Tree Farm License #30

Management Plan #11

Canadian Forest Products Ltd.

Authorized Licensee Signature: ______________________________

Reviewed By: ______________________________

Prepared By: ______________________________

Seal

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Dated: June 27, 2024

Presented to:

Ministry of Forest

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Version	Date	Prepared By	Reviewed By	Notes/Revisions
1	June 27, 2024	Terry Lazaruk		
2				

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1. Introduction

This Management Plan (MP) has been prepared for Tree Farm Licence 30 (TFL 30) to meet the requirements of the *Tree Farm Licence Management Plan Regulation* (B.C. Reg. 280/2009). This regulation, enacted by the provincial government in November 2009 (with associated amendments to the *Forest Act*), includes content requirements, submission timing and public review requirements for TFL Management Plans. The regulation has replaced the content requirements specified in past TFL agreements.

This MP and the associated timber supply analysis will provide the necessary information to the Chief Forester of BC for the determination of the next Allowable Annual Cut (AAC) for TFL 30.

1.1 Land Base Description

TFL 30 is located northeast of Prince George in the Prince George Forest District (Figure 1). The TFL stretches from its western boundary near Summit Lake on Highway 97, eastward across the western foothills of the Rocky Mountains to slightly northeast of Sinclair Mills. The total land base for TFL 30 is 180,347 hectares, with a productive forest land base of 154,983 hectares or about 86% of the total area. Forests in the area consist of spruce, balsam, lodgepole pine, Douglas-fir, cedar, hemlock and deciduous species.

Annual precipitation levels have ranged from 415 to 1650 mm, 25 – 50% of which is snow. The climate is characterized by seasonal extremes of temperature, severe, snowy winters and relatively warm, moist and short summers.

TFL 30 is predominantly in the traditional territory of the Lheidli T'enneh First Nation. TFL 30 also overlaps to a lesser degree the traditional territories of the following First Nations:

- McLeod Lake Indian Band
- West Moberly First Nation

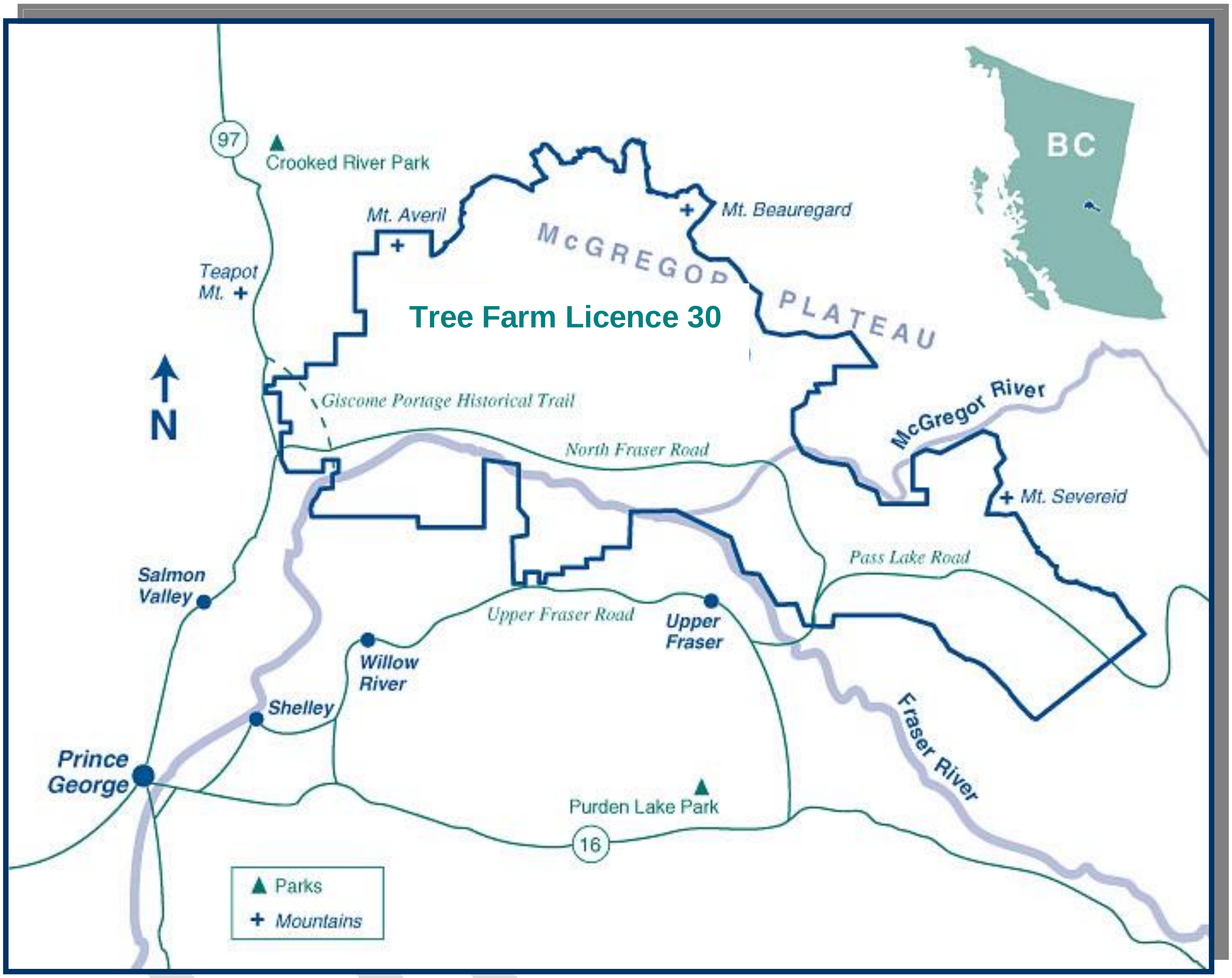

Figure 1.1 Location of Tenure

1.2 TFL30 History

Tree Farm licence 30 is an amalgamation of five smaller TFL's that were originally granted in 1959 to the following companies:

- TFL 28: Shelley Development Ltd.
- TFL 29: Eagle Lake Sawmills Ltd.
- TFL 30: Sinclair Spruce Lumber Co. Ltd.
- TFL 31: Upper Fraser Spruce Mills Ltd.
- TFL 34: Church Sawmill Ltd.

Subsequent corporate acquisitions during the 1960's resulted in combining these TFL's into the present-day TFL 30. The chronology of events was:

- **1960:** Midway Terminals (later National Forest Products) purchased Sinclair Spruce Lumber Co. Ltd. and Upper Fraser Spruce Mills Ltd.
- **1961:** Noranda Mines Ltd. purchased Sinclair and Upper Fraser in addition to other National Forest Products' holdings in southern British Columbia and formed a new company called Northwood Mills Ltd.
- **1963:** Eagle Lake Sawmills Ltd. purchased Shelly Development Ltd.
- **1964:** Northwood Mills combined with Mead Corporation of Dayton Ohio to construct a new pulpmill at Prince George. The name of the new company was changed to Northwood Pulp Limited.
- **1964:** Northwood purchased Church Sawmills Ltd.
- **1966:** Northwood purchased Eagle Lake Sawmills Ltd.

The schedule by which the individual Tree Farm Licences were amalgamated into TFL 30 varied only slightly from the corporate acquisitions. In 1965 TFL's 30, 31 and 34 were consolidated, and in 1967 TFL's 28, 29, and 30 were further consolidated into the present-day TFL 30.

During 1998 Northwood Pulp and Timber Ltd. changed its name to Northwood Inc.

During 1999, Canadian Forest Products Ltd. purchased Northwood Inc. There were no changes to the administrative boundaries of TFL 30 as a result of this acquisition.

The AAC for TFL30 has changed as noted below:

Table 1.1: TFL30 AAC History

Managaement Plan	Determination Date	AAC (m^3/yr)
1	1959 (TFL Amalgamations)	30,384
2	1965 (TFL Amalgamations)	104,773
2	1967 (New Inventory)	212,378
3	1969 (Conversion to Close Utilization)	261,932
3	1970 (TFL Amalgamations)	369,436
3	1972 (TFL Amalgamations)	421,921
4	1976 (New Inventory)	440,950
5	1981 (Revised Land Base Classification)	437,400
6	1986	428,000
7	1991	407,000
8	October 1, 1996	350,000
9	July 1, 2003	330,000
9	August 4, 2006 (MPB focused temporary reduction as per Canfor Request)	201,312
9	December 31, 2008 (Temporary Reduction Expired)	330,000
10	February 6, 2014	412,500

1.3 Major TFL Boundary Changes

Since the last TSR, there have been no modifications to the TFL Landbase boundary.

It should be noted that there is a 'Notation of Interest' area that has been identified within the TFL (located between Summit Lake and the Giscome portage Trail), but no definitive action on this area has taken place to date. Should advancements on this area take place prior to the next TSR, this area will be addressed at that time.

2. TFL30 Planning Documents

Table 2.1: List of Planning Documents that Impact/Influence TFL30 Management Practices

Plan Type	Plan Title	Description	Web Link (as of date)
SFMP	SFI – SFMS Sustainable Forest Management System	This Sustainable Forest Management System (SFMS) document describes how Canfor will meet the objectives of the 2015-2019 SUSTAINABLE FORESTRY INITIATIVE® (SFI®) Forest Management and Fibre Sourcing Standards on those Canfor Divisions certified to the SFI standards.	Western Canadian Woodlands Group SFI (2019)
FSP	Forest Stewardship Plan	A Forest Stewardship Plan shows areas on a map where a forest licensee may carry out forest development activities over a period of up to five years. The areas included in the FSP are called Forest Development Units. The plan also states the results, strategies or measures that the forest licensee will achieve in order to be consistent with government objectives for forest values.	N/A
LRMP	Prince George Land and Resource Management Plan	The Prince George Land and Resource Management Plan (LRMP) is a long-term plan for land use and resource development on Crown land within the Prince George Forest District. This plan is based on the principles of integrated resource management and sustainability.	Prince George LRMP (as of March 28, 2018)

3. Public Involvement

3.1 Opportunities for Public Involvement

Information Package:

- Letters: sent out April 20, 2023 (closed June 20, 2023)
- Newspaper (PG Citizen): Two runs (April 20, May 18, 2023)
- Posted online: http://www.canfor.com/responsibility/environmental/plans

Management Plan and Analysis Report

- Letters: sent out Sept 03, 2024 (closed November 08, 2024)
- Newspaper (PG Citizen): Two runs (Sept 05, October 10, 2024) TBD
- Posted online: http://www.canfor.com/responsibility/environmental/plans

3.2 Opportunities for First Nation Involvement

Information Package:

- Letters: sent out April 20, 2023 (closed June 20, 2023)
- Newspaper (PG Citizen): Two runs (April 20, May 18, 2023)
- Posted online: http://www.canfor.com/responsibility/environmental/plans
- Canfor and Lheidli T'enneh Stewardship Working Group meetings (Add dates)

Management Plan and Analysis Report

- Letters: sent out Sept 03, 2024 (closed November 08, 2024) TBD
- Newspaper (PG Citizen): Two runs (Sept 05, October 10, 2024) TBD
- Posted online: http://www.canfor.com/responsibility/environmental/plans
- Canfor and Lheidli T'enneh Stewardship Working Group meetings

Meeting Date	Agenda Items pertaining to TFL30 TSR
May 4/June 8, 2023	Key LTFN values
July 19, 2023	Key LTFN values, Pest management/Herbicide use, Moose habitat
August 30, 2023	Pest management/Herbicide use, Moose habitat
October 5/November 16, 2023	Pest management/Herbicide use, Moose habitat
December 21, 2023	Pest management/Herbicide use, Moose Habitat, Riparian strategies
January 26, 2024	Deciduous Stacking standards, Moose strategies
February 27, 2024	Moose BMP's, TFL30 TSR process update
March 25, 2024	Moose BMP's, Riparian strategies, TFL30 TSR process update

Meeting Date	Agenda Items pertaining to TFL30 TSR
April 26, 2024	Riparian strategies, TFL30 TSR process update
May 21, 2024	TFL30 TSR process update (Analysis Report)
June 24, 2024	Moose BMP review, Beaver management practices, TFL30 TSR process update (Analysis Report)
Meetings will continue monthly	

3.3 Summary of Comments

Phase	Comment	Response	Action
Information Package	Modelling for Moose Habitat	Canfor will incorporate a sensitivity into the Analysis Report to assess newly created/Draft moose habitat BMP's	In Progress – Draft BMP's are near completion as part of Lheidli Stewardship Working Group

4. Appendices

4.1 Appendix A – Data Package

Tree Farm License 30 – Management Plan 11 Timber Supply Analysis Information Package

Prepared by: **Canadian Forest Products Ltd**

&

Ecora Engineering and Environmental Ltd.

Dated: August 20, 2024

Ecora Project No.: 213105

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Version Control and Revision History

Version	Date	Prepared By	Reviewed By	Notes/Revisions
1	18 November 2022	Grace Zheng, FIT Valentina Coy, FIT		
2	17 February, 2023	Grace Zheng, FIT Luiz Terezan, FIT	David Coster, RPF / Terry Lazaruk, RPF	Initial Draft Reviewed by Client
3	27 February, 2023	Grace Zheng, FIT Luiz Terezan, FIT		Added additional details and addressed comments
4	26 February, 2023	Grace Zheng, FIT	Jay Greenfield, RPF	Revised silvicultural era, MSYT section and analyzed genetic gain
5	8 March, 2023	Grace Zheng, FIT	Terry Lazaruk, RPF	Inserted maps, updated numbers, revised watershed section, added genetic gain implementation method
6	22 March, 2023	Grace Zheng, FIT		Changed deciduous leading stands to non-commercial stands. Private land assumption changed. Incorporated Terry's Edits
7	22-31 August 2023	David Coster, RPF Sam Anderson, FIT	David Coster, RPF Terry Lazaruk, RPF	Edits based on FAIB comments

Version	Date	Prepared By	Reviewed By	Notes/Revisions
8	1 September 2023	David Coster, RPF		Version sent to FAIB
9	21 September 2023	Grace Zheng, FIT	Terry Lazaruk, RPF	Revised Growth and Yield Section specific to MSYT
10	1 December 2023	Grace Zheng, RPF	Terry Lazaruk, RPF	Revised Section 3, 4 and 5
11	8 January 2024	Grace Zheng, RPF	Terry Lazaruk, RPF	Added isolated patch
12	18 June 2024	Grace Zheng, RPF		Revise Riparian Buffer Width for L1B Lake Classes and associated Netdown tables. Revised natural disturbance section
13	20 August 2024	Grace Zheng, RPF		Revised UWR section

Limitations of Report

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Acronyms and Abbreviations

AAC	Allowable Annual Cut
AOS	Aerial Overview Survey
AU	Analysis Unit
BAFA	Boreal altai fescue alpine
BCGW	British Columbia Geographic Warehouse
BCLCS	British Columbia Land Classification Scheme
BEC	Biogeoclimatic Ecosystem Classification
Canfor	Canadian Forest Products Ltd.
CMAI	Culmination Mean Annual Increment
CMI	Change Monitoring Inventory
DBH	Diameter at Breast Height
DEM	Digital Elevation Model
DIB	Diameter Inside Bark
ECA	Equivalent Clear-cut Area
Ecora	Ecora Engineering & Resource Group Ltd.
ESSF	Engelmann Spruce Sub-Alpine Fir
EVQO	Effective Visual Quality Objectives
FAIB	Forest Analysis and Inventory Branch
FMLB	Forest Management Land Base
FN	First Nation
FOR	British Columbia Ministry of Forests
FPPR	Forest Planning and Practices Regulation
FRPA	Forest and Range Practices Act
FSP	Forest Stewardship Plan
FSW	Fisheries Sensitive Watershed
FWA	Fresh Water Atlas
GAR	Government Action Regulation
GIS	Geographic Information System
GLB	Gross Land Base
GWM	General Wildlife Measures
ha	Hectares
HEDA	Hydrological Equivalent Disturbed Area
IBS	Spruce Bark Beetle
ICH	Interior Cedar Hemlock
ITI	Individual Tree Inventory
MAI	Mean Annual Increment
LiDAR	Light Detection and Ranging
LHLB	Legally Harvestable Land Base
LRMP	Land and Resource Management Plan
LU	Landscape Unit
MFLNRORD	Ministry of Forests, Lands and Natural Resource Operations and Rural Development
MHA	Minimum Harvest Age
MHV	Minimum Harvest Volume
MOE	British Columbia Ministry of Environment
MP	Management Plan
MPB	Mountain Pine Beetle
MSYT	Managed Stand Yield Tables
NDT	Natural Disturbance Type
NRL	Non-Recoverable Losses
NSR	Not Satisfactorily Restocked
NSYT	Natural Stand Yield Tables
OAF	Operational Adjustment Factor
OGMA	Old Growth Management Area
PFT	Problem Forest Type
PG	Prince George
PSP	Permanent Sample Plots
PSPL	Provincial Site Productivity Layer
P2P	Perspective to Plan
REA	Recreational Emphasis Areas

RESULTS	Reporting Silviculture Updates and Land Status Tracking System
RMA	Riparian Management Area
RMZ	Resource Management Zone
RRZ	Riparian Reserve Zone
SBS	Sub Boreal Spruce
SI	Site Index
SFI	Sustainable Forestry Initiative
SFM	Sustainable Forest Management
SRMP	Sustainable Resource Management Plan
TADAM	TASS Approximation by a Dynamical Aggregated Model
TASS	Tree and Stand Simulator
TEM	Terrestrial Ecosystem Mapping
TFL	Tree Farm Licence
THLB	Timber Harvesting Land Base
TIPSY	Table Interpolation Program for Stand Yields
TSA	Timber Supply Area
TSR	Timber Supply Review
UWR	Ungulate Winter Range
VAC	Visual Absorption Capacity
VDYP	Variable Density Yield Prediction Growth and Yield Model
VEG	Visually Effective Green-up
VLI	Visuals Landscape Inventory
VPH	Volume per Hectare
VQO	Visual Quality Objectives
VRI	Vegetation Resources Inventory
WTP	Wildlife Tree Patch

1. Introduction

The Tree Farm Licence (TFL) #30 timber supply analysis in support of Management Plan (MP) #10 was completed in 2012, followed by the allowable annual cut (AAC) determination effective February 6th, 2014, in which the AAC was set at 412,500 m^3/year.

Canadian Forest Products Ltd. (Canfor) has initiated a timber supply analysis in support of MP #11 and this document has been prepared to describe the data and assumptions to be used in the timber supply analysis for TFL 30 that are relevant in determining a sustainable harvest level. The information and management assumptions represent current legal requirements and best practice for the tenure and are defined by:

- Current land base information for land ownership, topography, forest inventories, riparian network, etc.;
- Current forest management regime — the productive forest land available for timber harvesting, the silviculture treatments, the harvesting systems, and the integrated resource management practices on the area;
- Land and Resource Management Plan (LRMP) and other higher-level plans that were approved by Cabinet and guides resource management activities;
- Other legal objectives established under the Forest and Range Practices Act (e.g., visual quality objectives, ungulate winter ranges);
- Sustainable Forest Initiative (SFI) Certification standards, and
- Determination implementation instructions for MP #10 where Canfor assessed wildlife tree patches (WTPs) established in the timber harvesting land base over the past 10 years. As a result, WTP removals on the timber harvesting land base have changed from 0% to the current 1.3% for MP #11. In terms of operational adjustment factors (OAFs) Canfor will use standard OAFs in the unadjusted managed stands. OAFs are irrelevant in adjusted managed stands.

1.1 Land Base Description

TFL 30 is held by Canfor and is administered by the British Columbia Ministry of Forests (FOR), Prince George Natural Resource District office located in Prince George. The TFL is situated about 50 kilometers northeast of the City of Prince George and covers a total area of 180,347 hectares (ha). The location of the tenure is illustrated in Figure 1-1.

The TFL is in the western foothills of the Rocky Mountains and experiences heavy snowfall through the winter and substantial summer rain. It is dominated by the very wet and wet-cool variants of the Sub Boreal Spruce (SBS) biogeoclimatic (BEC) zones. Minor components of Interior Cedar Hemlock (ICH) and Engelmann Spruce Sub-Alpine Fir (ESSF) BEC zones also exist. The most common tree species in the TFL include spruce, and subalpine fir. Other coniferous tree species in the TFL include lodgepole pine, Douglas-fir, western redcedar, and western hemlock. Deciduous species include trembling aspen, paper birch, and black cottonwood.

There are three First Nations traditional territories that overlap with TFL 30, they are the Lheidli T'enneh First Nation, McLeod Lake Indian Band, and West Moberly First Nations.

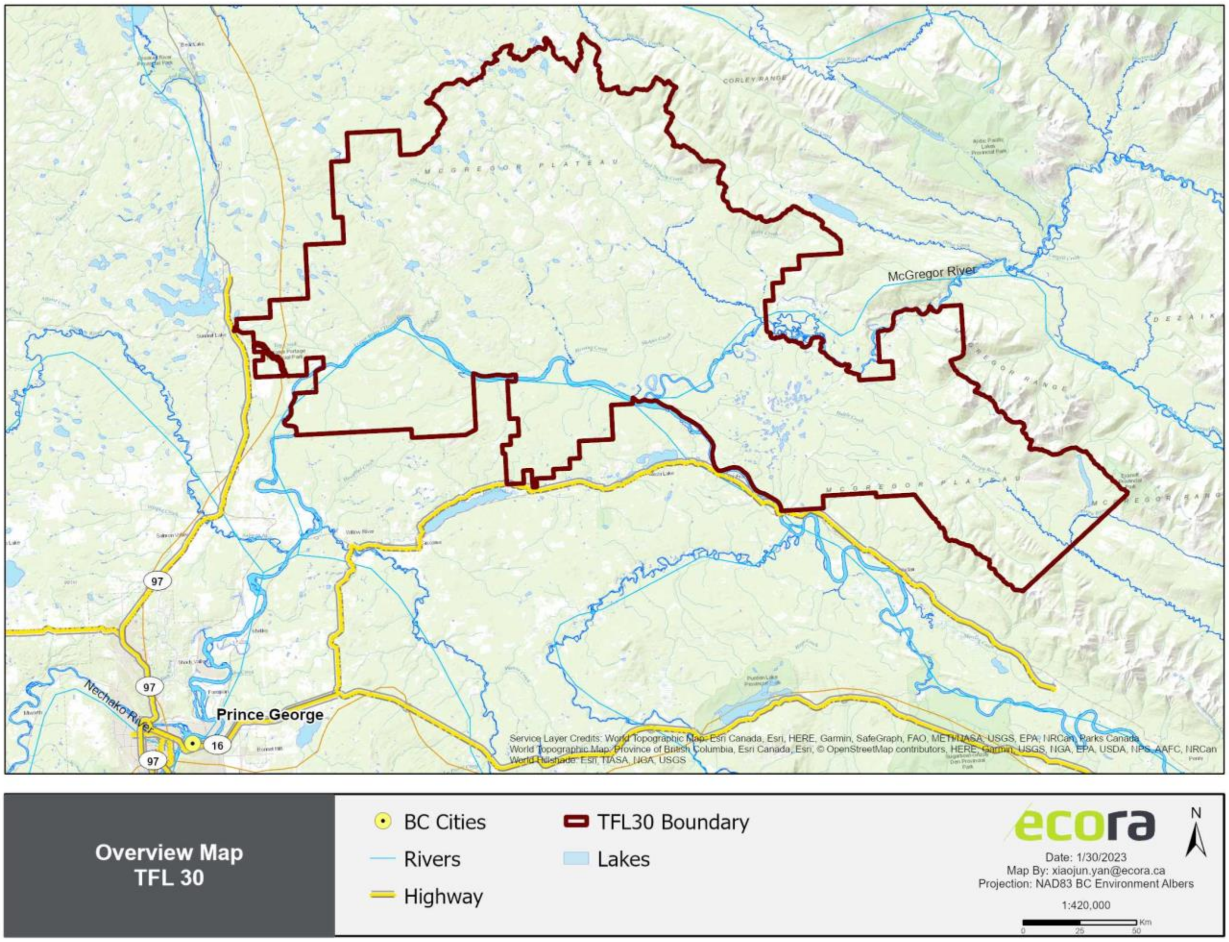

Figure 1-1 Location of Tenure

1.2 Annual Allowable Cut

The AAC for TFL 30 was initially determined on July 1st, 2003, and it was set at 330,000 m³/year. On March 16th, 2006, the Chief Forester reduced the AAC available to the licence holder to 201,312 m³/year under Section 61 of the Forest Act for the period of January 1st, 2003, to December 31st, 2008. This reduction was requested by Canfor to deal with mountain pine beetle-killed timber. After the temporary reduction expired, the AAC remained at 330,000 m³/year. The second determination was effective on February 6th, 2014, the AAC was set at 412,500 m³/year based on MP #10. This AAC will remain in effect until a new AAC is determined by February 6th, 2024.

2. Data Sources and Inventories

Spatial data sets that describe the TFL 30 land base (Table 2-1) have been overlayed into a single resultant file. The resultant is used to compile the forest estate model input files that are needed for the timber supply analysis.

2.1 Spatial Data Input

Table 2-1: List of Data Sources Used

Layer Name	Source	Date	Source Data Name
Accumulative Aerial Overview Survey	BCGW[1]	2021	AOS_2021_polygon
BC Archaeology sites	Canfor	2023	arch_1
Biogeoclimatic Ecosystem Classification (BEC)	BCGW	2021	BEC_V12
Boundary of TFL 30	BCGW	2022	WHSE_ADMIN_BOUNDARIES_FADM_TFL
Fisheries Sensitive Watersheds	BCGW	2022	WHSE_WILDLIFE_MANAGEMENT_WCP_FISH_SENSITIVE_WS_POLY
FSP Lakeshore Management	Canfor	2022	Hydrology_Poly_clip
Individual Tree Inventory (ITI)	Forsite[2]	2018	ITI
Landscape Unit	BCGW	2022	WHSE_LAND_USE_PLANNING_RMP_LANDSCAPE_UNIT_SVW
Licensee / Operating Areas	Canfor	2018	Licensee_Operating_Area
LRMP Legal	BCGW	2022	WHSE_LAND_USE_PLANNING_RMP_STRGC_LAND_RSRCE_PLAN_SVW
Natural Disturbance Type	BCGW	2022	WHSE_FOREST_VEGETATION_BEC_NATURAL_DISTURBANCE_SV
New Canfor Blocks	Canfor	2022	cfp_blks_2022_1
Forest Tenure Ownerships	BCGW	2022	WHSE_FOREST_VEGETATION_F_OWN
Planning Cells	Canfor	2018	pcell
Recreational Areas	BCGW	2022	WHSE_FOREST_TENURE_FTEN_RECREATION_POLY_SVW
Recreational Sites	BCGW	2022	WHSE_FOREST_TENURE_ FTEN_REC_SITE_POINTS_SVW
Recreational Trails	BCGW	2022	WHSE_FOREST_TENURE_FTEN_RECREATION_LINES_SVW
RESULTS Openings	BCGW	2023	WHSE_FOREST_VEGETATION_RSLT_OPENING_SVW
RESULTS Forest Cover Inventory	BCGW	2023	WHSE_FOREST_VEGETATION.RSLT_FOREST_COVER_INV_SVW
RESULTS Forest Cover Silviculture	BCGW	2023	WHSE_FOREST_VEGETATION.RSLT_FOREST_COVER_SILV_SVW
RESULTS Standard Unit	BCGW	2023	WHSE_FOREST_VEGETATION.RSLT_STANDARDS_UNIT_SVW
Riparian (Lakes and Wetlands)	Canfor	2017	Lakes_streams
	BCGW	2021	FWA_WETLANDS_POLY, FWA_LAKES_POLY
Riparian (Rivers and Streams)	Canfor	2020	Canfor_Stream_Class

[1] BC Geographic Warehouse (BCGW)
[2] Forsite Consultants Ltd. (Forsite)

Layer Name	Source	Date	Source Data Name
	BCGW	2021	FWA_STREAMS
Roads	Canfor	2022	roads_1
Sensitive Watersheds	Canfor	2023	Watersheds
Slope	BCGW	2022	bc_Slope_percent
	Forsite	2019	Dem_slope
Special Riparian Management Zone	Canfor	2012	biodiv
Spatialized OGMA	Canfor	2022	ogma_fsp_1
Terrain Ecosystem Mapping (TEM)	TIO Consortium[3]	2001	t_ecp_1
Terrain Stability Mapping (TSM)	Geowest Ltd.	1996	tsm_1
Ungulate Winter Range (UWR)	BCGW	2022	WHSE_WILDLIFE_MANAGEMENT_WCP_UNGULATE_WINTER_RANGE_SP
Visual Landscape Inventory (VLI)	BCGW	2022	WHSE_FOREST_VEGETATION_REC_VISUAL_LANDSCAPE_INVENTORY
Vegetation Resource Inventory (VRI)	BCGW	2021	veg_comp_lyr_r1_poly_2021
Wildlife Tree Patch (WTP)	Canfor	2022	reserves_1
	BCGW	2022	WHSE_FOREST_VEGETATION_RSLT_FOREST_COVER_RESERVE_SVW
First Nation Interest in Moose Boundary	FOR	2023	Nation_1_TFL 30, Nation_2_TFL 30
FN Accommodation Blocks	Canfor	2023	FN_blks_1

- The Vegetation Resource Inventory (VRI) is projected to 2020-12-31 with 75% of the TFL 30 gross land base photo interpreted based on aerial photographs taken in 2015. The remaining 25% of the area has reference year between 2008 to 2018 accounting for the various disturbance updates using Reporting Silviculture Updates and Land Status Tracking System (RESULTS).
- Canfor blocks data included harvested and planned blocks not yet reported in the RESULTS Openings dataset (2022) and is updated to include all blocks up to the end of 2023.
- RESULTS Openings are updated to the end of March 2024.
- VRI projected age has been adjusted with depletion data to December 31st, 2023. Stand age for cutblock reserves are not adjusted when overlapping with depletion data.

2.2 Individual Tree Inventory

This timber supply analysis will be incorporating the individual tree inventory (ITI) using the Light Detection and Ranging (LiDAR) data compiled and collected by Forsite Consultants Ltd. and Object Raku Technology in 2017-2018. The analysis follows Forest Analysis and Inventory Branch (FAIB) tier 1 recommendations for existing VRI stand height polygon adjustments using the canopy height model and leading species. Section 5.4 describes the process and procedure for adjusting the inventory height using ITI data.

The ITI project developed and applied specialized algorithms to LiDAR data to derive key forest inventory attributes on an individual tree basis by measuring stem height and predicting species, diameter, basal

[3] Timberline Forest Inventory Consultants Ltd.; Industrial Forestry Services Ltd.; and Oikos Ecological Services Ltd.

area, merchantable and gross volumes, and merchantable log product volumes (Forsite & Canfor, 2019). Tree species were predicted using training data and machine learning software. Once species of an individual tree has been predicted, the diameter at breast height (DBH) was predicted based on statistically derived relationship for each species and BEC zone (function of tree height and stand density). Volume, basal area, and biomass can be calculated from the predicted DBH using well known formulas adopted by the B.C Ministry of Forestry (MoF). Tree ages are estimated based on site index, species, height using BC MoF growth curves. Detailed methodology on the approach to attributing individual stems is included in Appendix C (LiDAR Enhanced Forest Inventory: Individual Tree Inventory Project (Forsite & Canfor, 2019)).

The ITI only includes trees that are greater than or equal to 5m. LiDAR data was not collected for parks, inoperable areas, and caribou areas. In 2017, LiDAR data was collected for approximately 80% of the gross area of TFL 30. The remaining 20% were collected in 2018. The LiDAR data collected for TFL 30 covers 173076.4 hectares of the 180346.5 hectares, approximately 95% of TFL 30.

Limitations of ITI from LiDAR is that density is often underestimated. The missed trees are typically of suppressed canopy, or those in tight clumps with a common height, as shown in Figure 2-1. Other limitations include leaning trees that are sometimes represented as multiple trees in ITI and volume associated with trees less than 5m or of blowdown/windthrow are not captured.

Net merchantable volume is calculated from the gross volume with a factor and no tree specific data on pathology, damage, forking etc. Net volume of dead trees is only factored down by the Variable Density Yield Prediction Growth and Yield Model (VDYP) number associated with the age of the live trees (Forsite et al., 2019).

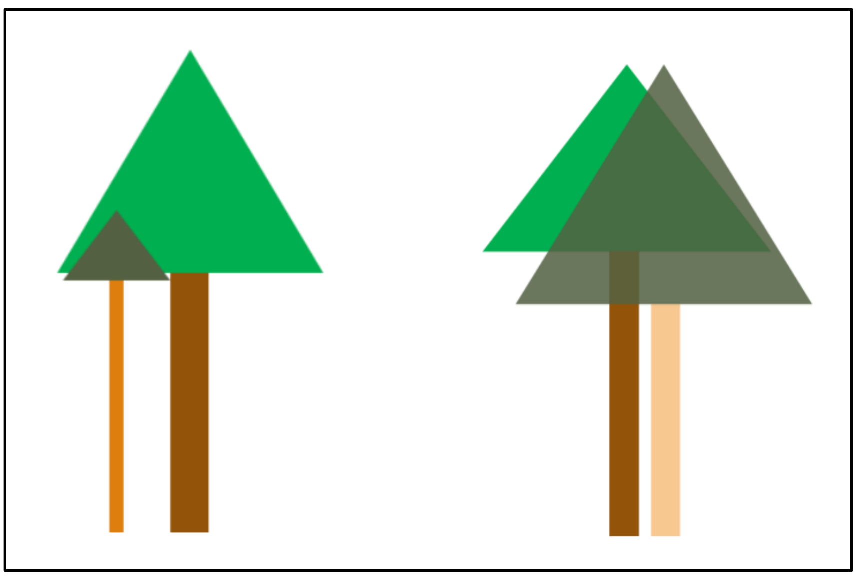

Figure 2-1 Density Limitation Example of ITI from LiDAR

Figure 2-2, Figure 2-3 and Figure 2-4 depict the distribution of heights, species and DBH of the TFL 30 ITI by percent frequency.

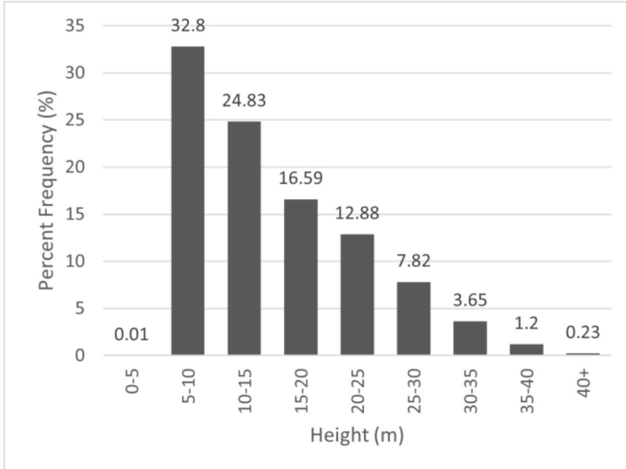

Figure 2-2 Height Distribution by Percent Frequency of ITI in 5m Classes

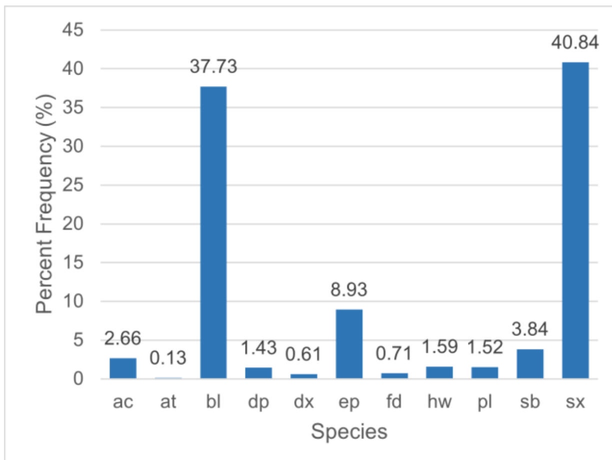

Figure 2-3 Species Distribution by Percent Frequency of ITI

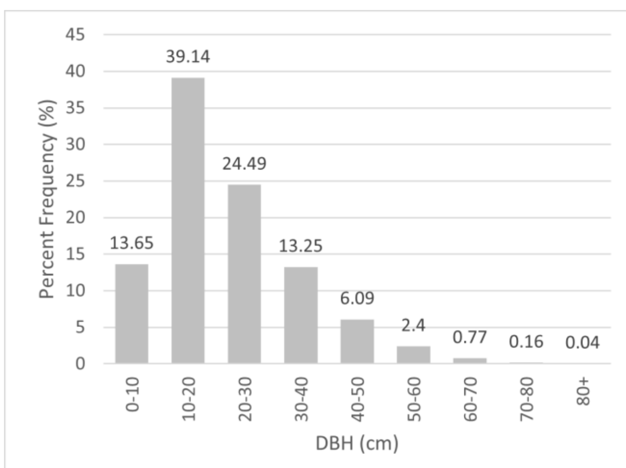

Figure 2-4 DBH Distribution by Percent Frequency of ITI in 10cm Classes

2.3 Riparian Classification

The stream classification layer for TFL 30 was assembled based exclusively on the following data sources:

- Fresh Water Atlas (FWA) stream data;
- Canfor operational stream data; and
- 25m provincial digital elevation model (DEM).

Stream classification at an area tenure level is often completed through photo interpretation with reference stream centerline and slope references. Stream width for larger streams (S1, S2, S3, S5) is generally measured from orthophotos. Given aerial photographs for TFL 30 were not available at the time of analysis an alternative classification methodology was adopted.

2.3.1 Fresh Water Atlas Layer

Each linear feature in the FWA has a feature code attribute assigned. The feature code attribute is the standard feature code as defined by the Geographic Feature Catalogue in accordance with the Canadian Council on Surveys and Mapping Classification System (Gray M., 2010). Table 3 of the Freshwater Water Atlas User Guide describes the values for the feature code attribute associated with the FWA. Based on the attributes represented by feature codes, the initial stream classifications were assigned to stream segments. Table 2-2 lists the associated FWA feature code, slope criteria and final assigned stream classification.

Table 2-2: Stream Classification Criteria

FWA Feature Code	FWA description	Slope Criteria	Stream Classification
GNIS_NAME <>’’ and Stream width >100m	Major Rivers	<20% per 100m segment	S1A
GNIS_NAME <>’’ and Stream width >20m and <100m	Major Rivers	<20% per 100m segment	S1B
FEATURE_CODE = GA24850000	River/Stream – Definite	<20% per 100m segment	S2/S3
FEATURE_CODE = GA24850140	River/Stream – Indefinite		
FEATURE_CODE = GA24850150	River/Stream – Intermittent	<20% per 100m segment	S4
FEATURE_CODE = GA24850150	River/Stream – Intermittent	>=20% per 100m segment	S6
FEATURE_CODE in (WA24111170, WA24111190, WA24111110, WA1141000, WA24111130, WA24111150)	Construction Line	Any	Not included

The FWA Feature Code attribute identified S1A/S1B/S2/S3 stream classes while S4/S6 stream classes were defined by FWA Feature Code and slope criteria.

To distinguish between S1A/S1B/S2/S3, open-layer satellite imagery from base data was used to assign stream classifications, specifically:

- Stream channels that are visible with an average stream width of 100m or wider for over 1km and have a name(s) under the GNIS_NAME attribute was classified as S1A.

- Stream channels that are visible with a stream width greater than 20m but less than 100m and have a name(s) under the GNIS_NAME attribute was classified as S1B.
- Stream channels that are visible with a stream width between 5m to 20m were classified as S2.
- Stream channels with a stream width less than 5m were classified as S3.

Other than S1, S2 and some S3, the resolution of the open-layer satellite imagery is not high enough to predict stream classifications.

To classify S4 and S6, streams were first broken into 100m segments starting from each confluence (occurs when two or more streams join to form a single channel). Each segment was assigned an average slope based on the elevation of its start and endpoints. Fish barriers were identified for segments where the slope was greater than or equal to 20% as stated in the Fish-stream Identification Guidebook (MoF,1998). Stream segments upstream of the fish barrier were automatically classified as non-fish-bearing and were assigned as S6.

S5 cannot be classified as stream width information cannot be obtained without ortho photo or field data, therefore treated as S6 streams. Fish barriers and fish-bearing streams that exist outside of the TFL boundary and are downstream of the streams within the boundary were identified for accuracy purposes.

Streams that were too narrow under the current image resolution were assigned as S4 when they originated from a fish-bearing stream or lake and did not have fish barriers along the channel up to the measured segment. This process concludes the stream classification process only using the FWA streams data and slope data.

2.3.2 Canfor Stream Layer

Canfor provided an operational stream data layer and upon review it was noted that the layer does not provide full coverage of streams within the TFL. The layer is primarily a collection of stream data that was sampled in field operations and often only captured within and around existing or planned cutblocks. Approximately 56% of the streams in Canfor stream dataset are classified, while the other 44% remain unclassified.

Unlike the last TSR (MP #10) where a 4.95m prorated buffer was applied to all unclassified streams, the unclassified stream segments in this TSR went through the identical process noted in the FWA S4/S6 classification, *i.e.* based on slope and 100m segments.

On a smaller land base, the line work of the FWA stream layer would be revised to connect and match the higher precision Canfor stream operational layer. However, given the extent of TFL 30 and the amount of data that required manual edits, this classification method was rejected. The selected classification method was to fully classify both layers, then review the FWA layer in conjunction with the Canfor operational layer. Streams with inconsistent classes are revised to match the Canfor operational layer. Upstream and downstream revised segments are also reviewed to ensure that the overall stream classification is consistent across the TFL.

2.3.3 Classified Riparian Layer

The classified FWA and Canfor stream layers are buffered according to their assigned stream classes and then joined to form the final stream layer. All assigned stream classes followed the criteria indicated in Section 47 of the Forest Planning and Practice Regulation (FPPR, 2004). Figure 2-5 provides an example of the final stream classification product for the TFL.

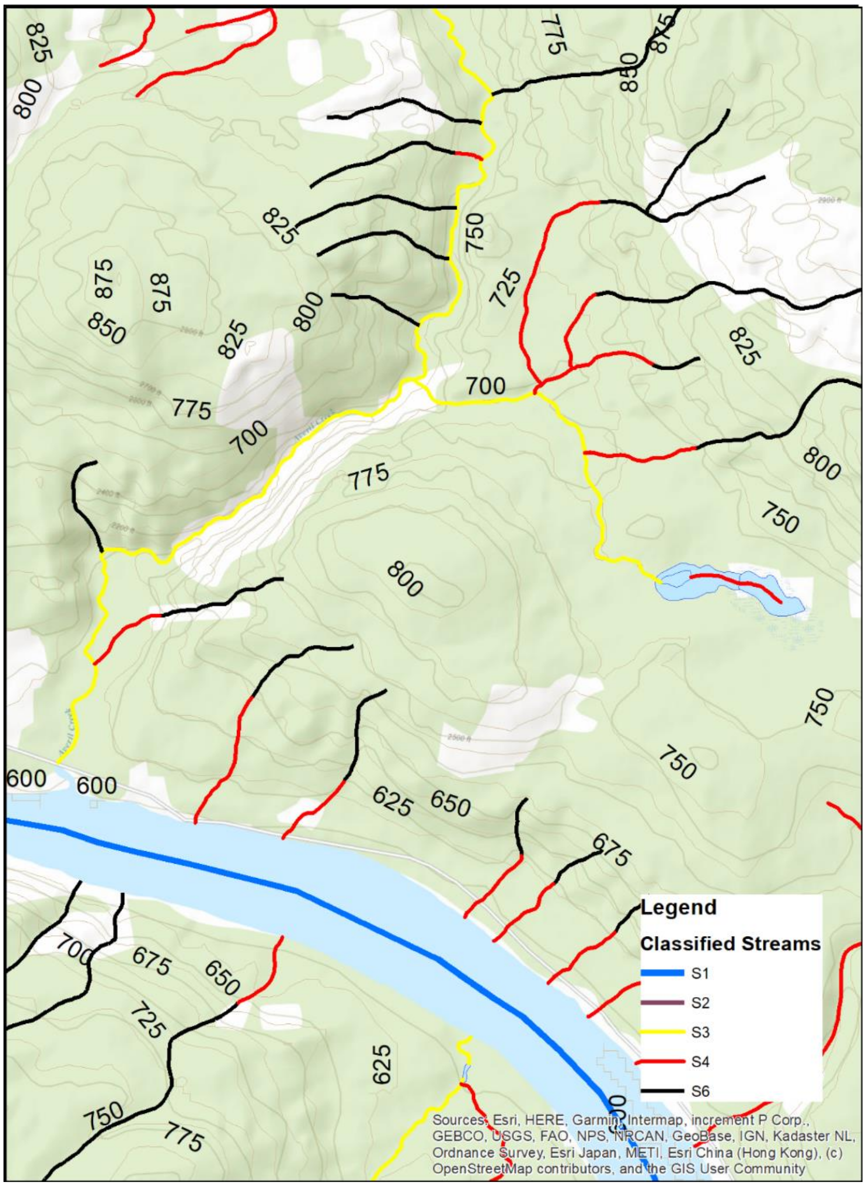

Figure 2-5 Example of the Final Stream Classification Product

FWA lakes and wetlands are classified based on their size according to Sections 48 and 49 of the FPPR (FLNRORD, 2004). Wetland riparian class 5 (W5) polygons were classified manually by reviewing the classified area and revising the classifications for wetland clusters in Section 48 of the FPPR. Canfor lakes and wetlands where the classification value was “null” was classified with the previous classification method.

The classified riparian layers were reviewed and buffered according to their Riparian Reserve Zone (RRZ) and Riparian Management Zone (RMZ) and joined together to form one consolidated layer to be included in the land base resultant for the timber supply analysis assessment on the TFL.

3. Land Base Classification

This section describes the steps that have been taken to classify the Forest Management Land Base (FMLB), Legal Harvestable Land Base (LHLB) and the timber harvesting land base (THLB) for TFL 30.

The starting land base for the analysis is all land within the TFL 30 boundary also known as the Gross Land Base (GLB). The FMLB is the portion of the GLB which contributes to meeting non-timber management objectives, such as landscape-level biodiversity. The LHLB is the portion of the FMLB where timber harvesting is legal and economical, subject to forest management objectives and requirements, finally the THLB is the portion of the LHLB where it is economical for timber harvesting to occur based on current forest management practices.

Table 3-1 presents the land base classification results that identify the FMLB and THLB. The FMLB excludes non-forested, non-productive and roaded areas from the GLB. The THLB further excludes areas that are unsuitable for timber production and areas with legally defined boundaries reserved for managing other resource values.

Of the 179,833 ha of Tree Farm Licence area, 755 ha are Schedule A and 179,078 are Schedule B as identified from the Generalized Forest Cover Ownership layer. Schedule A are private lands and Timber Licences apart the established TFL. Schedule B are crown land not subjected to Timber Licences within the TFL.

Individual areas may have several classification attributes. For example, stands within riparian reserve boundaries might also be classified as non-commercial. These areas would have been classified based on this latter attribute prior to the riparian classification. Therefore, the net reduction will be less than the total area in the category in most cases. The order of the entries in Figure 3-1 corresponds to the sequence in which the land base classifications were applied and the timber harvesting land base.

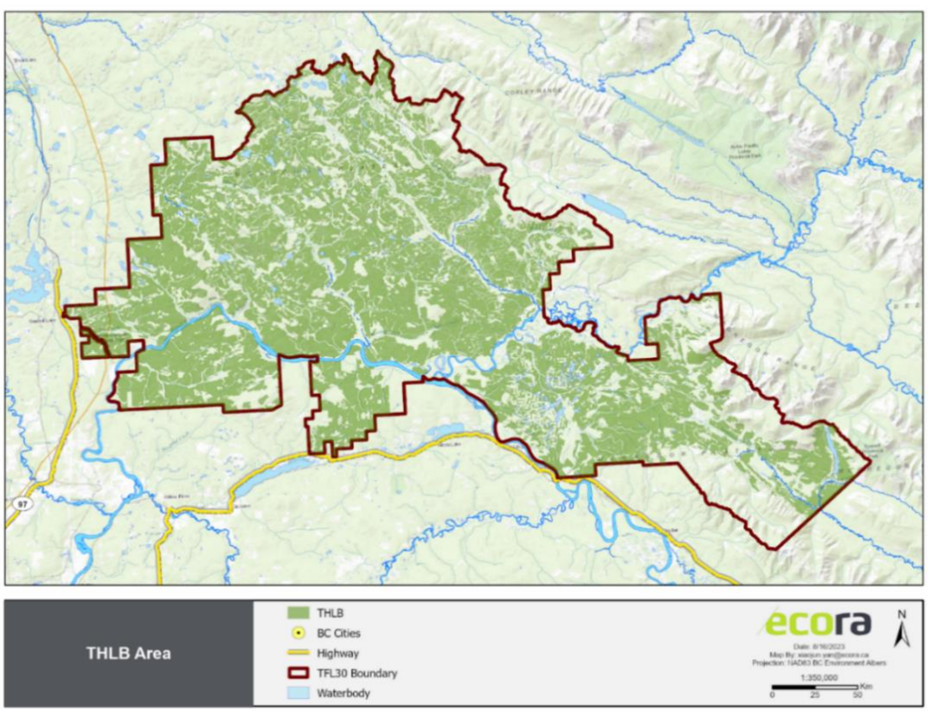

Figure 3-1 TFL 30 Timber Harvest Land Base

Table 3-1: Land Base Classification Summary

Land Base Classification	Gross Area (ha)	Schedule A Gross Area (ha)	Schedule B Gross Area (ha)	Net Area Removed (ha)	Percent of Gross Area (ha)
Gross Land Base	**180,347**	**755**	**179,079**		
Non-TFL	513			513	0.28%
Non-Forested & Non-Productive	22,320	33	22,287	22,320	12.38%
Roads and Trails	2,531	7	2,524	2,531	1.40%
Sub-Total Reduction				*25,364*	*14.06%*
Forest Management Land Base (FMLB)				**154,983**	**85.94%**
Ungulate Winter Range No Harvest Zone	8,838		8,838	8,838	4.90%
Old Growth Management Areas	19,642	522	19,120	19,642	10.89%
Recreational Areas	15		15	15	0.01%
Recreational Sites	2		2	2	0.00%
Recreational Trails	1		1	1	0.00%
Sub-Total Reduction				*28,498*	*15.80%*
Legally Harvestable Land Base (LHLB)				**126,485**	**70.13%**
Riparian Areas	6,907	6	6,901	6,907	3.83%
Unstable Terrain	887	20	867	718	0.40%
Steep Slope	398		398	398	0.22%
Difficult Regeneration Types	497	1	497	497	0.28%
Non-Commercial Stands	3,172	23	3,149	3,172	1.76%
Non-Merchantable Mature	8,156	5	8,151	8,156	4.52%
Low Productivity – Immature	8		8	8	0.00%
Archeological Sites	12		12	12	0.01%
FN Blocks	733		733	733	0.41%
Existing Wildlife Tree Patches	1,761		1,761	1,761	0.98%
Future Wildlife Tree Patches		6	1,389	1,395	0.77%
Sub-Total Reduction				*23,757*	*13.17%*
Timber Harvesting Land Base (THLB)				**102,728**	**56.96%**

3.1 Identifying the Forest Management Land Base (FMLB)

The GLB of TFL 30 is 180,347 ha and is the total land area legally associated with the tenure TFL 30. All data layers have been clipped to the TFL 30 boundary. The boundary file for TFL 30 used in the analysis is from the BC Geographic Warehouse (BCGW). The boundary was compared with other boundary versions and confirmed as the correct version to use by the FAIB staff on November 4th, 2022.

3.1.1 Lands Not Managed by Tenure Holder

Land not administered by TFL 30 is removed from the FMLB using ownership codes. Private lands are identified by ownership code 40 which are managed by Canfor and consequently not included in the FMLB. Table 3-2 lists the area associated with the ownership code and resultant area removed.

Table 3-2: Ownership Types

Ownership Code	Schedule	Description	Total Area (ha)	Area Removed (ha)
40	N	Private Land	513	513
72	A	Tree Farm License	755	0
72	B	Tree Farm License	179,079	0

3.1.2 Non-Forest and Non-Productive

Non-forest and non-productive areas are identified and removed from the THLB using a combination of Terrestrial Ecosystem Mapping (TEM) and Vegetation Resource Inventory (VRI) data (LiDAR was not applicable).

Stands with non-forested leading TEM site series are removed as non-forest and non-productive areas as shown in Table 3-3.

