## APPENDIX B - ACCEPTED TIMBER SUPPLY DATA PACKAGE

# TREE FARM LICENCE #48
# MANAGEMENT PLAN #5

# TIMBER SUPPLY ANALYSIS
# DATA PACKAGE

Prepared for:

Canadian Forest Products Ltd

All interested parties are invited to view and comment on the Draft Timber Supply Analysis Data Package for MP 5, from September 4th 2013 through to November 4th 2013. Comments will be accepted until 4:00 pm November 4th, 2013.
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# ACRONYMS

| | |
|---|---|
| AAC | Allowable Annual Cut |
| AU | Analysis Unit |
| BEC | Biogeoclimatic Ecosystem Classification |
| BEO | Biodiversity Emphasis Option |
| CFLB | Crown Forested Land Base |
| ECA | Equivalent Clearcut Area |
| ERA | Ecosystem Representation Analysis |
| FDU | Forest Development Unit |
| FPPR | Forest Planning and Practices Regulations |
| FRPA | Forest and Range Practices Act |
| FSP | Forest Stewardship Plan |
| FSW | Fisheries Sensitive Watershed |
| GWM | General Wildlife Measure |
| IWA | Interior Watershed Assessment |
| IWAP | Interior Watershed Assessment Procedures |
| LRDW | Land and Resource Data Warehouse |
| M | Modification VQO Classification |
| MFLNRO | Ministry of Forests, Lands and Natural Resource Operations |
| MHA | Minimum Harvest Age |
| MOE | Ministry of Environment |
| MOF | Ministry of Forests |
| MP | Management Plan |
| MPB | Mountain Pine Beetle |
| NCD | No Channel Defined |
| NDT | Natural Disturbance Type |
| NRL | Non-Recoverable Losses |
| NSR | Not Sufficiently Restocked |
| OAF | Operational Adjustment Factor |
| OGMA | Old Growth Management Areas |
| PFI | Peak Flow Index |
| PFLB | Productive Forest Land Base |
| PSI | Potential Site Index |
| PR | Partial Retention VQO Classification |
| RESULTS | Reporting Silviculture Updates and Land status Tracking System |
| RMA | Riparian Management Area |
| RMZ | Riparian Management Zone |
| RRZ | Riparian Reserve Zone |

| | |
|---|---|
| SPH | Stems Per Hectare |
| TEM | Terrestrial Ecosystem Mapping |
| TFL | Tree Farm Licence |
| THLB | Timber Harvesting Land Base |
| TIPSY | Table Interpolation Program for Stand Yields |
| TSA | Timber Supply Area |
| TSM | Terrain Stability Mapping |
| VDYP | Variable Density Yield Prediction Growth and Yield Model |
| VEG | Visually Effective Green-up Height |
| VLI | Visual Landscape Inventory |
| VQO | Visual Quality Objectives |
| VRI | Vegetation Resource Inventory |
| VSU | Visually Sensitive Unit |
| WTP | Wildlife Tree Patch |

# 1.0 BACKGROUND

The timber supply analysis in support of Management Plan #4 (MP4) was completed in 2006, followed by the allowable annual cut (AAC) determination effective May 25th, 2007 in which the AAC was set at 900,000 $m^3$/year of which 100,000 $m^3$/year is from deciduous-leading stands.

In November 2011, Canfor completed an analysis (Ecora, 2011) to support a request for an increase in AAC to address the expanding mountain pine beetle (MPB) epidemic on the tree farm. This analysis was undertaken using the MP4 Woodstock forest estate model with modifications to the MPB assumptions. The uplift request was denied based on uncertainty in the degree to which the MPB had impacted Tree Farm Licence (TFL) 48 and the impacts to mid-term timber supply based on the shelf-life assumptions used. Through subsequent discussions between Canfor and the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) it was mutually agreed that an update to the MP4 analysis would be sufficient to support and expedited timber supply review for TFL 48.

Based on this direction Canfor has initiated an expedited timber supply review for TFL 48 and this document has been prepared to describe the data and assumptions to be used in this timber supply analysis for TFL 48. It should be noted that the majority of data and assumptions from MP4 are utilized in this analysis and as such much of the text from the original MP4 Data Package (IFS, 2006) has been copied directly into this document. The following section describes the updates to the MP4 data and assumptions that have been incorporated into this analysis.

## 1.1 Updates to the MP4 Analysis

As discussed and agreed upon at a meeting between MFLRNO and Canfor on March 7th, 2013, the following components of the MP4 analysis have been updated to support this analysis:

### 1.1.1 Mountain Pine Beetle

The current and future state of the MPB infestation has been measured using version 10 of the BCMPB projections (British Columbia Forest Service, 2013). On May 7th, 2013 a helicopter flight of the TFL was taken to assess the accuracy of these projections. Overall the flight confirmed that the BCMPB projections represented the spatial location of the most severely impacted areas well but underestimated the overall percent attack. Some areas of low to moderate attack were under-represented in the BCMPB projections. However, overall it was determined that the attack percentages used in this analysis presents a reasonable representation of the state of the MPB infestation on the TFL. Section 4.3.9 provides a complete description of the MPB assumptions used in the analysis.

Additionally, Canfor's FSP was amended in 2012 to create additional flexibility around managing for VQOs in areas affected by MPB. The model will be updated to incorporate this flexibility.

### 1.1.2 Shelf-Life

Shelf life describes the length of time that a stand of trees remains economically viable following a MPB attack. A shelf life assumption of five years will be used in this analysis- stands will maintain 100% of their merchantable volume for five years after 2013 and after 5 years 100% of the pine volume within a stand will be lost – captured as a non-recoverable loss. The analysis will also examine the impacts of extending the shelf-life to ten years from 2013. Section 4.3.9 provides a complete description of the MPB assumptions used in the analysis.

### 1.1.3 Inventory Update

The inventory has been updated with harvest history up to December 31st, 2012 and the inventory has been projected to January 1st, 2013, the beginning of the planning horizon.

### 1.1.4 Visual Landscape Inventory

In 2010 the Visual Landscape Inventory (VLI) layer for the Dawson Creek TSA and portions of TFL 48 was updated. In 2012 an update to the VLI was completed which will be incorporated into the data set.

### 1.1.5 Patch Size Targets

Patch size objectives have been incorporated into Canfor's FSP and will be modeled in the base case. These objectives will replace the green-up constraints applied to non-visually sensitive areas in the last management plan analysis.

### 1.1.6 Peak Flow Index

Assumptions regarding the management of watershed peak flow index (PFI) and equivalent clear-cut area (ECA) have been updated to reflect Canfor's most recent Sustainable Forest Management Plan (SFMP) (Canfor, 2011). The impacts of management for peak flow is not part of the base case but is examined through a sensitivity analysis.

### 1.1.7 Genetic Gains

The availability and genetic gains associated with class A seed for interior spruce have increased on the TFL since the last management plan analysis. Current and anticipated future gains associated with the use of genetically improved stock will be incorporated into the base case.

### 1.1.8 SIBEC

The Predictive Ecosystem Mapping (PEM) product for TFL 48 had not received final approval from the MFLNO at the time the MP4 analysis was completed and therefore site index by biogeoclimatic classification (SIBEC) site productivity estimates for managed stand yields were not included in the base case. A sensitivity analysis showed that the use of these estimates increases the overall harvest level by over 16% (IFS, 2006b). In his rationale (British Columbia Ministry of Forests, 2007) the Chief Forester included consideration for these productivity estimates and included the increase in cut in the final AAC determination stating,

> *I also noted that I consider the site productivity estimates derived from the PEM work that is currently pending approval to be more representative of actual managed stand productivity than the estimates provided in the inventory. I therefore consider the base case to represent an underestimate of timber supply in the order of 100 000 cubic metres for coniferous-leading stands and 7000 cubic metres for deciduous-leading stands over the forecast period.*

In March 2008 an accuracy assessment of the TFL 48 PEM (Bio-Geo Dynamics Ltd, 2009) was completed demonstrating that the PEM has achieved the minimum accuracy requirement of 65% for inclusion in the base case. As such, PEM-based SIBEC productivity estimates will be used as an input for managed stand yields in the base case.

### 1.1.9 Ungulate Winter Range and Wildlife Habitat Areas

Ungulate winter range (UWR) and wildlife habitat areas (WHA) have been updated since the MP4 analysis with the passing of orders establishing UWR u-9-002 (MoE, 2006) and u-9-004 (MoE, 2008) and an order establishing several WHA (MoE, 2008a and MoE, 2008b) across the TFL. The THLB has been updated to reflect the no harvest area identified within each of these orders. See Section 3.21 for additional information.

### 1.1.10 Forest Estate Model

The MP4 analysis used Remsoft's Woodstock forest estate model whereas MP5 utilizes *Patchworks* from Spatial Planning Systems. See Section 4.3.1 for more information on *Patchworks*.

# 2.0 LAND BASE INFORMATION AND DATA

This section describes the data and information used in the analysis. Table 1 describes the input data layers used in the original MP4 analysis as well as the additional data layers used to update that analysis to 2013.

**Table 1: Input Data Layers**

| Inventory | Standard | Completed | Approved | Approved By | Status |
|---|---|---|---|---|---|
| Forest Cover/VRI | VRI Phase 1 | 2000 | 2000 | Regional Inventory Forester | Updated to for depletion to Dec 31, 2013 |
| | VRI Phase II/NVAF | 2004 | 2005 | Provincial Biometrician | Approved – (Age Height and volumes adjusted and projected to 2005) |
| Visual Landscape | RIC | 2005 | 2005 | Regional Manager (2005 consolidated inventory) | Replaced by VLI |
| Recreation | RIC | 1999 | 1995/2001 | Regional Manager | Approved |
| Stream | RIC | 1997-2000 | | | Pending |
| Operability | n/a | 2000 | Dec 2000 | Regional Geomorphologist | Approved |
| Road/trail network | n/a | 2000 | n/a | n/a | n/a |
| BEC | MOF | 2000 | Nov 2000 | Regional Ecologist | Approved |
| Grizzly Habitat | MOELP | 2000 | | District Manager | Approved |
| Ungulate Winter Range | MOE | 2000 | 2005 | MOE | Provided by MOE |
| Silviculture | MLSIS | 2000 | yearly | District Manager | Approved |
| Protected Areas | MOELP | 2000 | June 29, 2000 | Cabinet per Parks FTP Site | Approved |
| TFL Boundary | N/A | 2004 | July 27, 2004 | Resource Tenures Branch. New boundary included with TFL 48 Instrument 5 document | Approved |
| PA 10 & 13 | N/A | 2000 | 2000 | District Manager | Approved |
| **LRMP RMZ's** | LUCO | 1999 | March 1999 | Cabinet | Approved |
| Archeological Sites | N/A | Unknown | June 1999 | Ministry of Small Business Tourism and Culture | Approved |
| Genetic Gain | MoFR | 2003 | 2003 | MoFR – Tree Improvement Branch | Approved |
| Site Series | RIC | 2001 | Pending | Regional Ecologist | Accuracy assessment completed 2009 |
| Landscape Units | N/A | 2001 | 2004 | Minister of Sustainable Resource Management | Approved |
| Natural Disturbance Units | N/A | 2003 | 2003 | Regional Ecologist | Approved |
| Watersheds | N/A | 2005 | N/A | N/A | N/A |
| Agricultural Land Reserve | N/A | 2004 | 2004 | Agricultural Land Commission (MSRM) | Approved |
| ***New Layers Added June 2013*** | | | | | |
| Visual Landscape | RIC | 2012 | July 18, 2012 | District Manager | Approved |
| WHA | GAR | 2008 | 2008 | MOE | Approved |
| UWR | GAR | 2006/2008 | 2006/2008 | MOE | Approved |
| BCMPB Version 10 | FAIB | 2013 | 2013 | FAIB | N/A |
| Recent Cutblocks | Canfor | 2013 | 2013 | Canfor | All current cutblocks up to December 31st, 2012 |

The forest inventory conforms to Ministry of Forest's standards. The current forest cover inventory is based on a re-inventory performed by Canfor during the term of MP 2. The photography for this inventory was taken in 1993/94 for TFL Blocks 4 and 5, and in 1997 for TFL Blocks 1, 2 and 3. The inventory exists in the form of a Vegetation Resource Inventory (VRI). Phase I (the re-inventory) has been adjusted to incorporate extensive timber and ecology ground sampling (e.g. the Phase II part of a VRI). Finally, volume decay loss estimates and taper equations have been

localized through a destructive sampling process referred to as "Net Volume Adjustment Factoring" (NVAF). The information gained in the process of completing Phase II and the NVAF revealed that volume estimates were generally underestimated and losses for decay were typically overestimated for many of the stands in TFL 48. This has resulted in both a net increase in the amount of area that will contribute to the timber harvesting land base, and a net increase in the merchantable volume within each stand[1].

The inventory information of the TFL has been updated to January 1st, 2013, to account for stand aging, harvesting and other area/volume depletions. All constructed roads are now part of the VRI and have been removed from the forested land base. Trails, seismic lines and transmission lines have been removed from the forested land base. Canfor's spatial cut-block-tracking, silviculture and road management system was used as the source for the update and accomplished through ArcInfo™ Geographic Information System (GIS) buffering routines. The results of this buffering were visually inspected on the map products.

[1] *Based on the MP4 Data Package NVAFs were used to adjust the inventory volumes used to derive the THLB. Due to the expedited nature of this analysis we have utilized the THLB from this analysis and therefore the NVAF estimates have been considered in the THLB determination. However, NVAF estimates have not been applied to the natural stand yield curves in this analysis.*

# 3.0 TIMBER HARVESTING LAND BASE DEFINITION

The purpose of Table 2 is to summarize the area reductions made to the total area of the TFL, to arrive at the land base that is available for timber harvesting. The reductions and additions are listed in the order in which they are applied. Each reduction and addition is described in more detail in the appropriate sections that follow.

**Table 2: Timber Harvesting Land Base Determination**

| Classification | Gross Area (ha) | Area (ha) | % Prod. Forest |
|---|---|---|---|
| MP 3 TFL Total Area (incl. Water) | | 643,511 | |
| Changes to TFL Boundary | | | |
| Removed woodlots [1] | | 794 | |
| Removed "Rice Property" farm fields | | 1231 | |
| Inclusion of the Stewart Block | | 1,753 | |
| **SFMP 4 TFL Total Area (incl. Water)** | | **643,239** | |
| Less: TFL Boundary sliver polygons [1] | | 112 | |
| Water | 3,104 | 3,104 | |
| Mine Sites (existing and proposed) | 2,236 | 2,236 | |
| Existing Roads | 5,567 | 3,830 | |
| Non-Vegetated Land | 971 | 949 | |
| Vegetated Non-Treed (no disturbance history) | 67,171 | 66,943 | |
| Plus: Sukunka Falls Park [2] | 426 | 330 | |
| **Potentially Productive Area** | | **566,394** | **100.0%** |
| Less: Inoperable | 34,038 | 34,038 | 6.0% |
| NDT 5 | 14,942 | 13,765 | 2.4% |
| Forested Islands | 195 | 141 | 0.0% |
| Wildlife Habitat - Bull Trout | 86 | 74 | 0.0% |
| Archaeological Sites | 10 | 10 | 0.0% |
| Protected Areas (including parks) | 14,853 | 12,849 | 2.3% |
| Recreation | 1,270 | 418 | 0.1% |
| Buffers: Lakeshore reserves | 28 | 25 | 0.0% |
| Stream/River riparian buffers | 31,082 | 27,597 | 4.9% |
| Forested Wetlands | 4,001 | 3,558 | 0.6% |
| Forested Wetland Buffers | 1,882 | 1,760 | 0.3% |
| Low productivity sites | 72,618 | 55,710 | 9.8% |
| Problem Forest types | 62,497 | 48,077 | 8.5% |
| Sukunka Falls Park [2] | 426 | 286 | 0.1% |
| Visual preservation | 723 | 167 | 0.0% |
| Dunlevy Ungulate Winter Range | 4,480 | 1,983 | 0.4% |
| Rare Site Series | 4,080 | 2,572 | 0.5% |
| New UWR No Harvest Areas | 21,918 | 2,271 | 0.4% |
| New WHA No Harvest Areas | 22,252 | 1,377 | 0.2% |
| Total Reductions to Productive Forest | | 206,678 | 36.5% |
| **Net Land Base** | | **359,717** | **63.5%** |

Notes: 1 Woodlots have not formally been removed from the TFL, however they have been approved and issued by the MoF.
2 Sliver polygons less than 0.001 hectares in size were dissolved and merged with the largest adjacent polygon. As well, 23 ha were removed having no VRI information.
3 The Sukunka Falls Park is wholly encompassed by TFL48 but is not part of the TFL tenure. Comprising a total of 425 ha this park has been included in the Productive Forest Land Base for biodiversity purposes and then excluded from contributing to the THLB.

