



*Morice and Lakes Timber Supply Area
Innovative Forest Practices Agreement*

Lakes TSA Revised Information Package

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Table of Contents

1.0	Introduction	1
1.1	<i>Base Case Scenario.....</i>	<i>1</i>
1.2	<i>FRPA Implementation Scenario.....</i>	<i>1</i>
2.0	Timber Harvesting Landbase Determination	2
2.1	<i>Total Landbase.....</i>	<i>2</i>
2.2	<i>Reductions to the Total Landbase</i>	<i>3</i>
2.2.1	<i>Unclassified Lands.....</i>	<i>3</i>
2.2.2	<i>Non-Forest (Natural Non-Treed Non-Productive).....</i>	<i>3</i>
2.3	<i>Reductions to the Total Productive Landbase.....</i>	<i>4</i>
2.3.1	<i>Deforested Lands for Agriculture and Settlement</i>	<i>4</i>
2.3.2	<i>Deforested Lands for Timber Harvesting and Forest Management</i>	<i>4</i>
2.3.3	<i>Natural Treed Non-Productive.....</i>	<i>5</i>
2.4	<i>Reductions to Net Productive Landbase</i>	<i>5</i>
2.4.1	<i>Lands to Which Volume Based Tenure Agreements Cannot be Granted</i>	<i>5</i>
2.5	<i>Reductions to Volume Based Tenure Agreement Lands.....</i>	<i>6</i>
2.5.1	<i>Non-Commercial Cover.....</i>	<i>7</i>
2.5.2	<i>Non-Merchantable Forest Types.....</i>	<i>7</i>
2.5.3	<i>Low Productivity Sites.....</i>	<i>7</i>
2.5.4	<i>Environmentally Sensitive Areas.....</i>	<i>7</i>
2.5.5	<i>Inoperable</i>	<i>8</i>
2.5.6	<i>Recreation Areas.....</i>	<i>8</i>
2.5.7	<i>Riparian Management Areas.....</i>	<i>8</i>
2.5.8	<i>Old Growth Management Areas</i>	<i>8</i>
2.5.9	<i>Wildlife Tree Retention</i>	<i>9</i>
2.5.10	<i>Mountain Goat Habitat Access Management</i>	<i>9</i>
2.6	<i>Future Reductions</i>	<i>9</i>
2.6.1	<i>Conversion of THLB to Agricultural Uses</i>	<i>9</i>
2.6.2	<i>Future Roads, Trails, Landings (Deforested Lands for Timber Harvesting and Forest Management) ..</i>	<i>10</i>
3.0	Growth and Yield	11
3.1	<i>Volume exclusions for mixed species stands</i>	<i>11</i>
3.2	<i>Regeneration Delay.....</i>	<i>11</i>
3.3	<i>Yield Curve Development.....</i>	<i>11</i>
3.3.1	<i>Base Case Yield Curves.....</i>	<i>11</i>
3.3.2	<i>FRPA Implementation Scenario Yield Curves</i>	<i>12</i>
3.4	<i>Succession</i>	<i>13</i>
3.5	<i>Decreased Stump Height.....</i>	<i>14</i>
4.0	Protection	14
4.1	<i>Unsalvaged Losses.....</i>	<i>14</i>
5.0	Integrated Resource Management	15

5.1	<i>Landscape Level Biodiversity</i>	15
5.1.1	Seral Stage Requirements in BENs.....	15
5.1.2	Seral Stage Distribution in BEOs	16
5.1.3	Lakes South SRMP Landscape Corridors.....	17
5.2	<i>Species specific habitat requirements</i>	17
5.2.1	Seral Stage Requirements in Caribou Migration Corridors	17
5.2.2	Seral Stage Requirements for Specified Wildlife	18
5.3	<i>Visual Resources</i>	19
5.3.1	Base Case Visually Sensitive Area Requirements	19
5.3.2	FRPA Implementation Scenario Visually Sensitive Area Requirements	21
5.4	<i>Recreation Resources</i>	22
5.4.1	Backcountry lakes.....	22
5.5	<i>Adjacent Cutblock Green-Up</i>	22
5.6	<i>Patches</i>	23
6.0	Timber Harvesting	23
6.1	<i>Harvest Flow Policy</i>	23
6.2	<i>Initial Harvest Rates</i>	23
6.3	<i>Minimum Harvestable Age / Merchantability Standards</i>	24
6.4	<i>Harvest Rules</i>	24
6.5	<i>Harvest Priorities</i>	24
6.5.1	Base Case Harvest Priorities	24
6.5.2	FRPA Implementation Scenario Harvest Priorities	24
6.6	<i>Harvest Profile</i>	25
6.7	<i>Silviculture Systems</i>	25
	Appendix 1 Decision Scenario Netdown Summary Table	26
	Appendix 2 Base Case Scenario Netdown Summary Table	28
	Appendix 3 Lakes Base Case Yield Curves Report	30
	Appendix 4 Lakes Ecosystem Yield Curves Report	31
	Appendix 5 Lakes Forest Productivity Yield Curves Report	32
	Appendix 6 Beetle Curve Adjustments	33
	Appendix 7 Riparian Methodology	34
	Appendix 8 Forest Service Bulletin from December 12th, 2003 entitled ‘Modelling Visuals in TSR III	35