Table 3-3: Non-Forest and Non-Productive Based on TEM

BEC Subzone	TEM Map Code/ Site Series	Description
All	CB	Cut Bank
	ES	Exposed Soil
	FS	Non-Forest
	GB	Gravel Bar
	GP	Gravel Pit
	LA	Lake
	OW	Open Shallow Water
	PD	Pond
	RI	River
	RO	Rock
	RU	Unknown
	TA	Talus Slope
	UR	Urban
ESSFwc3	AL	Alder – lady fern
	BG	Bluejoint – Arrow-leaved groundsel meadow
ESSFwcp3	FH	Bl - Heather mesic krumholz forest
	FR	Bl – Rhododendron
	FV	Bl - Valerian wet meadow
	LC	Bracted louse-wort - Palmate coltsfoot
	SS	Leatherleaf saxifrage - Sedge wetland
	FA	Subalpine fir - Mountain arnica mesic meadow (Mesic forb meadow)

BEC Subzone	TEM Map Code/ Site Series	Description
ESSFwk2	BB AL WS	Scrub birch - Sedge - Sphagnum Sitka alder - Lady fern Water sedge - Sphagnum
ICHvk2	BB AL	Scrub birch - Sedge - Sphagnum Sitka alder - Lady fern
SBSmk1	WM HS AS HW	Bog willow-Shore sedge Hardhack - Sedge Mountain alder - Skunk cabbage - Lady Fern Sitka Willow - Horsetail
SBSvk	AA PW LC AD AS PL LB SP BB BH SB WH SU WF WB	ActSx - Mountain Alder Cow-Parsnip - Meadowrue - Wildrye Labrodor tea - Cloudberry - Red Peatmoss Mountain Alder - Red - osier dogwood Mountain Alder - Skunkcabbage - Ladyfern Pl - Labrador tea - Red Peatmoss Pl - Scrub birch - Sedge - Sphagnum Scheuchzeria - Shore Sedge - Rusty Peatmoss Scrub Birch - Beaked Sedge - Peatmoss Scrub Birch - Hardhack - Beaked Sedge Shore Sedge - Buckbean - Green Peatmoss Sitka Willow - Horsetail Sxw - Huckleberry - Sphagnum Water sedge fen Willow - Water Sedge - Bluejoint
SBSwk1	AL SF WM HS LS AD AS WB PL BH BP WS WD WH	Alder - Lady Fern Beaked Sedge fen Bog Willow - Shore sedge - Hook Moss Beaked Sedge - Hard hack Labrador tea - Red peatmoss Mountain alder - Red-osier dogwood Floodplain Mountain alder - Skunk cabbage Pacific Willow - Beaked Sedge Pl - Labrador Tea - Rusty Peatmoss Sb - Common Horsetail - Feathermoss Sb - Water Horsetail - Buckbean -Red Peatmoss Sitka Willow - Beaked Sedge Sitka Willow -Red-osier Dogwood Willow - Hardhack

Stands with VRI attributes that are non-forest and non-productive are removed as depicted in Table 3-4. Areas with a harvest history are not removed. For TFL 30 the harvest history dates back to 1942.

Table 3-4: Non-Forest and Non-Productive Based on VRI

VRI Attribute	Logging History	Description
Non-Vegetated (BCLCS_lv_1 = ‘N’)	No	Waterbodies and areas where the total cover of trees, shrubs, herbs and bryoids is less than 5% of the total surface area
Non-Treed (BCLCS_lv_1 = ‘V’ and BCLCS_lv_2 <> ‘T’)	No	Non-treed wetlands and alpine areas
Treed wetlands (BCLCS_lv_1 = ‘V’ and BCLCS_lv_2 = ‘T’ and BCLCS_lv_3 = ‘W’)	No	Areas having the water table at or above the soil surface or which is saturated for a long enough period to promote wetland or aquatic processes
Boreal altai fescue alpine (BAFA) BEC zone	No	Vegetated areas within the BAFA are considered non-forested for the purposes of timber supply
Low crown cover (BCLCS_lv_1 = ‘V’ and BCLCS_lv_2 = ‘T’ and crown_closure < 10%)	No	Treed area but with less than 10% crown closure
Low site productivity (BCLCS_lv_1 = ‘V’ and BCLCS_lv_2 = ‘T’ and site_index <= 5m)	No	Treed area but inventory site index is less or equal to 5m
No leading species code (BCLCS_lv_1 = ‘V’ and BCLCS_lv_2 = ‘T’ and species_cd_1 is null)	No	Area without logging history and does not have a leading species code in the VRI

The VRI includes the British Columbia Land Cover Classification Scheme (BCLCS). Under the BCLCS, land is first classified based on the presence or absence of vegetation. Vegetated polygons are then classified as treed or non-treed.

Non-treed polygons are classified as non-forested areas if they correspond to wetlands, alpine areas or have a site index less than or equal to 5m or a crown closure less than or equal to 10%.

Treed wetlands are also classified as non-forested areas. As the classification may identify recently harvested stands as non-treed, only polygons that were not previously harvested are classified as non-forest areas.

Vegetated areas classified as Boreal Altai Fescue Alpine (BAFA) in the BEC system are considered non-forested for the purpose of the timber supply analysis (FLNRORD, 2021).

Areas classified as non-forest and non-productive do not contribute to other forest management objectives such as seral stage distribution for landscape-level biodiversity or watershed protection.

3.1.3 Existing and Future Roads and Trails

The majority of the TFL is accessible by either existing or proposed roads. Road data was reviewed prior to the analysis and no additional future road is necessary to access the potentially harvestable land base.

To assign the adequate road buffer width to account for the non-vegetated road surface in the TFL, road data needs to be classified and buffered for each class. In the Timber Supply Analysis Data Package under MP #10, each road was classified into one of the four categories (Main, Operational, Spur, Trail) and attributed as either in-block or out-of-block based on the existing cutblock layer. The same process is applied in MP #11.

The road buffer widths applied to each road class were based on a comprehensive Roads, Trails and Landings inventory project completed for the Prince George (PG) Timber Supply Area (TSA) in 2011. This project classified roads across the TSA and field measured road widths for 404 randomly located points across the PG Forest Districts (another 566 plots were in the Fort St. James District).

Roads were classified into one of the 25 different categories of roads as shown in Table 3-5. Roads were then grouped into one of 15 strata (numbered 17 to 31 for the PG District).

Table 3-5: Prince George Forest District Road Stratifications

Stratum ID	Status	Method	Season	Class	Type
17	In-Block	Conventional	All	Main	ICAM
17	In-Block	Roadside	All	Main	IRAM
17	In-Block	Unknown	All	Main	IUAM
18	In-Block	Roadside	All	Operational	IRAO
19	In-Block	Roadside	Summer	Spur	IRSS
20	In-Block	Conventional	Winter	Operational	ICWO
20	In-Block	Roadside	Unknown	Operational	IRUO
20	In-Block	Roadside	Winter	Operational	IRWO
20	In-Block	Unknown	Unknown	Operational	IUUO
20	In-Block	Unknown	Summer	Operational	IUWO
21	In-Block	Roadside	Unknown	Spur	IRUS
21	In-Block	Roadside	Winter	Spur	IRWS
22	In-Block	Conventional	All	Operational	ICAO
22	In-Block	Conventional	Unknown	Operational	ICUO
23	In-Block	Conventional	Summer	Spur	ICSS
23	In-Block	Conventional	Unknown	Spur	ICUS
24	In-Block	Conventional	Winter	Spur	ICWS
25	In-Block	Unknown	All	Operational	IUAO
26	In-Block	Unknown	Summer	Spur	IUSS
26	In-Block	Unknown	Unknown	Spur	IUUS
27	In-Block	Unknown	Winter	Spur	IUWS
28	Outside	None	All	Main	ONAM
29	Outside	None	All	Operational	ONAO
30	Outside	None	Winter	Operational	ONWO
31	Outside	None	All	Trail	ONAT

To relate the average road widths calculated for the PG Forest District with the road classification information that exists for the TFL, some of the PG Forest District strata were combined and related to existing road classifications as shown in Table 3-6. In combining strata, a new average road width was calculated for the combined group based on the weighted distribution of that road across the district.

Table 3-6 shows the original road widths and the new weighted mean road widths for each new stratum. Each road (existing and proposed) has been buffered according to its road class (new stratum) and new weighted mean road width from Table 3-6. Road buffers have been removed from the FMLB.

Current harvesting practices have evolved such that landings are either not required (*i.e.* cut-to length or roadside processing) or are minimized. However, due to previous harvesting practices, constructed landings exist in the TFL. These landings are captured by the polygon delineation process in the 2021 VRI based on aerial photos collected in 2015.

Table 3-6: Road Buffer Width

Original Data from PG TSA RTL Project (2011)				Modified Groupings to Reflect TFL 30 Road Classes		
Stratum ID	**Original Mean Road Width (m)**	**Road Length (km)**	**Original Mean Road Width * Road Length**	**New Strata ID**	**New Stratum**	**New Weighted Mean Road Width (m)**
17	20.7	738.1	15,308.3	1	Mainline	22.7
28	23.7	1,371.5	32,493.3			
18	9.1	2,318.7	21,050.6	2	Operational	9.6
20	10.2	840.8	8,542.5			
22	7.9	4,510.6	35,716.0			
25	7.5	1,444.8	10,815.6			
29	11.6	5,531.7	64,137.5			
30	9.1	433.6	3,945.5			
19	9.3	2,390.5	22,320.2	3	Spur	6.5
23	5.1	3,040.9	15,523.8			
24	5.8	3,255.7	18,831.8			
26	7.6	1,040.3	7,867.3			
27	4.4	684.2	2,976.4			
31	3.8	3,049.5	11,679.5	4	Trail	3.8

Table 3-7 details the area summary and removal associated with existing and proposed roads.

Table 3-7: Road Area Summary

Road Class	Total Road Length (m)	Total Area (ha)[4]	Area Removed [5] (ha)
Mainline	650,226	600	2,531
Operational	230,379	73	
Spur	4,559,461	1,951	

3.2 Identifying the Legally Harvestable Land Base (LHLB)

The LHLB is the portion of the FMLB where timber harvesting is legal but is subject to forest management objectives and requirements. The portions of the FMLB that are required to be removed to identify the LHLB are described in the following sections.

[4] Gross area of the described netdown category including areas with spatial overlaps with previously described categories
[5] Area removal of the described netdown category that is not spatially overlapping with previously described categories

3.2.1 Parks and Protected Areas

Areas identified as parks, protected areas and ecological reserves are considered part of the productive forest but are excluded from the LHLB. The Giscome Portage Trail is outside the boundary of TFL 30 however, it is identified as a park, and it is currently being protected and managed under the TFL 30 Forest Stewardship Plan (FSP).

3.2.2 Ungulate Winter Range

As required by Ungulate Winter Range Order #U-7-003 (MOE, 2009), timber harvesting and road construction is excluded from all Caribou-High habitat zones and consequently is removed from the LHLB (Table 3-8).

On the other hand, management activities within Caribou-Corridor zones are addressed in Section 4.9.1.

Table 3-8: Ungulate Winter Range Area Summary

UWR Number	Unit	Timber Harvest Code	Total Area (ha)	Area Removed (ha)
u-7-003	Caribou – High Habitat	No Harvest Zone	12,107	8,838
u-7-003	Caribou – Corridor Unit	Conditional Harvest Zone	4,222	0

3.2.3 Old Growth Management Areas

Old-growth management areas (OGMA) are intended to be permanent reserves of unique old growth ecosystems present on the landscape. The intent is to maintain essential components of natural ecological succession that might be compromised in intensively managed forest landscapes. The Old Growth Objectives for TFL 30 are set by government under the PNOGO that establishes a-spatial targets required to be met in specific Biogeoclimatic Zones and variants (BEC's) within every Landscape Unit in TFL 30. Canfor is required through the Forest Practices and Planning Regulation to have an approved Forest Stewardship Plan (FSP) that is consistent with established orders and associated guidelines.

The PNOGO contains a provision under Section 8 for the establishment of draft OGMAs, which states "Where the Minister of Sustainable Resource Management, his delegate, or a licensee or group of licensees has identified draft old growth management areas, the Minister or delegate may specify in writing that these draft old growth management areas meet the intent of this Order". Since the last determination, Canfor has spatially identified and maintained draft OGMAs (Figure 3-2) based on the criteria described in Section 5.2.1 b) of the Canadian Forest Products Ltd. Carrier Lumber Ltd. Fort St. James Forest Products General Partner Ltd. Dunkley Lumber Ltd. Takla Track & Timber Ltd. Sasuchan Development Corporation Pacific Bioenergy Portions of the Prince George and Stuart Nechako Natural Resource Districts, Tree Farm Licence and Community Forest Agreement K1N Forest Stewardship Plan Approved November 14, 2017 Updated with Amendment Requiring Approval 9 Submitted September 20, 2021, hereinafter referred to as the FSP. These Draft OGMA's for TFL 30 under the provision of Section 8 in PNOGO meet the target amounts of the old growth objectives.

In MP #11, the strategies related to this order are addressed in the forest estate modelling approach.

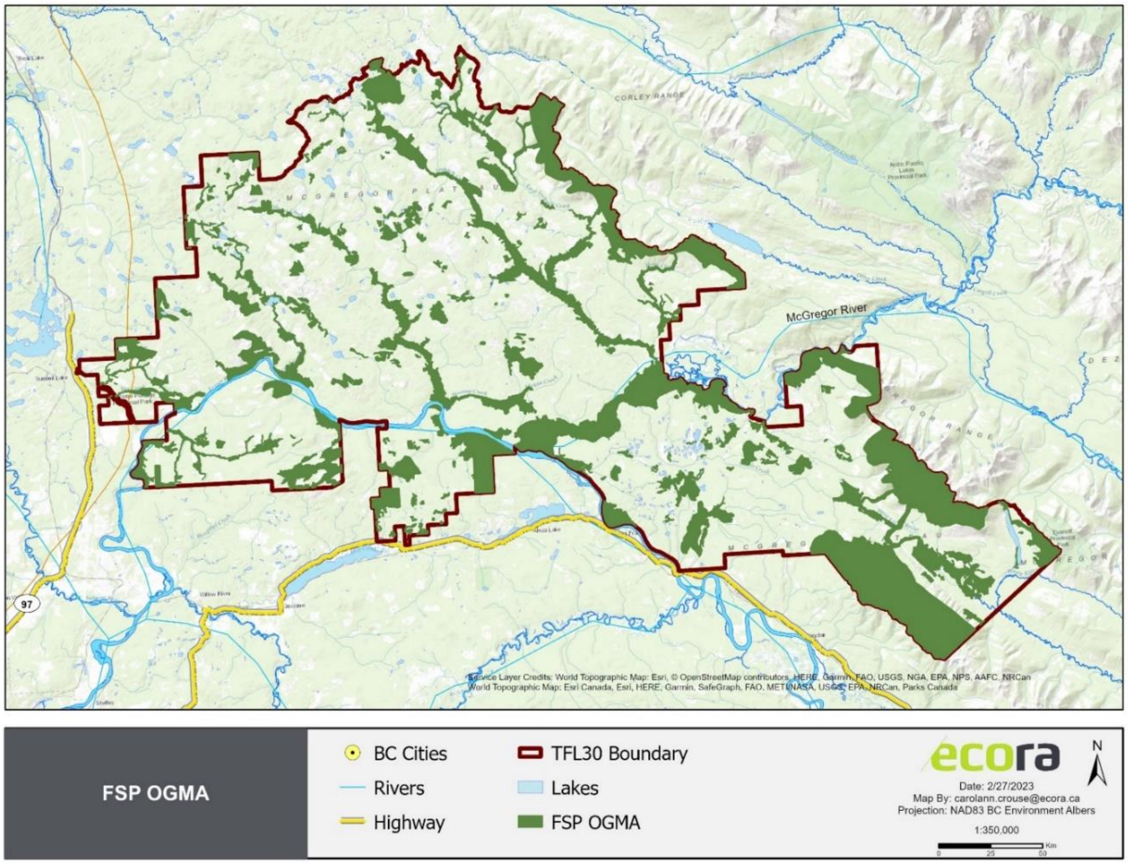

Figure 3-2 Map of FSP OGMA

Spatially identified OGMAs are delineated to meet the landscape level biodiversity targets set out by the *Provincial Non-Spatial Old Growth Objective*. Draft OGMAs removed from the LHLB for TFL 30 to meet the old growth target objectives were approved in June 2019 by the Prince George Natural Resource District Manager.

Table 3-9 summarizes the incremental amount of OGMAs removed the LHLB.

Table 3-9: Old Growth Management Areas Summary

Description	Total Area (ha)	Area Removed (ha)
FSP Draft OGMA	40,203	19,642

3.2.4 Recreation Areas

All active recreational polygons from the Forest Tenure Recreations layer are removed from the LHLB. Table 3-10 summarizes the project areas and the area removal.

Under MP#9, there were three key Recreation Emphasis Areas (REA) identified, they are Horseshoe Lake, Woodall Creek and Tri-Lakes Recreation Emphasis Area. For the current and future MP's, REA will no longer be accounted for as all REA have been incorporated into the current Draft OGMA's with 100% harvest exclusion.[3]

Table 3-10: Recreational Areas Summary

Project Name	Total Area (ha)	Area Removed (ha)
Amanita Lake	8	15
Averil Creek	7	
Boundary Lake	9	
Farm cabin	0.5	
Freya Lake Trail	9	
Pass Lake	11	

3.2.5 Recreation Sites

There are five recreation sites located in the TFL. Consistent with the analysis for MP #10, each site has been buffered by a 112.8m (radius) and removed from the LHLB. The recreation sites are noted in Table 3-11.

Table 3-11: Reductions for Recreation Sites

Recreation Area	Total Area (ha)	Area Removed (ha)
Amanita Lake	4	2
Averil Creek	4	
Boundary Lake	4	
Freya Lake Trail	4	
Pass Lake	3	

3.2.6 Recreation Trails

Active recreation trails that were not captured in the road layer nor visible in satellite imagery will be applied a 2m buffer and removed from the LHLB (Table 3-12).

Prince George East Trails (REC98452) is a series of trails that can be identified from the Recreation Sites and Trails BC website and interactive web map. These trails are designated to provide access for snowmobilers to venture into the backcountry and mountains east of Prince George. There are two distinct locations of the trail network, one located within TFL 30 near the South boundary, one further South, located outside of the TFL 30 boundary. The access point within TFL 30 is located at the junction of Pass Lake Forest Service Road and Archie Creek Forest Service Road. The trail runs along the Pass Lake Forest Service Road and extends to the East beyond Pass Lake. This trail currently is captured in the road layer and is removed from the FMLB in Section 3.1.3.

Table 3-12: Reductions for Recreation Trails

Recreation Area	Total Area (ha)	Area Removed (ha)
Farm Cabin Trail	1	1

3.2.7 Special Riparian Areas

To protect fish habitats and water quality within the McGregor River drainage, the McGregor River Management Zone was delineated within the TFL in MP #9. Additionally, the watersheds within the TFL that are tributary to the Fraser River and provide critical habitat for spawning salmon (Seebach Riparian Zone) was also designated in MP #9 to protect salmon habitat.

For the current and future MP's, this netdown category will no longer be accounted for as all but 6 ha of the special riparian areas have been incorporated into the current Draft OGMA's with 100% harvest exclusion.3

3.3 Identifying the Timber Harvesting Land Base (THLB)

The THLB is the portion of the LHLB where timber harvesting is likely to occur based on current practice and capabilities of Canfor. It is particularly important to provide unbiased data to justify including land in the THLB. The following sections describe land that is removed to determine the THLB for the purposes of timber supply analysis.

3.3.1 Riparian Areas

Sections 47 to 51 and 53 of the Forest Planning and Practices Regulations (FPPR) of the Forest and Range Practices Act (FRPA) govern harvesting activities within riparian areas of the TFL and specify the reserve zone (RRZ) and management zone (RMZ) widths for each type of riparian class listed in Table 3-13.

Table 3-13: Riparian Reserve and Management Zone Widths

Riparian Class	Riparian Reserve Zone (RRZ) Width (m)	Riparian Management Zone (RMZ) Width (m)	Basal Area Retention (%)	RMZ Equivalent (m)	Total Effective Buffer (m)
S1B	50	20	25	5	55
S2	30	20	25	5	35
S3	20	20	25	5	25
S4	0	30	10	3	3
S4 (Seebach)	0	30	10	3	13.5
S5	0	30	10	3	3
S6	0	20	0	0	0
S6 (Seebach)	0	20	0	0	13.5
NCD	0	0	0	0	0
L1B*	10	0	25	0	10
L3	0	30	25	7.5	7.5
W1	10	40	25	10	20
W3	0	30	10	3	3
W5	10	40	25	10	20

* Under FPPR. L1B within TFL 30 are automatically defaulted with a Lakeshore Class C except when specified, FSP Lakeshore Class riparian management is specified in Table 3-14

Table 3-14: FSP Lakeshore Class Riparian Width (Table 10 of the FSP)

Lakeshore Class	Riparian Reserve Zone (RRZ) Width (m)	Riparian Management Zone (RMZ) Width (m)	Basal Area Retention (%)	RMZ Equivalent (m)	Total Effective Buffer (m)
A	200	50	25	12.5	212.5
A-M	50	200	25	50	100
B	50	50	25	12.5	62.5
C	30	70	25	17.5	47.5
D	10	90	25	22.5	32.5
E	10	40	25	10	20

The FSP prescribes RMZ retention targets as a function of windthrow hazard within specific riparian classes (S1A, S1B, S2, S3, Lakes, Wetland). Areas with a moderate to high windthrow hazard receive >= 25% retention of basal area while those with a low windthrow hazard receive no retention requirement. A review of current practices indicates that RMZ areas in TFL 30 are assessed as having moderate to high windthrow hazard and are managed for 25% retention of basal area.

While the FSP follows the FPPR for riparian reserve zones and management zones, retention targets can reflect those identified in the FSP.

Section 5.13.1 (a) of the FSP specifies the riparian widths to be applied to the L1 lakes with lakeshore classification areas as identified on the FSP Content Map. The lakeshore classification area layer was obtained from Canfor and the riparian width is shown in Table 3-14. There are 2 lakeshore classes within TFL 30, E class with 28 hectares and C class with 415 hectares. L1 lakes without lakeshore classes from Canfor's operational hydrology layer are automatically defaulted to lakeshore class C, these amount to 1,724 ha of gross area. The lakes as well as areas that falls within the total effective buffer are removed from the THLB.

The FSW F-7-001 Order specified that S4 and S6 streams within the Seebach fisheries sensitive watershed be buffered to 13.5m on either side. Section 4.9.5 describes the watersheds identified in TFL 30.

All streams, lakes, and wetlands are classified as described in Section 2.3. and buffered according to the total effective buffer from Table 3-13 and Table 3-14. These areas are removed from the THLB and represent the combined impact of both the RRZ and RMZ management practices.

3.3.2 Unstable Terrain

Level 'D' terrain stability mapping has been completed for the entire TFL in 1997. Terrain survey intensity level 'D' consists of 20-30 larger polygons with a maximum of 20% of the polygons field checked. Figure 3-3 shows the classified land base. Prior to MP#9, Canfor field operations staff reviewed the initial terrain stability mapping results in order to assess the accuracy of the inventory based on their knowledge of the TFL. Subsequently, a portion of the areas initially classified as unstable were re-classified by Canfor as reduced stability. Of the total area re-classified, operations staff estimated that half was in fact unstable with the remaining half being stable. However, more detailed sampling under a level C terrain stability assessment would be required in order to isolate unstable polygons within this area. As a result, in MP#9, polygons that were re-classified as reduced stability, 50% of the area is considered unstable and removed from the THLB. Polygons classified as unstable in the initial and re-classification are entirely excluded from the THLB. All areas classified as potentially unstable or stable or not attributed with a stability rating class were considered available for harvest with no special restrictions. The land base classification assumptions in this analysis remain consistent with MP#9 and MP#10. Table 3-15 summarizes the area of each terrain stability class and harvest history and the corresponding area removal.

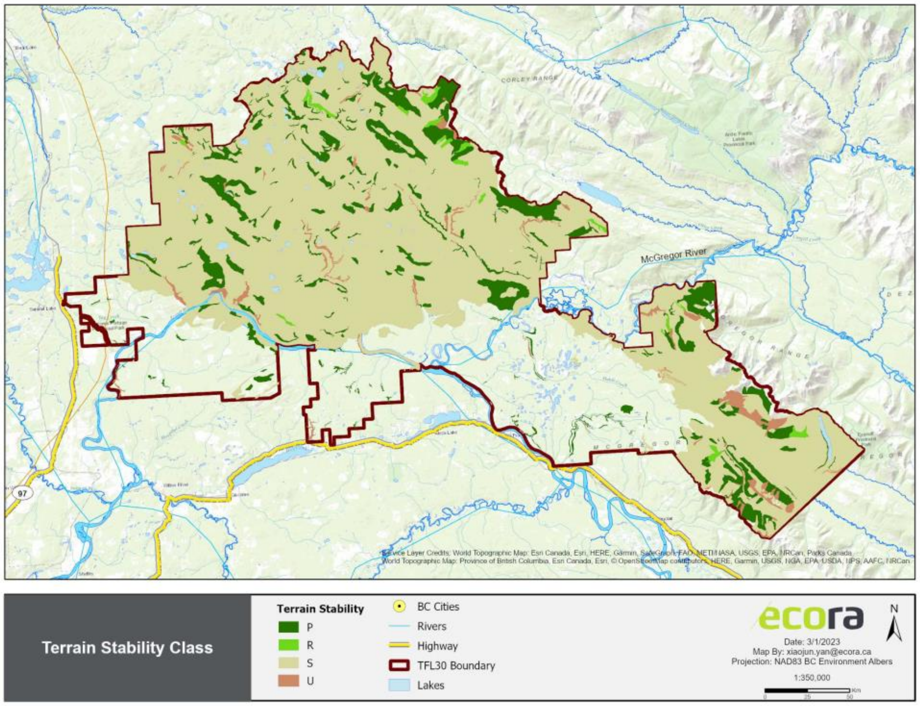

Figure 3-3 Map of Terrain Stability Class. Completed for all areas in TFL30 with terrain stability concerns.

Table 3-15: Area Summary of Unstable Terrain

Terrain Stability Class	Percent Removed	Total Area (ha)	Area Removed (ha)
U (Unstable)	100	3,240	718
R (Reduced Stability)	50	1,280	

3.3.3 Steep Slope

The maximum area weighted slope average from the RESULTS Openings dataset for the TFL is 63% recorded in 1989. This value is used in this analysis as the steep slope threshold. Stands with slope above 63% and without harvest history are excluded from the THLB. Table 3-16 shows the area removal summary.

Table 3-16: Steep Slope Reductions

Category	Total Area (ha)	Area Removed (ha)
Steep Slope	2,186	398

3.3.4 Difficult Regeneration Types

Historically, environmentally sensitive areas have been used to identify areas in which regeneration difficulties are likely to be encountered. However, TEM data provides a much more accurate reflection of where difficult regeneration types (DRT) are likely to exist. Using TEM data, stands with the leading site series identified in Table 3-17 have been removed from the THLB. All of the listed site series have been identified by Canfor’s Silviculture Foresters based on extensive local field experiences as very difficult to regenerate and/or have very poor productivity. As a result, these areas are typically avoided when developing harvest area. These exclusions are not applied in areas with a harvest history.

Table 3-17: Difficult Regeneration Type Site Series

BEC Subzone	TEM Site Series	Site Description	Rationale	Total Area (ha)	Area Removed (ha)
ESSFwc3	01	Bl - Rhododendron - Oak fern	High elevation inoperable	5,387	497
	02	Bl - Rhododendron - Queen's cup			
	03	Bl - Globeflower - Horsetail			
ESSFwk2	02	Bl - Oak fern - Sarsaparilla	Occurs on very steep, shallow soil		
	31	Non-forested bog	Non-forested bog		
SBSmk1	10	Sb - Scrub birch - Sedge	Difficult to regenerate		
SBSwk1	11	SbSxw - Scrub birch - Sedge	Difficult to regenerate		
	12	SbPl - Feathermoss			

3.3.5 Non-Commercial Stands

All non-commercial species leading stands are removed from the THLB, this includes all deciduous species, Western red cedar, Western hemlock, and black spruce. Consistent with current practices, the deciduous component of conifer-leading stands has been modelled as a reduction in yield curve volume according to the percentage of deciduous cover within each stand. Table 3-18 summarizes the area lead by the non-commercial species and the resulted area removal.

Table 3-18: Non-Commercial Stand Summary

Species Code	Species Name	Total Area (ha)	Area Removed (ha)
AC	Poplar	837	3,172
ACT	Black Cottonwood	829	
AT	Trembling Aspen	585	
EP	Paper Birch	3,715	
CW	Western Red Cedar	204	
HW	Western Hemlock	3,917	
SB	Black Spruce	3,068	

Figure 3-4 shows the map of the leading species in TFL 30.

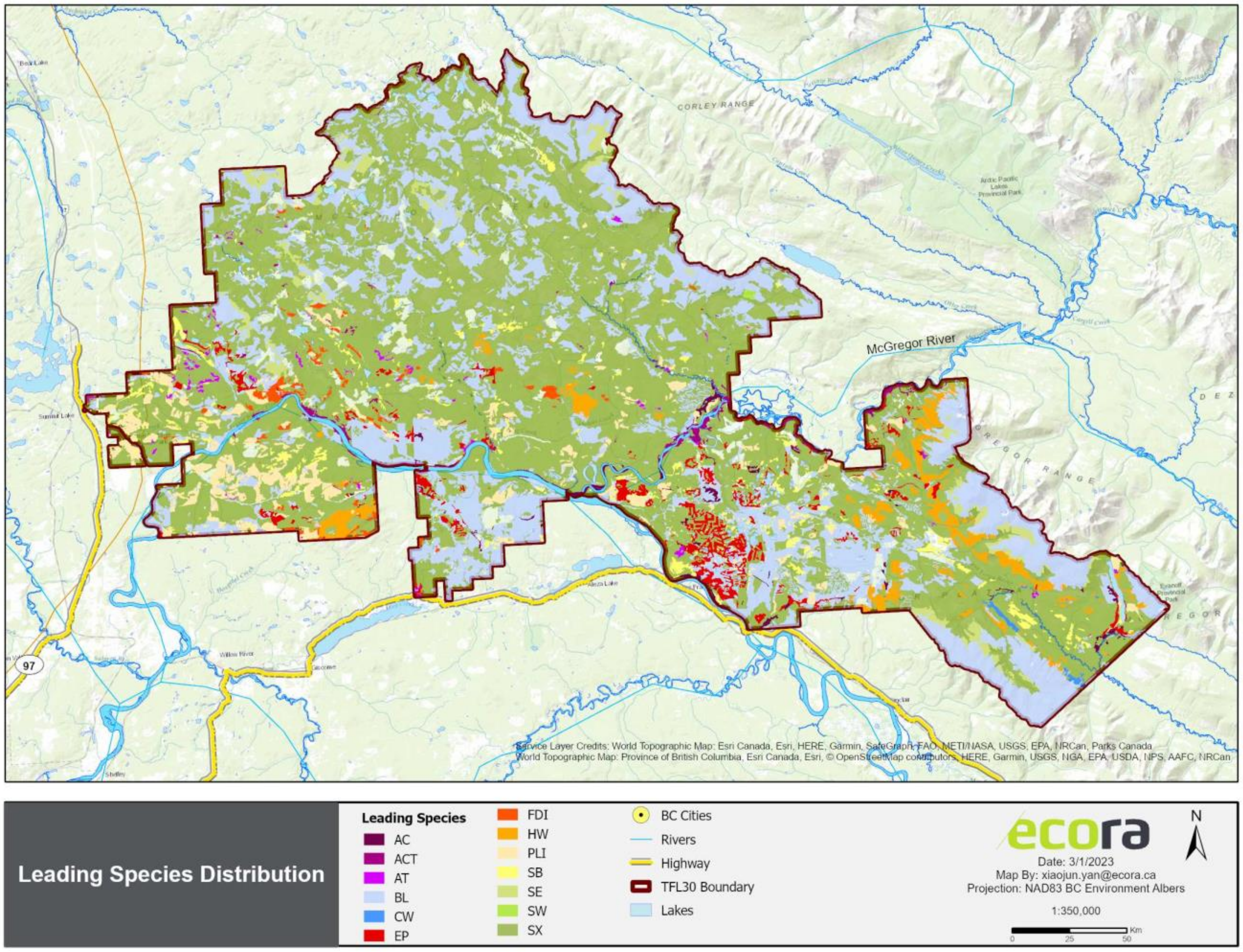

Figure 3-4 Map of Leading Species Distribution

3.3.6 Non-Merchantable – Mature

All stands without a harvest history that do not meet the minimum merchantability limits described in Table 3-19 are removed from the THLB based on the process employed in Section 6.1.3 Minimum Harvestable Criteria of the PG TSA Timber Supply Review Data Package (MFLNRORD, 2015).

Table 3-19: Minimum Merchantability Limits and Area Removal Summary

Harvest System	Leading Species	Age (Years)	Minimum Volume (m3/ha)	Total Area (ha)	Area Removed (ha)
Conventional	Pine Balsam Other	100 120 140	182	24,305	8,156

3.3.7 Low Productivity – Immature

Stands without a harvest history that are younger than the age limits identified in Table 3-19 are excluded from the THLB if the Potential Site Index (PSI) of the leading species is less than values identified in Table 3-20. In the absence of PSI data PSPL site index of the leading species was employed and where it was not available VRI site index was employed.

The minimum site index was assigned by running TIPSY at a density of 1700 stems per hectare for each leading species and adjusting the site index until it reached the minimum harvestable volume.

Table 3-20: Low Productivity Site Index Limits

Leading Species	Minimum Site Index	Total Area (ha)	Area Removed (ha)
Douglas Fir	8.5	1,080	8
Sub-Alpine Fir	8.0		
Hybrid Spruce	7.5		
Lodgepole Pine	10.0		

3.3.8 Cultural Heritage Resources and Archeological Sites

Archeological sites identified in

Table 3-21 were supplied by Canfor which included government data from the Archeological branch and Canfor identified sites.

Standard practices in place to manage cultural heritage resources and archaeological sites include the use of the 1999 Prince George District Archaeological Predictive Model, as well as the 2002 Norcan Archaeological Predictive Model. As the parameters are different within each model, both are utilized to ensure that there is a more comprehensive assessment for archaeological potential. For any low potential areas, unless evidence of cultural heritage resources is made known through information sharing or noted during the course of fieldwork, no further archaeological assessment work is completed. For moderate and high potential areas, if possible, they are typically included within reserves and WTP's. In the event that a high or moderate potential area cannot be avoided, archaeologists are used to assess the site and determine if any special management is required. Should any cultural heritage resource features be identified before or during harvesting or road construction, operations that may negatively impact these resource features will be suspended or modified.

In 2023, following the expansion of the Lheidli T'enneh N2E license, Canfor and Lheidli T'enneh members have established a Joint Stewardship Committee to facilitate changes in management practices within the Lheidli T'enneh Traditional Territory. As these practice changes get developed and applied to the TFL, they will be built into the TSR assumptions.

Table 3-21 Archeological Sites

Category	Total Area (ha)	Area Removed (ha)
Arch Sites	15	12

Potential archeological sites were included in the data, but not removed from the THLB. The total area in the THLB is depicted in Table 3-22.

Table 3-22 Potential Archeological Sites

Category	Total Area (ha)	THLB Area (ha)
Potential Arch Sites	5,702	953

3.3.9 Special Interest and First Nations Accommodation Blocks

Special interest and First Nations accommodation blocks were excluded from the THLB as summarized in Table 3-23.

These areas include blocks that have been identified by First Nations during operational development as being culturally important or sensitive. As a result, Canfor had made the commitment to defer harvesting in these areas until a later date when they may be reassessed in relation to First Nations key interests in the future. As these commitments still stand today, these areas will be treated as no harvest areas for this TSR.

Additionally, areas that harvesting has been avoided for a variety of reasons have also been included in this netdown. Some of the rationales for exclusion: rare ecosystems, special wildlife habitat features, non-First Nation stakeholder commitments (i.e. trapline and cabin impacts).

Table 3-23 First Nations Accommodation Blocks

Category	Total Area (ha)	Area Removed (ha)
Special Interest and First Nations accommodation blocks	2,026	733

3.3.10 Existing Wildlife Tree Patches

With respect to stand-level biodiversity, Canfor's FSP commits to ensuring that at least 7% of the total area of cutblocks harvested over a 12-month period will be retained as wildlife tree patches (WTP) and that at least 3.5% of each individual cut block will be covered by WTP if that cut block is greater than 15 hectares in size.

Operationally, retention requirements are first met using portions of the stand that do not typically contribute to timber supply (riparian areas, deciduous stands, unstable terrain, non-merchantable areas, and retention for visual quality and wildlife habitat). Existing WTPs were identified spatially from the RESULTS Forest Cover Reserve layer and Canfor reserve layer. The detail and procedure to identify future WTP is outlined in Section 3.3.11. The total area removed from THLB is shown in Table 3-24 below.

Table 3-24: Current WTP Area Summary

Criteria	Source	Total Area (ha)	Area Removed (ha)
silv_reserve_objective_code in ("WTR", “BIO”, “RMA”)	RESULTS Forest Cover Reserve	4,422	1,761
suty_type_id in ("RESRV", "WTRA")	CANFOR Reserves		

3.3.11 Isolated Patches

In the context of TFL30, a stand or aggregation of stands is deemed 'isolated' when it lacks accessibility via existing road networks and is simultaneously of insufficient magnitude to justify the construction of new roads for economic feasibility. These stands are designated as 'isolated patches' for the purposes of this analysis.

The methodology for identifying isolated patches within TFL30 encompasses the following steps:

- Existing road layer are buffered by a threshold distance to determine the accessible portion of the THLB. This threshold distance is indicative of the maximum range within which a harvesting machine can operate without necessitating new road infrastructure.
- The THLB polygons (prior to the exclusion of isolated patches) are dissolved to form a contiguous THLB layer. Subsequently, this dissolved layer is buffered by the aforementioned threshold distance to include adjacent stands accessible without new road construction.
- The accessible THLB layer and the buffered, dissolved THLB layer was intersected to pinpoint THLB parcels that fall outside the defined accessible THLB.
- The THLB area of these parcels is assessed against a pre-established size criterion (threshold size) to ascertain their economic viability.
- Parcels who’s original THLB area is below the threshold size limit are categorized as isolated patches. Conversely, parcels meeting or exceeding this size limit are not considered isolated.

Table 3-25 summarizes the outcomes of the isolated patch analysis, employing various combinations of threshold distance and size parameters. The findings suggest substantial accessibility across TFL30, coupled with a high degree of continuity in the THLB. Isolation, as per the criteria set forth in this analysis, is a rare occurrence within the TFL. Nonetheless, it is acknowledged that field operations might identify certain stands as inaccessible or isolated due to factors such as accessibility, sensitive soil conditions, riparian management practices, and road conditions. Such instances, not detectable via the source data utilized in this analysis, fall outside the scope of this report, which does not aim to serve as an operational-level plan.

Table 3-25: Isolated Patch Analysis Summary

Threshold Distance (m)	Threshold Size (ha)	Total THLB as Isolated Patch (ha)
500	1	0.23
200	1	1.34
200	5	4.41

Initially, the completion of the isolated patch analysis was intended to facilitate an examination of the potential impacts on harvest levels resulting from the exclusion of isolated patches from the base case THLB. However, the minimal size of the identified isolated patches renders such modeling efforts redundant, as their exclusion is unlikely to yield detectable impact in harvest levels within the base case.

3.3.12 Future Wildlife Tree Patches

In the last timber supply analysis (MP #10), the productive forest area of previous cutblocks and the associated WTP area was summarized. On average 7.8% of the total cutblock area was retained as WTP for blocks harvested between 1995 to 2013. This exceeds the 7% requirement set out by the FPPR Section 66 (1) to (3). Of the total cutblock area, approximately 11.5% of the area is occupied by productive non-THLB (including existing WTP areas). The non-THLB percentage of the productive forests outside of the harvested areas shows an even higher average at 21.3%.

The WTP to Non-THLB area summary found in Table 11 of the MP #10 Data Package shows that the productive non-THLB area is consistently greater than the amount of area required to be retained as WTP. The current practice has been focused in using the non-THLB areas to meet future WTP areas. The productive non-THLB to productive forest average suggest forest managers have more options to layout future WTPs in the productive non-THLB area.

Additionally, management for old forest objectives, visual quality and other habitat requirements will increase the amount of stand level retention and contribute to meeting WTP requirements without removing additional areas from the THLB.

Included in the previous Determination Letter from the Chief Forester was a request to revisit the use of THLB for WTP placement as the assumption applied in the MP #10 analysis was that there would be no need to set aside any THLB for future WTP due to the excess amount of non-THLB on the land base. No change to practices were made since the last MP, the majority of the non-THLB used in the creation of WTPs' is associated with riparian features, and it was felt that these were providing some of the best available options for WTP establishment.

To ensure the assumptions applied for future WTP's aligned with current practices, MP #10 THLB coverage, RESULTS Forest Cover Reserves, and Canfor reserves layers were assessed and analyzed to determine how much WTP placement over the last 10 years overlaps the MP #10 THLB.

The RESULTS Forest Cover Reserves layer was requested from BCGW on October 13, 2023 for the TFL30 extent and then was unioned to the Canfor reserves layer (also of TFL30) using QGIS a free and open-source geographic information system to create a composite reserves layer. Then this layer was intersected using QGIS with the MP#10 THLB coverage to identify the overlapping area between the reserves layer and MP #10 THLB layer. The analysis showed that 1.34% of the MP #10 THLB was reserved as WTP over the past 10 years, details summarized in Table 3-26. As a result, an aspatial reduction of 1.34% will be applied across all stands identified as THLB in Section 3.3.10 as future WTP. Table 3-27 summarizes the area removal.

Table 3-26: WTP and MP #10 THLB Overlap Assessment Results

Layer Description	Area (ha)	% of MP#10 THLB
Canfor reserves layer	156	1.34
RESULTS FC Reserves (OTH excluded)	4,485	
RESULTS and Canfor Reserves Unioned	4,559	
MP #10 THLB	122,345	
Reserves Overlapping with MP#10 THLB	1,636	

Table 3-27: Future WTP Reductions

Category	Percent THLB Removed (%)	Area Removed (ha)
Future WTP	1.34	1,395

4. Current Forest Management Assumptions

The primary purpose of the timber supply analysis is to project the timber supply that could be obtained from the TFL based on current practices and legal requirements. This timber supply projection is often referred to as the base case.

The following sections describe the modelling assumptions related to harvest and utilization specifications, objectives set by government and/or committed by Canfor through their FSP process on the TFL.

4.1 Harvesting

Under MP #10, effective February 6, 2014, the current AAC for TFL 30 is 412,500 m^3/yr (21,312 m^3 allocated to BCTS: 391,188 m^3/yr). In the previous management plan, base case harvesting quickly transitioned to managed stands at year 50, after this transition the average harvest age remains at 82 years of age, and the average volume per hectare (VPH) oscillates between 317 and 444 m^3/ha until the end of the planning horizon.

Based on Canfor Cut Control Performance Summary, the average total cut control volume per year since 2015 is around 397,000 m^3.

4.2 Utilization Levels

The utilization levels define the maximum stump height, minimum top diameter inside bark (DIB) and minimum diameter (outside bark) at stump height. For yield table projections, specifications for minimum stump diameter are converted to a corresponding diameter at breast height (DBH). Table 4-1 shows the TFL 30 utilization levels.

Table 4-1: Harvest Merchantability Specifications Utilized in TFL 30

Leading Species	Minimum DBH (cm)	Maximum Stump Height (cm)	Minimum Top DIB (cm)
All conifer except pine	17.5	30	10
Pine	12.5	30	10

4.3 Volume Exclusions for the Deciduous Component of Conifer-leading Stands

Consistent with current practices the deciduous component of conifer-leading stands is not harvested and as a result deciduous volume within mixed stands does not contribute to the timber supply.

The yield curves for the harvestable volume for these stands are adjusted to exclude deciduous volume and the total volume yield curve (including deciduous) are used to account for the THLB growing stock. The total volume of a mixed stand is assumed to be all coniferous when evaluating against the minimum harvestable volume criteria outlined in Section 4.4, because the stand has lower harvestable volume not due to poor site productivity but due to species diversity.

Table 4-2: Volume Exclusions for the Deciduous Component of Mixed Species Types

Mixed Stand Type	Species	Volume Exclusion (%)
All conifer leading	Deciduous	100

4.4 Minimum Harvestable Criteria

The minimum harvest volume (MHV) or minimum harvestable age (MHA) is the volume or age that a stand must attain before it is considered economically available for harvest (natural or managed). While harvesting may occur in stands at the minimum volume or age to meet certain modelling objectives, most stands will not be harvested until past the minimum criteria due to management objectives for other resource values.

The MHA and MHV follow the same assumption as the PG TSA Timber Supply Review Data Package (FLNRORD, 2015), herein referred as the PG TSR V. The MHA will be set based on the age at which a stand reaches 95% of Culmination Mean Annual Increment (CMAI); the age in the growth cycle of a tree or stand at which the mean annual increment (MAI) for height, diameter, basal area, or volume is at a maximum.

To define the lower bounds of merchantability, FAIB conducted a statistical analysis of harvest appraisal data. Analysis was completed for all cutting permits issued over the past 30 years to determine minimum volumes per hectare for merchantability using data from the Electronic Commerce Appraisal System. From this analysis, a minimum conifer VPH criterion was established at 182 m^3/ha.

4.5 Silviculture Systems

The base case assumes clearcut with reserves silviculture system in TFL 30. Under this system, a range of patch sizes (one to several hundred hectares) of even-aged forest is produced. A characteristic of this system is the maintenance of older forest remnants within harvest blocks. These remnants are intended to function as wildlife tree patches, riparian management zones and reserves, and island remnants to conserve old growth characteristics. Cutting of adjacent blocks is restricted until harvested areas have reached a specified minimum height.

4.6 Non-Recoverable Losses (NRL)

Unsalvaged losses are those endemic losses of timber on the THLB resulting from factors such as fire, wind, insects, and disease that are not captured through decay, waste, or breakage in VDYP or operational adjustment factors in TIPSY. Estimates of timber damage, less salvage, are made for the various categories of losses and this volume is subtracted from the harvest volume predicted by the timber supply model.

Epidemic or catastrophic losses are not included in unsalvaged losses estimates. Their inclusion will exaggerate the losses and skew the analysis results. Epidemic losses incurred since the last inventory update should have been reflected in the inventory used for this analysis. Epidemic losses incurred during the period of this MP will be reflected in the updated inventory and in the next timber supply review.

Past performance has demonstrated that protection measures within the TFL have been effective at minimizing natural disturbances. When they do occur, Canfor has been aggressive in salvaging damaged timber. Over the past 20 years, salvaged timber has accounted for 20 to 25% of annual harvested volume. As a result, minimal unsalvaged losses have been incurred.

Since the last AAC determination, Canfor has determined that unsalvaged losses have remained consistent with figures used under MP #8 and that no changes are anticipated. Therefore, the unsalvaged loss estimates used under MP #9 and MP #1010 will also be applied under MP #11 as depicted in Table 4-3.

Table 4-3: Non-Recoverable Loss (NRL) Estimates

Damaging Agent	Gross Volume Loss (m^3/yr)	Volume Salvaged (m^3/year)	NRL (m^3/year)
Insects (Epidemic)	37,420	35,940	1,480
Wind	19,700	18,540	1,160
Fire	10,200	9,200	1,000
Total	**67,320**	**63,680**	**3,640**

4.7 Forest Health

The 2022 Accumulative Aerial Overview Survey (AOS) data for TFL 30 was assessed to address current forest health on the TFL. The surveyed results for spruce beetle (IBS) are shown in Table 4-4.

Table 4-4: AOS Area Summary

Forest Health Factor	Severity Rating	Gross Area (ha)	CFLB (ha)	THLB (ha)
IBS	VS (Very Severe)	0	0	0
	S (Severe)	24	20	19
	M (Moderate)	3,027	2,648	1,498
	L (Low)	16,654	14,483	7,994
	T (Trace)	606	581	160

The AOS data has also identified areas with Western balsam bark beetle and aspen leaf miner with low and trace severity rating. There is also a minor amount of area identified with Pine needle cast, Dothistroma needle blight and Western hemlock looper. No other major forest health factor has been identified on TFL 30.

Harvest in stands with an IBS severity rating of severe or moderate will be prioritized in the forest estate model in the first period. Canfor is an active participant in the ongoing Omineca Region discussion regarding the Omineca Region spruce beetle outbreak. TFL 30's forest health management is being considered within the context of this larger forest health concern. While the AOS data is a coarse filter tool, not meant for stand level monitoring, it is being used to inform planning activities. Cruise data provides confirmation of forest health status at the time of data collection.

It should be noted that the Chief Foresters expectation letter around prioritization of stands, would not flag any of the stands within TFL 30 for priority harvest. Canfor currently has a hauling and milling strategy that is used to ensure that the potential for IBS spread during hauling activities is minimized. Additionally, funnel trap monitoring is used to monitor both the timing and the intensity levels of beetles' flights at various times of the season. Harvesting to address to forest health management activities will be modelled within the various other landscape level constraints.

4.8 Disturbing the non-THLB

In timber supply analysis, unless disturbances are explicitly modelled, the productive non-THLB continues to age throughout the planning horizon which likely overestimates its contribution to meeting various forest cover objectives. This issue is being addressed by modeling natural disturbances across the non-THLB. The natural disturbance assumptions define the extent and frequency of stand initiating natural disturbances such as fire or insect infestation.

This section describes the process of disturbing the non-THLB used in the base case scenario. This approach mimics the natural disturbance regimes and natural range of variation for each BEC unit in accordance with the Forest Practices Codes of British Columbia Biodiversity Guidebook (BGB) (MoF, 1995). This is done by:

1. Calculating the annual natural disturbance area required to achieve the natural disturbance return intervals within each BEC unit (Figure 4-1) in the BGB; and

2. Imposing an annual natural disturbance on the non-THLB that is equivalent to the areas calculated above.

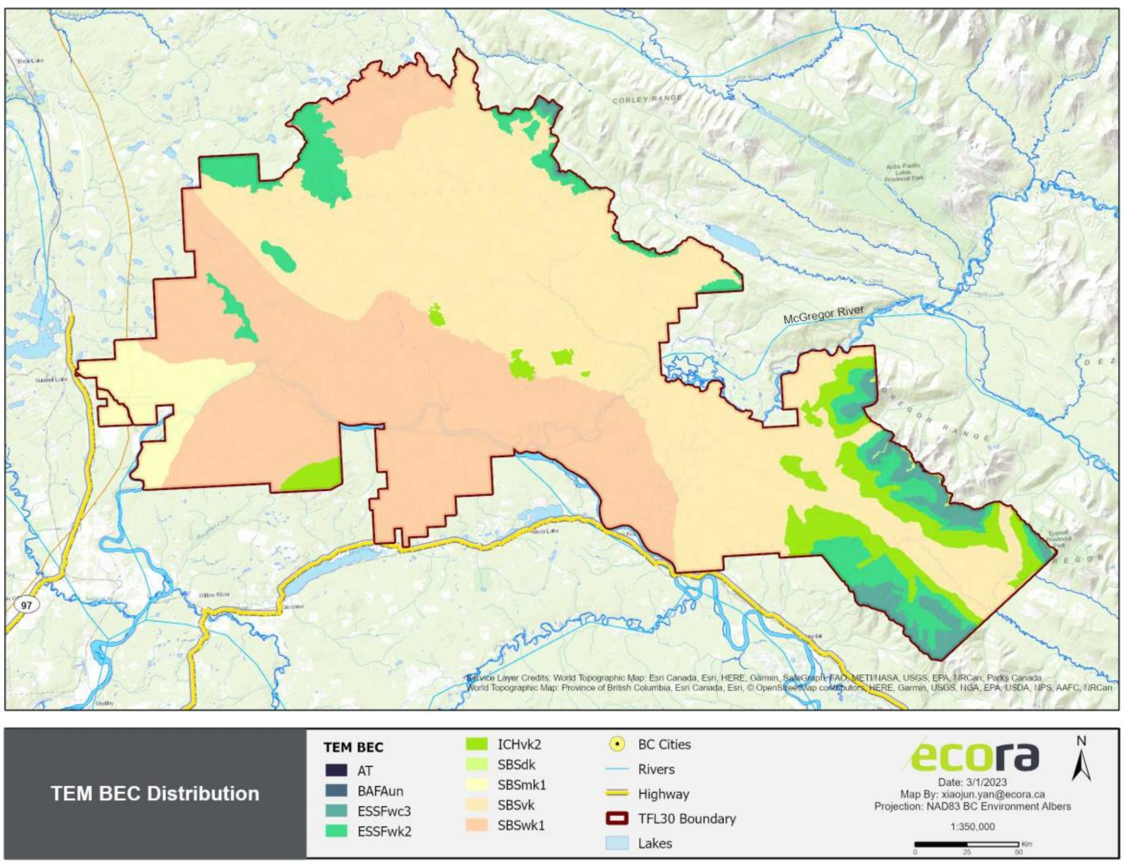

Figure 4-1 Map of TEM BEC Distribution

The disturbance return interval and the old age definition from the BGB for each NDT / BEC was used to calculate an annual disturbance target area as shown in Table 4-5. The area of disturbance varies based on the amount of non-THLB present, their associated natural disturbance intervals and old age definition.