## 3.1 Total Area

The total management area of Tree Farm License 48 after reductions for private lands and woodlots that exist within the confines of the TFL is 643,239 hectares. The TFL boundary has changed from the area reported in MP 3, primarily due to the creation of new woodlots, and the addition of the Stewart block in exchange for the removal of the field portion of the Rice Property.

## 3.2 Non-Vegetated – Water

Non-forest descriptors in the VRI can be broken into two land cover types: non-vegetated land and water. Water was identified on the VRI file for TFL 48 using BC land classification level 2 (i.e., BCLCS_LEVEL_2). The distribution of water resources relative to BCLCS_LEVEL_5 is shown in Table 3.

**Table 3: Non-Vegetated Water**

| Description | Total Area (ha) |
|---|---|
| Lakes | 1,231 |
| Rivers | 1,817 |
| Reservoirs | 56 |
| **Total** | **3,104** |

(BCLCS_LEVEL_5 where level 2 = "W")

## 3.3 Non-Vegetated Land

Non-vegetated land includes areas in the alpine, uplands and wetlands. The area can be further classified as: snow/ice, rock/rubble and exposed land. The area for these items is described in the TFL vegetation resource inventory file. Details are provided in Table 4.

**Table 4: Non-Vegetated Land**

| Cover Type | Landscape Position | Total Area (ha) |
|---|---|---|
| Rock | Upland | 775 |
| | Alpine | 174 |
| **Total** | | **949** |

Where BCLCS_level_4 = RO

## 3.4 Roads

Existing roads occur on the inventory files as polygons. During the term of MP3 roads were classified and buffered based upon average measured widths. The roads occur on the inventory file as non-vegetated land. A total of 3,830 hectares are removed from the productive forest land base area for existing roads.

### 3.4.1 Classified roads

Roads which have a right-of-way identified on the inventory file by a break in the VRI polygons are identified on the file as "RP" in the non-veg table of the VRI database. Having a non-veg cover type of "RP" being greater than 15% identified the polygons selected for removal from the THLB. These same polygons may have been classified as shrub, herb or some other vegetation type depending on the vegetation contained within the polygon. Typically, paved highways,

paved secondary roads, gravel secondary roads and main line roads should have had sufficient width to be typed out in the VRI. During the VRI update completed in February 2005 all roads were buffered by their average width based on road class and included in the VRI as a polygon with the BCLCS Level 4 = "RP". During the term of MP3 Canfor developed a process of tracking all oil and gas activities on TFL 48. These activities have been included in the VRI update described for roads. Included in this classification are all oil and gas well sites, camps, sumps, road access and borrow pits. From Table 5 we see a total of 3,830 hectares have been classified in this manner.

**Table 5: Existing Classified Roads**

| BCLCS LEVEL 1 | BCLCS LEVEL 4 | Total Area(ha) |
|---|---|---|
| Non-vegetated (N) | Road Surface (RP) | 2,654 |
| | Exposed Land (EL) | 1,176 |
| | **Total** | **3,830** |

Note: Included in the net-down for existing classified roads is area lost to exiting well sites.
The "classification" of roads does not infer classification of road ownership but rather that the road has been identified, the right-of-way has been buffered and the road now exists as a polygon on the inventory file.

### 3.4.2 Existing Unclassified roads

There are no existing unclassified roads within the TFL. During the term of MP 2, Canfor completed a comprehensive road inventory. During MP3, the roads in this inventory were buffered for their average width. A road inventory management process keeps the TFL's inventory updated for new road construction.

## 3.5 Mine Sites

Mining is a significant resource activity within the boundary of TFL 48. Mine sites have been identified in this analysis and excluded from the productive forest land base. This exclusion has occurred because it is difficult to predict the timing and extent of land denudation. As well, how much reclamation will occur and over what time period is unknown. Canfor could assume that when this reclamation occurs, many of these areas will contribute to the productive forest land base and provide an upwards pressure on the long term harvest level. However, for the purpose of this analysis no area has been added back to the forested land base due to current or future reclamation activities. Table 6 describes the TFL area exclude from the productive forest land base due to mining claims.

**Table 6: Reduction for Mining**

| Mine Classification | Land Status (BCLCS_LEVEL_2) | Total Area (ha - including mine roads) |
|---|---|---|
| Existing | Treed | 98 |
| | Non-treed / land | 1,625 |
| Proposed | Treed | 479 |
| | Non-treed / land | 34 |
| | **Total** | **2,236** |

Mine locations were intersected into the TFL database

## 3.6 Vegetated Non-Treed

Vegetated non-treed areas were often classified as NCBr in traditional forest cover inventories. These areas have been classified according to their position in the landscape, i.e., wetland,

upland or alpine. If disturbance history exists in the upland or wetland areas, it is assumed that the area exists as backlog NSR resulting from a burn, or from logging. In these instances (i.e., when disturbance history exists for these polygons), the area was not netted out. If disturbance history does not exist, the area was netted out of the potentially productive land base. A breakdown of vegetated non-treed area is shown in Table 7.

**Table 7: Vegetated Non-Treed**

| Landscape Position [1] | Cover Type | Total Area (ha) |
|---|---|---|
| Wetland | Shrub tall | 431.5 |
| | Shrub low | 543.2 |
| | Herb | 901.2 |
| | Bryoid | 7.3 |
| Upland | Shrub tall | 12,915.7 |
| | Shrub low | 12,892.1 |
| | Herb | 22,915.8 |
| | Bryoid | 2,569.9 |
| Alpine | Shrub tall | 76.0 |
| | Shrub low | 4,968.1 |
| | Herb | 7,295.8 |
| | Bryoid | 1,553.9 |
| **Total Vegetated Non-Treed** | | **67,070.5** |
| Add-back Upland [2] | Shrub low | 127.6 |
| **Total Vegetated Non-Treed Reduction** | | **66,942.9** |

1 BCLCS_LEVEL_1 = V, BCLCS_LEVEL_2 = N

2 Area in the uplands with disturbance history (BCLCS_LEVEL_5 = SP) was added back to the productive forest land base

## 3.7 Inoperable

Over the term of MP 2, Canfor completed a terrain inventory and landslide inventory, as well as slope stability and operability interpretations for TFL 48. This has been completed using Terrain, BEC variant mapping, landslide inventory and slope to predict terrain stability and operability. Using a combination of slope and terrain stability, all areas of the TFL were classified as conventional harvest systems, mixed harvest systems, cable harvest systems, aerial harvest systems and inoperable. The area in the newly acquired Stewart block did not have this work completed. Conventional Dawson Creek TSA operability mapping was used to define conventional, cable and inoperable areas. The coniferous leading inoperable, which includes aerial areas identified in the Operability interpretations have been excluded from the THLB. As well, the deciduous stands existing on mixed and cable ground have been excluded from harvesting. Table 8 and Table 9 describe physical operability within the TFL by slope class and harvest system.

**Table 8: Physical Operability by Slope Class and Harvest System**

| Physical Operability Class | | Slope / Area by Harvest System | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0-10% | | 10-45% | | 45-70% | | 70-80% | | 80-100% | | 100%+ | |
| Stability Index | Stable | 124,226 | Conv | 249,776 | Conv | 218 | Cable | | | | | | |
| | Moderately Stable | | | 703,02 | Conv | 3,862 | Cable | | | | | | |
| | Quasi-stable | | | 508,83 | Mix | 34,087 | Cable | 131 | Inop | 8 | Inop | | |
| | Lower Threshold | | | 21,220 | Cable | 43,300 | Cable | 8,902 | Inop | 3,685 | Inop | 15 | Inop |
| | Upper Threshold | | | 4,647 | Inop. | 8,033 | Inop | 2,968 | Inop | 2,791 | Inop | 1,539 | Inop |
| | Defended | | | 2,271 | Inop | 4,411 | Inop | 1,964 | Inop | 2,925 | Inop | 1,412 | Inop |
| **Total** | | **124,226** | | **399,099** | | **93,911** | | **13,965** | | **9,409** | | **2,965** | |
| | | | | | | | | | | | | | **643,575** |

**Table 9: Physical Operability Classes by Net Area**

| Operability | Forest Area (ha) | Excluded Forest (ha) |
|---|---|---|
| Conventional | 415,123 | 114,165 |
| Mixed | 29,631 | 7,246 |
| Cable | 82,937 | 46,573 |
| Aerial | 5,928 | 5,928 |
| Inoperable | 28,111 | 28,111 |
| **Total** | **561,729** | **202,022** |

In this analysis, a net-down was not applied to areas having a conventional, mixed or cable operability classification. A net down of the THLB was applied to all coniferous-leading areas identified as aerial or inoperable. In addition, since it is not current practice to harvest deciduous-leading species from mixed, aerial or cable ground, or from the ESSF, the deciduous-leading stands occurring within these locations have also been excluded from the THLB.

## 3.8 Non-commercial

Non-commercial cover or NC is not identified on the VRI as a polygon attribute.

## 3.9 Low Productivity Sites Identified for Immature Stands

Table 10 documents the immature area that is not suitable for harvest due to its poor timber growing potential. A site index is the height of a stand measured at breast height age 50 (mbha50). The site indices indicated in Table 10 reflect the minimum site index required for a stand to reach 120 m3/ha at maturity on conventional ground. Similarly, a minimum stand volume of 150 m3/ha and 200 m3/ha is required for mixed and cable ground respectively. The site indices calculated in Table 10 were derived from VDYP. A 50% crown closure was assumed for coniferous timber types and a 60 % crown closure for deciduous. The stands were assumed to reach maturity at the regional priority cutting age (i.e., 101 for Pl, 141 for Sw, 121 for Bl and 81 for At and Cot).

The Ministry of Forests requested that Canfor monitor the harvesting performance in deciduous leading stands, which are currently classified as having a low timber growing potential. However,

as a result of the deciduous manufacturing facility being closed for a significant period of time during MP3 there was no harvesting of deciduous leading stands. With re-opening of this facility and the addition of other deciduous manufacturing capacity in the Peace an increase in the demand for deciduous is anticipated. Due to the lack of new information the site index limits have remained unchanged from MP3.

**Table 10: Low Site Index applied to Immature Stands**

| Timber Types | Site Index Upper Limit of Exclusion by Operability Type | | | Forest Area (ha) | Net Reduction Area (ha) |
|---|---|---|---|---|---|
| | Conventional | Mixed | Cable | | |
| Balsam | 9.6 | 10.9 | 13.0 | 37,645 | 25,447 |
| Spruce | 7.5 | 8.5 | 12.0 | 11,504 | 9,393 |
| Pine | 10.4 | 11.7 | 14.1 | 10,605 | 9,090 |
| Aspen | 16.1 | 0 | 0 | 11,029 | 10,137 |
| Cottonwood | 12.4 | 0 | 0 | 1,835 | 1,643 |
| | | | **Total** | **72,618** | **55,710** |

## 3.10 Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are no longer identified in Vegetation Resource Inventories. Area management concerns for steep slopes, soils, recreation, visual quality, and wildlife must now be addressed through other land base net downs. Some of these net downs include inventories which were accumulated by Canfor and are specific to resource management objectives other than timber management (e.g., recreation). Specific wildlife habitat areas are now being modeled. Operability information is extensive and addresses steep slopes, soils, and physical operability concerns. Visual information is accounted for along with recreation net downs.

## 3.11 Riparian Reserves and Management Zones - Streams and Rivers

Since 1995, Canfor has conducted 1:20,000 RIC standard fish and fish habitat inventories throughout the TFL. Over the term of MP3, this detailed modelling exercise has been completed for the entire TFL.

A Stream Classification Tool (SCT)(Hatfield and Ecometrics 2000) was designed to predict stream classes for all reaches in TFL 48. The best fit model used a 20% average reach gradient barrier to upstream fish migration, no fish bearing streams higher than 1300 m in elevation and no fish upstream of a confirmed barrier.

The SCT predicted stream class for more than 30,000 reaches. For the purposes of analysis we established the amount of merchantable volume left in the total Riparian Management Area (RMA). To do this we had to develop a total Riparian Management Area width applied to streams. Riparian Reserve Zone (RRZ) widths are applied as per the Forest Practices and Planning Regulations of the Forest and Range Practices Act. Variable retention of merchantable timber left in the RMZs was based on SPs occurring within the TFL and harvested over the past 5 years.

Management Zone widths were applied using the same methodology as for RRZs. The legislated RMZ width was factored for a percent retention by stream class, as derived from summarizing the

prescribed retention in silviculture prescriptions from 2000 to 2003 (See the TFL48 SFMP Sec 3.7 for additional information). The area was then removed from the timber harvesting land base. The results of the reductions for RRZ and RMZ are shown in Table 11.

**Table 11: Riparian Reserve and Management Zones Around Rivers/Streams**

| Riparian Stream Class | Average Channel Width (m) | Stream Length (m) | FPC Act Reserve Zone Width (m) | FPC Act Mgmt Zone Width (m) | Net Width of Area Buffered (m) [1] | Total Buffered Area (ha) | Net Reduction Area |
|---|---|---|---|---|---|---|---|
| S1 | >20 & < 100 | 145,016 | 50.0 | 20 | 56.1 | 31,082 | 27,597 |
| S2 | > 5 & ≤ 20 | 65,095 | 30.0 | 20 | 46.9 | | |
| S3 | ≥ 1.5 & ≤ 5 | 1,763,049 | 20.0 | 20 | 60.8 | | |
| S4 | < 1.5 | 2,136,642 | 0.0 | 30 | 3.4 | | |
| S5 | > 3 | 1,484,134 | 0.0 | 30 | 23.2 | | |
| S6 | ≤3 | 8,001,367 | 0.0 | 20 | 3.1 | | |
| **Total** | | **13,595,303** | | | | | |

For TFL Blocks this is the weighted average reserve width of the stream to one side. Buffers were applied to both sides of every stream or river. Streams in the At BEC were not buffered as these areas were already removed from the THLB.

### 3.11.1 Forested Islands

Islands that exist primarily within the Sukunka River are often sufficiently large enough that riparian reserves did not capture all of the forest area within the island. Since it is unlikely that Canfor will harvest these areas in the foreseeable future, they were removed from the THLB via a visual inspection of maps of the TFL. The mapsheet polygon numbers were identified and used in the TFL net-down. A gross area of 195 hectares was identified as islands. Net within islands is 141 hectares that would otherwise have contributed to the THLB.

### 3.11.2 Riparian Reserves - Lakes and Wetlands

Lake riparian reserves were classified according to their size in the VRI. Thirty meter riparian reserves were placed around all lakes having a size between 5 and 1000 hectares.

Wetland classifications were determined using GIS. Complex wetlands were calculated by buffering wetland polygons to determine which wetlands were within the proximity of others. The logic used to complete this buffer was derived using Figure 1, extracted from the Riparian Management Plan Guidebook.

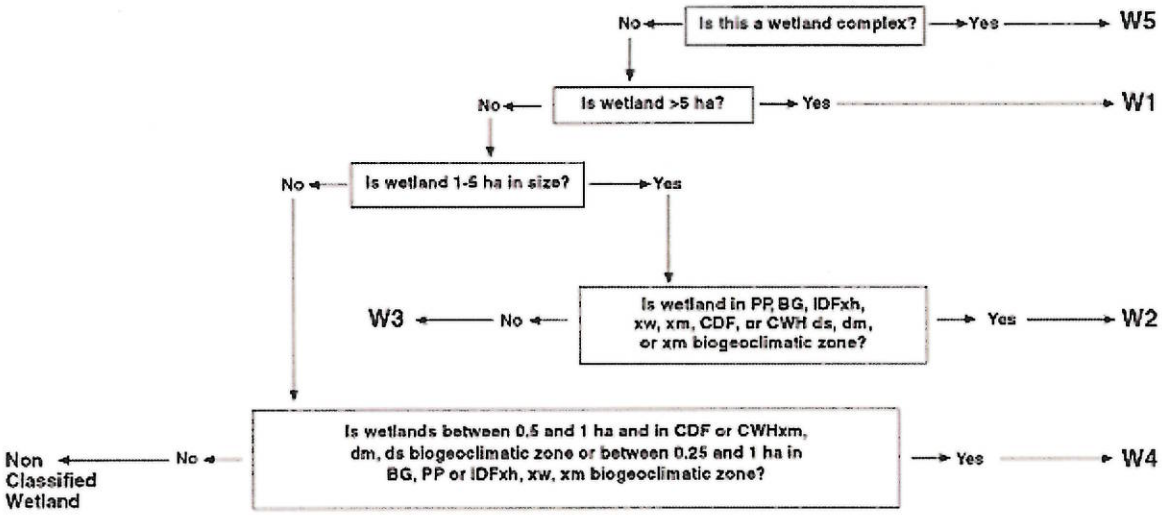


**Figure 1: Wetland Classification**

Wetlands have a management zone around them of varying widths and stem retention.