List of Tables

Table 1. Area comparison of Base Case and FRPA Implementation Scenario Netdown Classifications	2
Table 2. Unclassified Lands	3
Table 3. Non-Forest Area	3
Table 4. Deforested Lands for Agriculture and Settlement.....	4
Table 5. Deforested Lands for Timber Harvesting and Forest Management.....	4
Table 6. Natural Treed Non-Productive Areas	5
Table 7. Areas to which volume based tenure agreements cannot be granted.	6
Table 8. Reductions to Volume Based Tenure Agreement Lands	6
Table 9. Comparisons of Future Area Reductions	9
Table 10. Future Roads, Trails and Landings	10
Table 11. Yield Curve Data Sources for Base Case and FRPA Implementation Scenarios.....	11
Table 12. Future Managed Curve Species Adjustments for FRPA Implementation Scenario	12
Table 13. Unsalvaged Losses (First 25 Years).....	14
Table 14. Unsalvaged Losses (Remainder of Planning Horizon)	14
Table 15. Base Case Forested Area within BENS.....	15
Table 16. Seral Stage Assessment Units and Targets.....	16
Table 17. Seral Stage Requirements in Caribou Migration Corridor	18
Table 18. Habitat Preservation for Specified Wildlife	18
Table 19. Percent Denudation Targets for Visually Sensitive Units.	19
Table 20. Visually Effective Green-up for Scenic Areas.....	21
Table 21. Allowable Disturbance Parameters for VQO Depletion Adjustment	21
Table 22. Integrated Resource Management Zone where Green-up Adjacency Applies	22
Table 23. Desired Patch Distribution from Lakes South SRMP; Percent of forested area by NDT	23
Table 24. Seral Classes for Patch Definition.....	23
Table 25. Mitigation Scenario Harvest Priorities	24

1.0 Introduction

In order to support the AAC determination for the M&L IFPA, Tweedsmuir Forest Ltd. is also responsible for preparing a Timber Supply Analysis Information Package to document the data inputs and assumptions that were used to generate analysis results. The Lakes TSA Base Case Information Package report was completed in April 2005. This document you are reading is a revised Lakes TSA Information Package that compares the input parameters and management assumptions between the IFPA Lakes TSA Base Case Scenario and the IFPA Lakes TSA Forest and Range Practices Act Implementation Scenario.

1.1 *Base Case Scenario*

The mandate for the Lakes-IFPA Base Case required that data inputs and assumptions remain consistent with those implemented under TSR2, where relevant. In addition, this Base Case analysis incorporates management assumptions from the Expedited Timber Supply Review for the Lakes TSA (2004) and current non-recoverable loss projections for the Mountain Pine Beetle through 2013 according to the BC Mountain Pine Beetle Project. Other deviations included the conversion of aspatial approximation assumptions to their spatial equivalents, and the use of better, more up-to-date inventory information if available.

It has been acknowledged that several key assumptions under the Lakes TSR2 Base Case do not reflect current forest management practices being implemented by the licensees within the Lakes TSA. In order to accommodate current practices the following modeling assumption adjustments were made:

- The spatially explicit green-up constraint applied in the IRM zone is not applied in the first 20 years of the planning horizon in order to allow the creation of larger openings during the MPB epidemic.
- Early seral forest cover constraints are waived for the first 20 years of the planning horizon to facilitate increased harvesting associated with MBP management.