The process used to calculate the annual disturbed area is as follows and is referenced from the 2023 Kispiox Timber Supply Area Timber Supply Review Data Package Section 7.6:

1. Calculate the % area greater than old: **% area old** = exp(-[old age / disturbance interval])
2. Calculate the effective rotation age: **effective rotation age** = old age / (1- % area old)
3. Calculate the annual disturbance target area: **area disturbed** = non-THLB / effective rotation age

Table 4-5: Non-THLB Annual Disturbance

TEM BEC	NDT	Disturbance Interval (years)	Old Age From BGB	Percent Area Old	Effective Rotation Age	Non-THLB Area (ha)	Annual Disturbance (ha)
ESSF	1	350	250	49%	490	8,591	18
ICH	1	250	250	37%	395	1,603	4
SBS	1	250	250	37%	395	2,320	6
ESSF	2	200	250	29%	350	652	2
ICH	2	200	250	29%	350	3,070	9
SBS	2	200	250	29%	350	33,559	96
SBS	3	125	140	33%	208	1,808	9
Total							**143**

At the beginning of the analysis, polygons are randomly selected from the non-THLB until the annual natural disturbance targets are met. A disturbance schedule is then developed for these polygons and this schedule is enforced on the model prior to the harvest schedule optimization, thereby simulating the impacts of natural disturbance on the harvest schedule.

4.9 Resource Management Objectives

Resource Management Zones (RMZs) identify areas with differing resource management objectives, to reflect non-timber values on the land base. Each resource management objective has specific forest cover objectives (either retention or disturbance requirements) applied.

The delineation of RMZs is guided by legally established objectives, such as those contained in Land and Resource Management Plans (LRMPs), Government Action Regulation (GAR) orders and other forest management considerations. Where RMZs overlap, the more stringent requirements take precedence.

The following subsections describe the resource management objectives that are to be achieved in the timber supply analysis while still allowing trees to be harvested. Management objectives for which harvesting is not permitted are not listed under this section as they are addressed through the netdown process described in Section 3.

Table 4-6 shows the resource management objectives applied in the TFL 30 timber supply analysis.

Table 4-6: Resource Management Objective Summary

Resource Management Objectives	Modelling Approach
Landscape-Level Biodiversity	Not modelled. Met by FSP spatial OGMA
Forest Health (IBS)	Harvesting in stands with AOS severity in severe and moderate will be prioritized in the first 5 years
Visual Quality Objectives	Manage within the maximum allowed visual disturbance percent for the FMLB of the visual landscape inventory polygons with effective visual quality objectives
Patch Size Distribution	Apply the patch size distribution targets for each NDT FMLB
Cutblock Size Limit	Apply a minimum opening size limit of 5 ha
Ungulate Winter Range Caribou Corridors	Meet the minimum retention and maximum disturbance constraint in the UWR units
Sensitive Watershed	Meet the threshold for ECA and PFI according to stand height and watershed sensitivity rating within the TFL 30

4.9.1 Ungulate Winter Range – Caribou Corridors

Ungulate winter range Order U-7-003 specifies general wildlife measures (GWM) across three critical habitat classifications: Caribou high; Caribou medium; and Caribou corridors.

Only caribou high and caribou corridor habitat types exist in TFL 30. As noted in Section 3.2.2, all high value habitat areas are removed from LHLB.

Within the caribou corridor zones harvesting activities will result in a minimum of 20% of the FMLB within each UWR unit greater than 100 years of age and a maximum of 20% of the THLB less than 3 m in height at any point in time.

Table 4-7 shows the caribou corridor zones and the constraints applied to each unit.

Table 4-7: Caribou Corridor Zones

UWR Unit	Description	Minimum Retention Constraint	Maximum Disturbance Constraint	Non-THLB (ha)	THLB (ha)
P-042	Corridor	20% > 100 years	20% < 3m		
P-046	Corridor	20% > 100 years	20% < 3m	2,680	1,542
P-047	Corridor	20% > 100 years	20% < 3m		

4.9.2 Management Practices Influencing Moose Habitat

First Nations with territories that overlap with TFL 30 have expressed an interest in collecting better information around management practices that influence moose habitat quality and quantity within TFL 30. Additional information will be provided following discussions with each of the First Nation Bands.

This information and any associated results will be incorporated into the Analysis Report and Management Plan.

4.9.3 Landscape-Level Biodiversity

The goal of seral stage distribution targets is to maintain the diversity of seral stages and disturbance regimes found within various ecosystems. This diversity is important because the composition of plant and animal communities change as forest stands develop through time after a disturbance. Various life forms find their habitat requirements from various stages of forest development and most specialist species are associated with either the early herb/shrub stage or the mature to old seral stages.

The objectives for old seral distribution for TFL 30 follow the Provincial Non-Spatial Old Growth Order and are also described in Canfor's FSP. Management objectives for seral stage distribution apply to BEC subzone/variants within each landscape unit and vary depending on the assigned biodiversity emphasis option. These objectives are currently fulfilled with approved draft OGMAs as described in Section 3.2.3.

4.9.4 Cutblock Adjacency and Patch Size Distributions

Cutblock adjacency and patch-size distribution targets within the THLB are used to guide the structural characteristics left after harvest towards the temporal and spatial distribution of openings that would result from natural disturbances. This is an important consideration for values related to hydrology and landscape level biodiversity.

Requirements for harvesting adjacent to an existing harvest block are set through the FPPR. The FPPR specifies that timber must not be harvested on a new harvest block unless the tallest trees on a minimum of 75% of the net area to be reforested on all existing adjacent cut blocks are at least 3m in height. There can be circumstances when adjacency requirements are not required, for example for salvage harvest and applying patch size distributions consistent with biodiversity directions.

While no objectives for patch size distribution are specified in the FSP, current practice for managing patch size distribution is consistent with MP #10. Recommendations for patch size distribution for cut and leave areas of each natural disturbance type (NDT) are provided in the section "Temporal and spatial distribution of cut and leave areas" of the *Forest Practices Code Guidebook Biodiversity Guidebook* (Biodiversity Guidebook, 1995). These targets are shown in Table 4-8 below and applied to the base case.

Table 4-8: Seral Stage Objectives

NDT	Patch Size Category	Patch Size Class (ha)	Target Distribution Range (%)	FMLB (ha)
NDT 5	NA	NA	NA	100
NDT 3	Small Medium Large Extra Large	< 40 40 – 250 250 – 1000 > 1000	10 – 20 10 – 20 60 – 80 0	6,593
NDT 2	Small Medium Large Extra Large	< 40 40 – 80 80 – 250 > 250	30 – 40 30 – 40 20 – 40 0	129,139
NDT 1	Small Medium Large Extra Large	< 40 40 – 80 80 – 250 > 250	30 – 40 30 – 40 20 – 40 0	19,201

These targets are implemented in the forest estate model with the intention to guide harvest scheduling sequence to generate desired patch size distribution over the land base. Therefore, these constraints are not heavily reinforced. In doing so, the harvest level will not be significantly impacted, and the land base will reach desired patch size distribution in the long-term. Patch size distribution of the base case scenario will be described in the subsequent Timber Supply Analysis Report. For modelling purposes, the patch that is considered in this objective is one or more young stands of 20 years old or younger and is within 50m of each other as identified by the forest estate model.

4.9.5 Cutblock Size Limit

Current operational practice in TFL30 does not create cutblocks less than 5 ha in size. This will be modelled as a product patch size constraint in conjunction with grouping the fragment file used in modelling to reduce polygons too small in size. There is no maximum cutblock size limit in this analysis as FPPR Section 64 (2) (1) (ii) states that the maximum cutblock size defined in FPPR Section 64 (1) (b) does not apply to an agreement holder where timber harvesting is designed to be consistent with the structural characteristics and the temporal and spatial distribution of an opening that would result from a natural disturbance. Patch-size distribution targets applied in the basecase are designed to mimic the temporal and spatial distribution of openings on the land base resulted from natural disturbances.

4.9.6 Watersheds

As part of Canfor's Sustainable Forest Management (SFM) certification process, watershed values are managed according to the concepts of Risk Management. Risk Management is a function of the watershed hazards and the sensitivity of the watershed to those hazards.

To meet the objectives of the Sustainable Forestry Initiative (SFI), the selected watershed hazard to be investigated is increased peak flows associated with large-scale disturbances. The indicator chosen to quantify this hazard is the hydrological equivalent disturbed area (HEDA). The HEDA is the same as the more commonly used ECA calculation however HEDA also includes an accounting for the hydrological effects of dead pine forests caused by the recent pine beetle infestation. The HEDA (and the ECA) simply accounts for the total effect of extensive disturbances in the watershed on potential increases in peak flows and hydrological recovery (Winkler and Boone, 2015). Since the hazard considered is increased peak flows, the assessment of watershed sensitivity is directly related to this hazard.

A watershed sensitivity rating is determined for each watershed of interest. In 2014, Canfor contracted P. Beaudry and Associates Ltd. to prepare watershed sensitivity ratings and recommended HEDA values for the critical watersheds in the TFL 30 operating area. Thirty individual watersheds in TFL 30 were assessed. The delineation of the watershed boundary, physical characteristics, and its inherent sensitivities as well as the watershed sensitivity rating and recommended HEDA thresholds and supporting data are detailed in the Hydrological Sensitivity Ratings and Maximum Recommended HEDA Values for 30 Individual Watersheds in TFL #30 Operating Area (P. Beaudry and Associates Ltd., 2014).

In BC, the development of the hydrological recovery curves has evolved using field research conducted mostly in the Southern Interior and on the Coast. The published hydrological recovery curves do not align well with the maximum stand height at maturity in the Northern Interior. In many cases, the maximum stand height is well below 25m (maximum mature height from Winkler and Boon, 2015). The issue with using the 2015 curve to calculate hydrological recovery is not realistic, since most stands in the Northern Interior would never reach hydrological recovery when mature. Proposed Snow Recovery Curves for Stand Classes with Maximum Height Between 12 and 25 m in the Upper Fraser Area of Northern BC by P.Beaudry and Associates Ltd in 2021 presents the more appropriate curves to be used for stands that would never reach recovery at stand maturity if applying the Winkler curves.

Based on the report (P.Beaudry and Associates Ltd., 2021), HEDA is calculated as 100% - the area-weighted hydrological recovery (%) average of each watershed. The hydrological recovery (%) for each stand is determined by first categorizing each stand to one of the four classes based on the maximum tree height at maturity. This analysis used the age when the stand reaches the CMAI as the age of maturity. Based on the dominant height of the stand and the stand class, the hydrological recovery can be looked up from Table 4-9. As stand height increases, hydrological recovery increases with full recovery achieved once the stand reaches 15 to 25 m depending on the stand class.

Table 4-9: Hydrological Recovery of Tree Height

	Maximum Tree Height at Maturity			
Hydrological Recovery (%)	**< 15 m**	**15 to 18 m**	**18 to 20 m**	**> 20 m**
0	1	1	0.9	0.8
0	2	2	1.5	1
0	3	2.5	2	1.5
5	4	3.5	3	2.7
10	6	5.5	5	4.5
15	6.1	5.7	5.4	5
20	6.2	5.9	5.9	5.5
25	6.3	6.1	6.3	6
30	6.4	6.3	6.7	6.5
35	6.5	6.5	7.1	7
40	6.5	6.6	7.6	7.5
45	6.6	6.8	8	8

50	6.7	7	8.4	8.5
55	6.8	7.2	8.8	9.1
60	6.9	7.3	9.3	9.8
65	7	7.6	9.7	10.5
70	7.4	7.9	10.1	11
75	7.8	8.5	10.8	12
80	8.5	9.2	11.8	12.8
85	9.2	10.2	13	14.1
90	10.3	11.3	14.4	15.7
95	12	13.7	16.5	19
100	15	18	20	25

HEDA threshold values, excluding those prescribed in the legal Fisheries Sensitive Watersheds (FSW) order are shown in Table 4-10.

Table 4-10: Maximum HEDA Threshold Values

Watershed	HEDA Threshold (%)
Amanita Creek	59.3
Antonson Creek	47.0
Averil Creek	36.6
Barney Creek	74.0
Bearman Creek	47.6
Herring Creek	32.2
Hubble Creek	48.5
Limestone Creek	41.7
Mokus Creek	47.6
Ogilvie Creek	53.4
Olsson Creek	32.3
Tay Creek	43.6
West Torpy River	27.8
Woodall Creek	56.1
TFL_30_No-name-1	52.8
TFL_30_No-name-2	43.2
TFL_30_No-name-3	59.3
TFL_30_No-name-4	69.3
TFL_30_No-name-5	69.3
TFL_30-No-name-6	50.7
TFL_30-No-name-7	71.0
TFL_30-No-name-8	57.9
TFL_30-No-name-9	78.9
TFL_30_No-name-10	69.3
TFL_30_No-name-11	59.3
TFL_30_No-name-12	69.3
TFL_30_No-name-13	53.5
TFL_30_No-name-14	55.3

Watershed	HEDA Threshold (%)
TFL_30-No_name-15	78.9
TFL_30_No-name-16	51.1

FSW Order# F-7-001 given under the authority of sections 14(1) and 14(2) of the Government Actions Regulations (B.C. Reg. 582/2004) was approved in March 2013. This FSW covers the Seebach Creek watershed and has been included in the previous analysis. The ECA threshold for FSW Order# F-7-001 is shown in Table 4-11.

Table 4-11: FSW Peak Flow Index Maximum Threshold Values

Watershed	Subunit	Maximum ECA Threshold (%)
Seebach Creek f-7-001	Entire FSW	25
	Unit #2	30
	Unit #3	30

4.9.7 Visual Quality Objectives

To manage the visual impacts of harvesting on crown land, the government delineates and classifies visually sensitive areas for scenic management as part of the visuals landscape inventory (VLI). Visual quality objectives ensure that forestry activities are managed so that the size, shape, and location of cut blocks and roads fit with the landscape's natural character.

Operationally, the management of visual quality objectives for a scenic area is based on meeting requirements from specific viewpoints (i.e., a perspective view). However, for strategic modelling such as timber supply analysis, these objectives must be translated to a planimetric ("plan") view. To model in a plan view, visual management specialists in the ministry have developed procedures that are described in the Procedures for Factoring Visual Resources into Timber Supply Analyses (MoF, 1998), and the update bulletin Modelling Visuals in TSR III (MoF, 2003).

Polygons selected to achieve the effective visual quality objectives (EVQO) have been identified in the VLI and have been classified based on their permissible visually effective disturbance level. Within these classifications, categories of visual absorption capacity (VAC) help define the maximum percent (%) alteration allowed in each VLI polygon. The alteration limits depicted in Table 4-12 are applied to the clearcut silviculture system.

Table 4-12: VQO Assumptions

VQO Class	% Alteration by VAC (Perspective View)			
	Low	Medium	High	FMLB (ha)
Retention	0	0.75	1.5	0
Partial Retention	1.6	4.3	7.0	5,109
Modification	7.1	12.6	18.0	6,262
Maximum Modification	18.1	24.1	30.0	0

A 1m x 1m Digital Elevation Model (DEM) based on LiDAR is used to derive the average slope for each VLI polygon. Average slope for areas without LiDAR is based on the 25m x 25m provincial DEM layer.

The Perspective to Plan (P2P) and Visually Effective Green-up (VEG) heights are derived for each VLI polygon based on the values shown in Table 4-13 and Table 4-14.

The maximum alteration percentage in plan view for each VLI polygon is calculated based on the assigned VQO and P2P ratio. For example, a maximum 7% alteration is assigned to a VLI polygon classified as 'PR', which is then multiplied by the P2P ratio depending on the average polygon slope. The VEG height is determined for each VLI polygon found in TFL 30 based on the average slope calculated using the same methodology.

Table 4-13: VQO VEG Height Requirement

Category	Slope Classes (%)										
	0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-45	46-50	51-55	56-60	61+
VEG (m)	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5

Table 4-14: VQO P2P Ratios

Category	Slope Classes (%)							
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	70+
P2P	4.68	3.77	3.04	2.45	1.98	1.6	1.29	1.04

5. Growth and Yield

Knowledge of timber volume available from a forest stand over time is a critical input for timber supply modelling. Growth and yield models are used to generate volume estimates and projections based on the characteristics of a forest stand. The assumptions, inputs and outputs used in these models are documented in the following sections. Stands are classified as natural or managed depending on their silviculture history and origins.

5.1 Silviculture History

In TFL 30, recorded harvest history dates to the early 1940’s, however minimal if any silviculture was practiced until around 1978. A MP #10 review of RESULTS data for blocks harvested between 1978 and 1985 show that approximately 88% of regenerated areas are from planted stock (stock type code = ‘ART’). This increases to 93% for blocks harvested between 1986 and 1987 and 96% for blocks harvested after 1998.

In 1990, the practice of using genetically improved seed began, gradually increasing as the availability of genetically improved stock increased. By 1998, continuing to present time, all planting stock used on TFL 30 is from genetically improved seeds.

A small portion of the existing managed stands were fertilized in 2006 as part of an incremental silviculture project. Theses are not modelled separately in the growth and yield model.

Starting in 2010, Canfor began planting weevil tolerant seedlings and walk-through surveys of these plantations suggest that attack rates have been reduced by over 95% in these plantations.

Overall, in the past 10 to 15 years, planting with pine has been reduced to avoid Commandra blister rust in drier MPB infested areas. Dothistroma needle blight also impacted the pine mixed stands regenerated during that period (Spendiff, personal communication, October 25, 2022). Aside from some plantations established between 1975 and 1978 there has been minimal pine planted on the TFL. Some existing pine plantations have been impacted by Dothistroma needle blight where the growth has been negatively impacted. Dothistroma needle blight usually appear after free growing, where the tree crowns of affected stems become spindly, chlorotic and lose needles over time. Not enough data has been gathered on Dothistroma needle blight impact in the TFL, therefore the yield assumptions follow the summarized data from RESULTS.

There is no backlog not satisfactorily restocked (NSR) stands on TFL30, therefore all harvested non-treed polygons from the VRI are included in the THLB and will be considered as future managed stands.

Canfor began to plant at 1,450 stems per hectare (SPH) since 2014 based on a review of the planting records. Since 2021, Canfor committed to plant 1,700 SPH in all planting operations. (Spendiff, personal communication, November 24, 2022). The changes in planting density are not modelled in the yield projection as the increase in initial planting density is to balance the anticipated mortality associated with recent reductions in the use of herbicide treatments and increases in site preparation and manual treatments to address competition.

Additionally, RESULTS Forest Cover Inventory, RESULTS Forest Cover Silviculture and RESULTS Standard Units data were analyzed and summarized to capture the changes in regen delay, initial planting density, species composition, and natural ingress information for the basic silviculture assumptions.

Based on this information, stand yield will be modelled using the silviculture eras described in Table 5-1 below.

Table 5-1: Silviculture Eras

Harvest Year	Stand Age in 2023	Silviculture Era
<=1977 or None	Age >=46	R0 – Existing natural stands
1978 to 1997	Age >=26 and <=45	R1 – Existing managed stands – no genetic gain (CMI plots established for these stands)
1998 to 2009	Age >=14 and <=25	R2 – Existing managed stands – genetic gains
>=2010	Age <=13	R3 – Existing and Future managed stands – weevil tolerant stock, higher planting density and higher genetic gain

5.2 Growth and Yield Models

Stands harvested prior to 1978 or those without harvest history information are classified as existing natural stands with yield projections produced using the Variable Density Yield Prediction (VDYP) model version 7.19h.

All stands since 1978 with a harvesting history are classified as managed stands with yield projections produced using the Table Interpolation Program for Stand Yields (TIPSY) Version 4.4.3 or TADAM (TASS Approximation by a Dynamical Aggregated Model).

Developed by the Ministry, VDYP is an empirical growth and yield model that is based on a large temporary (52,000 plots) and permanent (9,300 plots) sample plot database collected from mature natural forests in British Columbia. Decay, waste, and breakage estimates are incorporated within VDYP and are based on BEC loss factors using a decay sample tree database, which consists of more than 82,000 trees. VDYP7 is the latest version of the model used by the Ministry for projecting British Columbia's forest inventory estimates. Input information for VDYP7 is based on VRI attributes, typically at the individual forest polygon level.

TIPSY on the other hand, provides yield tables for single-species and even-aged stands based on the interpolation of yield tables generated by the individual tree growth model tree and stand simulator (TASS). TIPSY retrieves data from its database of TASS II-generated yield tables, customizes the information and displays summaries and graphics for a specific site, species, and management regime. Mixed species yield tables generated by TIPSY are weighted averages of single-species yields and do not directly consider inter-species interactions.

Input information for TIPSY is based on stand initiation characteristics including species, initial density, regeneration method (planted or natural), genetic gain, and potential site index. TIPSY also enables consideration for various silviculture treatments, forest health, and general operational adjustment factors.

TASS II, developed by the Ministry, is an individual tree-level model for commercial species of British Columbia. TASS II predicts the potential growth and yield of even-aged and single species stands by modelling individual tree crown dynamics and the crown relationship to bole growth and wood quality. The resulting model was then calibrated to data from approximately 15,000 permanent sample and research plots in B.C., Alberta, the U.S. Pacific Northwest, Europe and New Zealand. The individual tree and crown focus makes TASS II well suited for predicting the response to many silviculture treatments and the exploration of stand dynamics. TASS III is a recently released version that extends TASS into more complex stand structures including multiple-species and multi-age cohorts although the current number of species modelled by TASS III is limited.

TADAM, developed by Oscar Garcia at University of Northern British Columbia, is a growth model for BC coastal Douglas-fir, interior lodgepole pine and interior white spruce plantations. The model is based on stand-level dynamical system approximation to output from TASS II (Garcia, 2005).

5.3 Analysis Units

Analysis units (AUs) are aggregations of stands with similar species composition, site productivity and treatment regimes for growth and yield modelling. The number of AUs created will depend on the size and heterogeneity of forests in the land base. A timber volume projection (yield table) is created for each AU based on a growth and yield model. This projection is based either on an area-weighted average of yield tables from within the AU or on a yield table derived from an area-weighted average of forest characteristics for the AU. There are three categories of AUs: existing natural stands, existing managed stands, and future managed stands.

To capture the heterogeneity of natural stands that exist on the land base, a yield table is created for each existing natural stand VRI polygon. The individual feature id of the VRI is used to identify each natural stand AU.

Managed stand AUs were created based on TEM site series to characterize the site-level ecological characteristics and key silviculture periods to distinguish major changes in regeneration practice. These AUs implement inputs based on an aggregation of RESULTS planting records and related information to generate TIPSY-based yield tables for managed stands.

5.4 Height Adjustment Using ITI

Ecora will use LiDAR data to decrease sources of error that exist in the current VRI process. It is well known that height is a feasible and accurate stand attribute derived from LiDAR. Using a specific methodology described in this section, Ecora will adjust VRI heights using ITI derived from the high-density LiDAR dataset acquired in 2017 and 2018. ITI data needs to be converted to stand-level height to be effectively used as an input into VDYP projections.

Ecora has tested five different methodologies to adjust VRI heights (Ecora, 2018) and compared these results with a re-interpreted VRI polygon. This analysis identified consistency and inconsistency between VRI interpreters, which can be considered an important source of error in the VRI interpretation process.

The best methodology to calculate the adjustment height is by averaging tree height of the 1st-20th percentile. This method was the most reasonable and conservative approach to estimating tree height from ITI data at the stand-level. Excluding the tallest trees (outliers), this approach also prevents edge effect trees from distorting the average tree height, successfully representing dominant trees in the stand. Figure 5-1 shows the ITI trees ranked by height within a VRI polygon for four VRI polygons. The average tree height of the 1st-20th percentile can be interpreted as the tree height values between the 99% to 80% line on the graphs.

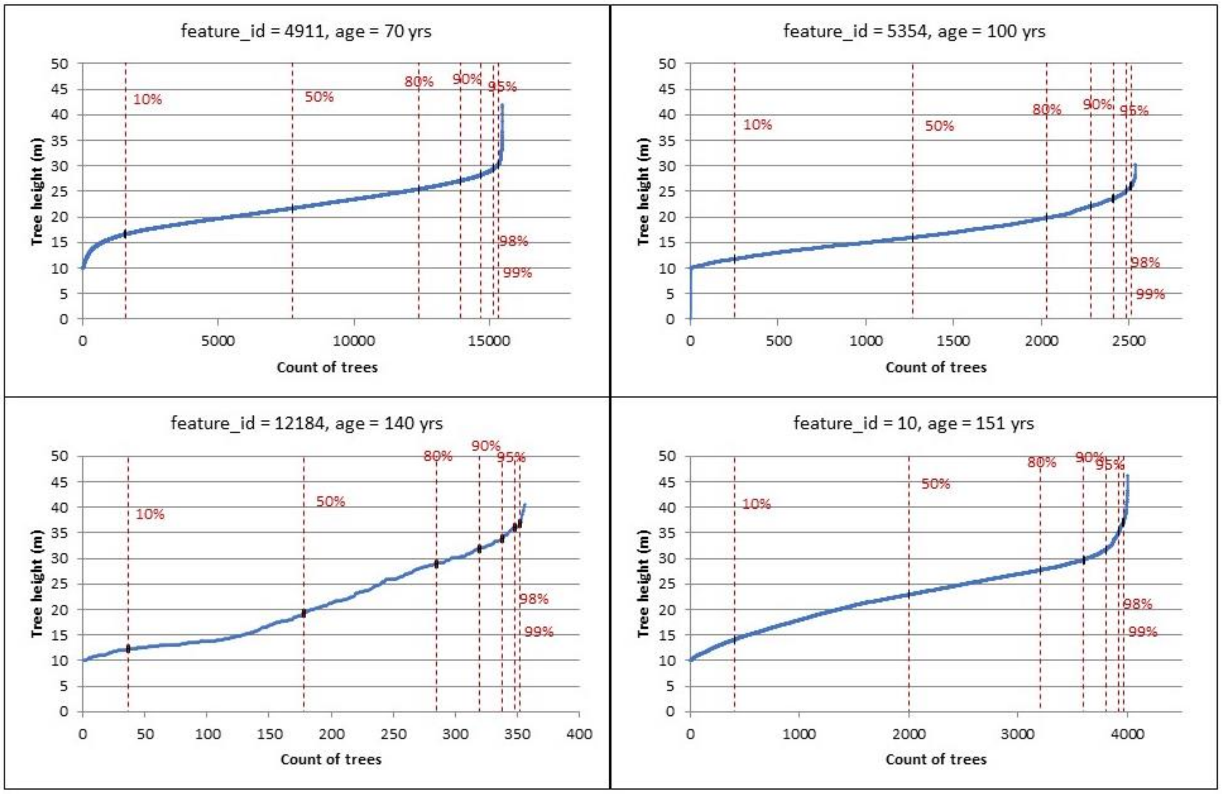

Figure 5-1 ITI Trees Ranked by Height for Four Mature Stands Based on the VRI

The height adjustment process is applied to even-age stands (stands with layer D also not included) that are within the productive land base, have no logging history after 2016 and are greater than 60 years of age. The 1-20th percentile approach has previously shown limitations in representing dominant and co-dominant trees in immature stands (< 60 years of age), ITI did not capture trees below 5m to avoid skewing average stand height.

Figure 5-2 shows the frequency distribution of the height comparison ratio of the VRI to ITI. As shown on the graph, most stands have a height adjustment ratio of the inverse of 0.8 to 0.9. The distribution of the adjustment ratio is normally distributed for the entire sample.

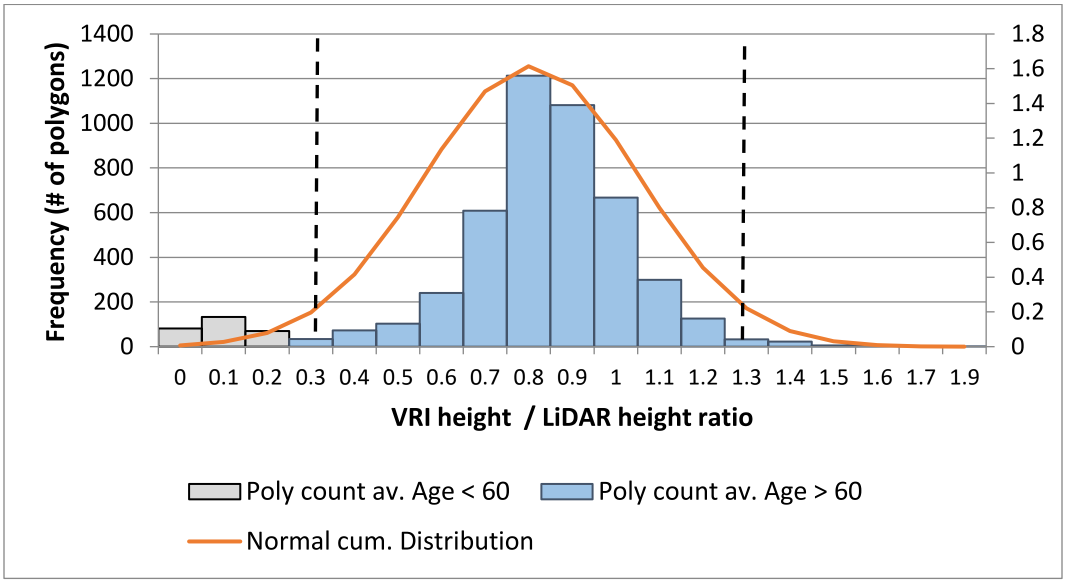

Figure 5-2 Height Comparison Ratio by Frequency with Normal Cumulative Distribution Guideline

To apply the height adjustment correctly, the to-be-adjusted VRI must be of the same year as the year in which the LiDAR was collected. Given no VRI project was completed for TFL 30 since 2017-2018, the most recent government Rank 1 VRI layer was obtained (2021). The 2021 VRI is based on attributes interpreted from 2015 ortho photos, which is only two years prior to when the LiDAR data was collected.

The VRI - 2021 – VDYP7 Input Polygon and VRI - 2021 – VDYP7 Input Layer tables have been downloaded from the BC Geographical Warehouse Data Catalogue under VRI – Historical Vegetation Resource Inventory. These are tables with the input estimates for the current years provincial forest cover to facilitate volume projections and yield curve calculations using the provincial growth tool VDYP7.

To adjust stand height, 2021 VRI VDYP inputs of the Rank 1 layer will be projected to 2017. Once the 2017 stand height has been adjusted, the 2017 stand attributes along with the adjusted will be imported into VDYP to generate new site index and volume based on adjusted height. Upon completion of this step, the final set of adjusted stand attributes are generated to be used in creating the natural stand yield tables for the timber supply modelling.

5.5 Natural Stand Yield Tables

Natural stand yield tables (NSYT) are yield projections generated for the existing natural stands, categorized in the R0 silviculture era, these yield tables will be modelled using VDYP. Existing natural stands that meet the LiDAR height adjustment criteria will have yield tables generated based on process described in the previous section. Natural stands that did not meet the height adjustment criteria will have yield tables projected with the 2021 VRI VEG COMP VDYP7 inputs including the unadjusted height attribute.

5.6 Managed Stand Yield Tables

Managed stand yields play a crucial role in the timber supply, particularly for TFL 30, where stands aged 45 years or younger make up a significant portion (60%) of the THLB. Given the current market conditions and limited fiber availability, gaining a comprehensive understanding of managed stands has become more critical than ever. Key factors include their growth rate, species and profile composition, and the timing of their harvestability. However, one major challenge in timber supply modeling in BC revolves around accurately projecting the volume of managed stands. Typically, this projection is based on summarized planting data for each AU and site productivity information from a range of sources. Subsequently, the Managed Stand Yield Tables (MSYT) are generated using TIPSY, and these tables are incorporated into timber supply models to inform decision-making processes.

To gather more information on managed stands and validate the growth and yield assumptions used in the TFL 30 timber supply model, Canfor launched the Change Monitoring Inventory (CMI) program in 2001. As part of this initiative, thirty-five (35) permanent sample plots (PSP) were strategically established in post-harvest regenerated stands aged between 15 and 30 years. In September 2022, Ecora Engineering & Resource Group Ltd. conducted the second measurement (M2) on 17 out of the 35 PSPs. Notably, 16 of these plots are situated within the two most prevalent site associations of the TFL: Sxw_Devilsclub and Sxw_Oakfern, whose ecosystems are physically and biologically similar enough and would have similar vegetation at maturity. Collectively, these site associations account for a significant 68% of the THLB. The data gathered from this CMI program aims to enhance the understanding of managed stands and refine the accuracy of the TFL 30 timber supply model (MYST), which is vital for this timber supply analysis.

The grouping of TEM site series to site associations is depicted in Table 5-2 . After the site associations were formed, the majority of TFL 30 THLB (MP #11) fell within two site associations, namely Sxw_Oakfern and Sxw_Devilsclub.

Table 5-2: TEM Site Series to Site Associations Grouping

Site Association	TEM Site Series	CFLB (ha)	THLB (ha)	THLB %
Sxw_Devilsclub	SBSwk1_08, SBSwk1_10, SBSvk0_01, SBSvk0_05, SBSvk0_07, SBSmk1_08,	58,196	42,889	42%
Sxw_Oakfern	SBSwk1_01, SBSvk0_04, SBSmk1_07,	35,145	27,148	26%
Sxw_Huckleberry	SBSwk1_05, SBSmk1_01,	10,517	8,244	8%
Sxw_Horsetail	SBSwk1_09, SBSvk0_06, SBSmk1_09,	8,050	4,529	4%
CwHw_Devilsclub	ICHvk2_01,	6,067	3,379	3%
Bl_Oakfern	ESSFwk2_01, ESSFwk2_02, ESSFwk2_03,	7,803	2,472	2%
Sxw_Pinkspirea	SBSwk1_06,	3,285	2,412	2%
Sxw_Twinberry	SBSwk1_07,	3,207	2,032	2%
SxwFd_Knightsplume	SBSwk1_04, SBSmk1_04,	2,440	1,678	2%
Alder_Ladyfern	SBSvk0_11,	4,032	1,655	2%
Others		16,239	6,291	6%

Figure 5-3 shows site association classifications across the TFL. The plot standard followed the CMI protocol keeping consistent with preliminary measurements. Data collected was compiled by Forestree Dynamics Ltd.

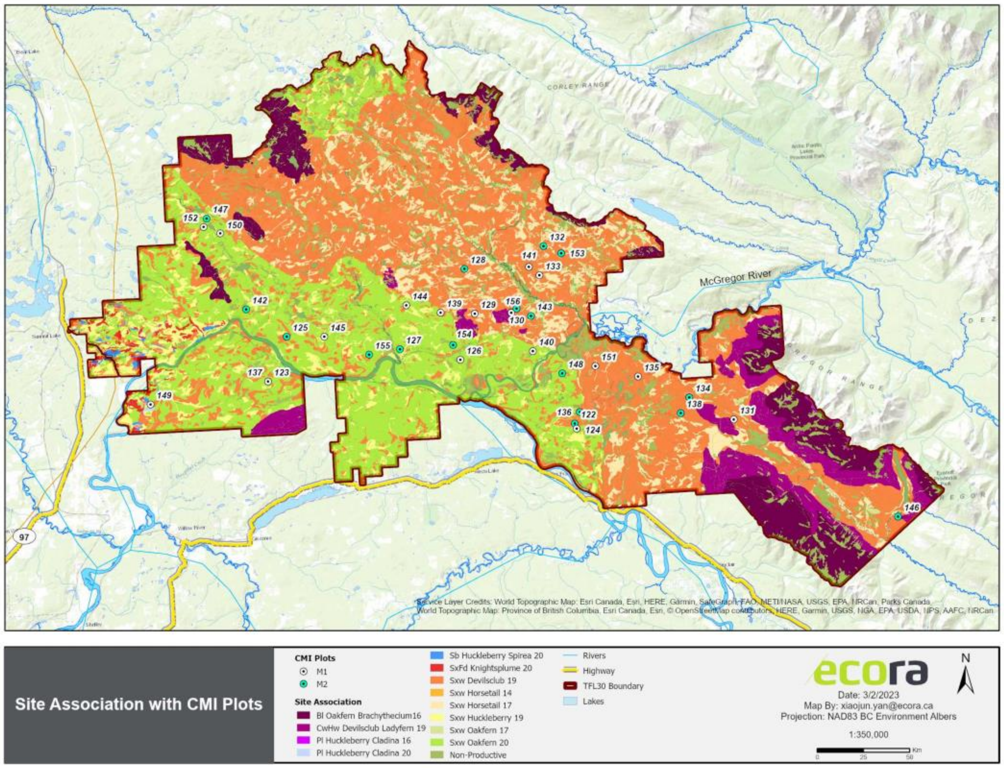

Figure 5-3 Map of Site Association and Established CMI Plot Locations

Following the second measurement, subsequent analyses were conducted to examine the findings on growth and yield validation. These analyses involved comparing the plot data with the TFL30 Management Plan (MP) #10 MSYT corresponding to the Sxw_Devilsclub and Sxw_Oakfern site associations. Additionally, the plot data was cross-referenced with the TIPSY projections, where the plot data served as inputs. Significant additional analyses were undertaken in an attempt to both correct the TIPSY projections and understand the potential reasons for the significant disparity between the observed and projected volumes. It was concluded that reasonable volume projections could not be practically achieved using TIPSY and that other yield modelling tools would be required. The TASS Approximation by a Dynamical Aggregated Model (TADAM) for Interior White Spruce was adopted to project the plot level yield curves. The gross merchantable volumes and basal areas per hectare derived using the TADAM equations matched closely with those compiled by Forestree Dynamics Ltd (using Kozak 1988 variable exponent equations) for each plot. Through these yield projections there were two distinct populations observed within the Sxw_Devilsclub site association and one population within the Sxw_Oakfern site association. Acknowledging the potential inaccuracies in the deciduous component of the gross merchantable volumes generated by TADAM, adjustments were made to align more closely with the timber supply assumptions. This correction transformed the gross merchantable volume to conifer merchantable volume for each plot, leveraging the species composition dynamics predicted by PrognosisBC. Finally, the mean conifer gross merchantable volumes of the curves within each of these three populations represent the recommended MSYT for all the existing and future managed stands within the Sxw_Oakfern and Sxw_Devilsclub site associations in this analysis. *Managed Stands Yields for Tree Farm Licence #30 Memo* (Canfor, 2023) provides a comprehensive account of the methodology employed, the outcomes derived from these comparative analyses, and the recommended MSYT for TFL 30 MP#11 timber supply model.

Managed stand input assumptions for other site associations will follow the basic silviculture assumptions, specifically:

- R1 assumptions are consistent with MP #10 as specified in Appendix A – Basic Silviculture Assumptions R1 Era; and
- R2 to R3 assumptions are prepared based on summarized data from RESULTS and Canfor planting records as specified in Appendix B – Basic Silviculture Assumption R2 to R3 Era.

5.7 Spruce Leader Weevil (*Pissodes strobi*)

Spruce leader weevil or white pine weevil (*Pissodes strobi*) is a weevil that damages the tree leader of young stands. This weevil attacks several commercially important conifer hosts. The most important hosts in British Columbia are Sitka Spruce, Engelmann Spruce and White Spruce.

During the development of MP10 analysis, following discussions with the FLNRORD Regional Pathologist, it was decided that the application of a regeneration delay corresponding with the projected level of attack would reflect the growth and yield impacts of the weevil. It is estimated that the most severely attacked stands will suffer, at most, a 10-year regeneration delay due to repeated weevil attacks on the leader. The regeneration delay suffered by a stand gradually increases as the attack percentage increases, stands attacked at a rate of 80% or greater would all experience the maximum 10-year regeneration delay. The spruce weevil attack rates are calculated using the same method as MP10 analysis using regenerating spruce density and elevation with the following formula (Taylor, 2005):

$$\text{Attack Percent} = 429.4 - 11.02 * E^{\wedge}(\text{Sx sph}) - 50.03 * E^{\wedge}(\text{elevation})$$

Where:

Sx sph is the stems per hectare of spruce;

elevation is the elevation in meters.

Based on these assumptions and the fact that TIPSY can only model regeneration delay in whole year increments, the relationship between attack percentage and regeneration delay, shown in Figure 5-4, is used to model the impacts of leader weevil on stand growth for the standard planting stock (stands harvested prior to 2008). Using this information, an average attack percentage is calculated for each regenerated analysis unit and the corresponding regeneration delay is applied to the yield curve for that analysis unit. These regeneration delays are applied in addition to the standard regeneration delays shown in Appendix A – Basic Silviculture Assumptions R1 Era and capped at 10 years.

Existing managed stands of the silviculture era R2 to R3 data have the actual regeneration delay captured in RESULTS, and therefore will use the summarized values.

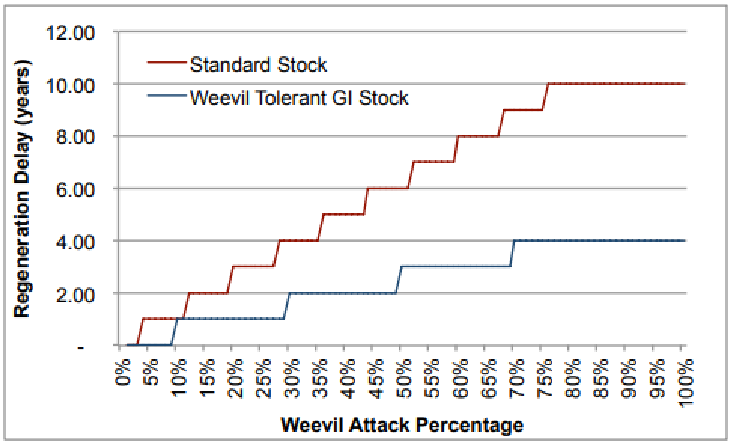

Figure 5-4 Regeneration Delay Due to Leader Weevil

5.8 Genetic Gain

Since 1990, Canfor has been planting genetically improved stock on the TFL. Initially, the availability of genetically improved stock was limited but over time increased until all planting occurred using genetically improved stock in 1998.

Calculated from Canfor's seed requests and planting records, Table 5-3 depicts the number-of-trees-planted weighted average genetic gain by species by silviculture era. These genetic gains are applied to the corresponding managed stand yield tables.

Table 5-3: Genetic Gain (%) by Species and Era

	% G.I. Stock Planted			Genetic Gains (%)		
Silviculture Era	Pli	Sx	Fdi	Pli	Sx	Fdi
R2: 1998 to 2009	34	100	0	0.5	18	0
R3: 2010+	43	100	100	5	27	29

6. Forest Estate Modelling

This section summarizes the harvest forecasts that will be provided. The assumptions pertaining to each option and sensitivity analysis are detailed in later sections.

Forest estate modelling will be conducted using Patchworks™. Patchworks is a spatially explicit harvest scheduling optimization model developed by Spatial Planning Systems in Ontario (www.spatial.ca). It facilitates the exploration of trade-offs between a broad range of conflicting forest management goals over short or long planning horizons.

On a technical level, Patchworks is a multiple-objective goal-programming model that consists of a GIS interface and a harvest scheduler that runs continuously in the background attempting to balance competing objectives – each of which is assigned penalty weights. Using a simulated annealing algorithm, Patchworks produces a solution that maximizes the value of the total objective function. The model has an interface that shows real-time progress towards a solution that meets user-specified criteria using tables, graphs, and maps. The simulation stops when the marginal improvement falls below the specified level.

For this analysis, Patchworks will be formulated to maximize harvest volume while meeting all the required management objectives.

Harvest scheduling decisions are based on maximizing the harvest forecast over the long-term, subject to meeting non-timber and other management objectives on the land base. As such, there are no explicit harvest rules other than minimum merchantability limits applied to the model. All scenarios must maintain a sustainable growing stock level in the long term.

The model utilizes 5-year planning periods over a 250-year planning horizon.

6.1 Base Case Harvest Forecast

The base case scenario provides a baseline forecast against which the alternative harvest flows and underlying resource dynamics of the TFL can be understood. It is based on current operational and management practices.

The base case objective will be to maximize the volume of timber harvested over a 250-year planning horizon. The long-term harvest level will be set to stabilize merchantable growing stock levels at the end of the planning horizon.

Following the previous Determination, there are several changes to key assumptions, data inputs and constraints within the TFL that will impact the base case and sensitivity scenarios for the TSR. These include:

- New Vegetation Resource Inventory;
- Improved Managed Stand Yield Tables;
- LiDAR data collected;
- Future Wildlife Tree Patch Retention;
- Individual Tree Inventory (ITI) data generated;
- Approval of Draft OGMA's;
- Exclusion of Hemlock leading stands; and

- Seebach FSW GAR approved (F-7-001).

6.2 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 several alternative harvest-flows possible. In this analysis, the harvest levels will reflect the following objectives:

- Maintain the current AAC for as long as possible;
- 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.

A harvest rule that maintains the existing AAC over the short-term will be applied while the long-term harvest level produces a non-declining growing stock. This is consistent with current forest practice.

Alternative initial, mid-term and long-term harvest levels will also be considered in sensitivity analyses. For example, if a step-up to a higher long-term harvest level is possible (while maintaining stable growing stock levels), it will be implemented.

6.3 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 minimal risk. By developing and testing several 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 6-1 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 6-1: Sensitivity Analyses

Sensitivity	Range Tested
Alternative Harvest Flow	Natural flow
	Non-declining even flow
	Step-up harvest flow
MP #10 Harvest Level	Applying MP #10's harvest level targets
Alternative Yield Tables	Uncalibrated MSYT
	Uncalibrated NSYT
	Uncalibrated MSYT & NSYT
Minimum Harvestable Volume	Set at 140 m3/ha
	Set at 220 m3/ha
Patch Size Distribution Objectives	Patch size distribution targets enabled to guide harvest pattern
	Patch size distribution targets strictly enforced
	No patch size distribution targets enabled
Fluctuations in Managed Stand Yield Tables	Increase by 10%
	Decrease by 10%
Fluctuations in Natural Stand Yield Tables	Increase by 10%
	Decrease by 10%
Uncertainties in THLB	Increase by 10%
	Decrease by 10%
Ecosystem Representation Analysis: Rare Ecosystems	No harvest in rare ecosystems
Natural Disturbance (ND)	ND on non-THLB
	ND on CFLB
	No ND
Old Growth Deferral Areas	No harvest in Old Growth Deferral Areas
BCTS Volume	Increase harvest volume target in first 10 years to accommodate for BCTS disposition volume

7. References

Anderson, M., D. Kim, V. Brumovsky, and B. Pate. (2018). *Beneficial Management Practices for Moose in the Fort St. John Timber Supply Area*. Wildlife Infometrics Inc. Report No. 626. Wildlife Infometrics Inc., Mackenzie, British Columbia, Canada.

Beaudry P. and Associates Ltd. (2014). *Hydrological Sensitivity Ratings and Maximum Recommended HEDA Values for 30 Individual Watersheds in TFL #30 Operating Area*. Prince George B.C.

British Columbia Ministry of Forests. (2023). *Kispiox TSA Timber Supply Review Updated Data Package* https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/12ts_dp_updated_jan_2023.pdf

British Columbia Ministry of Forests. (1995). *Biodiversity Guidebook*. https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf

British Columbia Ministry of Forests. (1998). *Procedures for Factoring Visual Resources into Timber Supply Analyses*. Forestry Division Services Branch. Victoria, B.C. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/visual-resource-mgmt/vrm_procedures_for_factoring_timber_supply_analyses.pdf

British Columbia Ministry of Forests, Lands and Natural Resource Operations. (2003). *Bulletin – Modelling Visuals in TSR III*. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/visual-resource-mgmt/vrm_modeling_visuals_bulletin.pdf

British Columbia Ministry of Forests, Lands and Natural Resource Operations. (2009). *Upper Fraser, Hart Ranges and Mount Robson Planning Units Order – Mountain Caribou Ungulate Winter Range #U-7-003*. https://www.env.gov.bc.ca/wld/documents/uwr/u-7-003_order_09Dec09.pdf

British Columbia Ministry of Forests, Lands and Natural Resource Operations. (2014). *Tree Farm License #30 Rationale for Allowable Annual Cut (AAC) Determination*.

British Columbia Ministry of Forests, Land and Natural Resource Operations. (2015). *Prince George Timber Supply Area Timber Supply Review Data Package.* https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/prince_george_tsa_data_package.pdf

British Columbia Ministry of Forests, Lands and Natural Resource Operations. (2021). *Provincial Guide for the preparation of Information Packages and Analysis Reports for Area-based Tenures*. For. Tenur. Br., For. Ana. & Inv. Br. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/timber-tenures/community-forest-agreements/provincial_guide_for_the_preparation_of_information_packages_and_analysis_reports_for_area-based_tenures_jun_2021.pdf

Canadian Forest Products Ltd & BC Timber Sales.(2006). *Sustainable Forest Management Plan – Tree Farm Licence # 30*. Available from: https://www.canfor.com/documents/environmental/plans/TFL30_SFM_Plan_Jun_2006.pdf

Canadian Forest Products Ltd., Carrier Lumber Ltd., Conifex Inc., Dunkley Lumber Ltd., Takla Track & Timber Ltd. (2018). Portions of the Prince George and Stuart Nechako Natural Resource Districts, Tree Farm Licence 30 and Community Forest Agreement K1N. *Forest Stewardship Plan*. Available in: https://www.canfor.com/docs/default-source/responsibility/fsp2_amd1_text_final_2018_04_06.pdf?sfvrsn=6784ee91_2

DeLong, C. (2003). A Field Guide to Site Identification and Interpretation for the Southeast Portion of the Prince George Forest Region (Issue 51 of Land management handbook, ISSN 0229-1622). Ministry of Forests, Forest Science Program.

Ecora. (2012). *Tree Farm Licence #30 Management Plan #10 Timber Supply Analysis - Data Package*. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/timber-tenures/tree-farm-licence/management-plans/tfl-30-mngment-plan-10-datapackage-v5.pdf

Ecora. (2013). *Tree Farm Licence #30 Management Plan #10 Timber Supply Analysis - Analysis Report*. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/timber-tenures/tree-farm-licence/management-plans/tfl-30-mngment-plan-10-analysis-report-v4.pdf

Ecora. (2018). *Vegetation Resource Inventory Height Adjustment Using LiDAR Data*. Internal Report: unpublished.

Forest Planning and Practices Regulation: BC Laws. (2004). Web. 13 Feb 2023. http://www.bclaws.ca/civix/document/id/complete/statreg/14_2004b

Forsite Consultants Ltd., Object Raku Technology and Canadian Forest Products Ltd. (2019). *Canfor – Prince George Region: Individual Tree Inventory 2017 LiDAR Data - TSI Results and Use Demonstration* [PowerPoint slides].

Forsite Consultants Ltd. and Canadian Forest Products Ltd. (2019). *LiDAR Enhanced Forest Inventory: Individual Tree Inventory Project - Point and Polygon Database Metadata*. Internal Report: unpublished.

Garcia, O. (2005). *TADAM: A dynamic whole-stand approximation for the TASS growth model*. The Forestry Chronicle, 81(4):575-581.

Gray, M. (2010). *Freshwater water atlas user guide*. GeoBC Integrated Land Management Bureau. Victoria, BC. https://www2.gov.bc.ca/assets/gov/data/geographic/topography/fwa/fwa_user_guide.pdf

McGregor Resource Analysis Group Ltd. (2001). Tree Farm Licence 30 – Management Plan No. 9– Timber Supply Analysis Data Inputs and Assumptions Report. 176p

McGregor Resource Analysis Group Ltd. (2002). Tree Farm Licence 30 – Management Plan No. 9 – Timber Supply Analysis Report. 80pp;

Ministry of Forests and BC Environment. (1998). *Fish-Stream Identification Guidebook*. Victoria, BC. https://www.for.gov.bc.ca/hfd/library/ffip/BCMoF1998.pdf

Beaudry, P., & Associates Ltd. (2021). *Proposed snow recovery curves for stand classes with maximum heights between 12 and 25 m in the Upper Fraser area of Northern BC.*

Pienaar, L. V., & Rheney, J. W. (1995). *Modeling Stand Level Growth And Yield Response To Silvicultural Treatments*. *Forest Science*, *41*(3), 629-638. https://academic.oup.com/forestscience/article-abstract/41/3/629/4627276?redirectedFrom=fulltext

Taylor, S.W. (2005). *Managing white pine weevil in lodgepole pine: A review of the issues*. B.C. Min. For., Res. Br., Victoria, BC. Tech. Rep. 037.

Thrower, J.S. & Associates Ltd. (2002). *Change Monitoring Inventory on TFL 30: First Measurement Results.* Internal Report. Not Published.

Thrower, J.S. & Associates Ltd. (2000). Potential Site Index Estimates for the Major Commercial Tree Species on TFL 30. March 31, 2000. 27pp.

Timberline Forest Inventory Consultants Ltd. & Industrial Forestry Services Ltd. & Oikos Ecological Service Ltd. (2001). Terrestrial Ecosystem Mapping of The McGregor Model Forest Final Report.

Tripp, T. and A. Jeffries.(2020). *Methods Report: Northeast Region – Spatial Coverage for the Wildlife Habitat Ratings (WHR) & Habitat Effectiveness Models (HEM) for Moose*.