Wetlands were defined as vegetated, treed, wetland polygons and vegetated, non-treed, wetland sites and a 10 meter reserve was placed around them. Complex wetlands are a relatively minor occurrence within the TFL as a result of the moderate to steep slopes. Due to the small area affected and the complexity of identifying and excluding these arfeas, wetland complex classifications have not been identified in this analysis. Sensitivity analysis may be used to examine the potential impact of addressing management concerns within these areas.

Table 12 describes the area removed from the timber harvesting land base for lakes and wetlands.

**Table 12: Riparian Reserve Zones Around Lakes and Wetlands**

| Riparian Class | Gross Area | Riparian Reserve Zone | | Riparian Management Zone [3] | | | Total Buffer Width [3] (m) | Gross Area Reserved (ha) | Net Area Reduction (ha) |
|---|---|---|---|---|---|---|---|---|---|
| | | Width (m) | % Retention | Width (m) | % Retention | Equivalent Distance Retention | | | |
| Lakes [1] | | 30 | 100 | 70 | 0 | 0 | 30 | 28 | 25 |
| W1 [2] | 2093 | 10 | 100 | 40 | 40 | 16 | 26 | 1,882 | 1,760 |
| W3 | 825 | 0 | 0 | 30 | 40 | 12 | 12 | | |
| W5 | 2584 | 10 | 100 | 40 | 30 | 12 | 22 | | |
| Forest Wetlands | | | | | | n/a | | 4,001 | 3,558 |

[1]Lakes greater in size than 1000 ha or less than 5 ha did not have a buffer applied.

[2]Wetlands were defined as vegetated treed wetland, vegetated non-treed wetland, or non-vegetated wetland in the VRI with an area not less than 5 hectares.

[3]Riparian Management Zone retention estimates are based upon the principle and practice of winching merchantable stems out of riparian management zone areas, where the damage to remaining vegetation is minimized. The Percent retention is a rough approximation of the amount of merchantable volume retained in wetland riparian management zones

## 3.12 Wildlife Habitat Reductions

In the MP4 analysis, specific reductions were made for bull-trout, and ungulate winter range in the Dunlevy Special Management Area (Butler Ridge, Aylard and Williston Management Units). These area reductions are shown in Table 13.

**Table 13: Specific Wildlife Habitat Area Reductions**

| Critical Habitat | Location | Gross Area (ha) | Forest Area (ha) | Net Area Reduction (ha) |
|---|---|---|---|---|
| Bull Trout | All | 105 | 86 | 74 |
| Ungulate Winter Range | Aylard | 2461 | 1661 | 383 |
| | Butler Ridge | 301 | 199 | 87 |
| | Williston | 2982 | 2620 | 1513 |
| | Graham | 3704 | 3408 | 0 [1] |
| | Total UWR | 9448 | 7888 | 1983 |
| **Total All Wildlife Reductions** | | **9553** | **7974** | **2,057** |

Note: 768 hectares in the Graham UWR have been excluded from harvesting for other net down reasons.

## 3.13 Cultural Heritage Resource Reductions

Known cultural heritage resources on TFL 48 have been provided by Archeology Branch, Ministry of Small Business, Tourism and Culture, and mapped by Canfor. As directed by the MOF, the 20 known spot locations have been intersected into the VRI and have been buffered with a 56 m radius to provide an approximate 1 hectare reserve. This 1 hectare buffer provides some measure of protection at a strategic level. More refined, site-specific buffers will be applied on the ground at the operational level of management. Table 14 provides a listing of the sites and the gross area and forested area affected. Consultations with Regional Archeological staff have indicated that a heritage trail is known to cross the TFL. However, the geographic location of this trail is not known, and therefore has not been incorporated into this analysis.

**Table 14: Cultural/Heritage Sites**

| Landscape Unit | # of sites | Forest Area (ha) | Net Area Reduction (ha) |
|---|---|---|---|
| Boucher | 3 | 2.5 | 2.5 |
| Carbon | 3 | 0.5 | 0.5 |
| Highhat | 3 | 3 | 2.8 |
| Martin Creek | 7 | 3.5 | 3.5 |
| Wolverine | 2 | 1.1 | 1.1 |
| **Total** | **20** | **10.6** | **10.4** |

## 3.14 Other Site Reductions

### 3.14.1 Protected Areas

Protected Areas resulting from the Dawson Creek LRMP have been removed from the T.H.L.B. Table 15 describes the area within the legislated protected areas within TFL 48.

Protected areas listed in the PAS section include; Bocock Peak, Butler Ridge, Klin-se-za (Twin Sisters), Peace River/Boudreau Lake, Pine/LeMoray, Gwillim Lake/Elephant Ridge, and Sukunka Falls Park in the Parks section. The forest area within all protected areas and the Sukunka Falls Park will contribute to the biodiversity seral stage targets within the zones that they occur.

**Table 15: Protected Areas and Parks within TFL 48**

| Protected Area | Gross Area (ha) | Forest Area (ha) | Net Reduction (ha) |
|---|---|---|---|
| PAS | 18,388 | 14,853 | 12,849 |
| Parks | 426 | 330 | 286 |
| **Total** | **18,814** | **15,183** | **13,135** |

### 3.14.2 Agriculture Land Reserves

Information pertaining to the Agricultural Land Reserve was obtained from the Provincial Land and Resource Data Warehouse. A small part of TFL 48 falls within areas identified under the Agriculture Land Reserve (ALR). Any indicated extractions from the TFL as a result of the ALR would have to be Minister approved upon referral under Sec 60.1B of the Forest Act.

Potential ALR's withdrawals have not been addressed in this analysis. The area within the ALR has been treated the same as the rest of the TFL. If a conversion occurs in the future, it is Canfor's understanding that the government would be responsible for providing compensation in some form. As well, should land conversions occur in the future, the impact on the long-term timber supply will be addressed at the time of the next analysis review.

### 3.14.3 High Elevation Forests

All forested and non-forested areas within Natural Disturbance Type 5 (NDT 5) were removed from the timber harvesting land base. A total of 43,697 hectares are within NDT5. Contributing to the productive forest land base are 14,942 ha. After exclusions for operability, 13,765 ha were removed from the timber harvesting land base.

### 3.14.4 Seismic Lines, Pipelines, Trails and Transmission Lines

All seismic lines, pipelines, trails and transmission lines identified in the TFL data base had been buffered and identified as polygons in the VRI. These polygons were removed as part of the vegetated non-treed lands identified in Table 7.

## 3.15 Mature Stand Problem Forest Types

Mature problem forest types are stands that exceed the minimum cutting age, are physically operable, but are excluded from the timber harvesting land base due to the stands being too old, too short, have too small a diameter or have insufficient volume. Although many of these stands may be harvested in part, they are not specifically targeted for harvesting at the present time. Changes in timber value, timber availability, and sawmill requirements may change Canfor's perception of the value of these stands in the future. Table 16 documents the areas that are currently considered to be mature problem forest types. The land base deductions are described according to inventory file attributes.

The area removed from the THLB due to mature stand problem forest types significantly changed in SFMP4 versus MP3 due to the completion of the VRI Phase II ground sampling including Net Volume Adjustment Factor.

Height, age, and net merchantable volume were adjusted as a result of the Phase II and NVAF sampling completed on TFL 48. TSR volume is defined as the net merchantable volume at the 12.5cm+ utilization level in lodgepole pine leading stands and the 17.5cm+ level in all other stands. After adjustment, the average height increased by 5%, age decreased by 7% and TSR

volume increase by 34%. The TSR volume increased by 18% in the high priority sample areas (those mature areas most likely to contribute to the timber harvesting land base) (JS Thrower & Associates 2005).

**Table 16: Problem Forest Types**

| Leading Species | Characteristics | | | | | | |
|---|---|---|---|---|---|---|---|
| | Age/Height/Stocking | Minimum Volume by Operability Class | | | Reduction Percent | Total Forested Area | Net Area reduction |
| | | Conv. | Mix | Cable | | | |
| B, BH | age class ≥ 6 and height class ≤2, or age class ≥ 6 and stocking class = 2 | 120 | 150 | 200 | 100 | 12,658 | 7,531 |
| BS | age class ≥ 6 and height class ≤2 | 120 | 150 | 200 | 100 | 12,587 | 9,914 |
| S | age class 8 and height class ≤ 2 | 120 | 150 | 200 | 100 | 4,971 | 3,881 |
| | All black spruce stands | All | all | all | 100 | 7,362 | 5,411 |
| Pl | age class ≥ 5 and height class = 1; all stocking class 4; all stands ≤17.5 metres | 120 | 150 | 200 | 100 | 7,935 | 6,999 |
| AtCon, CotCon AtDec, CotDec | Area within the ESSF, Area within cable or mixed operability | All | All | All | 100 | 7,747 | 6,395 |
| | age class ≥ 7 or age class ≥ 4 and height class = 1 | 120 | All | All | 100 | 9,039 | 7,773 |
| Other Species (W, L, Ep) | all | All | all | all | 100 | 198 | 173 |
| **Total** | | | | | | **62,497** | **48,077** |

**Table 17: Age, Height, Stocking Definitions**

| Age Class | | Height Class | | Stocking Class | | |
|---|---|---|---|---|---|---|
| # | Age Range (years) | # | Height Range (m) | Class # | | Definition |
| 5 | 81 - 100 | 1 | 0 - 10.4 | 0 | | immature |
| 6 | 101-120 | 2 | 10.5 - 19.4 | 1 | | mature & ≥ 76 stems/ha, 27.5+ cm dbh |
| 7 | 121-140 | 3 | 19.5 - 28.4 | 2 | | mature & < 76 stems/ha, 27.5+ cm dbh |
| 8 | 141 - 250 | 4 | 28.5 - 37.4 | Sub-div. of 2 | 3 | mature Pl ≥ 311 stems/ha, 17.5+cm dbh and 50% of stems 7.5+ cm dbh are ≥ 12.5+ cm dbh |
| 9 | 251 + | 5 | 37.5 - 46.4 | | 4 | mature Pl <311/ha, 15.5+cm dbh or ≥ 311/ha, 17.5+ cm dbh and <50% stems 7.5+ cm are ≥ 12.5+ cm dbh |

## 3.16 Future Roads and Trails

During MP3, Canfor undertook a process that used the existing MP3 THLB and terrain information to develop a classified future road network for the entire TFL. Portions of the THLB that will be lost through the construction of future roads and trails were identified by buffering future roads and intersecting the resultant coverage against the THLB identified in MP3. Six classes of future road were developed. Table 18 identifies these classes and the amount of area that may be lost to future road construction. Because the future road network was built using the MP3 THLB cover, this information is not directly compatible with the larger THLB identified in SFMP 4. To incorporate this information into the current analysis, the future road coverage was intersected against the MP3 THLB to determine the loss in THLB area, by analysis unit for future roads. This loss was divided by the total THLB area to derive a percent reduction for future roads. The loss will be applied as percent area reduction applicable as a one-time loss to all future managed stands.

**Table 18: Future Roads**

| Class | Description | Width (m) | Area (ha) |
|---|---|---|---|
| 1 | Mainline | 25 | 5,827 |
| 2 | Operational | 20 | |
| 3 | Block | 8 | |
| 10 | Highway | 50 | |
| 11 | Secondary | 30 | |
| 12 | Gravel Sec | 30 | |
| MP3 THLB Area in existing unmanaged stands and existing older managed stands | | | 314,151 |
| Percent area lost in all existing stands | | | 1.9% |
| Area in older existing managed stands and existing unmanaged stands | | | 347,824 |
| Maximum Loss to future stands in current analysis (348,296 x 1.9%) | | | 6,609 |

## 3.17 Visual Landscape Inventories

During the term of MP 2 (1994), an inventory of visual portions of the TFL landscape was completed by Canfor. In 1999 this visual landscape inventory was added to and updated to the 1997 standard. In 2005 the Ministry of Forests consolidated all visual landscape inventories within the previous Dawson Creek Forest District (TFL48 and Dawson Creek TSA). During this process it was discovered that some areas that had been declared and made known were not part of the TFL 48 visual inventory used in MP3. The 2005 consolidated inventory that was provided by the MoFR, and identifies polygons having an established VQO (EVQO) on the file, is used to remove 723 hectares (of which 167 ha was net) of Visual Preservation VQO based upon the 1999 Preservation VQO classification.

The base case analysis uses the established VQOs from the 2012 visual landscape inventory (VLI). Any additional preservation areas will be constrained to ensure there is no harvesting in Preservation VQOs.

## 3.18 Recreation

The recreation inventory for TFL 48 was completed in 1994. Based on input from the Dawson Creek Forest District the recreation inventory was updated in 2001. This updated inventory is used in this analysis. Management for recreation concerns within the TFL utilizes this inventory by making reductions to the net operable land base. The rationale for these reductions can be obtained from the Recreation/Landscape Analysis Report for TFL 48. Table 19 describes the reductions for recreation. To summarize, all areas having a recreation management class equal to 0 are excluded from the THLB. The area in recreation class B1 is traditionally modelled with an 80% inclusion factor. In this analysis we applied a 100% inclusion factor. Although this may seem optimistic, Table 19 reveals that the forested land base in areas identified as Recreation Class B1 have, through landbase reductions for operability, low sites, protected areas and problem forest types, already been reduced by 45 percent. Therefore, the application of forest cover constraints or area reductions will not be applied to the Recreation Class B1 areas.

**Table 19: Recreation**

| Significance Feature | Management Class | Total Area (ha) | Forested Area (ha) | Inclusion Factor | Net Area Excluded for recreation (ha) | Total Forest Area Excluded (ha) [1] |
|---|---|---|---|---|---|---|
| B | 0 | 1,316 | 1,222 | 0 | 370 | 1,222 |
| B | 1 | 39,550 | 36,486 | 1 | 0 | 16,449 |
| C | 0 | 70 | 44 | 0 | 44 | 44 |
| C | 1 | 147,490 | 114,764 | 1 | 0 | 53,172 |
| C | 2 | 13,892 | 10,409 | 1 | 0 | 4839 |
| D | 1 | 33,603 | 30,528 | 1 | 0 | 7417 |
| D | 2 | 405,994 | 366,076 | 1 | 0 | 116716 |
| Recreation Sites | | 4 | 4 | | 4 | 4 |
| **Total** | | **641,919** | **559,533** | | **418** | **199,863** |

Note 1: Refers to the area removed by recreation classification for all net-down criteria, such as operability, riparian buffers, protected areas, problem forest types, etc.

## 3.19 Rare Site Series

In this analysis, site series and structural stage is used to identify wildlife habitat areas. As well, site series has been incorporated into the net down and rate, unusual site series have been identified. These areas have been excluded from the THLB.

Table 20: Reductions for Rare Site Series

| Representation Cluster Name | BECLABEL | Site Series (Site_S1) | Productive Area (ha) | THLB Area Removed |
|---|---|---|---|---|
| BWBS subhydric wk1 | BWBSwk 1 | 07 | 220 | 74 |
| BWBS subhydric wk1 | BWBSwk 1 | 08 | 84 | 13 |
| BWBS subhygric wk1 | BWBSwk 1 | 05 | 1,033 | 786 |
| BWBS subhygric wk1 | BWBSwk 1 | 06 | 306 | 177 |
| BWBS submesic - mesic wk2-03 | BWBSwk 2 | 03 | 1,313 | 728 |
| BWBS xeric wk2-02 | BWBSwk 2 | 02 | 744 | 545 |
| ESSF subhygric - hygric mv | ESSFmv 2 | 06 | 378 | 249 |
| ESSF subhygric - hygric mv | ESSFmv 4 | 05 | 1 | 0 |
| | | **Total** | **4,079** | **2,572** |

## 3.20 Area Additions

The forested portions of Sukunka Falls Park were added to the Productive Forest Land Base, since the park is enclosed within the boundaries of the TFL. Many other parks and protected areas are also included in the TFL and are identified on the inventory file as TENURE = TFL48. Sukunka Falls was the exception. The forested area in this park will contribute to visual and landscape biodiversity (as do the other parks and protected areas). The park will not contribute to the timber harvesting land base.

