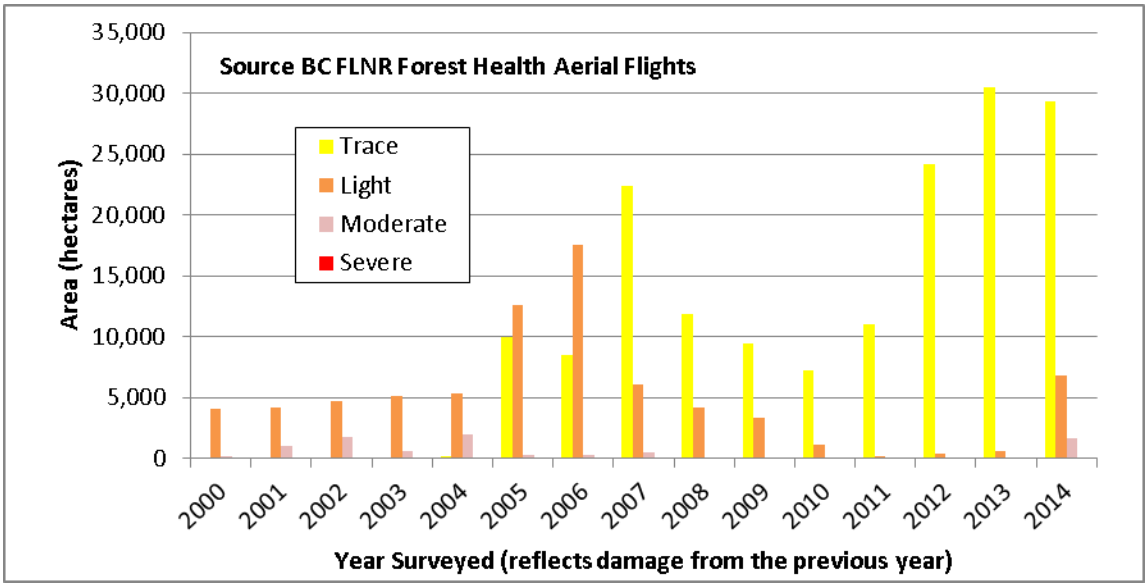

Figure 4 Area impacted by year from Western Balsam Bark Beetle

Western Spruce Budworm

Western spruce budworm feeds primarily on Douglas-fir. Because of the budworm's preferential feeding on current year's buds and foliage, height growth is severely reduced or eliminated during years of defoliation. A single year of defoliation by spruce budworm generally has little impact on tree mortality but repeated budworm defoliation can cause tree mortality, a reduction in growth rates, and reduced lumber quality. Over the past decade, western spruce budworm has impacted an average of 122,783 hectares each year at intensity classes of 73% trace/light, 26.5% moderate, 0.5% severe, 0% grey (see Table 3 and Figure 5). These forest health aerial flights have recorded some damage but very little tree mortality (grey attack) as a result of damage from western spruce budworm. Accordingly, this analysis did not account for volume losses to the inventory beyond those already considered in the natural stand volume projections in VDYP7 (section 3.5.2).

Table 3 Disturbance classes for western spruce budworm

Intensity Class	Disturbance Description
Light	Some branch tip and upper crown defoliation, barely visible from the air.
Moderate	Noticeably thin foliage, top third of many trees severely defoliated, some completely stripped.
Severe	Bare branch tips and completely defoliated tops, most trees sustaining more than 50% total defoliation.
Grey	Cumulative foliage damage resulting in mortality, recorded at end of damage agent cycle.

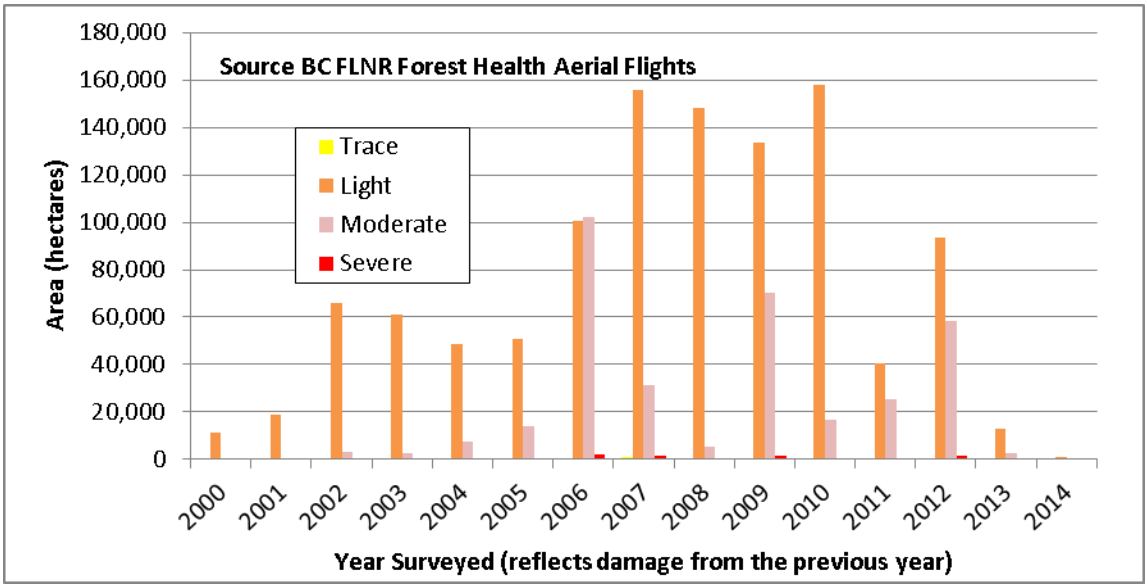

Figure 5 Area impacted by year from Western Spruce Budworm

Wildfires

An examination of the VRI revealed that fires prior to 2010 had already been incorporated. Therefore, fires greater than 10 hectares in size that occurred between 2010 and 2016 were included in the resultant and ages were reset to zero. Table 4 summarizes the gross area of wildfires, and the areas that were reset to age zero (i.e. forested areas).

Table 4 Wildfire Areas

Fire Year	Gross Area (ha)	Area reset to Age 0 (ha)
2010	37.4	29.7
2011	11.1	4.3
2012	495.1	287.9
2013	102.6	49.8
2014	1,112.8	770.1
2015	470.5	390.0
2016	104.8	49.2
Total	**2,334.3**	**1,581.0**

Volume Adjustments

No volume adjustments were applied to the forest inventory, consistent with the process used for TSR 2015.

3 Base Case Scenario

This section describes the assumptions used to model the base case scenario (status quo management). This scenario will provide the base from which to compare various silviculture treatment or other scenarios.

3.1 Land Base Assumptions

Land base assumptions were used to define the crown forested land base (CFLB) and timber harvesting land base (THLB) in the TSA. The THLB is designated to support timber harvesting while the CFLB is identified as the broader productive forest that can contribute toward meeting non-timber objectives (e.g. biodiversity).

Table 5 provides a summary of the land base area by netdown category for the ISS Base Case. The Merritt TSA covers a total area of approximately 1.13 million hectares. From this total area, approximately 71.2% is considered the CFLB while 49.7 % is considered the current THLB. The ISS Base Case THLB is approximately 97.5% of the THLB reported for the TSR Base Case. It is also noted that there are an additional 25,552 hectares of THLB in the Base Case that will not get harvested because of the minimum harvest criteria that is applied in the model (Refer to Section 3.3.3 for details). These have not been excluded from the THLB because alternate harvest scenarios may change this criteria.

Table 5 Merritt TSA land base area summary

	Gross Areas (Ha)	Effective Areas (Ha)	Percent of Total Area (%)	Percent of CFLB (%)
Total Area	**1,131,163**	**1,131,163**	**100.0%**	
less:				
Private Land, Federal Land, etc.	195,392	195,392	17.3%	
Community Forests	12,924	12,924	1.1%	
Woodlots	14,257	14,257	1.3%	
Non-Forest (Alpine)	16,409	16,409	1.5%	
Non-Forest (Rock)	10,611	9,353	0.8%	
Non-Forest (Water)	17,890	14,738	1.3%	
Non-Forest (Vegetation)	136,997	31,985	2.8%	
Non-Forest (Low productivity)	2,351	2,176	0.2%	
Non-Forest (Urban)	10,068	6,083	0.5%	
Non-Forest (Unclassified)	253	253	0.0%	
Non-Forest (Roads)	20,423	14,522	1.3%	
Non-Forest (Landings – Aspatial)	7,709	*7,709	0.7%	
Crown Forested Land Base		**805,366**	**71.2%**	**100.0%**
less:				
Parks, Reserves and Protected Areas	17,539	13,286	1.2%	1.6%
Environmentally Sensitive Areas	67,050	45,705	4.0%	5.7%
Physically Inoperable	91,569	37,943	3.4%	4.7%
Archaeological Sites (Aspatial)		*558	0.0%	0.1%
Riparian Areas	66,944	34,240	3.0%	4.3%
Heritage Trails	933	655	0.1%	0.1%
Wildlife Habitat Areas	7,335	4,464	0.4%	0.6%
Old Growth Management Areas	114,600	51,944	4.6%	6.4%
Coastal Tailed Frog	230	44	0.0%	
Ungulate Winter Range Snow Interception Cover	45,366	29,818	2.6%	3.7%
Existing Wildlife Tree Patches	14,856	9,649	0.8%	1.2%
Wildlife Tree Retention (Aspatial, Estimated)		** 14,390*	1.3%	1.8%
Timber Harvesting Land Base (current)		**562,670**	**49.7%**	**69.9%**

less:			
Future Wildlife Tree Retention (Aspatial)	**23,484*	2.1%	2.9%
Future Roads (Aspatial)	***11,701*	1.0%	1.5%
Williamson's Sapsucker Retention (Aspatial)	2,103	0.2%	0.3%
Timber Harvesting Land Base (future)	**525,382**	**46.4%**	**65.2%**

** Aspatial netdowns were applied in the model but were not reflected in the GIS dataset areas.*
*** To be applied with a yield table reduction*

More detailed descriptions of these land base assumptions are provided within the following subsections. After applying these assumptions, the landbase was summarized below according to BEC zones and age classes.

The distribution of the major BEC zones for both the THLB and Non-THLB (together equalling the CFLB) are shown in Figure 6.

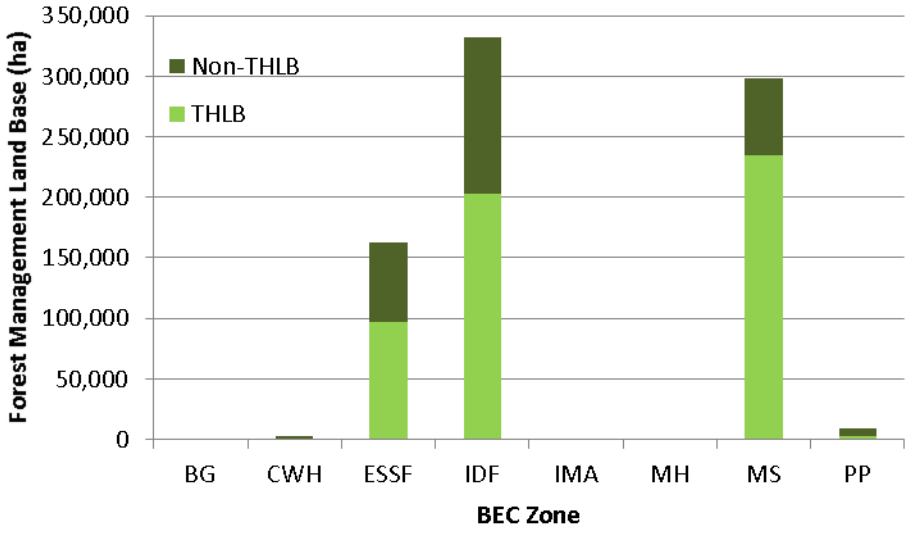

Figure 6 BEC zone distribution across the crown forested land base

Considering the magnitude of area affected by the MPB and across the spectrum of age classes, we can expect a large shift of future stands into a narrow age class range. Once mature, these stands will become available for harvest again in a common period. It will be necessary to find ways to break up this age class cohort and minimize the risk of future MPB outbreaks.

After applying assumptions to reflect changes in stand age from disturbances (i.e., fire and harvesting) the current age class distribution on both the THLB and Non-THLB are shown in Figure 7.

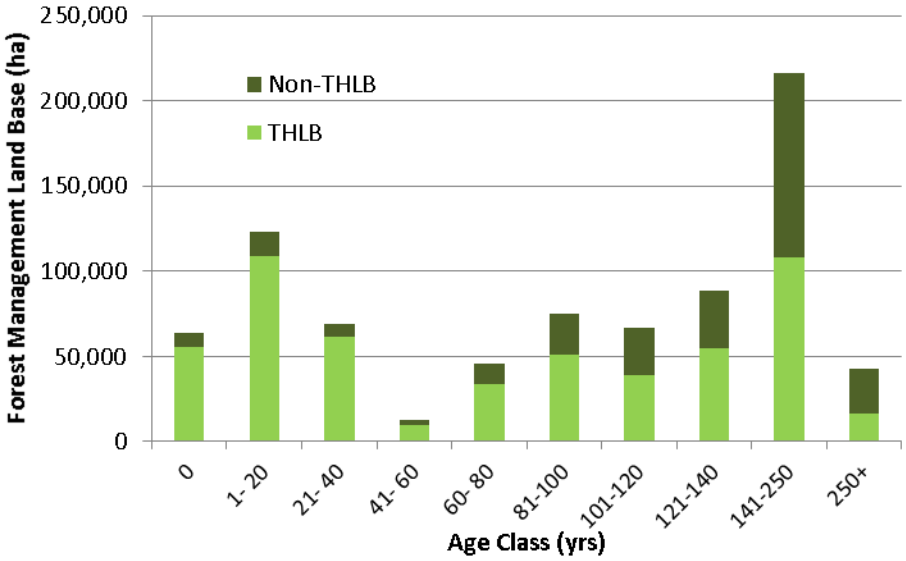

Figure 7 Age class distribution across the crown forested land base

3.1.1 Non-TSA Ownership

Ownership considered outside of the TSA was identified using the ownership data source. For this analysis, the CFLB was spatially reduced for all areas identified as private land (40N), federal reserve (50N), Indian reserve (52N), military reserve (53N), TFLs (72B), woodlots (77A, 77B), community forests (79B), and miscellaneous leases (99N). In addition, woodlots and community forests were identified using the managed licence data source.

Areas retained within the CFLB included: ecological reserves (60N), public reserves (61C, 61N), TSA lands (62C), provincial parks (63N), crown reserves (67N), crown biodiversity, mining and tourism areas (68N) and miscellaneous reserves (69C, 69N).

3.1.2 Non-Forest and Non-Productive

A similar process to that used for TSR 2015 was followed to identify areas that were either non-forest or non-productive. This process uses the British Columbia Land Classification Scheme and site index within the VRI in conjunction with past logging, as follows:

- All polygons were initially assumed to be non-forest
- Polygons with a site index >=5 were re-coded as forest
- Polygons with evidence of logging (either through the disturbance update or with a harvest date) were re-coded as forest
- Polygons without a site index but coded as either “TC” (tall conifer) or “TB” (tall broadleaf) in *BCLCS_LEVEL_4* with a logging history were re-coded as forest
- Polygons with a *BCLCS_LEVEL_4* of “RO” (rock) or *BCLCS_LEVEL_5* of “LA” (lake) , “UR” (urban), “GP” (gravel pit), “MI” (mine), “RS” (river sediment), “ES” (exposed soil), “RZ” (road surface), “RI” (river/stream) were coded as non-forest.

After a polygon was determined to be either forest or non-forest using the above process, it was assigned to a category as follows:

- Alpine : *BCLCS_LEVEL_3* = “A”

- Rock: *BCLCS_LEVEL_4* = *"RO"* or *BCLCS_LEVEL_5* in "GP", "MI", "RS", "ES", or "RZ"
- Water: *BCLCS_LEVEL_3* = "W" or *BCLCS_LEVEL_5* in "LA", "RE", "RI", or "OC"
- Non Forest Vegetation: *BCLCS_LEVEL_4* in "ST", "SL", "HE", "HF", "HG", "BY", "BM", or "BL"
- Low Productivity: Site Index <= 5 and Site Index not null
- Urban: *BCLCS_LEVEL_5* = "UR"
- Unclassified: Not captured by above criteria

3.1.3 Roads, Trails, and Landings

A spatial reduction for existing roads was completed using the consolidated roads dataset used for TSR 2015. The 20,932 kilometres of roads in this dataset were current to 2012, and were buffered by 10 metres. Areas contained within the buffers were considered to be non-forest and not available for harvesting.

An aspatial reduction for existing landings was applied using the assumptions documented for TSR 2015. All harvested areas to date had their area reduced by 2.4% prior to modelling.

A reduction of 3.5% for future roads was used for the modelling, and implemented by applying a reduction to the yield curves for future managed stands (i.e. stands currently greater than 30 years of age). This reduction is consistent with the assumptions used for TSR 2015, which were based on the 2008 Sustainable Forest Management Plan prepared for the Merritt TSA in March 2009 using local knowledge. FREP soils monitoring carried out in the Cascades District supports this assumption. This reduction equates to an allowance of 12,879 hectares for future roads.

3.1.4 Parks and Protected Areas

Productive forest within parks and protected areas is part of the CFLB that contributes to meeting requirements for non-timber values. However, these areas were not generally available for harvest. These areas were identified by applying the assumptions documented for TSR 2015. Miscellaneous Crown Reserves (69N) and Crown Christmas Tree Permits were also included in this category. Table 6 summarizes these areas.

Table 6 Parks and protected areas summary

Name	Gross Area (ha)	Effective Area(ha)
Kentucky-Alleyne Park	190.3	111.1
Allison Lake Park	20.6	10.0
Bromley Rock Park	150.4	116.0
Coldwater River Park	69.2	67.3
E.C. Manning Park	12,963.7	10,360.2
Monck Park	120.0	54.5
Otter Lake Park	52.6	16.2
Stemwinder Park	3.5	3.5
Soap Lake Ecological Reserve	937.5	788.4
Whipsaw Creek Ecological Reserve	32.4	25.9
Coquihalla Summit Recreation Area	2,729.1	1,627.8
Brent Mountain Protected Area	13.0	12.1
Crown Miscellaneous Reserves	240.2	78.1
Crown Christmas Tree Permits	16.1	15.2
Total	**17,538.6**	**13,286.3**

3.1.5 Environmentally Sensitive Areas

Areas with high environmental sensitivity were fully excluded from the THLB, unless there was evidence of previous logging. The ESA mapping dates back to the 1990s, with six categories identified (A, H, P, R, S, and W). The individual polygons contained one or more of these codes, as shown in the area summary contained in Table 7.

Table 7 Environmentally sensitive areas summary

ESA Code	Description	Gross Area (ha)	Effective Area(ha)
A	Snow avalanche	362.3	362.2
AP	Snow avalanche, potential regeneration problems	334.9	284.1
H	Water intake	108.1	83.9
P	Potential regeneration problems	40,493.2	26,423.9
PR	Potential regeneration problems, recreation/viewing	144.8	94.1
R	Recreation/viewing values	1,310.2	766.4
S	Unstable soils	6,969.4	4,446.0
SA	Unstable soils, snow avalanche	5.9	5.9
SP	Unstable soils, potential regeneration problems	16,571.9	12,582.6
SPR	Unstable soils, potential regeneration problems, recreation/viewing	547.1	543.3
SW	Unstable soils, wildlife	50.4	17.5
W	Wildlife	152.0	95.6
Total		**67,50.2**	**45,705.5**

3.1.6 Inoperable

Inoperable areas were identified using a combination of operability lines, terrain stability mapping, and slope, using similar logic and data to that used for TSR 2015. Table 8 summarizes the areas for these categories.

Operability Lines

The operability dataset referenced in TSR 2015 was used in this analysis, with all areas outside the operability lines excluded from the THLB unless they showed evidence of previous harvesting. Operability lines were delineated by District staff using 1991 air photos, and considered slope, topography, access, soil instability, elevation, and timber quality. These lines were reviewed by both District and industry staff and adjusted as necessary.

Terrain Stability

TSR 2015 indicated that terrain classification mapping has been completed for approximately 15% of the Merritt TSA. Areas identified as Terrain Class V were excluded from the THLB unless they showed evidence of previous harvesting.

Slope

Slopes greater than 65% were excluded from the THLB for areas where terrain classification mapping has not been completed, unless there was evidence of previous harvesting. The slope polygons used were obtained from Forest Analysis and Inventory Branch.

Table 8 Inoperable summary

Operability Criteria	Gross Area (ha)	Effective Area(ha)
District Operability Lines	79,793.0	31,529.0
Terrain Class V *	1,751.2	1,515.1
Slopes Greater Than 65 % *	10,025.2	4,898.83
Total	**91,569.4**	**37.942.9**

**Gross Area excludes area already captured by previous criteria*

3.1.7 Archaeological Sites

Spatial locations of archaeological sites were not made available to Forsite. Rather, district staff suggested applying an aspatial netdown to account for archaeological sites. This was implemented by applying a proportionate area reduction to all stands not already netted out of the land base for factors up to and including operability. The reduction was based on removing the same total area as the effective area reported for archaeology in TSR 2015 (558 hectares).

3.1.8 Riparian Zones

Riparian buffer areas were created using TSR 2015 datasets for lakes, wetlands, and streams. Buffer widths were consistent with those used for TSR 2015, except for selected S4, S5, and S6 Temperature Sensitive Streams (TSS) within the proposed Nicola Temperature Sensitive Watershed (see Section 3.2.9), which had their widths increased to either 20 or 30 metres. Riparian buffers are summarized in Table 9, while Table 10 contains a summary of the areas excluded for riparian management.

Table 9 Riparian zone buffer widths and retention levels

Feature	Class	Reserve Zone Width (m)	Management Zone Width (m)	Management Zone Basal Area Retention (%)	TSR Effective Buffer Width for Modelling (m)	ISS Base Case Effective Buffer Width for Modelling (m)
Lake	A		200	100	200	200
	B		200	50	100	100
	C		200	25	50	50
	D		200	10	20	20
	E		200	5	10	10
	L1	10	0	25	10	10
	L2	10	20	10	12	12
	L3	0	30	10	3	3
	L4	0	30	10	3	3
Wetlands	W1	10	40	10	14	14
	W2	10	20	10	12	12
	W3	0	30	0	0	0
	W4	0	30	10	3	3
	W5	10	40	10	14	14
Streams	S1-A	0	100	20	20	20
	S1-B	50	29	29	54	54
	S2	30	20	20	34	34
	S3	20	20	20	24	24
	S4	0	30	10	3	3 or 30*
	S5	0	30	10	3	3 or 30*
	S6	0	20	0	0	0 or 20*

Note: S1-A and S1-B classification determined using TRIM Feature Codes for double/single line features;
All S4 streams were assumed to be fish bearing; Indicated widths are for each side of the stream.
** Larger buffer widths are for selected streams in the Nicola Temperature Sensitive Watershed*

Table 10 Riparian areas summary

Riparian Criteria	Gross Area (ha)	Effective Area(ha)
Lakes	5,983.7	2,846.5
Wetlands*	1,308.5	705.2
Streams (S1 to S3) *	27,479.1	13,709.2
Streams (S4 to S6 excluding TSS streams)*	2,013.6	1472.9
Streams (S4 to S6 TSS streams)*	30,159.3	15,506.1
Total	**66,944.2**	**34,239.9**

**Gross Area excludes area already captured by previous criteria*

A sensitivity analysis will increase the buffers on small streams (S4, S5, and S6) to 10 metres. This will result in a 16,469 hectare increase to the gross area for riparian buffers, and a 10,904 hectare increase for the THLB riparian netdown.

3.1.9 Heritage Trails

Buffered areas around heritage trails referenced in TSR 2015 were excluded from the THLB. The trails were selected from the *FTEN_RECREATION_LINES_SVW* dataset and buffered by 100 metres on each side. Table 11 summarizes the length and buffered area for each trail.

Table 11 Heritage trail summary

Heritage Trail Name	Length (km)	Gross Area (ha)	Effective Area(ha)
Dewdney	15.52	306.7	235.5
Hope Pass	4.82	94.5	66.9
Hudson Bay Brigade	22.85	449.6	285.3
Whatcom	4.02	82.2	67.4
Total	**47.21**	**933.0**	**655.1**

3.1.10 Wildlife Habitat Areas

Wildlife Habitat Areas (WHA) were identified and excluded from the THLB where harvesting would not be possible. Either full or partial netdowns were used consistent with the approach used in TSR 2015. Note that one more WHA for snakes has been added compared to TSR 2015. Table 12 summarizes the WHA areas.

Table 12 Wildlife habitat area Summary

Species	WHA Identifiers	Gross Area (ha)	Effective Area(ha)
Coastal Tailed Frog*	3-004, 3-005, 3-014, 3-015, 3-016, 3-017, 3-148, 3-150, 8-011, 8-012, 8-013, 8-077, 8-078, 8-079, 8-080, 8-081, 8-082	348.6	138.6
Data Sensitive (Snakes)**	3-008, 3-009, 3-046, 3-047, 3-048, 3-140, 3-183	1,258.5	0.0
Great Basin Spadefoot	3-126	45.0	0.4
Grizzly Bear	3-026, 3-027, 8-083, 8-084, 8-085, 8-086, 8-087, 8-088, 8-089	4,500.7	2,511.2
Lewis's Woodpecker	3-082, 3-083, 3-103, 3-104	76.8	0.0
Western Screech Owl***	3-068, 8-125, 8-260	184.2	48.7
Williamson's Sapsucker	3-090, 3-091, 3-092, 3-093, 3-094, 3-095, 3-129, 3-130, 3-131, 3-132, 3-133, 3-134, 3-135, 3-137, 3-139, 3-142, 3-143, 3-167, 3-168, 3-169, 3-170, 3-202, 3-203, 3-204, 3-205, 3-206, 3-207, 3-208, 3-209, 3-210, 3-211, 3-212, 3-213, 3-214, 3-215, 3-216, 3-217, 3-218, 3-219, 3-220, 8-096, 8-097, 8-098, 8-100, 3-394, 8-395, 8-396, 8-397, 8-398, 8-399, 8-400, 8-401, 8-402, 8-403, 8-404, 8-405	2,180.2	1,764.8
Total		**8,594.0**	**4,463.7**

** A 75%% reduction was used for the management zone for Coastal Tailed Frog in 3-148 and 3-150.*

*** No area was deleted for snakes, however the WHA identifiers are included here for completeness of documentation.*

**** A 75% reduction was used for the management zone for Western Screech Owl in 8-125 and 8-126.*

3.1.11 Old Growth Management Areas

FLNRO staff and licensees have agreed on non-legal, spatial Old Growth Management Areas (OGMA) in order to manage for the old growth requirements outlined in the Order Establishing Provincial Non-Spatial Old Growth Objectives that took effect in June 30, 2004. The OGMA dataset that was used for TSR 2015 was obtained from Forest Analysis and Inventory Branch, and all OGMAs were excluded from the THLB. The gross area of OGMAs was 114,600.6 hectares, and the effective area removed was 51,944.4 hectares.