1.2 *FRPA Implementation Scenario*

The intent of this scenario is to fully implement the Forest and Range Practices Act while mitigating the negative effects of the current Mountain Pine Beetle epidemic to the Forest Industry. The data and assumptions of the learning scenarios are implemented along with any legally required management constraints absent in the learning scenarios. Policy based modeling assumptions that differ from those in Base Case include:

- Lakes South SRMP Old Growth Management Areas
- Lakes South SRMP wildlife connectivity corridors
- Dropping green-up adjacency requirements in favour of other land base constraints
- Applying patch size distribution targets
- Adjustments to wildlife tree retention requirements
- Including community forests in crown forested areas and conducting compartmental harvests within community forests

Mitigation driven modeling assumptions that differ from Base Case include:

- Volume matching approach to recovery curves for MPB depleted stands

- Plan to perspective ratio adjustments to allowable depletion levels within visually sensitive areas
- Forest productivity curve for future managed stands
 - Future managed stand site indices are principally taken from SIBEC. In the base case they were taken from the forest cover and some site index adjustments were applied.
 - First generation genetically improved stock is incorporated in future managed stand yield curve generation.
 - Use a different species mix for future managed stands with a significantly higher proportion of spruce and lower proportion of pine on many of the BEC site series within the TSA.
- “Best of the worst first” harvesting priorities scheme
- 2% increase in volume resulting from a 15cm reduction in stump height

The basis of these scenarios and the differences between them will be discussed in the following report sections; Landbase Netdown, Growth and Yield, Protection; and Integrated Resource Management.

2.0 Timber Harvesting Landbase Determination

Table 1 summarizes the area reductions made to the gross area of the Lakes TSA to arrive at the landbase that is available for timber harvesting. The reductions and additions to the total landbase are listed in the order in which they are applied. Each reduction and addition is described in detail in the following sections.

2.1 Total Landbase

The total landbase area used for the Morice & Lakes IFPA Base Case Scenario is 1,577,480 ha (Appendix 1 and Appendix 2). *Table 1* also provides a generalized summary of the different net area removals for both scenarios. There are three differences in net area removals between the two scenarios. Firstly, in the FRPA Implementation Scenario the Cheslatta Community Forest and the Burns Lake Community Forest were included as lands to which volume based tenure agreements can be granted. Secondly, Old Growth Management Areas (OGMAs) were defined in the FRPA Implementation for the Lakes South SRMP - the southern landscape units of Chelaslie, Cheslatta, Intata, Ootsa, Francois East and Francois West. And thirdly, the method used to determine retention requirements for wildlife tree patches was changed.

Table 1. Area comparison of Base Case and FRPA Implementation Scenario Netdown Classifications

Classification	Base Case Scenario Area (ha)	Decision Scenario Area (ha)	Percent Change in Area Relative to Base Case
Total Landbase Area	1,577,480	1,577,480	0.0%
Reductions to the Total Landbase	312,501	312,501	0.0%
Total Productive Landbase	1,264,979	1,264,979	0.0%
Reductions to Total Productive Landbase	119,080	119,080	0.0%
Net Productive Landbase	1,145,961	1,145,961	0.0%

Reductions to Net Productive Landbase	468,322	395,259	-15.6%
Forested Area where Volume Based Tenure Agreements Apply	677,639	750,702	10.8%
Reductions to Volume Based Tenure Agreement Lands	120,276	178,777	48.6%
Current Timber Harvesting Landbase	557,363	571,925	2.6%
Future Reductions	11,147	11,139	-0.1%
Future Timber Harvesting Landbase	546,216	560,786	2.7%

2.2 Reductions to the Total Landbase

There is no difference between the two scenarios regarding reductions to total land base. The reductions are however detailed in this section under the following categories: Unclassified Land, Non-Forest (Natural Non-Treed Non-Productive), Deforested Lands for Agriculture and Settlement, and Natural Treed Non-Productive.

2.2.1 Unclassified Lands

Table 2 lists the land that is unclassified in the Lakes TSA. Unclassified land is defined as non-typed area (NTA) within the forest inventory file.

Table 2. Unclassified Lands

Description	Gross Area (ha) including overlaps	Percent (%) Reduction	Net Area (ha)
Unclassified Lands (NPF_Descr = NTA)	2,055.8	100	2,055.8

2.2.2 Non-Forest (Natural Non-Treed Non-Productive)

Table 3 lists the non-forest areas in the Lakes TSA.