Net-down programming which might typically remove not-satisfactorily-restocked areas (NSR), did not remove these stands in the net-down process. Due to a rapid treatment and regeneration program, all NSR stands have an existing site index and species profile.

The gross productive area of NSR in the TFL is 3,245.2 hectares. Approximately 382.7 hectares are considered "lost" due to land base net downs (e.g. riparian reserves). The remaining 2,862.5 hectares comprises 2,148 hectares of current NSR and 709 hectares of backlog NSR.

The majority of the NSR existing within the TFL has been surveyed by Canfor to determine the leading species planted and regenerating and to determine an estimated site index based upon the biogeoclimatic ecosystem classification. Based upon this information, the NSR is added back to the appropriate managed stand analysis units.

In theory, backlog NSR continues to exist on TFL48. However, in reality these areas are now stocked sites that have regenerated to mixedwood stands. The concept of rehabilitating these areas to intensively managed plantations is neither practical nor economical. The "backlog NSR" area has been allocated to 2 analysis units – low-stocking conifer and low stocking-deciduous. The total area in these sites is 924 hectares, of which 709 hectares contributes to the THLB. These stands are assumed to grow on old "managed" stand curves that had their stocking adjusted to reflect the current stand density in these polygons.

## 3.21 New Ungulate Winter Range and Wildlife Habitat Areas

Since the MP4 analysis was completed four new UWR orders have been passed that overlap with the TFL (u-7-003, u-7-006, u-9-002, and u-9-004). There is very little overlap between u-7-003, u-7-006 and the TFL. Within the orders for u-9-002 and u-9-004, several units have general wildlife measures that preclude timber harvesting. These units are shown in Table 21 and the THLB has been updated to exclude these areas from harvest. It is important to note that only 478 ha from the initial UWR netdown overlaps with the current UWR and WHA no harvest areas. The

remaining 1,515 ha removed under MP4 is no longer identified as UWR no harvest area. However, due to the expedited nature of this analysis and limits on the available data from the MP4 analysis, this area has remained excluded from the THLB and represents an underestimate in the available timber supply of up to 0.4%.

**Table 21: New No Harvest UWR Units**

| UWR Number | UWR Unit Number | Productive Forest Area (ha) |
|---|---|---|
| u-7-003 | P-003 | 12 |
| u-9-002 | SPC-001 | 695 |
| u-9-002 | SPC-002 | 3,766 |
| u-9-002 | SPC-003 | 2,210 |
| u-9-002 | SPC-004 | 3,891 |
| u-9-002 | SPC-005 | 612 |
| u-9-002 | SPC-007 | 3,186 |
| u-9-002 | SPC-008 | 3,208 |
| u-9-004 | GR-011 | 615 |
| u-9-004 | GR-012 | 73 |
| u-9-004 | GR-013 | 9 |
| u-9-004 | GR-014 | 341 |
| u-9-004 | GR-020 | 3 |
| u-9-004 | GR-022 | 9 |
| u-9-004 | GR-023 | 163 |
| u-9-004 | GR-025 | 845 |
| u-9-004 | GR-026 | 4 |
| u-9-004 | GR-027 | 1,656 |
| u-9-004 | GR-029 | 2,094 |
| u-9-004 | GR-030 | 82 |
| u-9-004 | GR-031 | 200 |
| u-9-004 | GR-032 | 195 |
| u-9-004 | GR-033 | 33 |
| u-9-004 | GR-034 | 30 |
| u-9-004 | GR-035 | 16 |
| u-9-004 | GR-036 | 16 |
| u-9-004 | GR-037 | 10 |
| u-9-004 | GR-038 | 5 |
| u-9-004 | GR-039 | 4 |
| u-9-004 | GR-040 | 38 |
| **Total** | | **24,021** |

New wildlife habitat areas (WHA) have been updated since the MP4 analysis with the passing of two separate WHA orders (MoE, 2008a and MoE, 2008b). The THLB has been updated to reflect the no harvest area identified within each of these orders and are shown in Table 22.

**Table 22: New No Harvest WHA**

| WHA Number | Productive Forest Area (ha) |
|---|---|
| 9-041 | 611 |
| 9-044 | 2,691 |
| 9-045 | 166 |
| 9-049 | 69 |
| 9-050 | 3,768 |
| 9-051 | 30 |
| 9-055 | 3,747 |
| 9-056 | 628 |
| 9-057 | 775 |
| 9-061 | 4,358 |
| 9-062 | 401 |
| 9-063 | 3,150 |
| 9-064 | 1,079 |
| 9-065 | 766 |
| 9-103 | 13 |
| **Total** | **22,252** |

# 4.0 CURRENT FOREST MANAGEMENT ASSUMPTIONS

The following sections describe management objectives not captured through the land base reductions described above.

## 4.1 Resource Management Zones

Resource management zones represent areas in which specific management objectives are applied, generally to reflect non-timber values on the land base. Each resource management objective has specific forest cover objectives (either retention or disturbance requirements) applied. Detailed modelling information on each objective is provided in the sections below.

Table 23 shows the resource management zones developed through MP4 analysis. In the MP4 analysis each of these classifications is set in Woodstock as a "theme". *Patchworks* does not use "themes" per se. However, the information contained within each theme will be used to reflect a set of target values in *Patchworks* and is therefore described below.

**Table 23: Modelling Themes**

| Theme | Label | Description and Application |
|---|---|---|
| *THEME {1} | Analysis unit | Based upon Inventory Type group and leading species, site quality and current age – used for associating to yield tables |
| *THEME {2} | Genetics | Identification of area utilizing Class A Seed for spruce – used for association managed stand yield tables |
| *THEME {3} | THLB | Classification of the TFL into timber harvesting land base (THLB), non contributing forests (NCLB), Woodlots, private land and non forest. |
| *THEME {4} | Management | Used to identify the management status of the TFL (ie existing, older (pre 1995) managed, and intensive management (post 1995)) and track transitions from unmanaged to managed forest. |
| *THEME {5} | Natural Disturbance Unit | Identification of NDUs based upon spatial areas and subdivide into mountain and valley areas by BEC |
| *THEME {6} | BEC | Biogeoclimatic ecosystem classification |
| *THEME {7} | Landscape Unit | Landscape units – used for sensitivity analysis |
| *THEME {8} | VQO | Visual quality area – used for sensitivity analysis |
| *THEME {9} | Pulpwood Area | Pulpwood 10 and 13 areas – used for reporting only |
| *THEME {10} | Recreation Class | Recreation class– used for reporting only |
| *THEME {11} | Watershed | Used to apply Equivalent Clear-cut area constraints |
| *THEME {12} | Wildlife Habitat | Used to identify the areas having ungulate winter range habitat values |
| *THEME {13} | Dunlevy Zone | Used to identify the spatial management areas within the Dunlevy |
| *THEME {14} | Map stand | Used to identify each mapsheet forest cover polygon within the TFL |
| *THEME {15} | Remsoft ID | Concatenation of all themes. Used to assign site series and thereby track wildlife habitat ratings (quality and quantity) |
| Area | Area (ha) | Used to identify the area of each polygon |
| Age | Age in periods | Used to identify the stand age in 10 year periods; to rate structural stage for the application of wildlife habitat ratings; and to identify carbon amounts as they change by age and analysis unit |

### 4.1.1 Analysis Unit

Table 24 identifies the criteria used to identify analysis units (species, site quality and current age) the associated area.

Table 24: Analysis Units

| AU # | AU Code | Description | Forest Area (ha) | Type Group | Site Index Criteria | Current Age |
|---|---|---|---|---|---|---|
| 1 | Bl_all | Balsam - all | 43,201 | 18 | all | all |
| 2 | Bx_y | Balsam mixed young | 34,346 | 20 | all | <=140 |
| 3 | Bx_o | Balsam mixed old | 18,828 | 20 | all | >140 |
| 4 | Bl_s | Balsam Shelterwood | 17,561 | 20 | all | all |
| 5 | Sw_yg | Spruce young good | 11,913 | 21 | >10 | <=140 |
| 6 | Sw_ym | Spruce young medium | 8,738 | 21 | <=10 | <=140 |
| 7 | Sw_og | Spruce old good | 9,804 | 21 | >10 | >140 |
| 8 | Sw_om | Spruce old medium | 3,551 | 21 | <=10 | >140 |
| 9 | Sc_yg | Spruce conifer young good | 45,961 | 22,24,25 | >11 | <=140 |
| 10 | Sc_ym | Spruce conifer young medium | 20,675 | 22,24,25 | <=11 | <=140 |
| 11 | Sc_og | Spruce conifer old good | 15,284 | 22,24,25 | >11 | >140 |
| 12 | Sc_om | Spruce conifer old medium | 33,447 | 22,24,25 | <=11 | >140 |
| 13 | Sd_g | Spruce-deciduous good | 16,828 | 26 | >14 | all |
| 14 | Sd_m | Spruce-deciduous medium | 7,853 | 26 | <=14 | all |
| 15 | Ss_g | Spruce Shelterwood good | 9,403 | 21-25 | >14 | all |
| 16 | Ss_m | Spruce Shelterwood medium | 15,188 | 21-25 | <=14 | all |
| 17 | Pc_yg | Pine Conifer young good | 23,826 | 30 | >15 | <=140 |
| 18 | Pc_ym | Pine Conifer young medium | 48,469 | 30 | <=15 | <=140 |
| 19 | Pc_og | Pine Conifer old good | 5,963 | 30 | >14 | >140 |
| 20 | Pc_om | Pine Conifer old medium | 11,897 | 30 | <=14 | >140 |
| 21 | Pd_g | Pine Deciduous good | 14,149 | 31,34 | >12 | All |
| 22 | Pd_m | Pine Deciduous medium | 4,484 | 31,34 | <=12 | all |
| 23 | Pl_g | Pine good | 18,389 | 28,29 | >15 | all |
| 24 | Pl_m | Pine medium | 38,470 | 28,29 | <=15 | all |
| 25 | Ac_g | Aspen conifer good | 12,817 | 41 | >15 | all |
| 26 | Ac_m | Aspen conifer medium | 10,000 | 41 | <=15 | all |
| 27 | Ad_g | Aspen deciduous good | 34,211 | 42 | >14 | all |
| 28 | Ad_m | Aspen deciduous medium | 6,723 | 42 | <=14 | all |
| 29 | Ct_con | Cottonwood-conifer | 8,744 | 35 | all | all |
| 30 | Ct_dec | Cottonwood deciduous | 14,747 | 37-40 | all | all |
| 31 | LwStk_c | Low stocking – conifer | 292 | | all | all |
| 32 | LwStk_d | Low stocking – deciduous | 632 | | all | all |
| | | Totals | 566,394 | | | |

Note: Analysis units were allocated based upon the species percent by volume for managed stand and the inventory type group (ITG) for existing unmanaged stands. AU's 4, 15, 16 were identified spatially as two or more layered stands in the ESSF, SBS, and all stands within the ESSF wc3.

### 4.1.2 Management Classification

Stands within the TFL are divided into four management classifications. These are:

1. Existing unmanaged stands;
2. Existing managed stands (harvested pre 1995);

3. Existing managed stands (harvested between 1995 and 2008) – partial genetic gains;
4. Future managed stands (harvested after 2008) – full genetic gains.

After harvesting, the area in existing unmanaged stands and existing managed stand convert to "future" managed stands. Upon conversion, only 98.1 percent of the area is assumed to reforest. The remaining 1.9 percent is assumed to remain as roadway and will no longer contribute to the THLB.

### 4.1.3 Natural Disturbance Units

Natural Disturbance units applied in this analysis have been developed for the Prince George Forest Region. Table 25 describes the area by NDU. The area in the Boreal Plains and Boreal Foothills – Valley is shown sub-divided into conifer leading stands and deciduous leading stands. This is done for analysis purposes and the application of old-growth targets.

**Table 25: Natural Disturbance Units**

| THEME 5 | Total Area (ha) | NCLB Area (ha) | THLB Area (ha) |
|---|---|---|---|
| Boreal Foothills - Mountain | 177,669 | 76,908 | 100,761 |
| Boreal Foothills - Valley - Conifer | 67,962 | 15,400 | 52,563 |
| Boreal Foothills - Valley - Decid. | 43,760 | 16,232 | 27,528 |
| Boreal Plains - Upland - Conifer | 125,030 | 30,158 | 94,872 |
| Boreal Plains - Upland - Decid. | 39,619 | 20,057 | 19,562 |
| Omineca - Mountain | 13,195 | 3,721 | 9,473 |
| Omineca - Valley | 6,198 | 1,821 | 4,377 |
| Wet Mountain | 92,960 | 42,379 | 50,581 |
| **Total Area (ha)** | **566,393** | **206,676** | **359,717** |

### 4.1.4 Biogeoclimatic Ecosystem Classification

TFL 48 Biogeoclimatic Ecosystem Classifications (BEC) has not been updated since MP3. Table 26 describes the area within each BEC across the TFL.

**Table 26: Biogeoclimatic Ecosystem Classifications**

| THEME 6 | Total Area (ha) | NCLB Area (ha) | THLB Area (ha) |
|---|---|---|---|
| AT | 987 | 987 | - |
| BWBSmw1 | 124,343 | 40,332 | 84,011 |
| BWBSwk1 | 34,569 | 8,111 | 26,458 |
| BWBSwk2 | 12,504 | 4,492 | 8,012 |
| ESSFmv2 | 5,971 | 5,971 | - |
| ESSFmv4 | 6,417 | 6,417 | - |
| ESSFmvp2 | 1,432 | 1,432 | - |
| ESSFmvp4 | 148,794 | 55,577 | 93,217 |
| ESSFwc3 | 11,754 | 7,049 | 4,705 |
| ESSFwcp3 | 57,403 | 32,554 | 24,850 |
| ESSFwk2 | 52,873 | 14,897 | 37,976 |
| SBSwk2 | 109,347 | 28,859 | 80,488 |
| **Total Area (ha)** | **566,394** | **206,676** | **359,717** |

1 Edge slivers occurred because the BEC cover used was consistent with the BEC inventory from MP3 that was clipped to the TFL boundary. Though BEC coverage occurs over the entire TFL, this problem was discovered too late in the process to redo.

### 4.1.5 Landscape Unit

Landscape Units were utilized in MP3 in conjunction with biogeoclimatic zones to ensure that harvesting did not become overly concentrated in any one place in the TFL. Landscape Units were also used for the application of old seral biodiversity constraints and the maintenance of old growth. This analysis will see Landscape units used in sensitivity scenarios. Table 27 describes the area within the Landscape Units in TFL 48.

**Table 27: Landscape Units**

| LU_NAME | Theme7 | Total Area (ha) | NCLB Area (ha) | THLB Area (ha) |
|---|---|---|---|---|
| BURNT-LEMORAY | bl | 107,377 | 45,836 | 61,540 |
| BOUCHER | bo | 35,394 | 9,679 | 25,715 |
| CARBON | ca | 80,129 | 37,013 | 43,117 |
| DUNLEVEY | du | 45,414 | 22,170 | 23,244 |
| EAST PINE | ep | 18,912 | 4,541 | 14,371 |
| GETHING | ge | 55,982 | 15,327 | 40,655 |
| HIGHHAT | hh | 86,960 | 21,702 | 65,258 |
| MARTIN CREEK | mc | 57,591 | 17,360 | 40,231 |
| PINE RIVER | pr | 1,621 | 392 | 1,229 |
| WOLVERINE | wl | 77,015 | 32,657 | 44,358 |
| **Total Area (ha)** | | **566,394** | **206,677** | **359,717** |

### 4.1.6 Visually Sensitive Areas

Visually sensitive areas within TFL 48 are used to ensure that harvesting within the TFL is planned with sufficient due diligence to minimize the visual impact of harvesting on the scenic landscape. Visually sensitive areas having established visual quality objectives (VQOs) are utilized in the base case for this analysis. Additional scenarios will investigate the effect of

recommended VQOs. The established VQO's are based on the 2012 consolidated VLI. Table 28 describes the area within the TFL in established VQOs and recommended VQC from the 2012 VLI. In the forest estate model, VQOs will have forest cover constraints applied to the VQO / landscape unit zonation- see Table 34 for more information.