3.1.12 Coastal Tailed Frog

The ISS Base Case includes a net down for Coastal Tailed Frog (CTF) that was not included in TSR 2015. Point locations and watershed boundaries for known occurrences of CTF were provided by FLNRO. Small streams within 100 metres of these points were buffered by 33 metres on each side and removed from the landbase. The gross area of these buffers is 229.6 hectares, and the effective area removed was 43.6 hectares.

A sensitivity analysis will explore the impact of buffering all small streams within the CTF watersheds by 33 metres. This will increase the gross area within the CTF buffers to 9,420.4 hectares and result in a total THLB reduction of 3,259.9 hectares, not allowing for any overlap with the WTR area budget.

3.1.13 Ungulate Winter Range Snow Interception Areas

Although Patchworks is well suited to modelling ungulate winter range (UWR) through application of cover constraints, district staff requested that a similar approach be followed for the base case to that used in TSR 2015. TSR 2015 used a spatial netdown where stands within ungulate winter range cells were hierarchically identified based on their suitability for snow interception cover (SIC) according to the Government Action Regulation (GAR) Order #3-003 established on January 21, 2008.

This analysis used the following process in order to identify the areas that would be netted out of the landbase for ungulate winter range.

1. Resultant polygons within UWR planning cells were classified as either Shallow, Moderate, or Deep snowpack using their biogeoclimatic ecosystem classification as outlined in Table 13.

2. In accordance with TSR 2015, only Moderate snowpack zones were considered due to the relatively small area in Deep (331.7 forested hectares) and the ability to meet Shallow requirement through operational practices.
3. The required area of SIC for each UWR cell was calculated using 33% of the Moderate snowpack zone area within the cell. This resulted in a total of 49,991.0 hectares of SIC being required, if possible.
4. Resultant polygons were ranked according to their suitability as snow interception cover using the criteria outlined in Table 14.
5. Resultant polygons classified as Moderate snowpack zone within each planning cell were sorted in order by their SIC suitability rank, overlap with OGMAs, overlap with visual quality objectives, and polygon size.
6. The sort order outlined above was used to determine the resultant polygons to use for the spatial netdown. Polygons were assigned until either the required area of SIC was reached, or there were no more suitable candidates.
7. No attempt was made to split the last polygon assigned within an individual UWR cell. This means that the required amount of SIC was exceeded in some planning cells.

Using the above process resulted in 45,366.5 hectares being assigned as snow interception cover, as summarized in Table 15. Approximately 47.1% of this met the requirements for SIC, with the remainder being assigned from polygons meeting the stepdown ranking criteria. Approximately 27.4% overlapped with OGMAs, and 30.9% overlapped with visual quality objective polygons.

Table 13 Required Area of Snow Interception Cover by Snowpack Zone

Snowpack Zone (SZ)	BEC Units	SIC Requirement (% of planning cell)
Shallow	BG, PP, IDFxh1, IDFxh1a, IDFxh2, IDFxh2a	15%
Moderate	IDFdk1, IDFdk1a, IDFdk2, IDFdk3, IDFunk, MS	33%
Deep	ESSF, ICH, CWH	40%

Table 14 Snow Interception Cover Attributes and Step-down if requirements not available

SIC Suitability Rank Order	Snowpack Zone (SZ)	Species	Age	Canopy Closure
Meets Requirements	Shallow	Douglas-fir > 70%	>= 121 years	n/a
	Moderate	Douglas-fir > 70%	>= 121 years	>= 36%
	Deep	Douglas-fir > 70%	>= 121 years	>= 46%
Stepdown 1	All	Douglas-fir > 70%	>=81 years	>= 36%
Stepdown 2	All	Douglas-fir > 50%	>= 81 years	>= 36%
Stepdown 3	All	Douglas-fir > 50%	>=81 years	>= 16%
Stepdown 4	All	Douglas-fir > 30%	>= 81 years	>= 16%

Table 15 Ungulate Winter Range Snow Interception Cover Area Summary

SIC Suitability Rank Order	Gross Area (ha)	Overlap with OGMA (gross ha)	Overlap with VQO (gross ha)	Effective Area (ha)
Meets Requirements	21,372.4	6,272.0	6,106.5	13,919.1
Stepdown 1	3,765.3	740.4	1,309.7	2,820.5
Stepdown 2	9,987.0	2,543.6	3,492.4	6,860.4
Stepdown 3	8,011.1	2,510.3	2,433.7	4,565.9
Stepdown 4	2,230.7	356.9	671.0	1,651.7
Total	**45,366.5**	**12,423.2**	**14,013.3**	**29,817.6**

3.1.14 Wildlife Tree Retention

As discussed in Section 2.3, existing Wildlife Tree Retention (WTR) areas were identified through the process used to identify updates for harvesting disturbance. 100 percent of these WTRs were excluded from the THLB spatially. The gross area of existing WTRs was 14,856.5 hectares, and the effective area removed was 9,649.0 hectares.

TSR 2015 used an aspatial WTR totalling 8.1% of the unconstrained landbase. Therefore, a further aspatial netdown was undertaken to achieve a total WTR reduction of 8.1%. The required additional percentage to achieve 8.1 % overall WTR was calculated, and the additional area required was distributed proportionately across the landbase remaining at this point in the netdown.

From a modeling perspective, all of the aspatial WTR area is assigned to the non THLB as it will make no difference to the model (i.e. past or future WTRs were considered to be unavailable for harvest). However, for purposes of completing Table 5, it was necessary to estimate how much of the aspatial WTR netdown is attributed to previous harvesting. This was completed by determining the proportion of the THLB that is in existing managed stands (i.e. stands less than or equal to 30 years old).

3.1.15 Williamson's Sapsucker Habitat Suitability

Williamson's Sapsucker (WISA) is listed under Schedule 1 of the federal *Species at Risk Act*, and is on the provincial Red list in British Columbia. TSR 2015 did not include habitat requirements for Williamson's Sapsucker other than through THLB reductions for Wildlife Habitat Areas as outlined in Section 3.1.10. The ISS Base Case will include additional requirements for WISA as follows.

Best Management Practices (BMP) have been identified as an essential action in the provincial recovery plan. These BMPs apply nest tree retention and recruitment targets within low and moderate suitability habitat classes and within 500 metres of confirmed and probable nest sites. These retention targets range between 85 and 225+ live trees per hectare as outlined in Table 16.

The total THLB area affected by these requirements is 10,827 hectares, and the average THLB live stems per hectare using VRI information is calculated to be 500. After adjusting for 8.1% wildlife tree retention, the required stems per hectare retention is 143 stems per hectare or 29%. This was modelled as additional in block retention for areas within low/moderate suitability habitat classes and within 500 metres of nest sites. Dry Belt fir polygons that have been assigned to be managed with a selection harvest system will not have the additional retention requirement applied. After taking this into account, 7,251 hectares will require the additional retention, which equates to a THLB impact of 2,103 hectares.

Table 16 Live Tree Retention Targets for WISA Low/Moderate Suitability

Average Live Tree Retention Target (sph)	% Area of New Cutblocks
85-125	5-15
126-175	25-35
176-225	40-50
> 225	10-20
183 (Weighted Average)	

3.2 Non-Timber Management Assumptions

This section describes the criteria and considerations used to model non-timber resources.

3.2.1 Landscape-Level Biodiversity

Biodiversity emphasis options have been assigned to landscape units in the Merritt TSA. In some cases, more than one option has been assigned within an individual landscape unit, as shown in Figure 8.

An Order Establishing Provincial Non-Spatial Old Growth Objectives has been established and took effect in June 30, 2004. This order provides minimum areas of old growth that must be retained by landscape unit and biogeoclimatic zone (BEC version 5), as summarized in Appendix 1. Informal Old Growth Management Areas have been agreed to by FLNRO staff and licensees to address landscape-level biodiversity and the requirements of this order. These OGMAs were removed from the THLB for the base case through the land base netdown process described in Section 3.1.11.

TSR 2015 did not set old or mature plus old seral stage targets, and this was used for the base case. However, a sensitivity analysis will implement the old seral targets contained in the non-spatial old growth order in addition to the removal of OGMAs from the THLB. Disturbance in the non-THLB (including OGMAs) will also be implemented as outlined in Section 3.4.1.

Table 17 outlines the minimum retention targets for mature plus old seral stages as outlined in the Biodiversity Guidebook. The status of mature plus old seral stage targets by landscape unit/BEC (version 9) variant was reported but not constrained for the base case. Weighted values were used for landscape units with more than one biodiversity emphasis option. Targets within the CFLB were applied as a sensitivity analysis.

The amount of early seral stage by landscape unit / BEC variant was also reported but not constrained.

Table 17 Mature plus old seral requirements

BEC zone	BEC variant	NDT	Minimum Mature Age	Biodiversity emphasis (% Retention)		
				Low	Intermediate	High
BG	xh2, xw1,	4	101	17	34	51
PP	xh1, xh1a, xh2, xh2a	4	101	17	34	51
IDF	dk1, dk1a,dk2,xh1, xh1a, xh2,xh2a	4	101	17	34	51
MS	xk1, xk2	3a	101	14	26	39
MS	dm2, mw1	3b	101	14	26	39
ESSF	dc2, dcw, xc1, xc2, xcw	3a	121	14	23	34
ESSF	mw, mw1, mww	2	121	14	28	42
ESSF	dcp, mwp, xcp	5	N/A			
CWH	ms1	2	81	17	34	51
MH	mm2	1	121	19	36	54
IMA	Unp	5	N/A			

Note: There is very little THLB in the NDT1 (115 ha) and NDT5 (150 ha), so these will not be modelled.

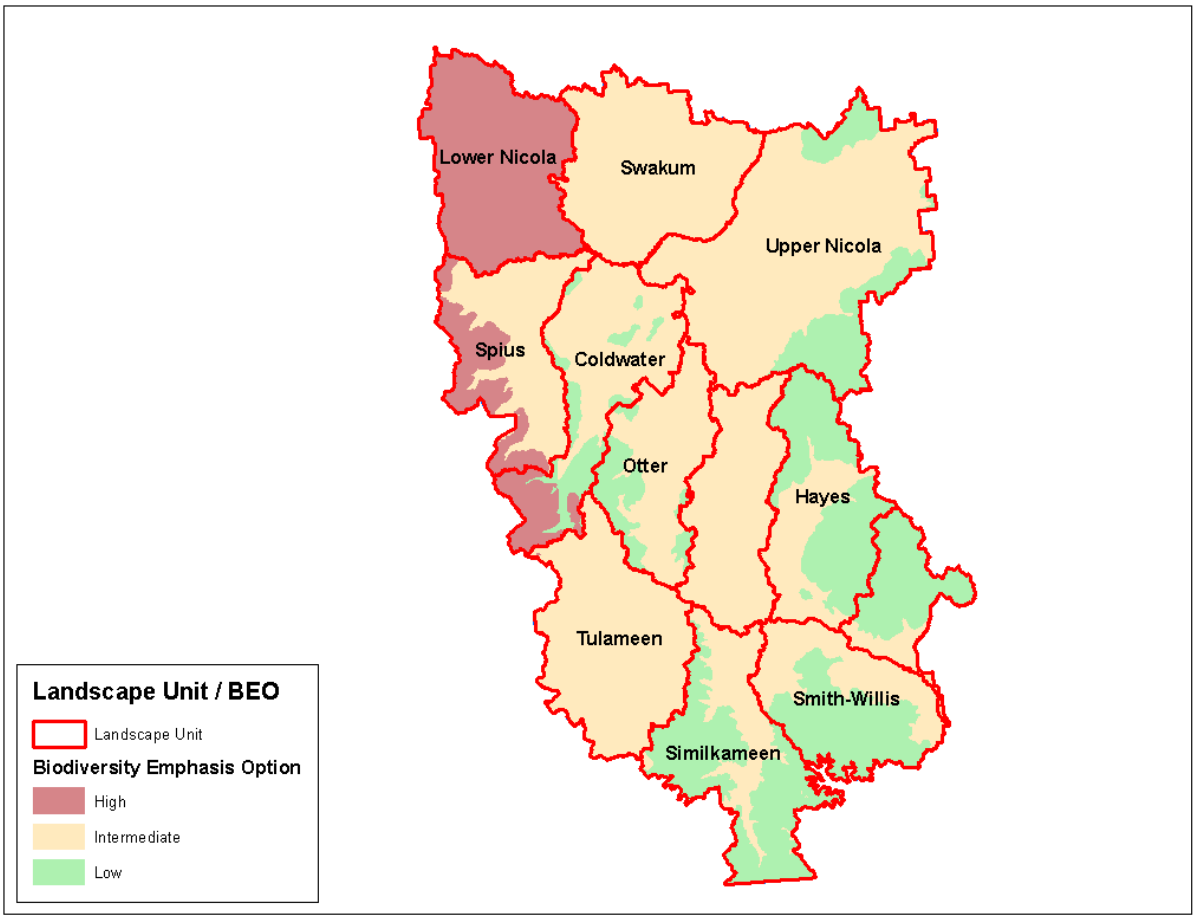

Figure 8 Landscape Units and Biodiversity Emphasis Option

3.2.2 Stand-Level Biodiversity

Wildlife tree retention targets are specified in individual licensee Forest Stewardship Plans (FSPs). Wildlife tree retention has been dealt with in this analysis through a THLB reduction as discussed in Section 3.1.14 based on FREP monitoring results and these FSP commitments. Sensitivity analyses will examine alternate levels of WTR.

3.2.3 Patch Size Distribution

Patch sizes were not modelled in TSR 2015. The ISS Base Case model was configured to create, where possible, patches that are consistent with very young seral (<20yr) patch size distributions as defined in the Biodiversity Guidebook. This is meant to control the spatial distribution of harvest on the landbase while avoiding strict 40 hectare green-up rules and or unrealistically sized harvest openings.

Patches were defined as contiguous areas less than 20 years of age. Stands within 50 metres of each other were considered to be contiguous so patches can be made up of a single cutblock or an aggregation of cutblocks close together.

Very young seral patch size targets were applied according to NDTs shown in Table 18. The weight assigned to these targets was set relatively low so as to encourage the intended distribution without unduly affecting timber supply.

Patch sizes for mature plus old seral stages were reported without implementing targets.

Table 18 Patch size targets

		Patch Sizes (ha)			Target Forested Area (%)		
NDT	**BEC Unit**	**Small**	**Medium**	**Large**	**Small**	**Medium**	**Large**
1	MHmm	<40	40-80	80-250	30-40	30-40	20-40
2	ESSFmw, CWHms	<40	40-80	80-250	30-40	30-40	20-40
3a	MSxk, ESSFdc/xc	<40	40-80	250-1000	10-20	10-20	60-80
3b	MSdm/mw	<40	40-250	80-250	20-30	25-40	30-50
4	BGxh/xw, PPxh, IDFdk/xh	<40	40-80	80-250	30-40	30-40	20-30

Note: Only early seral stands (Age <20 years) were modelled; target sizes/% adopted from the biodiversity guidebook.

3.2.4 Visual Quality

There are over 1,000 scenic areas or polygons within the Merritt TSA that require maintenance of visual quality objectives (VQO). During harvest design, maximum denudation limits were considered for each individual VQO polygon. A similar approach to that used for TSR 2015 was used for modelling. Each combination of VQO and Visual Absorption Capability (VAC) was assigned a maximum denudation percentage. These percentages were determined by dividing the allowable percent alteration range for the VQO class into thirds, and then using the midpoint of each third as the allowable percentage alteration for the VAC class. Weighted average Visually Effective Green-up (VEG) heights were then calculated for each VQO class by considering the average slopes of the visual polygons and the VEG heights required by slope as specified in the TSR technical document. Table 19 summarizes these targets. For each analysis unit, Site Tools was used to derive ages for the VEG heights. Any stands managed with selection silvicultural systems were assumed to be visually greened up.

An issue with the VQO polygons was identified after modelling commenced. It appears that the VQO dataset has been built up by combining data from several sources, resulting in individual "resultant" polygons that do not reflect the original intent of the scenic area inventories, and in some cases were unrealistically small. This will likely cause the model to be overly constrained as VQO requirements must be met on smaller polygons than intended. As cleanup and rationalization of the VQO data is beyond

the scope of this project, it was decided to not constrain individual VQO polygons less than 10 hectares in size.

Table 19 Maximum percent denudation by visual quality objective

Visual Quality Objectives	Visual Absorption Capability	Number of Visual Polygons in CFLB	Area in CFLB (hectares)	Area in THLB (hectares)	Maximum Denudation (%)	VEG Height
Preservation	Low	5	385	103	0.2	5.6 metres
	Moderate	23	1,189	476	0.5	
	High	4	3	0	0.8	
Retention	Low	84	9,247	4,672	2.0	5.7 metres
	Moderate	187	15,937	7,294	3.0	
	High	18	686	350	4.0	
Partial Retention	Low	82	13,259	6,727	6.7	5.3 metres
	Moderate	409	79,560	52,856	10.0	
	High	36	7,136	4,819	13.3	
Modification	Low	6	1,450	784	16.7	4.8 metres
	Moderate	106	16,876	13,783	20.0	
	High	78	7,351	5,274	23.3	

Note: Polygons with a null VAC were assigned to the Moderate Class

3.2.5 Wildlife Habitat Areas and Ungulate Winter Ranges

Wildlife Habitat Areas (WHAs) and Ungulate Winter Ranges (UWR) were established within the study area, as discussed in Section 3.1.10 and Section 3.1.13. These areas were removed from the THLB through the netdown process. Therefore, no further constraints were required for the base case scenario.

3.2.6 Equivalent Clearcut Area

The level of disturbance in a watershed can impact stream flows, sediment delivery, channel stability, riparian function and aquatic habitat. Assessing equivalent clearcut areas (ECA) is a coarse-level indicator of forest disturbance and recovery in a watershed. ECAs do not directly pose constraints on harvesting but can act as red flags to identify when professional hydrologists should be consulted for management recommendations. Disturbance limits used in operational circumstances typically vary by watershed and basin relative to professional hydrologic recommendations.

Harvested Stands

Until recently, hydrologic recovery of logged stands was estimated using the Interior Watershed Assessment Procedure (IWAP). Table 20 summarizes the IWAP hydrologic recovery assumptions that are based on stand height.

Table 20 Criteria for estimating hydrological recovery of logged stands (IWAP)

Stand Height Minimum (m)	Stand Height Maximum (m)	Hydrologic Recovery (%)	Equivalent Clearcut Area (%)
0.0	3.0	0	100
3.0	5.0	25	75
5.0	7.0	50	50
7.0	9.0	75	25
9.0	12.0	90	10
>12	n/a	100	0

In 2015, a new hydrologic recovery curve based on a mature stand height of 25 metres (Winkler and Boon 2017) was published. This curve uses the following equation to estimate ECA based on stand height, and was used to calculate ECA in the ISS Base Case Scenario.

ECA (25m) percent = 100 – (100*(1-exp(-0.24*(ht-2)))**2.909)

Mountain Pine Beetle

Significant uncertainty exists regarding the hydrologic impact of dead pine trees and residual forest canopy, but it is clear that snow interception and shading can be considerably reduced for stands attacked by MPB. As well, incomplete information on existing advanced regeneration makes it difficult to estimate the rate of hydrologic recovery of these stands.

In this analysis, the ECA of any unsalvaged stand impacted by MPB was assigned an ECA value shown in Table 21.

Adjustments for Anthropogenic Disturbance and non-CFLB Areas

Within Patchworks, ECA is calculated based on the CFLB area of the watershed unit, and only considers the growth and disturbance (i.e. harvesting or non-THLB disturbance) that occurs within this landbase. Therefore, ECA calculated within the model must be adjusted to correspond more closely with the ECA that would be calculated as part of a hydrologic assessment. This was completed as a post-processing exercise as necessary. In cases where ECA targets were set, the targets were adjusted accordingly to ensure the model is appropriately constrained. The required adjustments are provided below.

ECA is normally calculated based on the gross area of the watershed. As non-CFLB land is not included in the modelling framework, ECA targets were adjusted to reflect the gross areas of the watershed, including non-CFLB land. For this analyses, watershed areas outside the Merritt TSA will not be modelled or included.

In addition, man-made disturbances such as urban areas were assigned an ECA of 100%. Therefore, ECA targets were adjusted to reflect the existing anthropogenic disturbance within each watershed. Finally, forested land excluded from the CFLB (e.g. private land) will also contribute to ECA. For purposes of this analysis, the current ECA status of forested, non-CFLB lands was assumed to continue for the duration of the simulations, and ECA targets were adjusted to reflect this ongoing ECA.

Table 21 ECA estimates associated with MPB affected forest stands

Time since attack (yrs)	Pine Content Dead Class (30-50%	Pine Content Dead Class (50-70%)	Pine Content Dead Class (>70%)
0-5	5	5	10
6-10	10	15	30
11-15	15	20	40
16-20	20	30	45
21-25	20	30	45
26-30	15	20	40
31-35	10	15	30
36-40	5	10	15
41-45	0	5	20
46-50	0	0	15
51-55	0	0	10
56-60	0	0	5
61+	0	0	0

3.2.7 Community Watersheds

There are nine community watersheds in the Merritt TSA, with approximately 72% of their forested area considered to be THLB (Table 22). Although community watersheds were not included in the analysis for TSR 2015, they were included in the base case for this project. A maximum ECA value of 30% was used for this analysis to approximate typical conditions where harvesting would be curtailed in most community watersheds.

For this analysis, ECAs were assessed in each of these watersheds using the 2015 Winkler hydrologic recovery curves for logged areas and the MPB ECA assumptions discussed in Section 3.2.6.

Table 22 Community Watersheds

Community Watershed	Gross Area (ha)	CFLB Area (ha)	THLB Area (ha)
Anderson	275.0	273.8	120.3
Bell	332.0	329.8	197.9
Brook	3,010.0	2,967.8	2,154.7
Dillard	3,871.2	3,817.0	3,182.6
Hackett	163.7	160.9	113.7
Kwinshatin	2,726.7	2,706.9	1,606.4
Lee	463.7	458.9	319.9
Skuagam	451.0	447.4	251.0
Trout	1,956.0	1,940.7	1,546.4
Total	**13,249.3**	**13,103.2**	**9,492.9**

Note: The majority of the Trout watershed is in the Okanagan TSA

3.2.8 Proposed Fisheries Sensitive Watersheds

Fisheries Sensitive Watersheds are proposed within the Merritt TSA. The proposed Order requires a maximum ECA of 25% above the snowline for a subset of the watershed units, as outlined in Table 23. This requirement was not modelled in TSR 2015, but was included in the ISS Base Case using the 2015 Winkler hydrologic recovery curves for logged areas and the MPB ECA assumptions discussed in Section 3.2.6.

The proposed Order also requires a "sustainable rate of cut" for all of the watershed units. The effects of implementing this requirement were included as a sensitivity analysis by limiting the harvested area per period to a value based on THLB area / silviculture system and average rotation age for each watershed. The right column of Table 23 lists the average rotation age for the clearcut harvesting within each watershed. For selection harvesting, the average time between entries is 34 years.

For modelling purposes the following tolerances were set for the annual area harvested to allow for operational reality:

- Clearcut systems: 90% of target area to 105% of target area
- Selection systems: 85% of target area to 115% of target area

Table 23 Proposed Fisheries Sensitive Watersheds

Fisheries Sensitive Watershed Unit	Entire Watershed			Areas Above the Snowline Where a Maximum 25% ECA Applies			Clearcut Rotation Age
	Gross Area (ha)	CFLB Area (ha)	THLB Area (ha)	Gross Area (ha)	CFLB Area (ha)	THLB Area (ha)	
Brook Creek	4,234.2	4,183.2	2,755.3	3,410.2	3,362.8	2,384.5	84
Coldwater River	20,043.6	19,935.9	8,758.3	-	-	-	74
East Upper Maka Creek	5,825.3	5,783.4	4,093.0	4,127.4	4,098.3	3,129.5	80
Godey Creek	5,254.0	5,225.3	1,594.1	-	-	-	71
Juliet Creek	6,912.0	6,898.6	2,115.2	6,421.2	6,410.4	1,800.2	84
July Creek	2,121.3	2,115.7	704.1	2,019.5	2,013.9	691.9	86
Maka Creek Residual	9,184.5	9,082.8	6,105.7	3,758.3	3,736.3	2,506.6	76
Midday Creek	8,665.4	8,581.5	4,330.1	-	-	-	76
Richardson Creek	2,269.2	2,262.1	963.9	-	-	-	82
South Prospect Creek	4,377.1	4,371.1	1,239.5	3,943.2	3,938.6	986.5	95
South Upper Spius Creek	3,786.2	3,745.5	2,756.6	2,053.2	2,036.3	1,492.1	80
Southwest Prospect Creek	2,018.8	2,015.4	798.7	1,919.2	1,916.1	733.7	108
Spius Creek	20,506.7	20,369.9	11,534.2	-	-	-	78
Teepee Creek	2,442.1	2,429.2	1,601.1	2,154.9	2,144.4	1,371.6	79
Upper Coldwater	11,286.8	11,263.3	4,769.3	9,413.7	9,393.4	3,835.9	83
Upper Coldwater Residual	11,653.8	11,591.4	6,080.7	6,920.6	6,879.3	4,268.4	78
Upper Maka Creek	6,593.9	6,574.0	2,256.9	5,166.8	5,154.4	1,496.0	80
Upper Prospect Creek	3,780.5	3,764.9	1,605.5	3,712.7	3,697.7	1,563.1	105
Upper Spius Creek	9,234.8	9,207.6	3,665.0	6,961.0	6,940.0	2,430.0	89
Voght Creek	21,046.2	20,850.9	10,790.8	-	-	-	73
West Prospect Creek	3,197.2	3,194.3	1,498.8	3,153.7	3,150.9	1,479.6	106
West Upper Spius Creek	3,421.0	3,393.6	2,123.8	2,668.2	2,647.4	1,680.6	92
Total	**167,854.6**	**166,839.5**	**82,140.6**	**67,803.7**	**67,520.4**	**31,850.2**	

3.2.9 Proposed Nicola Temperature Sensitive Watershed

There is a proposal to designate the Nicola Watershed as a Temperature Sensitive Watershed. The Base Case will include enhanced riparian buffers for selected small streams within the watershed. Streams were selected for the enhanced buffers using the following process;

- The base stream classification layer was used to identify fish-bearing streams. All S1, S2, S3, and S4 streams were assumed to contain fish.
- Streams upstream from fish streams were selected until the stream order changed, provided that the upstream length was at least 100 metres. If the stream order changed at the boundary of the fish stream and the upstream segment, the upstream portion was selected until the order changed again.

Once the small streams were selected, 30 metre buffers were created on both sides of S4 and S5 streams, and 20 metre buffers were created on both sides of S6 streams. These buffers were netted out of the THLB.