Table 3. Non-Forest Area

Description	Gross Area (ha) including overlaps	Percent (%) Reduction	Net Area (ha)
Alpine (NPF_Descr = A)	74,440.7	100	74,440.7
Clay Bank (NPF_Descr = CL)	44.3	100	44.3
Gravel Bar (NPF_Descr = G)	3.4	100	3.4
Lake (NPF_Descr = L)	156,066.2	100	156,066.2
Meadow (NPF_Descr = M)	239.5	100	239.5
Non-Productive (NPF_Descr = NP and SPC_1 is null)	8,890.7	100	8,890.7
Non-Productive Brush (NPF_Descr = NPBR)	8,949.2	100	8,949.2
Non-Productive Burn (NPF_Descr = NPBU)	0.0	100	0.0
Rock (NPF_Descr = R)	2,148.4	100	2,148.4

Description	Gross Area (ha) including overlaps	Percent (%) Reduction	Net Area (ha)
River (NPF_Descr = RIV)	1,275.4	100	1,275.4
Swamp (NPF_Descr = SWAMP)	58,290.7	100	58,290.7
Sand	4.1	100	4.1
TOTAL	310,445.8		310,445.8

2.3 Reductions to the Total Productive Landbase

This netdown classification includes removals for:

- Deforested lands for agriculture and settlement
- Deforested lands for timber harvesting and forest management activities
- Natural treed non-productive areas

The total productive landbase is the same for the FRPA Implementation Scenario and the Base Case.

2.3.1 Deforested Lands for Agriculture and Settlement

Table 4 lists the area that is a reduction from the total productive landbase since it is deforested for agriculture and settlement purposes.

Table 4. Deforested Lands for Agriculture and Settlement

Description	Gross Area (ha) including overlaps	Percent (%) Reduction	Net Area (ha)
Open Range (NPF_Descr = OR)	7,696.7	100	7,696.7
Hayfields (NPF_Descr = P)	0	100	0
Clearings (NPF_Descr = C)	16,561.4	100	16,561.4
Urban (NPF_Descr = U and NP_CD = 54)	5,227.0	100	5,227.0
TOTAL	29,485.1		29,485.1

2.3.2 Deforested Lands for Timber Harvesting and Forest Management

In TSR2 an estimate of 5.24% was used to reflect the loss of productive forestland to existing and future roads, trails and landings. In the Lakes Base Case roads reductions and landings reductions occur in a quasi-spatial manner. Only those polygons with roads running through them have roads reductions taken. The road length and road width associated with the different classes of roads are multiplied to calculate a roaded area, which is subtracted from the productive area of the polygon when the road is built.

Table 5 provides detail regarding the area that is a reduction from the total productive landbase from deforestation for of timber harvesting and forest management activities.

Table 5. Deforested Lands for Timber Harvesting and Forest Management

Description	Gross Area (ha) including overlaps	Percent (%) Reduction	Net Area (ha)
Highways (P_Class = 10 and P_State >=2)	920.3	100	251.4
Mainline Roads¹ (P_Class = 1 and P_State >=2)	5,492.1	100	5,282.7
Operational Roads² (P_Class = 2 and P_State >=2)	2,239.4	100	2,216.0
Spur Roads³ (P_Class = 3 and P_State >=2)	788.5	100	384.7
Landings⁴ (Estab_Year >=1958)	2,701.5	N/A	2,701.5
Gravel Pits	5.0	100	5.0
TOTAL	12,146.8		10,841.4

¹ Reduction applied aspatially based on 30m road width for mainlines as per Table A-8 in the Lakes TSR2 Information Package.

² Reduction applied aspatially based on 10m road width for operational roads as per Table A-8 in the Lakes TSR2 Information Package.

³ Reduction applied aspatially based on 5m road width for spur roads as per Table A-8 in the Lakes TSR2 Information Package.

⁴ A 2.1% aspatial reduction is used in the Lakes Base Case to simulate the loss of productive area due landings on existing and future harvest blocks.

2.3.3 Natural Treed Non-Productive

Table *Error! Reference source not found.*6 lists the areas that are a reduction from the total productive landbase that are classified as natural treed non-productive.

Table 6. Natural Treed Non-Productive Areas

Description	Gross Area (ha) including overlaps	Percent (%) Reduction	Net Area (ha)
Alpine Forest (NPF_Descr = AF)	69,670.8	100	69,670.8
Treed Non-Productive (NPF_Descr = NP and SPC_1 Is Not Null)	9,047.2	100	9,020.5
TOTAL	78,718.0		78,691.3

2.4 Reductions to Net Productive Landbase

2.4.1 Lands to Which Volume Based Tenure Agreements Cannot be Granted

In the Base Case Scenario 735,888.4 hectares was removed from the net productive landbase as lands to which volume based tenure agreements cannot be granted. The FRPA Implementation Scenario excluded Cheslatta Community Forest and Burns Lake Community Forest from this classification. Therefore a lesser amount of 652,429.4 hectares is netted out.

Table 7 shows the areas to which volume based tenure agreements cannot be granted. These represent a reduction to the net productive landbase. In the FRPA Implementation Scenario Community Forests are considered lands to which volume based tenure agreements **can** be granted. This leaves a forested area where volume based tenure agreements apply of 677,639 hectares in the Base Case and 750,702 hectares in the FRPA Implementation Scenario.