**Table 28: Visually Sensitive Areas**

| VQO Classification | | Total Area (ha) | NCLB Area (ha) | THLB Area (ha) |
|---|---|---|---|---|
| Established VQO | P | 283 | 202 | 80 |
| | R | 15,118 | 6,464 | 8,654 |
| | PR | 44,323 | 14,943 | 29,380 |
| | M | 14,349 | 4,470 | 9,879 |
| | MM | 17,044 | 5,254 | 11,790 |
| Recommended VQC | r | 79 | 65 | 14 |
| | pr | 15,009 | 8,033 | 6,976 |
| | m | 1,663 | 511 | 1,152 |
| **Total** | | **107,868** | **39,942** | **67,925** |

### 4.1.7 Pulpwood Area

In MP3 deciduous leading stands outside of Pulpwood Agreement 13, (with the exception of the remaining deciduous-leading stands in TFL Block 3B1 and 3B2 (Rice Property)) were excluded from the THLB. For MP 4, these stands were included as part of the THLB, so long as they are not in the ESSF. Table 29 describes the total area of PA10 and PA13 relative to the TFL. This information is tracked for reporting purposes only.

**Table 29: Pulpwood Agreement Area**

| PA | Total | Forested | Forested Deciduous |
|---|---|---|---|
| Area (ha) | 483,758 | 481,109 | 81,801 |

### 4.1.8 Recreation

Information regarding recreation classifications is provided in Section 3.18 and in Table 19.

### 4.1.9 Watersheds

Canfor, under its SFMP has committed to maintaining water quality and quantity by ensuring that at least 95% of all watersheds within the TFL are below baseline threshold values. As such watersheds within the TFL are identified in the model. Watershed constraints are tracked in the basecase and applied in a sensitivity analysis- see section "6.2 Peak Flow Index" for more details.

### 4.1.10 Wildlife Habitat Areas & WTPs

Several spatially defined wildlife areas have been delineated for TFL48. Areas pertain to Grizzly habitat, and ungulate habitat and portions of these areas overlap.

**Table 30: Wildlife Habitat**

| THEME12 | Total Productive Forest (ha) |
|---|---|
| Grizzly | 209,504 |
| Ungulate | 2,637 |

The wildlife themes identified here were added to allow for the ability to perform sensitivity analysis if required. In some instances, such as the UWR in the Dunlevy, the areas were used to identify stands for removal from the THLB.

Wildlife Tree Patches (WTPs) in this analysis are not spatially identified. To account for WTPs, the amount of area or volume harvested from each forest stand must be reduced by the amount required to be retained as a WTP. For this analysis, a percent volume reduction was used as a proxy to identify area retained as WTPs.

The proportion of the timber harvesting land base that is in WTPs was derived from an intersection of existing WTPs against the total forested land base identified in MP3. During the MP3 analysis the proportions of all WTPs within and outside the THLB was identified. The results revealed that 55% percent of all spatially established WTPs were inside the THLB and 45% were outside the THLB

Within the TFL, 8.0 percent of the forested area within cut blocks must legislatively be retained in WTPs after the blocks are harvested.

By extension, this equates to 4.4 percent of the THLB (8.0% * 0.55).

To simulate management of WTPs, this analysis will reduce the volume in each harvested stand by 4.4 percent.

### 4.1.11 Dunlevy Special Management Area

Forest management considerations for the Dunlevy Special Management Areas are described in the Dunlevy Creek Management Plan. The plan was prepared by the Ministry of Sustainable Resource Management (MSRM), and completed January 24, 2002. Information pertaining to the THLB and other forestry statistics were supplied for the Plan by Canfor, using the TFL 48 Management Plan 3 Data Base. The current analysis has seen an increase in the potential THLB as a result of improvements in inventory information. These increases were utilized to adjust the recommended harvest target for the Dunlevy. Table 31 describes the area within the Dunlevy. These areas have changed in some ways significantly from the 2002 report. The changes are due to the refinement of some of the line work associated with the plan. The Dunlevy theme is used to manage the extent and timing of harvest operations within the compartments.

**Table 31: Dunlevy Creek Management Areas**

| Compartment | Total Productive Forest (ha) | NCLB Area (ha) | THLB Area (ha) |
|---|---|---|---|
| Adams Creek | 6,510 | 3,199 | 3,311 |
| Aylard Creek | 5,436 | 2,644 | 2,792 |
| Butler Ridge | 5,376 | 5,376 | 1 |
| Dresser Creek | 5,898 | 2,708 | 3,189 |
| Lower Dunlevy | 8,650 | 4,230 | 4,420 |
| Upper Dunlevy | 3,181 | 1,603 | 1,578 |
| **Totals** | **35,051** | **19,760** | **15,292** |

## 4.2 Resource Management Objectives

The Management Plan 4 analysis (IFS, 2006b) was conducted using the Remsoft Spatial Planning System (Woodstock / Stanley) which uses "Themes" to classify the land base. The themes themselves are used to represent analysis units, and spatially identify areas within the TFL with specific management objectives - analogous to the AUs, zones and groups used in FSSIM. Although this analysis will be conducted using the forest estate model *Patchworks* (see Section 4.3.1). These themes provide the information required by *Patchworks* and will be utilized for this analysis.

For the purposes of modelling forest management across TFL 48, harvesting is conducted with consideration given to the following management restrictions:

1) Minimum harvest age and minimum economic volume;
2) A sustainable future THLB growing stock;
3) Minimum old-growth constraints applied by landscape unit / BEC variant;
4) Limits on the amount of harvesting in visually sensitive areas; and
5) Restrictions on access, timing and harvest levels within the Dunlevy Special Management Area.

These management considerations are modelled explicitly within *Patchworks*. Each of these management considerations are discussed in the sections following.

### 4.2.1 Old Seral Management

NDU-based seral stage objectives have not been incorporated into an old growth order specific to TFL 48 even though it reflects the best science-based approach to old seral management. Consistent with the Provincial Non-Spatial Old Growth Order (the Old Growth Order), Canfor's FSP commits to old growth management targets by Landscape Unit / BEC variant combination as shown in Table 32 which will be reflected in the base case.

NDU-based seral stage targets will be applied as a sensitivity analysis and are discussed in Section 6.1.

**Table 32: Old Seral Targets as per the Provincial Non-Spatial Old Growth Order and Canfor's FSP**

| Landscape Unit | BEO | BEC Variant | Dominant Tree Type | Age of Old Forest | Percent Old Forest Retention |
|---|---|---|---|---|---|
| Boucher | Low | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | BWBS wk1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | SBS wk2 | All | >140 | >11 |
| Burnt-Lemoray | Intermediate | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | ESSFwc3 | All | >250 | >19 |
| | | ESSFwk2 | All | >250 | >19 |
| | | SBSwk2 | All | >250 | >9 |
| Carbon | Intermediate | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | ESSFwc3 | All | >250 | >19 |
| | | ESSFwk2 | All | >250 | >19 |
| | | SBSwk2 | All | >250 | >9 |
| Dunlevy | High | BWBS mw1 | Dec | >100 | >19 |
| | | | Con | >140 | >16 |
| | | BWBS wk1 | Dec | >100 | >19 |
| | | | Con | >140 | >16 |
| | | ESSFmv4 | All | >250 | >13 |
| East Pine | Low | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| Gething | Low | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | SBS wk2 | All | >250 | >9 |
| Highhat | Low | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | BWBS wk1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | ESSFwc3 | All | >250 | >19 |
| | | ESSFwk2 | All | >250 | >19 |
| | | SBSwk2 | All | >250 | >9 |
| Martin Creek | Low | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | BWBS wk1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | SBSwk2 | All | >250 | >9 |
| Wolverine | Intermediate | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | BWBS wk1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | ESSFwc3 | All | >250 | >19 |
| | | ESSFwk2 | All | >250 | >19 |
| | | SBSwk2 | All | >250 | >9 |
| Pine River | Low | BWBS mw1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | BWBS wk1 | Dec | >100 | >13 |
| | | | Con | >140 | >11 |
| | | ESSFmv2 | All | >250 | >9 |
| | | SBSwk2 | All | >250 | >9 |

### 4.2.2 Patch Size Objectives

Canfor's FSP commits to attain or maintain a pattern of early forest patches that trend towards or achieve the range of early forest patches shown in Table 33. These patch targets are applied to each NDU. Early forest patches are defined as forested areas where the age is less than or equal to 40 years of age. Areas of forest that are less than or equal to 40 years and within 100m of each other are amalgamated into one early forest patch and their areas summed. These targets are established to gradually achieve these targets over time.

**Table 33: Early Forest Patch Size Targets**

| NDU | Percent of Early Forest for Each Patch Size Category | |
|---|---|---|
| | 50 – 100 ha | 100+ |
| Boreal Plains | < 15% | >50% |
| Boreal Foothills/ Omineca | <20% | >40% |
| Wet Mountain | <25% | <60% |

### 4.2.3 Visually Sensitive Areas

The MP4 base case utilized the established VQO's as represented in the 2005 consolidated Visual Landscape Inventory (VLI) which differed from the visual landscape inventory used in Management Plan 3. In 2012 an update to the VLI was completed which will be reflected in the base case.

Canfor's management of visually sensitive areas has evolved such that all new harvesting proposed in visually sensitive areas has to be planned using the principles of visual landscape design. In addition, Canfor has taken further actions that effectively address visual landscape management. These include:

- Block layout consistent with visual landscape design and biodiversity requirements which soften block appearance;
- The initial minimum target density on the TFL is 1600 sph. This density exceeds that of the Regional well-stocked stand target of 1200 sph;
- Road and trail deactivation/rehabilitation, grass seeding/reforestation and an acute awareness of dispersed site disturbance have reduced site disturbance well below levels considered normal when VAC denudation percentages were calculated;
- Site preparation methods where used, now emphasize minimal disturbance of the duff in order to maintain a more natural look to the blocks. Broadcast burning is not used and raw planting is the preferred treatment. This minimizes exposed rock and soil;
- Mixed species plantations which avoid monocultures, and improves visual characteristics;
- Increased cable harvesting reduces the presence of skid trails on the steeper visual slopes.

In the past, Canfor has demonstrated performance in the following harvesting methods: Ground-based conventional, cable and aerial systems. In the past selection, shelterwood, irregular shelterwood, patch cut, clear-cut and clear-cut with reserves silviculture systems have been used on the TFL. However, in the last 10 years, nearly all of the harvesting in the TFL has utilized a clear-cut with reserves silviculture system.

Canfor's FSP was amended in 2012 to create additional flexibility around managing for VQOs in areas affected by MPB. The amendment allows Canfor to drop by one visual quality class in areas affected by MPB- specifically from the FSP:

*"...where >35% of the timber volume in the stand is in danger of being or has been damaged, significantly reduced in value, lost or destroyed and it is not practicable to achieve the established VQO, the following Result and Strategy will apply:*

*(a) Where it is not practicable to achieve the established VQO, the visual condition to be achieved may be greater in scale and visual acuity by one VQO category, and*

*(b) consistent with the design elements of the established VQO where practicable."*

Table 34 describes the percent constraint applied to each designation based on the 2012 version of the VLI. Constraints will be applied at the landscape unit level to the total forested area within each established VQO at the level shown as '% constraint in non-MPB Affected areas'. The reduced constraints in MPB affected areas will be considered as an option should salvage be limited by VQO constraints. Recommended VQCs will be implemented in a sensitivity analysis.

**Table 34: Forest Cover Constraints in Visual Areas**

| Type | VQO/VQC | % Constraint in non-MPB Affected Areas | % Constraint in MPB Affected Areas |
|---|---|---|---|
| Established VQO | P | 0.0 | 1.5 |
| | R | 1.5 | 7.0 |
| | PR | 7.0 | 18.0 |
| | M | 18.0 | 30.0 |
| | MM | 30.0 | n/a |
| Recommended VQC | r | 1.5 | 7.0 |
| | pr | 7.0 | 18.0 |
| | m | 18.0 | 30.0 |

### 4.2.4 Forest Cover Constraints in Non-Visually Sensitive Areas

In MP4, the impacts of cut blocks size and adjacency requirements on timber supply was approximated using a 33% disturbance limit applied to each landscape unit. Since MP4, Canfor has adopted patch size objectives which have been incorporated into its FSP. Patch size objectives based on the natural range of variability mimic the natural disturbance regime and regulate cut block size and adjacency requirements. This analysis will develop cut blocks that trend towards or achieve the range of early forest patches, as specified in the FSP and described in Section 4.2.2. As such, no further forest cover constraints are required in non-visually sensitive areas.

### 4.2.5 Ungulate Winter Range

Management for ungulate winter range (UWR) within UWR units identified as "No Harvest" is addressed through the removal of these areas from the THLB and is discussed in Section 3.12. UWR unit numbers for which general wildlife measures other than "No Harvest" have been identified in the orders are shown in Table 35. The modeling approach used to approximate these measures is also shown in Table 35.

Table 35: New No Harvest UWR Units

| UWR Number | UWR Unit Number | Productive Forest Area (ha) | General Wildlife Measures[2] | Modelling Approach |
|---|---|---|---|---|
| u-9-002 | SPC-009 | 1 | Primary forest activities:<br>1. Will result in the maintenance or enhancement of the productivity of key lichen communities<br>2. Will result in large patches and at least equivalent size connected leave areas of appropriate forest stand types as suitable for the natural disturbance regime for the area.<br>3. Will result in a maximum allowable disturbance of 33% of the Crown forest area being less than 3 metres.<br>4. Will result in maintaining the species composition of pine-leading stands. | None – small area precludes application of forest cover constraint |
| u-9-004 | GR-024 | 0 | Primary forest activities:<br>1. Will result in sequential development<br>2. Will not result in material adverse disturbance to the productivity of key terrestrial lichen communities.<br>3. Will result in a network of connected forest cover, which provides visual screening and snow interceptions, to facilitate caribou movement.<br>4. Will result in pre-harvest pine-leading stands to be re-established as pine-leading stands.<br>5. Will be completed in as short a time frame as practicable to a maximum of 5 years from initiation.<br>6. Will not result in the use of domestic sheep or goats. | No specific modelling approach. Operationally, harvesting will be conducted in order to preserve key terrestrial lichen communities. As migration corridors are established they will in incorporated into future timber supply analyses. |
| u-9-004 | GR-029 | 2,094 | | |

The West Moberly First Nation has recently published a draft Caribou recovery strategy, *Action Plan for the Klinse-Za Herd of Woodland Caribou (Rangifer tarandus caribou) in Canada* (McNay et. al. 2013). The plan provides a series of recommendations for recovery of the *Klinse-Za Herd of Woodland Caribou* with some of the plan area overlapping with TFL 48. From the maps provided in the draft action plan it appears that much of the area identified as high elevation winter range coincides with the additional areas of high value caribou habitat identified in Figure 2 of this report and are removed from THLB. It is likely that other habitat values identified in the plan overlap with many of the other land base reductions and non-timber management objectives addressed in this analysis however without the data corresponding to this plan this is difficult to quantify. In the event that future UWR orders are developed and / or amended to include components this action plan they will be incorporated into future timber supply analyses.

### 4.2.6 Other Land Base Objectives

#### Recreation

The following recreation sites have been removed from the timber harvesting land base:

[2] *Only General Wildlife Measures pertaining to harvesting and silviculture activities are specified here. Other measures may affect access and the timing of activities and can be found in the order itself located at* http://www.env.gov.bc.ca/wld/frpa/uwr/approved_uwr.html

- Boulder Lake;
- Carbon Lake;
- Gething Creek; and
- Wright Lake.

## Wildlife Tree Patches

Refer to Section 4.1.10 for details and rationale.

## Higher Level Plans

TFL 48 falls entirely within the Dawson Creek Land and Resource Management Plan (LRMP). The Dawson Creek LRMP was officially approved with direction to implement on March 30, 1999.

New protected areas that were proposed in the LRMP have received official designation under an Order-In-Council (OIC). These areas have been excluded from the THLB.