3.2.10 Cumulative Effects Assessment Watersheds

The Cumulative Effects Assessment project that is being completed in the Merritt TSA provided spatial data and stream flow hazard rating for 162 watershed units in the Merritt TSA, along with the H40 and H60 snowlines. The ISS Base Case will report the ECA for these watershed units above the H40 snowline

and the H60 snowline. Although the ECA was not constrained, the thresholds of interest were 25% ECA for watershed units with a hazard rating of "High", and 35% ECA for watershed units with hazard ratings of "Low" and "Moderate". Figure 9 provides an overview of the hazard ratings.

For this analysis, ECAs were assessed in each of these units using the 2015 Winkler hydrologic recovery curves for logged areas and the MPB ECA assumptions discussed in Section 3.2.6. Only the areas contained within the Merritt TSA were considered for those units that span the TSA boundary.

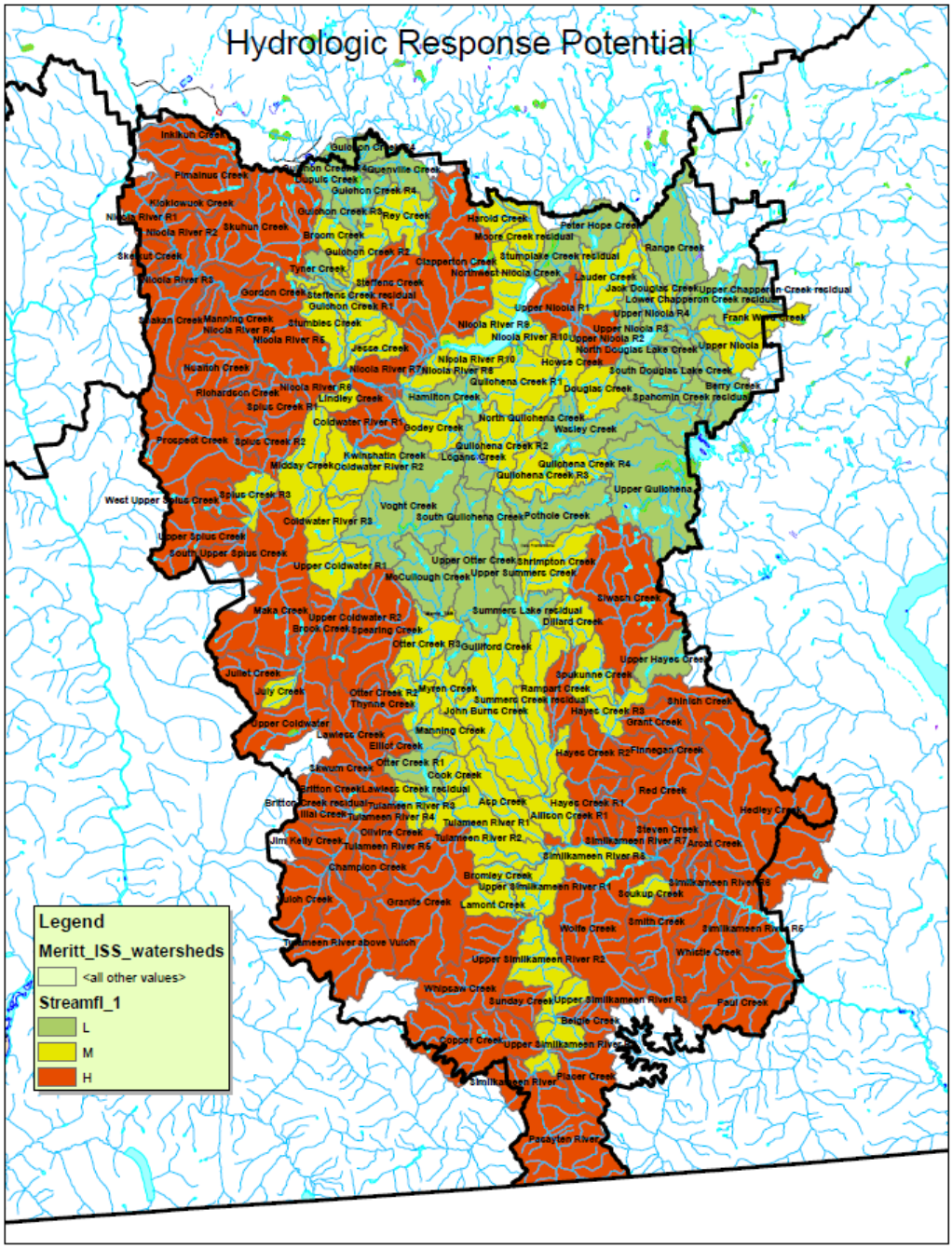

Figure 9 Cumulative Effects Watersheds / Hazard Ratings

3.2.11 Mule Deer Winter Range

Section 3.1.13 outlined the landbase netdown undertaken to meet the snow interception cover requirements of Government Action Regulation (GAR) Order #3-003. Similar to TSR2015, no further constraints were implemented for the ISS Base Case to model mule deer habitat requirements.

3.2.12 Moose Winter Range

TSR 2015 did not model moose habitat requirements as it was assumed they would not have any impact on timber supply. The ISS Base Case will model and report on moose habitat within the Section 7 notice moose polygon, as follows:

- Forage: Maintain a minimum of 15% of the net forested land base in early seral stands, which were defined as < 25 years of age for IDF/ICH BEC zones and < 35 years in MS and ESSF BEC zones. Although this was implemented as a constraint, it is not expected to impact timber supply.
- Cover: Report the area of coniferous stands >= 16 metres in height. No threshold were applied.
- Cover: Report on the proportion of cover that is in patches >= 20 hectares. Report at 0, 25, 50, and 100 years.
- Cover: Report on the area of cover that is within 200 metres of lakes, wetlands, and streams. No threshold were applied.

The total CFLB area of the moose polygon is 503,999 hectares and the CFLB area within 200 metres of riparian features is 317,806 hectares.

3.2.13 Coastal Tailed Frog

TSR 2015 did not consider Coastal Tailed Frog other than through the netdown for wildlife habitat areas. The ISS Base Case will model and report on coastal tailed frog in two ways. First, habitat in the vicinity of known CTF point locations was netted out of the THLB as discussed in Section 3.1.12.

Second, FLNRO provided boundaries for watershed units where CTF is known to occur. Because many of these watersheds overlapped, it was necessary to rationalize the units into large watershed, watershed, basin, sub-basin and residual units. Through this process, 298 watershed units were created with a gross area of 83,340 hectares, CFLB area of 82,876 hectares, and THLB area of 50,371 hectares. For this analysis, ECAs were assessed and reported in each of these units using the 2015 Winkler hydrologic recovery curves for logged areas and the MPB ECA assumptions discussed in Section 3.2.6. Targets will not be implemented.

A sensitivity analysis will consider the impact of increasing buffer widths on all small streams within the CTF watersheds as outlined in Section 3.1.12.

3.2.14 Marten

Marten has been identified as a potential species of concern in the Merritt TSA. TSR 2015 did not include any modelling for Marten habitat. The ISS Base Case will implement the following reporting criteria:

- Early seral stage area was reported within the MS and ESSF BEC zones. No thresholds were applied.
- Mature plus old seral stage area was reported within the CWHms, ESSFdc, ESSFdcw, ESSFxc, ESSFmw, and ESSFmww BEC variants. No thresholds were applied.

3.2.15 Adjacency

TSR 2015 modelled adjacency requirements by limiting the proportion of THLB area with a height of less than 3 metres to 33% within each Fresh Water Atlas watershed. The ISS Base Case will not implement this constraint, but rather, will use the patch size capabilities within the Patchworks model to encourage harvest locations to mimic natural disturbance patterns as outlined in Section 3.2.3.

A sensitivity scenario will implement the adjacency constraints instead of patch size targets. This sensitivity will use the cumulative effects watershed units rather than the Fresh Water Atlas watersheds as the basis for the constraint. Landscape units were the basis for those parts of the TSA where cumulative effects watersheds were not defined.

3.2.16 Other Resource Features

Various resource features for cultural and archaeological sites, and research installations (e.g., permanent sample plots) that exist throughout the TSA were considered and typically protected within reserve areas during operational planning. Accordingly, no further modelling assumptions were applied for other resource features in this analysis.

3.3 Harvesting Assumptions

This section describes the criteria and considerations used to model timber harvesting activities.

3.3.1 Utilization Levels

The minimum merchantable timber specifications for all species and analysis units (natural and managed) are shown in Table 24.

Table 24 Utilization Levels

Species	Minimum Diameter at Breast Height	Maximum Stump Height	Minimum Top Diameter Inside Bark
Lodgepole pine	12.5 cm	30.0 cm	10.0 cm
Other Conifer	17.5 cm	30.0 cm	10.0 cm
Deciduous	17.5 cm	30.0 cm	10.0 cm

3.3.2 Volume Exclusions

No species-specific volume exclusions were applied in this analysis.

Volume from deciduous species in predominately coniferous stands is typically not harvested today but this may present future harvest opportunities. Accordingly, merchantable volumes for both deciduous and coniferous stand types were tracked and reported in the analysis. Harvest levels were set to target coniferous volumes while deciduous volumes harvested were considered incidental.

3.3.3 Minimum Harvest Criteria

Minimum harvestable criteria were used to determine the age when stands become available for harvesting. For the base case, the criteria used in TSR 2015 were applied, as shown in Table 25. The effect of using alternate criteria may be explored through sensitivity analyses and strategy development.

The model will only harvest stands whose merchantable volumes meet these minimum thresholds now or sometime in the future. There are 25,552 hectares of THLB stands that will never be harvested because they do not meet the minimum merchantable volume criteria. These effectively become non-THLB, and are categorized as follows:

- Deciduous Leading : 4,495 hectares
- Douglas-fir Leading: 16,807 hectares
- Ponderosa pine Leading: 4,251 hectares

Table 25 Minimum harvest thresholds

Stand Type	Minimum Merchantable Volume	Minimum volume per tree	Minimum Age (years)
Even-aged Natural	150 m^3/ha	0.2 m^3	N/A
Even-aged Managed	150 m^3/ha	0.2 m^3	60
Uneven-aged Dry Belt fir	120 m^3/ha	0.2 m^3	N/A

3.3.4 Harvest Opening Sizes

The patch size capabilities of Patchworks were used to encourage the model to create harvest openings that are realistic. This was applied within a 5 year period, and are discussed in Section 3.2.3 along with the very young seral patch size targets The targets were implemented as outlined in Table 26, and the target weight were set relatively low to avoid unduly impacting the harvest flow.

Table 26 Harvest Patch Size Targets

Silviculture System	Harvest Patch Targets (%) 0-5 ha	5-20 ha	20-100 ha	100 + ha
Clearcut	0 to 5%	5 to 50%	10 to 70%	0 to 10%
Selection	0 to 5%	10 to 50%	10 to 80%	0 to 15%

3.3.5 Harvest Profiles

Harvest profiles can be configured in the model to track or limit harvest profiles for each time period. This section describes the profiles that may be applied. Strategy / scenario development may require the incorporation of additional profiles as the project progresses.

3.3.5.1 Product Profile

Modelling products distributions delivered to the mill is a complex and often criticized exercise. The considerations required for this are not trivial: stand-level variations for predicting products on the stump, harvesting practices, preferred log specifications specific to each manufacturing facility. This is further complicated by the damage from insects – particularly shelf-life, and other disturbances (e.g., piece size, decay, checking, and blue-stain).

Rather than categorizing harvested products as a model input, this analysis will track and report species harvested by age class. Through a post-processing exercise, product distributions can then be combined with the harvest summaries (as a model output). With this approach, one can easily adjust the product distribution with specific assumptions to generate new product profiles.

As this approach applies product distributions through a post-modelling process, the model will not be configured to regulate the harvest flow for any specific product, or combination of species and age class.

3.3.6 Silvicultural Systems

The most common silvicultural system implemented within the TSA is clearcut with reserves. However, selection systems were modelled in dry-belt Douglas-fir stands.

The modelled silvicultural systems simplified prescribed harvest treatments with unique responses. Yield curves for each silvicultural system treatment were developed for existing and future managed stands. The approach applied to model these treatments is shown in Appendix 3.

3.4 Natural Disturbance Assumptions

Natural disturbance assumptions define the extent and frequency of natural disturbances across the land base. Assumptions used to model disturbance within and outside the THLB are explained below.

3.4.1 Natural Disturbance within Non-THLB

For this analysis, a constant area was disturbed annually within each BGC Zone and natural disturbance type (NDT). The area of disturbance varied based on the biogeoclimatic variants present, their associated natural disturbance intervals and old seral definitions, as outlined in the Biodiversity Guidebook (B.C. Ministry of Forests and B.C. Ministry of Environment, Lands and Parks 1995). Table 27 shows the process used to determine the annual disturbance limits applied to the forested non-THLB. Note that disturbances were not applied to the small amount of NDT5 within the TSA.

Table 27 Annual natural disturbance limits in the forested non-THLB by BEC Zone/NDT

BEC ZONE	NDT	Disturbance Interval (yrs)	"OLD" Defn (yrs)	% Area > OLD*	Effective Rotation Age (yrs)*	Contributing Non-THLB Area (ha)	Annual Area Disturbed (ha) (area/rot age)
CWH	2	200	250	29%	350	1,434	4
ESSF	3a	150	140	39%	231	20,214	88
ESSF	2	200	250	29%	350	36,956	106
MS	3a	150	140	39%	231	22,398	97
MS	3b	150	140	39%	231	24,217	105
IDF	4	250	250	37%	395	114,418	290
PP/BG	4	350	250	49%	490	6,916	14
Total						226,553	704

** % area old = exp (-[old age / disturbance interval]), Effective rotation age = old age / (1 – % area old)*

To reduce the number of modeled zones required, modeling disturbance was simplified to BGC/NDT combinations for applying annual disturbances. Stands were randomly selected to account for these natural disturbance areas. Ages were then adjusted in each period according to the effective rotation age so that all stands within each unit were turned over once throughout the effective rotation. This process continued throughout the planning horizon and avoided seral requirements because disturbance was selected randomly; independent of modeled harvest priority.

Across the Non-THLB, approximately 793 ha (0.31%) is disturbed each year, resulting in an average disturbance turn-over of the non-THLB approximately every 319 years (range is 231 to 490 years).

3.4.2 Natural Disturbance within the THLB

Throughout the planning horizon, natural disturbance within the THLB was addressed as non-recoverable losses (NRL). These are estimates of annual volume losses resulting from catastrophic events such as insect epidemics, fires, wind damage or other agents.

Table 28 shows the NRL figures used for this analysis, which are based on the TSR 2015 technical document. Note that the loss for MPB is not applied until year 16 (i.e. post salvage) as it is assumed the yield assumptions adequately deal with MPB losses during the salvage period.

Table 28 Non-recoverable losses

Period	Damaging Agent	Annual NRL (m^3/yr)
Year 16+	MPB	35,000
All	Fire	22,097
All	Spruce Beetle	7,150
All	Wind	18,000
	Total	**82,247**

Modelling natural disturbance within the THLB involved removing the total NRL (47,247 or 82,247 m^3/yr) from the annual target harvest level achieved in the model for the applicable period.

3.5 Growth and Yield Assumptions

Growth and yield assumptions describe how net volumes for natural and managed stands are developed and incorporated in the model. They also describe changes in other tree and stand attributes over time (e.g., height, tree diameters, presence of dead trees, etc.).

3.5.1 Analysis Unit Characteristics

Stands were grouped into analysis units (AU) to reduce the complexity and volume of information in the model and for assigning potential treatments and transitions to yield curves following harvest. The analysis units are complex because of the desire to reflect MPB impacts, past silvicultural investments, potential future silviculture investments, and other resource criteria such as fire management. The criteria used to group stands are provided in Table 29.

Table 29 Criteria used to group stands into analysis units

Existing Stand Type	Future Stand Type (Transition)
Existing Natural Stands ○ BEC (BG/PP/IDF, MS, ESSF/MH/CWH/IMA) ○ Leading species groups (Pl, Fd/Lw, Py, Sx/Cw/Hw/Pa/Pw, Bl/Ba, Decid) ○ Site productivity – VRI SI (SI @ SI >=5&<10, ≥10&<15, >= 15&<20,≥20) ○ % of Pine Dead (<20, ≥20&<40, ≥40&<60, ≥60&<80, ≥80) ○ Age class for MPB attacked stands (5 yr increments) ○ Clearcut or Partial Cut (Dry Belt Fir) ○ Wildfire Impact (Regeneration delay if not salvaged) ○ Dry-belt Fd stand types (three volume categories) ○ THLB/NTHLB	***Future Managed Stands*** Clearcuts ○ BEC (BG/PP/IDF, MS, ESSF/MH/CWH/IMA) ○ Leading species (Pl, Fd, Sx, Bl, Py, Decid) ○ Site productivity – PHR SI (IDF Fir @ SI <= 17.0, >17.0&<=18.8, >18.8; IDF Pine @ SI <= 17.8, >17.8&<=18.9, >18.9; IDF Spruce@ SI <=16.1, >16.1&<=17.9, >17.9; MS Fir @ SI <= 18.0, >18.0&<=19.3, >19.3; MS Pine @ SI <= 17.3, >17.3&<=17.9, >17.9; MS Balsam @ SI <= 17.3, >17.3&<=19.4, >19.4; MS Spruce @ SI <= 17.3, >17.3&<=18.3, >18.3; ESSF Fir @ SI <= 15.0, >15.0&<=19.0, >16.0; ESSF Pine @ SI <= 14.1, >14.1&<=17.1, >17.1; ESSF Balsam @ SI <= 15.8, >15.8&<=19.0, >19.0; ESSF Spruce @ SI <= 14.7, >14.7&<=18.1, >18.1) ○ Planted vs. Natural Regeneration Partial Cuts (Dry Belt Fir) ○ Create linear growth curves, with 50% volume removal Wildlife objectives (Williamson's Sapsucker) Fire Management objectives
Existing Managed Stands ○ BEC (BG/PP/IDF, MS, ESSF/MH/CWH/IMA) ○ Leading species (Pl, Fd, Sx, Bl, Py, Decid) ○ Site productivity – – PHR SI (IDF Fir @ SI <= 17.0, >17.0&<=18.8, >18.8; IDF Pine @ SI <= 17.8, >17.8&<=18.9, >18.9; IDF Spruce@ SI <=16.1, >16.1&<=17.9, >17.9; MS Fir @ SI <= 18.0, >18.0&<=19.3, >19.3; MS Pine @ SI <= 17.3, >17.3&<=17.9, >17.9; MS Balsam @ SI <= 17.3, >17.3&<=19.4, >19.4; MS Spruce @ SI <= 17.3, >17.3&<=18.3, >18.3; ESSF Fir @ SI <= 15.0, >15.0&<=19.0, >16.0; ESSF Pine @ SI <= 14.1, >14.1&<=17.1, >17.1; ESSF Balsam @ SI <= 15.8, >15.8&<=19.0, >19.0; ESSF Spruce @ SI <= 14.7, >14.7&<=18.1, >18.1) ○ Age (0-10 yrs, 10 to 29 yrs) ○ Wildfire Impacted	***Future Managed Stands*** Same criteria as future managed stands

A detailed list of the analysis units and TIPSY inputs is provided in Appendix 2.

For existing natural stands, a VDYP yield was first generated for each forest polygon then area-weighted averages of these curves were calculated according to the assigned AUs. For MPB-impacted stands, yield curves were also adjusted to reflect the future trajectories for both live and dead portions of the stand using the average dead/live ratio from the forest inventory for the stands in the AU (max 20% span in any AU).

3.5.2 Dry Belt Fir

The process documented for TSR 2015 was used to define Dry Belt Fir. All Douglas-fir leading, south facing polygons within the IDF and PP biogeoclimatic zones were categorized as Dry Belt Fir, with the exception of those stands in the IDFdk which also needed to be below 1200 metres in elevation.

Managed stands (i.e. stands less than 30 years of age) were excluded from Dry Belt Fir as it is assumed they are being managed with clearcut silviculture systems.

There is considerable overlap with other constraints on the landbase, as detailed in Table 30. Of the 59,002 hectares of dry-belt fir, roughly 28,234 hectares are in the THLB, and 17,165 hectares are in areas without overlapping constraints.

Consistent with 2015 TSR, twenty percent of Dry Belt Fir is assumed to be harvested using conventional clearcut with reserve silviculture systems, and the remaining eighty percent was harvested using a selection silviculture system. For purposes of modeling, Dry Belt Fir polygons were assigned to be harvested with a selection system until the required area was achieved using the following criteria:

- First priority – overlap with a VQO polygon, or Williamson's Sapsucker BMP area (within 500 m of nest or in Low or Moderate habitat suitability)
- Second priority – same VRI "feature_id" as a first priority polygon
- Third priority – picked from a list sorted by VRI "feature_id"

Table 30 Dry Belt Fir overlap with other constraints

Overlap Category	THLB Area (ha)	Non-THLB Area (ha)	Total CFLB Area (ha)
Parks/Protected Areas	`	272	272
ESA		7,951	7,951
Inoperable		6,268	6,268
Riparian		2,590	2,590
WHA		580	580
OGMA		8,093	8,093
Coastal Tailed Frog		1	1
UWR		4,845	4,845
WTR		167	167
WISA*	1,634		1,634
WISA & VQO – Retention	516		516
WISA & VQO – Partial Retention	1,239		1,239
WISA & VQO – Modification	188		188
VQO - Preservation	102		102
VQO - Retention	1,571		1,571
VQO – Partial Retention	5,362		5,362
VQO - Modification	458		458
Unconstrained	17,165		16,864
Total	28,234	30,767	59,002

3.5.3 Stand Projection Models

Yield curves developed for the forest estate model were prepared using the following stand projection models:

- Existing natural stands: Variable Density Yield Prediction (VDYP) 7
- Existing and future managed stands: Table Interpolation Program for Stand Yields (TIPSY) 4.3

3.5.4 Decay, Waste, and Breakage

For natural stands, default reductions to stand volume for decay, waste and breakage were applied to the VDYP7 model for Forest Inventory Zones C and D. Reductions for decay, waste and breakage are also

incorporated in the TIPSY model for managed stands as operational adjustment factors (section 3.5.6) that affect both the magnitude and the shape of the yield curve.

3.5.5 Managed Stand Definition

To project stand growth and yield, stands were classified as natural or managed stands based on their silviculture regime. Natural stands were established naturally under various scenarios that affect the timing and stocking of stands while managed stands were post-harvest regenerated based on specific silviculture treatments. In this analysis, post-harvest regenerated (PHR) stands less than 30 years old were assumed to be managed while those 30 years and older were handled as natural stands. Existing managed stands were further classified into new managed (age 0 to 10 years) and old managed (age 10 to 29 years).

3.5.6 Operational Adjustment Factors Applied to Managed Stand Yields

The TIPSY projection model reports the potential yield of a specific site, species and management regime. Operational adjustment factors (OAFs) were applied to reflect the operational environment accordingly:

- OAF1 of 15% to address a constant reduction for unmapped stocking gaps (e.g., non-productive areas, management effects, and losses due to forest health and random risk factors).
- OAF2 of 5% to address dynamic reductions over the life of the stand such as decay, waste and breakage and some forest health concerns.

3.5.7 Site Index Assignments

Managed stand site index reflects the potential productive capacity of a stand. The inventory site index was used as the site productivity input to develop yield curves for existing natural stands while the managed site index was used for existing managed and future managed stands.

For this analysis, site index for managed stands was calculated as area-weighted averages from provincial site productivity estimates. These estimates were based on the provincial site productivity tile SIBEC estimates and site series identified in the predictive ecosystem mapping for the Merritt TSA (section 2.3). The distribution of natural and managed stand site indices across the THLB is shown in Figure 10. The area-weighted average site index of the THLB for natural stands is 14.5 m. After the THLB is converted into managed stands the average site index increases to 18.0 m.

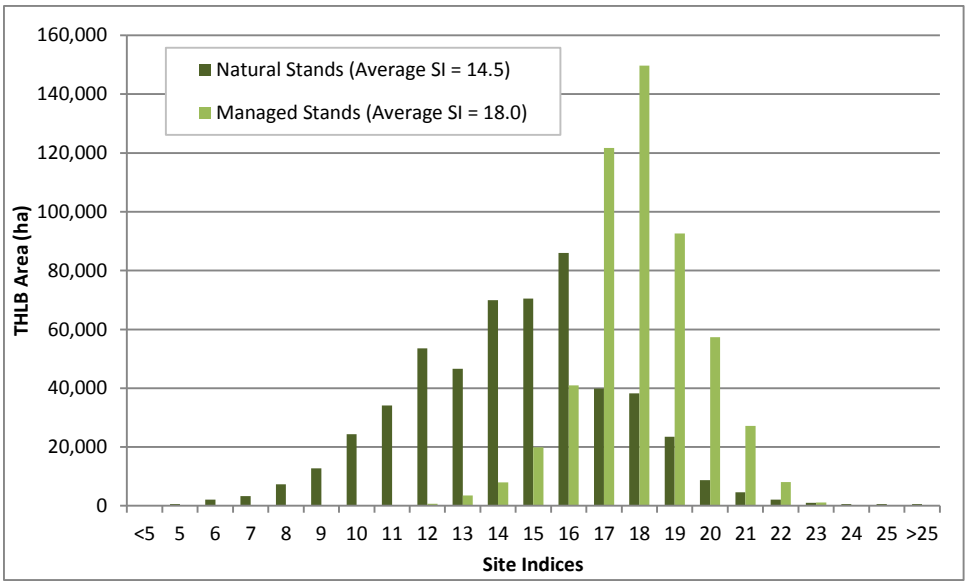

Figure 10 Distribution of natural and managed stand site indices over the THLB

3.5.8 Not Satisfactorily Restocked

Not satisfactorily restocked (NSR) is defined as a forested area that does not have a sufficient number of well-spaced trees of desirable species. This definition does specify why the area is NSR (harvesting or natural disturbances) but does suggest that NSR areas require some remedy or consideration (i.e., it is not satisfactory).

Current NSR typically refers to stands recently disturbed (i.e., since 1987) that are not yet declared as being stocked while *backlog* NSR refers to stands disturbed prior to 1987 that are not declared as satisfactorily restocked. Back NSR is not considered an issue in the Merritt TSA and was thus not addressed in this analysis.

Current NSR is addressed in the analysis as part of the regular regeneration assumptions (average regeneration delay). NSR was also considered in yields for stands affected by natural disturbance (i.e., extended regeneration delays in fire areas).

3.5.9 Select Seed Use / Genetic Gain

Genetic gains were applied to existing managed stands less than 10 years old, and to future managed stands using the assumptions documented for TSR 2015. These assumptions were based on a review of Tree Improvement Branch data for stands planted since 2004. Unlike TSR 2015 which used the same gain for both existing and future managed stands, this analysis will differentiate between the two and apply the values outlined in Table 31.

Table 31 Genetic gains for existing and future managed stands

Species	Existing Managed Stands	Future Managed Stands
Lodgepole Pine	1.7%	3.7%
Spruce	13.3%	17.3%

3.5.10 Regeneration

Regeneration assumptions for future managed stands were adapted from those used in TSR 2015, which used "Free Growing" data from RESULTS to estimate the probability of lead species conversion for

existing BEC/lead species combinations (Table 32), combined with the regeneration delay, species composition, and density by BEC/lead species for existing managed stands (Table 33. This approach was simplified to produce a single regeneration pathway for each existing BEC/lead species combination by weighting the TSR 2015 values. The resulting species compositions are provided in Table 34, and regeneration assumptions for existing and future managed stand analysis units are provided in Appendix 2.