Winkler R. and Boon S, 2015. *Revised Snow Recovery Estimates for Pine-dominated Forests in Interior British Columbia.* Prov. B.C., Victoria, B.C. Exten. Note 116. www.for.gov.bc.ca/hfd/pubs/Docs/En/En116.htm

8. Appendices

8.1 Appendix A – Basic Silviculture Assumptions R1 Era

TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	SP1	SP1%	SP2	SP2%	SP3	SP3%
ESSFwc3_01	11	Planted	85	85	95	2	1500	Sx	100				
ESSFwc3_01	11	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_00	15	Planted	85	85	95	2	1500	Sx	100				
ESSFwk2_00	14	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_01	14	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_01	15	Planted	85	85	95	2	1500	Sx	100				
ESSFwk2_02	13	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_02	13	Planted	85	85	95	2	1500	Sx	100				
ESSFwk2_03	15	Planted	85	85	95	2	1500	Sx	100				
ESSFwk2_03	15	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_04	15	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_04	16	Planted	85	85	95	2	1500	Sx	100				
ESSFwk2_05	16	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_05	17	Planted	85	85	95	2	1500	Sx	100				
ESSFwk2_06	15	Natural	15	85	95	4	1725	Bl	100				
ESSFwk2_06	15	Planted	85	85	95	2	1500	Sx	100				
ICHvk2_00	21	Natural	15	85	95	6	1725	Cw	100				
ICHvk2_00	8	Planted	85	85	95	4	1500	Sx	70	Fdi	30		
ICHvk2_01	20	Natural	15	85	95	6	1725	Cw	100				
ICHvk2_01	21	Planted	85	85	95	4	1500	Sx	70	Fdi	30		
ICHvk2_03	21	Natural	15	85	95	7	1725	Cw	100				
ICHvk2_03	21	Planted	85	85	95	5	1500	Fdi	70	Sx	30		

TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	SP1	SP1%	SP2	SP2%	SP3	SP3%
ICHvk2_04	17	Natural	20	85	95	5	1800	Cw	100				
ICHvk2_04	19	Planted	80	85	95	3	1500	Sx	70	Fdi	30		
ICHvk2_05	20	Natural	20	85	95	5	1800	Cw	100				
ICHvk2_05	23	Planted	80	85	95	3	1500	Sx	70	Pli	30		
ICHvk2_06	12	Natural	20	85	95	5	1800	Cw	100				
ICHvk2_06	13	Planted	80	85	95	3	1500	Sx	70	Pli	30		
ICHvk2_07	10	Natural	20	85	95	5	1800	Cw	100				
ICHvk2_07	10	Planted	80	85	95	3	1500	Sx	70	Pli	30		
SBSmk1_00	23	Planted	70	85	95	8	1400	Sx	60	Pli	40		
SBSmk1_00	23	Natural	30	85	95	10	1820	Pli	67	Sx	17	Bl	16
SBSmk1_01	21	Natural	30	85	95	10	1820	Pli	67	Sx	17	Bl	16
SBSmk1_01	20	Planted	70	85	95	8	1400	Sx	60	Pli	40		
SBSmk1_03	14	Natural	30	85	95	4	1820	Pli	67	Sx	17	Bl	16
SBSmk1_03	14	Planted	70	85	95	2	1400	Pli	50	Fdi	30	Sx	20
SBSmk1_04	17	Planted	70	85	95	2	1400	Pli	50	Fdi	30	Sx	20
SBSmk1_04	17	Natural	30	85	95	4	1820	Pli	67	Sx	17	Bl	16
SBSmk1_05	20	Natural	30	85	95	6	1820	Pli	67	Sx	17	Bl	16
SBSmk1_05	19	Planted	70	85	95	4	1400	Sx	60	Pli	40		
SBSmk1_06	16	Natural	30	85	95	10	1820	Pli	67	Sx	17	Bl	16
SBSmk1_06	16	Planted	70	85	95	9	1400	Pli	60	Sx	40		
SBSmk1_07	20	Natural	15	85	95	7	1610	Pli	34	Sx	33	Bl	33
SBSmk1_07	20	Planted	85	85	95	5	1400	Sx	60	Pli	40		
SBSmk1_08	24	Planted	70	85	95	7	1400	Sx	70	Pli	30		
SBSmk1_08	24	Natural	30	85	95	9	1820	Pli	67	Sx	17	Bl	16
SBSmk1_09	18	Planted	85	85	95	7	1000	Pli	70	Sx	30		

TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	SP1	SP1%	SP2	SP2%	SP3	SP3%
SBSmk1_09	17	Natural	15	85	95	9	1150	Sx	67	Bl	33		
SBSmk1_10	12	Planted	85	85	95	7	1000	Pli	70	Sx	30		
SBSmk1_10	11	Natural	15	85	95	9	1150	Sx	67	Bl	33		
SBSvk0_00	9	Natural	15	85	95	8	1725	Bl	67	Sx	33		
SBSvk0_00	10	Planted	85	85	95	6	1500	Sx	100				
SBSvk0_01	21	Planted	85	85	95	6	1500	Sx	100				
SBSvk0_01	20	Natural	15	85	95	8	1725	Bl	67	Sx	33		
SBSvk0_02	15	Planted	100	85	95	4	1500	Sx	80	Pli	20		
SBSvk0_02	15	Natural	100	85	95	9	1000	Sx	70	Bl	30		
SBSvk0_03	18	Planted	100	85	95	3	1500	Sx	70	Fdi	30		
SBSvk0_04	17	Natural	15	85	95	7	1725	Bl	67	Sx	33		
SBSvk0_04	18	Planted	85	85	95	5	1500	Sx	100				
SBSvk0_05	23	Planted	85	85	95	7	1500	Sx	100				
SBSvk0_05	21	Natural	15	85	95	9	1725	Bl	67	Sx	33		
SBSvk0_06	17	Natural	15	85	95	10	1725	Bl	67	Sx	33		
SBSvk0_06	19	Planted	85	85	95	8	1500	Sx	100				
SBSvk0_07	17	Natural	15	85	95	9	1725	Bl	67	Sx	33		
SBSvk0_07	19	Planted	85	85	95	7	1500	Sx	100				
SBSvk0_08	12	Planted	85	85	95	5	1500	Sx	100				
SBSvk0_08	12	Natural	15	85	95	7	1725	Bl	67	Sx	33		
SBSvk0_09	4	Natural	100	85	95	10	1000	Sx	70	Bl	30		
SBSvk0_09	4	Planted	100	85	95	10	1000	Sx	80	Pli	20		
SBSvk0_10	20	Planted	100	85	95	8	1000	Sx	100				
SBSvk0_11	21	Planted	100	85	95	3	1500	Sx	100				
SBSwk1_00	16	Planted	75	85	95	8	1400	Sx	70	Pli	30		

TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	SP1	SP1%	SP2	SP2%	SP3	SP3%
SBSwk1_00	16	Natural	25	85	95	10	1750	Pli	60	Sx	20	Bl	20
SBSwk1_01	21	Planted	75	85	95	8	1400	Sx	70	Pli	30		
SBSwk1_01	21	Natural	25	85	95	10	1750	Pli	60	Sx	20	Bl	20
SBSwk1_03	15	Planted	100	85	95	3	1200	Pli	100				
SBSwk1_04	19	Natural	25	85	95	6	1750	Pli	60	Sx	20	Bl	20
SBSwk1_04	18	Planted	75	85	95	4	1400	Sx	70	Pli	30		
SBSwk1_05	20	Planted	75	85	95	6	1400	Sx	70	Pli	30		
SBSwk1_05	20	Natural	25	85	95	8	1750	Pli	60	Sx	20	Bl	20
SBSwk1_06	21	Planted	75	85	95	8	1400	Sx	70	Pli	30		
SBSwk1_06	21	Natural	25	85	95	10	1750	Pli	60	Sx	20	Bl	20
SBSwk1_07	22	Planted	75	85	95	7	1400	Sx	70	Pli	30		
SBSwk1_07	22	Natural	25	85	95	9	1750	Pli	60	Sx	20	Bl	20
SBSwk1_08	24	Natural	25	85	95	10	1750	Pli	60	Sx	20	Bl	20
SBSwk1_08	24	Planted	75	85	95	8	1400	Sx	70	Pli	30		
SBSwk1_09	20	Planted	100	85	95	8	1400	Sx	70	Pli	30		
SBSwk1_10	22	Planted	100	85	95	6	1400	Sx	70	Pli	30		
SBSwk1_11	11	Planted	100	85	95	4	1400	Sx	70	Pli	30		
SBSwk1_10	25	Planted	100	85	95	6	1400	Sx	70	Pli	30		
SBSwk1_11	12	Planted	100	85	95	4	1400	Sx	70	Pli	30		

8.2 Appendix B – Basic Silviculture Assumption R2 to R3 Era

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R2	existing	ESSFwk2_00	18	Natural	64	85	95	3	1879	BL 86 AT 14
R2	existing	ESSFwk2_00	18	Planted	36	85	95	1	1049	SW 86 BL 14
R3	existing	ESSFwk2_00	7	Natural	46	85	95	0	862	BL 90 PLI 6 SW3 AT 1
R3	existing	ESSFwk2_00	7	Planted	54	85	95	0	998	SW 88 BL 12
R3	future	ESSFwk2_00	10	Natural	46	85	95	0	862	BL 90 PLI 6 SW3 AT 1
R3	future	ESSFwk2_00	11	Planted	54	85	95	0	998	SW 88 BL 12
R2	existing	ESSFwk2_01	16	Natural	64	85	95	3	1879	BL 86 AT 14
R2	existing	ESSFwk2_01	16	Planted	36	85	95	1	1049	SW 86 BL 14
R3	existing	ESSFwk2_01	14	Natural	46	85	95	0	862	BL 90 PLI 6 SW3 AT 1
R3	existing	ESSFwk2_01	15	Planted	54	85	95	0	998	SW 88 BL 12
R3	future	ESSFwk2_01	14	Natural	46	85	95	0	862	BL 90 PLI 6 SW3 AT 1
R3	future	ESSFwk2_01	14	Planted	54	85	95	0	998	SW 88 BL 12
R2	existing	ESSFwk2_02	19	Natural	64	85	95	3	1879	BL 86 AT 14
R2	existing	ESSFwk2_02	19	Planted	36	85	95	1	1049	SW 86 BL 14
R3	existing	ESSFwk2_02	13	Natural	34	85	95	0	720	BL 100
R3	existing	ESSFwk2_02	14	Planted	66	85	95	0	1388	SW 94 BL 6
R3	future	ESSFwk2_02	13	Natural	34	85	95	0	720	BL 100

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	future	ESSFwk2_02	13	Planted	66	85	95	0	1388	SW 94 BL 6
R2	existing	ESSFwk2_03	16	Natural	57	85	95	5	1255	BL 75 SW 25
R2	existing	ESSFwk2_03	16	Planted	43	85	95	5	936	SW 84 BL 16
R3	existing	ESSFwk2_03	18	Planted	100	85	95	2	1471	SW 100
R3	future	ESSFwk2_03	15	Planted	100	85	95	2	1471	SW 100
R2	existing	ESSFwk2_04	19	Natural	57	85	95	5	1255	BL 75 SW 25
R2	existing	ESSFwk2_04	19	Planted	43	85	95	5	936	SW 84 BL 16
R3	existing	ESSFwk2_04	15	Planted	100	85	95	1	1511	SW 100
R3	future	ESSFwk2_04	15	Planted	100	85	95	1	1511	SW 100
R2	existing	ESSFwk2_05	16	Natural	52	85	95	1	1100	BL 100
R2	existing	ESSFwk2_05	16	Planted	48	85	95	1	1032	SW 92 BL 8
R3	existing	ESSFwk2_05	16	Natural	10	85	95	1	153	BL 100
R3	existing	ESSFwk2_05	16	Planted	90	85	95	1	1318	SW 100
R3	future	ESSFwk2_05	15	Natural	10	85	95	1	153	BL 100
R3	future	ESSFwk2_05	16	Planted	90	85	95	1	1318	SW 100
R2	existing	ESSFwk2_06	14	Natural	71	85	95	4	2338	SW 91 BL 9
R2	existing	ESSFwk2_06	14	Planted	29	85	95	2	962	SW 86 BL 14
R3	existing	ESSFwk2_06	14	Natural	10	85	95	1	153	BL 100
R3	existing	ESSFwk2_06	15	Planted	90	85	95	1	1318	SW 100

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	future	ESSFwk2_06	13	Natural	10	85	95	1	153	BL 100
R3	future	ESSFwk2_06	14	Planted	90	85	95	1	1318	SW 100
R2	existing	ESSFwk2_31	20	Natural	71	85	95	4	2338	SW 91 BL 9
R2	existing	ESSFwk2_31	20	Planted	29	85	95	2	962	SW 86 BL 14
R3	existing	ESSFwk2_31	19	Natural	10	85	95	1	153	BL 100
R3	existing	ESSFwk2_31	19	Planted	90	85	95	1	1318	SW 100
R3	future	ESSFwk2_31	16	Natural	10	85	95	1	153	BL 100
R3	future	ESSFwk2_31	16	Planted	90	85	95	1	1318	SW 100
R2	existing	ICHvk2_00	19	Natural	63	85	95	5	1858	HW 45 AT 37 BL18
R2	existing	ICHvk2_00	23	Planted	37	85	95	2	1102	SW 62 PLI 34 HW2 BL 2
R3	existing	ICHvk2_00	21	Natural	30	85	95	2	581	HW 49 AT 26 BL25
R3	existing	ICHvk2_00	21	Planted	70	85	95	2	1346	SW 98 BL 2
R3	future	ICHvk2_00	20	Natural	30	85	95	2	581	HW 49 AT 26 BL25
R3	future	ICHvk2_00	20	Planted	70	85	95	2	1346	SW 98 BL 2
R2	existing	ICHvk2_01	19	Natural	63	85	95	5	1858	HW 45 AT 37 BL18
R2	existing	ICHvk2_01	22	Planted	37	85	95	2	1102	SW 62 PLI 34 HW2 BL 2
R3	existing	ICHvk2_01	13	Natural	30	85	95	2	581	HW 49 AT 26 BL25
R3	existing	ICHvk2_01	21	Planted	70	85	95	2	1346	SW 98 BL 2

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	future	ICHvk2_01	17	Natural	30	85	95	2	581	HW 49 AT 26 BL25
R3	future	ICHvk2_01	21	Planted	70	85	95	2	1346	SW 98 BL 2
R3	existing	ICHvk2_02	20	Natural	30	85	95	2	581	HW 49 AT 26 BL25
R3	existing	ICHvk2_02	20	Planted	70	85	95	2	1346	SW 98 BL 2
R3	future	ICHvk2_02	17	Natural	30	85	95	2	581	HW 49 AT 26 BL25
R3	future	ICHvk2_02	17	Planted	70	85	95	2	1346	SW 98 BL 2
R3	existing	ICHvk2_03	19	Planted	100	85	95	1	1336	SW 100
R3	future	ICHvk2_03	18	Planted	100	85	95	1	1336	SW 100
R2	existing	ICHvk2_04	21	Natural	63	85	95	5	1858	HW 45 AT 37 BL18
R2	existing	ICHvk2_04	21	Planted	37	85	95	2	1102	SW 62 PLI 34 HW2 BL 2
R3	existing	ICHvk2_04	21	Planted	100	85	95	1	1336	SW 100
R3	future	ICHvk2_04	19	Planted	100	85	95	1	1336	SW 100
R2	existing	ICHvk2_05	19	Natural	63	85	95	5	1858	HW 45 AT 37 BL18
R2	existing	ICHvk2_05	23	Planted	37	85	95	2	1102	SW 62 PLI 34 HW2 BL 2
R3	existing	ICHvk2_05	23	Planted	100	85	95	1	1336	SW 100
R3	future	ICHvk2_05	22	Planted	100	85	95	1	1336	SW 100
R3	existing	ICHvk2_06	20	Planted	100	85	95	1	1336	SW 100
R3	future	ICHvk2_06	19	Planted	100	85	95	1	1336	SW 100

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R2	existing	ICHvk2_07	21	Natural	63	85	95	5	1858	HW 45 AT 37 BL18
R2	existing	ICHvk2_07	21	Planted	37	85	95	2	1102	SW 62 PLI 34 HW2 BL 2
R3	existing	ICHvk2_07	19	Planted	100	85	95	1	1336	SW 100
R3	future	ICHvk2_07	10	Planted	100	85	95	1	1336	SW 100
R0	existing	SBSmk1_00	2	Natural	100	85	95	3	3020	AT 40 BL 36 PLI14 SW 7 CW 1
R2	existing	SBSmk1_00	19	Natural	73	85	95	3	3020	AT 40 BL 36 PLI14 SW 7 CW 1
R2	existing	SBSmk1_00	19	Planted	27	85	95	1	1140	SW 55 PLI 33 BL11
R3	existing	SBSmk1_00	19	Natural	70	85	95	3	2850	AT 53 BL 23 SW18 PLI 6
R3	existing	SBSmk1_00	24	Planted	30	85	95	1	1197	SW 51 PLI 37 BL9 FD 3
R3	future	SBSmk1_00	20	Natural	70	85	95	3	2850	AT 53 BL 23 SW18 PLI 6
R3	future	SBSmk1_00	20	Planted	30	85	95	1	1197	SW 51 PLI 37 BL9 FD 3
R2	existing	SBSmk1_01	18	Natural	73	85	95	3	3020	AT 40 BL 36 PLI14 SW 7 CW 1
R2	existing	SBSmk1_01	21	Planted	27	85	95	1	1140	SW 55 PLI 33 BL11
R3	existing	SBSmk1_01	11	Natural	70	85	95	3	2850	AT 53 BL 23 SW18 PLI 6
R3	existing	SBSmk1_01	20	Planted	30	85	95	1	1197	SW 51 PLI 37 BL9 FD 3

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	future	SBSmk1_01	13	Natural	70	85	95	3	2850	AT 53 BL 23 SW18 PLI 6
R3	future	SBSmk1_01	20	Planted	30	85	95	1	1197	SW 51 PLI 37 BL9 FD 3
R3	future	SBSmk1_03	15	Natural	70	85	95	3	2850	AT 53 BL 23 SW18 PLI 6
R3	future	SBSmk1_03	15	Planted	30	85	95	1	1197	SW 51 PLI 37 BL9 FD 3
R2	existing	SBSmk1_04	17	Natural	75	85	95	3	3359	BL 54 AT 35 PLI4 SW 4 FD 4
R2	existing	SBSmk1_04	17	Planted	25	85	95	0	1110	SW 52 PLI 41 BL7
R3	existing	SBSmk1_04	19	Natural	70	85	95	3	2850	AT 53 BL 23 SW18 PLI 6
R3	existing	SBSmk1_04	19	Planted	30	85	95	1	1197	SW 51 PLI 37 BL9 FD 3
R3	future	SBSmk1_04	17	Planted	100	85	95	1	1507	SW 80 PLI 20
R2	existing	SBSmk1_05	18	Natural	75	85	95	3	3359	BL 54 AT 35 PLI4 SW 4 FD 4
R2	existing	SBSmk1_05	18	Planted	25	85	95	0	1110	SW 52 PLI 41 BL7
R3	existing	SBSmk1_05	19	Planted	100	85	95	1	1507	SW 80 PLI 20
R3	future	SBSmk1_05	19	Planted	100	85	95	1	1507	SW 80 PLI 20
R2	existing	SBSmk1_06	15	Natural	55	85	95	3	1270	AT 67 BL 22 SW7 PLI 4
R2	existing	SBSmk1_06	15	Planted	45	85	95	0	1031	PLI 67 SW 31 BL3

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	existing	SBSmk1_06	17	Natural	82	85	95	2	6420	PLI 100
R3	existing	SBSmk1_06	17	Planted	18	85	95	2	1454	PLI 59 SW 41
R3	future	SBSmk1_06	14	Natural	82	85	95	2	6420	PLI 100
R3	future	SBSmk1_06	14	Planted	18	85	95	2	1454	PLI 59 SW 41
R2	existing	SBSmk1_07	20	Natural	67	85	95	0	2161	BL 77 PLI 17 FD7
R2	existing	SBSmk1_07	21	Planted	33	85	95	0	1044	SW 68 PLI 20 BL10 FD 2
R3	existing	SBSmk1_07	23	Planted	100	85	95	0	1369	PLI 51 SW 49
R3	future	SBSmk1_07	21	Planted	100	85	95	0	1369	PLI 51 SW 49
R2	existing	SBSmk1_08	24	Natural	75	85	95	3	2342	PLI 89 BL 11
R2	existing	SBSmk1_08	24	Planted	25	85	95	2	778	PLI 55 SW 32 BL12
R3	existing	SBSmk1_08	24	Planted	100	85	95	1	1424	SW 100
R3	future	SBSmk1_08	21	Planted	100	85	95	1	1424	SW 100
R2	existing	SBSmk1_09	18	Natural	75	85	95	3	2342	PLI 89 BL 11
R2	existing	SBSmk1_09	18	Planted	25	85	95	2	778	PLI 55 SW 32 BL12
R3	existing	SBSmk1_09	14	Planted	100	85	95	1	1424	SW 100
R3	future	SBSmk1_09	16	Planted	100	85	95	1	1424	SW 100
R2	existing	SBSmk1_10	13	Natural	75	85	95	3	2342	PLI 89 BL 11
R2	existing	SBSmk1_10	13	Planted	25	85	95	2	778	PLI 55 SW 32 BL12
R3	future	SBSmk1_10	13	Planted	100	85	95	1	1424	SW 100

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R0	existing	SBSvk0_00	15	Natural	100	85	95	3	1617	BL 75 AT 17 SW4 HW 2 PLI 1
R2	existing	SBSvk0_00	18	Natural	62	85	95	3	1617	BL 75 AT 17 SW4 HW 2 PLI 1
R2	existing	SBSvk0_00	18	Planted	38	85	95	1	997	SW 87 BL 9 PLI4
R3	existing	SBSvk0_00	12	Natural	10	85	95	1	168	AT 57 BL 24 SW15 HW 2
R3	existing	SBSvk0_00	16	Planted	90	85	95	1	1453	SW 99 BL 1
R3	future	SBSvk0_00	15	Natural	10	85	95	1	168	AT 57 BL 24 SW15 HW 2
R3	future	SBSvk0_00	15	Planted	90	85	95	1	1453	SW 99 BL 1
R2	existing	SBSvk0_01	19	Natural	62	85	95	3	1617	BL 75 AT 17 SW4 HW 2 PLI 1
R2	existing	SBSvk0_01	21	Planted	38	85	95	1	997	SW 87 BL 9 PLI4
R3	existing	SBSvk0_01	20	Natural	10	85	95	1	168	AT 57 BL 24 SW15 HW 2
R3	existing	SBSvk0_01	20	Planted	90	85	95	1	1453	SW 99 BL 1
R3	future	SBSvk0_01	10	Natural	10	85	95	1	168	AT 57 BL 24 SW15 HW 2
R3	future	SBSvk0_01	21	Planted	90	85	95	1	1453	SW 99 BL 1
R2	existing	SBSvk0_02	18	Natural	62	85	95	3	1617	BL 75 AT 17 SW4 HW 2 PLI 1
R2	existing	SBSvk0_02	18	Planted	38	85	95	1	997	SW 87 BL 9 PLI4
R3	existing	SBSvk0_02	16	Natural	15	85	95	2	297	SW 100

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	existing	SBSvk0_02	16	Planted	85	85	95	2	1633	SW 100
R3	future	SBSvk0_02	15	Natural	10	85	95	1	168	AT 57 BL 24 SW15 HW 2
R3	future	SBSvk0_02	15	Planted	90	85	95	1	1453	SW 99 BL 1
R2	existing	SBSvk0_03	18	Natural	62	85	95	2	1614	BL 85 AT 10 SW3 HW 2
R2	existing	SBSvk0_03	18	Planted	38	85	95	1	988	SW 82 BL 13 PLI6
R3	existing	SBSvk0_03	18	Natural	15	85	95	2	297	SW 100
R3	existing	SBSvk0_03	18	Planted	85	85	95	2	1633	SW 100
R3	future	SBSvk0_03	18	Natural	15	85	95	2	297	SW 100
R3	future	SBSvk0_03	18	Planted	85	85	95	2	1633	SW 100
R2	existing	SBSvk0_04	19	Natural	62	85	95	2	1614	BL 85 AT 10 SW3 HW 2
R2	existing	SBSvk0_04	20	Planted	38	85	95	1	988	SW 82 BL 13 PLI6
R3	existing	SBSvk0_04	20	Natural	1	85	95	1	19	FD 100
R3	existing	SBSvk0_04	20	Planted	99	85	95	1	1440	SW 100
R3	future	SBSvk0_04	19	Natural	1	85	95	1	19	FD 100
R3	future	SBSvk0_04	19	Planted	99	85	95	1	1440	SW 100
R2	existing	SBSvk0_05	20	Natural	59	85	95	5	1284	BL 97 AT 2 SW1
R2	existing	SBSvk0_05	22	Planted	41	85	95	3	883	SW 93 BL 6 PLI1
R3	existing	SBSvk0_05	22	Natural	1	85	95	1	22	AT 63 BL 33 SW4

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	existing	SBSvk0_05	22	Planted	99	85	95	1	1456	SW 100
R3	future	SBSvk0_05	22	Natural	1	85	95	1	22	AT 63 BL 33 SW4
R3	future	SBSvk0_05	22	Planted	99	85	95	1	1456	SW 100
R2	existing	SBSvk0_06	19	Natural	59	85	95	5	1284	BL 97 AT 2 SW1
R2	existing	SBSvk0_06	20	Planted	41	85	95	3	883	SW 93 BL 6 PLI1
R3	existing	SBSvk0_06	18	Planted	100	85	95	1	1593	SW 100
R3	future	SBSvk0_06	19	Planted	100	85	95	1	1593	SW 100
R2	existing	SBSvk0_07	21	Natural	59	85	95	5	1284	BL 97 AT 2 SW1
R2	existing	SBSvk0_07	22	Planted	41	85	95	3	883	SW 93 BL 6 PLI1
R3	existing	SBSvk0_07	14	Planted	100	85	95	1	1392	SW 100
R3	future	SBSvk0_07	20	Planted	100	85	95	1	1392	SW 100
R2	existing	SBSvk0_08	12	Natural	59	85	95	5	1284	BL 97 AT 2 SW1
R2	existing	SBSvk0_08	12	Planted	41	85	95	3	883	SW 93 BL 6 PLI1
R3	existing	SBSvk0_08	11	Planted	100	85	95	1	1392	SW 100
R3	future	SBSvk0_08	12	Planted	100	85	95	1	1392	SW 100
R3	future	SBSvk0_09	10	Planted	100	85	95	1	1392	SW 100
R2	existing	SBSvk0_10	18	Natural	59	85	95	5	1284	BL 97 AT 2 SW1
R2	existing	SBSvk0_10	19	Planted	41	85	95	3	883	SW 93 BL 6 PLI1
R3	existing	SBSvk0_10	18	Planted	100	85	95	1	1392	SW 100

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	future	SBSvk0_10	18	Planted	100	85	95	1	1392	SW 100
R2	existing	SBSvk0_11	16	Natural	59	85	95	5	1284	BL 97 AT 2 SW1
R2	existing	SBSvk0_11	16	Planted	41	85	95	3	883	SW 93 BL 6 PLI1
R3	existing	SBSvk0_11	11	Planted	100	85	95	1	1392	SW 100
R3	future	SBSvk0_11	13	Planted	100	85	95	1	1392	SW 100
R0	existing	SBSwk1_00	9	Natural	100	85	95	3	2578	AT 52 BL 42 SW5 PLI 1 CW 1
R2	existing	SBSwk1_00	19	Natural	70	85	95	3	2578	AT 52 BL 42 SW5 PLI 1 CW 1
R2	existing	SBSwk1_00	19	Planted	30	85	95	1	1092	SW 49 PLI 44 BL6 FD 1
R3	existing	SBSwk1_00	11	Natural	26	85	95	1	486	BL 44 AT 26 SW11 FD 11 PLI 8
R3	existing	SBSwk1_00	12	Planted	74	85	95	1	1381	SW 87 PLI 11 BL2 FD 1
R3	future	SBSwk1_00	15	Planted	100	85	95	1	1392	SW 100
R2	existing	SBSwk1_01	19	Natural	70	85	95	3	2578	AT 52 BL 42 SW5 PLI 1 CW 1
R2	existing	SBSwk1_01	21	Planted	30	85	95	1	1092	SW 49 PLI 44 BL6 FD 1
R3	existing	SBSwk1_01	19	Natural	26	85	95	1	486	BL 44 AT 26 SW11 FD 11 PLI 8
R3	existing	SBSwk1_01	21	Planted	74	85	95	1	1381	SW 87 PLI 11 BL2 FD 1

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	future	SBSwk1_01	21	Planted	100	85	95	1	1392	SW 100
R3	future	SBSwk1_02	14	Planted	100	85	95	1	1392	SW 100
R2	existing	SBSwk1_03	20	Natural	86	85	95	3	5331	SW 37 AT 35 HW15 BL 12 PLI 1
R2	existing	SBSwk1_03	20	Planted	14	85	95	2	902	SW 42 PLI 26 FD23 BL 9
R3	existing	SBSwk1_03	15	Planted	100	85	95	1	1389	SW 90 PLI 10
R3	future	SBSwk1_03	13	Planted	100	85	95	1	1389	SW 90 PLI 10
R2	existing	SBSwk1_04	19	Natural	86	85	95	3	5331	SW 37 AT 35 HW15 BL 12 PLI 1
R2	existing	SBSwk1_04	19	Planted	14	85	95	2	902	SW 42 PLI 26 FD23 BL 9
R3	existing	SBSwk1_04	18	Natural	33	85	95	2	664	AT 83 FD 17
R3	existing	SBSwk1_04	18	Planted	67	85	95	2	1371	SW 82 PLI 12 FD4 BL 2
R3	future	SBSwk1_04	15	Natural	33	85	95	2	664	AT 83 FD 17
R3	future	SBSwk1_04	18	Planted	67	85	95	2	1371	SW 82 PLI 12 FD4 BL 2
R2	existing	SBSwk1_05	20	Natural	64	85	95	2	1718	AT 55 BL 38 SW5 FD 2
R2	existing	SBSwk1_05	20	Planted	36	85	95	1	946	SW 56 PLI 34 FD5 BL 5
R3	existing	SBSwk1_05	19	Natural	59	85	95	1	1746	AT 81 FD 11 BL6 SW 2

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	existing	SBSwk1_05	19	Planted	41	85	95	1	1217	SW 64 PLI 31 FD3 BL 2
R3	future	SBSwk1_05	16	Natural	59	85	95	1	1746	AT 81 FD 11 BL6 SW 2
R3	future	SBSwk1_05	20	Planted	41	85	95	1	1217	SW 64 PLI 31 FD3 BL 2
R2	existing	SBSwk1_06	21	Natural	67	85	95	3	1072	BL 48 AT 33 SW12 PLI 5 FD 2
R2	existing	SBSwk1_06	21	Planted	33	85	95	2	539	PLI 53 SW 40 BL7
R3	existing	SBSwk1_06	14	Natural	42	85	95	1	827	AT 88 BL 12 SW1
R3	existing	SBSwk1_06	20	Planted	58	85	95	1	1147	SW 79 PLI 18 BL3
R3	future	SBSwk1_06	17	Natural	42	85	95	1	827	AT 88 BL 12 SW1
R3	future	SBSwk1_06	20	Planted	58	85	95	1	1147	SW 79 PLI 18 BL3
R2	existing	SBSwk1_07	21	Natural	47	85	95	2	822	BL 94 PLI 4 SW1
R2	existing	SBSwk1_07	23	Planted	53	85	95	0	912	SW 76 PLI 22 BL2
R3	existing	SBSwk1_07	22	Natural	21	85	95	1	371	AT 37 SW 31 BL17 PLI 10 CW 5
R3	existing	SBSwk1_07	23	Planted	79	85	95	1	1364	SW 83 PLI 16 BL1
R3	future	SBSwk1_07	15	Natural	21	85	95	1	371	AT 37 SW 31 BL17 PLI 10 CW 5
R3	future	SBSwk1_07	22	Planted	79	85	95	1	1364	SW 83 PLI 16 BL1
R2	existing	SBSwk1_08	23	Natural	47	85	95	2	822	BL 94 PLI 4 SW1
R2	existing	SBSwk1_08	25	Planted	53	85	95	0	912	SW 76 PLI 22 BL2

Silviculture Era	Existing Future	TEM Site Series	Site Index	Method	Proportion	OAF1	OAF2	Regen Delay	Density	Species Composition
R3	existing	SBSwk1_08	22	Natural	19	85	95	2	342	AT 35 BL 35 SW19 PLI 6 FD 6
R3	existing	SBSwk1_08	23	Planted	81	85	95	2	1443	SW 96 PLI 3 BL1
R3	future	SBSwk1_08	13	Natural	19	85	95	2	342	AT 35 BL 35 SW19 PLI 6 FD 6
R3	future	SBSwk1_08	23	Planted	81	85	95	2	1443	SW 96 PLI 3 BL1
R2	existing	SBSwk1_09	21	Natural	64	85	95	2	1848	BL 68 AT 23 PLI9
R2	existing	SBSwk1_09	21	Planted	36	85	95	2	1043	SW 87 BL 9 PLI4
R3	existing	SBSwk1_09	20	Planted	100	85	95	3	1421	SW 100
R3	future	SBSwk1_09	19	Planted	100	85	95	3	1421	SW 100
R2	existing	SBSwk1_10	25	Natural	64	85	95	2	1848	BL 68 AT 23 PLI9
R2	existing	SBSwk1_10	27	Planted	36	85	95	2	1043	SW 87 BL 9 PLI4
R3	existing	SBSwk1_10	25	Planted	100	85	95	3	1421	SW 100
R3	future	SBSwk1_10	22	Planted	100	85	95	3	1421	SW 100
R2	existing	SBSwk1_11	20	Natural	64	85	95	2	1848	BL 68 AT 23 PLI9
R2	existing	SBSwk1_11	20	Planted	36	85	95	2	1043	SW 87 BL 9 PLI4
R3	existing	SBSwk1_11	16	Planted	100	85	95	3	1421	SW 100
R3	future	SBSwk1_11	17	Planted	100	85	95	3	1421	SW 100

8.3 Appendix C – LiDAR Enhanced Forest Inventory Report

LiDAR Enhanced Forest Inventory: Individual Tree Inventory Project

Point and Polygon Database Metadata

Interim Delivery: 2017 LiDAR Data Analysis

March 22, 2019

Project 197-36

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8.4 Appendix D – Managed Stand Yields for Tree Farm Licence #30

CANFOR

Memo

To:	Mark Perdue, RPF – Senior Analyst TFLs Ministry of Forests	**Date:**	September 20, 2023
CC:	Ian Moss, PhD RPF – Forestree Dynamics Ltd. Jay Greenfield, RPF – Meristem Insights Ltd. Grace Zheng, FIT – Canadian Forest Products Ltd.		
From:	Terry Lazaruk, RPF Canadian Forest Products Ltd.		
Subject:	Managed Stands Yields for Tree Farm Licence #30		

Introduction & Objectives

Managed stand yields play a crucial role in the timber supply, particularly for Tree Farm License (TFL) #30, where stands aged 45 years or younger make up a significant portion (61%) of the timber harvestable land base (THLB). Given the current market conditions and limited fiber availability, gaining a comprehensive understanding of managed stands has become more critical than ever. Key factors include their growth rate, species and profile composition, and the timing of their harvestability. However, one major challenge in timber supply modeling in BC revolves around accurately projecting the volume of managed stands. Typically, this projection is based on summarized planting data for each analysis unit (AU) and site productivity information from a range of sources. Subsequently, the Managed Stand Yield Tables (MSYT) are generated using the Table Interpolation Program for Stand Yields (TIPSY), and these tables are incorporated into timber supply models to inform decision-making processes.

To gather more information on managed stands and validate the growth and yield assumptions used in the TFL 30 timber supply model, Canfor launched the Change Monitoring Inventory (CMI) program in 2001. As part of this initiative, thirty-five (35) permanent sample plots (PSP) were strategically established in post-harvest regenerated stands aged between 15 and 30 years. In September 2022, Ecora Engineering & Resource Group Ltd. conducted the second measurement (M2) on 17 out of the 35 PSPs. Notably, 16 of these plots are situated within the two most prevalent site associations of the TFL: Sxw_Devilsclub and Sxw_Oakfern. Collectively, these site associations account for a significant 80% of the THLB. The data gathered from this CMI program aims to enhance the understanding of managed stands and refine the accuracy of the TFL 30 timber supply model (MYST), which is vital for the upcoming timber supply review.

Following the second measurement, subsequent analyses were conducted to further examine the findings. These analyses involved comparing the plot data with the TFL30 Management Plan (MP) #10 MSYT corresponding to the Sxw_Devilsclub and Sxw_Oakfern site associations. Additionally, the plot data was cross-referenced with the TIPSY projections, where the plot data served as inputs. This report provides a comprehensive account of the methodology employed, the outcomes derived from these comparative analyses, and the recommended MSYT for TFL 30 MP#11 timber supply model.

This analysis aimed to accomplish the following objectives:

1. Investigate the characteristics of managed stands within TFL 30, including their stand attributes, growth rate, profile breakdown, and harvestability timeline.
2. Confirm the accuracy of localized growth and yield projections for TFL 30.
3. Validate the MSYT used in TFL 30 MP#10 timber supply analysis through on-the-ground observations.
4. Provide recommendations on how MSYT should be modelled in MP#11 for TFL 30.

4.2 Appendix B – Analysis Report

Tree Farm License #30

Management Plan #11

Timber Supply Analysis Report

Dated: August 20, 2024

Prepared and Submitted by: Canadian Forest Products Ltd.

Presented to

Government of British Columbia

Ministry of Forests

Forest Analysis and Inventory Branch

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Version	Date	Prepared By	Reviewed By	Notes/Revisions
2	14-June-24	Grace Zheng, RPF	Terry Lazaruk, RPF	Initial Draft
3	25-June-24	Grace Zheng, RPF	Terry Lazaruk, RPF	Digital Version Sent to FAIB for Review
4	23-July-24	Grace Zheng, RPF & Terry Lazaruk, RPF	Terry Lazaruk, RPF, Stacey Boks, RPF (FAIB) Mark Perdue, RPF (FAIB)	Added a section on Moose. Updated Section 3 for: theoretical LRSY, other resource objectives diagnostics. Updated Section 4.1 for 50 years non-declining growing stock scenario. Sent to Lheidli Tenneh First Nation (LTNFN) (Chelton VanGeloven) for review before Public Release
5	2-August-24	Grace Zheng RPF & Terry Lazaruk, RPF	Chelton VanGeloven, RPF (LTNFN)	Addressed all comments in MP and AR Content Checklist from FAIB. Sent to LTNFN (Chelton VanGeloven) for review before Public Release
6	20-August-2024	Grace Zheng RPF		Revisited some sections to include information that was noted from the meeting with LTNFN (Chelton VanGeloven) on August 15 and 16,2024.

Executive Summary

This report delivers a detailed analysis of the timber supply for Tree Farm Licence #30 (TFL30) as part of Management Plan #11, and should be read in conjunction with the accompanying TFL30 - Management Plan 11 Timber Supply Analysis Information Package (Canfor & Ecora, 2024), which outlines the assumptions and data underpinning the basecase scenario. This scenario is built upon current management practices and the best available data concerning the land base, proposing the Allowable Annual Cut (AAC).

Section 2 discusses the biogeoclimatic ecosystem classification, leading species distribution, site productivity, age class, volume distribution, and disturbance history of TFL30. These factors, reflecting the inherent characteristics and management history of the TFL, have significantly shaped its current state and the harvest level in the basecase. Section 3 provides detailed descriptions of the basecase characteristics, including harvest volume, growing stock projections, age class trajectories, and patch size distribution.

A comprehensive sensitivity analysis in Section 3.4.8, presented in Table E-1, assesses the impact of various factors on harvest levels and quantifies the sensitivity of these levels to changes in specific variables. This information is vital for informed decision-making regarding the AAC for TFL30.

Table E-1 Summary of Basecase Harvest Level (conifer m^3/yr) and Sensitivity Analysis Results

Scenario	Percent Difference to the Basecase (%)		
	1 to 20	21 to 50	51 to 250
Basecase	408,190	414,230	424,044
Even Harvest Flow	-1%	-2%	-4%
Step-up Harvest Flow	-1%	-2%	2%
MP#10 Harvest Flow	-20%	-6%	6%
Adjusted NSYT Only	-31%	-25%	-19%
Adjusted MSYT Only	-1%	-1%	0%
Unadjusted NSYT & MSYT	-34%	-26%	-22%
MHV 140	2%	2%	2%
MHV 220	0%	0%	0%
No Patch Targets	4%	3%	1%
Enforced Patch Targets	-5%	-2%	0%
MSYT +10%	12%	16%	19%
MSYT -10%	-6%	-7%	-7%
NSYT +10%	4%	3%	2%
NSYT -10%	-6%	-3%	-1%
THLB + 10%	9%	10%	12%
THLB - 10%	-8%	-9%	-10%
Natural Disturbance on the FMLB	-18%	-19%	-21%
No Natural Disturbance	5%	4%	3%
No harvest in Rare Ecosystems	-2%	-1%	-1%
No Harvest in Old Growth Deferral Areas	-4%	-5%	-7%
BCTS Volume	2%	0%	-1%

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Acronyms and Abbreviations

AAC	Allowable Annual Cut
AU	Analysis Unit
BEC	Biogeoclimatic Ecosystem Classification
BCGW	BC Geographic Warehouse
BCTS	British Columbia Timber Sales
BMP	Best Management Practices
Canfor	Canadian Forest Products Ltd.
CMAI	Culmination Mean Annual Increment
CMI	Change Monitoring Inventory
ESSF	Engelmann Spruce Sub-Alpine Fir
ERA	Ecosystem Representation Analysis
EVQO	Effective Visual Quality Objectives
FAIB	Forest Analysis and Inventory Branch
FMLB	Forest Management Land Base
FOR	British Columbia Ministry of Forests
FSW	Fishery Sensitive Watershed
ha	Hectares
HEDA	Hydrological Equivalent Disturbed Area
ICH	Interior Cedar Hemlock
ITI	Individual Tree Inventory
LHLB	Legally Harvestable Land Base
LRSY	Long Run Sustainable Yield
LTNFN	Lheidli Tenneh First Nation
MHV	Minimum Harvestable Volume
MP	Management Plan
MSYT	Managed Stand Yield Tables
MoF	Ministry of Forest
NDEF	Non-Declining Even Flow
NDT	Natural Disturbance Unit
NRL	Non-Recoverable Losses
NSYT	Natural Stand Yield Tables
OGMA	Old Growth Management Area
PEM	Predictive Ecosystem Model
PSPL	Provincial Site Productivity Index
RESULTS	Reporting Silviculture Updates and Land Status Tracking System
SBS	Sub Boreal Spruce
SFMP	Sustainable Forest Management Plan
SI	Site Index
SIBEC	Site Index Estimates by BEC Site Series
TADAM	TASS Approximation by a Dynamical Aggregated Model
TASS	Tree and Stand Simulator
TEM	Terrestrial Ecosystem Mapping
TFL	Tree Farm License
THLB	Timber Harvesting Land Base
TIPSY	Table Interpolation Program for Stand Yields
TSA	Timber Supply Area
TSR	Timber Supply Review
UWR	Ungulate Winter Range
VAC	Visual Absorption Capacity
VDYP	Variable Density Yield Prediction Growth and Yield Model
VLI	Visuals Landscape Inventory
VPH	Volume per Hectare
VQO	Visual Quality Objectives
VRI	Vegetation Resources Inventory

1. Introduction

This report contains a timber supply analysis for Tree Farm Licence #30 (TFL30) and is part of the provincial Timber Supply Review (TSR) process for Tree Farm Licence (TFL) areas in British Columbia. As specified within the Tree Farm License Management Plan Regulation, the TFL licence holder is required to submit a management plan for approval by the British Columbia's Chief Forester. The management plan must include a timber supply review that analyzes the short and long-term availability of timber that may be harvested from the TFL including the impact of management practices on the availability of timber.

The purpose of the review is to provide the Chief Forester with sufficient information to enable him or her to determine an allowable annual cut (AAC) for the TFL over a defined period (typically 10 years) as required under Section 8 of the Forest Act. In order for the Chief Forester to accurately and rationally make a determination, he or she must have an up-to-date assessment of the timber supply available from the TFL based on the best available information, including current land use decisions and forest management practices for the land base.

The timber supply analysis report focuses on a single forest management scenario referred to as the 'basecase', which reflects current management practices and land base conditions. Current management practices are defined by the specifications in the Information Package for the TFL including guidelines for the protection of forest resources, Sustainable Forest Initiative Certification standards and other legal objectives established under the Forest and Range Practices Act (FRPA). An important part of this analysis is an assessment of how the basecase result might be affected by uncertainties through a process called the sensitivity analysis. Together, the basecase scenario and sensitivity analysis form a solid basis for enabling the Chief Forester to make an AAC determination.

The previous timber supply analysis in support of Management Plan #10 (MP#10) was completed in 2013, followed by the AAC determination on February 6, 2014 in which the AAC was set at 412,500 m3/year. Canfor initiated the timber supply review in support of Management Plan #11 (MP#11) in 2022 and this document describes the results of the recently completed timber supply analysis for TFL30.

This report is the second of three documents under the Timber Supply Review process for TFL30. The first document, entitled TFL30 Management Plan 11- Timber Supply Analysis Information Package, was released for public consultation in April of 2023 and provided detailed technical information related to the inventories, resource strategies and assumptions used to support the timber supply analysis. The last document, after the timber supply analysis report and management plan is submitted, will be prepared by the government and will outline the Chief Forester's AAC decision for TFL30 and the reasoning behind it.

1.1 TFL History

Tree Farm licence 30 is an amalgamation of five smaller TFL's that were originally granted in 1959 to the following companies:

- TFL 28: Shelley Development Ltd.
- TFL 29: Eagle Lake Sawmills Ltd.
- TFL 30: Sinclair Spruce Lumber Co. Ltd.
- TFL 31: Upper Fraser Spruce Mills Ltd.
- TFL 34: Church Sawmill Ltd.

Subsequent corporate acquisitions during the 1960's resulted in combining these TFL's into the present-day TFL 30. The chronology of events was:

- **1960:** Midway Terminals (later National Forest Products) purchased Sinclair Spruce Lumber Co. Ltd. and Upper Fraser Spruce Mills Ltd.
- **1961:** Noranda Mines Ltd. purchased Sinclair and Upper Fraser in addition to other National Forest Products' holdings in southern British Columbia and formed a new company called Northwood Mills Ltd.
- **1963:** Eagle Lake Sawmills Ltd. purchased Shelly Development Ltd.
- **1964:** Northwood Mills combined with Mead Corporation of Dayton Ohio to construct a new pulpmill at Prince George. The name of the new company was changed to Northwood Pulp Limited.
- **1964:** Northwood purchased Church Sawmills Ltd.
- **1966:** Northwood purchased Eagle Lake Sawmills Ltd.

The schedule by which the individual Tree Farm Licences were amalgamated into TFL 30 varied only slightly from the corporate acquisitions. In 1965 TFL's 30, 31 and 34 were consolidated, and in 1967 TFL's 28, 29, and 30 were further consolidated into the present-day TFL 30.

During 1998 Northwood Pulp and Timber Ltd. changed its name to Northwood Inc.

During 1999, Canadian Forest Products Ltd. purchased Northwood Inc. There were no changes to the administrative boundaries of TFL 30 as a result of this acquisition.

The AAC for TFL30 has changed as noted below:

Table 1-1 TFL30 Management Plan and AAC History

Management Plan	Determination Date	AAC (m^3/yr)
1	1959 (TFL Amalgamations)	30,384
2	1965 (TFL Amalgamations)	104,773
2	1967 (New Inventory)	212,378
3	1969 (Conversion to Close Utilization)	261,932
3	1970 (TFL Amalgamations)	369,436
3	1972 (TFL Amalgamations)	421,921
4	1976 (New Inventory)	440,950
5	1981 (Revised Land Base Classification)	437,400
6	1986	428,000
7	1991	407,000
8	October 1,1996	350,000
9	July 1,2003	330,000
9	August 4, 2006 (MPB focused temporary reduction as per Canfor Request)	201,312
9	December 31, 2008 (Temporary Reduction Expired)	330,000
10	February 6, 2014	412,500

1.2 MP10 Determination Implementation Instructions

With the MP10 Determination, there were key areas identified where additional work was requested to address uncertainties. Table 1-2 below lists the Instructions and the work done to address them.

Table 1-2 TFL30 MP10 Implementation Instructions and Actions Taken

Instruction	Actions Taken	Progress
Work with FLNR district staff to develop a strategy to provide suitable habitat, including appropriate location of WTP's, to better accommodate wildlife needs	Draft OGMA's have been established and a reassessment of WTP locations has been completed and incorporated into the current TSR assumptions increasing the land base netdown from 0% (MP10) to 1.34%. Key changes in practices are associated primarily with riparian retention and practices to address migratory bird habitat concerns.	Complete
Work with staff at FAIB to develop a better estimate of OAF1 for the next AAC Determination	The OAF1 estimates have not been directly improved upon, but rather a change in focus and work on the managed stand G&Y projections has taken place instead.	In-Progress

2. Land Base Description

2.1 Location of the Tenure

TFL30 is situated 75 km east of the city of Prince George in the Prince George Forest District, covering approximately 180,350 hectares within the Fraser Basin Ecoregion (Figure 2-1). Its western boundary lies near Highway 97 at Summit Lake, extending eastward across the western foothills of the Rocky Mountains, primarily north of the Fraser River. The terrain of TFL30 is a blend of rolling landscapes with steeper inclines as one moves towards the Rocky Mountains to the north.

TFL30 boasts a vast array of riparian environments, flanked by three major rivers - the Fraser, McGregor, and Torpy Rivers - and numerous lakes and streams, contributing to its ecological diversity.

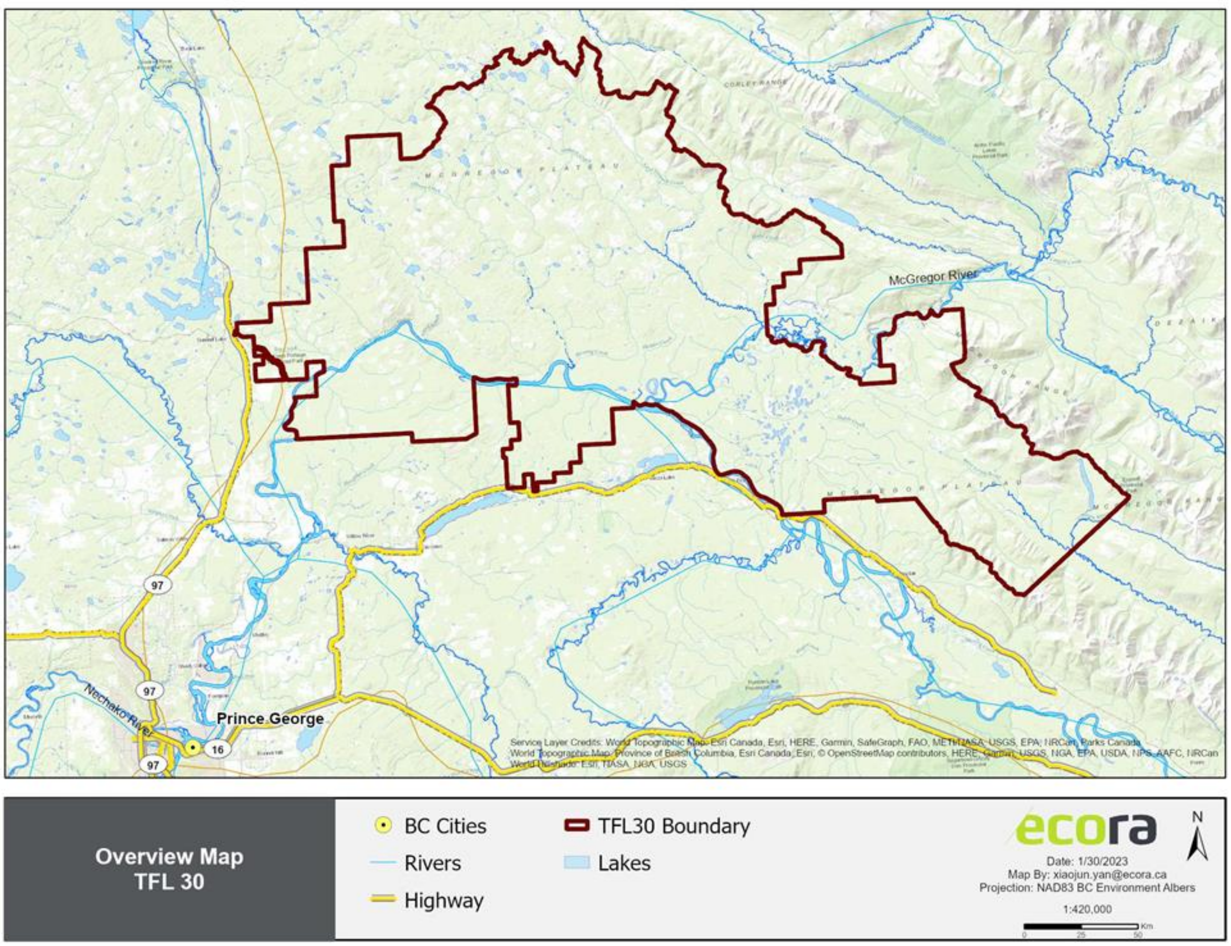

Figure 2-1 Overview Map of TFL30

2.2 TFL30 and First Nation Traditional Territories

The majority of TFL30 overlaps with the traditional territory of the Lheidli T'enneh First Nation band (~82% of the gross area). Smaller portions overlap with McLeod Lake Indian Band and West Moberly First Nation in the North West section of the TFL.