Resource management zones, which were defined as part of the LRMP process will not have specific forest cover constraints applied to them. Canfor believes that all of the activities and concerns associated with the resource management zones can and will be addressed at the operational level of management, rather than at the strategic level. Landscape Unit, biogeoclimatic zone, variant biodiversity objectives provide sufficient levels of spatial resolution to ensure that multi-resource management objectives are being addressed.

The LRMP recognizes the Twin Sisters RMZ as an area of profound spiritual significance and traditional use value to the First Nations people of northeastern BC. Due to the low levels of THLB within the RMZ's and the management of visual areas from the Twin Sisters Protected Area, no additional forest cover constraints are necessary to meet the objectives stated in the LRMP section 4.13.

## Dunlevy Creek Management Plan

During the term of MP3, a special management plan for the Dunlevy block of the TFL was developed (January 24, 2002) and prepared by the Ministry of Sustainable Resource Management and subsequently received Government endorsement. The Plan divides the Dunlevy into several compartments and identifies specific operational guidelines around which harvesting and mineral extraction may occur. In this analysis, harvest area within the Dunlevy Creek management plan area is limited to the hectares by decade listed in Table 36 (adapted from Table 59 from the 2006 Information Package).

Table 36: Proposed Harvest Limits in Dunlevy Creek Plan Area

| Decade in Analysis | Compartment in Dunlevy Management Plan Area | | | | |
|---|---|---|---|---|---|
| | Adams | Aylard | Lower Dunlevy | Upper Dunlevy | Dresser |
| 1 | 1,246 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 245 | 0 | 0 |
| 3 | 0 | 0 | 0 | 480 | 0 |
| 4 | 0 | 561 | 245 | 0 | 0 |
| 5 | 0 | 0 | 489 | 0 | 1,697 |
| 6 | 722 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 489 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 |
| 9 | 897 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 726 | 0 | 0 |
| 11 | 0 | 848 | 0 | 0 | 0 |
| 12 | 0 | 0 | 726 | 0 | 1,697 |
| 13 | 0 | 848 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 566 | 0 |
| 15 | 1,246 | 0 | 245 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 245 | 480 | 0 |
| 18 | 0 | 561 | 0 | 0 | 0 |
| 19 | 722 | 0 | 245 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 489 | 0 | 0 |
| 22 | 0 | 848 | 0 | 0 | 0 |
| 23 | 0 | 0 | 489 | 0 | 0 |
| 24 | 897 | 0 | 0 | 0 | 1,697 |
| 25 | 0 | 0 | 0 | 0 | 0 |

## 4.3 Modelling Approach

### 4.3.1 Forest Estate Model

Forest estate modelling will be conducted using the spatially explicit optimization model Patchworks. Patchworks is developed by Spatial Planning Systems in Ontario (www.spatial.ca) and allows the user to explore trade-offs between a broad range of conflicting management goals while considering operational objectives and limitations into strategic-level decisions. The model provides an easy to use interface that allows users to access and understand information in real-time.

The model has been formulated using five-year planning periods over a 250-year planning horizon.

### 4.3.2 Harvest Flow Objectives

The biological capacity of the land base as well as forest cover and green-up requirements dictate the sustainable harvest level for a particular land base. There are a number of alternative harvest flows possible. In this analysis, the harvest levels will reflect the following objectives:

- Maximize the salvage and recovery of MPB-affected stands while minimizing the impact and risk to mid-term timber;
- Following salvage, decrease to a non-declining mid-term harvest level that reflects the productive capability of the land base; and
- Increase to an even-flow long-term harvest level over a 250-year planning horizon.

Alternative initial, mid-term and long-term harvest levels will also be considered in sensitivity analyses. For example, a lower initial harvest level (at or below the current AAC) will be applied to assess the impacts of this lower harvest level on mid and long-term timber supply.

### 4.3.3 Minimum Harvest Age

Minimum harvest age (MHA) for both existing natural, existing managed and future managed stands is derived for each analysis unit based on the age at which the stand achieves both 95% of culmination MAI and has achieved at least 140 m3/ha.

### 4.3.4 Operability

The majority of harvesting on the TFL takes place with conventional, ground-based equipment. This reflects the generally favorable operating conditions in the area. Non- conventional methods such as overhead cable systems and helicopter logging are used as required to harvest steeper ground to meet terrain stability requirements or to expand summer harvesting opportunities on areas with sensitive soils. Historically, approximately 40% of harvesting activities within the TFL utilize cable systems. The increased use of this system has occurred as a result of the backlog of cable ground accessible from existing roads. This component of cable logging will decrease to a lower level over time.

Utilizing any and all of these systems where applicable has resulted in there being very few physically inoperable areas within the TFL

Economic operability has been estimated using a combination of the age/height/stocking attributes of a forest stand, and an indication of site quality. Although these areas are excluded at this time from the timber harvesting land base, this does not preclude Canfor's harvesting within them some time in the future. Estimates of future market conditions are typically difficult to predict. Economic operability is also addressed through minimum volume criteria applied to stands existing where mixed and cable harvesting systems are required.

### 4.3.5 Harvest Rules

Optimization models such as Woodstock and Patchworks do not require the specification of harvest rules required in simulation models such as FSSIM. Optimization models sort and harvest stands based on the harvest decisions that best achieve the overall modelling objectives. The only real harvest rules in optimization models are minimum harvest ages that prevent the model from harvesting stands below their economic threshold. As such harvest rules are driven by the objectives:

1) Maximize MPB salvage in the short-term;
2) Minimize the impacts to mid-term timber supply;
3) Maximize the evenflow deciduous harvest;
4) Maintain a sustainable long-term conifer and deciduous harvest level; and

5) Ensure that non-timber management objectives are achieved wherever possible.

### 4.3.6 Harvest Profile

The harvest profile will be divided between the deciduous leading land base and the coniferous leading land base. In MP3, the deciduous harvest came solely from the pulpwood portion of the TFL. In MP 4 and 5, this harvest is expanded to include the merchantable deciduous across the entire TFL.

### 4.3.7 Silviculture Systems

Clear cutting is the system of choice on the TFL. Irregular shelterwood harvesting has been phased out of management on the TFL with the last shelterwood application in 2004 / 2005. As such, clear-cut harvesting is the only silviculture system included in the timber supply analysis.

### 4.3.8 Non-Recoverable Losses

Non-recoverable losses (NRL) are timber volumes that are being destroyed on an annual basis by natural causes. Estimated annual losses are deducted from the gross harvested volume in the model to determine the net volume of timber that could be harvested over time.

In the Data Package for MP 3, a calculated NRL number based on the forest cover inventory was summarized by non-logging disturbances. This estimate will be used in the analysis for MP 4 and 5 as well. The estimates are split for coniferous and deciduous species:

**Table 37: Non-Recoverable Losses**

| Cause | Net Loss (m3/year) |
|---|---|
| Fire | 44,605 |
| Insects / Disease | 4,367 |
| Windthrow (and other natural causes) | 7,174 |
| **Total** | **56,146** |

Reduction for Non-Recoverable Coniferous Losses: 49,700 $m^3$/year.

Reduction for Non-Recoverable Deciduous Losses: 6,400 $m^3$/year.

The TFL 48 MP3 Management Plan approval letter written by the Deputy Chief Forester indicated that NRL's may be overestimated and asked Canfor to work with the MOF to confirm or vary this estimate. See Table 26 in Section 3.16 of the SFMP for the results for the work done to-date. Over the past 5 years it is estimated that there has been significantly less NRL's than what is currently being modelled (e.g. 4,395 $m^3$/year). However, in consideration of the MPB outbreak currently on TFL48, Canfor has chosen not to adjust downward the NRL estimate at this time.

Non-recoverable losses due to MPB will be modelled explicitly as described below. Once the analysis is complete, this information may provide a rationale for reducing the NRL identified above.

### 4.3.9 Mountain Pine Beetle

The mountain pine beetle has continued to expand on the TFL over the last several years. The MP4 analysis included an increase in the AAC from 580,000 m3/yr (in 2001) to 900,000 m3/yr, the management of the MPB infestations one of the reasons for the increase.

## MPB Projections

Since 1999, the MOFR has been projecting the spread of MPB throughout the province and recalibrating the projections each year using the forest health overview survey data (BCMPB Projections). As of the start of this analysis BCMPB Version 10 (2013) was the most current version of this data set and Figure 2 shows the progression of the MPB since 2000 and its projected change until 2026. Overall, the most significant growth of the infestation occurred between 2006 and 2009, after the MP4 analysis had been completed. The data shows that in 2013, 49% of the TFL area has some level of MPB attack. Beyond 2013 the MPB severity is projected to increases slightly but overall the area impacted remains largely the same.

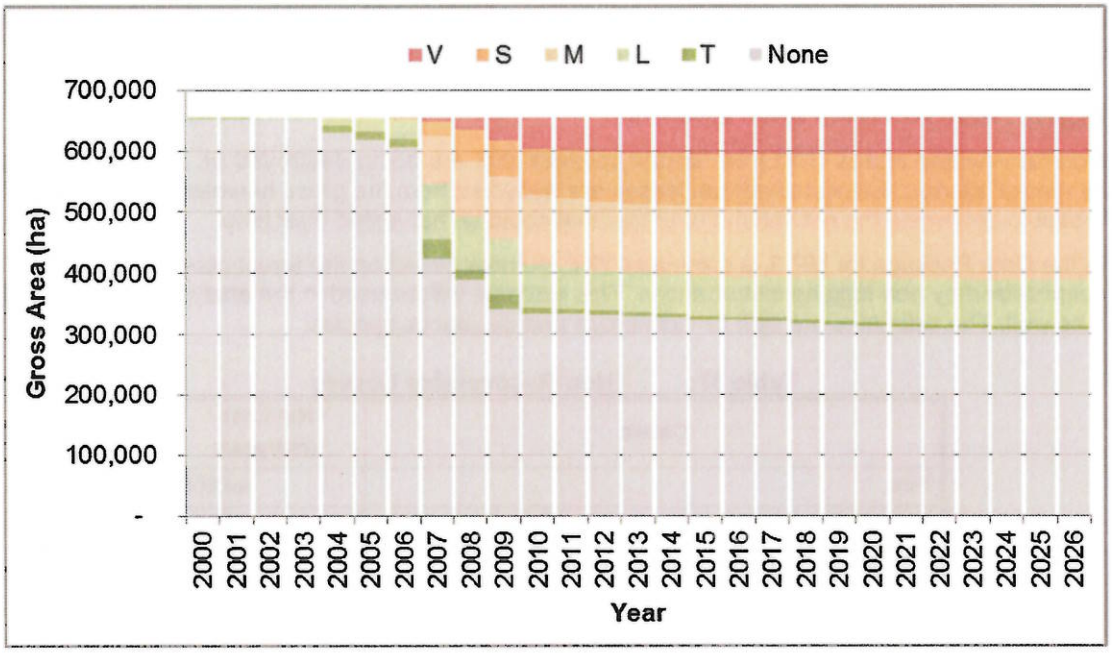


**Figure 2: BCMPB Version 10 (2013) Projections for TFL 48**

The percent of the stand affected has been classified using the forest health overview (FHO) classification system. This classification system is shown in Table 38.

**Table 38: MOFR Severity Class Definition**

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

In order to increase the spatial accuracy of the BCMPB projections and to maintain consistency with the inventory information, the BCMPB classifications are overlaid with the pine percentages from the VRI. Overall attack percentages are then corrected based on the percentage of pine within each VRI polygons such that the attack percent is never greater than the overall pine percent in a polygon. The attack percent is then combined with the THLB layer, inventory

species and merchantable volume to produce Figure 3 showing the attacked (dead) volume by pine percentage class compared with the overall conifer and overall pine volume. Of the 73.1 million m3 of conifer volume on the TFL, 27.3 million m3 (37%) is pine and of this, 18.6 million m3 (25% of the total conifer and 68% of pine volume) is attacked.

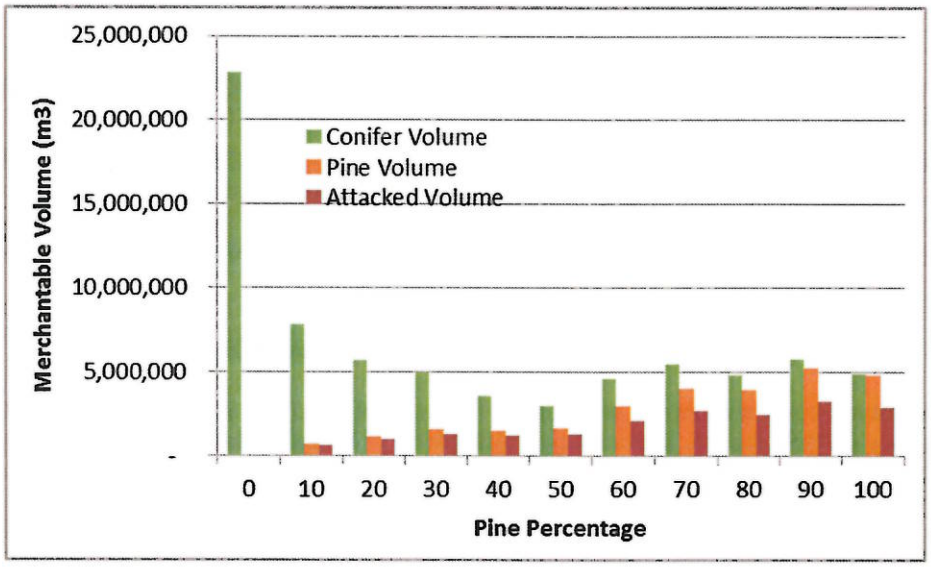


**Figure 3: Merchantable Volume by Pine Percent**

On May 7th, 2013 a helicopter flight of the TFL was taken to assess the accuracy of these projections. Overall the flight confirmed that the BCMPB projections represented the spatial location of the most severely impacted areas well but underestimated the overall percent attack. Some areas of low to moderate attack were under-represented in the BCMPB projections. However, overall it was determined that the attack percentages shown in Figure 3 presents a reasonable representation of the state of the MPB infestation on the TFL and have been used in this analysis.

## Shelf life Assumptions

Shelf life is defined as the time a stand will remain economically viable for harvest following MPB attack. The death age of a stand is the year in which the BCMPB classification reaches its maximum level. Based on licencees experience in harvesting MPB-affected stands on the TFL, a five-year shelf life assumption will be used. Stands will maintain 100% of their merchantable volume for five years after 2013 and after 5 years 100% of the pine volume within a stand will be lost – captured as a non-recoverable loss. Stands in which the merchantable volume falls below the minimum economic threshold of 140 m3/ha will become unsalvageable until such time that the remaining live portion of the stand grows up over 140 m3/ha. Stands that do not achieve this minimum economic threshold will remain unavailable for harvest throughout the planning horizon.

# 5.0 GROWTH AND YIELD

Yield curves for MP4 were submitted and approved by MFLNRO staff. These yield curve inputs have been utilized for this analysis and have been adjusted to incorporate updated site index and genetic gain information and shelf life assumptions as described above.

## 5.1 Site Index Assignments

Site indices for existing natural stands were assigned using the MOF's Variable Density Yield Prediction Model (VDYP), batch version 6.6d and were sourced from the existing VRI.

Site indices for managed stands were assigned using PEM-based SIBEC estimates. The BGC zone and site series from each stand was used along with the planted species from the managed analysis unit input tables to link SIBEC estimates from the 2013 approximation (http://www.for.gov.bc.ca/hre/sibec/ ). These were area-weight averaged into each managed stand analysis unit.

## 5.2 Genetics Gains for Managed Stands

Class 'A' spruce seed is available and utilized for much of the TFL. According to Seed Planning and Registry (SPAR) reports provided by the Ministry of Forests, Range and Natural Resource Operations (MFLNRO), summarized in Table 39, 55.5% of all planted spruce stock over the last five years is from class 'A' seed with an average genetic gain of 11.4%.

This weighted genetic gain takes into account the proportion of class 'A' / class 'B' spruce seed planted as well as the overall spruce genetic gains and will be applied to the managed stand yields for all spruce planted since 2009 and to all future managed stands. The availability of class 'A' pine seed is limited to the Prince George seed planning unit and the majority of the pine seedlings planted are class 'B' from the Hudson Hope seed planning unit. As such no genetic gains have been applied for pine.