Table 32 Regeneration Pathways

BEC Zone	Existing Lead Species	Regenerating Lead Species	Probability of Lead Species Conversion
ESSF/CWH/MH	Balsam	Balsam	25%
		Lodgepole Pine	15%
		Spruce	60%
	Douglas-fir	Lodgepole Pine	100%
	Lodgepole Pine	Balsam	17%
		Lodgepole Pine	76%
		Spruce	7%
	Spruce	Balsam	27%
		Lodgepole Pine	41%
		Spruce	32%
BG/PP/IDF	Douglas-fir	Douglas-fir	22%
		Lodgepole Pine	78%
	Lodgepole Pine	Douglas-fir	12%
		Lodgepole Pine	88%
	Ponderosa Pine	Lodgepole Pine	100%
	Spruce	Lodgepole Pine	87%
		Spruce	13%
MS	Balsam	Lodgepole Pine	92%
		Spruce	8%
	Douglas-fir	Douglas-fir	11%
		Lodgepole Pine	89%
	Lodgepole Pine	Lodgepole Pine	100%
	Spruce	Balsam	7%
		Lodgepole Pine	83%
		Spruce	10%

Table 33 Regenerated Stand Characteristics

BEC Zone	Regenerating Lead Species	Regeneration Delay	Composition	Regeneration Type	Density
ESSF/CWH/MH	Balsam	2	BL60SX24PL16	Natural	4700
	Lodgepole Pine	2	PL69SX16BL15	Planted	1200
	Spruce	2	SX64BL27PL9	Planted	1200
BG/PP/IDF	Douglas-fir	3	FD67PL33	Planted	1000
	Lodgepole Pine	2	PL86FD14	Planted	1200
	Spruce	1	SX60PL22BL10FD8	Planted	1000
MS	Balsam	2	BL62PL22SX16	Natural	5500
	Douglas-fir	2	FD59PL21BL13SX7	Planted	1000
	Lodgepole Pine	2	PL82BL10SX8	Planted	1300
	Spruce	2	SX60PL18BL16FD6	Planted	1200

Table 34 Weighted Species Composition for Regenerated Stands

BEC Zone	Existing Lead Species	Lodgepole Pine %	Douglas-fir %	Spruce %	Balsam %
ESSF/CWH/MH	Balsam	19.8	-	46.8	33.4
	Douglas-fir	69.0	-	16.0	15.0
	Lodgepole Pine	55.8	-	20.7	23.5
	Spruce	35.5	-	33.5	31.0
BG/PP/IDF	Douglas-fir	74.3	25.7	-	-
	Lodgepole Pine	79.6	20.4	-	-
	Ponderosa Pine	86.0	14.0	-	-
	Spruce	76.0	12.2	8.3	3.5
MS	Balsam	76.9	0.5	12.2	10.4
	Douglas-fir	75.3	6.5	7.9	10.3
	Lodgepole Pine	82.0	-	8.0	10.0
	Spruce	71.4	0.6	13.8	14.2

3.5.11 Deciduous

Deciduous volumes were included in this analysis for both leading species and mixed stands. In the base scenario, however, deciduous volumes harvested were tracked as a separate product while harvest targets were based on coniferous volumes. Moreover, only coniferous volumes contribute in determining minimum harvest age.

3.5.12 Stands Impacted by Wildfires

The approach taken to update the forest inventory impacted by past wildfires was discussed in section 2.3. The following approach was used to adjust yield curves accordingly:

- Live stands: existing natural yield curve (VDYP)
- Unlogged, dead stands: existing natural yield curve (VDYP) with 30 year regeneration delay from the year of disturbance
- Logged, dead stands (plantations): existing managed curve (TIPSY) with 7 year regeneration delay from the year of disturbance.

3.5.13 Stands Impacted by Mountain Pine Beetle (MPB)

Using current forest inventory attributes, VDYP was used to generate full volume yield curves for each natural stand. These curves were then adjusted to develop volume curves that reflect MPB impacts on pine mortality, shelf-life, and regenerating volume similar to the approach used for TSR 2015.

3.5.13.1 MPB Mortality and Age of Attack

VRI volume attributes were used to determine the percentage of pine that was impacted by MPB for each polygon in the inventory. Each polygon that was impacted by MPB was then assigned an age of attack based on the VRI attribute "*earliest_nonlogging_dist_date*". Analysis units were assigned based on the age of attack in 5 year classes, and percentage of pine killed in 20% classes.

3.5.13.2 MPB Yield Tables

Natural (unsalvaged) stands were assigned four yield curves; combined to reflect growth and yield over time. The four stand components (live non-pine volume, live pine volume, dead merchantable pine volume, and naturally regenerating understory volume) are described in Table 35 and illustrated in Figure 11.

Table 35 Approach to reflect post-attack MPB impacts to yields for natural stands

Stand Component	Timing [1]	Yield Adjustments [2]
Dead pine overstory trees	○ From year of death	○ VDYP used to project yields for each polygon ○ Yield and density reduced according to attack severity ○ (Dead% x Yield) ○ Yield drops to 0 m³/ha over 32 years (see shelf life assumptions below).
Live pine overstory trees	○ From year of death	○ VDYP used to project yields for each polygon ○ Yield and density reduced according to attack severity ((100%-Dead%) x Yield) ○ Yield calculated as the incremental growth from the original unattacked projection: LV = UV x (1-AS), where LV is live volume, UV is unattacked volume and AS is percent attack severity.
Non-pine overstory trees	○ From year of death	○ VDYP used to project yields for each polygon ○ Yield and density of non-pine species unaffected by death of pine component
Regenerating understory trees [3]	○ 20 years from year of death	○ Uses original non-killed pine volume at corresponding regen age times attack severity: ○ E.g. volume at 20 years from death = un-attacked pine volume at age 20 times attack severity, volume at 30 years from death = un-attacked pine volume at age 30 times attack severity, etc.

1. Year of death was determined as the VRI "earliest non-logging disturbance date"
2. Dead % applies to the pine component.
3. The approach for yields of regenerating understory trees is adapted from TSR 2015 approach.

The example in Figure 11 below (100 yr old stand at time of attack in 2007, 60% dead), shows the stand's dead merchantable volume declines over the 32 years following attack (red dashed line), while the remaining live pine (orange line) and live non-pine (green line) portions of the stand continue to grow. Understory regeneration (purple line) begins to contribute volume in 2047. The sum of the four curves provides the total merchantable volume at any time. In this example, the stand recovers to post attack volumes in 2167 (160 years from year of death). This is only an example for discussion.

These stands are considered ineligible for harvesting when the total merchantable volume for the stand (dead + live + regeneration) falls below the minimum volume threshold (150 m³/ha). In this example, this occurs about 11 years after death and lasts for about 40 years.

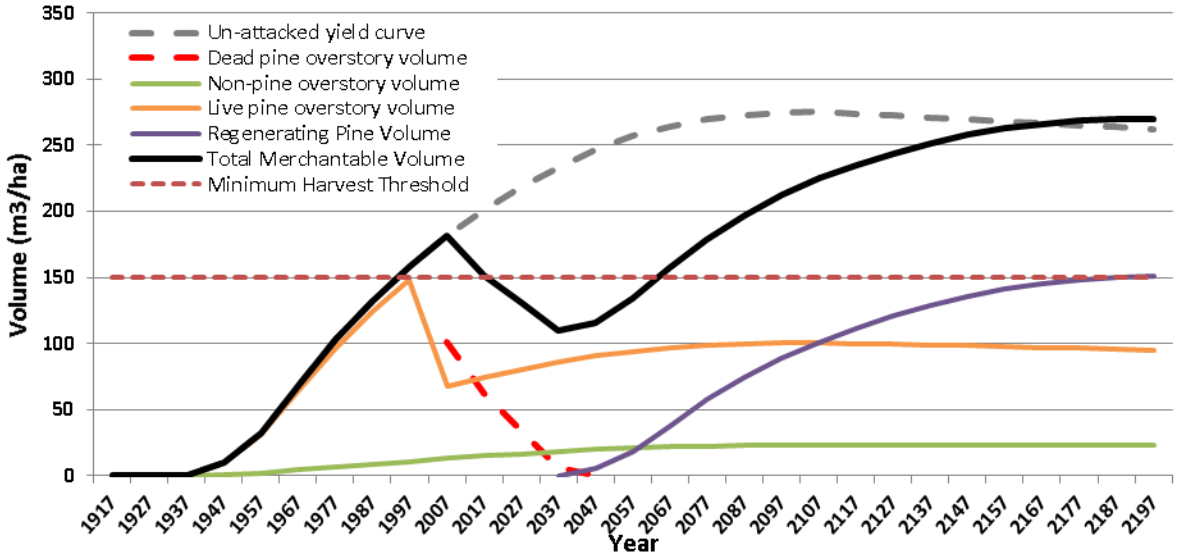

Figure 11 Example of how natural yields were impacted by MPB

3.5.13.3 Shelf Life Assumptions

Shelf life is the time a tree/stand will remain economically viable to harvest. The following shelf life function, shown graphically in Figure 12 was used to reduce volumes at various ages beyond the year of attack:

(equation 1) $useable\_dead\_conifer\_vph = initial\_dead\_vph * useable\_dead\_pct$

where

(equation 2) $useable\_dead\_pct = 0.9 - (0.0281 * yrs\_since\_death)$

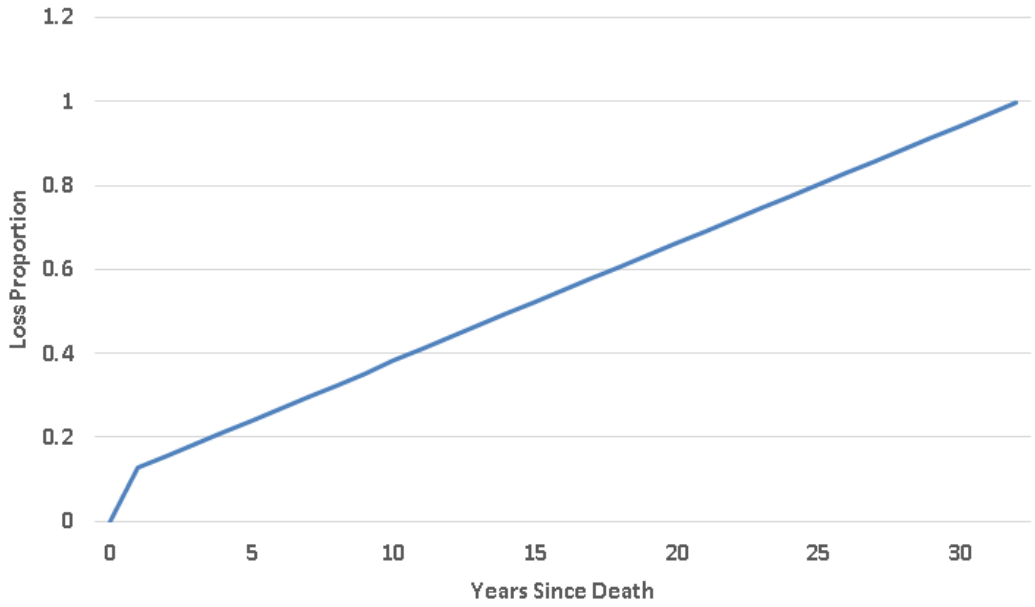

Figure 12 Shelf life loss of MPB-attacked, dead overstory trees

3.5.13.4 Regenerating understory volume

The approach used in TSR 2015 was adapted for use in this analysis. The regenerating volume was calculated based on the un-attacked pine curve and the percentage of pine killed, as follows. The un-attacked pine volume curve was first multiplied by the percentage of pine killed to calculate regenerating volumes at each age. This regenerating curve was then applied starting at the age of attack (i.e. the regenerating volume at age of attack plus 20 = pine volume at age 20 times pine percentage killed).

3.5.14 Mountain Pine Beetle Impacts on Managed Stands

TSR 2015 indicated that the MPB impacts observed in managed stands are not believed to be of sufficient severity to impact growth, and therefore did not adjust managed stand volumes. A similar approach is used for this analysis.

3.5.15 Stands Impacted by Spruce Beetle and Western Spruce Budworm

Past damage from spruce beetle and western spruce budworm (section 2.3) suggests that at least some damage is likely to occur on existing and future stands. However, no specific adjustments were made to existing and future yields or annual target harvest levels beyond those considered for endemic insect losses incorporated into OAF2 (see 3.5.6) and non-recoverable losses for insects (section 3.4.2).

3.5.16 Silviculture systems

The silviculture systems used to model various management regimes are discussed below while the modelling approach for these treatments is shown in Appendix 3.

Clearcut System

Clearcut with reserves was assumed to be the silviculture system used for all stand types other than the 80% of Dry Belt Fir stands that would be harvested using a selection system, as outlined in Section 3.5.2.

Selection System

Selection silviculture systems were modeled for Dry Belt Fir stands using the approach outlined in TSR 2015. Inventory polygons within the THLB were classified into three groups based on their 17.5 cm+ live inventory conifer volume so that each group had roughly 1/3 of the area weighted volume. The area weighted average live inventory volume for each group was the starting volume assigned to the yield curve for each group (Table 36).

The starting volume for each group was incremented by 1.74 m^3/ha per year, as per TSR 2015 which was based on re-measurements from the Pothole Creek Dry Belt Fir partial cutting research trial. The yield curves were incremented in a linear fashion until plateauing at 300 m^3/ha.

The minimum harvest threshold was set to 120 m^3/ha. Fifty percent of the volume could be removed at harvest, at which time the stand is no longer eligible until it grows back to the minimum threshold.

Table 36 Volume classes for Dry Belt Fir Selection System Yield Curves

Volume Class	Volume range (m^3/ha)	THLB Area (ha)	Average Volume (m^3/ha)
Low	< 114	13,576	56.9
Medium	>= 114 and < 175	5,301	141.7
High	>= 175	3,150	232.2

3.6 Modeling Assumptions

General assumptions were incorporated into the model to improve its efficiency or to produce results that are more realistic spatially. Table 37 summarizes the modelling assumptions employed in this analysis.

Table 37 Modelling assumptions

Criteria	Assumption
Minimum Polygon Size	Very small resultant polygons were merged into neighbouring polygons through a smart geoprocessing exercise to eliminate sliver polygons based on their size, shape, and source layer (e.g. smaller polygons were retained for riparian buffers than for landscape units, and larger long skinny polygons were eliminated vs smaller round polygons).
Blocking	To improve modelling performance, resultant polygons were blocked (or grouped) where possible by maintaining the same AUs and 10-year age classes and the model was configured for a target harvest opening size of 20 ha and a maximum opening size of 50 ha.
Planning Horizon	A 200 year planning horizon was applied reported in 5-year increments (i.e., 40 periods).
Harvest Flow Objectives	○ Achieve the long term and mid-term harvest levels achieved in the TSR benchmark scenario after adjusting for the reduction in THLB. ○ Do not provide a transition between the mid-term and long-term harvest levels in order to better understand the effects of future ISS scenarios ○ Obtain the best short term harvest levels that do not drop more than 5% per 5-year period, and that do not impact mid-term harvest levels. ○ TBD for other scenarios

3.6.1 Grade 4 Credit

The approach documented in the TSR 2015 technical paper was used to account for Grade 4 credits. The volumes indicated in Table 38 were removed from the annual harvest level achieved in the model over the applicable period.

Table 38 Grade 4 Credit

Period	Grade 4 Credit (m^3/yr)
Year 1-5	150,000
Year 6-10	100,000
Year 11-15	50,000

4 Additional Data Layers

A number of data layers not required for the base case were incorporated into the resultant used for the analysis to allow for additional strategies or scenarios to be developed. A brief description of these layers follows:

4.1 Fire Management Layers

4.1.1 Fire Management Planning Units and Fire Breaks

A Fire Management Plan has been developed for the Merritt TSA. Twenty-nine fire management planning units cover the TSA and have been included in the resultant. Spatial data representing proposed fire breaks has also been included.

4.1.2 Provincial Strategic Threat Analysis 2015 Wildfire Threat Analysis

The Provincial Strategic Threat Analysis 2015 Wildfire Threat Analysis is used to inform government's landscape fire management planning and the Strategic Wildfire Prevention Initiative fuel treatment programs. Wildland Urban Interface polygons and from this analysis have been incorporated into the resultant dataset.

4.2 Forest Inventory Layers

4.2.1 Pruned and Fertilized Areas

Areas that were previously pruned or fertilized were extracted from RESULTS and incorporated into the dataset. There are approximately 125 hectares of pruned stands, and 820 hectares that have been fertilized.

4.3 Other Layers

4.3.1 Stoyoma Spiritual Area

The Stoyoma Mountain area is spiritually important to First Nations and has been included in the resultant.

4.3.2 Licensee Operating Areas

Major licensee operating areas have been included in the resultant, in anticipation of summaries being required at this level.

5 *Sensitivity Analyses*

5.1 Old Seral Requirements

A sensitivity analysis was completed that implements the old seral requirements by landscape unit and BEC as specified in the Order Establishing Provincial Non-Spatial Old Growth Objectives. Refer to Section 3.2.1 for details of these requirements.

5.2 Mature Plus Old Seral Requirements

A sensitivity analysis was completed that implements the mature plus seral requirements by landscape unit and BEC as specified in the Biodiversity Guidebook. Refer to Section 3.2.1 for details of these requirements.

5.3 Contiguous Pine Leading Patches

TSR 2015 did not consider limiting the amount of contiguous mature pine leading patches. The ISS Base Case will undertake a sensitivity analysis to explore the impact of limiting mature pine leading patches by implementing the targets outlined in Table 39.

Table 39 Patch size thresholds for Mature + Old Pl-leading Stands.

NDT	BEC Unit	Patch Sizes (ha)			Target Patch Area (%)		
		Small	Medium	Large	Small	Medium	Large
3a	MSxk, ESSFdc/xc	<40	40-250	250-1000	30-40	20-30	40-60
3b	MSdm/mw	<40	40-80	80-250	20-30	25-45	20-40
4	BGxh/xw, PPxh, IDFdk/xh	<40	40-80	80-250	40-50	35-45	10-20

5.4 Sustainable Rate of Cut in Fisheries Sensitive Watersheds

In addition to the ECA cap above the snowline for selected watersheds, the proposed Fisheries Sensitive Watershed (FSW) Order requires a "sustainable rate of cut" for all of the FSW watershed units. The effects of implementing this requirement was included as a sensitivity analysis by limiting the harvested area per period to a maximum value based on THLB area and average rotation age. The values applied are described in Table 23 within Section 3.2.8.

5.5 TSR Greenup Approach

A sensitivity analysis was completed that uses the TSR 2015 approach for adjacency rather than the patch size approach described in Section 3.2.3. Adjacency was modelled by limiting the proportion of THLB area with a height of less than 3 metres to 33% within each cumulative effects watershed unit. Landscape units were used for those parts of the TSA where cumulative effects watersheds were not defined.

5.6 Additional Riparian Buffers for Small Streams

This sensitivity will investigate the impact of applying enhanced riparian buffers (10 metres on each side) for S4, S5, and S6 streams. This will increase the riparian netdown by 10,904 hectares, or approximately 1.9% of the current TSA THLB. Most of this increase occurs outside the Nicola TSS watershed which already has enhanced buffers applied to selected small streams for the Base Case.

5.7 Wildlife Tree Retention

Two sensitivity analyses will examine the effect of changing the wildlife tree retention targets from the 8.1 percent target.

5.7.1 Forest Planning and Practices Regulation WTR

The FREP analysis used for TSR 2015 determined that there was currently 14.7% total WTR, with 8.1% on the THLB. The Forest Planning and Practices Regulation (FPPR) requires 7% total WTR. It was assumed that the FREP split between non-THLB/THLB will apply to this requirement. Therefore, this sensitivity will implement 3.9% WTR on the THLB (i.e. 7% * 8.1/14.7). The assignment will take into account the proportion of existing WTR by BEC, as shown in Table 40. Assuming the excess WTR in the MS is retained, the resulting overall WTR retention was 5.3%.

Table 40 FPPR WTR Targets by BEC Zone

BEC Zone	Existing THLB WTR %	Additional THLB WTR %
ESSF	1.7	2.5
MS	10.7	0.0
IDF	2.4	1.5
PP	0.4	3.5
CWH	0.0	3.9

5.7.2 Licensee Forest Stewardship Plan WTR

Licensee FSPs define gross WTR requirements by BEC zone. The corresponding targets for THLB WTR were determined by applying the FREP factor of 8.1/14.7 to these gross targets and taking into account the proportion of existing WTR by BEC zone, as shown in Table 41. Assuming the excess WTR in the MS is retained, the resulting overall WTR retention was 5.1%.

Table 41 Licensee FSP WTR Targets by BEC Zone

BEC Zone	FSP Gross WTR%	FSP THLB WTR%	Existing THLB WTR %	Additional THLB WTR %
ESSF	4.5	2.5	1.7	0.8
MS	3.0	1.7	10.7	0
IDF	7.0	3.9	2.4	1.5
PP	17.0	9.4	0.4	9.0
CWH	12.0	6.6	0.0	6.6

5.8 Additional Riparian Buffers for Coastal Tailed Frog

This sensitivity will investigate the impact of applying enhanced riparian buffers (33 metres on each side) to small streams within the watershed units where Coastal Tailed Frog is known to occur. The existing THLB area in these watershed units is 49,587 hectares. The enhanced buffers will result in a THLB reduction of 3,216 hectares (6.5% of the CTF watershed THLB or 0.6% of the current TSA THLB), not allowing for any overlap with the WTR budget.

6 Reserve Scenario

The Reserves scenario was designed to address the question, “Where and how should we reserve forested stands to address landscape-level biodiversity and non-timber values while, wherever possible, minimizing impacts to the working forest?” The underlying purpose of this scenario was to explore ways to maintain the harvestable area while providing for the full range of values on the landbase. This tactic was approached by maximizing relative scores assigned across the landbase for old forests, patch size, and interior old forest.

Results are not intended to be applied as reserves in an operational sense. Rather, these candidate reserves provide additional information – as starting point – for revising existing reserves or developing recruitment strategies; involving a collaborative planning team to review one landscape unit at a time.

We recognize that we currently do not have full information regarding First Nations values. While tactics to address specific First Nations values may not be directly modelled in this Reserve Scenario, they are considered within other scenarios where appropriate information is available. We will continue to work with First Nations to understand and incorporate their values into the Reserve and other Scenarios as information becomes available.

6.1 Approach

The following aspects guided the development of this reserve scenario:

1. Landscape-level exercise to stabilize and maximize THLB by overlapping reserves where possible (colocation).
2. Meet the requirements of multiple values on the land base that provide equivalent or greater ecological benefits.
3. Assess existing constraints (e.g., legal habitat designations).
4. Prioritize stand types according to current and future habitat capability.
5. Identify areas with increased retention (i.e., Coarse Woody Debris, Wildlife Tree Retention, and connectivity) (e.g., key wildlife species, increased in-block retention); ensure both scale are considered here (landscape- and stand-level – e.g., riparian reserves).
6. Manage rare sites/ecosystems (see Conservation Data Center); use existing Predictive Ecosystem mapping/Sensitive Ecosystems Inventory data to map sites.
7. Evaluate overall production of the landbase for all values while maintaining a sustainable forest industry; establish a baseline.
8. Without further work to assess selected stands in the field, this will NOT produce an operational-level scenario. However, it should provide a solid start to build from.

This analysis involved two general steps. First, each stand was assigned a relative score that promotes, or demotes, those most appropriate as candidate reserves. Then, a model is used to select candidate reserves that steadily meet landscape-level criteria and thresholds.

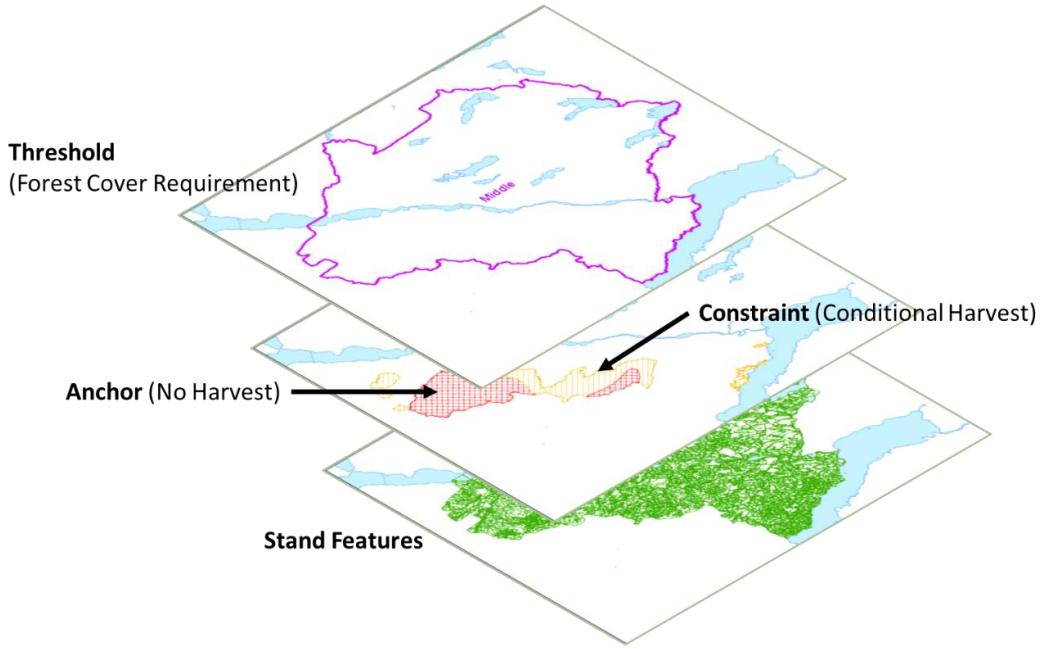

Figure 13 Approach for ranking stands as candidate reserves

A stand's total score, determined by the spatial exercise, is the sum of the anchor scores (number of overlapping anchors), constraint scores, and stand features. Stands were then sorted by their total scores – those with the highest values were the most desirable candidate reserves. Candidate reserves

were selected through a forest modelling exercise that assesses the combined score for each stand relative to established one or more landscape-level thresholds. In this case, candidate reserves must address multiple thresholds. In addition, to maintain an appropriate spatial pattern for reserves, stands with higher scores were also grouped to accommodate patch size distribution criteria. This prevents the 'shot-gun' pattern that otherwise results if only the highest scoring stands were selected.

6.2 Stand Features

Stand features scoring utilizes vegetation and other attributes to rank stands based on their overall suitability as candidate reserves. Stands were evaluated using the indicators described in Table 42.