2.3 Land Base Classification

The land base classification (netdown) process commences with the total gross area of the land base, from which areas are sequentially excluded based on specific classification criteria. This process is thoroughly documented in the *Tree Farm License 30 – Management Plan 11 Timber Supply Analysis Information Package* (herein refers to as the Information Package, Canfor & Ecora, 2024) , outlining both the data and assumptions utilized in the analysis. Through this systematic exclusion, the forest management land base (FMLB), legally harvestable land base (LHLB), and timber harvesting land base (THLB) are delineated. Table 2-1 details the area removed under each netdown category, along with the summarized reduction and current THLB.

Table 2-1 Land Base Classification Summary

Land Base Classification	Gross Area (ha)	Schedule A Gross Area (ha)	Schedule B Gross Area (ha)	Net Area Removed (ha)	Percent of Gross Area (ha)
Gross Land Base	**180,347**	**755**	**179,079**		
Non-TFL	513			513	0.28%
Non-Forested & Non-Productive	22,320	33	22,287	22,320	12.38%
Roads and Trails	2,531	7	2,524	2,531	1.40%
Sub-Total Reduction				*25,364*	*14.06%*
Forest Management Land Base (FMLB)				**154,983**	**85.94%**
Ungulate Winter Range No Harvest Zone	8,838		8,838	8,838	4.90%
Old Growth Management Areas	19,642	522	19,120	19,642	10.89%
Recreational Areas	15		15	15	0.01%
Recreational Sites	2		2	2	0.00%
Recreational Trails	1		1	1	0.00%
Sub-Total Reduction				*28,498*	*15.80%*
Legally Harvestable Land Base (LHLB)				**126,485**	**70.13%**
Riparian Areas	6,907	6	6,901	6,907	3.83%
Unstable Terrain	887	20	867	718	0.40%
Steep Slope	398		398	398	0.22%
Difficult Regeneration Types	497	1	497	497	0.28%
Non-Commercial Stands	3,172	23	3,149	3,172	1.76%
Non-Merchantable Mature	8,156	5	8,151	8,156	4.52%
Low Productivity – Immature	8		8	8	0.00%
Archeological Sites	12		12	12	0.01%
FN Blocks	733		733	733	0.41%
Existing Wildlife Tree Patches	1,761		1,761	1,761	0.98%
Future Wildlife Tree Patches		6	1,389	1,395	0.77%
Sub-Total Reduction				*23,757*	*13.17%*
Timber Harvesting Land Base (THLB)				**102,728**	**56.96%**

2.3.1 Notation of Interest

It should be noted that there is a 'Notation of Interest' area that has been identified within the TFL (located between Summit Lake and the Giscome portage Trail), but no definitive action on this area has taken place to date. Should advancements on this area take place prior to the next TSR, this area will be addressed at that time. The area covers less than 1% of the current THLB.

2.4 Current Land Base Condition

2.4.1 Biogeoclimatic Ecosystem Classification

The Biogeoclimatic Ecosystem Classification (BEC) system in Canada is a scientific framework for classifying and mapping ecosystems. The BEC system categorizes ecosystems into zones and variants based on their ecological features, including the types of plant communities present, soil types, and climatic conditions. The mapping products are essential tools for land-use planning and environmental assessment.

Terrestrial Ecosystem Mapping (TEM) is a detailed and systematic approach to classify, describe, and map ecosystems based on the BEC framework at a fine scale. TEM involves classifying land into distinct ecological units and site series based on a combination of factors such as vegetation, soil, topography, climate, and human influences.

The current version of the provincial BEC map is the BEC version 12 (BECv12) released in 2021 through the BC Geographic Warehouse (BCGW). TEM was completed for the McGregor Model Forest (overlaps with TFL30) in 2001 by Timberline Forest Inventory Consultants, Industrial Forest Service, and Oikos Ecological Consultants using a combination of field survey plots and aerial photography. This TEM mapping currently is considered the best available information for ecosystem mapping for TFL30. Therefore, TEM at the BEC variant level is used where applicable and available. Areas without TEM coverage is resulted from the TFL boundary version inconsistencies, found along the TFL boundary, BECv12 is used for these areas.

The climate of TFL30 is best described by its overlapping biogeoclimatic units. There are three biogeoclimatic zones: the Sub-Boreal Spruce (SBS), Interior Cedar-Hemlock (ICH), and Engelmann Spruce Sub-alpine Fir (ESSF). The three zones share a continental climate characterized by long cold winters and short warm summer. Each zone has different precipitation and temperature patterns that distinguishes them. Precipitation in SBS is moderate but higher during the summer months due to convectional rainfall. The ICH zone experiences milder and more humid conditions compared to the SBS. Precipitation is fairly high throughout the year, with a peak during the fall and winter months, supported by the coastal influences that extend into the interior. The ESSF zone is found at higher elevations and is characterized by a colder climate with a shorter growing season. Precipitation is also higher than in the lower elevation zones, occurring predominantly as snow during the winter.

Table 2-2 details the FMLB differences of the BECv12 and TEM at the BEC variant level. Overall, TEM has identified more area in ICHvk2 and less area in ESSFwk2, SBSvk, and SBSwk1.

Table 2-2 FMLB Area of BECv12 and TEM by BEC Zone/Subzone/Variant

BEC Zone/Subzone/Variant	FMLB (Ha)		
	BECv12	TEM	Difference
ESSFwc3	2,552	2,866	314
ESSFwcp	100		-100
ESSFwk2	11,487	9,759	-1,729
ICHvk2	5,156	9,616	4,460
SBSmk1	6,593	6,586	-7
SBSvk	73,310	70,703	-2,607
SBSwk1	55,784	54,444	-1,340
no-TEM-Coverage	-	1,009	1,009

The FMLB/THLB distribution by BEC variant in TEM is illustrated in Figure 2-2 and BECv12 in Figure 2-3. Figure 2-4 and Figure 2-5 present the maps of BECv12 and TEM of TFL30. The THLB distribution by BEC variants in both ecosystem mapping is relatively consistent.

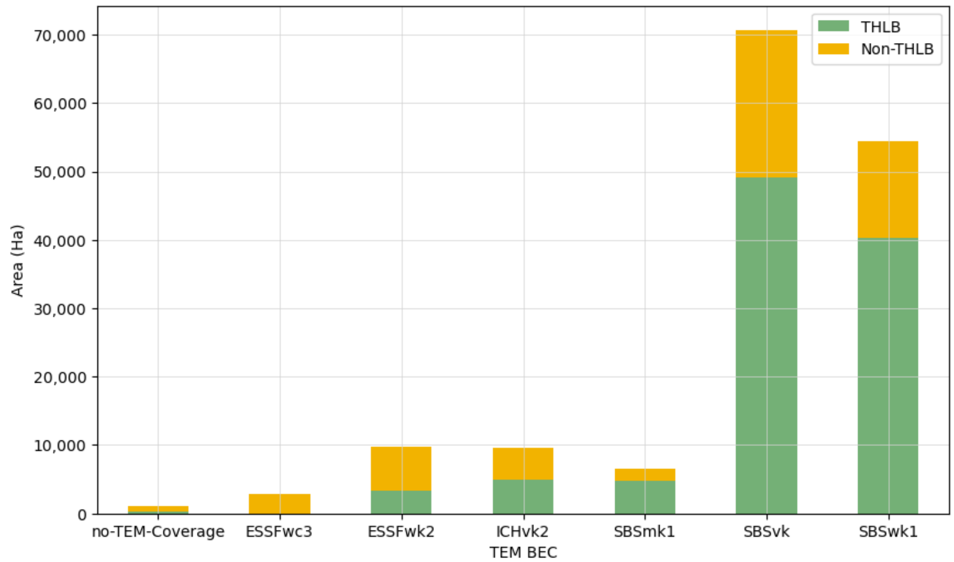

Figure 2-2 TEM BEC Summary

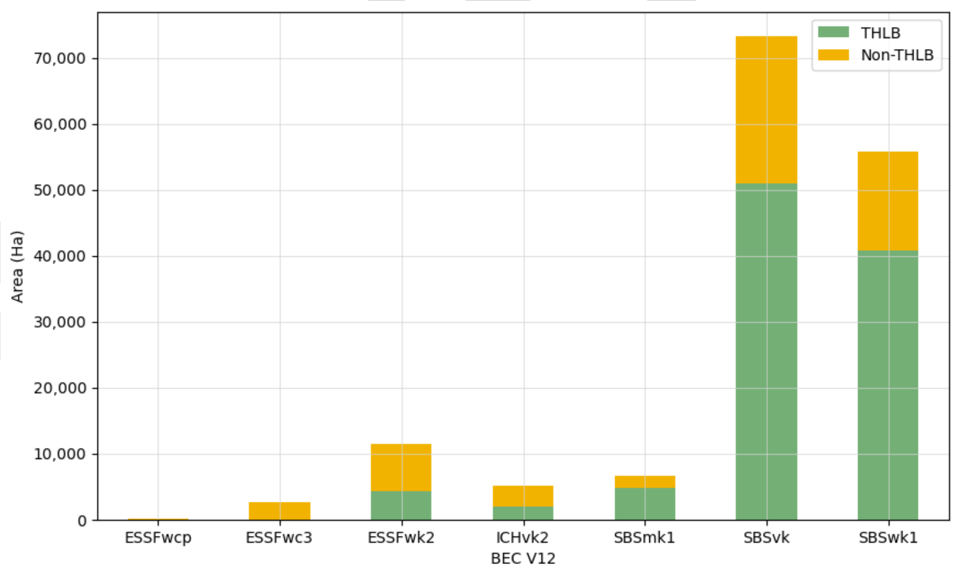

Figure 2-3 BECv12 Summary

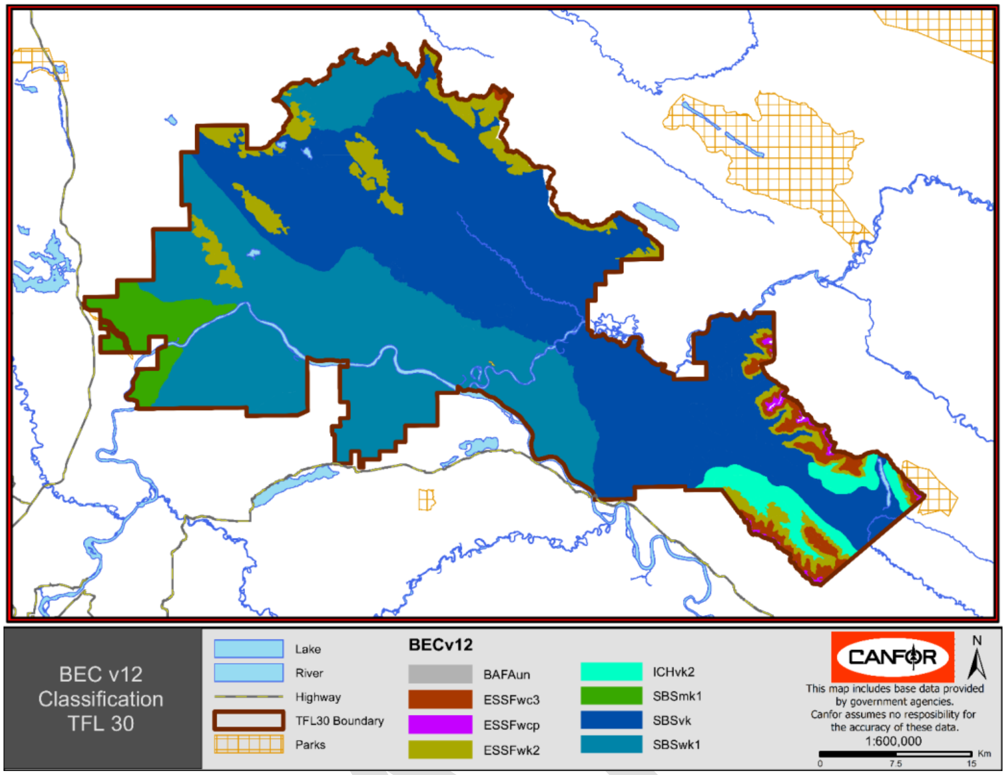

Figure 2-4 Map of BECv12 Distribution in TFL30

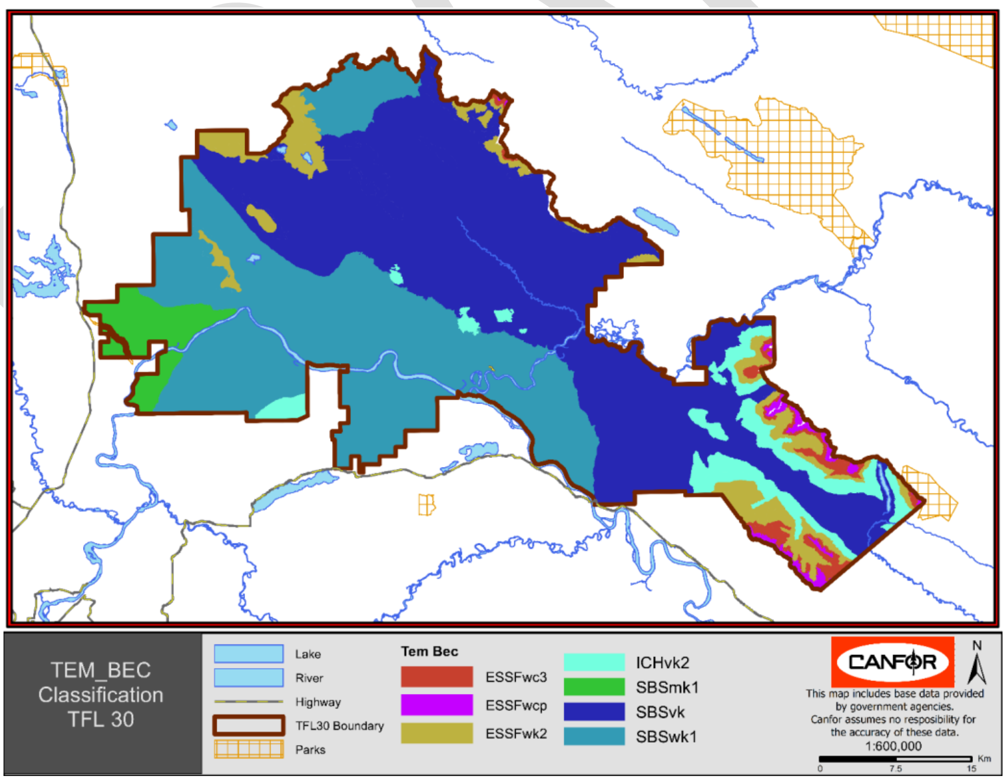

Figure 2-5 Map of TEM BEC Distribution in TFL30

2.4.2 Leading Species

In TFL30, hybrid spruce is the predominant leading tree species, closely followed by subalpine fir (balsam). In the land base classification process, stands of deciduous, Western red cedar, and Western hemlock without harvest history are excluded from the THLB. Conversely, THLB areas with these leading species are considered existing managed stands, although their species profiles have not been updated in the Vegetation Resource Inventory (VRI). Additionally, approximately 4% of the THLB does not have a leading species in the VRI (categorized as 'None' in Table 2-3), indicating these areas as recently harvested stands lacking the regenerated species composition. Table 2-3 summarizes the FMLB and THLB area by leading species, Figure 2-6 and Figure 2-7 illustrates the leading species distribution on the TFL by THLB and Non-THLB.

Table 2-3 FMLB and THLB Area by VRI Leading Species

VRI Leading Species	FMLB (ha)	% of FMLB	THLB (ha)	% of THLB
Subalpine fir	39,488	26%	19,996	20%
Western Red cedar	201	0%	31	0%
Deciduous species	5,273	3%	3,599	4%
Douglas fir	1,124	1%	635	1%
Western hemlock	3,757	2%	439	0%
Lodgepole pine	5,837	4%	5,497	6%
Hybrid spruce	95,247	63%	68,947	70%
none	4,056	3%	3,583	4%

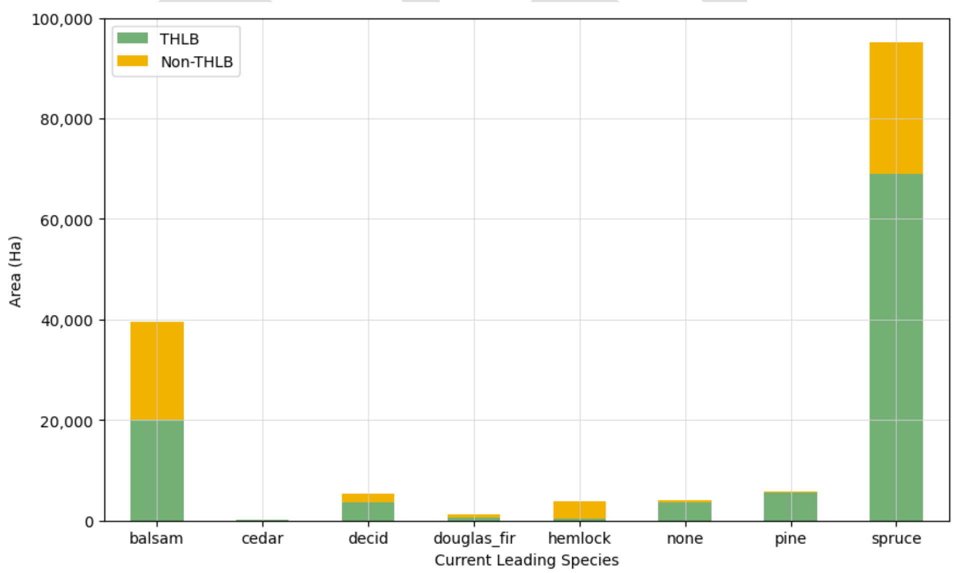

Figure 2-6 Leading Species Summary

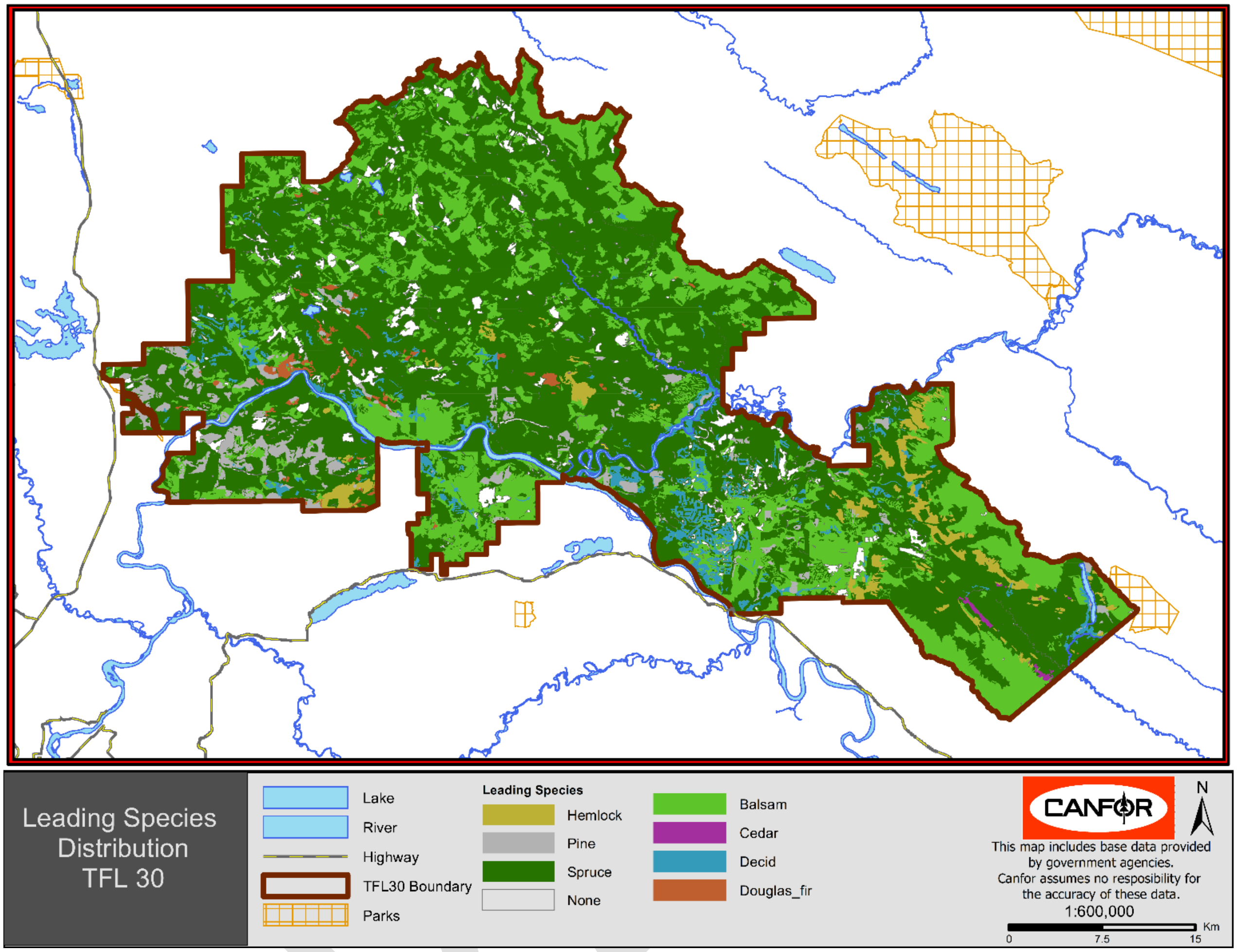

Figure 2-7 Map of Leading Species Distribution in TFL30

2.4.3 Site Index

Site index is a measure of site productivity and plays a vital role in forecasting stand growth trajectories. Although field surveys providing biometric data of the site tree offer the most precise site index measurements, such extensive data collection across the TFL is impractical. Within TFL30, three primary site index sources are available: VRI, the TFL30 Site Index Adjustment Project, and the Provincial Site Productivity Layer (PSPL). The VRI site index is utilized for projecting growth and yield of existing natural stands, while PSPL, covering only 56% of the TFL, offers managed stand estimates based on Predictive Ecosystem Model (PEM) coverage and Site Index Estimates by BEC Site Series (SIBEC) estimates.

The Site Index Adjustment Project, conducted by J.S. Thrower & Associates Ltd. in 2000 for TFL30, produced the Potential Site Index (PSI) as detailed in the *Potential Site Index Estimates for Major Commercial Tree Species on TFL 30* report. Employed extensively in the land base classification and growth and yield calculations for MP #9, #10, and #11, PSI represents the best available site index data for TFL30, covering 98% of its gross area.

Table 2-4 presents the FMLB area by site index classes (in 3-meter), comparing VRI site index, PSPL site index and PSI estimates based on the leading species as per VRI data.

Table 2-4 FMLB by Site Index Classes by Site Index Data Sources

Site Index Classes (3m averages)	Site Index Range (m)	FMLB (ha) by Site Index Sources		
		VRI	PSPL	PSI
6	4.5 to 7.4	2,288		34
9	7.5 to 10.4	7,854	270	582
12	10.5 to 13.4	27,968	796	4,167
15	13.5 to 16.4	28,676	4,544	8,697
18	16.5 to 19.4	34,021	24,550	8,862
21	19.5 to 22.4	35,707	56,224	66,249
24	22.5 to 25.4	10,995	1,726	32,139
27	25.5 to 28.4	2,421		3,474
30+	28.5 to 31.4	1,113		
Null	Null	3,940	66,875	30,778
	Total	154,983	154,983	154,983

Figure 2-8 displays the site index distribution across the FMLB using the three data sources. The VRI site index distribution closely resembles a normal distribution, with the bulk of the FMLB falling within the 12 to 21m site index classes. In contrast, both the PSI and PSPL site index distributions show a rightward skew, predominantly clustering in the 21m and above classes. It's important to note that null values in the inventory site index typically represent recently harvested stands. However, in the cases of PSI and PSPL, these null values may signify either the absence of a site index for the VRI leading species or a lack of coverage in that particular area.

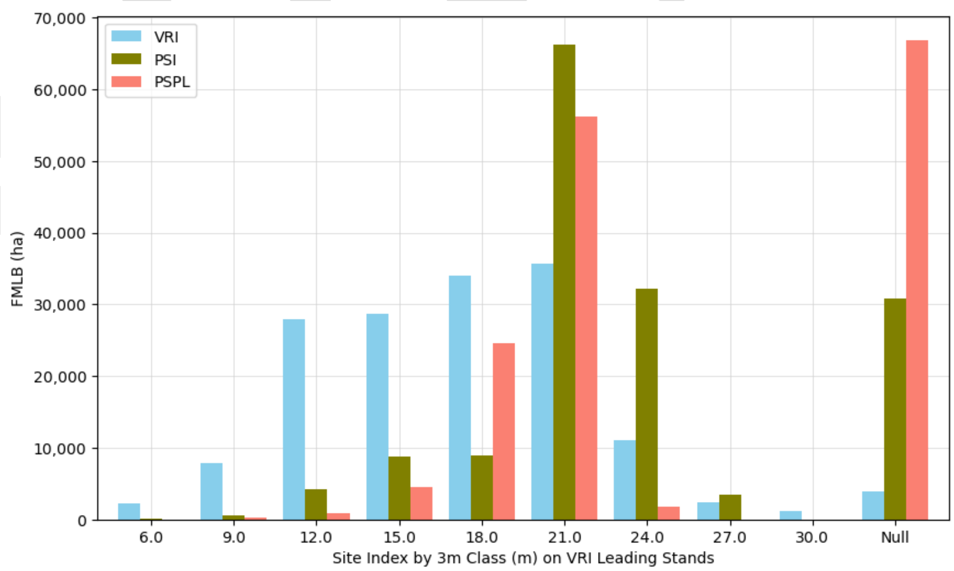

Figure 2-8 Site Index Distribution by FMLB by Data Sources

Site index for the natural and managed stands of the THLB is a critical component in timber supply analysis, as it helps to assess the relative changes in productivity due to stand tending techniques and planting stock quality. In the case of TFL 30, the area-weighted average site index for the existing natural stands on the THLB provides a general overview of the quality and quantity of merchantable stands in the short-term planning horizon. The selected data source for this estimation is the VRI site index, which has an estimated average of 17 meters. This value is close to the median site index in the VRI distribution across the FMLB and slightly lower than the median for the THLB, as shown in Figure 2-8 and Figure 2-9.

For the existing managed stands, the PSPL and PSI are used to calculate the THLB-weighted site index, with an estimated average of approximately 20 meters. The future managed stand site index is estimated using the same approach as for the existing managed stands, but it is calculated for the entire THLB, resulting in an average of 21 meters. The differences between these three values indicate improvements in silviculture practices that have led to higher site productivity. Additionally, they reflect strategic landscape-level planning implemented after previous Management Plans, which aims to balance the harvest of stands to prevent a potential timber supply shortage VRI Site Index

Figure 2-9 reveals that a significant portion (82%) of the FMLB in TFL30 falls within the 12 to 21 meters site index range based on VRI site index. The majority of non-THLB areas predominantly feature site indices ranging from 12 to 15 meters. This concentration in the lower site index classes (15m and below) can be attributed to various netdown factors such as unstable terrain, steep slopes, difficult regeneration types, non-commercial stands, non-merchantable mature stands, and low productivity immature stands. These factors often lead to the exclusion of stands in lower site index classes. Additionally, VRI data indicates that 9% of the FMLB is in the higher site index category of 24m and above. Table 2-5 details the FMLB and THLB by VRI site index classes. Figure 2-10 presents a map of the VRI site index distribution on the TFL.

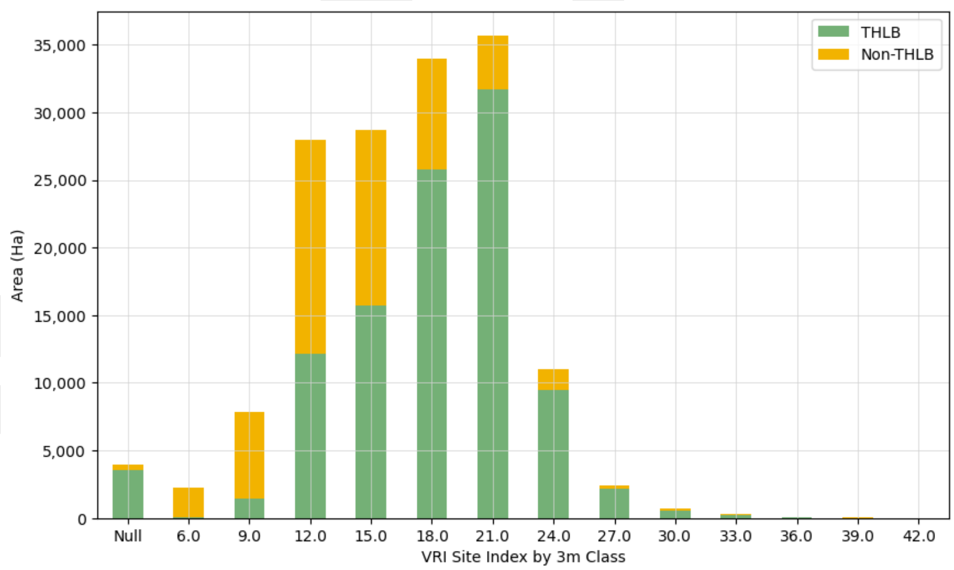

Figure 2-9 Inventory Site Index Distribution by 3m Classes

Table 2-5 Inventory Site Index Classes by FMLB and THLB

Inventory Site Index Classes (3m averages)	FMLB (ha)	FMLB (%)	THLB (ha)	THLB (%)
6	2,288	1%	66	0%
9	7,854	5%	1,424	1%
12	27,968	18%	12,111	12%
15	28,676	19%	15,681	15%
18	34,021	22%	25,773	25%
21	35,707	23%	31,674	31%
24	10,995	7%	9,456	9%
27	2,421	2%	2,164	2%
30	675	0%	544	1%
33	329	0%	216	0%
36	82	0%	66	0%
39	21	0%	18	0%
42	7	0%	5	0%
Null	3,940	3%	3,529	3%

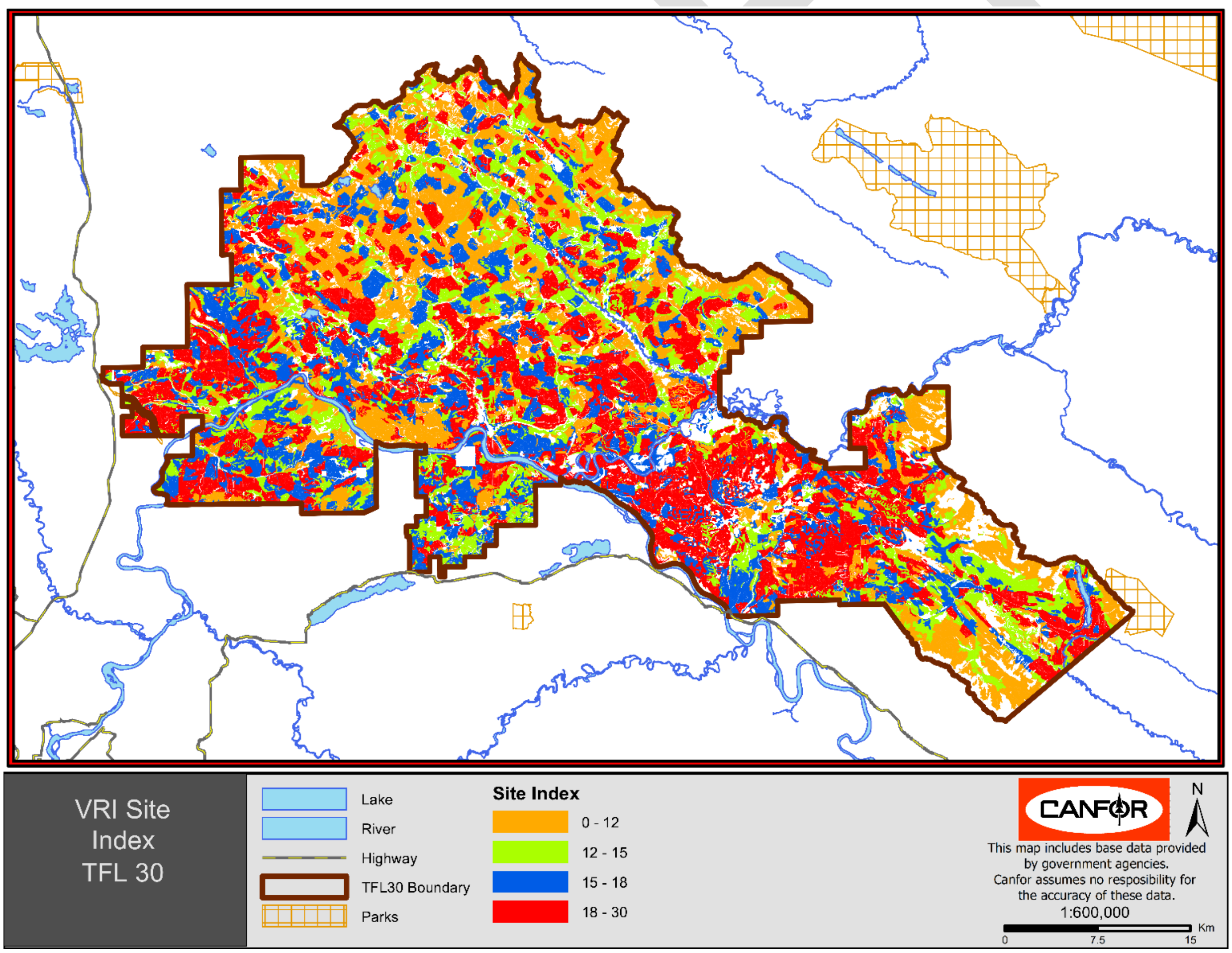

Figure 2-10 Map of VRI Site Index Distribution in TFL30

2.4.3.1 Potential Site Index

The 2001 Site Index Adjustment Project's PSI data shows that within the FMLB, the most prevalent site index class is 21m, accounting for 43% of the area, followed by 21% in the 24m class. A smaller portion, 14%, falls within the 6 to 18m range. The 27m site index class comprises 2%, while 20% is categorized as null, due to either a lack of coverage or an absence of corresponding PSI for the VRI leading species. Figure 2-11 illustrates the relatively uniform PSI values across TFL30, indicating a high degree of consistency in the site productivity of managed stands within the TFL. Table 2-6 details the FMLB and THLB by PSI classes. Figure 2-12 illustrates the spatial distribution of the PSI estimate in TFL30.

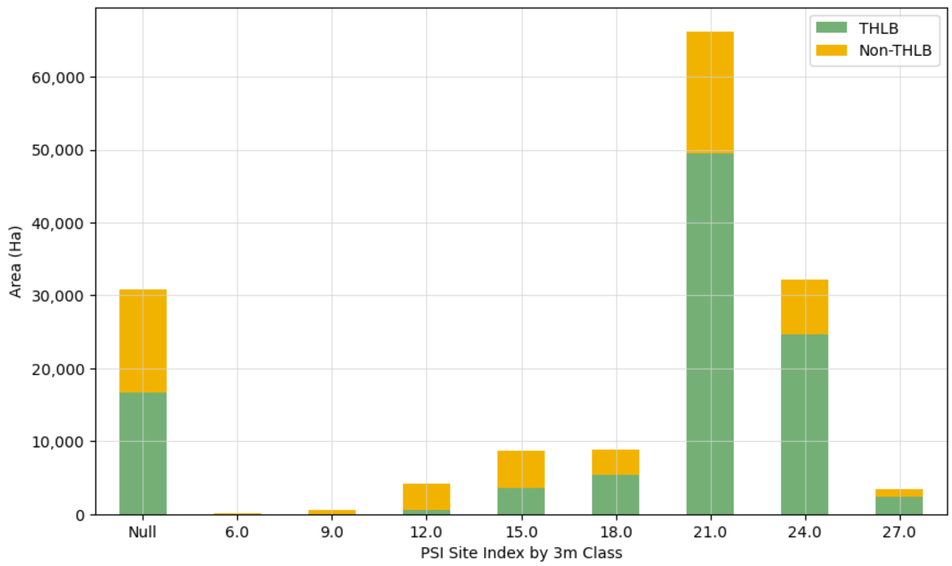

Figure 2-11 PSI Site Index Distribution by 3m Class by THLB and Non-THLB

Table 2-6 PSI Distribution in 3 Meters Classes by FMLB and THLB

Potential Site Index Classes (3m averages)	FMLB (ha)	FMLB (%)	THLB (ha)	THLB (%)
6	34	0%	-	0%
9	582	0%	31	0%
12	4,167	3%	597	1%
15	8,697	6%	3,499	3%
18	8,862	6%	5,348	5%
21	66,249	43%	49,522	48%
24	32,139	21%	24,675	24%
27	3,474	2%	2,321	2%
Null	30,778	20%	16,736	16%

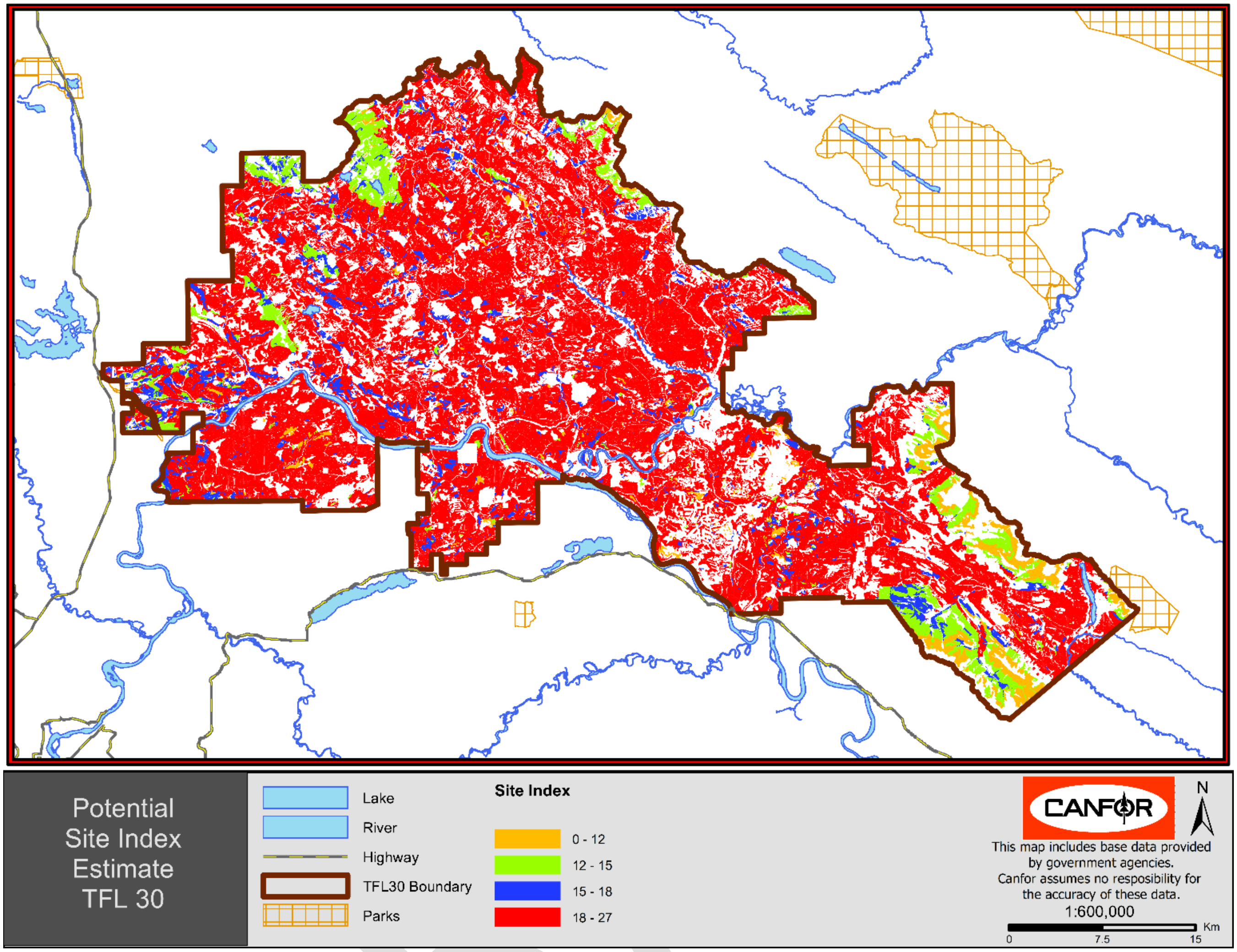

Figure 2-12 Map of PSI Distribution in TFL30

2.4.3.2 Provincial Site Productivity Layer Site Index

The Provincial Site Productivity Layer (PSPL) serves as an alternative for estimating managed stand site index, but its coverage for TFL30 is limited, covering only 56% of the total area (Figure 2-14). Consequently, PSPL data is primarily used to supplement site index information in areas where PSI data is unavailable. Figure 2-13 presents the distribution of the leading species' PSPL site index within TFL30. A significant portion (44%) of the FMLB lacks PSPL coverage, thus rendering the PSPL data null for these areas. In regions where PSPL data is available, 52% of the FMLB falls within the 18 to 21m site index class. Detailed information on PSPL site index distribution across the FMLB can be found in Table 2-7.

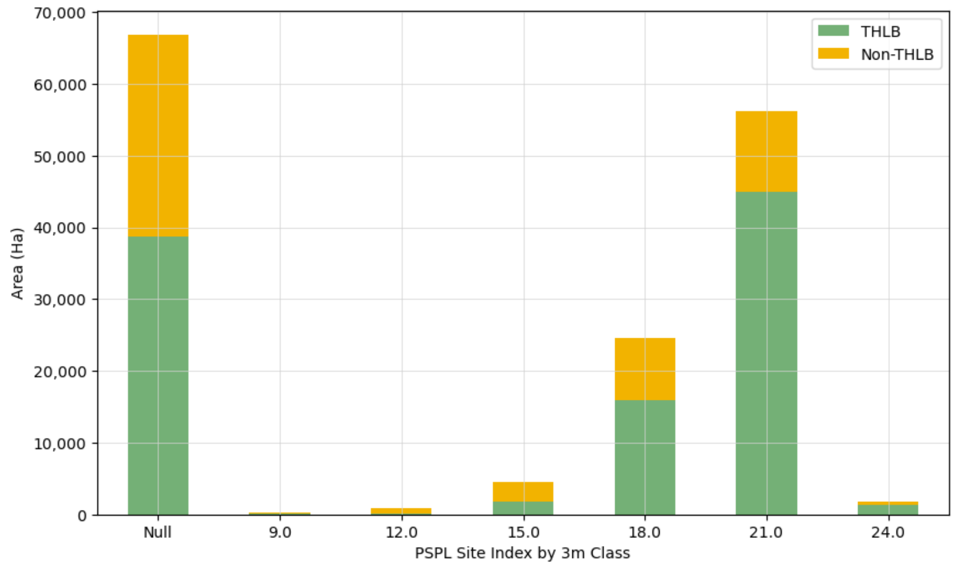

Figure 2-13 PSPL Site Index Distribution by THLB and Non-THLB

Table 2-7 PSPL Site Index Distribution in 3 Meters Classes by FMLB and THLB

PSPL Site Index Classes (3m averages)	FMLB (ha)	FMLB (%)	THLB (ha)	THLB (%)
9	270	0%	38	0%
12	796	1%	139	0%
15	4,544	3%	1,749	2%
18	24,550	16%	15,915	15%
21	56,224	36%	44,931	44%
24	1,726	1%	1,282	1%
Null	66,875	43%	38,673	38%

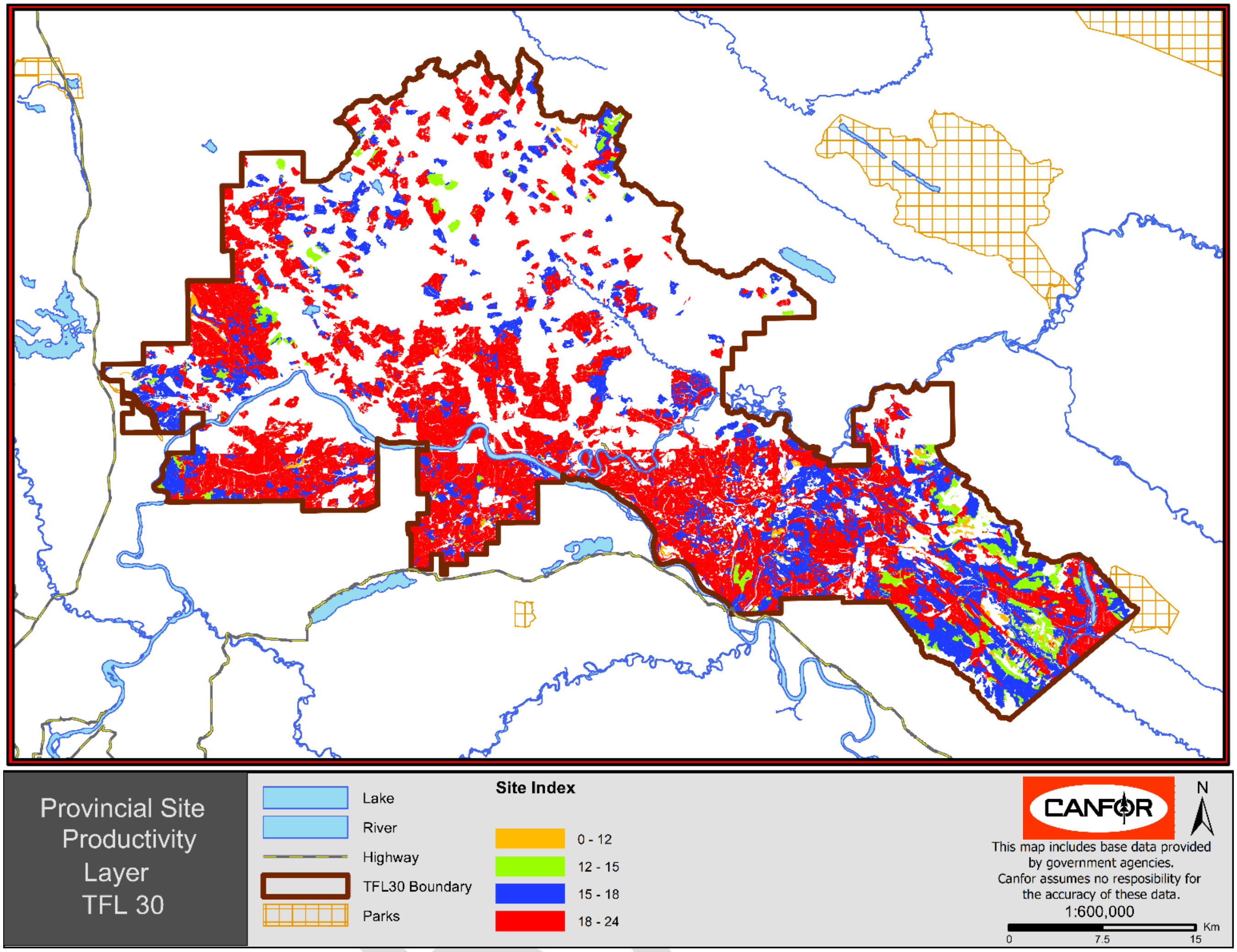

Figure 2-14 Map of PSPL Site Index Distribution in TFL30

2.4.3.3 Site Index Comparison

Given the predominance of spruce and balsam as leading species in TFL30, a comparative comparison of the site indices across the three data sources for these species is facilitated. Figure 2-15 shows the site index variations for spruce across the three sources, while Figure 2-16 does the same for balsam.

Across all sources, the majority of the THLB for the current spruce leading stands, as indicated by VRI data, is classified in the 21m site index class. PSI data tends to distribute a larger portion of THLB in the 24m class, whereas VRI and PSPL show a greater concentration in the 18m class. The VRI site index, encompassing all existing stands, includes a higher number of natural stands in the lower site index classes (below 18m). The distribution patterns in PSI and PSPL data reflect enhanced site productivity due to stand management. Table 2-8 details the distribution of THLB across site index classes for spruce leading stands, segmented by data source.

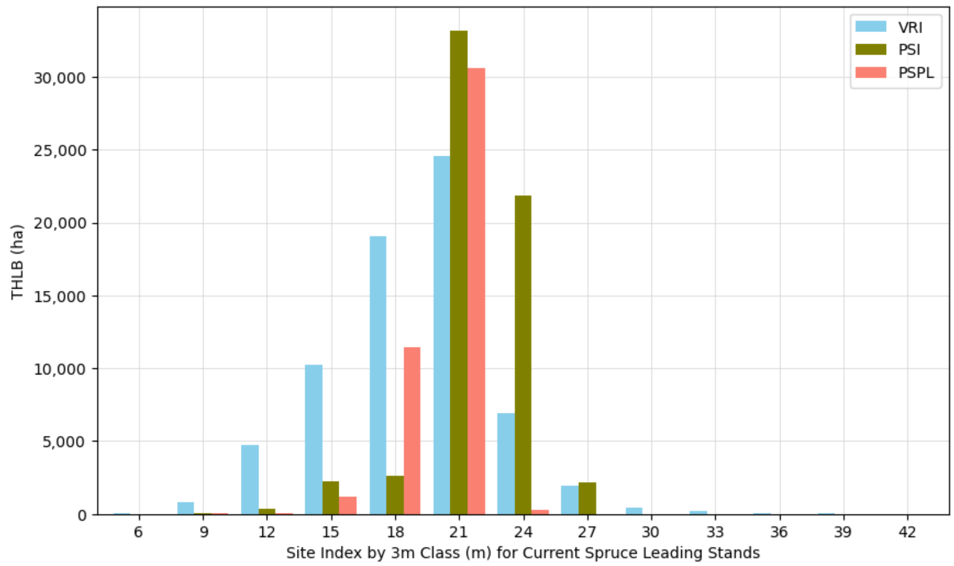

Figure 2-15 Site Index Comparison Graph for Current Spruce Leading Stands

Table 2-8 THLB by Site Index in 3 Meters Classes by Data Sources for Spruce Leading Stands

Site Index Classes (3m averages)	Inventory	PSI	PSPL
6	27		
9	774	18	27
12	4,747	341	71
15	10,253	2,277	1,169
18	19,062	2,643	11,480
21	24,563	33,189	30,630
24	6,887	21,863	260
27	1,941	2,169	
30	447		
33	169		
36	53		
39	18		
42	5		

The site index distribution for balsam within TFL30, as per PSI and PSPL data, shows uniformity and a significant concentration in the 21m class across the THLB. In contrast, the site index for balsam leading stands in VRI data is skewed towards the lower classes. Specifically, 35% of balsam leading stands are classified in the 12m class, followed by 23% in 15m, 19% in 18m, 14% in 21m, and 5% in 24m. This considerable variation in the VRI data is likely attributable to the natural disparities found in the unmanaged stands.

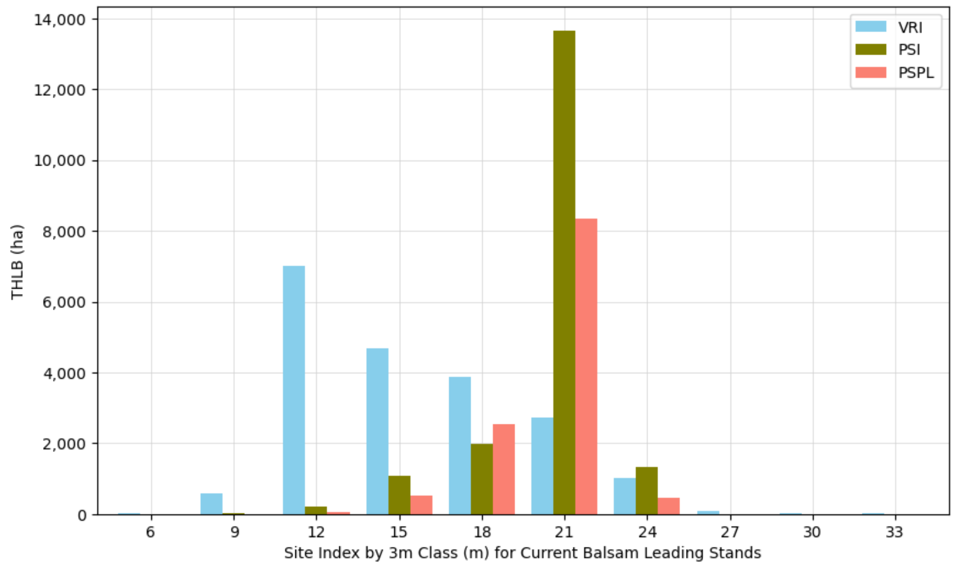

Figure 2-16 Site Index Comparison Graph for Current Balsam Leading Stands

Table 2-9 THLB by Site Index in 3 Meters Classes by Data Sources for Balsam Leading Stands

Site Index Classes (3m averages)	Inventory	PSI	PSPL
6	36		
9	575	12	
12	7,013	199	46
15	4,675	1,088	504
18	3,860	1,964	2,540
21	2,713	13,664	8,348
24	1,004	1,321	459
27	90		
30	9		
33	22		

2.4.4 Harvest History

The first recorded logging activities in TFL30 date back to the early 1940s, with a significant increase in harvesting occurring during the 1970s and continuing through the 1990s. The harvested area saw a decline in the 2000s,due to Canfor's request to reduce the TFL's AAC to accommodate for the increase in Mountain Pine Beetle salvage operations outside of TFL30 at the time. This lead to a growth in the standing timber on the TFL which resulted in a positive pressure on the total growing stock. . Harvesting activities intensified in the 2010s. To date, 48% of the FMLB and 27% of the THLB have not been harvested. Stands without legal harvesting restrictions generally remain part of the THLB, reflecting their harvest history. On the other hand, areas designated as no-harvest zones – including Ungulate Winter Range, Old Growth Management Areas, recreational features, archaeological sites, and blocks of First Nations interest, regardless of harvest history– are excluded from the THLB.