Table 39: Genetic Gains for Managed Stands Planted Between 2003 and 2013

| Sewing Year | Class A | Class B | Total | Genetic Worth (%) | % GI Stock | Weighted Genetic Gains (%) |
|---|---|---|---|---|---|---|
| **Pine Seedlings (1,000s Seedlings Requested)** | | | | | | |
| 2013 | | 1,380 | 1,380 | | | |
| 2012 | | 950 | 950 | | | |
| 2011 | 32 | 1,093 | 1,125 | 9% | 3% | 0.3% |
| 2010 | | 77 | 77 | | | |
| 2009 | | 434 | 434 | | | |
| 2008 | | | | | | |
| 2007 | | 1,800 | 1,800 | | | |
| 2006 | | 950 | 950 | | | |
| 2005 | | 1,220 | 1,220 | | 0% | 0.0% |
| 2003 | | 800 | 800 | | 0% | 0.0% |
| 2004 | | 925 | 925 | | 0% | 0.0% |
| **Pine Total** | **32** | **7,324** | **7,356** | | **0%** | **0.0%** |
| **Spruce Seedlings (1,000s Seedlings Requested)** | | | | | | |
| 2013 | 280 | 300 | 580 | 19% | 48.3% | 9.2% |
| 2012 | 1,236 | 300 | 1,536 | 22% | 80.5% | 17.7% |
| 2011 | 238 | 1,164 | 1,402 | 19% | 16.9% | 3.2% |
| 2010 | 136 | 14 | 150 | 19% | 90.7% | 17.2% |
| 2009 | 387 | 50 | 437 | 19% | 88.6% | 16.8% |
| 2008 | | | | | | 0.0% |
| 2007 | 400 | 830 | 1,230 | 19% | 32.5% | 6.2% |
| 2006 | 200 | 1,900 | 2,100 | 25% | 9.5% | 2.4% |
| 2005 | | 1,168 | 1,168 | | 0.0% | 0.0% |
| 2004 | 1,073 | 2,100 | 3,173 | 16% | 33.8% | 5.4% |
| 2003 | 400 | 1,580 | 1,980 | 16% | 20.2% | 3.2% |
| **Spruce Total (2003 - 2013)** | **4,349** | **9,406** | **13,755** | | **31.6%** | **6.0%** |
| **Spruce Total (Last 5 Years)** | **2,277** | **1,828** | **4,105** | | **55.5%** | **11.4%** |

Select seed was not utilized on TFL48 prior to 2003 and therefore in the silviculture era between 1995 and 2008 a weighted spruce genetic gain value of 0.7% was applied as shown in Table 40.

Table 40: Spruce Genetic Gains Between 1995 and 2008

| Period | Age Range | Area | Propn | Spruce GG |
|---|---|---|---|---|
| **1995 - 2002** | 18 - 11 yrs | 12,144 | 82% | 0.0% |
| **2003 - 2008** | 10 - 5 yrs | 2,747 | 18% | 3.7% |
| **Average between 1995 - 2008** | | | | 0.7% |

Table 41 shows the future projected genetic gains associated with the seed planning units in the TFL. Overall, future genetic gains are not projected to change substantially from the 2012 values and therefore no changes to the genetic gains values have been applied to future managed stands.

Table 41: Projected Future Genetic Gains

| SPU | Species | Elevation Band | THLB Area (ha) | Projected Genetic Gains in Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 + |
| CP | PLI | LOW | 76,489 | 13% | 14% | 15% | 16% | 18% | 19% | 21% | 21% | 21% | 21% | 21% |
| PG | PLI | LOW | | 12% | 12% | 13% | 13% | 14% | 14% | 14% | 15% | 16% | 16% | 16% |
| PG | SX | HIGH | | 14% | 14% | 14% | 15% | 15% | 15% | 16% | 16% | 16% | 16% | 16% |
| PG | SX | LOW | | 26% | 26% | 26% | 26% | 26% | 26% | 26% | 26% | 27% | 27% | 28% |
| PR | SX | LOW | 286,875 | 6% | 6% | 6% | 6% | 6% | 6% | 6% | 6% | 6% | 6% | 6% |
| PR | SX | MID | | 23% | 23% | 23% | 23% | 23% | 23% | 23% | 23% | 23% | 23% | 23% |

## 5.3 Utilization Levels

The utilization standards as indicated in Table 42 will be applied in the analysis.

Table 42: Utilization Levels

| Species | Utilization | | | |
|---|---|---|---|---|
| | Minimum Dbh (cm) | | Maximum Stump Height (cm) | Minimum Top dib (cm) |
| | Natural Stands | Plantations | | |
| Spruce | 17.5 | 17.5 | 30.0 | 10.0 |
| Balsam | 17.5 | 17.5 | 30.0 | 10.0 |
| Lodge pole Pine | 12.5 | 12.5 | 30.0 | 10.0 |
| Deciduous | 12.5 | 12.5 | 30.0 | 10.0 |

## 5.4 Decay Waste and Breakage for Unmanaged Stands

To obtain net volumes per hectare, Ministry of Forests' decay, waste and breakage factors provided in the Variable Density Yield Prediction Model (VDYP) v7 for Forest Inventory Zone (FIZ) L were used.

## 5.5 Operational Adjustment Factors

Operational adjustment factors for managed stands were applied to all managed stand yield tables. Factors of 15% OAF 1 and 5% OAF 2 were used.

## 5.6 Volume Adjustments

An adjustment to the volume in unmanaged stands was applied to several coniferous analysis units that exist in the ESSF. To reflect Canfor's practice of retaining deciduous stems within the ESSF, the deciduous component of leading coniferous-mixed-wood stands within the ESSF was removed from the VDYP generated volume curve for each of these AU's.

Table 43 shows the amount of volume removed for existing unmanaged Analysis units for the deciduous component of coniferous leading stands in the ESSF.

Table 43 Volume adjustments for Stands in the ESSF

| Unmanaged AU [1] | Description | Percent Reduction |
|---|---|---|
| 13 - Sd_g | Spruce deciduous stands in good sites | 20 |
| 14 - Sd_m | Spruce deciduous stands in medium site | 25 |
| 21 - Pd_g | Pine deciduous stands in good sites | 20 |
| 22 - Pd_m | Pine deciduous stands in medium sites | 18 |

1: Four yield tables were added to the analysis to reflect this volume adjustment for stands in the ESSF.

## 5.7 Yield Table Development

### 5.7.1 Aggregated Yield Tables

Yield tables are initially created such that a natural stand yield table exists for every forest polygon within the TFL. These polygons are then assigned to an analysis unit and the yield tables area-weighted to produce one table for each analysis unit.

### 5.7.2 Yield Tables for Existing Unmanaged Stands

Yield tables for natural stands were generated using the Variable Density Yield Prediction (VDYP) 'batch' model, version 7.

Separate curves were produced for some of the natural mature stands versus natural immature stands. This was done in cases where significant amounts of area existed for natural stands both in an immature and over-mature (>140 years) state.

A temporary yield curve was created for each forest polygon in the TFL. The yield curves were then grouped by analysis unit and area-weighted to provide one curve for each analysis unit. All of the net area in each analysis unit was used in the generation of the curves.

### 5.7.3 Existing Timber Volume Check

To verify that significant error did not occur in the aggregation of polygons into analysis units, the total net volume of the current inventory using VDYP polygon specific volumes was compared to the total net volume of the current inventory using the aggregated analysis unit volumes from the VRI file.

Table 44: Total TFL Empirical Volume

| | Method Used | | |
|---|---|---|---|
| | Polygon Specific (m3) | Analysis Unit (m3) | % difference |
| Total Empirical Volume (m3) | 6.29e7 | 6.22e7 | 1% |

The calculations are performed as follows:

1) Total polygon specific inventory volume: Σ(all unmanaged polygons in the THLB (projected VDYP volume/ha 'multiplied by' net polygon area))

2) Total analysis unit volumes: Σall analysis units (Σall age classes (analysis unit area in age class N 'multiplied by' VDYP estimated volume @ age class N))

### 5.7.4 Yield Tables for Managed Stands

Managed stand yield tables are created using the Table Interpolation Program for Stand Yields (TIPSY) (Version 4.3). The species distribution derived for the natural mixed-wood stand curves was used to determine the percentage of deciduous to be blended with the coniferous.

Stands harvested prior to 1995 will grow along TIPSY MSYT, but will utilize a combination of natural and planted regeneration histories, longer regeneration delays, and reduced stocking. Table 45 shows the amount of area with a harvest year that is pre 1995 and will be assumed to be growing on the MSYT. The combination of increased regeneration delay, reduced stocking levels, increased proportion of naturals and Canfor's historic activities of a) monitoring stocking levels, b) fill planting, c) brushing and d) thinning activities, make TIPSY a more appropriate model than VDYP to use to estimate the growth and yield of these stands.

The Prince George and Peace River Class A seed planning units (SPU) occur within TFL 48 and class 'A' spruce seed is available within both SPU. Stands harvested after 2009 and into the future will incorporate the improved class 'A' spruce seed across the TFL as described in Section 5.2. Canfor intends to use improved seed where available, for all spruce planted in the future.

Managed stand yield tables have been regenerated for this analysis in order to capture updates in the availability of genetically improved seed for the TFL.

#### Silviculture Systems

The mature and over-mature even-aged stands in TFL 48 are predominantly spruce, spruce-balsam and spruce-lodgepole pine. Clear-cutting is the current form on harvesting on the TFL.

#### Aggregated Yield Tables

In MP4, the forest cover polygons comprising the THLB were aggregated into analysis units based on leading species, secondary species, site index and age- these aggregations were used in this analysis.

#### Regeneration Delay

Regeneration delay by analysis unit is shown in Table 46 and Table 47. The regeneration delay was applied as an input directly into the TIPSY model during the creation of the post-1995 managed stand yield tables.

#### Regeneration Assumptions

Table 20, Table 46 and Table 47 describe the regeneration assumptions used to create managed stand yield tables. Three sets of managed stand yield tables are used to represent the TFL. The first set applies to stands harvested prior to 1995, the second set applies to all stands harvested on or after 1995, and the third applies to all future stands harvesting.

#### Species Conversion

Operating under the principle that there will be no significant net gain or loss of deciduous in the TFL, mixed-wood stands will regenerate to their original proportions of coniferous and deciduous. The managed deciduous component will be assumed to grow on VDYP curves. The coniferous component will be assumed to grow on the TIPSY curve.

**Table 45: Regeneration Assumptions (Stands Harvested prior to 1995)**

| AU # | AU description | Existing managed area | Weighted SIBEC | Species % | Regen method [4] | Regen Density [3] |
|---|---|---|---|---|---|---|
| 1 | BL_all | 499 | 15.9 | Sw 100 | P 60 N 40 | 1300 |
| 2 | Bx_y | 1,163 | 13.7 | Sw 100 | P 60 N 40 | 1300 |
| 4 | Bl_s | 36 | 13.9 | Sw 100 | P45 N 55 | 1300 |
| 6 | Sw_ym | 1,178 | 18.5 | Sw 100 | P 60 N 40 | 1300 |
| 9 | Sc_yg | 7,472 | 16.9 | Sw 80 Pl 20 | P 20 N 80 | 1300 |
| 10 | Sc_ym | 28 | 15.1 | Sw 80 Pl 20 | P 50 N 50 | 1300 |
| 13 | Sd_g | 2,725 | 18.9 | Sw 53 At 47 | P 53 N 47 | 1300 |
| 14 | Sd_m | 254 | 20.2 | Sw 64 At 36 | P 64 N 36 | 1300 |
| 15 | Ss_g | 32 | 14.6 | Sw 100 | P45 N 55 | 1300 |
| 16 | Ss_m | 82 | 15.0 | Sw 100 | P45 N 55 | 1300 |
| 17 | Pc_yg | 3,908 | 17.7 | Pl 80 Sw 20 | P 20 N 80 | 1300 |
| 18 | Pc_ym | 689 | 16.0 | Pl 80 Sw 20 | P 50 N 50 | 1300 |
| 23 | Pl_g | 486 | 16.0 | Pl 100 | P 20 N 80 | 1300 |
| 24 | Pl_m | 68 | 15.5 | Pl 100 | P 50 N 50 | 1300 |
| 25 | Ac_g | 18 | 17.3 | At 70 Sw 17 Pl 13 | N 70 P 30 | 1300 |
| 26 | Ac_m | 0 | 16.4 | At 69 Sw 13 Pl 18 | N 89 P 31 | 1300 |
| 27 | Ad_g | 336 | 17.4 | At 100 | N 100 | 3000 |
| 29 | Ct_con | 62 | 16.9 | At 70 Sw 25 Pl 5 | N 70 P 30 | 1300 |
| 31 | LwStk_c | 188 | 18.0 | Sw60 Pl10 Ac30 | N100 | 550 |
| 32 | LwStk_d | 282 | 17.4 | At45 Ct30 Sw20 Pl 5 | N 100 | 700 |
| | | | | | | |

1 Proportions of deciduous in coniferous leading stands were obtained based upon the current percent species distribution.

2 Operational Adjustment Factors of 15% and 5% were applied to all managed stand yield tables when TIPSY was used.

3 Regeneration Density refers to TIPSY inputs only.

4 'Regen method' refers to the proportion of analysis unit area that is planting (P) versus natural (N). With the exception of AU27 all resultant yield tables are blended blend of the natural and planted proportions.

5

**Table 46: Regeneration Assumptions (Stands Harvested between 1995 and 2008)**

| AU# | AU Desc | Area (ha) | SIBEC | Species % | TIPSY Regen Density | Regen method | Regen Delay |
|---|---|---|---|---|---|---|---|
| 1 | BL_all | 105 | 13.1 | Bl 100 | 1600 | P 100 | 2 |
| 2 | Bx_y | 1,101 | 14.1 | Bl 100 | 1600 | P 100 | 2 |
| 3 | Bx_o | 57 | 9.7 | Bl 100 | 1600 | P 100 | 2 |
| 4 | Bl_s | 887 | 17.2 | Bl 100 | 1600 | P45 N55 | 0 |
| 5 | Sw_yg | 239 | 16.5 | Sw100 | 1600 | P 100 | 2 |
| 6 | Sw_ym | 3,319 | 17.2 | Sw100 | 1600 | P 100 | 2 |
| 7 | Sw_og | 255 | 14.0 | Sw100 | 1600 | P 100 | 2 |
| 8 | Sw_om | 38 | 9.2 | Sw100 | 1600 | P 100 | 2 |
| 9 | Sc_yg | 2,701 | 15.7 | Sw80 Pl20 | 1600 | P 100 | 2 |
| 10 | Sc_ym | 1,956 | 16.4 | Sw80 Pl20 | 1600 | P 100 | 2 |
| 11 | Sc_og | 314 | 13.7 | Sw80 Pl20 | 1600 | P 100 | 2 |
| 12 | Sc_om | 459 | 15.0 | Sw80 Pl20 | 1600 | P 100 | 2 |
| 13 | Sd_g | 603 | 17.8 | Sw65 At35 | 1600 | P 65 N 35 | 2 |
| 14 | Sd_m | 1,047 | 18.3 | Sw65 At35 | 1600 | P 65 N 35 | 2 |
| 15 | Ss_g | 1,179 | 14.8 | Sw 100 | 1600 | P45 N 55 | 0 |
| 16 | Ss_m | 768 | 14.2 | Sw 100 | 1600 | P45 N 55 | 0 |
| 17 | Pc_yg | 1,601 | 18.2 | Pl80 Sw20 | 1600 | P 100 | 2 |
| 18 | Pc_ym | 1,904 | 17.2 | Pl80 Sw20 | 1600 | P 100 | 2 |
| 19 | Pc_og | 192 | 16.4 | Pl80 Sw20 | 1600 | P 100 | 2 |
| 20 | Pc_om | 300 | 12.1 | Pl80 Sw20 | 1600 | P 100 | 2 |
| 21 | Pd_g | 391 | 15.9 | Pl65 At35 | 1600 | P 65 N 35 | 2 |
| 22 | Pd_m | 13 | 11.6 | Pl65 At35 | 1600 | P 65 N 35 | 2 |
| 23 | Pl_g | 1,332 | 16.9 | Pl100 | 1600 | P 100 | 2 |
| 24 | Pl_m | 1,247 | 14.2 | Pl100 | 1600 | P 100 | 2 |
| 25 | Ac_g | 185 | 17.8 | At70Sw17Pl13 | 1600 | N 70 P 30 | 2 |
| 26 | Ac_m | 705 | 17.4 | At70Sw17Pl13 | 1600 | N 70 P 30 | 2 |
| 27 | Ad_g | 1,144 | 17.6 | At100 | n/a | N 100 | 2 |
| 28 | Ad_m | 298 | 16.6 | At100 | n/a | N 100 | 2 |
| 29 | Ct_con | 673 | 17.4 | ACT73Sw17P10 | 1600 | N 73 P27 | 2 |
| 30 | Ct_dec | 152 | 18.0 | ACT100 | n/a | N 100 | 2 |
| 31 | LwSTK_c | 0 | 17.7 | Pl 55 Sw 45 | 1600 | P 100 | 2 |
| 32 | LwStk_d | 1 | 19.2 | At 55 Sw 45 | 1600 | N 55 P 45 | 2 |
| | | | | | | | |

Notes:

1. Operational Adjustment Factors (OAFs) of 15% and 5% were applied to TIPSY managed stand yield tables.
2. See footnotes under Table 45 for additional information
3. The SIBEC column indicates the area-weighted site index determined using the MOF's *Site Index Estimates by Site Series*, 2013 Approximation. This information was used in sensitivity analysis.