Table 42 Rationale for Stand Features Scoring

Indicator	Rationale
Seral Stage	Overarching intent is to designate reserves in old seral stand types because they typically do not occur when forests are managed using economic rotation ages. Retaining old stands on the land base ensures habitat / biodiversity niches continue to exist. Seral stage is assigned to VRI polygons using age and BEC zone.
Species Composition	Non-pine leading or deciduous leading stands are higher contributors to biodiversity and old growth habitats. A higher diversity of species mix lends to a higher potential for biodiversity, however species mix will be to a certain extent captured in the rare ecosystem classification.
Dry-belt Douglas-fir	Douglas-fir leading, south facing polygons within the IDF and PP biogeoclimatic zones (except those stands in the IDFdk), below 1200 metres in elevation.
Tree Height	Connection between height, age and site productivity – taller trees for a given age can provide valuable habitat and recruitment for future snags.
Deadwood Abundance	Desirable stands consist of old, large, living and dead trees with coarse woody debris. Snags are an important contributor to biodiversity.
Vertical Complexity	Higher levels of vertical structure / complexity are linked with old growth stands.
Old / Mature Interior Forest	The quality of old growth habitat is affected by edge conditions versus interior old forest. Areas large enough to provide interior old forest condition are preferred.

Stand-level indicators were divided into categories that align with scoring for old forest criteria. In addition, categories and scoring considers stand resilience while negative values reflect undesirable stand characteristics.

In some cases, stand feature scores provided the 'tie-breaking' assessment between two stands identified as candidate reserves. These scores were developed and assessed independently of scores developed for anchors and constraints.

The total score for a stand is the sum of the applicable category scores – for example, a coniferous stand in the old seral stage (9 points), that's non-pine leading (0 points), 26 m tall (1 point), with a non-uniform vertical complexity (4 points) has a total score of 14 points.

Table 43 Stand Feature Scoring

Indicator	Category	Score
Seral Stage	Young	**0**
	Mid	**2**
	Mature Conifer (>120 years)	**5**
	Old Conifer (see Table 46)	**9**
	Very Old Conifer (Old + 50 years)	**10**
	Mature Deciduous (>40 years)	**10**
	Old Deciduous (>100 years)	**8**
	Very Old Deciduous (Old + 50 years)	**5**
Species Composition	Deciduous-leading	**5**
	Ponderosa Pine (≥ 50%)	**5**
	Lodgepole Pine-leading (≥ 70%)	**-1**
Dry-belt Douglas-fir	Yes (See Constraints)	**3**
Tree Height	≥ 20 m	**1**
Deadwood Abundance	5 to 30%	**2**
	> 70%	**-2**
Vertical Complexity	4 - Non-Uniform	**4**
	5 - Very Non-Uniform	**5**
Old/Mature Interior Forest	Yes	**3**

6.3 Anchors

Anchors are resource management areas that cannot be harvested because of a legal requirement or physical limitation. All anchors were assigned the same score (10) so that the combined score for stands with overlapping anchors was replicated (e.g., a stand with 3 overlapping anchors is given a score of 30).

Scoring for these areas was developed and assessed separately. The detailed criteria for scoring anchors are listed in Table 44 and described in Appendix 4. While some components may not affect THLB (e.g., wetland and grassland species like snakes and Great Basin Spadefoot), they were still identified as no-harvest to potentially build candidate reserves upon.

Table 44 Anchor Scoring

Anchors	Score
WHA (core): Coastal Tailed Frog	10
WHA (core): Data Sensitive (snakes)	10
WHA (core): Great Basin Spadefoot	10
WHA (core): Grizzly Bear	10
WHA (core): Lewis's Woodpecker	10
WHA (core): Western Screech Owl	10
WHA (core): Williamson's Sapsucker	10
UWR (core): Mountain Goat	10
Parks and Protected Areas	10
Environmentally Sensitive Areas	10
Slope Class >65% or Terrain Stability Class 5	10
Legally Established Heritage Trails	10
Research Sites (i.e. PSP with 50m buffer)	10
Effective Riparian Reserves (including TSS buffers)	10
Whitebark Pine (exists)	10
Wetlands (adjacency); recognize this value	10
Cultural Survival Areas - (No Go) *	10
Cultural Heritage Resources – (No-Go) *	10
Archaeological Sites **	10

** Data not available at this time*

*** Not permitted to use data at this time*

6.4 Constraints

Constraints are resource management areas that restrict harvesting on a portion of stands (i.e., conditional harvest). Like stand features, constraints were used to influence selection when a choice is presented. Constraints were scored (from 1 to 10 - Table 45) based on their perceived impact to timber availability (i.e., the higher the score, the greater the impact to timber supply relative to other constraints). The total score for a stand is the sum of all applicable category scores for that stand including those for multiple overlapping constraints. Detailed criteria for scoring constraints based on timber impact are described in Appendix 5.

Table 45 Constraint Scoring

Constraints	Score
OGMA	**9**
Wildlife Habitat Area: Coastal Tailed Frog	**8**
Wildlife Habitat Area: Lewis's Woodpecker	**7**
Wildlife Habitat Area: Western Screech Owl	**9**
Best Management Practice: Williamson's Sapsucker	**5**
Ungulate Winter Range: Mountain Goat	**6**
Ungulate Winter Range: Mule Deer, Bighorn Sheep, Elk (Shallow Snowpack)	**2**
Ungulate Winter Range: Mule Deer, Bighorn Sheep, Elk (Moderate/Deep Snowpack)	**7**
Ungulate Winter Range: Moose	**1**
Fisheries Sensitive Watersheds: Proposed (above snowline in specified basins)	**2**
Community Watersheds	**5**
Riparian Management Zones (provides for other values)	**5**
Recreation - Use, Recreation and Enjoyment of the Public Reserve (UREP)	**7**
Visual Quality Objectives: Preservation (P)	**10**
Visual Quality Objectives: Retention (R)	**7**
Visual Quality Objectives: Partial Retention (PR)	**3**
Landscape Level Fuel Breaks	**-2**
Wildland Urban Interface	**-2**
Wildlife Tree Retention	**6**
Operability 2 (Slope ≥0 and <45%; SI ≥9 to <12)	**2**
Operability 3 (Slope ≥45 and <65%; SI ≥12 to <16)	**3**
Operability 4 (Slope ≥45 and <65%; SI ≥9 to <12)	**6**
Operability 5 (Slope ≥0 and <45%; SI <9)	**8**
Operability 6 (Slope ≥45 and <65%; SI <9)	**9**
Logged THLB with Slope ≥65%; SI <9	**10**
Logged THLB with Slope ≥65%; SI ≥9 and <12	**8**
Logged THLB with Slope ≥65%; SI 12	**6**
Inoperable (from operability Lines, terrain mapping, and slope ≥65%)	**8**
Cultural Survival Areas*	**n/a**
Cultural Heritage Resources*	**n/a**

Note: SI refers to inventory/natural stand Site Index
** Data not available at this time*

6.5 Criteria and Thresholds

Threshold(s) were used to evaluate when the required objective is met with the candidate reserves. Thresholds are the indicators and targets to be maintained or enhanced through this analysis. In modelling terms, these are typically forest cover requirements configured as target levels that the model seeks to achieve as:

- minimum or maximum levels,
- units in percent or area,

- over a given unit (e.g., watershed or landscape unit), or
- across specified periods (not applicable for this reserve scenario).

Stands were ranked and grouped relative to each landscape-level threshold until the appropriate requirements are met.

For this analysis, landscape-level thresholds were assessed for old forest retention and patch size, and tracked for interior old forest.

6.5.1 Old Forest

BEC version 5 was used to assess the target old forest retention designated in hectares, as shown in Table 46.

Table 46 Area (ha) of Old Forest Required by BEC Variant (version 5) and Landscape Unit

Min Age	251	251	251	251	251	251	251	251	251	141	141	141	251	251	Total
Landscape Unit	CWH ms1	ESSF dc2	ESSF mw	ESSF xc	IDF dk1	IDF dk2	IDF xh1	IDF xh2	MH mm2	MS dm2	MS mw	MS xk	PP xh1	PP xh2	
Coldwater	132	721	794		2,169	1,673	754	493		705	294	567		110	8,412
Hayes		3		732	1,097	1,725	330			2,533		4,055			10,475
Lower Nicola		606	32	150	2,561	534		4,784		618		5,591		1,002	15,878
McNulty				1,519	445		160			1,078		1,574			4,776
Otter		407		30	1,063	3,439	182	64		1,770		153			7,108
Similkameen		2,552	35	1,360	74	2,782	233			4,388					11,424
Smith-Willis				961	367	2,260	839			880		3,836	0		9,143
Spius	10	1,162	2,410		224	1,814	51	762	40	1,715	731	25		7	8,951
Summers		93		215	2,451	1,673	644			1,971		763	15		7,825
Swakum					4,660			1,244				3,048		270	9,222
Tulameen	88	2,437	3,471	16		919	18			1,840	649				9,438
Upper Nicola				163	4,923	15		734		158		4,657		106	10,756
Total	230	7,981	6,742	5,146	20,034	16,834	3,211	8,081	40	17,656	1,674	24,269	15	1,495	113,408

Source: 2004 Order Establishing Provincial Non-spatial Old Growth Objectives (Table 2 of Appendix 2)

6.5.2 Patch Size

This analysis was originally designed as a Geographic Information System exercise but given the complexities involved with assessing reserves relative to multiple thresholds and the desire to group reserves into larger areas where appropriate, we had to change this exercise to a spatial model (i.e., Patchworks). Criteria for defining patch size were not available for the Merritt TSA, so we implemented an interim set of arbitrary criteria aimed to promote larger patches while avoiding small patches (Table 47). To avoid patch splitting resulting from narrow riparian or road buffers, a distance threshold for combining patches (i.e., combine where patches are under 10m) was applied by clean topology in a raster environment.

Table 47 Interim patch size criteria

Area (ha)	Target	Attractor
1-10	< 0%	
10-100	< 10%	
100-500	< 100% (no target)	
500-1000	> 40%	
1000-1500	>30%	
1500+	< 100% (no target)	Yes

Patches were combined where the distance between patches was under 10m.

6.5.3 Interior Old Forest

Interior old forest is an area of 'old seral' forest or natural forest area, which is buffered from younger age classes or anthropogenic disturbances.

The Merritt TSA does not have targets for interior old forest, so criteria for defining interior old forest were not available. Consequently, exploring this element required the adoption of criteria from another management unit – in this case, Prince George TSA (FLNRO 2004). While these criteria were applied to define interior old forest, targets were not applied or controlled in the model. Rather, interior old forests were tracked and reported for areas selected as candidate reserves.

Interior old forest was identified based on the definition for old seral forests (section 6.5.1) and the age class of adjacent stands, as shown in Table 48 and Figure 14.

Table 48 Criteria for identifying interior old forest

Stand Type	Adjacent Age Class	Buffer Distance
Pine- and deciduous-leading stands	1 to 3	200 metres
	4 to 9	0 metres
All other species-leading stands	1 to 4	200 metres
	5 to 9	0 metres

A buffer of 200 metres extending from the edge of the old forest into the old forest (see legend for Figure 14), is excluded to calculating the amount of old interior forest for:

- transportation corridors attributed to all primary access roads (e.g. Forest Service Roads),
- pipelines,
- railways, and
- hydro transmission corridors.

Buffers were not applied to secondary and tertiary roads. Initially, interior forest included natural non-forest (e.g., lakes, wetlands, rock) to eliminate unnecessary 'edges'. These features were then erased from the interior layer. The buffer area of old forest stands were maintained as edge buffer areas.

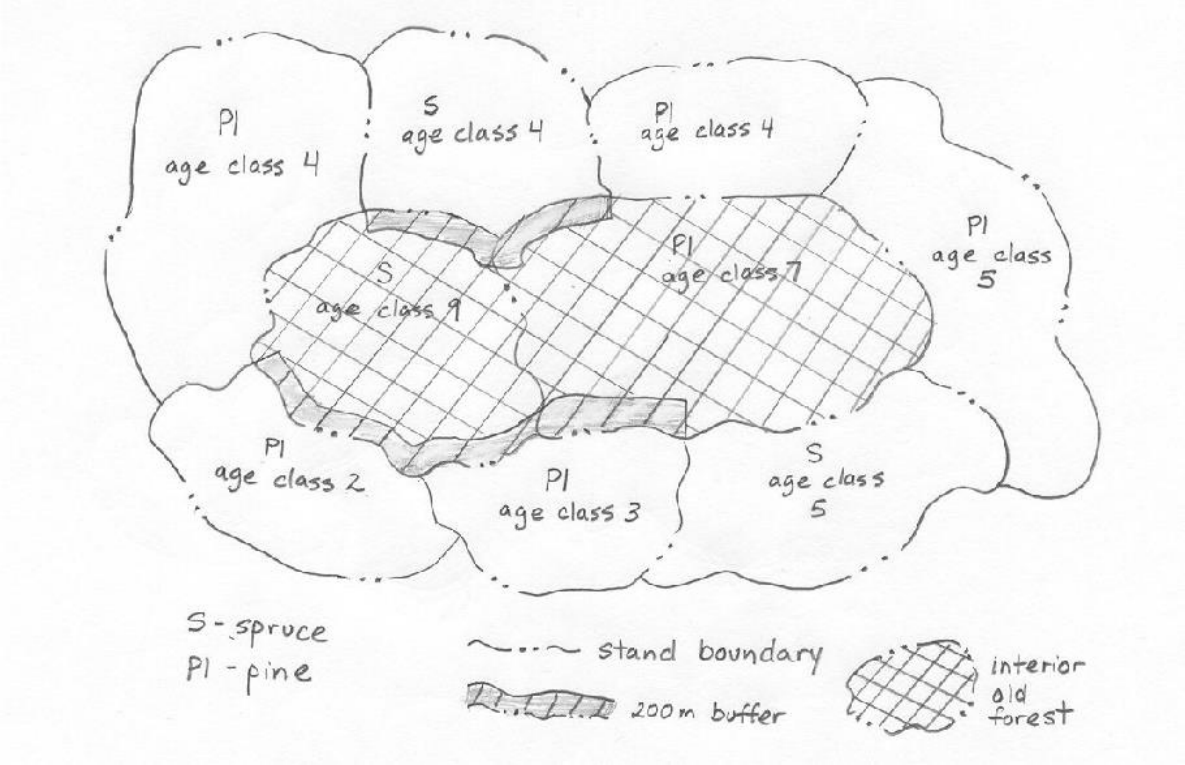

Figure 14 Interior old forest buffering example in unit where old forest is >120 years old

6.6 Analysis Steps

The subsections below briefly describe the analysis steps taken; including work to prepare the model prior to processing, modelling itself, and following each run.

6.6.1 Pre-Processing

A copy of the 'resultant' (overlays of spatial data developed for the ISS Base Case analysis) provided an initial spatial dataset to work with. Additional spatial data - not required for the ISS Base Case - were added to the resultant for the Reserve Scenario:

- Operability,
- Interior Old Forest, and
- Interior Old Forest Edges

Assessment criteria were then calculated as separate fields in the database:

1) identify/flag non-pine leading stands,
2) assign seral stage; specifically to determine old seral forest, and
3) create interior old patches (section 6.5.3).

Scores for stand features, anchors, and constraints were assigned in separate fields, then combined scores were calculated into additional fields. This was done through a python script, which accessed Excel spreadsheets that recorded each indicator and their score.

6.6.2 Processing

The basic approach to modelling this reserve scenario was to maximize the cumulative score while trending towards a set of landscape-level criteria and thresholds. A Patchworks™ model was built with the following components:

1) Product accounts for the thresholds defined in section 6.5 were created as old forest accounts for old forest polygons/targets, in the following order:
    1. Old NHLB
    2. Old
    3. Old + Mat NHLB
    4. Old + Mat
    5. Old + Mat + Mid + Early
2) A minimum area target was set on each of these product accounts with decreasing weights and a maximum area target was set on each of these product accounts with a steady weight.
3) Anchors within the NHLB were 'hard-coded' to always be selected as candidate reserves.
4) A general 'reserved' account was created so that polygons spanning two assessment units (e.g., BEC/LU) would be considered part of the same patch.
5) Patch size criteria were applied.
6) A basic 'maximize score' target was applied across the entire the landbase so that scores would accumulate as the model-selected candidate reserves. Meanwhile, a (soft) target was assigned so that the model was rewarded for selecting NHLB.

6.6.3 Post-Processing

Unfortunately, Patchworks™ does not track dynamically-buffered areas – required with old interior forest as candidate reserves are selected. Our approach was to increase the roundness of the reserves selected (increasing the area to edge ratio of a polygon) and to increase the size of the patches selected. However, if polygons within edges are not selected, then the old interior forest polygons are no longer 'interior'. So, an additional assessment of the candidate reserves must be undertaken to confirm that the old forest interior thresholds are, in fact, maintained and identify where they are not.

6.6.4 Adjustments

The Reserve Scenario modelling process was developed to accommodate adjustments with the stand scoring and the criteria and thresholds assigned. Implementing these adjustments as sensitivities can be done fairly easily but changes to spatial designations (e.g., turning draft wildlife habitat designations off) require more work to rebuild and/or redefine the resultant.

6.6.5 Implementation

The approach anticipated for implementing candidate reserves in the Preferred Scenario is to 'lock' the selected areas from harvesting for some period over the short term (e.g., 20 years). In this case, edge polygons identified to maintain forest interior thresholds will also be included with the candidate reserves.

7 Harvest Scenario

The Harvest scenario aimed to answer the question "Which stands should be prioritized for harvest/salvage in the short term (and what are the mid/long term consequences of not following this strategy)?" The Harvest scenario can also be used to illustrate differences in species profile that may occur if harvest is not distributed well (i.e., volume looks alright in the future, but economics become much more challenging). The underlying purpose of the Harvest scenario was to explore tactics aimed to improve timber harvesting opportunities, and to determine if harvesting could be used as a tool to reduce the impacts from wildfire without unduly impacting timber supply. Three tactics were explored: 1) minimum harvest criteria, 2) harvest feasibility, and 3) wildfire management and harvest priority.

7.1 Minimum Harvest Criteria

The minimum harvest criteria (MHC) set for the ISS Base Case scenario limits harvesting to stands with a merchantable volume of at least 150 m^3/ha. For the harvest scenario, alternate minimum harvest criteria were explored. The effects of allowing harvest of lower volume stands was explored by categorizing harvest opportunities in four volume classes, as follows:

- >= 200 m^3/ha
- 150 to 200 m^3/ha
- 100 to 150 m^3/ha
- 75 to 100 m^3/ha.

In addition, the minimum harvest criteria for managed stands was changed to require achievement of 95% Culmination MAI (CMAI), and be at least 60 years of age for all runs.

Two runs were completed with alternative minimum harvest criteria. Run 1 required stands to be at least 200 m^3/ha to be eligible for harvest. Run 2 allowed stands with at least 75 m^3/ha to be harvested, provided that the volume achieved from stands with at least 200 m^3/ha was at least as much as from Run 1.

A sensitivity analysis (Run 3) was also completed to explore the impact of not utilizing Ponderosa pine. In this run, all Ponderosa pine volume was excluded from the harvest flow, and minimum harvest criterion was set to 75 m^3/ha based on non-Ponderosa pine volumes only.

7.2 Revised Harvest Opening Sizes

In the ISS Base Case (section 3.3.4), harvest blocks in the 0 to 5 hectare range were encouraged to be a maximum of 5% of the harvest area. Since the weight was set such that timber supply was not affected, this target was not achieved in the resulting runs.

The Harvest Scenario was designed to provide more operationally feasible harvest opening sizes. No blocks less than 1 hectare in size were allowed, and blocks between 1 hectare and 5 hectares in size were limited to a maximum of 5% of the harvest area. The weight on the 1 to 5 hectare target was set so that only a very minor variation above 5% was allowed. These requirements were applied to all harvest scenario runs.

7.3 Smooth Selection Harvest Flow

The ISS Base Case did not place any limits on the amount of volume harvested using selection harvest systems. As a result, there were large fluctuations from period to period in the amount of selection harvest. The Harvest Scenario attempts to "smooth" the volume flow from selection harvest by encouraging the model to achieve selection volumes between 34,000 m³/year and 37,600 m³/year.

7.4 Wildfire Management and Harvest Priority

The wildfire management tactic aimed to incorporate stand and landscape-level wildfire management to address the potential impact or risk of fire. This involved placing higher harvest priorities in the first 10 years for stands that were located in Wildland Urban Interfaces (THLB Area ~79,600 ha), proposed Fire Breaks (THLB Area ~69,250 ha), or rated as extreme fire threat according to the 2015 Provincial Strategic Threat Analysis (PSTA) – wildfire threat component dataset for Merritt TSA (THLB Area ~218,650 ha). After accounting for overlaps, the approximately 317,700 hectares of THLB area was prioritized for harvest as a wildfire management tactic.

A sensitivity analysis (Run 4) was also completed to explore the impact of applying alternate stocking standards for regenerated stands in the Wildland Urban Interface (WUI) areas. This run was based on Run 2 (minimum 75 m³/ha), with all planted stands in the WUIs regenerated using TIPSY yield generated with "clumped" regeneration method and initial density of 600 stems per hectare.

8 Silviculture Scenario

The Silviculture Scenario examined tactics aimed to enhance timber quantity and quality over the mid- and long-term, as well as, improve biodiversity, wildlife habitat, and cultural interests. This scenario integrated three key silviculture tactics: 1) fertilization, 2) enhanced basic silviculture, and 3) rehabilitating MPB impacted stands. The Silviculture Scenario reflects the best combination of these treatments applied to stands within the Merritt TSA, while assuming a steady funding level of $3 million per year over the first 20 years of the planning horizon. Specific tactics and approaches are briefly summarized in Table 49.

The model was created using managed stand analysis units based on those used for TSR 2015. These did not align well with the fertilization treatments specified in Table 49 due to the mixed species compositions in the analysis units (i.e. no 100% pure Sx stands to be considered for multiple treatments). Therefore, weighted responses were created based on the species compositions of the managed stand analysis units, and all managed stands were assumed to be treated every five years.

Similarly, under the enhanced basic silviculture tactic, the response for using planting instead of natural regeneration was weighted for those analysis units with a blend of natural and planting regeneration.

Table 49 Tactics Applied in the Silviculture Scenario

Tactic	Element	Description	Criteria
Rehabilitation of MPB impacted stands	Eligible Stands	Unlogged MPB-impacted stands, min 40% dead, >40 yrs old at attack	○ <100m³/ha live volume ○ IDF: Fd mSI >17.0; Pl mSI >17.8; Sx mSI >16.1>=40% ○ MS: Fd mSI >18.0; Pl mSI >17.39; Bl mSI >17.3; Sx mSI >17.3 ○ ESSF: Fd mSI >15.0; Pl mSI >14.1; Bl mSI >15.8; Sx mSI >14.7
	Timing	Stands unlikely to be salvaged/harvested	○ According to minimum harvest criteria that are less than 'low volume stands' ○ Next 40 years only
	Treatment Response	Transition stands onto future managed stands as if harvested	○ Regular future AUs, or enhanced future AU (where stand eligibility overlaps)
	Costs	Marginally Economic (>= 50m³/ha) - Harvest/Knockdown/Site Prep/Plant	○ $1,500/ha
		Uneconomic (<50m³/ha) - Knockdown/Site Prep/Plant	○ $2,000/ha
		Rehab 'incentive' within WUI	○ Reduce treatment by $500/ha
	Anticipated Issues	No Distance cost with access so good throughout TSA	○ N/A
Fertilization	Eligible Stands	Young natural stands	○ Age 30 to 80
		Existing managed stands	○ Age 25 to 55
		Current/future managed stands	○ Age 25 to 55
		Species (model selects priority)	○ (Sx & Fdi & Pli) >= 80%
		BEC Zones	○ MS, ESSF, IDF dk1, dk2 (non drybelt)
		Site index (not thresholds correspond to existing AUs; not from FFT guidelines	○ IDF: Sx 16.1, Fir 17.0, Pine 17.8 ○ MS: Sx mSI >17.3; Fd mSI >18.0; Pl mSI >17.39 ○ ESSF: Sx mSI >14.7; Fd mSI >15.0; Pl mSI >14.1
		Slope	○ <= 45% (entire stand)
	Timing	See Fertilization response tables below (Table 50 & Table 51)	○ Application every 5 or 10 years, progressively closest from harvesting, delay harvest eligibility 10 yrs after last application
	Treatment Response	See Fertilization response tables below (Table 50 & Table 51)	
		Transition stands onto future managed stands	○ Locked from harvesting, 10 years after last application.
	Costs	Fertilization costs for all stands	○ Fd, Pl: $450/ha for each application ○ Sx single treatment: $450/ha for each application ○ Sx multiple treatments : $600/ha for each application
	Anticipated Issues	First Nations' concerns	
Enhanced Silviculture	Eligible Stands	All clearcut stands	
	Timing	Stands harvested in the model	○ Future managed

Tactic	Element	Description	Criteria
	Treatment Response	Planting method	○ Natural to 100% planted (where possible)
		Regeneration delay	○ Decrease from 2 to 1 yrs (3 to 2 yrs)
		Planting Density	○ Increase to 1800 sph with genetic gains applied
	Costs	Incremental planting of trees sown with select seed	○ $450/ha
		Switch from natural to planted	○ $1000/ha
	Anticipated Issues	Currently lacks funding mechanism	

Table 50 Fertilization Response for Fd, Pl and Natural Stands

Number of Applications Every 10 years	Stand Age Window (yrs)	Fd Response (gross m^3/ha)	Pl Response (gross m^3/ha)	Natural Stands (gross m^3/ha)	Efficiency
1	30 – 80	15	12	10	100%
2	30 – 70	30	24	20	100%
3	30 – 60	45	36	30	100%
4	30 – 50	60	48	40	100%

Pl and Fd response are simple multiples of the single treatment response

Table 51 Fertilization Response for Multiple Sx Treatments

Number of Applications Every 5 years	Stand Age Window (yrs)	Sx Response (gross m^3/ha)	Efficiency
1	30 – 80	15	100%
2	25 – 55	49	100%
3	25 – 50	89	100%
4	25 – 45	132	100%
5	25 – 40	155	100%
6	25 – 35	176	100%

Sx response was derived from information provided by FLNRO in the document "intensive fertilization graphs.xlsx" (Rob Brockley email June 14, 2012, Mel Scott/Ralph Winter email June 15, July 28, 2012).

9 Combined Scenario

The Combined Scenario aimed to guide development, implementation, and monitoring of tactical plans over the first 20 years of the planning horizon. Key elements from all four scenarios (Base Case, Reserves, Harvest, and Silviculture) were included to provide an integrated strategy to this first iteration of the ISS process. Specific tactics and approaches are briefly summarized in Table 52.

Three different runs were completed for the Combined Scenario:

- ***Run 1 (Spatial OGMAs)*** did not incorporate elements from the Reserve Scenario and removed OGMAs from the THLB as a spatial netdown.
- ***Run 2 (Candidate Reserves)*** allowed harvesting to occur in spatial OGMAs where they did not overlap with Candidate Reserves. Harvesting was prevented in Candidate Reserves for the first 40 years after which time they became eligible for harvest. In addition, Old Seral Targets were implemented for the duration of the planning horizon.