Canfor initiated the regeneration of post-harvest stands in 1978, nearly a decade ahead of the silviculture obligations mandated by the *Forest Act* in 1987. Consequently, stands harvested in TFL30 since 1978 are categorized as managed stands.

Figure 2-17 and Table 2-10 details the FMLB and THLB by log year decades in TFL30.

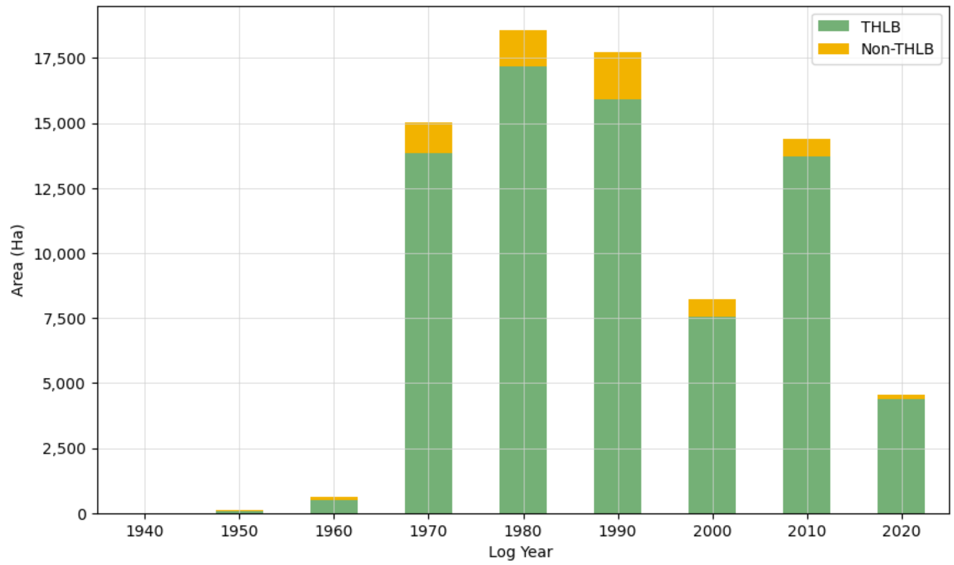

Figure 2-17 Harvest History Summary by Decades

Table 2-10 FMLB and THLB by Log Year in Decades

Decades	FMLB (ha)	% of FMLB	THLB (ha)	% of THLB
No Harvest	74,246	48%	28,144	27%
1940	5	0%	3	0%
1950	96	0%	55	0%
1960	642	0%	505	0%
1970	15,023	10%	13,826	13%
1980	18,586	12%	17,191	17%
1990	17,732	11%	15,911	15%
2000	8,216	5%	7,568	7%
2010	14,384	9%	13,702	13%
2020	4,536	3%	4,371	4%
2040	1,516	1%	1,452	1%
2050	1	0%	0	0%

2.4.5 Current Age Class Distribution

Figure 2-18 and Figure 2-19 depicts the current age class distribution of TFL30, with a notable concentration in age classes one, two, and three, reflecting the impact of historical harvesting activities. The limited inventory in age classes four through seven indicates a potentially lower short-term harvest level, in contrast to the long-term harvest level, which is influenced by the condition and extent of the managed stands. The prevalence of age class eight stands highlights the infrequency of large-scale stand replacement events in these ecosystems.

The scarcity of age class nine stands within the TFL suggests either their natural rarity in these ecosystems or a potential gap in the current inventory's ability to accurately identify such stands. This pattern has been consistently observed in the last two Management Plan updates.

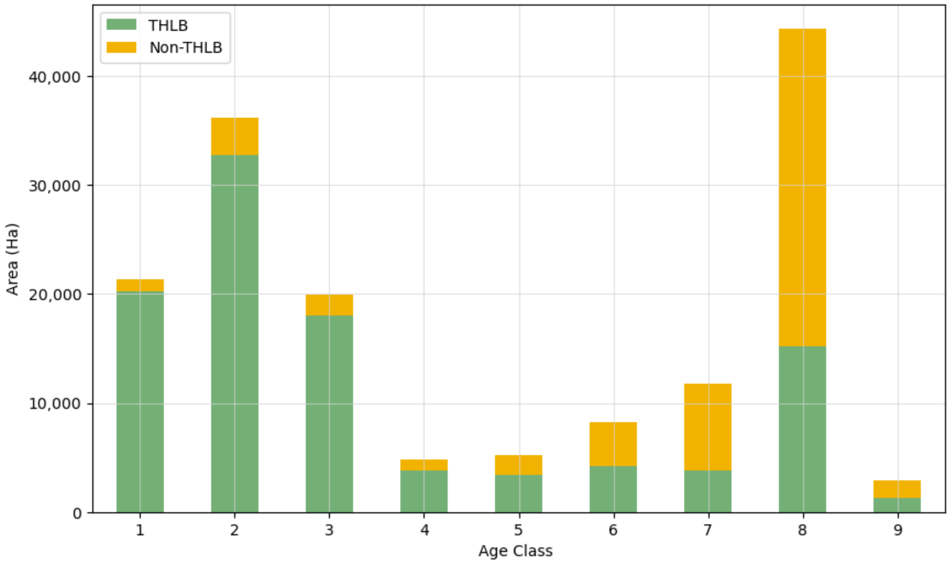

Figure 2-18 Time Zero Age Class Distribution Summary

Table 2-11 FMLB and THLB by Age Class

Age Class	Age Range	FMLB (ha)	% of FMLB	THLB (ha)	% of THLB
1	0 to 19	21,363	14%	20,265	20%
2	20 to 39	36,208	23%	32,780	32%
3	40 to 59	19,926	13%	18,048	18%
4	60 to 79	4,846	3%	3,762	4%
5	80 to 99	5,247	3%	3,401	3%
6	100 to 119	8,242	5%	4,184	4%
7	120 to 139	11,813	8%	3,788	4%
8	140 to 249	44,392	29%	15,247	15%
9	250+	2,946	2%	1,251	1%

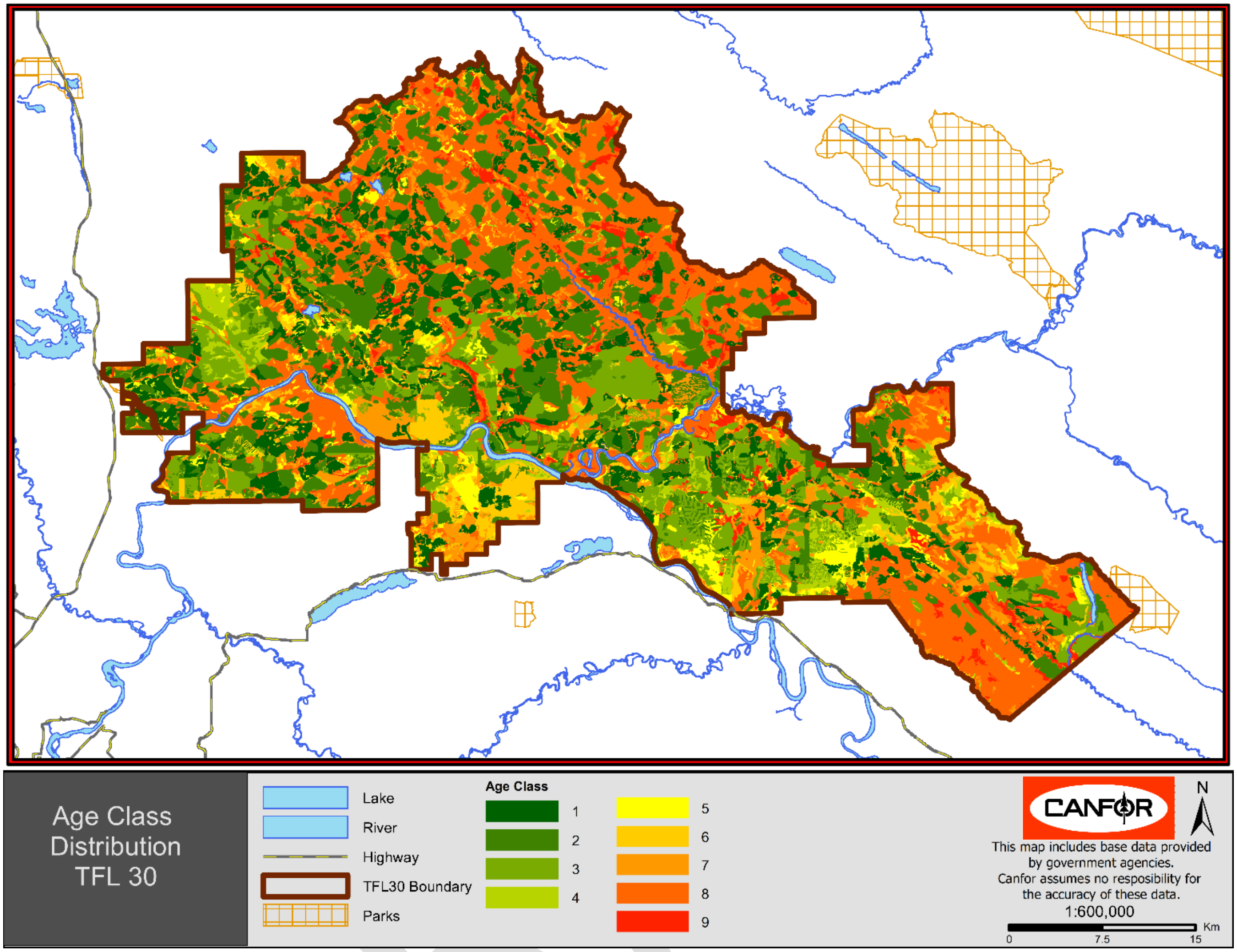

Figure 2-19 Map of Age Class Distribution in TFL30

2.4.6 Volume Class Distribution

The current volume distribution across the land base (Figure 2-20, Figure 2-21 and Table 2-12) mirrors both its site index and age class distribution. 'Null' and zero volume classes predominantly align with age classes one and two, reflecting stands with recent disturbances. The majority of the volume is concentrated in the 200 and 250 m³/ha classes. Stands in volume class 50 and higher represent the TFL's current growing stock. A scarcity of stands in age classes four through seven correlates with lower area in the higher volume classes. The prevalence of stands in age class eight and the high productivity of early-managed stands in age class three contribute to the substantial area within the 200 and 250 volume classes. Mature stands not meeting the minimum harvestable volume criteria are excluded from the THLB, forming part of the non-THLB in the 50 to 150 volume class range. Similarly, young managed stands not yet meeting these criteria constitute the THLB within the 50 to 150 volume class. Note, the current volume class distribution is based on the merchantable volume meeting the utilization limit. Managed stand will contribute a significant portion of the area in the higher volume classes as soon as most of the trees in the stand reaches the utilization limit.

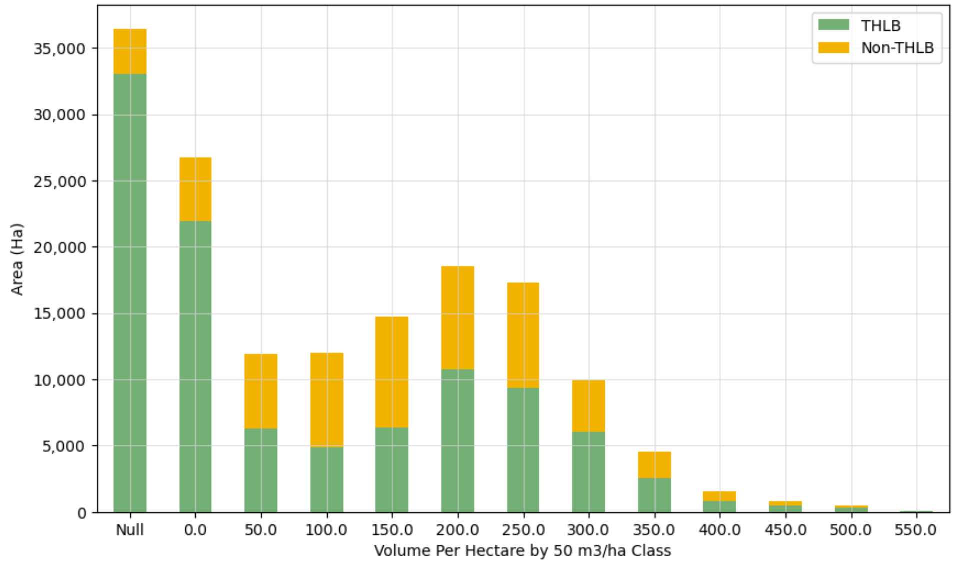

Figure 2-20 Current Volume Class Distribution Summary

Table 2-12 FMLB and THLB by Volume Class

Volume Class	Volume Range	FMLB (ha)	% of FMLB	THLB (ha)	% of THLB
0	0 to 49.9	26,744	17%	21,933	21%
50	50 to 99.9	11,947	8%	6,240	6%
100	100 to 149.9	11,959	8%	4,827	5%
150	150 to 199.9	14,738	10%	6,393	6%
200	200 to 249.9	18,512	12%	10,732	10%
250	250 to 299.9	17,307	11%	9,329	9%
300	300 to 349.9	9,924	6%	6,028	6%
350	350 to 399.9	4,574	3%	2,521	2%
400	400 to 449.9	1,517	1%	843	1%
450	450 to 499.9	797	1%	488	0%
500	500 to 549.9	442	0%	290	0%
550	550 to 599.9	64	0%	49	0%
Null	Null	36,459	24%	33,056	32%

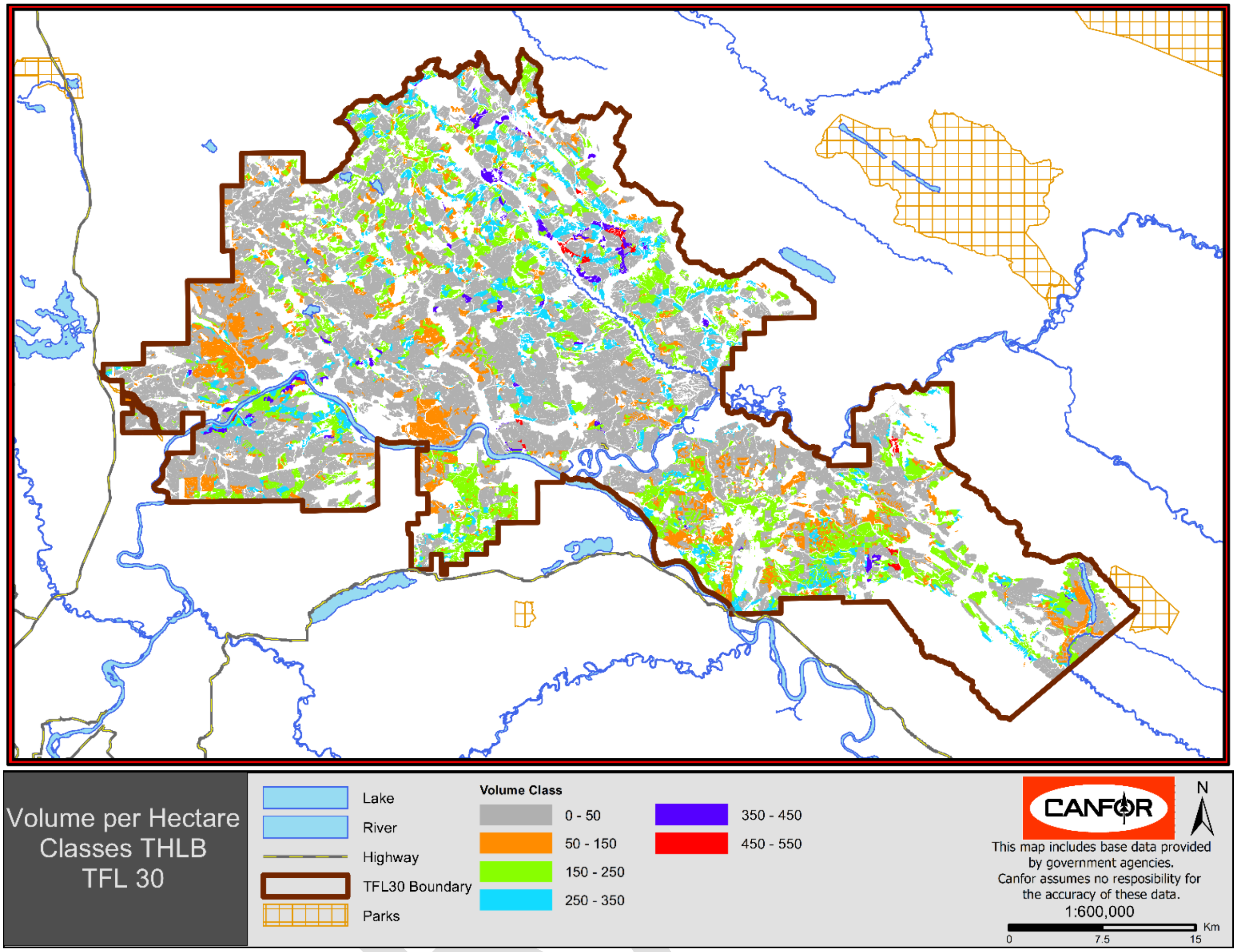

Figure 2-21 Map of Volume Per Hectare Class Distribution of the THLB in TFL30

3. Basecase Timber Supply Analysis

The basecase represents the best depiction of the current management practices in the TFL. It comprises the data and assumptions that collectively yield the best estimate of the timber supply for TFL30. Acknowledging the inherent uncertainties in both data and assumptions, sensitivity analyses were conducted to assess the potential impact of these uncertainties on the TFL's overall harvest level.

This section details the outcomes of the basecase timber supply analysis and offers essential context about various aspects of the timber supply. The basecase and all sensitivity analyses were performed using the forest estate model - Patchworks. Reported harvest levels are net figures, accounting for non-recoverable losses (3,640 m^3/year). The model employs five-year intervals within a 250-year planning framework.

3.1 Theoretical Long Run Sustainable Yield (LRSY)

The theoretical long run sustainable yield (LRSY) for any timber supply land base equals the culmination of the mean annual increment (MAI) weighted by area for all productive and utilizable forest land types. It represents the theoretical maximum even-flow sustainable yield achievable on the land base and serves as a benchmark against the modelling basecase harvest level. The calculation is as follows:

Theoretical LRSY = Sum(Maximum MAI of Conifer Volume of a Future Yield Table on the THLB × THLB of that Future Yield Table)

For TFL30, the calculated LRSY is 517,985 m^3/year. The actual basecase harvest level is often lower than the theoretical LRSY because not all stands are harvested at the age where the MAI is greatest. This approach does not account for non-timber objectives that may require retaining stands beyond the age of maximum MAI. Additionally, stands must meet the minimum harvestable volume criteria, which may not coincide with the age of maximum MAI. The model might also harvest stands before reaching maximum MAI if they meet the minimum harvestable volume criteria, to balance harvest level objectives and non-timber objectives. These factors contribute to differences between the actual basecase harvest level and the theoretical LRSY.

3.2 Harvest Level Projection

Figure 3-1 illustrates the basecase harvest forecast across a 250-year planning horizon. The harvest level begins at approximately 408,000 m^3/year and gradually increases to a long-term harvest level of around 424,000 m^3/year. In Patchworks, targets like harvest volume are not absolute and permit some variation, leading to fluctuating harvest levels across different periods. To represent this variability, average harvest volumes are calculated for four distinct intervals: the first 20 years, year 21 to 50, years 51 to 100, and years 101 to 250. Table 3-1 details these average conifer harvest levels, net of non-recoverable losses (3,640 m^3/year), for the specified timeframes in the basecase scenario.

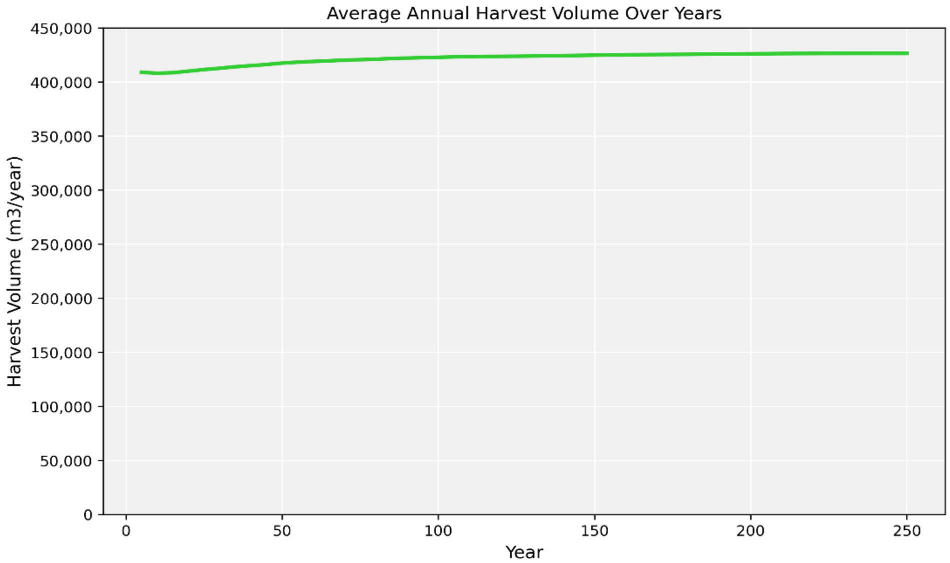

Figure 3-1 Basecase Harvest Level Projection

Table 3-1 Basecase Harvest Level Summary

Scenario	Average Coniferous Harvest Volume (m^3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188

Figure 3-2 illustrates the total growing stock on the THLB of the basecase. Initially, the growing stock, starting at approximately 12 million m³, shows a gradual increase over the first 50 years, coinciding with the maturation of the first managed stands. Around year 55, the projection encounters a brief stagnation, at this juncture, THLB currently in age class 1 progresses to age classes 3 and 4. During this period, the harvest level aligns with the growth of the standing volume within the TFL. As more managed stands reach maturity, the growing stock begins to rise again, likely due to the retention of mature and old seral stands to meet various non-timber constraints. This increase allows for more flexible harvest scheduling, ultimately supporting a gradual elevation in harvest levels toward the long-run sustainable yield.

The growing stock projection for TFL30 shows two distinct rises and falls, driven by the uneven age class distribution at the start of the planning horizon. The more skewed the initial age class distribution, the longer it takes for the model to achieve equilibrium between growing stock and harvest levels. However, by the final 20 years of the projection, the growing stock stabilizes, indicating that the long-term harvest level is sustainable for the THLB within TFL30.

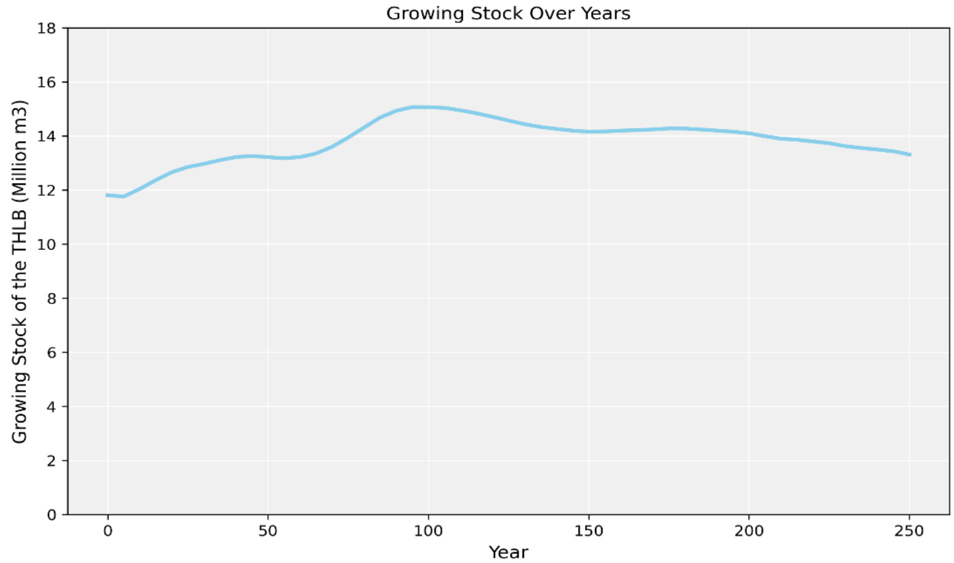

Figure 3-2 Basecase Total Growing Stock Projection

The merchantable growing stock projection, illustrated in Figure 3-3 refers to the coniferous standing volume on the THLB that meets the minimum harvestable criteria for each time period after harvest. This volume projection under the base case harvest schedule exhibits more variability compared to the total growing stock projection, which includes stands of all species and ages. While merchantable growing stock is a subset of the total growing stock, it only contributes if it meets specific harvestable age criteria defined in the modeling input.

The minimum harvestable age for each stand is determined by when the stand reaches the minimum harvestable volume of 182 m^3/ha and when it achieves 95% of the culmination of mean annual increment (CMAI). The accumulation of volume and the rate of growth are highly correlated with the age of the stand, making the age class distribution of the THLB a significant factor in the merchantable growing stock pattern. A large proportion of THLB in the lower age classes results in a lower merchantable growing stock level, as seen in year 20. Conversely, a substantial amount of THLB in the mid to upper age classes corresponds to a higher merchantable growing stock level, as shown in year 110.

The oscillations in the merchantable growing stock pattern indicate an unbalanced age class distribution, meaning certain age classes are underrepresented or absent, creating gaps. In the case of TFL30, there is very little THLB between ages 60 and 140, resulting in the waves observed in the merchantable growing stock projection. This does not suggest that the current harvest level is unsustainable; rather, it illustrates the portion of the growing stock remaining on the THLB after depletion that meets the harvest criteria. Even at the lowest point of the merchantable growing stock projection, in year 20, the transition from harvesting primarily natural stands to managed stands shows that the merchantable growing stock remains 1.5 times higher than the harvest rate.

Figure 3-3 Basecase Merchantable Growing Stock Projection

3.3 Management Plan #10 Comparison

Since the last Management Plan (#10), various data and assumption changes have occurred, each with varying impacts on the timber supply. These modifications are comprehensively documented in the Information Package. The most notable deviations in data and assumptions compared to MP#10 are outlined below, presented in no particular order of impact:

- VRI update
- Decrease in THLB
- Establishment of the Draft OGMA
- Changes in Natural Stand Yield Table projection
- Changes in Managed Stand Yield Table projection

Table 3-2 presents a detailed account of these changes:

Table 3-2 Tabular Summary of MP#10 vs MP#11 Data and Assumption Changes

MP#11	MP#10
Inventory using VRI standard and 2015 orthophoto (~2,671 ha more FMLB)	Inventory using Forest Inventory Planning standard and 1995 orthophoto with phase II adjustment
THLB = 102,728 ha (16% decrease)	THLB = 122,345 ha
Old growth management is achieved through spatially defined Draft OGMA (removes ~11,239 ha of THLB)	Old growth management follows the Provincial Non-Spatial Old Growth Order
Minimum Harvest Volume 182 m^3/ha (removes ~4,326 ha of THLB)	Minimum Harvest Volume 140 m^3/ha
Patch size distribution targets modelled but not strictly enforced in the basecase	Patch size distribution targets not modelled in the basecase
H60 watershed boundary with recommended hydrologically equivalent disturbed area value based on the Northern BC Adpated Hydrological Recovery Curves (P Beaudry, 2014)	H60 watersheds based on 1999 Beaudry review and Interior Watershed Assessment Procedure Guidebook recovery curves
VRI derived inputs for VDYP[1] with adjusted height from LiDAR derived individual tree inventory	VRI derived inputs for VDYP
MSYT[2] for Sxw_Oakfern and Sxw_Devilsclub site associations are projected from TADAM[3] based on CMI[4] plot data. MSYT of other site associations are projected with TIPSY[5] using RESULTS[6] data and standard OAF[7]s	RESULTS and silviculture practice based MSYT with OAF1 derived from photo delineation process and averaged for each BEC variant

Figure 3-4 compares the basecase harvest level projections of MP#11 vs past MPs. The short-term harvest level is mostly determined by the accuracy of forest inventory, age class distribution, THLB definition, whereas the long-term harvest level is predominantly determined by the growth and yield assumptions and projections of the managed stands.

[1] Variable Density Yield Prediction Growth and Yield Model
[2] Managed Stand Yield Tables
[3] TASS Approximation by a Dynamical Aggregated Model
[4] Change Monitoring Inventory
[5] Table Interpolation Program for Stand Yields
[6] Reporting Silviculture Updates and Land Status Tracking System
[7] Operational Adjustment Factor

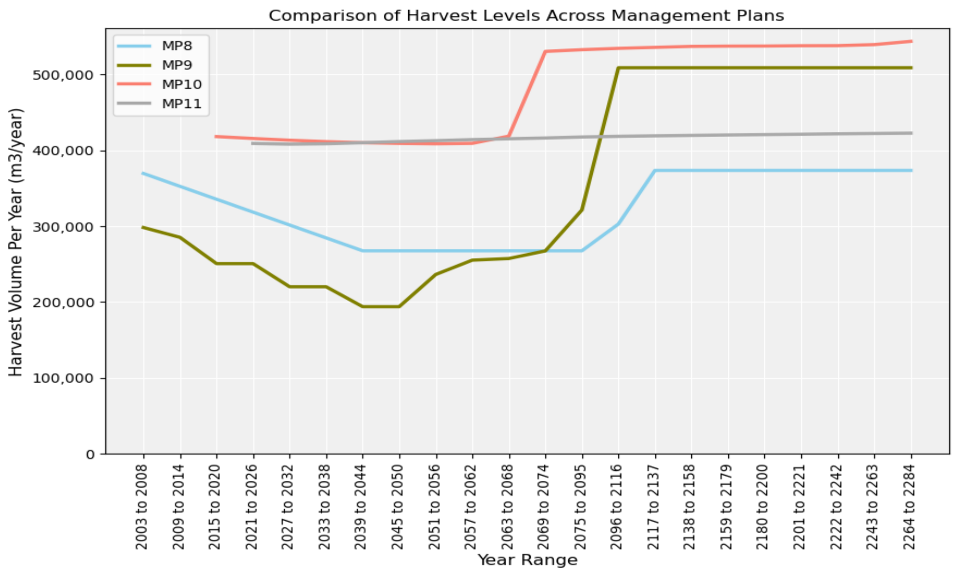

Figure 3-4 Basecase Harvest Level Comparison Between Past MPs

3.4 Basecase Timber Supply Characteristics

3.4.1 Age Class Distribution

The initial age class distribution reveals that the THLB is predominantly in age classes one to three. Figure 3-5 depicts the evolving age class distribution of the THLB under the basecase scenario. Within the first 30 years, age class 4 (60-80 years) starts to build up, stabilizing at approximately 15% of the total THLB. Stands in age class 5 (80-100 years) reach a balance with other age classes by year 50, averaging around 6.5% of the total THLB. Additionally, stands older than 100 years consistently constitute about 9% of the THLB area throughout the remainder of the planning period.

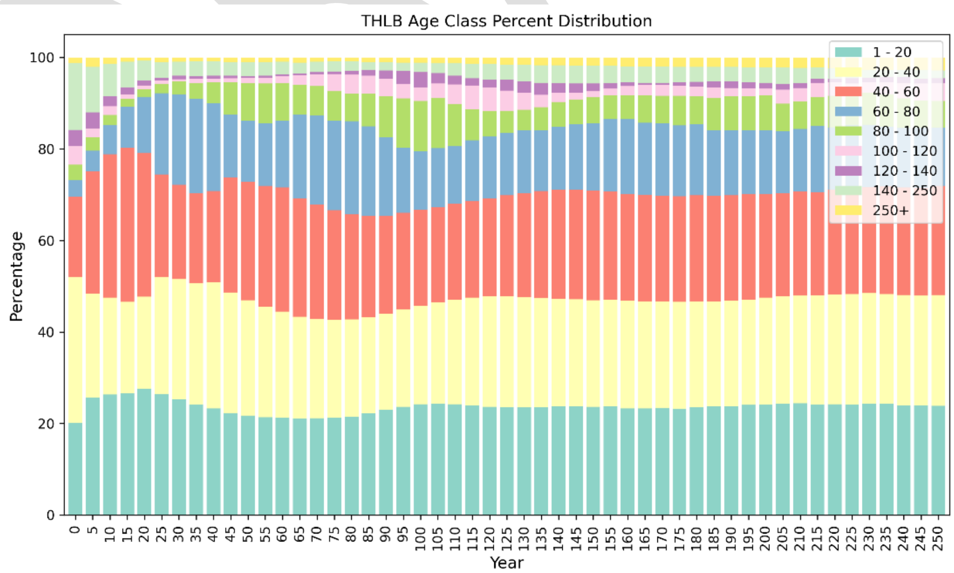

Figure 3-5 Age Class Distribution by Percent THLB for 250-Years

Figure 3-6 presents the age class distribution within the non-THLB over a 250-year period. The model incorporates randomized natural disturbances affecting stands of all age classes, resulting in an annual depletion which slows down the accumulation of the stands in the older age classes. The overall trend shows stabilization and leveling off of age classes towards the latter part of the planning horizon, as the natural aging of stands compensates for the disturbances.

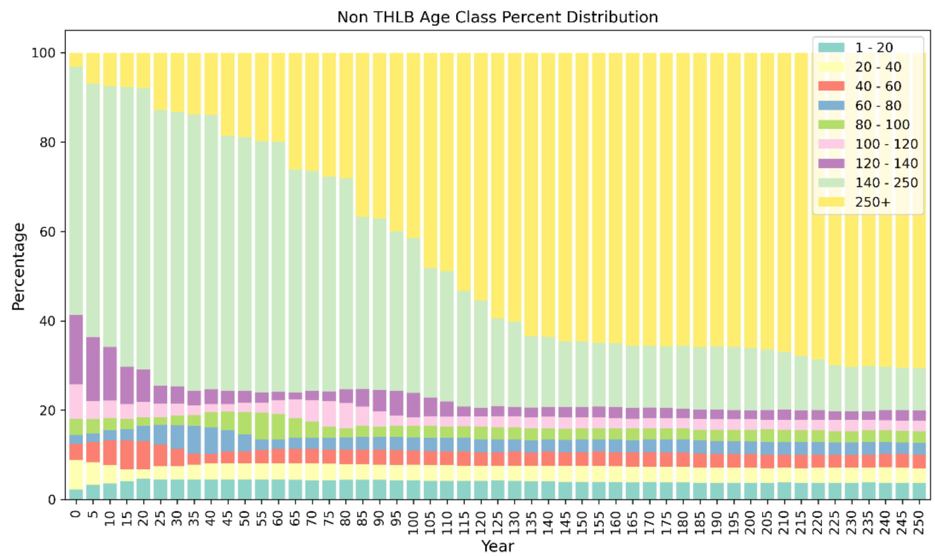

Figure 3-6 Age Class Distribution by Percent Non-THLB for 250-Years

3.4.2 Average Harvest Age and Average Harvest VPH

In the basecase scenario, the average harvest age initially stands at 168 years, but experiences a swift decline within the first 20 years, averaging 136 years during this period. Subsequently, the average harvest age settles at around 82 years-old and remains relatively stable for the rest of the planning period. This trend indicates a transition towards harvesting predominantly managed stands within approximately 20 years. Figure 3-7 presents the average harvest age trend over time.

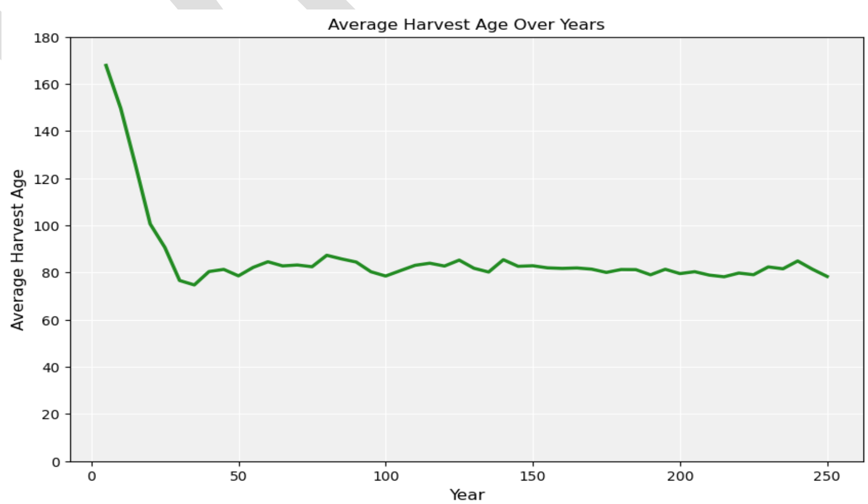

Figure 3-7 Average Harvest Age of the Basecase

Figure 3-8 shows the average harvest volume per hectare of the basecase, beginning at 275 m³/ha and rapidly increasing over the first 60 years, peaking at 407 m³/ha in year 65. This is followed by a gradual decline to approximately 355 m³/ha by year 90. From year 90 onwards, the volume fluctuates between 370 m³/ha and 345 m³/ha, averaging 358 m³/ha for the remainder of the planning horizon.

The initial decrease in average harvest age and the concurrent increase in average harvest volume per hectare within the first 50 years resulted from the model prioritizing the harvest of remaining merchantable natural stands on the THLB. These stands, typically lower in site productivity, are beyond their culmination age yet yield lower volumes. As the focus shifts to managed stands, the average harvest age decreases, but the average harvest volume per hectare continues to rise. The peak in average harvest volume per hectare coincides with the pinch point in the growing stock (Figure 3-2), marking a period with limited flexibility in stand selection due to only the earliest managed stands meeting harvest criteria. As more managed stands become harvestable, the harvest schedule is less constrained by the nature of the land base, allowing for a steady average harvest age and volume per hectare, thereby supporting a sustainable long-term harvest level.

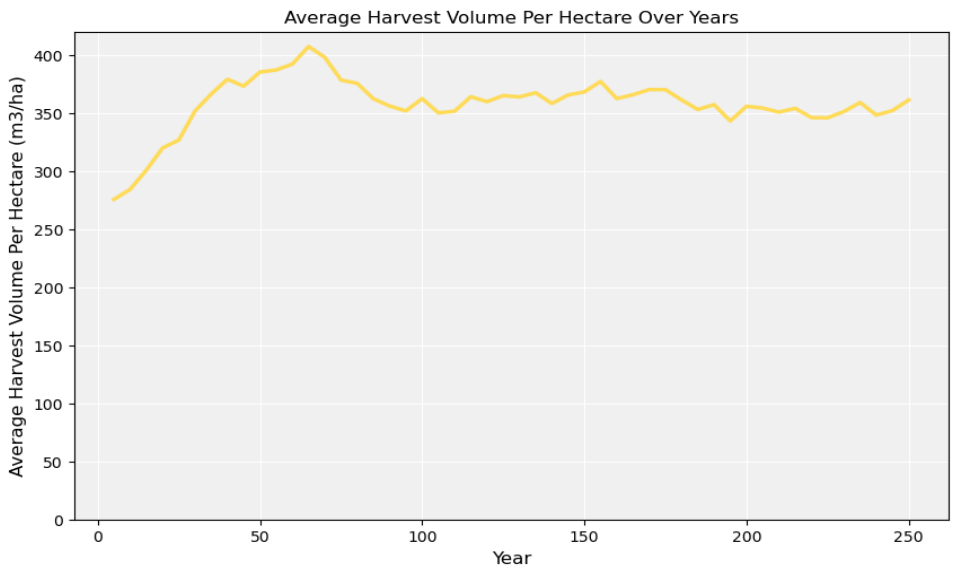

Figure 3-8 Average Harvest Volume Per Hectare of the Basecase

3.4.3 Growing Stock by Natural and Managed Stand

Figure 3-9 illustrates the total growing stock, differentiating between natural and managed stands. In the first 20 years, the natural growing stock experiences a rapid decline, aligning with the decrease in average harvest age. As managed stands mature, they become the predominant contributors to the THLB's growing stock. Notably, 2,955 hectares of the THLB remain unharvested throughout the 250-year planning period, and an additional 1,188 hectares of THLB experience natural disturbances, as they do not fulfill the criteria for harvesting. These areas continue to contribute to the natural growing stock within the THLB.

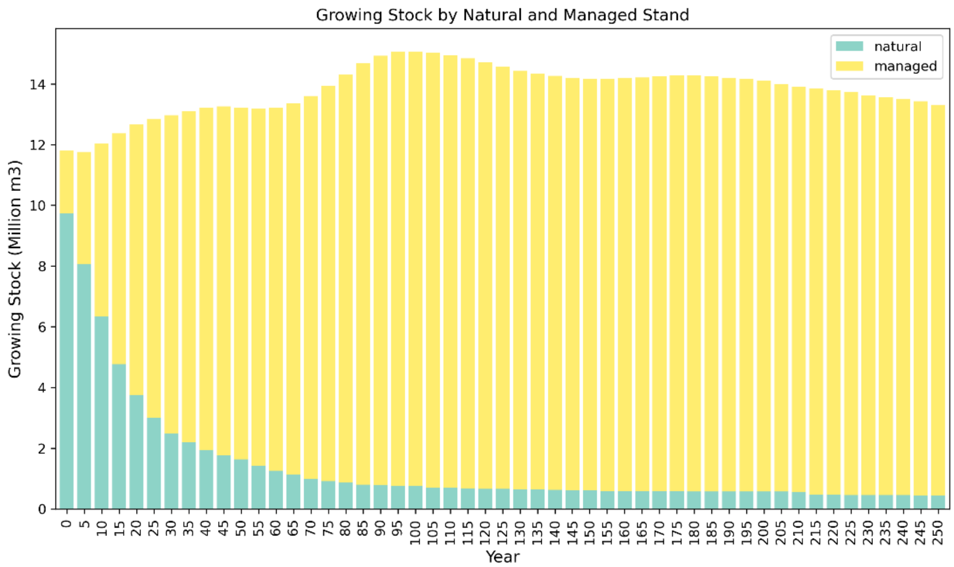

Figure 3-9 Growing Stock by Natural and Managed Stand

Table 3-3 Growing Stock (m^3) by Natural and Managed Stand Summary

Stand Type	Year 0	Year 1 to 20	Year 21 to 100	Year 101 to 250
Natural	9,731,736	5,732,054	1,418,206	571,327
Managed	2,080,627	6,474,379	12,331,491	13,571,613

3.4.4 Harvest Volume by Natural and Managed Stand

Figure 3-10's depiction of harvest volumes by natural and managed stands clearly demonstrates the transition from primarily harvesting natural stands to managed stands around year 20.

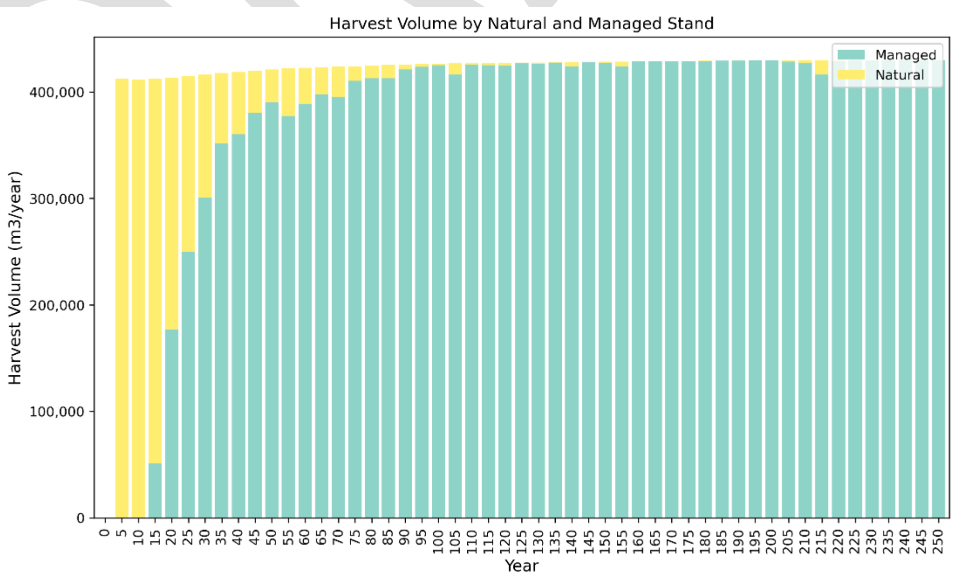

Figure 3-10 Harvest Volume by Natural and Managed Stand

Table 3-4 Total Harvest Volume (m^3) by Natural and Managed Stand Summary

Stand Type	Year 1 to 20	Year 21 to 100	Year 101 to 250
Natural	1,421,867	654,712	50,232
Managed	228,143	6,097,648	12,815,747

3.4.5 Harvest Volume by Conifer and Deciduous

Figure 3-11 illustrates the incidental deciduous volume associated with harvesting conifer-led stands, where the deciduous component is typically left unharvested if possible. This incidental volume primarily arises from natural ingress of aspen, poplar and birch species within existing managed stands. When these deciduous trees are preserved on-site, they contribute significantly to wildlife habitat, water retention, fire resistance, and overall biodiversity of the managed stands.

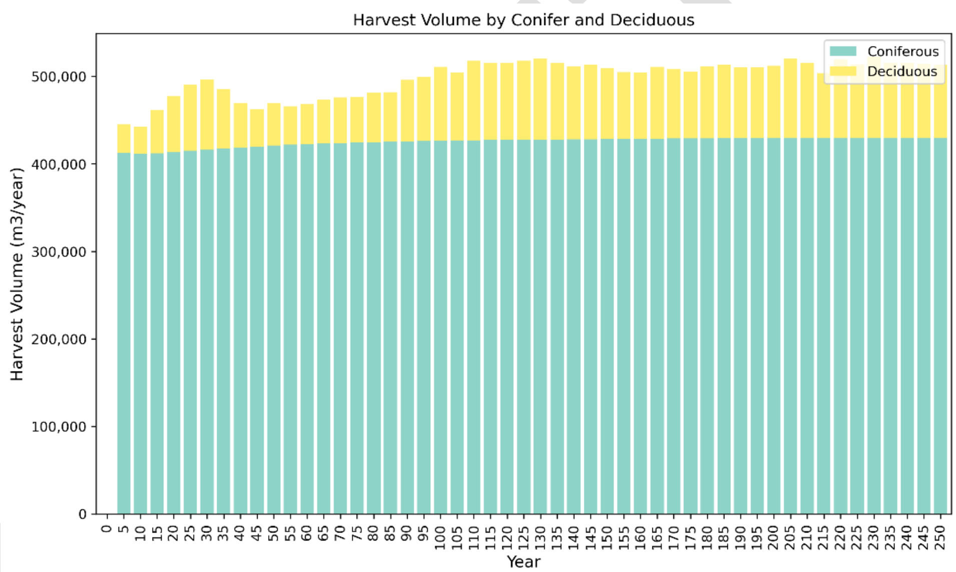

Figure 3-11 Coniferous and Deciduous Volume Associated with Harvested Areas

Table 3-5 Average Harvest Volume (m^3/year) by Deciduous and Coniferous Stand

Stand Type	Year 1 to 50	Year 51 to 100	Year 100 to 250
Coniferous	411,814	420,613	425,188
Deciduous	54,149	58,595	83,958

3.4.6 Regen Patch Size Distribution

A key challenge in timber supply analysis is that the harvest schedules from the simulation models are not directly applicable to operational planning, primarily due to the fragmented nature of the spatial input dataset, or the resultant. This fragmentation often results in the scheduling of small, dispersed stand fragments that fall below operational thresholds, leading to a biased projection of harvest level. This bias arises because consolidating stands into operational cutblocks and scheduling them over planning periods reduces harvest schedule flexibility, typically resulting in lower harvest level projection. In this analysis, measures have been taken to mitigate the bias from fragmentation: the resultant dataset has been aggregated to preserve spatial boundaries only between heterogeneous stands and distinct resource management zones. Additionally, stands younger than 20 years located within 100 meters of each other have been grouped into regen patches, reducing the prevalence of isolated, small regen patches under 5 ha.

Figure 3-12 illustrates the changes in regen patch size (percent of total number of regen patches) distribution across TFL30 for the 250-year planning period. Table 3-6 summarizes the averages between key periods. The current distribution of regen patches in TFL30 shows almost no patches smaller than 5 ha, with over 60% exceeding 100 ha. This suggests that cutblocks are clustered relatively closely across the land base. In the basecase scenario, as the focus shifts to managed stands around year 20, the harvest schedule redistributes regen patches from the larger 100+ ha category to smaller ranges, primarily between 5 to 60 ha and 60 to 100 ha.

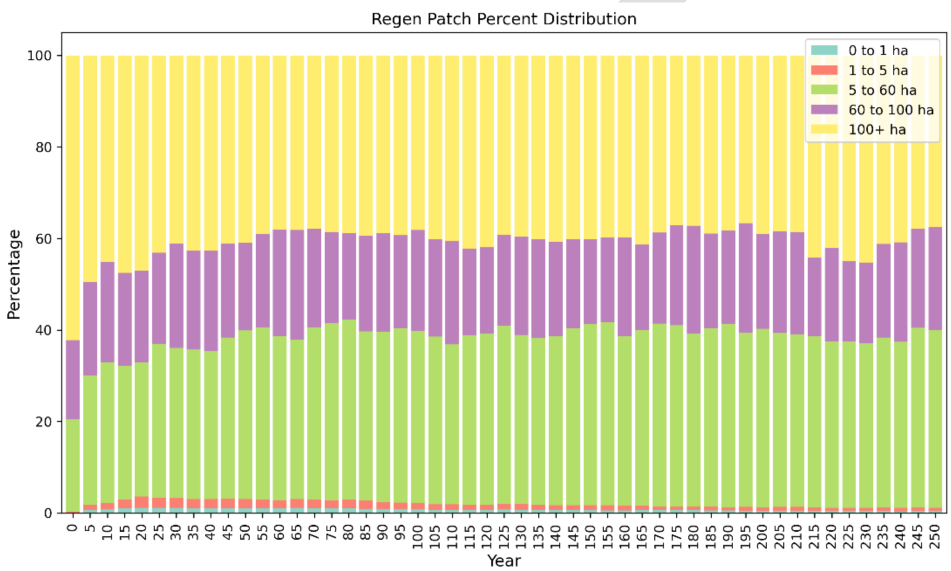

Figure 3-12 Regen Patch Distribution Projection

Table 3-6 Regen Patch Size Distribution Summary

	Regen Patch Distribution Percentage (%)			
Patch Size	Year 0	Year 1 to 20	Year 21 to 50	Year 51 to 250
0 to 1 ha	0.01	0.75	1.03	0.76
1 to 5 ha	0.25	2.16	2.51	1.55
5 to 60 ha	20.20	27.51	33.72	37.05
60 to 100 ha	17.29	19.61	19.18	18.73
100+ ha	62.25	49.96	43.57	41.91

3.4.7 Patch Size Distribution

The basecase patch size distribution by natural disturbance types (NDT) based on the recommended distribution of patch sizes for NDT from the *Forest Practice Code Biodiversity Guidebook* are summarized in Table 3-7 and displayed in Figure 3-13, Figure 3-14 and Figure 3-15. In the basecase scenario, patch size distribution targets are not rigidly enforced but are used to influence the harvest schedule towards the recommended distribution. The impact of strictly implementing these targets, as well as the consequences of no management for patch size distribution, are examined in subsequent sensitivity analyses (Section 4.8).

Achieving patch size distribution targets can be challenging, often due to the prioritization of other non-timber resource management constraints like watershed protection, wildlife habitat conservation, and visual quality objectives. However, despite these other objectives taking precedence, patch size distribution targets are still incorporated into the basecase to provide as much guidance as possible.