Table 47: Regeneration Assumptions (Stands Harvested after 2008)

| AU# | AU_decip | Area_ha | SIBEC | Species | Density | Regen Planted | Regen Delay | Sx/Sw Genetic Gain (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | BL_all | 17,204 | 13.7 | Bl 100 | 1600 | P 100 | 2 | n/a |
| 2 | Bx_y | 10,235 | 13.2 | Bl 100 | 1600 | P 100 | 2 | n/a |
| 3 | Bx_o | 8,479 | 14.0 | Bl 100 | 1600 | P 100 | 2 | n/a |
| 4 | Bl_s | 0 | 15.6 | Bl 100 | 1600 | P45 N55 | 0 | n/a |
| 5 | Sw_yg | 7,146 | 17.9 | Sw100 | 1600 | P 100 | 2 | 11.4 |
| 6 | Sw_ym | 737 | 16.1 | Sw100 | 1600 | P 100 | 2 | 11.4 |
| 7 | Sw_og | 4,950 | 18.1 | Sw100 | 1600 | P 100 | 2 | 11.4 |
| 8 | Sw_om | 2,660 | 16.5 | Sw100 | 1600 | P 100 | 2 | 11.4 |
| 9 | Sc_yg | 26,604 | 16.8 | Sw80 Pl20 | 1600 | P 100 | 2 | 11.4 |
| 10 | Sc_ym | 8,228 | 15.3 | Sw80 Pl20 | 1600 | P 100 | 2 | 11.4 |
| 11 | Sc_og | 11,179 | 17.2 | Sw80 Pl20 | 1600 | P 100 | 2 | 11.4 |
| 12 | Sc_om | 22,014 | 15.4 | Sw80 Pl20 | 1600 | P 100 | 2 | 11.4 |
| 13 | Sd_g | 10,282 | 19.2 | Sw65 At35 | 1600 | P65 N35 | 2 | 11.4 |
| 14 | Sd_m | 4,148 | 18.0 | Sw65 At35 | 1600 | P65 N35 | 2 | 11.4 |
| 15 | Ss_g | 6,686 | 14.5 | Sw 100 | 1600 | P45 N55 | 0 | 11.4 |
| 16 | Ss_m | 11,747 | 14.5 | Sw 100 | 1600 | P45 N55 | 0 | 11.4 |
| 17 | Pc_yg | 14,592 | 16.8 | Pl80 Sw20 | 1600 | P 100 | 2 | 11.4 |
| 18 | Pc_ym | 31,033 | 15.8 | Pl80 Sw20 | 1600 | P 100 | 2 | 11.4 |
| 19 | Pc_og | 4,688 | 17.0 | Pl80 Sw20 | 1600 | P 100 | 2 | 11.4 |
| 20 | Pc_om | 8,909 | 15.8 | Pl80 Sw20 | 1600 | P 100 | 2 | 11.4 |
| 21 | Pd_g | 10,752 | 17.0 | Pl65 At35 | 1600 | P65 N35 | 2 | n/a |
| 22 | Pd_m | 1,970 | 16.8 | Pl65 At35 | 1600 | P65 N35 | 2 | n/a |
| 23 | Pl_g | 13,176 | 16.2 | Pl100 | 1600 | P 100 | 2 | n/a |
| 24 | Pl_m | 25,393 | 15.5 | Pl100 | 1600 | P 100 | 2 | n/a |
| 25 | Ac_g | 6,918 | 16.7 | At70Sw17Pl13 | 1600 | N70 P30 | 2 | 11.4 |
| 26 | Ac_m | 2,897 | 16.3 | At70Sw17Pl13 | 1600 | N70 P30 | 2 | 11.4 |
| 27 | Ad_g | 19,825 | 16.4 | At100 | n/a | N 100 | 2 | n/a |
| 28 | Ad_m | 2,135 | 16.4 | At100 | n/a | N 100 | 2 | n/a |
| 29 | Ct_con | 3,478 | 16.4 | Ct73Sw17P10 | 1600 | N73 P27 | 2 | 11.4 |
| 30 | Ct_dec | 8,246 | 16.5 | Ct100 | n/a | N 100 | 2 | n/a |
| | | | | | | | | |

Notes:

1. Operational Adjustment Factors (OAFs) of 15% and 5% were applied to TIPSY managed stand yield tables See footnotes under Table 45 for additional information
2. The SIBEC column indicates the area-weighted site index determined using the MOF's *Site Index Estimates by Site Series*, 2013 Approximation.

## 5.8 Silviculture History

### 5.8.1 Current NSR and Low Stocking Sites

Low stocking sites were previously considered backlog NSR that had been logged prior to 1987- there are 709ha of this modeled in the analysis. All other NSR is current NSR- created from harvesting operations. It is treated under silviculture prescriptions. The regeneration delay of 2 years or less keeps the amount of current NSR relatively small. An area of 6,292ha has been harvested from 2011.

# 6.0 SENSITIVITY ANALYSIS

Sensitivity analysis provides information on the degree to which uncertainty in the base case data and assumptions might affect the proposed harvest level for the TFL. The magnitude of the change in the sensitivity variable(s) reflects the degree of risk associated with a particular uncertainty – a very uncertain variable that has minimal impact on the harvest forecast represents a low risk. By developing and testing a number of sensitivity issues, it is possible to determine which variables most affect results and to provide information to guide management decisions in consideration of uncertainty.

Each of the sensitivities shown in Table 48 test the impact of a specific variable with impacts measured relative to the base case harvest forecast. The list of sensitivities may be amended as the analysis is completed and other issues arise.

**Table 48: Sensitivity Analyses**

| Sensitivity | Range Tested |
|---|---|
| Alternative Harvest Flows | Assess the impacts of various levels of MPB salvage on mid and long-term timber supply |
| Mountain Pine Beetle | Regeneration assumptions |
| Shelf Life | Assess the impacts of changing the shelf life of MPB killed stands from 5 to 10 years. |
| VLI | Assess the impacts of applying RVQC objectives in addition to the EVQOs currently applied in the base case. |
| Old Seral Management | Utilize NDU seral stage targets |
| Peak Flow Index | Examine impacts of applying watershed PFI constraints as per SFMP. |

## 6.1 Old Seral Management

Work completed within the Prince George Forest Region by the Regional Ecologist has seen the establishment of natural disturbance units (NDU). NDUs were developed through a scientific process to replace the Provincial identification of Natural Disturbance Types, as defined by the Forest Practices Code Act Biodiversity Guidebook. The rationale to support NDUs is documented by the Ministry of Forests Northern Interior Forest Region office. Further information is also provided in the Section 3.3 of SFMP4, where a detailed discussion occurs around late seral Forest Indicators and the targets.

The base case will utilize the old seral targets defined by the Provincial Non-Spatial Old Growth Order. This sensitivity will utilize NDU-based seral stage constraints using the minimum natural range of variation for stands greater than 140 years of age (100 years for deciduous in the Boreal Plains and Boreal Foothills - Valley). Table 49 describes the area within each NDU zone and

subzone as well as the minimum NRV target applied to each of these areas as a percent and in equivalent area.

**Table 49: Natural Disturbance Units – Natural Range of Variation**

| NDU | Total Forest Area (ha) | NRV % Target |
|---|---|---|
| Boreal Foothills – Mountain | 177,669 | 33 |
| Boreal Foothills – Valley - Conifer | 67,962 | 23 |
| Boreal Foothills – Valley – Decid. | 43,760 | 10 |
| Omineca – Mountain | 125,030 | 58 |
| Omineca – Valley | 39,619 | 23 |
| Wet Mountain | 13,195 | 84 |
| Boreal Plains - Upland – Conifer | 6,198 | 17 |
| Boreal Plains - Upland – Decid. | 92,960 | 10 |
| **Total Area (ha)** | **566,393** | |

Due to the large size of NDUs and the desire that there is some representation of old growth by BEC, the constraints identified in Table 49 have been expanded to include NDU/BEC combinations. Table 50 identifies the proportion of forest area designated as old growth (above 140 years for conifer and 100 years for deciduous) that will be applied to each NDU/BEC across the TFL.

Note that portions of Parks that are within the TFL have been excluded from the timber harvesting land base, but are retained in the model as these areas contribute to biodiversity and seral stage targets. These areas were identified in Table 15.

**Table 50 NDU/BEC old growth constraints**

| Natural Disturbance Unit | BEC | Late Seral Target | Forest Area (ha) |
|---|---|---|---|
| Boreal Plains - Deciduous | BWBSmw1 | 10% | 39,028 |
| | BWBSwk1 | 10% | 4,217 |
| | ESSFmv2 | 10% | 510 |
| | SBSwk2 | N/A | 41 |
| Boreal Plains Deciduous - Total | | 10% | |
| Boreal Foothills – Valley - Deciduous | BWBSmw1 | 10% | 23,129 |
| | BWBSwk1 | 10% | 1,606 |
| | BWBSwk2 | 10% | 5,082 |
| | SBSwk2 | 10% | 9,866 |
| Boreal Foothills – Valley - Deciduous - Total | | 10% | |
| Boreal Plains - Conifer | BWBSmw1 | 5% | 31,425 |
| | BWBSwk1 | 5% | 23,531 |
| | ESSFmv2 | 5% | 12,959 |
| | SBSwk2 | N/A | 202 |
| Boreal Plains – Conifer - Total | | 17% | |
| Boreal Foothills – Valley - Conifer | BWBSmw1 | 7% | 30,912 |
| | BWBSwk1 | 7% | 5,294 |
| | BWBSwk2 | 7% | 7,438 |
| | SBSwk2 | 7% | 81,537 |
| Boreal Foothills – Valley – Conifer - Total | | 23% | |
| Boreal Foothills – Mountain | ESSFmv2 | 10% | 106,082 |
| | ESSFmv4 | 10% | 11,756 |
| | ESSFwc3 | 10% | 24,543 |
| | ESSFwk2 | 10% | 26,406 |
| Boreal Foothills – Mountain - Total | | 33% | |
| Omineca Valley | BWBSmw1 | N/A | 31 |
| | SBSwk2 | 7% | 6,179 |
| Omineca Valley - Total | | 23% | |
| Omineca Mountain | ESSFmv2 | 17% | 13,188 |
| Omineca Mountain - Total | | 58% | |
| Wet Mountain | ESSFmv2 | 25% | 16,256 |
| | ESSFwc3 | 25% | 32,389 |
| | ESSFwk2 | 25% | 26,163 |
| | SBSwk2 | 25% | 11,558 |
| Wet Mountain- Total | | 84% | |

## 6.2 Peak Flow Index

Canfor, under its SFMP has committed to maintaining water quality and quantity by ensuring that at least 95% of all watersheds within the TFL are below baseline threshold values. Peak flow index (PFI) is a measure of the proportion of a watershed that has not yet achieved hydrological green-up, placing a higher weight on disturbances occurring at higher elevations (above the H60 line) and represents an indicator of how this objective is being achieved.

Equivalent clear-cut area (ECA) is calculated using the area harvested within a watershed multiplied by the hydrological recovery of each stand. As stand height increases, hydrological recovery increases with full recovery achieved once the stand reaches 12 meters in height as shown in Table 51. Area above the H60 line[3] contributes 1.5 times the area to the ECA calculation. Peak flow index (PFI) is a measure of the ratio of ECA to total watershed area. PFI

[3] *The elevation line above which 60% of the watershed area exists.*

threshold values are shown in Table 52 and will be enforced as targets in the model in a sensitivity analysis scenario.

**Table 51: Hydrological Recovery**

| Stand Height (m) | Hydrological Recovery (%) |
|---|---|
| <3 | 0 |
| 3 to < 5 | 25 |
| 5 to < 7 | 50 |
| 7 to < 9 | 75 |
| 9 to < 12 | 90 |
| 12 + | 100 |

**Table 52: Peak Flow Index Maximum Threshold Values**

| Watershed Name | PFI (%) | Total Forest (ha) | NCLB (ha) | THLB (ha) |
|---|---|---|---|---|
| Adams Creek | 43 | 5,335 | 2,077 | 3,257 |
| Aylard Creek | 37 | 5,071 | 2,297 | 2,774 |
| Basin 862 | 43 | 1,998 | 264 | 1,735 |
| Beany Creek | 37 | 3,351 | 1,178 | 2,173 |
| Brazion Creek | 37 | 27,709 | 9,236 | 18,473 |
| Burnt Creek | 37 | 49,155 | 19,133 | 30,022 |
| Cameron Creek | 50 | 2,623 | 661 | 1,962 |
| Cameron Lakes | 30 | 5,513 | 1,160 | 4,354 |
| CarbonInlet | 30 | 7,577 | 2,021 | 5,557 |
| Dunlevy Creek | 31 | 15,580 | 7,328 | 8,252 |
| ElevenMile | 43 | 17,835 | 9,724 | 8,112 |
| Gaylard | 31 | 14,771 | 4,033 | 10,738 |
| Gething | 31 | 17,175 | 5,381 | 11,794 |
| Gwillim | 43 | 5,099 | 1,437 | 3,663 |
| Hasler Creek | 37 | 18,199 | 4,855 | 13,344 |
| Highat Creek | 43 | 14,706 | 3,693 | 11,014 |
| Johnson | 37 | 11,128 | 2,306 | 8,822 |
| Lebleu Creek | 50 | 1,908 | 601 | 1,307 |
| LeMoray Creek | 37 | 9,371 | 5,141 | 4,230 |
| Lower Carbon | 50 | 10,752 | 3,220 | 7,532 |
| Lower Murray | 37 | 15,775 | 4,404 | 11,371 |
| Lower Peace Reach | 50 | 13,025 | 3,350 | 9,675 |
| Lower Pine Residual | 43 | 15,269 | 3,176 | 12,094 |
| Lower Sukunka | 43 | 47,355 | 13,794 | 33,561 |
| Lower Wolverine | 37 | 19,921 | 8,288 | 11,633 |
| Medicine Woman Creek | 35 | 4,320 | 1,039 | 3,281 |
| Middle Wolverine | 43 | 14,169 | 7,634 | 6,535 |
| North Peace Residual | 50 | 8,645 | 6,949 | 1,695 |
| Ruddy Creek | 31 | 5,348 | 2,032 | 3,316 |
| Seven Mile | 43 | 6,697 | 2,560 | 4,137 |

| Watershed Name | PFI (%) | Total Forest (ha) | NCLB (ha) | THLB (ha) |
|---|---|---|---|---|
| Trapper Creek | 37 | 6,387 | 2,602 | 3,784 |
| Uppe rCarbon | 37 | 38,575 | 20,022 | 18,554 |
| Upper Murray | 37 | 13,854 | 5,600 | 8,254 |
| Upper Pine Residual | 37 | 36,377 | 14,237 | 22,140 |
| Upper Sukunka | 43 | 21,901 | 7,263 | 14,637 |
| Upper Wolverine | 37 | 13,209 | 6,673 | 6,537 |
| Watershed_1 | 30 | 3,797 | 516 | 3,281 |
| Watershed_2 | 30 | 1,577 | 338 | 1,238 |
| Watershed_3 | 30 | 5,576 | 1,526 | 4,050 |
| Watershed_4 | 30 | 8,504 | 3,502 | 5,003 |
| Watershed_5 | 30 | 14,918 | 4,035 | 10,882 |
| Watershed_6 | 30 | 1,613 | 390 | 1,223 |
| Watershed_7 | 30 | 3,945 | 489 | 3,457 |
| Total | | 565,613 | 206,163 | 359,449 |

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