Table 7. Areas to which volume based tenure agreements cannot be granted.

Description	Base Case		FRPA Implementation	
	Gross Area (ha) including overlaps	Net Area (ha)	Gross Area (ha) including overlaps	Net Area (ha)
Indian Reserves (Own1 = 52)	1,959.7	1,108.0	1,959.7	1,108.0
Miscellaneous Leases (Own1 = 99)	67.3	37.8	67.3	37.8
Private Land (Own1 = 40)	70,178.1	42,238.1	70,178.1	42,238.1
Woodlots (Own1 = 77)	24,434.9	22,828.1	24,434.9	22,828.1
Crown Land Not Available for Timber Harvesting (Own1 = 62 and Schedule1 = N)	26.0	1.8	26.0	1.8
Miscellaneous Reserves (Own1 = 69 and Schedule1 = N)	2,118.3	1,703.6	2,118.3	1,703.6
Provincial Parks (Own1 = 63) Includes Tweedsmuir Park and Entiako Protected Area	552,072.5	326,007.2	552,072.5	326,007.2
UREPs (Use and Recreation Enjoyment for the Public) (Own1 = 61 and Schedule1 = N)	1,573.2	1,334.1	1,573.2	1,334.1
Community Forests (Own1 = 101 and Schedule 1 = N)	83,459.0	73,062.9	0	0
TOTAL	735,888.4	468,321.7	652,429.4	395,258.8

2.5 Reductions to Volume Based Tenure Agreement Lands

Table 8 shows the differences in net area reductions to volume based tenure agreement lands between Base Case and FRPA Implementation Scenarios. In only two categories is there a difference in the actual gross areas identified; Old Growth Management Areas (OGMAs) and the Wildlife Tree Retention (WTR) areas. There are differences in the net area removal figures in Table 8 for categories other than OGMAs and WTR. This is due to including Cheslatta Community Forest and Burns Lake Community Forest in the area to which volume based tenure agreements apply in the FRPA Implementation Scenario.

Table 8. Reductions to Volume Based Tenure Agreement Lands

Description	Base Case	FRPA	Base Case	FRPA
	Gross Area (ha)	Gross Area (ha)	Net Area (ha)	Net Area (ha)
Non-Commercial Brush (NF_Descr = NCBR)	4,111.2	4,111.2	2,295.7	2,581.0
Non-merchantable Forest Types	74,279.7	74,279.7	34,138.6	39,018.6
Low Productivity Sites	69,156.2	69,156.2	4,301.4	4,301.4
Environmentally Sensitive Areas	36,440.6	36,440.6	21,912.4	25,716.8
Inoperable Areas	2,808.0	2,808.0	38.0	38.0

Description	Base Case	FRPA	Base Case	FRPA
	Gross Area (ha)	Gross Area (ha)	Net Area (ha)	Net Area (ha)
Recreation Areas	4,839.8	4,839.8	2,058.9	2,532.3
Riparian Management Areas	63,814.3	63,814.3	27,369.5	29,123.2
Old Growth Management Areas	0	61,489.2	0	44,155.8
Wildlife Tree Retention	43,883.8	74,582.4	26,690.8	28,805.2
Mountain Goat Habitat Access Management	6,601.7	6,601.7	1,471.3	2,504.8
TOTAL	305,935.3	398,123.1	120,276.6	178,777.1

2.5.1 Non-Commercial Cover

Non-commercial cover is identified in the forest cover inventory where the non-forested descriptor indicates that an area is either non-commercial or covered with non-commercial brush.

2.5.2 Non-Merchantable Forest Types

The areas of non-merchantable forest types shown in *Table 8* are stands that are accessible and otherwise available for harvesting but are assumed to be non-merchantable due to stand characteristics such as small piece size, incidence of decay, species composition and low stocking. In the Lakes TSA these are deciduous leading stands.

2.5.3 Low Productivity Sites

The low productivity sites identified in the Lakes TSA and shown in *Table 8* are balsam leading stand in inventory type groups 18, 19, or 20 that are more than 250 years old. As in TSR2 Low Productivity Site reductions apply only to stands with no harvest history.

2.5.4 Environmentally Sensitive Areas

Table 8 shows the areas that are a reduction to the volume based tenure agreement lands within environmentally sensitive areas. These are areas with significant non-timber values or fragile or unstable soils, or where there are impediments to establishing a new tree crop, or where timber harvesting may cause avalanches. The percent reductions aspatially applied for this analysis were the same as in TSR2.