Table 3-7 Patch Size Distribution by NDT Summary

Natural Disturbance Type (NDT)	Non-THLB (ha)	THLB (ha)	Patch Size	Target Distribution	Patch Distribution Percentage (%)			
					Year 0	Year 1 to 20	Year 21 to 50	Year 51 to 250
NDT1	12,850	6,349	0 to 40 ha	30 to 40%	34.51	38.26	49.23	41.45
			40 to 80 ha	30 to 40%	18.39	29.18	29.13	30.75
			80 to 250 ha	20 to 40%	47.10	32.56	21.64	27.79
			250+ ha	-	0	0	0	0
NDT2	37,489	91,601	0 to 40 ha	30 to 40%	15.49	24.55	28.29	29.94
			40 to 80 ha	30 to 40%	15.17	24.91	28.41	29.94
			80 to 250 ha	20 to 40%	35.56	20.05	19.44	20.44
			250+ ha	-	33.79	30.48	23.86	19.67
NDT3	1,816	4,777	0 to 40 ha	10 to 20%	5.98	23.56	22.09	19.26
			40 to 250 ha	10 to 20%	37.76	20.89	18.04	18.15
			250+ ha	60 to 80%	56.26	55.54	59.86	62.59

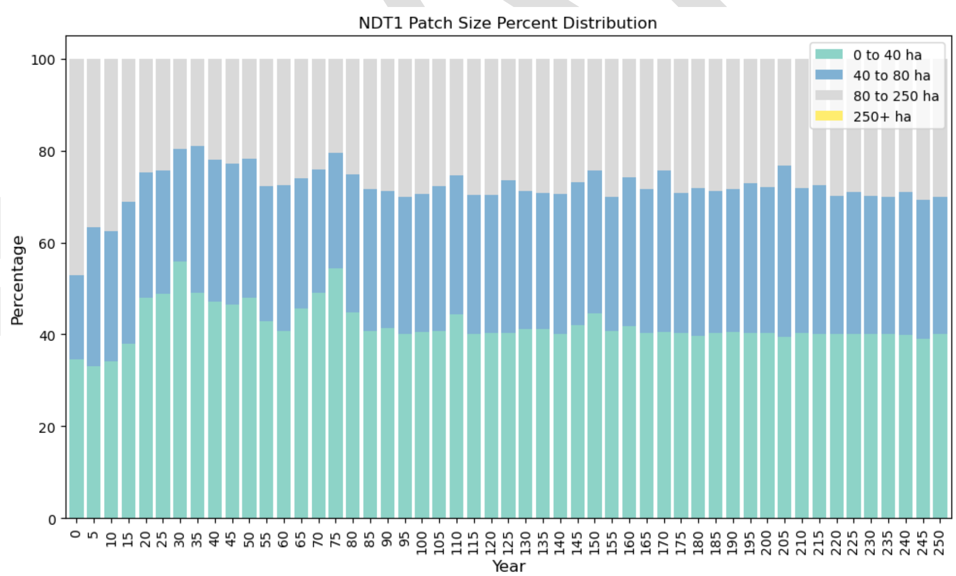

Figure 3-13 NDT1 Patch Size Distribution

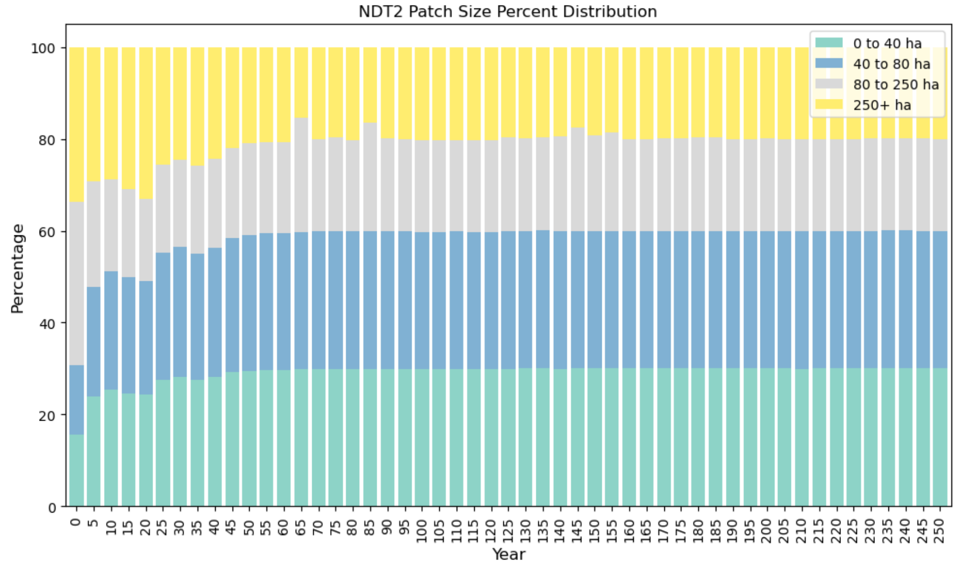

Figure 3-14 NDT2 Patch Size Distribution

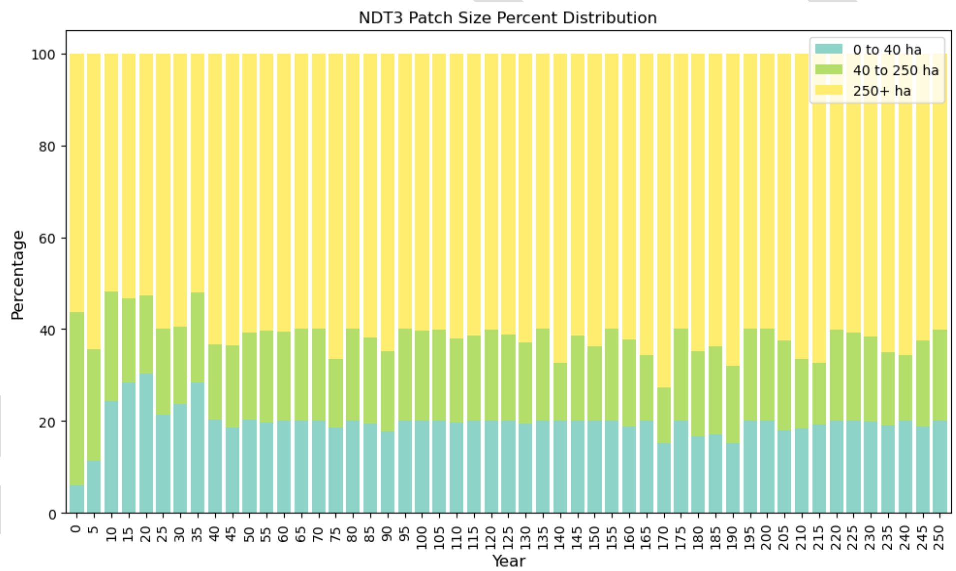

Figure 3-15 NDT3 Patch Size Distribution

3.4.8 Other Non-Timber Objectives

Other resource management objectives, aside from regen patch size distribution and patch size distribution, are modeled in the basecase scenario to address the management objectives for the non-timber values of TFL30. Resource management zones have been established to identify areas with different resource management objectives. These zones can overlap, and the forest cover constraints associated with them may apply to the same overlapping area. Section 4.9 in the Information Package outlines the resource management objectives included in the basecase and details the forest cover constraints as well as how they were modeled. The three legally established forest cover objectives in TFL30 are: Visual Quality Objectives (VQO) (Section 4.9.7), Sensitive Watersheds including Fishery Sensitive Watersheds (FSW) (Section 4.9.6), and the Ungulate Winter Range (UWR) Caribou Corridors (Section 4.9.1).

Figure 3-16 and Figure 3-17 illustrate the Hydrological Equivalent Disturbed Area (HEDA) projection for the FSW F-7-001 Unit 2 and Unit 3 under the basecase scenario. Both units' targets are well under the maximum threshold limit, indicated by the blue line. Figure 3-18 illustrates the HEDA projection for the entire F-7-001 watershed under the basecase scenario, showing that the HEDA is close to, but has not yet exceeded, the threshold limit.

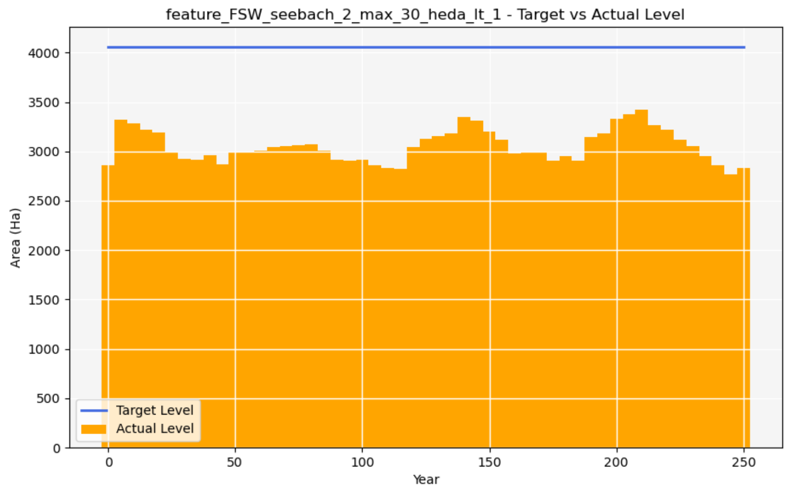

Figure 3-16 FSW F-7-001 Unit 2 HEDA Constraint Basecase Projection

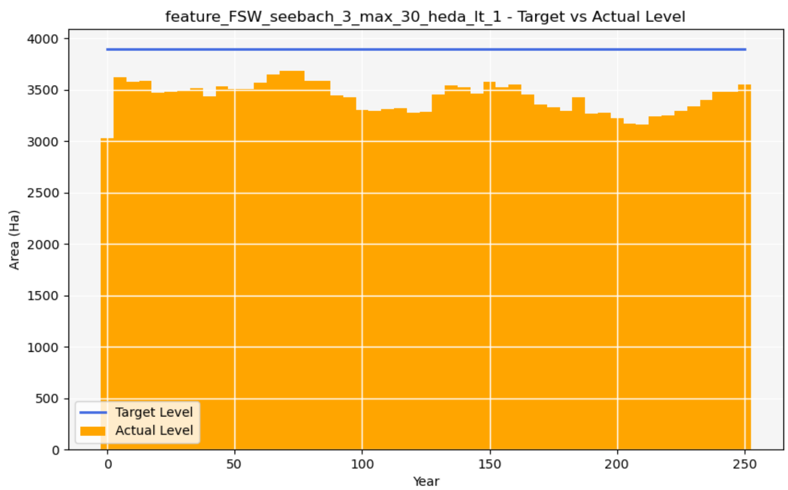

Figure 3-17 FSW F-7-001 Unit 3 HEDA Constraint Basecase Projection

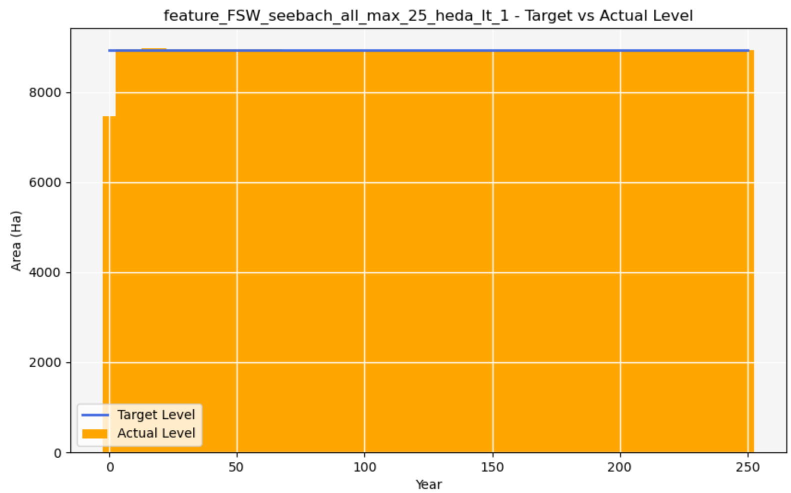

Figure 3-18 FSW F-7-001 Entire Watershed HEDA Constraint Basecase Projection

The following set of graphs (

Figure 3-19 to Figure 3-24) presents the forest cover height constraint projection and the forest cover age constraint projection under the basecase scenario for the UWR U-7-003 Unit P-042, P-046, and P-047. The blue line indicates the minimum or maximum threshold limit, while the orange bar indicates the amount of area contributing to the constraint. For all forest cover age constraints, the amount of area meeting the age criteria is well above the minimum threshold, indicating a large proportion of mature and old stands in the UWR caribou corridor units that naturally exist and are retained in reserves.

Currently, unit P-047 has exceeded the UWR General Wildlife Measure b in the Order as shown in Figure 3-23. Consequently, no harvest activities will occur in unit P-047 until the green-up target is met, which is evident from the decrease in area contributing to the target until it falls below the threshold level.

For unit P-042, the forest cover height constraint projection shows a violation from year 5 to year 45. This violation is due to the unit's overlap with a very small portion of THLB, with a target area of only 28 hectares. The polygon size in the spatial input dataset is not small enough to allow the harvest schedule to fit a block of the exact size during those periods, resulting in a minor violation of less than 2 hectares. Given that this timber supply model is intended for strategic planning rather than operational purposes, this slight violation is considered acceptable.

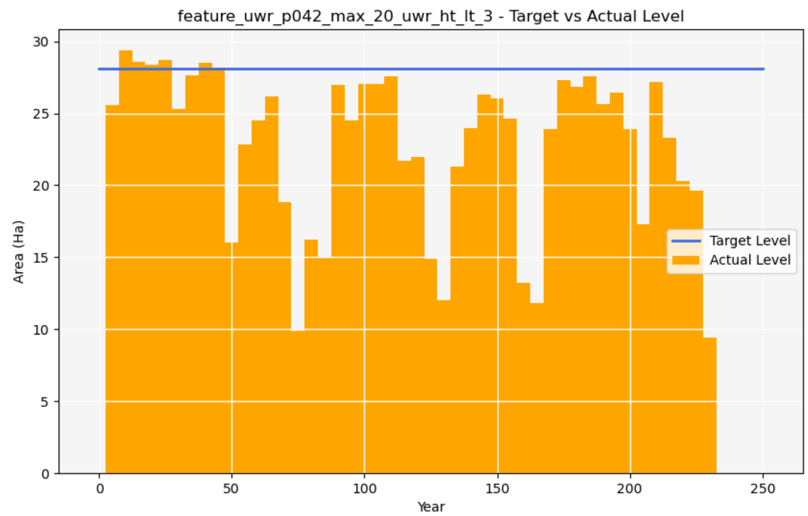

Figure 3-19 UWR U-7-003 Unit P-042 Forest Cover Height Constraint Basecase Projection

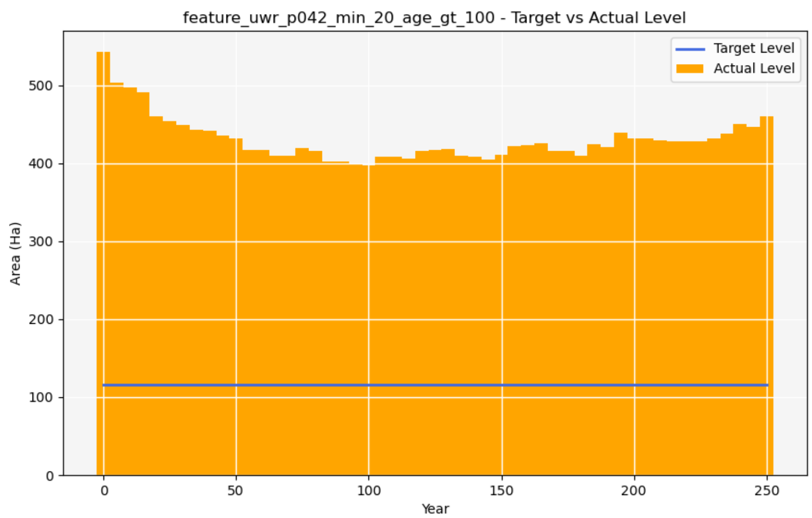

Figure 3-20 UWR U-7-003 Unit P-042 Forest Cover Age Constraint Basecase Projection

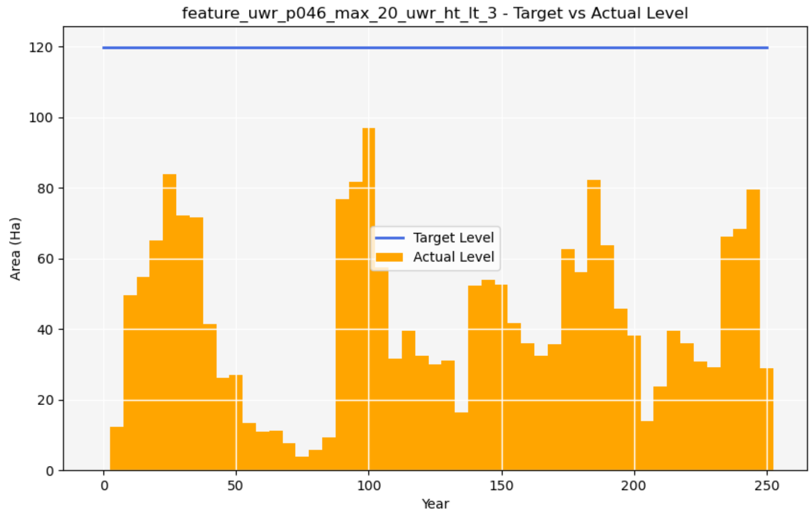

Figure 3-21 UWR U-7-003 Unit P-046 Forest Cover Height Constraint Basecase Projection

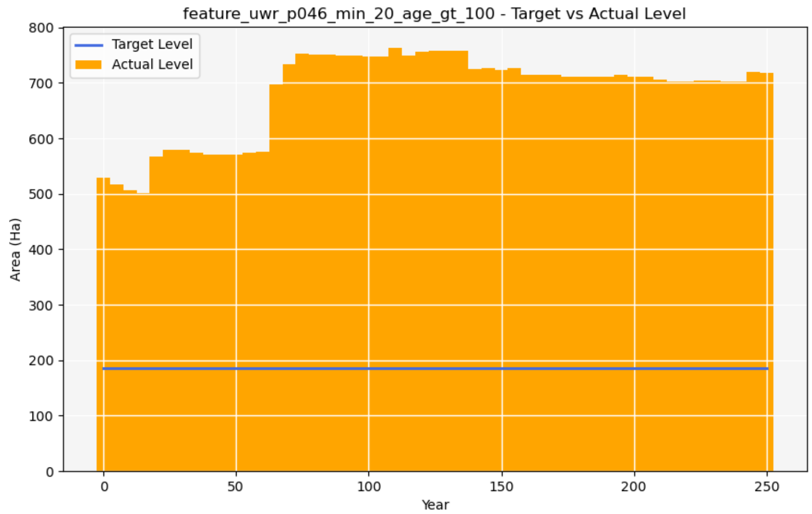

Figure 3-22 UWR U-7-003 Unit P-046 Forest Cover Age Constraint Basecase Projection

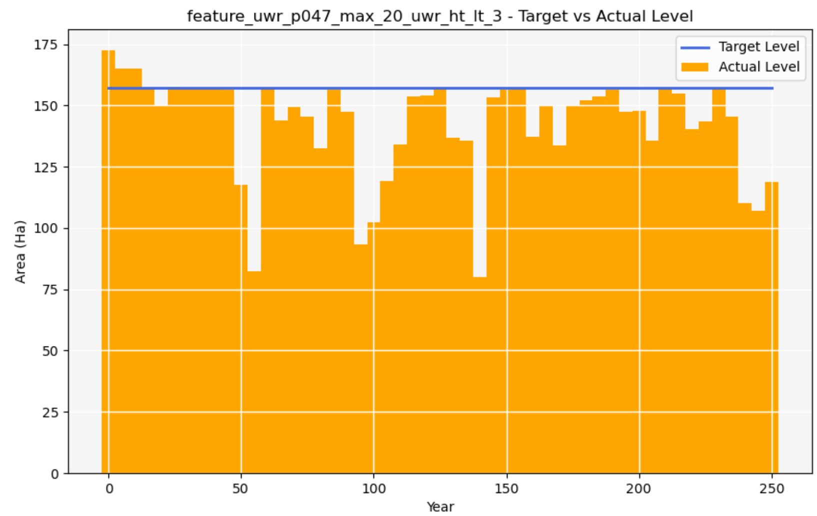

Figure 3-23 UWR U-7-003 Unit P-047 Forest Cover Height Constraint Basecase Projection

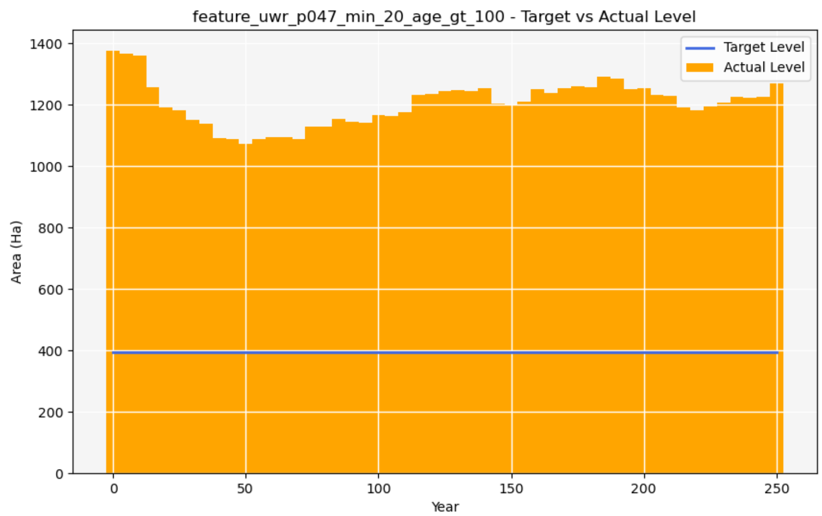

Figure 3-24 UWR U-7-003 Unit P-047 Forest Cover Age Constraint Basecase Projection

Visual Landscape Inventory (VLI) polygons are delineated and classified as visually sensitive areas for scenic management. The maximum percent alteration and maximum alteration area allowed in each VLI polygon have been calculated and are presented in Table 3-8. The threshold area indicates the amount of area allowed in each VLI polygon that has not yet met the green-up height. Year 0 to Year 250 in Table 3-8 details the amount of area not meeting the green-up height at specified time intervals. The area not meeting the green-up height must be lower than the threshold area to indicate compliance with the constraint. Year 0 indicates the current status, and some polygons might exceed the threshold amount. This indicates that currently, these VLI polygons are in violation of the Visual Quality Objectives (VQO) constraint, restricting harvesting in these areas until the green-up area requirement is met. For some small VLI polygons, minor violations may occur in the middle of the planning horizon due to natural disturbances on the non-THLB enforced in the model. Under those circumstances, harvesting is still not permitted until green-up is achieved.

Table 3-8 VQO Target Basecase Projection Summary

VLI Number	EVQO	VAC	Target Type	Max Alt Percent (%)	Green-up Height (m)	Threshold Area (ha)	Year 0	Year 5	Year 10	Year 15	Year 20	Year 30	Year 40	Year 50	Year 100	Year 150	Year 200	Year 250
816	M	H	max	67	4.0	29	5	-	0	0	0	22	8	8	9	6	3	22
818	M	H	max	67	4.5	40	-	1	2	2	3	30	40	13	27	3	12	13
851	M	H	max	54	5.0	318	-	182	293	318	295	142	64	21	194	93	151	150
868	M	H	max	23	8.5	136	5	15	16	16	19	39	43	45	39	15	5	-
869	M	H	max	67	4.0	148	-	7	7	13	55	105	29	73	71	103	7	37
803	M	L	max	17	6.5	84	38	46	57	60	60	36	32	20	56	35	17	63
804	M	L	max	21	5.5	11	-	-	8	16	16	16	20	23	0	0	-	3
810	M	L	max	26	4.5	7	4	-	-	-	-	-	4	4	0	-	-	6
811	M	L	max	21	5.0	8	-	0	1	3	3	3	0	1	0	0	4	1
812	M	L	max	21	5.0	5	2	17	17	17	16	3	-	-	1	4	1	1
813	M	L	max	26	4.0	6	10	10	5	5	6	6	6	5	5	6	5	5
814	M	L	max	21	5.0	2	0	1	2	2	2	2	1	1	1	1	3	1
831	M	L	max	17	6.0	3	0	0	2	2	2	3	2	1	2	0	1	2
832	M	L	max	14	7.0	44	19	10	17	21	21	22	15	13	6	2	3	9
833	M	L	max	21	5.0	17	26	33	33	33	32	15	16	15	17	8	13	10
835	M	L	max	26	4.0	6	-	-	-	-	-	1	1	0	1	-	1	0
836	M	L	max	21	5.0	4	1	1	-	-	-	-	2	3	2	1	3	2
837	M	L	max	21	5.5	1	-	0	0	0	0	-	0	0	-	0	0	-
839	M	L	max	21	5.0	9	-	0	0	3	3	-	1	17	-	8	2	0
843	M	L	max	14	6.5	12	-	-	0	1	2	4	3	13	12	13	1	2
846	M	L	max	21	5.0	71	41	54	59	69	47	43	28	28	46	48	23	45
848	M	L	max	26	4.5	10	-	-	-	7	7	10	10	10	-	10	10	9
854	M	L	max	21	5.0	40	1	2	11	13	13	12	14	23	29	17	10	13

VLI Number	EVQO	VAC	Target Type	Max Alt Percent (%)	Green-up Height (m)	Threshold Area (ha)	Year 0	Year 5	Year 10	Year 15	Year 20	Year 30	Year 40	Year 50	Year 100	Year 150	Year 200	Year 250
865	M	L	max	21	5.5	6	0	-	1	4	5	5	6	5	-	10	0	6
866	M	L	max	11	8.0	21	13	8	9	25	25	25	18	1	-	20	14	-
867	M	L	max	17	6.0	4	-	-	0	0	0	0	0	-	0	0	-	-
872	M	L	max	17	6.5	4	5	-	3	3	3	3	-	-	-	-	3	-
802	M	M	max	20	7.5	59	3	3	4	4	19	21	25	19	13	29	10	18
805	M	M	max	30	6.5	5	-	-	-	-	-	-	6	6	2	3	3	3
806	M	M	max	38	5.0	10	6	8	9	9	10	9	5	4	1	6	6	6
807	M	M	max	47	4.5	19	1	1	-	-	1	1	9	17	1	1	2	7
808	M	M	max	47	4.5	9	7	3	0	0	0	0	0	0	0	0	1	-
809	M	M	max	47	4.0	51	48	48	50	1	5	34	36	9	39	35	9	23
815	M	M	max	47	4.5	22	-	15	15	15	15	26	26	1	5	1	15	17
817	M	M	max	47	4.0	15	-	0	15	15	15	15	13	13	1	12	0	7
819	M	M	max	47	4.0	11	-	-	-	-	4	4	14	4	-	8	-	2
820	M	M	max	38	5.5	13	-	12	12	15	14	14	13	11	4	11	9	10
821	M	M	max	38	5.0	20	-	14	20	20	18	21	20	15	4	20	4	6
822	M	M	max	38	5.5	121	45	59	67	70	71	17	11	9	70	12	27	38
824	M	M	max	47	4.0	21	17	21	22	17	11	7	6	2	3	15	15	2
828	M	M	max	38	5.5	6	-	5	5	5	6	5	6	2	5	2	5	2
829	M	M	max	38	5.0	8	-	7	8	8	8	7	8	6	7	3	7	5
830	M	M	max	47	4.0	4	-	0	2	4	4	4	-	-	5	2	2	3
834	M	M	max	38	5.0	28	1	0	0	0	0	0	0	0	-	-	-	-
838	M	M	max	20	8.0	4	-	-	-	-	-	-	-	-	-	-	-	-
840	M	M	max	47	4.0	31	-	16	16	32	27	13	21	0	27	11	5	14
841	M	M	max	38	5.0	1	-	-	-	-	-	-	-	-	-	-	-	-

VLI Number	EVQO	VAC	Target Type	Max Alt Percent (%)	Green-up Height (m)	Threshold Area (ha)	Year 0	Year 5	Year 10	Year 15	Year 20	Year 30	Year 40	Year 50	Year 100	Year 150	Year 200	Year 250
842	M	M	max	30	6.0	3	-	-	-	-	-	-	-	-	-	-	-	-
845	M	M	max	38	5.5	266	279	215	228	136	113	120	88	65	131	101	149	141
855	M	M	max	38	5.0	6	8	-	-	0	0	0	3	2	6	0	5	2
856	M	M	max	38	5.0	49	14	37	47	37	50	49	32	12	36	26	33	13
857	M	M	max	47	4.5	52	11	28	18	16	16	49	43	31	23	38	28	12
858	M	M	max	47	4.5	22	-	1	1	1	1	1	1	21	-	22	2	9
859	M	M	max	47	4.5	19	-	-	-	4	6	6	0	5	8	5	13	2
861	M	M	max	30	6.0	11	-	-	-	-	-	-	-	-	-	-	-	-
863	M	M	max	20	8.0	25	7	7	6	5	6	6	6	6	3	7	-	24
871	M	M	max	38	5.0	20	-	1	1	2	5	9	5	15	6	10	11	12
873	M	M	max	47	4.5	37	-	-	-	-	-	7	8	16	3	12	22	24
874	M	M	max	30	6.0	14	28	-	-	-	2	2	3	3	5	1	8	14
823	PR	L	max	2	7.5	1	30	30	30	10	11	11	11	11	-	-	-	-
825	PR	L	max	2	8.0	2	23	27	5	6	7	8	5	10	6	11	5	4
826	PR	L	max	2	8.0	7	46	35	43	44	45	36	17	9	7	7	5	6
827	PR	L	max	3	6.5	9	17	1	4	4	5	5	6	9	3	9	5	7
849	PR	L	max	3	6.0	12	28	9	2	3	13	15	6	13	19	12	12	14
862	PR	L	max	3	6.5	9	45	17	6	9	9	11	10	10	11	9	8	5
844	PR	M	max	13	5.0	126	89	51	52	51	80	122	123	126	126	121	83	123
850	PR	M	max	13	5.5	18	8	17	18	18	15	17	20	15	18	18	11	15
853	PR	M	max	6	7.5	77	4	59	65	68	78	78	76	76	77	77	71	76
860	PR	M	max	8	7.0	25	18	14	15	25	26	27	24	25	25	23	18	25
864	PR	M	max	8	6.5	68	3	12	13	14	12	18	36	66	67	68	68	68

4. Sensitivity Analysis

Sensitivity analysis provides information on the degree to which uncertainty in the basecase data and assumptions might affect the proposed harvest level for the land base. 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 provide information to guide management decisions in consideration of uncertainty.

Each of the sensitivities shown in Table 4-1 test the impact of a specific variable (or variables) with impacts measured relative to the basecase harvest projection.

Table 4-1 Description of Sensitivity Analysis

Sensitivity	Range Tested
Alternative Harvest Flow	Natural flow
	Non-declining even flow
	Step-up harvest flow
MP #10 Harvest Level	Applying MP #10's harvest level targets
Alternative Yield Tables	Alternative MSYT
	Alternative NSYT
	Alternative MSYT & NSYT
Minimum Harvestable Volume	Set at 140 m3/ha
	Set at 220 m3/ha
Patch Size Distribution Objectives	Patch size distribution targets enabled to guide harvest pattern
	Patch size distribution targets strictly enforced
	No patch size distribution targets enabled
Fluctuations in Managed Stand Yield Tables	Increase by 10%
	Decrease by 10%
Fluctuations in Natural Stand Yield Tables	Increase by 10%
	Decrease by 10%
Uncertainties in THLB	Increase by 10%
	Decrease by 10%
Ecosystem Representation Analysis: Rare Ecosystems	No harvest in rare ecosystems
Natural Disturbance (ND)	ND on non-THLB
	ND on FMLB
	No ND
Old Growth Deferral Areas	No harvest in Old Growth Deferral Areas
BCTS Volume	Increase harvest volume target in first 5 years to accommodate for BCTS disposition volume

4.1 Alternative Harvest Flow Pattern

The harvest flow pattern in the basecase scenario is influenced by the forest's current condition, including its age class distribution and growing stock, alongside the yield projections and harvest flow objectives of the license holder and stakeholders. Commonly, the aim is to either maintain the current AAC or achieve a maximized, non-declining flow (NDEF) of the harvest level. If there's an abundance of productive natural growing stock that could yield higher volumes after transitioning to managed stands, the land base may support a higher short to mid-term harvest, though the long-run sustainable yield will likely be lower than the initial harvest level. Conversely, if the land base characteristics suggest a lower initial harvest but promise higher mid-term or long-term yields, the harvest flow pattern will typically show an upward trend, either through step-up or a gradual increase in the harvest level. The latter scenario applies to TFL30. Figure 4-1 illustrates the harvest level projections of the NDEF and the step-up scenario. Table 4-2 summarizes the average annual harvest volume by time period and percent difference compared to the basecase.

Table 4-2 Harvest Level and Impacts of Alternative Harvest Flow

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
NDEF	403,174	404,953	406,145	406,358
Step-up	403,317	405,993	428,469	435,161
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
NDEF	-1%	-2%	-3%	-4%
Step-up	-1%	-2%	2%	2%

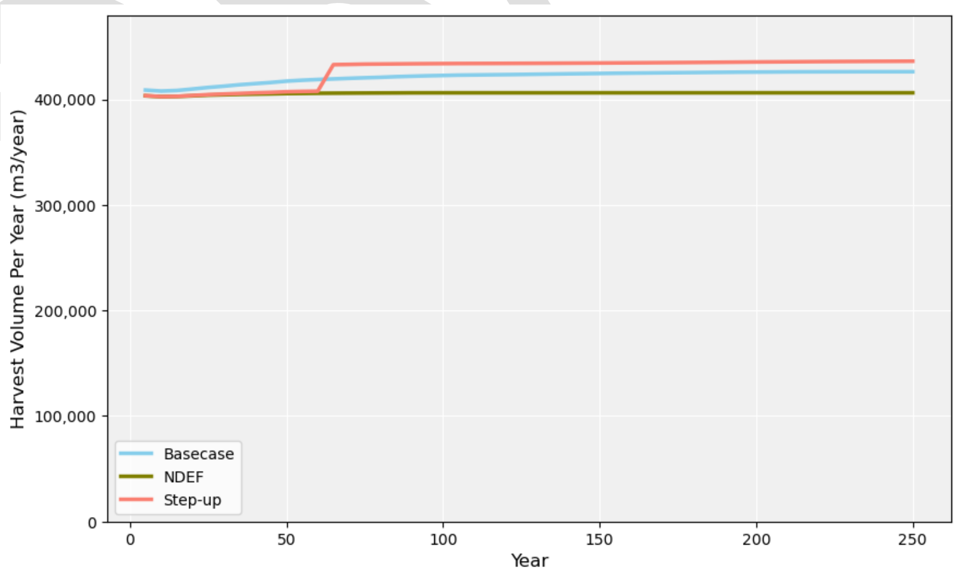

Figure 4-1 Harvest Level Projections of Alternative Harvest Flow Scenarios

Figure 4-2 illustrates the total THLB growing stock projections for both the basecase and alternative harvest flow scenarios. In the step-up scenario, the growing stock follows a similar pattern to the basecase but with a notable volume accumulation around year 70, followed by a sharper decline starting in year 210. Conversely, the NDEF scenario demonstrates a stable accumulation of growing stock around year 100, which persists through the end of the planning horizon. This stability suggests that the land base could support a higher long-term harvest level.

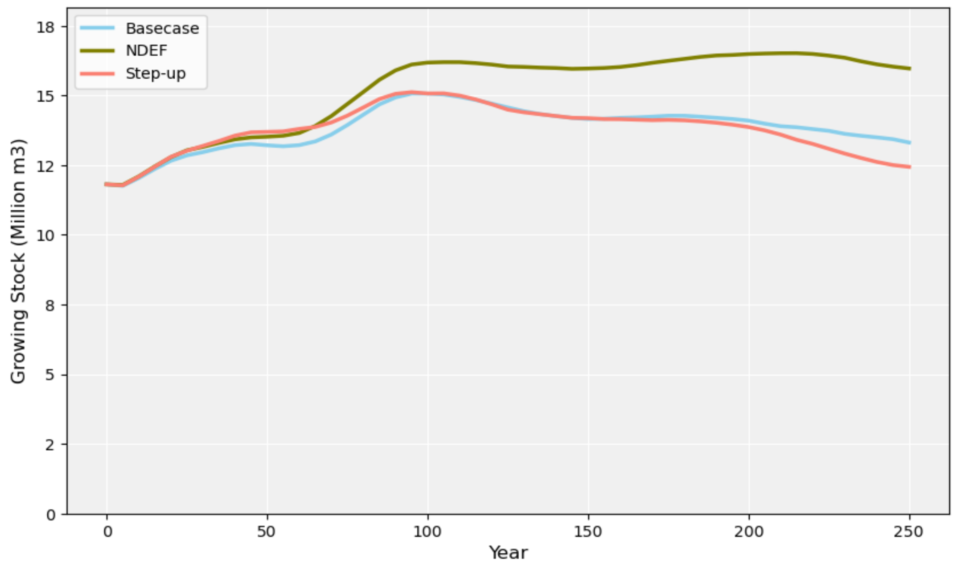

Figure 4-2 Total THLB Growing Stock Projection of Alternative Harvest Flow Scenarios

After the initial Management Plan #11 Content Check as part of the Timber Supply Review procedure, the Forest Analysis and Inventory Branch (FAIB) noted the slight decline in the growing stock in the last 50 years of the proposed basecase scenario and requested an alternative scenario without this decline. Figure 4-3 illustrates the harvest level projections for both the basecase and the 50-year non-declining growing stock scenario, while Figure 4-4 shows the growing stock projections. The harvest level in the alternative scenario shows a 1% decrease in the first 30 years compared to the basecase. After presenting these results to FAIB, it was agreed that, at this phase of the TSR, the proposed basecase in this Analysis Report can remain unchanged until further review, as the difference in harvest levels does not affect the review and feedback process for this report.

The primary reason for the declining growing stock in the basecase is the use of a consistent harvest level target, which results in a gradually increasing harvest level. Lowering the harvest level target elevates the growing stock projection but still shows a decline in the last few decades. Although harvest level flow control and growing stock flow control were enabled, they were not heavily reinforced. In the alternative scenario, these flow control targets were enforced to achieve the 50-year non-declining growing stock projection and a gradually increasing harvest level projection. If the AAC is established and maintained based on the short-term harvest level of the proposed basecase, the long-term growing stock will experience a upward trend similar to the NDEF scenario described above.

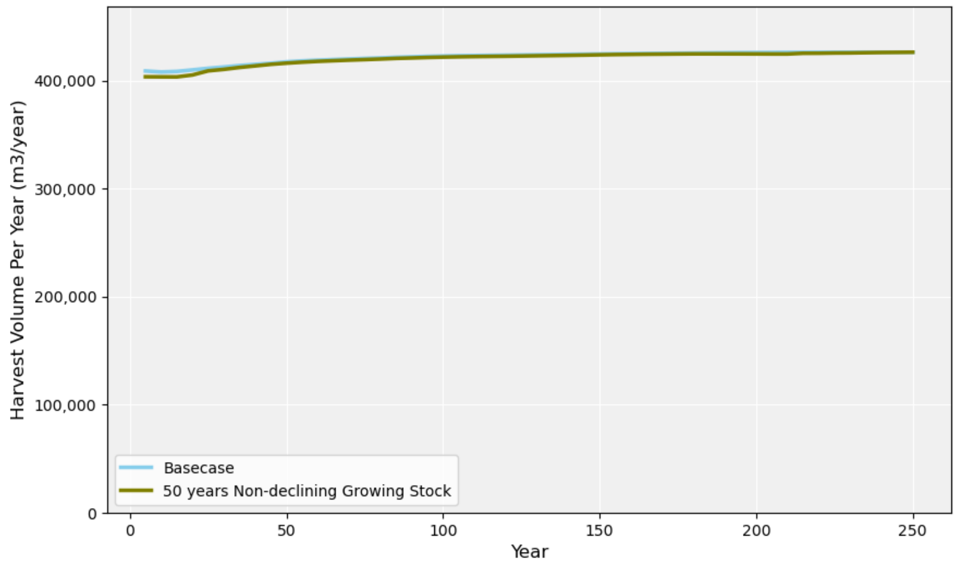

Figure 4-3 Harvest Level Projections of 50-Year Non-Declining Growing Stock Scenarios

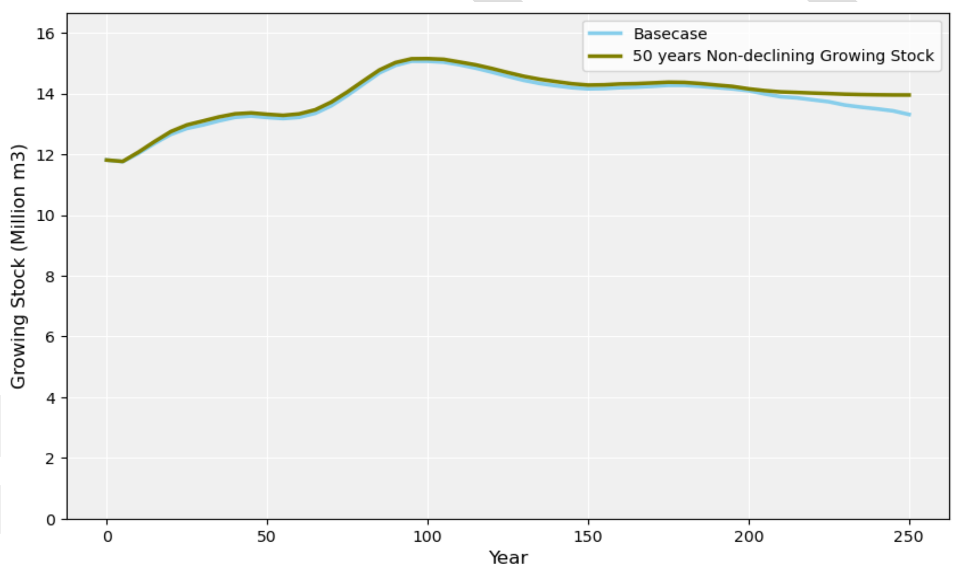

Figure 4-4 Total THLB Growing Stock Projection of 50-Year Non-Declining Growing Stock Scenarios

4.2 MP #10 Harvest Level

It is important to compare the proposed harvest level of the basecase in MP#11 with those from MP#10. The MP#10 harvest level were 3% higher in the short-term and 27% higher in the mid to long-term compared to the current proposed basecase. These differences are attributed to the changes in data and assumptions outlined in Section 3.3.

Applying the MP#10 basecase harvest level targets to the current timber supply model leads to a notable decrease in harvest volume during the first 20 years, with a modest increase in the mid to long-term, as detailed in Table 4-3. This approach delays harvest opportunities to later periods. As indicated in Figure 4-5 and Figure 4-6, this harvest pattern does not maximize short-term harvest levels and fails to maintain a viable long-term growing stock.

Table 4-3 Harvest Level and Impacts of MP#10 Harvest Level Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
MP10 Harvest Level	326,251	388,542	451,076	451,182
Actual MP10 Harvest Projection	414,494	430,891	533,803	538,399
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
MP10 Harvest Level	-20%	-6%	7%	6%
Actual MP10 Harvest Projection	1%	4%	27%	27%

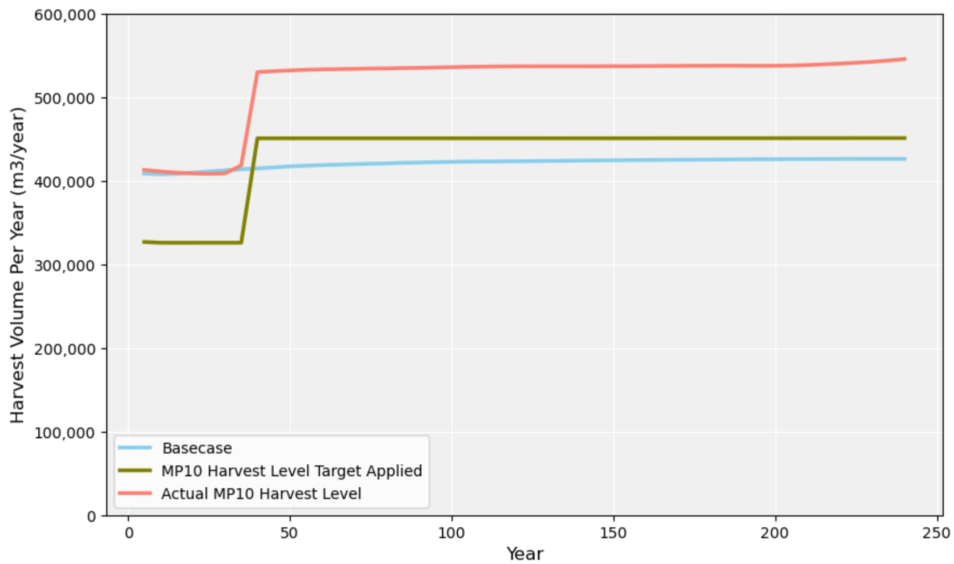

Figure 4-5 Harvest Level Projections of MP#10 Scenarios

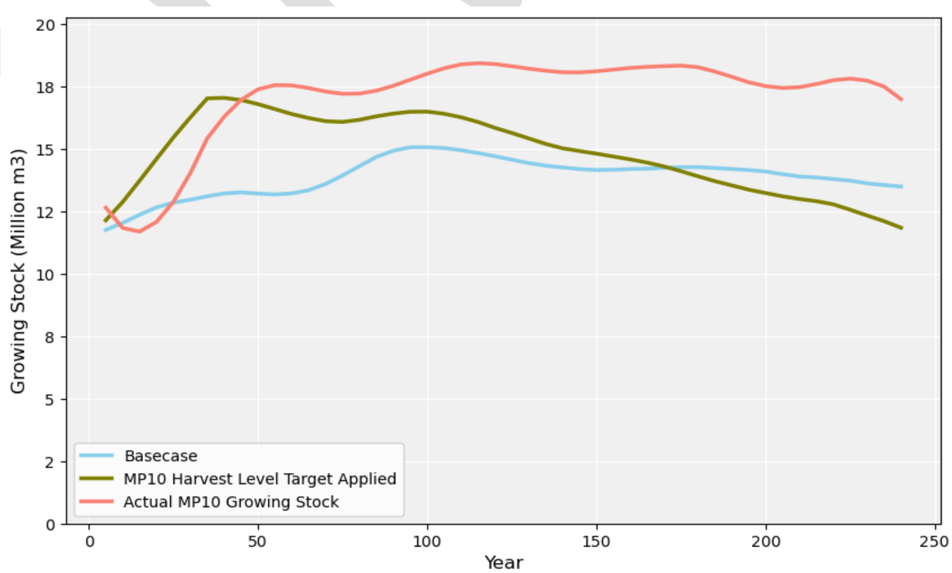

Figure 4-6 Total THLB Growing Stock Projections of MP#10 Scenarios

4.3 Alternative Natural Stand Yield Tables

The standard approach for compiling the natural stand yield tables (NSYT) used in timber supply modelling is to project in Variable Density Yield Prediction Growth and Yield Model (VDYP) using all VRI attributes as inputs. The basecase NSYT are projected using VDYP based on VRI attributes and adjusted heights from the LiDAR derived Individual Tree Inventory (ITI). The use of ITI in this analysis is introduced in Section 2.2 of the Information Package, while Section 5.4 describes the height adjustment process that projected the NSYT used in the basecase scenario. Similarly, the Managed Stand Yield Tables (MSYT) in the basecase are produced through a non-standard approach. For clarity, yield curves derived from the conventional method will be referred to as 'unadjusted' and those used in the basecase as 'adjusted.'

Both the MSYT and NSYT in the basecase are adjusted, making it essential to evaluate the impact on the harvest levels when using the unadjusted set. A scenario using both unadjusted MSYT and NSYT, compared to the basecase, illustrates the effects of applying unadjusted yield curves: a 34% decrease in the short-term harvest level, 27% in the mid-term, and 21% in the long-term. This analysis helps isolate the impact of using the adjusted NSYT, which matches those used in the basecase, indicating a short-term gain of 3% in harvest levels, diminishing to a 2% increase in the long-term. Table 4-4 and Figure 4-7 presents the results of this comparison.

Table 4-4 Harvest Level and Impact of Alternative Natural Stand Yield Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
Adjusted NSYT only	280,576	309,347	334,010	345,263
Unadjusted MSYT & NSYT	271,249	304,533	328,720	334,118
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
Adjusted NSYT only	-31%	-25%	-21%	-19%
Unadjusted MSYT & NSYT	-34%	-27%	-22%	-21%

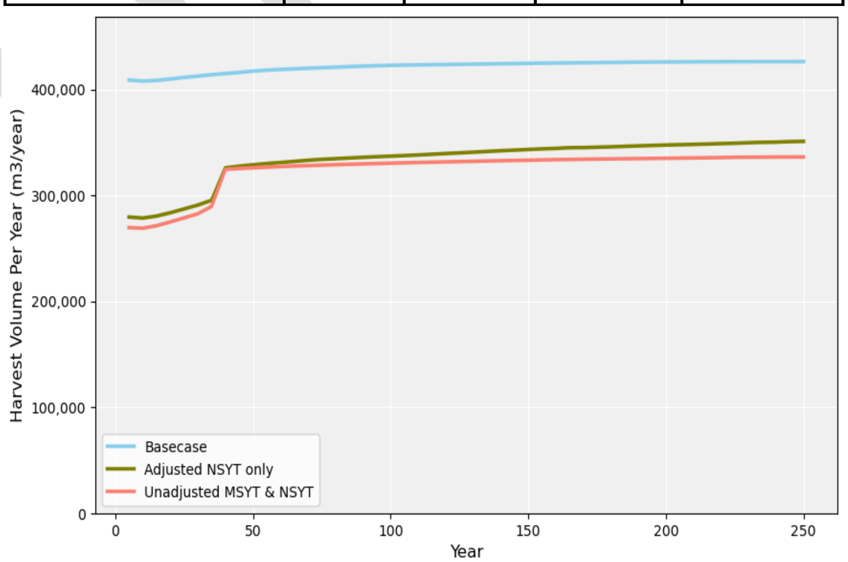

Figure 4-7 Harvest Level Projections of Alternative Natural Stand Yield Scenarios

4.4 Fluctuations in Natural Stand Yield Tables

Uncertainties in the NSYT used in this analysis have been addressed through sensitivity analysis, evaluating the effects of modifying the NSYT by ±10%. An increase in NSYT by 10% leads to a 4% higher harvest level than the basecase in the first 20 years, with this positive impact diminishing to 2% from year 101 onwards. Conversely, decreasing the NSYT by 10% results in a 6% reduction in the first 20 years, tapering off to a 1% reduction from year 51 to 100, with no impact thereafter. Fluctuations in NSYT predominantly affect short to mid-term harvest levels due to the shift from harvesting mainly natural stands to managed stands.

Table 4-5 and Figure 4-8 detail the harvest level impacts for both NSYT ±10% scenarios. Notably, the impact on harvest levels is not symmetrical between NSYT +10% and NSYT -10%. The negative effect is bigger when NSYT is decreased by 10% compared to when it is increased by the same margin. This asymmetry arises because the current harvestable criteria of a stand is when the stand reaches 95% of the culmination mean annual increment (CMAI) and meets the minimum harvestable volume criteria of 182 m^3/ha. Thus, the harvest schedule for the first 50 years is highly sensitive to the NSYT, where a decrease might delay or prevent a stand from becoming harvestable if it fails to meet the minimum volume criteria. In contrast, increasing the NSYT by 10% does not necessarily alter the timing for when a stand reaches 95% of the CMAI and met the minimum harvestable volume criteria, resulting in a less pronounced effect on harvest levels.

Table 4-5 Harvest Level and Impacts of NSYT Plus/Minus 10% Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
NSYT +10%	424,455	427,655	431,987	435,232
NSYT -10%	385,029	400,038	414,619	423,452
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
NSYT +10%	4%	3%	3%	2%
NSYT -10%	-6%	-3%	-1%	0%

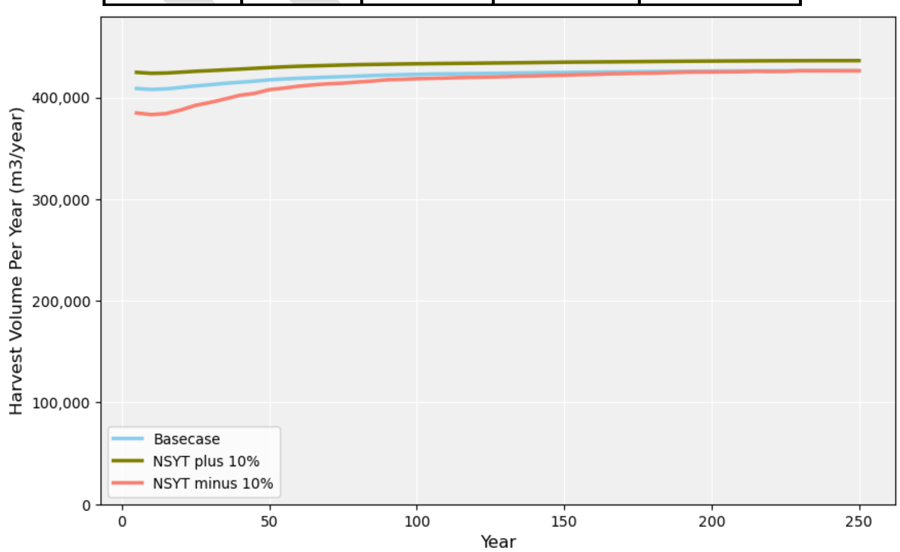

Figure 4-8 Harvest Level Projections of NSYT Plus/Minus 10% Scenarios

4.5 Alternative Managed Stand Yield Tables

The managed stand yield tables (MSYT) in the proposed basecase scenario for the two predominant site associations in TFL30 - Sxw_Oakfern and Sxw_Devilsclub - are derived using the TASS Approximation by a Dynamic Aggregated Model (TADAM), which incorporates data from the Change Monitoring Inventory (CMI) plots collected in 2022. The methodology, comparative analysis steps, and recommended yield curves for this timber supply analysis are thoroughly documented in the *Managed Stands Yields for Tree Farm Licence #30 Memo* (Canfor, 2023). Additionally, Section 5.6 of the Information Package provides an overview of the project's background and outcomes.