- ***Run 3 (Increased Fertilization Sensitivity)*** is the same as Run 1, except that the slope restrictions on stands eligible for fertilization were relaxed. Specifically, stands were considered eligible if no more than 50% of their area has slopes greater than 45%.

Table 52 Tactics Applied in the Combined Scenario

Scenario	Category	Tactic	Approach
Base Case	Landscape-Level Biodiversity	Spatial OGMAs	○ ***Run 1 – Spatial OGMAs***: Include spatial OGMAs as landbase netdown to address landscape level biodiversity. (Section 3.1.11) ○ ***Run 2 – Candidate Reserves***: Spatial OGMAs that do not overlap with a Candidate Reserve were added to the THLB for the duration of the planning horizon.
Base Case	Landscape-Level Biodiversity	Old Seral	○ Report Only, Target Not Active (***Run 1 – Spatial OGMAs***) ○ Target Active (***Run 2 – Candidate Reserves***) ○ Implement the hectare targets for old seral according to the Non-Spatial Old Growth Order (Section 3.2.1)
Base Case	Landscape-Level Biodiversity	Mature-Plus-Old Seral	○ Report Only, Target Not Active ○ Implement mature-plus-old seral targets according to the biodiversity guidebook (Section 3.2.1)
Base Case	Landscape-Level Biodiversity	Early Seral	○ Report Only, Target Not Active ○ Report amount of early seral stage (<40 years) by NDT, as per the guidelines in the Biodiversity Guidebook (Section 3.2.1)
Base Case	Landscape-Level Biodiversity	Patch Size – Very Early Seral	○ Target Active, low weight not to impact timber supply ○ Implement target ranges for very early seral stage (< 20 years) patches by NDT, as per the guidelines in the Biodiversity Guidebook (Section 3.2.3).
Base Case	Landscape-Level Biodiversity	Patch Size – Mature-Plus-Old Seral	○ Report Only, Target Not Active ○ Report mature-plus-old seral stage patches by NDT relative to targets identified in the Biodiversity Guidebook (Section 3.2.3).
Base Case	Watershed Health	Community Watersheds	○ Target Active ○ Implement ECA targets within all Community Watershed Units (Section 3.2.7)
Base Case	Watershed Health	Fisheries Sensitive Watersheds	○ Target Active ○ Implement ECA targets within all Fisheries Sensitive Watershed units where an ECA maximum is required (Section 3.2.8)
Base Case	Wildlife Habitat and Access	Coastal-Tailed Frog	○ Reduce THLB for CTF Wildlife Habitat Areas and point buffers ○ Report only (no targets) the ECA within identified CTF watersheds (Section 3.1.12 and Section 3.2.13)
Base Case	Wildlife Habitat and Access	Moose Forage	○ Target Active ○ Maintain a minimum 15% of the net forested land base in early seral stands. Early seral defined as < 25 years for IDF/ICH and <35 years in MS and ESSF zones (Section 3.2.12)
Base Case	Wildlife Habitat and Access	Moose Cover	○ Report Only, Target Not Active ○ Report the area of coniferous stands >= 16 metres in height ○ Report the proportion of cover that is in patches >= 20 hectares ○ Report on the area of cover that is within 200 metres of lakes, wetlands and streams
Base Case	Wildlife Habitat and Access	Marten Habitat	○ Report Only, Target Not Active ○ Report the amount of early seral in the MS and ESSF zones, plus amount of old and very old within specific subzones (Section 3.2.14)

Scenario	Category	Tactic	Approach
Base Case	Other	Visuals	○ Target Active ○ Implement disturbance limits to individual visual polygons according to their recommend VQO
Base Case Sensitivity	Other	Adjacency Constraints	○ Target Active ○ Implement requirement to limit area below 3 m tall to a maximum of 33% within a cumulative effects watershed (Section 3.2.15)
Reserve	Candidate Reserves	Total Score	○ Candidate Reserves identified by maximizing the total score for anchors, stand features, and constraints ○ ***Run 1 – Spatial OGMAs***: Candidate Reserves not implemented ○ ***Run 2 – Candidate Reserves***: Harvesting within Candidate Reserves prevented for the first 40 years of the planning horizon.
Harvest	Minimum Harvest Criteria	High Volume Partition	○ Establish harvest flow for higher MHC (>200 m^3/ha). (Section 7.1).
Harvest	Minimum Harvest Criteria	Low Volume Classes	○ Establish harvest flow that includes three lower MHC classes (75-100 m^3/ha, 100-150 m^3/ha, 150-200 m^3/ha) (Section 7.1) ○ Do not allow harvest less than 150 m^3/ha on slopes >45%
Harvest	Minimum Harvest Criteria	CMA Criterion	○ Managed stands must reach 95% of CMAI, and be at least 60 years of age to be eligible for harvest (Section 7.1)
Harvest	Harvest Priority	Selection Harvesting	○ "Smooth" selection harvesting over time (Section 7.2) ○ Do not allow selection harvesting on slopes >=45%

Harvest	Harvest Priority	Harvest Opening Size	○ Implement harvest opening criteria as follows (Section 7.2):
			  ○ 0 to 1 hectare: None allowed, hard constraint
			  ○ 1 to 5 hectares: Maximum 5% of harvest area, moderate weight

Harvest	Harvest Priority	Harvest System Profile	○ Report flow by slope class (< 45%, >= 45%) to approximate harvest system profile over time (ground/cable)
Harvest	Harvest Priority	Product Profile	○ Report flow by species/age class to generate interactive report of product profile over time

Harvest	Harvest Priority	Wildfire Risk	○ Target harvest in first 10 years to reduce fire risk, as follows (Section 7.4)
			  ○ Operable stands within WUI
			  ○ Conifer leading stands within landscape-level fuel breaks
			  ○ Stands identified as "extreme" risk through PSTA

Harvest Sensitivity	Wildfire Mitigation	Treatments within WUI	○ Implement modified draft Fire Management Stocking Standards within Wildland Urban Interface areas (Section 7.4)
Silviculture	Combine Rehab and Fertilization Treatments	Maximize harvest flow with combination of silv. treatments	○ Implement alternative treatment options for rehabilitating MPB-impacted stands, fertilization, and enhanced basic silviculture (Section 8) ○ Annual Enhanced Basic Silviculture area limited to 50% of the annual clearcut harvest area ○ Maximum budget $3M/year total
Silviculture	Minimum Harvest Critera	Reduce minimum harvest ages	○ Minimum harvest age for managed stands regenerated with enhanced basic silviculture set to 95% of CMAI (can be lower than 60 years)
Silviculture	Harvest Flow	Increase short/mid-term harvest level	○ Adjust the harvest request to push the short/mid-term level while matching the long-term level from the Base Case

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Appendix 1 ***Non-Spatial Old Growth Objectives***

	BEC Label	Old Target Area (ha)
Coldwater	CWHms1	132
Coldwater	ESSFdc2	721
Coldwater	ESSFmw	794
Coldwater	IDFdk1	2,169
Coldwater	IDFdk2	1,673
Coldwater	IDFxh1	754
Coldwater	IDFxh2	493
Coldwater	MSdm2	705
Coldwater	MSmw	294
Coldwater	MSxk	567
Coldwater	PPxh2	110
Coldwater	Totals	8,412
Hayes	ESSFdc2	3
Hayes	ESSFxc	732
Hayes	IDFdk1	1,097
Hayes	IDFdk2	1,725
Hayes	IDFxh1	330
Hayes	MSdm2	2,533
Hayes	MSxk	4,055
Hayes	Totals	10,477
Lower Nicola	ESSFdc2	606
Lower Nicola	ESSFmw	32
Lower Nicola	ESSFxc	150
Lower Nicola	IDFdk1	2,561
Lower Nicola	IDFdk2	534
Lower Nicola	IDFxh2	4,784
Lower Nicola	MSdm2	618
Lower Nicola	MSxk	5,591
Lower Nicola	PPxh2	1,002
Lower Nicola	Totals	15,877
McNulty	ESSFxc	1,519
McNulty	IDFdk1	445
McNulty	IDFxh1	160
McNulty	MSdm2	1,078
McNulty	MSxk	1,574
McNulty	Totals	4,777
Otter	ESSFdc2	407
Otter	ESSFxc	30
Otter	IDFdk1	1,063
Otter	IDFdk2	3,439
Otter	IDFxh1	182
Otter	IDFxh2	64
Otter	MSdm2	1,770
Otter	MSxk	153
Otter	Totals	7,108
Tulameen	CWHms1	88
Tulameen	ESSFdc2	2,437
Tulameen	ESSFmw	3,471
Tulameen	ESSFxc	16
Tulameen	IDFdk2	919
Tulameen	IDFxh1	18
Tulameen	MSdm2	1,840
Tulameen	MSmw	649
Tulameen	Totals	9,436

LU Name	BEC Label	Old Target Area (ha)
Similkameen	ESSFdc2	2,552
Similkameen	ESSFmw	35
Similkameen	ESSFxc	1,360
Similkameen	IDFdk1	74
Similkameen	IDFdk2	2,782
Similkameen	IDFxh1	233
Similkameen	MSdm2	4,388
Similkameen	Totals	11,425
Smith-Willis	ESSFxc	961
Smith-Willis	IDFdk1	367
Smith-Willis	IDFdk2	2,260
Smith-Willis	IDFxh1	839
Smith-Willis	MSdm2	880
Smith-Willis	MSxk	3,836
Smith-Willis	PPxh1	0
Smith-Willis	Totals	9,144
Spius	CWHms1	10
Spius	ESSFdc2	1,162
Spius	ESSFmw	2,410
Spius	IDFdk1	224
Spius	IDFdk2	1,814
Spius	IDFxh1	51
Spius	IDFxh2	762
Spius	MHmm2	40
Spius	MSdm2	1,715
Spius	MSmw	731
Spius	MSxk	25
Spius	PPxh2	7
Spius	Totals	8,950
Summers	ESSFdc2	93
Summers	ESSFxc	215
Summers	IDFdk1	2,451
Summers	IDFdk2	1,673
Summers	IDFxh1	644
Summers	MSdm2	1,971
Summers	MSxk	763
Summers	PPxh1	15
Summers	Totals	7,824
Swakum	IDFdk1	4,660
Swakum	IDFxh2	1,244
Swakum	MSxk	3,048
Swakum	PPxh2	270
Swakum	Totals	9,223
Upper Nicola	ESSFxc	163
Upper Nicola	IDFdk1	4,923
Upper Nicola	IDFdk2	15
Upper Nicola	IDFxh2	734
Upper Nicola	MSdm2	158
Upper Nicola	MSxk	4,657
Upper Nicola	PPxh2	106
Upper Nicola	Totals	10,757

Appendix 2 ***Analysis Unit Details***

Analysis Units for Existing Natural Stands

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
500000	THLB	3,455	0.6%	IDF	DBF	N/A	-	SEL	500000	N/A					FD100
501000	THLB	5,802	1.0%	IDF	DBF	N/A	-	SEL	501000	N/A					FD100
502000	THLB	14,940	2.6%	IDF	DBF	N/A	-	SEL	502000	N/A					FD100
1000000	THLB	5,894	1.0%	ESSF	BL	<10	-	CCR	3007	Nat/Plt	25/75	2/2	4700/1200	>19.0	SX47BL33PL20
1001000	THLB	6,448	1.1%	ESSF	BL	<10	-	CCR	3008	Nat/Plt	25/75	2/2	4700/1200	>15.8 & <=19.0	SX47BL33PL20
1002000	THLB	4,976	0.9%	ESSF	BL	<10	-	CCR	3009	Nat/Plt	25/75	2/2	4700/1200	<=15.8	SX47BL33PL20
1003000	THLB	1,204	0.2%	ESSF	BL	>=15 & <20	-	CCR	3007	Nat/Plt	25/75	2/2	4700/1200	>19.0	SX47BL33PL20
1004000	THLB	658	0.1%	ESSF	BL	>=15 & <20	-	CCR	3008	Nat/Plt	25/75	2/2	4700/1200	>15.8 & <=19.0	SX47BL33PL20
1005000	THLB	995	0.2%	ESSF	BL	>=15 & <20	-	CCR	3009	Nat/Plt	25/75	2/2	4700/1200	<=15.8	SX47BL33PL20
1006000	THLB	61	0.0%	ESSF	BL	>= 20	-	CCR	3007	Nat/Plt	25/75	2/2	4700/1200	>19.0	SX47BL33PL20
1007000	THLB	92	0.0%	ESSF	BL	>= 20	-	CCR	3008	Nat/Plt	25/75	2/2	4700/1200	>15.8 & <=19.0	SX47BL33PL20
1008000	THLB	7	0.0%	ESSF	BL	>= 20	-	CCR	3009	Nat/Plt	25/75	2/2	4700/1200	<=15.8	SX47BL33PL20
1009000	THLB	5	0.0%	ESSF	Dec	<10	5	N/A	1009000	N/A					
1010000	THLB	6	0.0%	ESSF	Dec	>=15 & <20	5	N/A	1010000	N/A					
1011000	THLB	2	0.0%	ESSF	Dec	>= 20	-	N/A	1011000	N/A					
1012000	THLB	139	0.0%	ESSF	FD	<10	-	CCR	3001	Plt	100	2	1200	>19.0	PL60SX16BL15
1013000	THLB	104	0.0%	ESSF	FD	<10	-	CCR	3002	Plt	100	2	1200	>15.0 & <= 19.0	PL60SX16BL15
1014000	THLB	12	0.0%	ESSF	FD	<10	-	CCR	3003	Plt	100	2	1200	<= 15.0	PL60SX16BL15
1015000	THLB	343	0.1%	ESSF	FD	>=15 & <20	-	CCR	3001	Plt	100	2	1200	>19.0	PL60SX16BL15
1016000	THLB	158	0.0%	ESSF	FD	>=15 & <20	-	CCR	3002	Plt	100	2	1200	>15.0 & <= 19.0	PL60SX16BL15
1017000	THLB	24	0.0%	ESSF	FD	>=15 & <20	-	CCR	3003	Plt	100	2	1200	<= 15.0	PL60SX16BL15
1018000	THLB	9	0.0%	ESSF	FD	>= 20	-	CCR	3001	Plt	100	2	1200	>19.0	PL60SX16BL15
1019000	THLB	5,501	1.0%	ESSF	PL	<10	-	CCR	3004	Nat/Plt	17/83	2/2	4700/1200	>17.1	PL56BL23SX21
1020000	THLB	6,782	1.2%	ESSF	PL	<10	-	CCR	3005	Nat/Plt	17/83	2/2	4700/1200	>14.1 & <= 17.1	PL56BL23SX21
1021000	THLB	6,307	1.1%	ESSF	PL	<10	-	CCR	3006	Nat/Plt	17/83	2/2	4700/1200	<=14.1	PL56BL23SX21
1022000	THLB	4,260	0.7%	ESSF	PL	>=15 & <20	-	CCR	3004	Nat/Plt	17/83	2/2	4700/1200	>17.1	PL56BL23SX21
1023000	THLB	5,451	0.9%	ESSF	PL	>=15 & <20	-	CCR	3005	Nat/Plt	17/83	2/2	4700/1200	>14.1 & <= 17.1	PL56BL23SX21
1024000	THLB	3,651	0.6%	ESSF	PL	>=15 & <20	-	CCR	3006	Nat/Plt	17/83	2/2	4700/1200	<=14.1	PL56BL23SX21
1025000	THLB	330	0.1%	ESSF	PL	>= 20	-	CCR	3004	Nat/Plt	17/83	2/2	4700/1200	>17.1	PL56BL23SX21
1026000	THLB	187	0.0%	ESSF	PL	>= 20	-	CCR	3005	Nat/Plt	17/83	2/2	4700/1200	>14.1 & <= 17.1	PL56BL23SX21
1027000	THLB	270	0.0%	ESSF	PL	>= 20	-	CCR	3006	Nat/Plt	17/83	2/2	4700/1200	<=14.1	PL56BL23SX21

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
1028000	THLB	3,275	0.6%	ESSF	SX	<10	-	CCR	3010	Nat/Plt	27/73	2/2	4700/1200	>18.1	PL35SX34BL31
1029000	THLB	4,731	0.8%	ESSF	SX	<10	-	CCR	3011	Nat/Plt	27/73	2/2	4700/1200	>14.7 & <=18.1	PL35SX34BL31
1030000	THLB	4,541	0.8%	ESSF	SX	<10	-	CCR	3012	Nat/Plt	27/73	2/2	4700/1200	<=14.7	PL35SX34BL31
1031000	THLB	2,817	0.5%	ESSF	SX	>=15 & <20	-	CCR	3010	Nat/Plt	27/73	2/2	4700/1200	>18.1	PL35SX34BL31
1032000	THLB	1,468	0.3%	ESSF	SX	>=15 & <20	-	CCR	3011	Nat/Plt	27/73	2/2	4700/1200	>14.7 & <=18.1	PL35SX34BL31
1033000	THLB	647	0.1%	ESSF	SX	>=15 & <20	-	CCR	3012	Nat/Plt	27/73	2/2	4700/1200	<=14.7	PL35SX34BL31
1034000	THLB	312	0.1%	ESSF	SX	>= 20	-	CCR	3010	Nat/Plt	27/73	2/2	4700/1200	>18.1	PL35SX34BL31
1035000	THLB	92	0.0%	ESSF	SX	>= 20	-	CCR	3011	Nat/Plt	27/73	2/2	4700/1200	>14.7 & <=18.1	PL35SX34BL31
1036000	THLB	133	0.0%	ESSF	SX	>= 20	-	CCR	3012	Nat/Plt	27/73	2/2	4700/1200	<=14.7	PL35SX34BL31
1037000	THLB	1,678	0.3%	IDF	Dec	<10	1,537	N/A	1037000	N/A					
1038000	THLB	2,021	0.4%	IDF	Dec	>=15 & <20	1,856	N/A	1038000	N/A					
1039000	THLB	575	0.1%	IDF	Dec	>= 20	-	N/A	1039000	N/A					
1040000	THLB	12,643	2.2%	IDF	FD	<10	-	CCR	3014	Plt	100	2/3	1200/1000	>18.8	PL74FD26
1041000	THLB	21,290	3.7%	IDF	FD	<10	-	CCR	3015	Plt	100	2/3	1200/1000	>17.0 & <=18.8	PL74FD26
1042000	THLB	17,999	3.1%	IDF	FD	<10	-	CCR	3016	Plt	100	2/3	1200/1000	<=17.0	PL74FD26
1043000	THLB	8,685	1.5%	IDF	FD	>=15 & <20	-	CCR	3014	Plt	100	2/3	1200/1000	>18.8	PL74FD26
1044000	THLB	9,721	1.7%	IDF	FD	>=15 & <20	-	CCR	3015	Plt	100	2/3	1200/1000	>17.0 & <=18.8	PL74FD26
1045000	THLB	4,206	0.7%	IDF	FD	>=15 & <20	-	CCR	3016	Plt	100	2/3	1200/1000	<=17.0	PL74FD26
1046000	THLB	733	0.1%	IDF	FD	>= 20	-	CCR	3014	Plt	100	2/3	1200/1000	>18.8	PL74FD26
1047000	THLB	356	0.1%	IDF	FD	>= 20	-	CCR	3015	Plt	100	2/3	1200/1000	>17.0 & <=18.8	PL74FD26
1048000	THLB	130	0.0%	IDF	FD	>= 20	-	CCR	3016	Plt	100	2/3	1200/1000	<=17.0	PL74FD26
1049000	THLB	9,521	1.7%	IDF	PL	<10	-	CCR	3017	Plt	100	2/3	1200/1000	>18.9	PL80FD20
1050000	THLB	10,636	1.9%	IDF	PL	<10	-	CCR	3018	Plt	100	2/3	1200/1000	>17.8 & <= 18.9	PL80FD20
1051000	THLB	9,060	1.6%	IDF	PL	<10	5	CCR	3019	Plt	100	2/3	1200/1000	<= 18.9	PL80FD20
1052000	THLB	5,068	0.9%	IDF	PL	>=15 & <20	5	CCR	3017	Plt	100	2/3	1200/1000	>18.9	PL80FD20
1053000	THLB	6,340	1.1%	IDF	PL	>=15 & <20	-	CCR	3018	Plt	100	2/3	1200/1000	>17.8 & <= 18.9	PL80FD20
1054000	THLB	4,398	0.8%	IDF	PL	>=15 & <20	-	CCR	3019	Plt	100	2/3	1200/1000	<= 18.9	PL80FD20
1055000	THLB	563	0.1%	IDF	PL	>= 20	-	CCR	3017	Plt	100	2/3	1200/1000	>18.9	PL80FD20
1056000	THLB	294	0.1%	IDF	PL	>= 20	-	CCR	3018	Plt	100	2/3	1200/1000	>17.8 & <= 18.9	PL80FD20
1057000	THLB	50	0.0%	IDF	PL	>= 20	-	CCR	3019	Plt	100	2/3	1200/1000	<= 18.9	PL80FD20
1058000	THLB	4,555	0.8%	IDF	PY	<10	-	CCR	3020	Plt	100	2	1200	All	PL86FD14
1059000	THLB	914	0.2%	IDF	PY	>=15 & <20	-	CCR	3020	Plt	100	2	1200	All	PL86FD14
1060000	THLB	50	0.0%	IDF	PY	>= 20	-	CCR	3020	Plt	100	2	1200	All	PL86FD14
1061000	THLB	486	0.1%	IDF	SX	<10	-	CCR	3021	Plt	100	2/1	1200/1000	>17.9	PL76FD12SX8BL4

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
1062000	THLB	578	0.1%	IDF	SX	<10	-	CCR	3022	Plt	100	2/1	1200/1000	>16.1 & <=17.9	PL76FD12SX8BL4
1063000	THLB	197	0.0%	IDF	SX	<10	-	CCR	3023	Plt	100	2/1	1200/1000	<=16.1	PL76FD12SX8BL4
1064000	THLB	649	0.1%	IDF	SX	>=15 & <20	-	CCR	3021	Plt	100	2/1	1200/1000	>17.9	PL76FD12SX8BL4
1065000	THLB	648	0.1%	IDF	SX	>=15 & <20	-	CCR	3022	Plt	100	2/1	1200/1000	>16.1 & <=17.9	PL76FD12SX8BL4
1066000	THLB	132	0.0%	IDF	SX	>=15 & <20	-	CCR	3023	Plt	100	2/1	1200/1000	<=16.1	PL76FD12SX8BL4
1067000	THLB	35	0.0%	IDF	SX	>= 20	-	CCR	3021	Plt	100	2/1	1200/1000	>17.9	PL76FD12SX8BL4
1068000	THLB	44	0.0%	IDF	SX	>= 20	-	CCR	3022	Plt	100	2/1	1200/1000	>16.1 & <=17.9	PL76FD12SX8BL4
1069000	THLB	28	0.0%	IDF	SX	>= 20	-	CCR	3023	Plt	100	2/1	1200/1000	<=16.1	PL76FD12SX8BL4
1070000	THLB	1,027	0.2%	MS	BL	<10	-	CCR	3031	Plt	100	2	1300/1200	>19.4	PL77SX12BL10FD1
1071000	THLB	1,138	0.2%	MS	BL	<10	-	CCR	3032	Plt	100	2	1300/1200	>17.3 & <= 19.4	PL77SX12BL10FD1
1072000	THLB	772	0.1%	MS	BL	<10	-	CCR	3033	Plt	100	2	1300/1200	<= 17.3	PL77SX12BL10FD1
1073000	THLB	434	0.1%	MS	BL	>=15 & <20	-	CCR	3031	Plt	100	2	1300/1200	>19.4	PL77SX12BL10FD1
1074000	THLB	463	0.1%	MS	BL	>=15 & <20	-	CCR	3032	Plt	100	2	1300/1200	>17.3 & <= 19.4	PL77SX12BL10FD1
1075000	THLB	439	0.1%	MS	BL	>=15 & <20	-	CCR	3033	Plt	100	2	1300/1200	<= 17.3	PL77SX12BL10FD1
1076000	THLB	95	0.0%	MS	BL	>= 20	-	CCR	3031	Plt	100	2	1300/1200	>19.4	PL77SX12BL10FD1
1077000	THLB	28	0.0%	MS	BL	>= 20	-	CCR	3032	Plt	100	2	1300/1200	>17.3 & <= 19.4	PL77SX12BL10FD1
1078000	THLB	219	0.0%	MS	Dec	<10	-	N/A	1078000	N/A					
1079000	THLB	310	0.1%	MS	Dec	>=15 & <20	1,566	N/A	1079000	N/A					
1080000	THLB	38	0.0%	MS	Dec	>= 20	1,887	N/A	1080000	N/A					
1081000	THLB	2,050	0.4%	MS	FD	<10	537	CCR	3025	Plt	100	2	1300/1000	>19.3	PL75SX8FD7
1082000	THLB	3,385	0.6%	MS	FD	<10	6	CCR	3026	Plt	100	2	1300/1000	>18.0 & <= 19.3	PL75SX8FD7
1083000	THLB	3,500	0.6%	MS	FD	<10	-	CCR	3027	Plt	100	2	1300/1000	<=18.0	PL75SX8FD7
1084000	THLB	3,856	0.7%	MS	FD	>=15 & <20	16,800	CCR	3025	Plt	100	2	1300/1000	>19.3	PL75SX8FD7
1085000	THLB	2,543	0.4%	MS	FD	>=15 & <20	-	CCR	3026	Plt	100	2	1300/1000	>18.0 & <= 19.3	PL75SX8FD7
1086000	THLB	1,732	0.3%	MS	FD	>=15 & <20	-	CCR	3027	Plt	100	2	1300/1000	<=18.0	PL75SX8FD7
1087000	THLB	172	0.0%	MS	FD	>= 20	-	CCR	3025	Plt	100	2	1300/1000	>19.3	PL75SX8FD7
1088000	THLB	133	0.0%	MS	FD	>= 20	-	CCR	3026	Plt	100	2	1300/1000	>18.0 & <= 19.3	PL75SX8FD7
1089000	THLB	30	0.0%	MS	FD	>= 20	-	CCR	3027	Plt	100	2	1300/1000	<=18.0	PL75SX8FD7
1090000	THLB	16,769	2.9%	MS	PL	<10	-	CCR	3028	Plt	100	2	1300	>17.9	PL82Bl10SX8
1091000	THLB	21,024	3.7%	MS	PL	<10	-	CCR	3029	Plt	100	2	1300	>17.3 & <=17.9	PL82Bl10SX8
1092000	THLB	22,511	3.9%	MS	PL	<10	-	CCR	3030	Plt	100	2	1300	<=17.3	PL82Bl10SX8
1093000	THLB	12,112	2.1%	MS	PL	>=15 & <20	-	CCR	3028	Plt	100	2	1300	>17.9	PL82Bl10SX8
1094000	THLB	9,352	1.6%	MS	PL	>=15 & <20	-	CCR	3029	Plt	100	2	1300	>17.3 & <=17.9	PL82Bl10SX8
1095000	THLB	9,671	1.7%	MS	PL	>=15 & <20	-	CCR	3030	Plt	100	2	1300	<=17.3	PL82Bl10SX8