- Es1 - Sensitive Soils, High Rating
 - 90% reduction in PSYU #134 and
 - 70% reduction in PSYU #154 and #155
- Ep1 - Areas Where Forest Regeneration is Difficult, High Rating
 - 60% reduction
- Es2 - Sensitive Soils, Moderate Rating
 - 70% reduction in PSYU #134 and
 - 60% reduction in PSYU #154 and #155
- Ep2 – Areas Where Forest Regeneration is Difficult, Moderate Rating
 - 60% reduction

2.5.5 Inoperable

Inoperable lands are defined as such since they are unsuited for timber production now and in the foreseeable future by virtue of their: elevation; topography; inaccessible location; low value of timber; small size of timber stands; steep or unstable soils that cannot be harvested without serious and irreversible damage to the soil or water resources; or designation as parks, wilderness areas, or other uses incompatible with timber production. In the Lakes TSA certain drainages flowing into Sutherland Valley with high soil hazard for slope stability and erosion were delineated as inoperable/inaccessible areas. These occur in Planning Cells B011, B012, and B013 and are aspatially reduced by 70%.

2.5.6 Recreation Areas

Recreation areas are removed in the volume based tenure agreement lands. These reductions are consistent with TSR2 and whether the rating is high or moderate the aspatial reduction is 90%

- Er1 - Recreation Area, High Rating.
 - 90% reduction
- Er2 – Recreation Area, Moderate Rating
 - 90% reduction

2.5.7 Riparian Management Areas

The process for creating the riparian layer for the IFPA was extensive, involving a number of data sources including Forest Cover, TRIM, PEM/TEM mapping and digital orthophotos. The intent of this process was to capture all lakes, rivers and wetlands that exist in the Lakes TSA so that they were adequately inventoried and accounted for in various IFPA projects. These riparian areas were then classified and buffered according to provincial standards. For a detailed review of the steps used to develop the riparian features, refer to Appendix 7.

Table 8 shows the gross and net area reduction to volume based tenure agreement lands within riparian management areas (RMAs). RMAs are areas of a width defined in the operational planning regulation that is adjacent to a stream, wetland or lake with a riparian class of L2, L3 or L4; and, consists of a riparian management zone and, depending on the riparian class of the stream, wetland or lake, a riparian reserve zone. The following areas were 100% removed from the THLB: 50m reserve zone on S1 rivers, 30m reserve zone on S2 streams, 20m reserve zone on S3 streams, 10m reserve zone on lakes between 5 and 1000 ha, 10m reserve zone on W1 wetlands, 10m reserve zone on W5 wetlands, 20m management zone on S1 rivers, and 20m management zone on S2 streams. The gross area is the same in both scenarios, but the net area reduction is larger in the FRPA Implementation scenario due to the inclusion of community forests.

2.5.8 Old Growth Management Areas

Old Growth Management Areas were not netted from the THLB in the Base Case, but they were netted from the THLB in the FRPA Implementation Scenario. At the time the Base Case Scenario was conducted the OGMAs were still considered candidate areas. By the time the FRPA Implementation Scenario was conducted the boundaries of OGMAs in the Lakes South Sustainable Resource Management Planning (SRMP) area were defined. The Lakes South planning area includes six landscape units (Francois East, Francois West, Cheslatta, Ootsa, Intata, and Chelaslie). The gross land area of these OGMAs is 61,489 hectares and the net area removed in the ordered net-down is 44,156 hectares. Delineation of OGMAs in the northern landscape units is currently underway.

2.5.9 Wildlife Tree Retention

Table 8 shows the areas reductions to the volume based tenure agreement lands due to wildlife tree retention (WTR). In TSR2 a 2% volume reduction was applied to yield curves within the IRM zone to accommodate wildlife tree patches. The method used to calculate WTR was different in the FRPA Implementation Scenario than in the Base Case. Consistent with the intent of TSR2, the Base Case had applied WTP targets using Table A3.1 of the Landscape Unit Planning Guide. Each landscape unit and biogeoclimatic sub-zone combination has a WTP target assigned.

In contrast, for the FRPA Implementation Scenario the WTR reductions were 7% for all harvest blocks, and this was based on Forest Planning and Practices Regulations Section 9.1, and Section 66.1. WTR amounts are applied at the harvest block level.

In both scenarios stand specific forested areas that are reserved from harvest due to other reasons including riparian areas, recreation areas, environmentally sensitive areas, inoperable, non-merchantable forest types, and low productivity sites contribute to the gross WTR requirement. The remaining area required for WTR within blocks is applied as an aspatial reduction to the block’s THLB area. These areas are retained on harvest blocks as stands are harvested.