To evaluate the impact of applying the alternative MSYT on the harvest levels, particularly focusing on the adjusted vs unadjusted yield curves, two scenarios were analyzed: one incorporating both unadjusted MSYT and NSYT, and another featuring only the adjusted MSYT for these specific analysis units (Sxw_Oakfern, Sxw_Devilsclub partitioned by existing stems per hectare >=1200 and <1200). This approach helps assess the individual and combined effects of the adjusted yield table on the overall timber supply.

The results are presented in Table 4-6 and Figure 4-9. The use of the adjusted MSYT substantially enhances the harvest level: it results in a 33% increase in the first 20 years, 26% in years 21 to 50, and 21% from year 51 onwards. This notable impact underscores the critical importance of precisely calibrating growth and yield projections to the actual growth performance observed in managed stands, ensuring that forestry management strategies are both effective and sustainable.

Table 4-6 Harvest Level and Impacts of Alternative Managed Stand Yield Tables Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
Adjusted MSYT only	403,613	411,170	420,457	425,141
Unadjusted MSYT & NSYT	271,249	304,533	328,720	334,118
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
Adjusted MSYT only	-1%	-1%	0%	0%
Unadjusted MSYT & NSYT	-34%	-27%	-22%	-21%

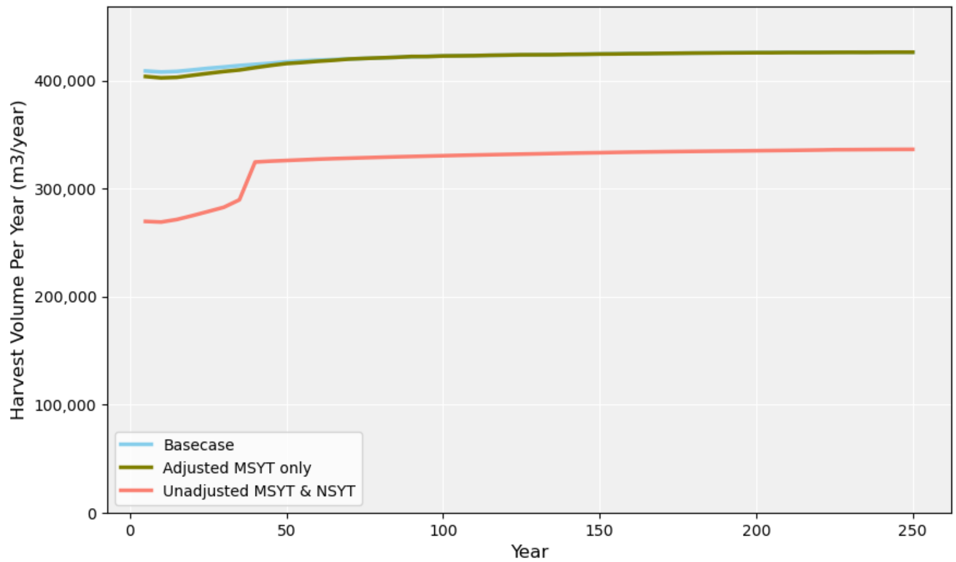

Figure 4-9 Harvest Level Projections of Alternative Managed Stand Yield Table Scenarios

4.6 Fluctuations in Managed Stand Yields

Uncertainties in the MSYT used in this analysis exist, and their impact on harvest levels is assessed in a sensitivity analysis by altering the MSYT by ±10%. An increase of 10% in the MSYT leads to a 12% higher harvest level than the basecase in the first 20 years. This positive impact grows to 19% after year 50 and remains consistent through the end of the planning horizon. Conversely, a decrease in the MSYT by 10% results in a consistent 7% reduction in harvest levels across the entire 250-year planning period.

Table 4-7 and Figure 4-10 illustrate the effects of these MSYT fluctuations. It's important to note that the impacts are not symmetrical for MSYT +10% and MSYT -10%. When MSYT is decreased by 10%, the reduction in harvest levels is evenly spread throughout the planning period, unlike the scenario where MSYT is increased. The increase in MSYT yields a smaller boost in the short term compared to the long term, primarily because short-term harvest levels rely more on the NSYT and are less sensitive to changes in MSYT.

The dynamics of the harvest level changes are mainly driven by the proportion of managed stands on the THLB that are near the culmination age and close to the minimum harvest volume. Increasing the MSYT might make some stands harvestable sooner and/or enhancing short-term yields. In contrast, decreasing the MSYT could delay or negate the harvestability of these stands, extending the harvest window and thereby reducing overall timber availability.

Table 4-7 Harvest Level and Impacts of MSYT Plus/Minus 10% Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
MSYT +10%	456,144	479,700	502,303	506,082
MSYT -10%	383,341	385,917	389,494	393,821
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
MSYT +10%	12%	16%	19%	19%
MSYT -10%	-6%	-7%	-7%	-7%

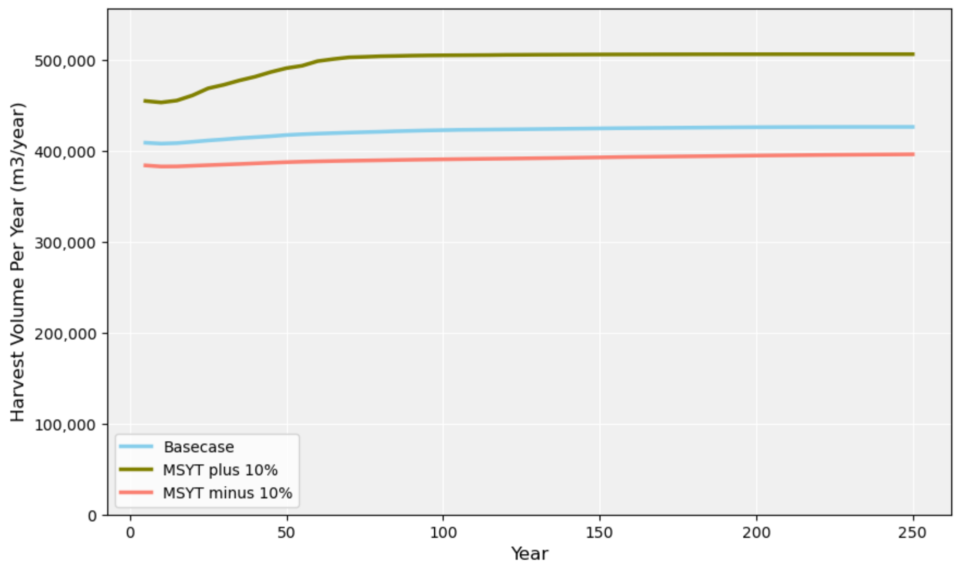

Figure 4-10 Harvest Level Projections of MSYT Plus/Minus 10% Scenarios

4.7 Minimum Harvestable Volume

Adjustments to the minimum harvestable volume (MHV) criteria can significantly influence harvest opportunities and timing across all stand types. In this analysis, the impacts of modifying the MHV from the current 182 m³/ha to both lower (140 m³/ha) and higher (220 m³/ha) thresholds were explored. Table 4-8 and Figure 4-11 detail the resultant harvest volumes and the implications of these MHV changes on the basecase harvest level.

Lowering the MHV from 182 m³/ha to 140 m³/ha results in an average increase of 2% in the harvest level across the planning horizon. Conversely, increasing the MHV to 220 m³/ha does not impact the harvest level. The disproportionate increase when reducing the MHV compared to increasing it can be attributed to the fact that the distribution of volume per hectare of the THLB around the culmination age tends more towards 140 m³/ha rather than 220 m³/ha.

In TFL30, stands typically reach their culmination age before meeting the MHV criteria. Consequently, lowering the MHV threshold allows for a broader harvest window and greater flexibility in the harvest schedule, thereby improving the overall harvest level. This approach leverages the existing volume distribution to optimize timber yield without waiting for stands to meet higher volume thresholds.

Table 4-8 Harvest Level and Impacts of Minimum Harvestable Volume 140/220 Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
MHV140	415,434	422,066	430,206	435,279
MHV220	407,716	415,038	422,166	425,595
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
MHV140	2%	2%	2%	2%
MHV220	0%	0%	0%	0%

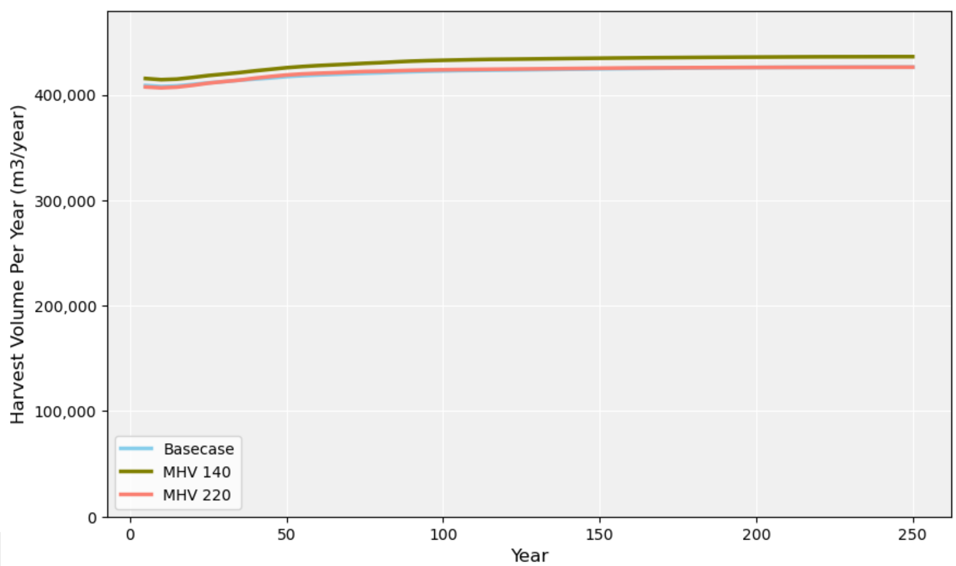

Figure 4-11 Harvest Level Projections of Minimum Harvestable Volume 140/220 Scenarios

4.8 Patch Size Distribution

A patch is comprised of stands under 20 years of age and are within spatial proximity of each other. The *Forest Practice Code Biodiversity Guidebook* outlines the recommended patch size distributions for each natural disturbance unit (NDT) to mirror the natural landscape patterns. However, these recommendations often conflict with other conservation-related land cover constraints within the model. Additionally, the land base classification process can lead to a more dispersed THLB, which hampers the formation of patches at the recommended sizes.

Despite these challenges, the model can generally optimize the harvest schedule to align with the recommended patch size distribution in the long term. This optimization is demonstrated in Table 4-9 and Figure 4-12, which show no impact from either eliminating or enforcing the patch size distribution targets from year 101 onwards. Eliminating patch size distribution targets in the basecase results in a 4% increase in the harvest level during the first 20 years, which then decreases to 1% from year 21 to 100. Conversely, enforcing the patch size distribution targets leads to a 6% decrease in harvest levels during the first 20 years, with the effect gradually diminishing until there is no impact from year 51 to the end of the planning horizon. The initial spike of the harvest level in the first planning period is a result of the model trying to reset the patch size distribution of the land base by first harvesting nearly all of the merchantable stands on the THLB, causing the subsequent shape decline in harvest level which gradually climbs back as managed stands begin to meet the minimum harvestable criteria. Under this scenario, some land cover constraints are further violated to accommodate the patch size distribution targets.

The initial discrepancies are primarily due to the current spatial distribution of young patches, which deviates from the recommended distribution. It often requires many years for the harvest schedule to adjust the initial patch size distribution to the desired pattern while managing other constraints on the land base. Operationally, managing for patch size distribution can challenging given that as stands ages beyond 20 years of age, area previously part of a patch falls out of a patch. Overall, due to the uncertainties associated with management practices for patch, patch size distribution targets in timber supply model usually allow for flexibility.

Table 4-9 Harvest Level and Impacts of Patch Size Distribution Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
No Patch Target	424,999	425,559	426,120	426,329
Enforced Patch Target	385,892	407,996	422,704	425,673
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
No Patch Target	4%	3%	1%	0%
Enforced Patch Target	-6%	-2%	0%	0%

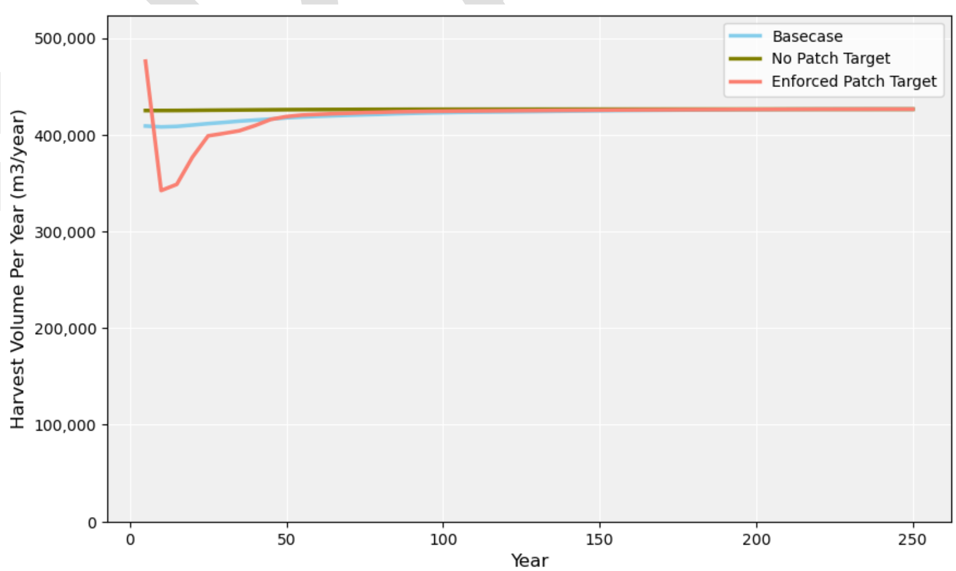

Figure 4-12 Harvest Level Projections of Patch Size Distribution Scenarios

4.9 Uncertainties in THLB

The land base classification process is influenced by both the spatial data layers, netdown assumptions ,and the aspatial reduction assumptions. Variability in these input data and assumptions can significantly affect the amount of FMLB and THLB. A routine sensitivity analysis conducted during the timber supply review involves evaluating the implications of increasing or decreasing the THLB by 10% aspatially. This analysis is based on the premise that the THLB varies by 10% while maintaining the same FMLB throughout the entire TFL.

Table 4-10 and Figure 4-13 display the outcomes of this sensitivity analysis, detailing the resultant harvest levels and their impacts. This analysis helps to understand the potential effects of netdown uncertainties on the timber supply. The harvest level impacts of adjusting the THLB by increasing or decreasing it by 10% are relatively symmetrical, with changes averaging about ±10% of the basecase harvest level. This symmetry in results aligns closely with the proportional changes made to the THLB, demonstrating a direct correlation between the area available for harvesting and the volume of timber harvested.

Table 4-10 Harvest Level and Impacts of THLB Plus/Minus 10% Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
THLB+10%	445,581	456,788	468,399	474,798
THLB-10%	373,952	376,200	379,139	381,078
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
THLB+10%	9%	10%	11%	12%
THLB-10%	-9%	-9%	-10%	-10%

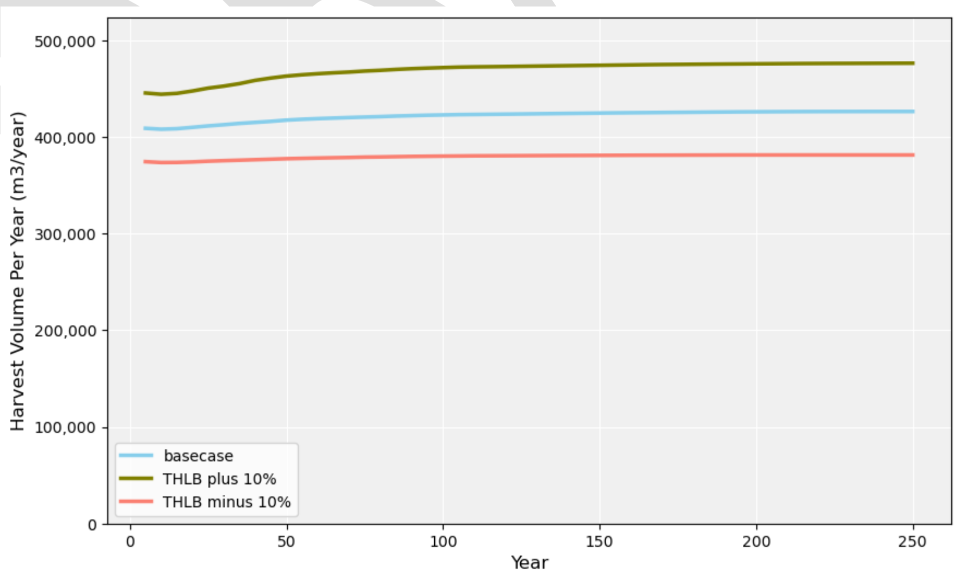

Figure 4-13 Harvest Level Projections of THLB Plus/Minus 10% Scenarios

4.10 Natural Disturbance

In the basecase, natural disturbances are modeled across the non-THLB for each NDT/BEC zone. These disturbances adhere to the annual target areas derived from the disturbance return intervals outlined in the *Forest Practice Code Biodiversity Guidebook* (MoF, 1995) and is described in Section 4.8 of the Information Package. Unlike clear-cut with reserves harvest method, which occurs once per rotation, natural disturbances are stand-replacement events that can affect stands of any species, site productivity, and age, and a stand may undergo multiple natural disturbances within a single rotation.

Two sensitivity scenarios were developed to assess the impacts on the harvest levels under different conditions of natural disturbance within the TFL. The first scenario examines the effect if natural disturbances also occur on the THLB, while the second scenario considers the situation with no natural disturbances within the TFL, except for the reduction in harvest levels attributed to non-recoverable losses. The outcomes of these scenarios are detailed in Table 4-11 and depicted in Figure 4-14, illustrating the variations in harvest levels and the respective impacts of these disturbances.

Removing the natural disturbance modeling specifications results in a slight overall increase (5% in short-term then gradually decreases to 3% until the end of the planning horizon) in harvest levels, while including natural disturbances across the entire FMLB leads to a notable decrease in harvest levels. In the basecase, natural disturbances are confined to the non-THLB, yet they still influence the stand's age, thereby reducing the area available to meet forest cover objectives such as the maximum hydrological equivalent disturbed area targets of watersheds and visual quality objectives (VQO). This modelling assumption also negatively impacts patch size distribution as non-THLB also contribute towards meeting patch size distribution targets.

When natural disturbances are not modeled, stands in the FMLB that are not harvested continue to age, thus increasing the area meeting forest cover objectives. This provides greater flexibility in harvesting productive stands within the THLB and alleviates the downward pressure on harvest levels from natural disturbances. Conversely, applying natural disturbances to the THLB introduces greater complexity to harvest scheduling. It changes the stand's age, rendering the stand unavailable for harvest until it matures, and decreases the area contributing to forest cover objectives. This randomized disruption complicates the model’s ability to balance harvest targets with forest cover constraints, leading to a significant reduction in harvest levels (-18 to -21%).

Table 4-11 Harvest Level and Impacts of Natural Disturbance Scenarios

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
Natural Disturbance on FMLB	336,359	336,359	336,359	336,359
No Natural Disturbance	429,688	432,291	434,946	436,020
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
Natural Disturbance on FMLB	-18%	-19%	-20%	-21%
No Natural Disturbance	5%	4%	3%	3%

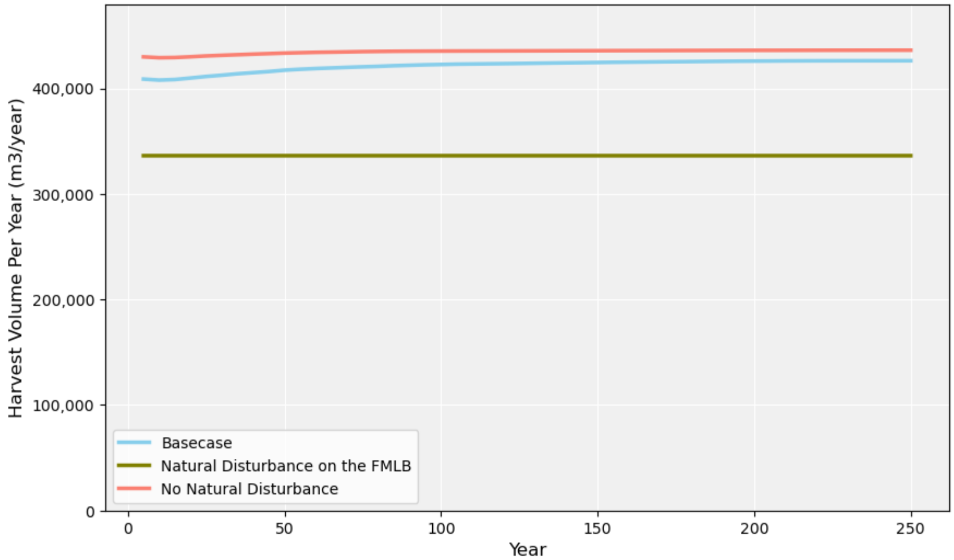

Figure 4-14 Harvest Level Projections of Natural Disturbance Scenarios

4.11 Ecosystem Representation Analysis

In 2012, as part of its commitment to sustainable forest management under the CSA Standard, Canfor conducted an Ecosystem Representation Analysis (ERA) across its operations in British Columbia, integral to the Prince George Defined Forest Area Sustainable Forest Management Plan (SFMP) of 2014. This ERA was pivotal in assessing the abundance of ecosystem groups within the Defined Forest Area, particularly spotlighting rare or uncommon ecosystems requiring special management attention. It effectively supported the indicator and target for Indicator 1.1.1, focusing on the percent representation of ecosystem groups. This approach aimed to provide a coarse-filter tool for biodiversity conservation, involving the spatial identification of potentially rare ecosystems. These ecosystems were then subject to field confirmation and, if deemed representative by qualified professionals, reserved from harvest.

The SFMP, developed with substantial contributions from Don Vaillancourt and the Wynndell Division team, originally adhered to the CSA Z809 standard. Canfor successfully transitioned to the Sustainable Forestry Initiative 2015-2019 Forest Management and Fibre Sourcing Standards in March 2019. This transition meant that the rare ecosystems indicators from the CSA-certified SFMP were replaced by those in the Sustainable Forestry Initiative Forest Management Standard, particularly under Objective 4 - Conservation of Biological Diversity. The integration of the December 2017 Wynnwood SFMP into the broader, Canfor-wide SFMP document marks a significant milestone, indicating Canfor's evolving approach to sustainable forest management across its western Canadian Divisional Operating areas, with an enduring focus on conserving biodiversity.This scenario examines the timber supply impact of applying a no harvest restriction to all site series identified as “rare‟ in the ERA within TFL30 as presented in Table 4-12.

Table 4-12 Stands Identified as Rare or Uncommon From 2011 Ecosystem Representation Analysis

Site Series	Moisture- Nutrient Regime	Site Association	FMLB (ha)	THLB (ha)
ESSF wk1- 06	Subhygric - subhydric; Very poor - poor	Bl - Horsetail -Sphagnum	-	-
ICH vk2-02	Xeric; very poor - poor	HwCw - Cladonia	95.26	24.64
ICH vk2-05	Subhygric - hygric; medium - rich	Cw - Devil's club - Ostrich fern	898.57	491.94
ICH vk2-06	Hygric - subhydric; rich	Cw - Sxw – Skunk cabbage	70.85	35.49
ICH vk2-07	subhydric	Sb - Sphagnum	32.34	20.58
ICH wk3-02	Xeric; very poor - poor	Hw - False Azalea- Lichens	-	-
ICH wk4-02	Xeric; very poor - poor	HwCw - Cladonia	-	-
ICH wk4-04	Subxeric - submesic; very poor - poor	CwSxw-Velvet-leaved blueberry	-	-
ICH wk4-06	Subhygric; medium - rich	Sxw - Twinberry - Oak fern	-	-
ICH wk4-08	Hygric - subhygric; medium - very rich	Sxw - Devil's club - Lady fern	-	-
SBS mk1-02	Xeric; very poor - medium	Pl - Cladina – Step moss	-	-
SBS mw-02	Very xeric - xeric; very poor - rich	Fd - Bl - Huckleberry	-	-
SBS mw-04	Xeric - submesic; medium - rich	Sxw - Fd - Knight's plume	-	-
SBS mw-05	Subhygric; poor	Sxw - Pink spirea	-	-
SBS vk-03	Subxeric - submesic; poor - medium	Sxw - Fd - Thimbleberry	1,415.65	680.67
SBS vk-07	Hygric; medium - very rich	Sxw - Devil's club - Ostrich fern	1,436.79	373.45
SBS vk-11	mesic - subhygric	Sitka Alder - Ladyfern	4,050.62	1,675.21
SBS wk1-06	Subhygric; poor - medium	Sxw - Pink spirea - Oak fern	3,285.20	2,412.67
SBS wk1-10	hygric; rich – very rich	Sxw - Devil's club - Lady fern	202.00	140.25
SBS wk1-11	subhydric	SbSxw – Scrub birch - Sedge	1,004.50	231.81
SBS wk3a-01	Mesic; poor-medium	Sxw - Dogwood -Fairybells	-	-

Table 4-13 and Figure 4-15 detail the harvest levels and impacts resulting from implementing a no-harvest restriction on the rare or uncommon site series within the THLB. These site series cover 6,087 hectares, which accounts for approximately 6% of the total THLB. The implementation of this restriction leads to a reduction in harvest levels of 2% in the first 50 years and 1% in the long term. This reduction is proportionally less than the total area reserved, likely attributable to the relatively low site productivity of the stands in these site series, which may have prompted the model to naturally avoid harvesting these areas even in the basecase scenario.

Table 4-13 Harvest Level and Impact of No Harvest in Rare/Uncommon Site Series Scenario

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
No Harvest in Rare/Uncommon Site Series	400,465	408,219	416,733	423,037
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
No Harvest in Rare/Uncommon Site Series	-2%	-2%	-1%	-1%

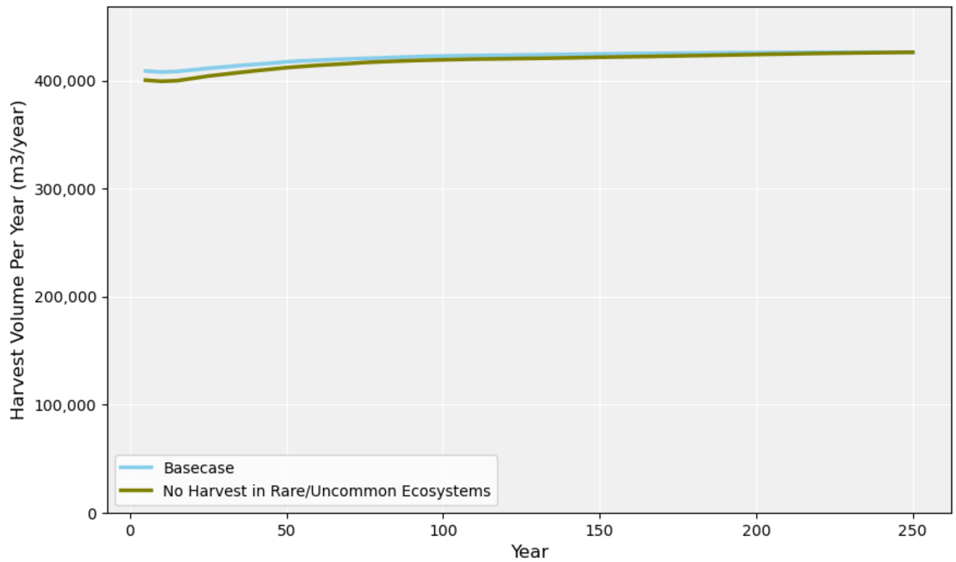

Figure 4-15 Harvest Level Projection of No Harvest in Rare/Uncommon Site Series Scenario

4.12 Old Growth Deferral Areas

Old growth deferral areas are stands across the province that are determined by the government of British Columbia in partnership with First Nations and industry to temporaily defer the logging in them. As of Feburary 2024, there are more than 2.42 million hectares of stands being deferred or protected since November 2021 on top of 3.7 million hectares that were already reserved. Currently, the two mechanisms of deferring harvest in these stands include: voluntary deferrals, regulation based deferrals including the use of Part 13, and directed deferrals in the case for government owned organizations (Government of British Columbia, 2024).

In this sensitivity analysis, impact on the harvest level by restricting harvesting in the old growth deferral areas has been quantified. Table 4-14 and Figure 4-16 shows the resulting harvest level changes. There are more than 6,000 ha of THLB in TFL30 that overlaps the old growth deferral areas, which is roughly 6% of the total THLB, this is reflected in the 6% harvest level reduction in the basecase.

Table 4-14 Harvest Level and Impact of No Harvest in Old Growth Deferral Areas

Scenario	Average Coniferous Harvest Volume (m3/year)			
	1 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188
No Harvest in Old Growth Deferral Areas	391,689	394,752	396,245	396,361
	Percent Difference to the Basecase (%)			
	1 to 20	21 to 50	51 to 100	101 to 250
No Harvest in Old Growth Deferral Areas	-4%	-5%	-6%	-7%

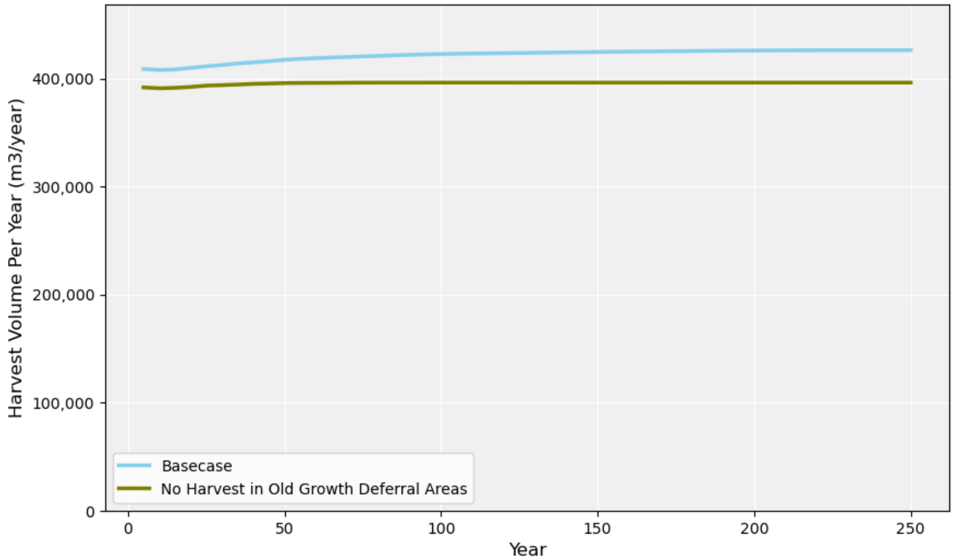

Figure 4-16 Harvest Level Projection of No Harvest in Old Growth Deferral Areas

4.13 BCTS Disposition Volume

Within the existing TFL30 License document, a portion of the AAC is reserved for disposition by British Columbia Timber Sales (BCTS) totaling 21,312 m³/year. Based on a summary produced by BCTS, the organization is claiming that it has unused volume accumulations within TFL30, from the period prior to 2014 (the last Determination year). Based on BCTS's accounting, the unused volume amounts to a total of 149,956 m³. Canfor does not accept the BCTS assertion of having access to harvesting so-called unused volume. Their current plan is to address this accumulated volume within the first 5 years of the current management period.

A modelling scenario was prepared, assessing the impact of the harvest level by targeting the model to harvest an additional 149,956 m³ in the first 10 years on top of the basecase harvest level. Table 4-15 and Figure 4-17 shows the resulting harvest level changes if the unused volume is added to the basecase harvest level. Under the current land base characteristics and existing age class distribution, only 142,950 m³ could get harvested on top of the basecase harvest level. Also, the harvest level would experience a slight decrease in year 11 to 20 and in year 101 to 250. It should be noted that both VQO and watershed constraints are violated in this scenario. Additionally, as there is a remaining balance between this scenario harvest level and the total that BCTS is attempting to access, it is assumed that the differential would further impact the basecase total by 7,006 m³ over the first 5 years.

As the basecase scenario is the best representation of what the land base can support, the unused BCTS volume would ultimately have a direct impact on total harvest volume available to Canfor. Assuming the basecase harvest remains as illustrated for the first 5 years, the unused BCTS volume would need to be subtracted from that amount. This would result in a reduced harvest level down to 393,486 m³/yr. As BCTS's portion of this harvest remains fixed at 21,312 m³/yr, the full impact of this reduction would be on Canfor's portion of the harvest.

Table 4-15 Harvest Level and Impact of Additional BCTS Volume

Scenario	Average Coniferous Harvest Volume (m3/year)				
	1 to 10	11 to 20	21 to 50	51 to 100	101 to 250
Basecase	408,190	414,230	420,613	425,188	408,190
BCTS Vol Added	422,777	406,087	412,675	419,225	422,500
BCTS Vol Removed	393,486	409,243	414,443	420,746	425,226
	Percent Difference to the Basecase (%)				
	1 to 10	11 to 20	21 to 50	51 to 100	101 to 250
BCTS Vol Added	3%	-1%	0%	0%	-1%
BCTS Vol Removed	-4%	0%	0%	0%	0%

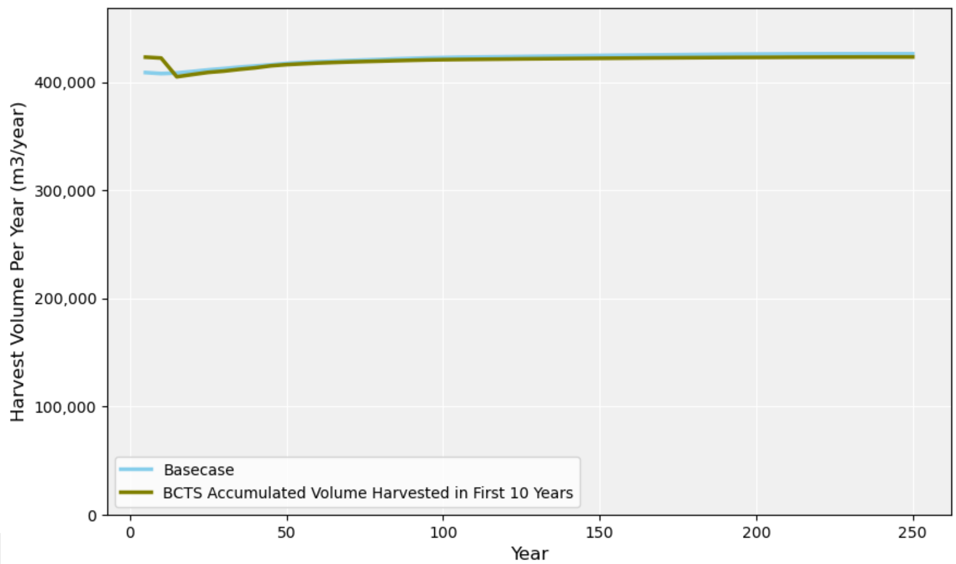

Figure 4-17 Harvest Level Projection of BCTS Volume

4.14 Moose Best Management Practices

Working in collaboration with Lheidli T'enneh, a suite of Best Management Practices (BMP) are in developement that are conducive to maintain and improve conditions of moose habitat. Currently the BMP focus on the following:

- Increase landscape heterogeneity and connectivity
- Maintain deciduous and preferred moose browsing vegetation on the landscape.
- Maintaining security and thermal cover in appropriate locations and configurations, including standing dead pine
- Reducing the functionality of roads as travel corridors for predators and in some places humans, and reducing overall road densities.

As these BMP's get further refined, a sensitivity will be completed to assess the application of these practices against the basecase.

5. Discussion and Conclusion

Over 40 years of area-based tenure management, TFL30 has evolved from a primary forest influenced by natural climate and landscape conditions to a scientifically managed and meticulously maintained forest tenure. This management plan marks a pivotal transition, capitalizing on the early phase of managed forests in northern interior British Columbia. Significant enhancements in data collection and management practices have been integral to refining the timber supply analysis. Developments include the creation of the Potential Site Index estimates, acquisition of LiDAR coverage, and the development of individual tree inventories and riparian features classification. Additionally, management enhancements have been implemented, such as spatial delineation of OGMA by operational planners, investment in watershed sensitivity assessments, advancements in silviculture practices, ongoing investments in growth and yield projects and also the accommodation of stand-level special interests. All of which further enhancing the overall accuracy of the timber supply projection.

Sensitivity analysis has been included in this analysis to evaluate how uncertainties in the basecase data and assumptions could potentially influence the proposed harvest levels of basecase. This analysis is crucial for determining the stability and reliability of management strategies under varying conditions of input data. Table 5-1 presents the basecase harvest level in annual average conifer harvest volume and the percent difference to the basecase of sensitivity scenarios.

Table 5-1 Basecase Average Coniferous Harvest Volume (m^3/yr) and Sensitivity Scenario Impacts

Scenario	Percent Difference to the Basecase (%)		
	1 to 20	21 to 50	51 to 250
Basecase	408,190	414,230	424,044
Even Harvest Flow	-1%	-2%	-4%
Step-up Harvest Flow	-1%	-2%	2%
MP#10 Harvest Flow	-20%	-6%	6%
Adjusted NSYT Only	-31%	-25%	-19%
Adjusted MSYT Only	-1%	-1%	0%
Unadjusted NSYT & MSYT	-34%	-26%	-22%
MHV 140	2%	2%	2%
MHV 220	0%	0%	0%
No Patch Targets	4%	3%	1%
Enforced Patch Targets	-5%	-2%	0%
MSYT +10%	12%	16%	19%
MSYT -10%	-6%	-7%	-7%
NSYT +10%	4%	3%	2%
NSYT -10%	-6%	-3%	-1%
THLB + 10%	9%	10%	12%
THLB - 10%	-8%	-9%	-10%
Natural Disturbance on the FMLB	-18%	-19%	-21%
No Natural Disturbance	5%	4%	3%
No harvest in Rare Ecosystems	-2%	-1%	-1%
No Harvest in Old Growth Deferral Areas	-4%	-5%	-7%
BCTS Volume	2%	0%	-1%

Adjusting the MSYT represents the most significant factor affecting harvest level variances, with a change of about -30% in the basecase harvest level for the first 20 years and -19% in the long term, as notably observed in the Adjusted NSYT Only scenario. The MSYT +10% scenario harvest level also shares the same outlook. In contrast, sensitivities around the NSYT have less impact on the harvest level, primarily because most natural stands within the TFL are retained under various netdown categories, rendering them unavailable for harvest.

The basecase harvest level is also highly responsive to changes in the proportion of the THLB available for harvest. This is demonstrated in several scenarios, particularly those involving no harvest in specific areas and adjustments to the THLB by ±10%.

Additionally, targets for patch distribution and the simulation of natural disturbances both significantly affect the harvest level, with their removal alleviating some of the downward pressure.The relevance of these targets in the basecase has been a subject of debate in previous timber supply analyses, with the primary concern being whether these assumptions are justified given the historical disturbance patterns and the size of the land base. Nonetheless, exploring these assumptions through sensitivity analysis is beneficial, as it sheds light on the potential impacts these variables could have on the basecase harvest levels.

The timber supply analysis for TFL30 integrates advancements in forest management and data precision, such as the use of LiDAR derived products and change monitoring inventory plot data, to enhance forecast accuracy and strategic planning. Adjustments in yield tables, the application of ecological considerations like patch distribution and natural disturbance simulations, and the adherance to the forest cover requirements are crucial in shaping harvest levels and ensuring sustainable management. This analysis not only reflects current forest conditions and stakeholder needs but also adapts to future changes, promoting a balanced approach to forest resource utilization and ecological integrity.

Looking to the future, Canfor will continue to collect and improve on the managed stand yield projections through a revised sample plan program, and will to continue to work with our First Nation partners in further developing and refining the management practices within the TFL to address the key areas of interest, specifically moose BMP's.

6. References

British Columbia Ministry of Forests. (1995). Biodiversity Guidebook. https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf

Canadian Forest Products Ltd. & Ecora Engineering & Resource Group Ltd. (2024). *Tree Farm Licence #30 Management Plan #11 Timber Supply Analysis – Information* Package.

Forestress Dynamics Ltd. & Meristem Insights Ltd. & Canadian Forest Products Ltd. (2023). Managed Stand Yields for Tree Farm Licence #30 Memo.

Timberline Forest Inventory Consultants Ltd. & Industrial Forestry Services Ltd. & Oikos Ecological Service Ltd. (2001). Terrestrial Ecosystem Mapping of The McGregor Model Forest Final Report.

Thrower, J.S. & Associates Ltd. (2000). Potential Site Index Estimates for the Major Commercial Tree Species on TFL 30. March 31, 2000. 27pp.

Makitalo, A., C. Tweeddale and R. Wells. 2012. Ecosystem Representation Analysis Final Report. Forest Ecosystems Solutions Ltd. 378 pages. Unpublished.

4.3 Appendix C – Comment and Review Information

4.3.1 Approved Communication Strategy

Public Review Strategy

Tree Farm Licence 30 – Management Plan 11

As part of the preparation of Management Plan 11 (MP 11) for Tree Farm Licence 30 (TFL 30), this strategy has been developed to address legislation and policy requirements for the First Nations, stakeholders and public review and involvement in the preparation of MP 11.

The public review strategy of MP 11 will be completed in accordance with the actions and approximate timelines in the following table (Table 1).

Table 1 - Public Review Timelines

Step #	Action	Approximate Date(s) NOTE: These have been adjusted through the TSR process
0	Canfor requests the province to identify Nations that the province has commitments for collaboration on Timber Supply Reviews, and which Nations are identified for this TFL project.	December, 2022
1	Canfor submits review strategy (this document) to RED	December, 2022
2	RED approves review strategy	January, 2023
3	Canfor initiates review of a draft Info Package (IP) with the First Nations identified by the province	February 2023
4	Canfor considers, and where appropriate incorporates First Nations interests into the draft Info Package (IP)	April 2023
5	Canfor submits, refers and advertises for review a draft Info Package (IP) for all First Nations, stake holders and general public	April 2023
6	Review period occurs over 60 days	May-June, 2023
7	Canfor considers any comments received and submits a final IP to MoF and FAIB	June 2023
8	IP accepted by FAIB	June 2023
9	Canfor initiates review of a draft Management Plan Package (MP) including the timber supply analysis with the First Nations identified by the province	September 2023
10	Canfor considers, and where appropriate incorporates First Nation interests into the draft Management Plan Package (MP)	November 2023
11	Canfor submits, refers and advertises for review the draft Management Plan (MP), including the timber supply analysis for all First Nations, stake holders and general public	November 2023
12	Review period occurs over 60 days	December, 2023 – January, 2024
12a	Canfor provides the First Nations identified by the province with a summary of how their interests/concerns were incorporated into the draft MP	January 2024

12b	Canfor provides Province record of comments received from First Nations, stake holders and general public and responses provided by Canfor	
13	Canfor summarizes First Nations, stake holders and general public comments in final MP to MoF and FAIB	February, 2024
14	Chief Forester approves the MP and determines the AAC	April 2024

Advertisements

In May 2023, the attached advertisement (Appendix A) will appear twice in the Prince George Citizen Newspapers to inform the public that the Info Package will be available for review at the local Canfor and Prince George Ministry of Forests Natural Resource District office, as well as on Canfor's public website.

This same process will be initiated in November 2023 regarding the draft MP11, with the advertisement as per Appendix B.

First Nations Referrals

The attached letter (Appendix C) will be sent to First Nations as per Table 2 below:

Table 2 – First Nations Contacts

First Nation	Chief	Main Contact
Lheidli T'enneh	Dolleen Logan	Gbenga Ayansola
McLeod Lake	Harley Chingee	Stephanie Rocheleau/Nathan Prince
West Moberly	Roland Willson	Jeff Richert

NOTE: the above represents Bands with Traditional Territory within TFL30.

Agency and Stakeholder Notification Letters

The attached letter (Appendix D) will be distributed to those identified in the agency (Table 3) and stakeholder contact lists (Table 4). Agency contacts will be sent the documents and maps; the Prince George Natural Resource District office, will also be provided with a paper copy. All other stakeholders will be directed to a website or to view a paper copy at either Canfor or the District office.

Table 3 – Agency Contacts

Ministry of Forests	Forest Analysis and Inventory Branch	Mark Perdue, Stacey Boks, April Bilawchuk
Ministry of Forests	Prince George Natural Resource District	Krista Desmond, Jesse Seniunas, Tara Bogh

Table 4 – Stakeholder Contacts

Group
Non-timber tenure holders (trappers and guide outfitters)
Regional District of Fraser-Fort George
City of Prince George

Resources North Association
BC Timber Sales – Prince George Business Area
Prince George/TFL30 Public Outreach Group members
Other stakeholders as identified from Canfor's "Creating Opportunities for Public Involvement" database (forest users, recreationists, general public, etc.)

Public Review Summary

Canfor will reply in writing to each person who took the opportunity to comment on MP 11.

As input is received by Canfor, this correspondence will be shared with MoF staff. To ensure information is shared at regular intervals, conference calls will be held between Canfor and applicable MoF staff on a biweekly basis during the comment and review periods.

A public review summary report will be included in the final Management Plan 11 document, noting the following:

- Name
- Organization (if applicable)
- Medium and date of communication
- Comments and follow-up
- Actions taken to accommodate
- Outstanding concerns

APPENDIX A
NEWSPAPER ADVERTISEMENT – INFO PACKAGE

CANADIAN FOREST PRODUCTS LTD.

Draft Timber Supply Analysis Information Package
Tree Farm Licence 30 Management Plan 11

Notice is hereby given, under section 6 (1) of the *Tree Farm Licence Management Plan Regulation*, that Canadian Forest Products Ltd. (Canfor) is seeking public review and comment on the Draft Timber Supply Analysis Information Package, relating to Management Plan 11 (MP 11) for Tree Farm Licence 30 (TFL 30). MP 11 is being prepared in order to meet the requirements of the *Tree Farm Licence Management Plan Regulation*. This regulation includes content requirements, submission timing and public review requirements for TFL Management Plans. These content requirements replace the Management Plan content requirements previously listed in the Tree Farm Licence document and reduce duplication with associated Forest Stewardship Plan results and strategies.

The Management Plan consists of a summary of the TFL along with the Timber Supply Review Analysis report and Data Package with a reference to the other guiding legislation (i.e Forest Stewardship Plans, Sustainable Forest Management Plans and other Higher Level Plans). This information is provided to the Ministry of Forests to set a new Allowable Annual Cut for the TFL.

All interested parties are invited to view and comment on the Draft Timber Supply Analysis Information Package for MP 11, from ___________, 2023 through to _______________, 2023. Viewing appointments can be arranged by calling our office at (250) 570-8444, or by visiting http://www.canfor.com/responsibility/environmental/plans . Comments will be accepted until 4:00 pm ____________, 2023.

For further information, please contact:

Terry Lazaruk, RPF
Strategic Planning Coordinator,
Canadian Forest Products Ltd.
PO Box 9000,
Prince George, BC V2L 4W2

APPENDIX B
NEWSPAPER ADVERTISEMENT – DRAFT MP10

CANADIAN FOREST PRODUCTS LTD.

Draft - Tree Farm Licence 30 Management Plan 11

Notice is hereby given, under section 6 (1) of the *Tree Farm Licence Management Plan Regulation*, that Canadian Forest Products Ltd. (Canfor) is seeking public review and comment on Draft Management Plan 11 (MP 11) for Tree Farm Licence 30 (TFL 30). MP 11 is being prepared in order to meet the requirements of the *Tree Farm Licence Management Plan Regulation*. This regulation includes content requirements, submission timing and public review requirements for TFL Management Plans. These content requirements replace the Management Plan content requirements previously listed in the Tree Farm Licence document and reduce duplication with associated Forest Stewardship Plan results and strategies.

The Management Plan consists of a summary of the TFL along with the Timber Supply Review Analysis report and Data Package with a reference to the other guiding legislation (i.e Forest Stewardship Plans, Sustainable Forest Management Plans and other Higher Level Plans). This information is provided to the Ministry of Forests to set a new Allowable Annual Cut for the TFL.

All interested parties are invited to view and comment on MP 11, from month day, year through to month day, year. Viewing appointments can be arranged by calling our office at (250) 570-8444, or by visiting http://www.canfor.com/responsibility/environmental/plans. Comments will be accepted until 4:00 pm month day, year.

For further information, please contact:

Terry Lazaruk, RPF
Strategic Planning Coordinator,
Canadian Forest Products Ltd.
PO Box 9000,
Prince George, BC V2L 4W2

APPENDIX C
FIRST NATIONS REFERRAL LETTER

<insert date>
Chief >>>
First Nation>>>

Address>>>

RE: Draft Management Plan 10 for TFL 14 Available for Review and Comment

Dear Chief>>>:

Canadian Forest Products has prepared a Draft Management Plan (MP 11) for Tree Farm License 30 (TFL 30). The Management Plan is a legislative requirement as well as a requirement of the TFL Agreement with the Provincial Government. The Management Plan consists of a summary of the TFL along with the Timber Supply Review Analysis report and Data Package with a reference to the other guiding legislation (i.e. Forest Stewardship Plans, Sustainable Forest Management Plans and other Higher-Level Plans). This information is provided to the Ministry of Forests to set a new Allowable Annual Cut for the TFL.

TFL 30 is located just northeast of Prince George in the Prince George Forest District. The TFL stretches from its western boundary near Summit Lake on Highway 97, eastward across the western foothills of the Rocky Mountains to slightly northeast of Sinclair Mills. The total land base for TFL 30 is 182,298 hectares, with a productive forest land base of 159,385 hectares or about 87 % of the total area. Forests in the area consist of spruce, balsam, lodgepole pine, Douglas-fir, cedar, hemlock, and deciduous species.

Canadian Forest Products Ltd. requests that the <insert band name> review and provide comments on MP 11 by xx date, a copy of which is posted on Canfor's website at http://www.canfor.com/responsibility/environmental/plans . A paper copy of MP 11 and all maps will be provided at your request.

To facilitate information sharing between Canfor and the <insert band name>, we are interested in meeting to discuss MP 11. Given the fiduciary responsibility of the Crown to First Nations, Canfor will be requesting the Ministry of Forests to coordinate any such meeting. If you are interested in participating in a meeting, please contact Terry Lazaruk, Strategic Planning Coordinator, at (250) 570-8444.

Sincerely,

Terry Lazaruk, RPF
Strategic Planning Coordinator,
Canadian Forest Products Ltd.
PO Box 9000,
Prince George, BC V2L 4W2

cc: Tara Bogh, Ministry of Forest

APPENDIX D
STAKEHOLDER REFERRAL LETTER

<insert date>

Name>>>
Address>>>

RE: Draft Management Plan 11 for TFL 30 Available for Review and Comment

Dear Sir or Madam:

Canadian Forest Products has prepared a Draft Management Plan (MP 11) for Tree Farm License 30 (TFL 30). The Management Plan is a legislative requirement as well as a requirement of the TFL Agreement with the Provincial Government. The Management Plan consists of a summary of the TFL along with the Timber Supply Review Analysis report and Data Package with a reference to the other guiding legislation (i.e. Forest Stewardship Plans, Sustainable Forest Management Plans and other Higher-Level Plans). This information is provided to the Ministry of Forests to set a new Allowable Annual Cut for the TFL.

TFL 30 is located just northeast of Prince George in the Prince George Forest District. The TFL stretches from its western boundary near Summit Lake on Highway 97, eastward across the western foothills of the Rocky Mountains to slightly northeast of Sinclair Mills. The total land base for TFL 30 is 182,298 hectares, with a productive forest land base of 159,385 hectares or about 87 % of the total area. Forests in the area consist of spruce, balsam, lodgepole pine, Douglas-fir, cedar, hemlock, and deciduous species.

We are seeking public input on MP 11, which will be available for review and comment from 9 am to 3 pm from <insert dates> at the Canfor office, located at 5162 Northwood Pulp Mill Road, Prince George. Alternatively, MP 11 is available for viewing on Canfor's website at http://www.canfor.com/responsibility/environmental/plans, or at the Ministry of Forests Prince George District office, located at 2000 South Ospika Boulevard, Prince George.

If you are unable to view the proposed plan at the above times or locations, please contact us at (250) 570-8444 to make alternative arrangements.

Sincerely,

Terry Lazaruk, RPF
Strategic Planning Coordinator,
Canadian Forest Products Ltd.
PO Box 9000,
Prince George, BC V2L 4W2

4.3.2 Stake Holder Contact List

This will be completed following the Review Process and provided as part of the final package to the Chief Forester for review

4.3.3 Comments Received and Canfor Responses

This will be completed following the Review Process and provided as part of the final package to the Chief Forester for review