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
1096000	THLB	1,396	0.2%	MS	PL	>= 20	-	CCR	3028	Plt	100	2	1300	>17.9	PL82Bl10SX8
1097000	THLB	795	0.1%	MS	PL	>= 20	-	CCR	3029	Plt	100	2	1300	>17.3 & <=17.9	PL82Bl10SX8
1098000	THLB	587	0.1%	MS	PL	>= 20	-	CCR	3030	Plt	100	2	1300	<=17.3	PL82Bl10SX8
1099000	THLB	1,688	0.3%	MS	SX	<10	-	CCR	3034	Nat/Plt	7/93	2	5500/1300/1200	>18.3	PL71SX14BL14FD1
1100000	THLB	2,917	0.5%	MS	SX	<10	4,251	CCR	3035	Nat/Plt	7/93	2	5500/1300/1200	>17.3 & <= 18.3	PL71SX14BL14FD1
1101000	THLB	3,007	0.5%	MS	SX	<10	-	CCR	3036	Nat/Plt	7/93	2	5500/1300/1200	<=17.3	PL71SX14BL14FD1
1102000	THLB	1,876	0.3%	MS	SX	>=15 & <20	-	CCR	3034	Nat/Plt	7/93	2	5500/1300/1200	>18.3	PL71SX14BL14FD1
1103000	THLB	1,696	0.3%	MS	SX	>=15 & <20	-	CCR	3035	Nat/Plt	7/93	2	5500/1300/1200	>17.3 & <= 18.3	PL71SX14BL14FD1
1104000	THLB	857	0.1%	MS	SX	>=15 & <20	-	CCR	3036	Nat/Plt	7/93	2	5500/1300/1200	<=17.3	PL71SX14BL14FD1
1105000	THLB	257	0.0%	MS	SX	>= 20	-	CCR	3034	Nat/Plt	7/93	2	5500/1300/1200	>18.3	PL71SX14BL14FD1
1106000	THLB	264	0.0%	MS	SX	>= 20	-	CCR	3035	Nat/Plt	7/93	2	5500/1300/1200	>17.3 & <= 18.3	PL71SX14BL14FD1
1107000	THLB	12	0.0%	MS	SX	>= 20	-	CCR	3036	Nat/Plt	7/93	2	5500/1300/1200	<=17.3	PL71SX14BL14FD1
1500000	NHLB	9,462	1.6%	ESSF	BL	<10	-	N/A	1500000	N/A					
1501000	NHLB	10,500	1.8%	ESSF	BL	<10	-	N/A	1501000	N/A					
1502000	NHLB	11,451	2.0%	ESSF	BL	<10	-	N/A	1502000	N/A					
1503000	NHLB	542	0.1%	ESSF	BL	>=15 & <20	-	N/A	1503000	N/A					
1504000	NHLB	368	0.1%	ESSF	BL	>=15 & <20	-	N/A	1504000	N/A					
1505000	NHLB	589	0.1%	ESSF	BL	>=15 & <20	-	N/A	1505000	N/A					
1506000	NHLB	94	0.0%	ESSF	BL	>= 20	-	N/A	1506000	N/A					
1507000	NHLB	187	0.0%	ESSF	BL	>= 20	-	N/A	1507000	N/A					
1508000	NHLB	-	0.0%	ESSF	BL	>= 20	-	N/A	1508000	N/A					
1509000	NHLB	6	0.0%	ESSF	Dec	<10	-	N/A	1509000	N/A					
1510000	NHLB	5	0.0%	ESSF	Dec	>=15 & <20	-	N/A	1510000	N/A					
1511000	NHLB	13	0.0%	ESSF	Dec	>= 20	-	N/A	1511000	N/A					
1512000	NHLB	73	0.0%	ESSF	FD	<10	205	N/A	1512000	N/A					
1513000	NHLB	84	0.0%	ESSF	FD	<10	289	N/A	1513000	N/A					
1514000	NHLB	312	0.1%	ESSF	FD	<10	-	N/A	1514000	N/A					
1515000	NHLB	84	0.0%	ESSF	FD	>=15 & <20	-	N/A	1515000	N/A					
1516000	NHLB	230	0.0%	ESSF	FD	>=15 & <20	-	N/A	1516000	N/A					
1517000	NHLB	272	0.0%	ESSF	FD	>=15 & <20	-	N/A	1517000	N/A					
1518000	NHLB	41	0.0%	ESSF	FD	>= 20	-	N/A	1518000	N/A					
1519000	NHLB	3	0.0%	ESSF	FD	>= 20	-	N/A	1519000	N/A					
1520000	NHLB	114	0.0%	ESSF	FD	>= 20	-	N/A	1520000	N/A					
1521000	NHLB	2,613	0.5%	ESSF	PL	<10	-	N/A	1521000	N/A					

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
1522000	NHLB	1,764	0.3%	ESSF	PL	<10	-	N/A	1522000	N/A					
1523000	NHLB	2,718	0.5%	ESSF	PL	<10	-	N/A	1523000	N/A					
1524000	NHLB	1,003	0.2%	ESSF	PL	>=15 & <20	-	N/A	1524000	N/A					
1525000	NHLB	1,011	0.2%	ESSF	PL	>=15 & <20	-	N/A	1525000	N/A					
1526000	NHLB	614	0.1%	ESSF	PL	>=15 & <20	-	N/A	1526000	N/A					
1527000	NHLB	56	0.0%	ESSF	PL	>= 20	-	N/A	1527000	N/A					
1528000	NHLB	14	0.0%	ESSF	PL	>= 20	-	N/A	1528000	N/A					
1529000	NHLB	121	0.0%	ESSF	PL	>= 20	-	N/A	1529000	N/A					
1530000	NHLB	2,582	0.4%	ESSF	SX	<10	-	N/A	1530000	N/A					
1531000	NHLB	2,980	0.5%	ESSF	SX	<10	-	N/A	1531000	N/A					
1532000	NHLB	4,261	0.7%	ESSF	SX	<10	-	N/A	1532000	N/A					
1533000	NHLB	1,077	0.2%	ESSF	SX	>=15 & <20	-	N/A	1533000	N/A					
1534000	NHLB	989	0.2%	ESSF	SX	>=15 & <20	-	N/A	1534000	N/A					
1535000	NHLB	724	0.1%	ESSF	SX	>=15 & <20	-	N/A	1535000	N/A					
1536000	NHLB	234	0.0%	ESSF	SX	>= 20	-	N/A	1536000	N/A					
1537000	NHLB	359	0.1%	ESSF	SX	>= 20	-	N/A	1537000	N/A					
1538000	NHLB	214	0.0%	ESSF	SX	>= 20	-	N/A	1538000	N/A					
1539000	NHLB	1,761	0.3%	IDF	Dec	<10	-	N/A	1539000	N/A					
1540000	NHLB	1,925	0.3%	IDF	Dec	>=15 & <20	-	N/A	1540000	N/A					
1541000	NHLB	583	0.1%	IDF	Dec	>= 20	-	N/A	1541000	N/A					
1542000	NHLB	17,064	3.0%	IDF	FD	<10	-	N/A	1542000	N/A					
1543000	NHLB	22,844	4.0%	IDF	FD	<10	-	N/A	1543000	N/A					
1544000	NHLB	26,628	4.6%	IDF	FD	<10	-	N/A	1544000	N/A					
1545000	NHLB	11,529	2.0%	IDF	FD	>=15 & <20	-	N/A	1545000	N/A					
1546000	NHLB	7,679	1.3%	IDF	FD	>=15 & <20	-	N/A	1546000	N/A					
1547000	NHLB	4,036	0.7%	IDF	FD	>=15 & <20	-	N/A	1547000	N/A					
1548000	NHLB	578	0.1%	IDF	FD	>= 20	-	N/A	1548000	N/A					
1549000	NHLB	197	0.0%	IDF	FD	>= 20	-	N/A	1549000	N/A					
1550000	NHLB	89	0.0%	IDF	FD	>= 20	-	N/A	1550000	N/A					
1551000	NHLB	2,375	0.4%	IDF	PL	<10	-	N/A	1551000	N/A					
1552000	NHLB	1,757	0.3%	IDF	PL	<10	-	N/A	1552000	N/A					
1553000	NHLB	2,048	0.4%	IDF	PL	<10	-	N/A	1553000	N/A					
1554000	NHLB	1,323	0.2%	IDF	PL	>=15 & <20	-	N/A	1554000	N/A					
1555000	NHLB	1,149	0.2%	IDF	PL	>=15 & <20	-	N/A	1555000	N/A					

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
1556000	NHLB	915	0.2%	IDF	PL	>=15 & <20	-	N/A	1556000	N/A					
1557000	NHLB	232	0.0%	IDF	PL	>= 20	-	N/A	1557000	N/A					
1558000	NHLB	100	0.0%	IDF	PL	>= 20	-	N/A	1558000	N/A					
1559000	NHLB	20	0.0%	IDF	PL	>= 20	-	N/A	1559000	N/A					
1560000	NHLB	9,327	1.6%	IDF	PY	<10	-	N/A	1560000	N/A					
1561000	NHLB	508	0.1%	IDF	PY	>=15 & <20	-	N/A	1561000	N/A					
1562000	NHLB	28	0.0%	IDF	PY	>= 20	-	N/A	1562000	N/A					
1563000	NHLB	360	0.1%	IDF	SX	<10	-	N/A	1563000	N/A					
1564000	NHLB	334	0.1%	IDF	SX	<10	-	N/A	1564000	N/A					
1565000	NHLB	37	0.0%	IDF	SX	<10	-	N/A	1565000	N/A					
1566000	NHLB	530	0.1%	IDF	SX	>=15 & <20	-	N/A	1566000	N/A					
1567000	NHLB	579	0.1%	IDF	SX	>=15 & <20	-	N/A	1567000	N/A					
1568000	NHLB	56	0.0%	IDF	SX	>=15 & <20	-	N/A	1568000	N/A					
1569000	NHLB	43	0.0%	IDF	SX	>= 20	-	N/A	1569000	N/A					
1570000	NHLB	150	0.0%	IDF	SX	>= 20	-	N/A	1570000	N/A					
1571000	NHLB	18	0.0%	IDF	SX	>= 20	-	N/A	1571000	N/A					
1572000	NHLB	765	0.1%	MS	BL	<10	-	N/A	1572000	N/A					
1573000	NHLB	270	0.0%	MS	BL	<10	-	N/A	1573000	N/A					
1574000	NHLB	285	0.0%	MS	BL	<10	-	N/A	1574000	N/A					
1575000	NHLB	69	0.0%	MS	BL	>=15 & <20	-	N/A	1575000	N/A					
1576000	NHLB	37	0.0%	MS	BL	>=15 & <20	-	N/A	1576000	N/A					
1577000	NHLB	11	0.0%	MS	BL	>=15 & <20	-	N/A	1577000	N/A					
1578000	NHLB	9	0.0%	MS	BL	>= 20	-	N/A	1578000	N/A					
1579000	NHLB	1	0.0%	MS	BL	>= 20	-	N/A	1579000	N/A					
1580000	NHLB	209	0.0%	MS	Dec	<10	-	N/A	1580000	N/A					
1581000	NHLB	255	0.0%	MS	Dec	>=15 & <20	-	N/A	1581000	N/A					
1582000	NHLB	35	0.0%	MS	Dec	>= 20	-	N/A	1582000	N/A					
1583000	NHLB	1,090	0.2%	MS	FD	<10	-	N/A	1583000	N/A					
1584000	NHLB	2,084	0.4%	MS	FD	<10	-	N/A	1584000	N/A					
1585000	NHLB	2,881	0.5%	MS	FD	<10	-	N/A	1585000	N/A					
1586000	NHLB	1,666	0.3%	MS	FD	>=15 & <20	-	N/A	1586000	N/A					
1587000	NHLB	857	0.1%	MS	FD	>=15 & <20	-	N/A	1587000	N/A					
1588000	NHLB	1,234	0.2%	MS	FD	>=15 & <20	-	N/A	1588000	N/A					
1589000	NHLB	74	0.0%	MS	FD	>= 20	-	N/A	1589000	N/A					

ANALYSIS UNIT DESCRIPTION (Existing Natural Stands)									FUTURE MANAGED STAND DESCRIPTION						
AU	Land-base	AREA (ha)	AU Pct	BEC Group	Species Group	VRI Site Index Class	THLB Never Merch Area (ha)	Silv. System	Regen AU	Regen Method	Regen Percent	Regen Delay (yrs)	Establishment Density (sph)	PHR Site Index Range	Species Composition
1590000	NHLB	91	0.0%	MS	FD	>= 20	-	N/A	1590000	N/A					
1591000	NHLB	96	0.0%	MS	FD	>= 20	-	N/A	1591000	N/A					
1592000	NHLB	4,785	0.8%	MS	PL	<10	-	N/A	1592000	N/A					
1593000	NHLB	4,214	0.7%	MS	PL	<10	-	N/A	1593000	N/A					
1594000	NHLB	3,950	0.7%	MS	PL	<10	-	N/A	1594000	N/A					
1595000	NHLB	2,994	0.5%	MS	PL	>=15 & <20	-	N/A	1595000	N/A					
1596000	NHLB	2,312	0.4%	MS	PL	>=15 & <20	-	N/A	1596000	N/A					
1597000	NHLB	1,691	0.3%	MS	PL	>=15 & <20	-	N/A	1597000	N/A					
1598000	NHLB	363	0.1%	MS	PL	>= 20	-	N/A	1598000	N/A					
1599000	NHLB	163	0.0%	MS	PL	>= 20	-	N/A	1599000	N/A					
1600000	NHLB	62	0.0%	MS	PL	>= 20	-	N/A	1600000	N/A					
1601000	NHLB	1,053	0.2%	MS	SX	<10	-	N/A	1601000	N/A					
1602000	NHLB	1,788	0.3%	MS	SX	<10	-	N/A	1602000	N/A					
1603000	NHLB	1,567	0.3%	MS	SX	<10	-	N/A	1603000	N/A					
1604000	NHLB	1,372	0.2%	MS	SX	>=15 & <20	-	N/A	1604000	N/A					
1605000	NHLB	736	0.1%	MS	SX	>=15 & <20	-	N/A	1605000	N/A					
1606000	NHLB	239	0.0%	MS	SX	>=15 & <20	-	N/A	1606000	N/A					
1607000	NHLB	405	0.1%	MS	SX	>= 20	-	N/A	1607000	N/A					
1608000	NHLB	189	0.0%	MS	SX	>= 20	-	N/A	1608000	N/A					
1609000	NHLB	32	0.0%	MS	SX	>= 20	-	N/A	1609000	N/A					

Notes:
The analysis units described here do not include criteria that divide units further (e.g., Age class for MPB attacked stands, MPB impact classes)
BEC Groups: ESSF(ESSF, CWH, MH, IMA);IDF(IDF, BG, PP);MS (MS)
Species Groups: PL=Pine leading, SX=Spruce leading; BL = Balsam leading; FD=Douglas-fir leading; PY=Ponderosa Pine leading; Dec=Deciduous leading
Silvicultural systems: CCR=clearcut with reserves; SEL=selection
Analysis units were stratified on basis of BEC, Leading Species, VRI Site Index, PHR Site Index, Silviculture System, and MPB years since attack / %Dead

Analysis Units and TIPSY Inputs for Existing Managed Stands

ANALYSIS UNIT DESCRIPTION (Existing Managed Stands)													FUTURE MANAGED
AU	Land-Base	Silviculture Era	AREA (ha)	AU Pct	BEC Group	Species Group	PHR Site Index Range	Regen Method	Regen Percent	Delay (yrs)	Establishment Density (sph)	Species Composition	Silv. Sys	Regen AU
1001	THLB	Old Managed	1	0.0%	ESSF	FD	>19.0	Plt	100	2	1200	PL60SX16BL15	CCR	3001
1002	THLB	Old Managed	13	0.0%	ESSF	FD	>15.0 & <= 19.0	Plt	100	2	1200	PL60SX16BL15	CCR	3002
1003	THLB	Old Managed	3,430	1.5%	ESSF	PL	>17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	CCR	3004
1004	THLB	Old Managed	2,797	1.2%	ESSF	PL	>14.1 & <= 17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	CCR	3005

ANALYSIS UNIT DESCRIPTION (Existing Managed Stands)														FUTURE MANAGED
AU	Land-Base	Silviculture Era	AREA (ha)	AU Pct	BEC Group	Species Group	PHR Site Index Range	Regen Method	Regen Percent	Delay (yrs)	Establishment Density (sph)	Species Composition	Silv. Sys	Regen AU
1005	THLB	Old Managed	3,306	1.4%	ESSF	PL	<=14.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	CCR	3006
1006	THLB	Old Managed	501	0.2%	ESSF	BL	>19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	CCR	3007
1007	THLB	Old Managed	1,339	0.6%	ESSF	BL	>15.8 & <=19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	CCR	3008
1008	THLB	Old Managed	792	0.3%	ESSF	BL	<=15.8	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	CCR	3009
1009	THLB	Old Managed	2,331	1.0%	ESSF	SX	>18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	CCR	3010
1010	THLB	Old Managed	1,554	0.7%	ESSF	SX	>14.7 & <=18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	CCR	3011
1011	THLB	Old Managed	1,280	0.6%	ESSF	SX	<=14.7	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	CCR	3012
1012	THLB	Old Managed	2,000	0.9%	IDF	FD	>18.8	Plt	100	2/3	1200/1000	PL74FD26	CCR	3014
1013	THLB	Old Managed	995	0.4%	IDF	FD	>17.0 & <=18.8	Plt	100	2/3	1200/1000	PL74FD26	CCR	3015
1014	THLB	Old Managed	378	0.2%	IDF	FD	<=17.0	Plt	100	2/3	1200/1000	PL74FD26	CCR	3016
1015	THLB	Old Managed	9,152	4.0%	IDF	PL	>18.9	Plt	100	2/3	1200/1000	PL80FD20	CCR	3017
1016	THLB	Old Managed	9,189	4.0%	IDF	PL	>17.8 & <= 18.9	Plt	100	2/3	1200/1000	PL80FD20	CCR	3018
1017	THLB	Old Managed	6,169	2.7%	IDF	PL	<= 18.9	Plt	100	2/3	1200/1000	PL80FD20	CCR	3019
1018	THLB	Old Managed	303	0.1%	IDF	PY	All	Plt	100	2	1200	PL86FD14	CCR	3020
1019	THLB	Old Managed	152	0.1%	IDF	SX	>17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	CCR	3021
1020	THLB	Old Managed	69	0.0%	IDF	SX	>16.1 & <=17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	CCR	3022
1021	THLB	Old Managed	8	0.0%	IDF	SX	<=16.1	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	CCR	3023
1022	THLB	Old Managed	365	0.2%	MS	FD	>19.3	Plt	100	2	1300/1000	PL75SX8FD7	CCR	3025
1023	THLB	Old Managed	380	0.2%	MS	FD	>18.0 & <= 19.3	Plt	100	2	1300/1000	PL75SX8FD7	CCR	3026
1024	THLB	Old Managed	163	0.1%	MS	FD	<=18.0	Plt	100	2	1300/1000	PL75SX8FD7	CCR	3027
1025	THLB	Old Managed	18,123	7.8%	MS	PL	>17.9	Plt	100	2	1300	PL82Bl10SX8	CCR	3028
1026	THLB	Old Managed	14,538	6.3%	MS	PL	>17.3 & <=17.9	Plt	100	2	1300	PL82Bl10SX8	CCR	3029
1027	THLB	Old Managed	9,533	4.1%	MS	PL	<=17.3	Plt	100	2	1300	PL82Bl10SX8	CCR	3030
1028	THLB	Old Managed	302	0.1%	MS	BL	>19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	CCR	3031
1029	THLB	Old Managed	841	0.4%	MS	BL	>17.3 & <= 19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	CCR	3032
1030	THLB	Old Managed	670	0.3%	MS	BL	<= 17.3	Plt	100	2	1300/1200	PL77SX12BL10FD1	CCR	3033
1031	THLB	Old Managed	832	0.4%	MS	SX	>18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	CCR	3034
1032	THLB	Old Managed	516	0.2%	MS	SX	>17.3 & <= 18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	CCR	3035
1033	THLB	Old Managed	375	0.2%	MS	SX	<=17.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	CCR	3036
1501	NHLB	Old Managed	0	0.0%	ESSF	PL	>17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	N/A	N/A
1502	NHLB	Old Managed	103	0.0%	ESSF	PL	>14.1 & <= 17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	N/A	N/A
1503	NHLB	Old Managed	45	0.0%	ESSF	PL	<=14.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	N/A	N/A
1504	NHLB	Old Managed	78	0.0%	ESSF	BL	>19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	N/A	N/A
1505	NHLB	Old Managed	53	0.0%	ESSF	BL	>15.8 & <=19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	N/A	N/A

ANALYSIS UNIT DESCRIPTION (Existing Managed Stands)														FUTURE MANAGED
AU	Land-Base	Silviculture Era	AREA (ha)	AU Pct	BEC Group	Species Group	PHR Site Index Range	Regen Method	Regen Percent	Delay (yrs)	Establishment Density (sph)	Species Composition	Silv. Sys	Regen AU
1506	NHLB	Old Managed	58	0.0%	ESSF	BL	<=15.8	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	N/A	N/A
1507	NHLB	Old Managed	22	0.0%	ESSF	SX	>18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	N/A	N/A
1508	NHLB	Old Managed	122	0.1%	ESSF	SX	>14.7 & <=18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	N/A	N/A
1509	NHLB	Old Managed	79	0.0%	ESSF	SX	<=14.7	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	N/A	N/A
1510	NHLB	Old Managed	34	0.0%	ESSF	FD	>18.8	Plt	100	2/3	1200/1000	PL74FD26	N/A	N/A
1511	NHLB	Old Managed	231	0.1%	IDF	FD	>17.0 & <=18.8	Plt	100	2/3	1200/1000	PL74FD26	N/A	N/A
1512	NHLB	Old Managed	85	0.0%	IDF	FD	<=17.0	Plt	100	2/3	1200/1000	PL74FD26	N/A	N/A
1513	NHLB	Old Managed	21	0.0%	IDF	PL	>18.9	Plt	100	2/3	1200/1000	PL80FD20	N/A	N/A
1514	NHLB	Old Managed	339	0.1%	IDF	PL	>17.8 & <= 18.9	Plt	100	2/3	1200/1000	PL80FD20	N/A	N/A
1515	NHLB	Old Managed	314	0.1%	IDF	PL	<= 18.9	Plt	100	2/3	1200/1000	PL80FD20	N/A	N/A
1516	NHLB	Old Managed	292	0.1%	IDF	PY	All	Plt	100	2	1200	PL86FD14	N/A	N/A
1517	NHLB	Old Managed	72	0.0%	IDF	SX	>17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	N/A	N/A
1518	NHLB	Old Managed	12	0.0%	IDF	SX	>16.1 & <=17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	N/A	N/A
1519	NHLB	Old Managed	10	0.0%	IDF	FD	>19.3	Plt	100	2	1300/1000	PL75SX8FD7	N/A	N/A
1520	NHLB	Old Managed	2	0.0%	IDF	FD	>18.0 & <= 19.3	Plt	100	2	1300/1000	PL75SX8FD7	N/A	N/A
1521	NHLB	Old Managed	29	0.0%	MS	FD	<=18.0	Plt	100	2	1300/1000	PL75SX8FD7	N/A	N/A
1522	NHLB	Old Managed	28	0.0%	MS	PL	>17.9	Plt	100	2	1300	PL82Bl10SX8	N/A	N/A
1523	NHLB	Old Managed	2	0.0%	MS	PL	>17.3 & <=17.9	Plt	100	2	1300	PL82Bl10SX8	N/A	N/A
1524	NHLB	Old Managed	796	0.3%	MS	PL	<=17.3	Plt	100	2	1300	PL82Bl10SX8	N/A	N/A
1525	NHLB	Old Managed	450	0.2%	MS	BL	>19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	N/A	N/A
1526	NHLB	Old Managed	215	0.1%	MS	BL	>17.3 & <= 19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	N/A	N/A
1527	NHLB	Old Managed	13	0.0%	MS	BL	<= 17.3	Plt	100	2	1300/1200	PL77SX12BL10FD1	N/A	N/A
1528	NHLB	Old Managed	26	0.0%	MS	SX	>18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
1529	NHLB	Old Managed	31	0.0%	MS	SX	>17.3 & <= 18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
1530	NHLB	Old Managed	56	0.0%	MS	SX	<=17.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
1531	NHLB	Old Managed	34	0.0%	MS	SX	>17.3 & <= 18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
1532	NHLB	Old Managed	37	0.0%	MS	SX	<=17.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
2001	THLB	New Managed	37	0.0%	ESSF	FD	>19.0	Plt	100	2	1200	PL60SX16BL15	CCR	3001
2002	THLB	New Managed	93	0.0%	ESSF	FD	>15.0 & <= 19.0	Plt	100	2	1200	PL60SX16BL15	CCR	3002
2003	THLB	New Managed	0	0.0%	ESSF	FD	<= 15.0	Plt	100	2	1200	PL60SX16BL15	CCR	3003
2004	THLB	New Managed	4,235	1.8%	ESSF	PL	>17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	CCR	3004
2005	THLB	New Managed	4,155	1.8%	ESSF	PL	>14.1 & <= 17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	CCR	3005
2006	THLB	New Managed	3,566	1.5%	ESSF	PL	<=14.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	CCR	3006
2007	THLB	New Managed	912	0.4%	ESSF	BL	>19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	CCR	3007