2.5.10 Mountain Goat Habitat Access Management

Mountain goat habitat was not modeled in TSR2. In the IFPA Lakes TSA Base Case, LRMP Goat habitat zones management constraints are being modeled. These constraints include a 200m no-road buffer applied around LRMP goat habitat zones, and a 600m no-new-road buffer applied around the 200m no-road buffer. In the Lakes IFPA, the Tesera Scheduling Model incorporates a road network that includes projected locations of future roads. To prevent future roads from being activated or “built”, areas accessed by future roads within mountain goat habitat zones and within the buffers described were netted from the THLB.

2.6 Future Reductions

Future Reductions to the landbase include; conversion of forested areas to agriculture uses and reductions due to projected future roads. Table 9 illustrates the 0.1% change in the total area of these future reductions between the FRPA Implementation Scenario and the Base Case.

Table 9. Comparisons of Future Area Reductions

Classification	Gross Area (ha)	Base Case	FRPA
		Net Area (ha)	Net Area (ha)
Conversion to Agriculture Areas	2,010.1	1,596.5	1,236.9
Deforested Lands for Timber Harvesting and Forest Management	25,010.7	9,549	9,902
TOTAL	27,020.8	11,146	11,139

2.6.1 Conversion of THLB to Agricultural Uses

In TSR2, 50 hectares per year was harvested and permanently removed from the THLB over a period of four decades. In the Base Case 2,010 hectares gross forested area was set aside for the same program of conversion, but following the ordered net-down only 1,597 hectares of THLB remained. Within the

FRPA Implementation Scenario, the assumptions did not change, however the THLB area involved decreased to 1,237 hectares due to the including some of the area for conversion within OGMAs. This area does not overlap with recreation areas, backcountry lake buffers, or deer habitat. *Table 9* summarizes the THLB area converted to agricultural land.

2.6.2 Future Roads, Trails, Landings (Deforested Lands for Timber Harvesting and Forest Management)

In TSR2 an estimate of 5.24% was used to reflect the loss of productive forestland to existing and future roads, trails and landings. The assumptions around deforested lands for timber harvesting and forest management in the future are the same in both the Base Case and the FRPA Implementation Scenario and are more spatially explicit. Tesera Systems Inc. used a **Linear Feature Projection Model (LFPM)** to develop the future road network required to access the entire Lakes TSA. LFPM is typically used to delineate road networks into currently unaccessed regions within a landbase through the use of an existing road network and identified flow control points (e.g. mill sites). Only those polygons with roads running through them have roads reductions taken. The road length and road width associated with the different classes of roads (see *Table 10*) are multiplied to calculate a roaded area, which is subtracted from the productive area of the polygon when the road is “built” in the modeling environment. No future landings are modeled as it is assumed that these road side processing will occur or that future landings will be rehabilitated.

Table 10 indicates a larger amount of area to be converted to future roads in the FRPA Implementation Scenario. This is due to including the two community forests in areas to which volume based tenure agreements apply.

Table 10 summarizes the future reductions from the current THLB that will be deforested due to timber harvesting and forest management activities in the Base Case. The net area figures are slightly different for the FRPA Implementation Scenario, but are not summarized here.

Table 10. Future Roads, Trails and Landings

Description	Gross Area (ha)	Road Width	Net Area (ha)
Future Mainline Roads (P_Class = 1 and P_State = 1)	5,793.0	30m	1,043.2
Future Operational Roads (P_Class = 2 and P_State = 1)	11,568.0	10m	4,566.4
Future Spur Roads (P_Class = 3 and P_State = 1)	7,649.7	5m	3,940.0
TOTAL	35,082.7		18,790.7

3.0 Growth and Yield

The underlying growth and yield assumptions used for this Timber Supply Analysis follow the standard BC Ministry of Forests (BCMoF) protocol. Growth and yield projections were obtained using the Variable Density Yield Prediction (VDYP) and Table Interpolation Program for Standard Yields (TIPSY) based on the TSR2 data inputs and assumptions for the Lakes TSA. A detailed description of how growth and yield information was compiled and used in the analysis is contained in the attached growth and yield reports that have been submitted and approved by the BC Ministry of Forests (Appendices 3, 4, and 5).

Non recoverable losses associated with the current mountain pine beetle epidemic were implemented as yield curve adjustments. See Appendix 6 for details on the source data and methods used.