ANALYSIS UNIT DESCRIPTION (Existing Managed Stands)														FUTURE MANAGED
AU	Land-Base	Silviculture Era	AREA (ha)	AU Pct	BEC Group	Species Group	PHR Site Index Range	Regen Method	Regen Percent	Delay (yrs)	Establishment Density (sph)	Species Composition	Silv. Sys	Regen AU
2008	THLB	New Managed	843	0.4%	ESSF	BL	>15.8 & <=19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	CCR	3008
2009	THLB	New Managed	372	0.2%	ESSF	BL	<=15.8	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	CCR	3009
2010	THLB	New Managed	458	0.2%	ESSF	SX	>18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	CCR	3010
2011	THLB	New Managed	822	0.4%	ESSF	SX	>14.7 & <=18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	CCR	3011
2012	THLB	New Managed	752	0.3%	ESSF	SX	<=14.7	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	CCR	3012
2013	THLB	New Managed	5,927	2.6%	IDF	FD	>18.8	Plt	100	2/3	1200/1000	PL74FD26	CCR	3014
2014	THLB	New Managed	4,699	2.0%	IDF	FD	>17.0 & <=18.8	Plt	100	2/3	1200/1000	PL74FD26	CCR	3015
2015	THLB	New Managed	2,080	0.9%	IDF	FD	<=17.0	Plt	100	2/3	1200/1000	PL74FD26	CCR	3016
2016	THLB	New Managed	4,834	2.1%	IDF	PL	>18.9	Plt	100	2/3	1200/1000	PL80FD20	CCR	3017
2017	THLB	New Managed	7,012	3.0%	IDF	PL	>17.8 & <= 18.9	Plt	100	2/3	1200/1000	PL80FD20	CCR	3018
2018	THLB	New Managed	8,342	3.6%	IDF	PL	<= 18.9	Plt	100	2/3	1200/1000	PL80FD20	CCR	3019
2019	THLB	New Managed	236	0.1%	IDF	PY	All	Plt	100	2	1200	PL86FD14	CCR	3020
2020	THLB	New Managed	160	0.1%	IDF	SX	>17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	CCR	3021
2021	THLB	New Managed	298	0.1%	IDF	SX	>16.1 & <=17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	CCR	3022
2022	THLB	New Managed	53	0.0%	IDF	SX	<=16.1	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	CCR	3023
2023	THLB	New Managed	653	0.3%	MS	FD	>19.3	Plt	100	2	1300/1000	PL75SX8FD7	CCR	3025
2024	THLB	New Managed	485	0.2%	MS	FD	>18.0 & <= 19.3	Plt	100	2	1300/1000	PL75SX8FD7	CCR	3026
2025	THLB	New Managed	221	0.1%	MS	FD	<=18.0	Plt	100	2	1300/1000	PL75SX8FD7	CCR	3027
2026	THLB	New Managed	23,048	10.0%	MS	PL	>17.9	Plt	100	2	1300	PL82Bl10SX8	CCR	3028
2027	THLB	New Managed	27,911	12.1%	MS	PL	>17.3 & <=17.9	Plt	100	2	1300	PL82Bl10SX8	CCR	3029
2028	THLB	New Managed	20,125	8.7%	MS	PL	<=17.3	Plt	100	2	1300	PL82Bl10SX8	CCR	3030
2029	THLB	New Managed	99	0.0%	MS	BL	>19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	CCR	3031
2030	THLB	New Managed	286	0.1%	MS	BL	>17.3 & <= 19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	CCR	3032
2031	THLB	New Managed	263	0.1%	MS	BL	<= 17.3	Plt	100	2	1300/1200	PL77SX12BL10FD1	CCR	3033
2032	THLB	New Managed	499	0.2%	MS	SX	>18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	CCR	3034
2033	THLB	New Managed	1,108	0.5%	MS	SX	>17.3 & <= 18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	CCR	3035
2034	THLB	New Managed	972	0.4%	MS	SX	<=17.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	CCR	3036
2501	NHLB	New Managed	1	0.0%	ESSF	FD	>19.0	Plt	100	2	1200	PL60SX16BL15	N/A	N/A
2502	NHLB	New Managed	6	0.0%	ESSF	FD	>15.0 & <= 19.0	Plt	100	2	1200	PL60SX16BL15	N/A	N/A
2503	NHLB	New Managed	225	0.1%	ESSF	PL	>17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	N/A	N/A
2504	NHLB	New Managed	127	0.1%	ESSF	PL	>14.1 & <= 17.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	N/A	N/A
2505	NHLB	New Managed	327	0.1%	ESSF	PL	<=14.1	Nat/Plt	17/83	2/2	4700/1200	PL56BL23SX21	N/A	N/A
2506	NHLB	New Managed	335	0.1%	ESSF	BL	>19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	N/A	N/A
2507	NHLB	New Managed	273	0.1%	ESSF	BL	>15.8 & <=19.0	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	N/A	N/A

ANALYSIS UNIT DESCRIPTION (Existing Managed Stands)														FUTURE MANAGED
AU	Land-Base	Silviculture Era	AREA (ha)	AU Pct	BEC Group	Species Group	PHR Site Index Range	Regen Method	Regen Percent	Delay (yrs)	Establishment Density (sph)	Species Composition	Silv. Sys	Regen AU
2508	NHLB	New Managed	147	0.1%	ESSF	BL	<=15.8	Nat/Plt	25/75	2/2	4700/1200	SX47BL33PL20	N/A	N/A
2509	NHLB	New Managed	36	0.0%	ESSF	SX	>18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	N/A	N/A
2510	NHLB	New Managed	58	0.0%	ESSF	SX	>14.7 & <=18.1	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	N/A	N/A
2511	NHLB	New Managed	47	0.0%	ESSF	SX	<=14.7	Nat/Plt	27/73	2/2	4700/1200	PL35SX34BL31	N/A	N/A
2512	NHLB	New Managed	932	0.4%	IDF	FD	>18.8	Plt	100	2/3	1200/1000	PL74FD26	N/A	N/A
2513	NHLB	New Managed	273	0.1%	IDF	FD	>17.0 & <=18.8	Plt	100	2/3	1200/1000	PL74FD26	N/A	N/A
2514	NHLB	New Managed	380	0.2%	IDF	FD	<=17.0	Plt	100	2/3	1200/1000	PL74FD26	N/A	N/A
2515	NHLB	New Managed	308	0.1%	IDF	PL	>18.9	Plt	100	2/3	1200/1000	PL80FD20	N/A	N/A
2516	NHLB	New Managed	422	0.2%	IDF	PL	>17.8 & <= 18.9	Plt	100	2/3	1200/1000	PL80FD20	N/A	N/A
2517	NHLB	New Managed	619	0.3%	IDF	PL	<= 18.9	Plt	100	2/3	1200/1000	PL80FD20	N/A	N/A
2518	NHLB	New Managed	146	0.1%	IDF	PY	All	Plt	100	2	1200	PL86FD14	N/A	N/A
2519	NHLB	New Managed	6	0.0%	IDF	SX	>17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	N/A	N/A
2520	NHLB	New Managed	57	0.0%	IDF	SX	>16.1 & <=17.9	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	N/A	N/A
2521	NHLB	New Managed	9	0.0%	IDF	SX	<=16.1	Plt	100	2/1	1200/1000	PL76FD12SX8BL4	N/A	N/A
2522	NHLB	New Managed	41	0.0%	MS	FD	>19.3	Plt	100	2	1300/1000	PL75SX8FD7	N/A	N/A
2523	NHLB	New Managed	28	0.0%	MS	FD	>18.0 & <= 19.3	Plt	100	2	1300/1000	PL75SX8FD7	N/A	N/A
2524	NHLB	New Managed	20	0.0%	MS	FD	<=18.0	Plt	100	2	1300/1000	PL75SX8FD7	N/A	N/A
2525	NHLB	New Managed	2,155	0.9%	MS	PL	>17.9	Plt	100	2	1300	PL82Bl10SX8	N/A	N/A
2526	NHLB	New Managed	1,541	0.7%	MS	PL	>17.3 & <=17.9	Plt	100	2	1300	PL82Bl10SX8	N/A	N/A
2527	NHLB	New Managed	802	0.3%	MS	PL	<=17.3	Plt	100	2	1300	PL82Bl10SX8	N/A	N/A
2528	NHLB	New Managed	3	0.0%	MS	BL	>19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	N/A	N/A
2529	NHLB	New Managed	18	0.0%	MS	BL	>17.3 & <= 19.4	Plt	100	2	1300/1200	PL77SX12BL10FD1	N/A	N/A
2530	NHLB	New Managed	18	0.0%	MS	BL	<= 17.3	Plt	100	2	1300/1200	PL77SX12BL10FD1	N/A	N/A
2531	NHLB	New Managed	109	0.0%	MS	SX	>18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
2532	NHLB	New Managed	156	0.1%	MS	SX	>17.3 & <= 18.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A
2533	NHLB	New Managed	68	0.0%	MS	SX	<=17.3	Nat/Plt	7/93	2	5500/1300/1200	PL71SX14BL14FD1	N/A	N/A

Notes:

BEC Groups: ESSF(ESSF, CWH, MH, IMA);IDF(IDF, BG, PP);MS (MS)

Species Groups: PL=Pine leading, SX=Spruce leading; BL = Balsam leading; FD=Douglas-fir leading (Based on Existing Species)

Stand Parameters (Site Index, Densities, Composition, Etc.) were the same for Future Managed Analysis Units and the Existing Managed Analysis Units they transition from

Appendix 3 ***Silvicultural Systems***

Approach for modelling silvicultural systems of stand / management regimes within THLB

Order	Stand Type	Management Type	BEC Zone	Species Group	Snowpack Zone	Habitat Type	Silviculture System	Modelled Treatment	Regeneration	Model	SI Source
1	Existing Natural	Non-Dry Belt Fir	By BEC GRP	By SPP GRP	NA	NA	CCR	Clearcut	Natural and planted	VDYP	VRI
2	Existing Managed	Non-Dry Belt Fir	By BEC GRP	By SPP GRP	NA	NA	CCR	Clearcut	Natural and planted	TIPSY	Provincial productivity tile
3	Future Managed	Non-Dry Belt Fir	By BEC GRP	By SPP GRP	NA	NA	CCR	Clearcut	Natural and planted	TIPSY	Provincial productivity tile
4	Existing Natural	Dry Belt Fir	IDF & PP	Fd leading	NA	NA	SEL	Remove 60m³/ha @ 35 yr cycle	Natural	Linear 1.74 m³ per hectare per year	N/A

Notes:
Silvicultural systems (CCR = clearcut with reserves; SEL = selection;
Regeneration assumptions for these regimes are described in Appendix 2 – Analysis Units for Existing Natural Stands

Appendix 4 ***Criteria for Scoring Anchors***

Anchors	Order / Units	Criteria (Based on Timber Impact)	Modelling
WHA: Coastal Tailed Frog	3-004, 3-005, 3-014 to 3-017, 3-148, 3-150, 8-011 to 8-013, 8-077 to 8-082	No harvest in core area – no salvage – do not construct stream crossing or roads within 33 m of streams and within 100 m of a known point location.	No harvest
http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-077_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-078_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-079_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-080_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-081_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-082_ord.pdf			
WHA: Data Sensitive	3-008, 3-009, 3-046 to 3-048, 3-140	No harvest in data sensitive areas	No harvest
http://www.env.gov.bc.ca/cgi-bin/apps/faw/wharesult.cgi?search=forest_region&forest=Cascades&submit2=Search			
WHA: Great Basin Spadefoot	3-126	No harvest – do not construct roads or landings	No harvest
http://www.env.gov.bc.ca/wld/documents/wha/SPIN_3-126_ord.pdf			
WHA: Grizzly Bear	8-083 to 8-089 2-105, 2-195, 2-203, 3-026 to 3-028	No forestry practices to be carried out – do not construct roads, trails or landings	No harvest
http://www.env.gov.bc.ca/wld/documents/wha/URAR_8-083to89_Cascades_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/URAR_2-097varto380_Order.pdf http://www.env.gov.bc.ca/wld/documents/wha/URAR_13-Cascades_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/URAR_3-026to028_ord.pdf			
WHA: Lewis's Woodpecker	3-082, 3-083	Do not harvest or salvage mature timber	No harvest
	3-103, 3-104	Do not construct roads – no timber harvesting	
http://www.env.gov.bc.ca/wld/documents/wha/LEWO_3-080to089_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/LEWO_3-103_104_ord.pdf			
WHA: Western Screech Owl	3-068	Do not construct roads or stream crossings – do not harvest or salvage – do not construct trails within 50 m of known nest site	No harvest
	8-125, 8-260	Do not construct new roads or stream crossings within core area – do not harvest or salvage during breeding season (March 1 to Aug 15) – do not harvest or salvage – do not construct trails within 50 m of known nest site	
http://www.env.gov.bc.ca/wld/documents/wha/WSOW-3-032,068_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/WSOW_8-125_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/WSOW_8-260_ord.pdf			
WHA: Williamson's Sapsucker	3-090 to 3-095, 3-129 to 3-135, 3-137, 3-139, 3-142, 3-143, 8-096 to 8-098, 8-100	Do not construct roads – No timber harvesting	No harvest
http://www.env.gov.bc.ca/wld/documents/wha/WISA_3-090_095,129_130_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/WISA_3_131varto143_order.pdf http://www.env.gov.bc.ca/wld/documents/wha/WISA-8-096_098,100_ord.pdf			
UWR: Mountain Goat	U-2-001	No harvest within winter ranges – GWM applies to 500m buffer around UWR – forest activities (incl. salvage) will retain all forest cover (100% retention)	No harvest

<table>
<tr><th>Anchors</th><th>Order / Units</th><th>Criteria (Based on Timber Impact)</th><th>Modelling</th></tr>
<tr><td></td><td>U-3-006</td><td>Do not construct roads – no permanent roads within 500m adjacent to UWR – no forestry activities between Nov 1 to June 30 (including no heli-logging/blasting within 2km of UWR, no ground-based or cable logging within 500m adjacent to UWR)</td><td></td></tr>
<tr><td colspan="4">http://www.env.gov.bc.ca/wld/documents/uwr/uwr_u2_001.pdf
http://www.env.gov.bc.ca/wld/documents/uwr/u-3-006_ORAM_Order.pdf</td></tr>
<tr><td>Parks and Protected Areas</td><td>Multiple Statutes</td><td>No harvest within parks.</td><td>No harvest</td></tr>
<tr><td>Environmentally Sensitive Areas</td><td>Non-Legal</td><td>FLNRO Cascades District inventory (1994-1996):
<table>
<tr><th>Code Description</th><th>CD</th><th>Area (ha)</th></tr>
<tr><td>Unknown</td><td></td><td>975</td></tr>
<tr><td>Snow chute and avalanche.</td><td>A</td><td>362</td></tr>
<tr><td>Snow chute and avalanche, regen problems.</td><td>AP</td><td>335</td></tr>
<tr><td>High water values/harvesting sensitivity.</td><td>H</td><td>108</td></tr>
<tr><td>Regen problems.</td><td>P</td><td>40,493</td></tr>
<tr><td>Regen problems, high recreational.</td><td>PR</td><td>145</td></tr>
<tr><td>High recreational.</td><td>R</td><td>1,309</td></tr>
<tr><td>Fragile or unstable soils.</td><td>S</td><td>6,972</td></tr>
<tr><td>Fragile or unstable soils, snow chute and avalanche.</td><td>SA</td><td>6</td></tr>
<tr><td>Fragile or unstable soils, regen problems.</td><td>SP</td><td>16,574</td></tr>
<tr><td>Fragile or unstable soils, regen problems, high recreational.</td><td>SPR</td><td>547</td></tr>
<tr><td>Fragile or unstable soils, importance to wildlife.</td><td>SW</td><td>50</td></tr>
<tr><td>Importance to wildlife.</td><td>W</td><td>153</td></tr>
<tr><td></td><td></td><td>68,029</td></tr>
</table></td><td>No harvest</td></tr>
<tr><td>Cultural Survival Areas</td><td></td><td>Data not available at this time</td><td></td></tr>
<tr><td>Cultural Heritage Resources</td><td></td><td>Data not available at this time</td><td></td></tr>
<tr><td>Archaeological Sites</td><td>Arch. Sites, heritage features, traditional use sites, etc.</td><td>Protected and/or conserved areas under the Heritage Conservation Act or through consultation with First Nations

Not permitted to use data at this time.</td><td>No harvest</td></tr>
<tr><td>Physically Inoperable</td><td></td><td>Slopes > 65% or Terrain Stability Class 5</td><td>No harvest</td></tr>
<tr><td>Legally Established Heritage Trails</td><td></td><td>No harvesting within 100m each side of established trail.</td><td>No harvest</td></tr>
<tr><td>Research Sites (i.e. PSP)</td><td></td><td>Permanent Sample Plot (PSP) with 50 m buffer</td><td>No harvest</td></tr>
<tr><td>Effective Riparian Reserve Zones</td><td></td><td>FPPR buffer widths (each side):
- S1 (except large rivers) 100m, S2 30m, S3 20m
- Lakeshore Management Zones (Class A 200m), L1/L2 10m
- W1/W2/W5 10m</td><td>No harvest</td></tr>
<tr><td>Temperature Sensitive Streams</td><td></td><td>Enhanced riparian buffers (10m each side) for S4, S5, and S6 streams within the Nicola Watershed.</td><td>No harvest</td></tr>
<tr><td>Whitebark Pine</td><td></td><td>Where Pa exists within any species code of the forest inventory.</td><td>No harvest</td></tr>
<tr><td>Wetlands</td><td></td><td>Forest Inventory where BCLCS_LEVEL_3 = ‘W’</td><td>No harvest</td></tr>
</table>

Appendix 5 ***Criteria for Scoring Constraints***

Constraints	Order / Units	Criteria (Based on Timber Impact)	Modelling
OGMA	Provincial Non-Spatial Old Growth Objectives	Non-legal spatial layer developed based on target areas assigned by LU and BEC (v6) variant (Table 2 of Appendix 2 of the order); updated by licensees from time-to-time to track minor changes and replacements.	No harvest
WHA: Coastal Tailed Frog	3-004, 3-005, 3-014 to 3-017, 3-148, 3-150, 8-011 to 8-013, 8-077 to 8-082	Minimize length of road in WHA – partial harvest in buffer areas that maintain 80% basal area – no salvage	Partial harvest max 20% basal area
	3-148, 3-150	Minimum 70% basal area retention within buffer areas – all high value wildlife trees retained – no salvage	Partial harvest max 30% basal area
http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-077_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-078_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-079_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-080_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-081_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/ASTR-8-082_ord.pdf			
WHA: Lewis's Woodpecker	3-082, 3-083	If harvesting is approved: protect and retain all PP and ACT live and dead ≥ 30 cm dbh – maintain >= 6 standing dead trees per ha (≥ 45 cm dbh) – partial harvest to maintain widely spaced late seral PP and FD	Partial harvest; maintain widely spaced late seral PP/FD; retain all PP/ACT
http://www.env.gov.bc.ca/wld/documents/wha/LEWO_3-080to089_ord.pdf			
WHA: Western Screech Owl	8-125, 8-260	Avoid constructing roads or stream crossings – in PP/IDF select harvest ≤ 20% basal area provided no suitable wildlife trees are removed – retain deciduous species – within RMZs retain >60% trees including all suitable wildlife trees – do not construct trails within 50 m of known nest site Suitable wildlife trees (WTP): ≥ 2.5 ha; PPxh/ PPdh/ IDFxh/ IDFxw/ IDFdk/ IDFmw/ riparian areas; cavities; deciduous preferred (AT, ACT, EW, FD, PP, LW); deciduous ≥34 cm dbh, conifer ≥ 74cm dbh (≥30 cm dbh recruit)	Partial harvest max 20% basal area; retain deciduous; in RMZs retain > 60% trees
http://www.env.gov.bc.ca/wld/documents/wha/WSOW_8-125_ord.pdf http://www.env.gov.bc.ca/wld/documents/wha/WSOW_8-260_ord.pdf			
UWR: Mule Deer, Bighorn Sheep, Elk	U-3-003	1. Forestry activities must retain min amount of snow interception cover (SIC) targets: a. Shallow (SIC 15%)– BG, PP, IDFxh1, IDFxh1a, IDFxh2, IDFxh2a – Fd > 70%, ≥ 121 years b. Moderate (SIC 33%) – IDFdk1, IDFdk1a, IDFdk2, IDFdk3, IDFunk, MS– Fd > 70%, ≥ 121 years, ≥ 36% canopy closure c. Deep (SIC 40%) – ESSF, ICH, CWH – Fd > 70%, ≥ 121 years, ≥ 46% canopy closure 2. In Moderate SZ with insufficient forest cover, activities must retain forest cover with SIC attributes (rank order from A (high) to D (low)): a. Fd 70%, ≥ 81 years, ≥ 36% crown closure b. Fd 50%, ≥ 81 years, ≥ 36% crown closure c. Fd 50%, ≥ 81 years, ≥ 16% crown closure d. Fd 30%, ≥ 81 years, ≥ 16% crown closure	Partial harvest to maintain SIC targets/attributes Min patch size: Shallow = 1 ha Moderate = 10 ha Deep = 20 ha

Constraints	Order / Units	Criteria (Based on Timber Impact)	Modelling
		Area of roads and right of ways under permit is not included in area used to calculate percent of SIC *SIC: mature conifer with high % Fd, ≥ 140 years, ≥ 46% CC* *Deep SZ: 40% in SIC, patches no less than 20ha* *Moderate SZ: 33% in SIC, patches no less than 10ha* *Shallow SZ: 15% in SIC, patches no less than 1 ha* *Security Cover: stands ≥ 2 m height in patches ≥ 5 ha*	
	U-8-001	SIC requirements: a. Shallow – BG/ PP/ IDFxh; Fd ≥ 50%; ≥ 140 years b. Moderate – IDFdk/ IDFdm/ IDFmw/ MS/ ICHdw; Fd ≥ 50%; IDFmw ≥ 140 years, all others ≥ 175 years; CC ≥ 36% c. Deep – ICH (except ICHdw); Fd ≥ 50%; ≥ 100 years; CC ≥ 46% - WTPs are Fd ≥ 140 years - Moderate (except IDFmw) ≤ 50% SIC by pcell can be NTHLB provided ≥ 50% Fd, ≥ 120 years and CC ≥ 36% - IDFmw no restrictions to % in NTHLB as long as CC ≥ 50% and age/species conditions are met - Moderate – in 67% available for harvest to be uneven aged silv. System as long as ≤ 20% of stems removed every 40 years - Moderate SIC stands on slopes < 80% - Moderate ≤ 30% of pcell can be ≤ 20 years	Partial harvest to maintain SIC targets/attributes Moderate: partial harvest uneven-aged system with ≤20% removed 40 year rotation; retained stands on slopes <80%; ≤30% pcell ≤20 years
http://www.env.gov.bc.ca/wld/documents/uwr/uwr_u3_003.pdf http://www.env.gov.bc.ca/wld/documents/uwr/u-8-001_ord.pdf http://www.env.gov.bc.ca/esd/distdata/ecosystems/frpa/Approved_FRPR_sec7_WLPPR_sec9_Notices_and_Supporting_Info/UWR/Timber_Supply_Areas/Merritt_TSA/Supporting_Info/Docs/Supporting_info_Merritt%20TSA_UWR.pdf			
UWR: Mountain Goat	U-3-006	Harvesting must result in: uneven aged stands with ≥ 50% pre-harvest basal area in mature stems (> 100 years) retained; cutblocks ≤ 5ha or 200m in one dimension; ≤ 33% forested area < 33 years; maintain SIC/thermal cover by retaining Fd leading stands ≥ height class 2 and ≥ crown closure class 8 *Escape terrain: slopes > 30° and < 60°* *Forage: high snow interception characteristics, warm southerly aspects in coastal/transition areas and/or high-exposure/windswept slopes* *Termal/Security Cover: ≤ 33% of forested habitat within 200 m of escape terrain in early seral (< 40 years) over one rotation and ≥ 50% basal area of mature and old stems retained at all times* *Snow Interception/ Thermal Cover:Fd leading stands ≥ 12m height with large, well developed crowns, ≥ 70% CC*	Maintain SIC/ thermal cover with stands > 50% Fd, ≥ 10.5m, ≥ 76% Partial harvest max 50% basal area, retain stands > 100 years; cutblocks ≤ 5ha; ≤ 33% < 33 years
http://www.env.gov.bc.ca/wld/documents/uwr/u-3-006_ORAM_Order.pdf http://www.env.gov.bc.ca/esd/distdata/ecosystems/frpa/Approved_FRPR_sec7_WLPPR_sec9_Notices_and_Supporting_Info/UWR/Timber_Supply_Areas/Merritt_TSA/Notice/Merritt%20TSA_UWR.pdf			
UWR: Moose	FPPR Sec 7 Notice	*Forage: maintain min 15% forested landbase in early seral stands: IDF/ICH < 25 years, MS/ESSF < 35 years* *Cover: conifer stands ≥ 16 m height with relatively high CC; ≥ 50% cover in patches ≥ 20 ha; where possible cover close to riparian features*	Forage: retain 15% in early seral Cover: conifer stands ≥ 16m with high CC, ≥ 50% in patches ≥ 20 ha
http://www.env.gov.bc.ca/esd/distdata/ecosystems/frpa/Approved_FRPR_sec7_WLPPR_sec9_Notices_and_Supporting_Info/UWR/Timber_Supply_Areas/Merritt_TSA/Notice/Merritt%20TSA_UWR.pdf			

Constraints	Order / Units	Criteria (Based on Timber Impact)	Modelling
DRAFT: Fisheries Sensitive Watersheds	Spius, Prospect, Maka, Upper Spius, Juliet, Upper Coldwater	TBD	TBD
Community Watersheds	Anderson, Bell, Brook, Dillard, Hackett, Kwinshatin, Lee, Skuagam, Thomas	maximum allowable ECA as per licensee's FSPs – young seral limit of 30% under 6.6 m height with 100 m buffer reserve upstream of water intakes	Max 30% of young seral stands (by CWS) < 6.6 m
Riparian Management Zones		Modified FPPR buffer widths (each side) and basal area (BA) retention based on licensee FSPs: - S1-A 100m 20% BA - S1-B/S2/S3 20m 20% BA - S4 fish/S5 30m 10% BA - S4 no fish 30m 0% BA - S6 20m 10% BA - L1 25% BA - L2 20m 10% BA - L3/L4 30m 10% BA - LMZ 200m – Class B 50% BA, Class C 25% BA, Class D 10% BA, Class E 5% BA - W1/W5 40m 10% BA - W2 20m 10% BA - W3 30m - W4 30m 10% BA	Minimum basal area retention by riparian class and applicable management zone (buffer width)
Recreation	Heritage Trails: Dewdney, Hope Pass, Hudson's Bay Brigade, Whatcom	200 m right of way – requires permit for any alterations – must meet VQO Retention (activities not visually evident – perspective view below Visually Effective Green-up)	Max 4%
Visual Quality Objectives	Preservation (P)	No visible activities – percent alteration per VQO 0.17-0.83% – perspective view below Visually Effective Green-up (VEG) (based on slope)	Max 0.83%
	Retention (R)	Activities not visually evident – percent alteration per VQO 2-4% – perspective view below VEG	Max 4%
	Partial Retention (PR)	Activities visible but minimal – percent alteration per VQO 6.7-13.3% – perspective view below VEG	Max 13.3%
Landscape Level Fuel Breaks	N/A	FLNRO Cascades Natural Resource District – Fire Management Plan	No thresholds.
Wildland Urban Interface	N/A	Provincial Strategic Threat Analysis	No thresholds.
Wildlife Tree Retention	N/A	RESULTS reserves; WTR already removed from depletion areas (blocks)	No thresholds.

<table>
<tr><th>Constraints</th><th>Order / Units</th><th>Criteria (Based on Timber Impact)</th><th>Modelling</th></tr>
<tr><td>Operability</td><td>N/A</td><td>Adopt the following relative scores to distinguish timber harvesting preference:
<table><tr><td></td><td colspan="4">Site Index</td></tr><tr><td>Slope</td><td>≤9</td><td>≥9&<12</td><td>≥12&<16</td><td>≥16</td></tr><tr><td>0-45</td><td>8</td><td>2</td><td>0</td><td>0</td></tr><tr><td>45-65</td><td>9</td><td>6</td><td>3</td><td>0</td></tr><tr><td>>65</td><td colspan="4">Already considered as anchors</td></tr></table></td><td>No thresholds.</td></tr>
</table>