3.1 Volume exclusions for mixed species stands

In TSR2, all deciduous species were excluded from the estimation of volume in coniferous-leading stands. Consistent with TSR2 all secondary and lower deciduous volumes were deducted from the existing stand volume estimates.

3.2 Regeneration Delay

In TSR2, the regeneration delay of zero years was applied to all analysis units, except Douglas-fir and balsam where a one year regeneration delay will be applied. The IFPA Lakes TSA Base Case and FRPA Implementation Scenarios regeneration delays are consistent with those used in TSR2.

3.3 Yield Curve Development

Table 11 identifies the source of the different curve types for the Base Case and FRPA Implementation Scenarios.

Table 11. Yield Curve Data Sources for Base Case and FRPA Implementation Scenarios

Curve Type	Base Case	FRPA Implementation
Existing Natural	Base Case	Forest Productivity
Existing Natural - MPB Adjustments	Base Case	Base Case
Existing Managed	Base Case	Forest Productivity
Future Managed	Base Case	Forest Productivity with new species mix
Recovery / Succession	Ecosystem - initiate recovery from age zero at year 20	Ecosystem - initiate recovery using Volume Matching

3.3.1 Base Case Yield Curves

The details of the yield curves used in the Base Case are documented in Appendix 3, 4 and 6. Appendix 3 describes the development of the curve sets for the Base Case existing natural, existing managed and future managed stands.

Significant modifications were applied to the entire existing natural inventory provided it was at least 60 years of age and contained some component of lodgepole pine. These beetle curve adjustments are detailed in Appendix 6. These modified curves were used in both the Base Case and the FRPA Implementation Scenarios.

Stands depleted by MPB to a level below the merchantable threshold of 140 m³/ha were allowed to recover along succession pathways. This is true for both the Base Case and the FRPA Implementation

Scenario. However, the mechanism initiating recovery is different in the two scenarios. The following section explains the difference.

Appendix 4 describes the development of the Ecosystem scenario curves that were used as recovery curves following the MPB epidemic in both the Base Case and FRPA Implementation Scenarios. All of these recovery curves or succession pathways are natural stand yield tables developed using VDYP.

3.3.2 FRPA Implementation Scenario Yield Curves

In the FRPA Implementation Scenario the existing managed, future managed and existing natural curves are the Forest Productivity curves described Appendix 5. The exception is that the beetle adjusted curves from Base Case were applied to the existing natural inventory wherever stands were at least 60 years old and contained susceptible pine.

In the Forest Productivity curves, future managed stand site indices are principally taken from SIBEC; whereas, in the base case they were taken from the forest cover and some site index adjustments were applied. Also, first generation genetically improved stock is incorporated in future managed stand yield curve generation.

Adjustments were made to the species components of future Future Managed Forest Productivity Curves for the FRPA Implementation Scenario. The future managed stand yield curves were adjusted to use an increased spruce component and decreased pine component. The intent here was not to reduce beetle hazard, but to improve mean annual increment and thus improve recovery. *Table 12* summarizes the adjustments made.

Table 12. Future Managed Curve Species Adjustments for FRPA Implementation Scenario

Forest Productivity										FRPA Implementation									
Spp1	Spp2	Spp3	Spp4	Spp5	Spp1 %	Spp2 %	Spp3 %	Spp4 %	Spp5 %	Spp1	Spp2	Spp3	Spp4	Spp5	Spp1 %	Spp2 %	Spp3 %	Spp4 %	Spp5 %
PL	AT	SX	ACT	0	65	21	11	3	0	SX	PLI	0	0	0	60	40	0	0	0
PL	AT	SX	ACT	0	78	14	7	1	0	SX	PLI	0	0	0	60	40	0	0	0
PL	SX	AT	BL	0	79	12	7	2	0	SX	PLI	AT	ACT	EP	50	34	12	2	2
PL	SX	AT	BL	ACT	65	16	15	2	1	SX	PLI	AT	0	0	50	32	18	0	0
PL	SX	BL	A	ACT	70	15	9	5	1	SX	PL	0	0	0	60	40	0	0	0
PL	SX	BL	ACT	AT	43	33	11	8	5	SX	PLI	AT	ACT	BL	55	37	5	2	1
PL	SX	BL	ACT	AT	46	34	11	6	3	SX	PLI	AT	ACT	BL	55	37	5	2	1
PL	SX	BL	AT	0	52	35	11	2	0	SX	PLI	BL	ACT	AT	55	37	4	2	2
PL	SX	BL	AT	0	80	7	7	6	0	SX	PLI	0	0	0	60	40	0	0	0
PL	SX	BL	AT	ACT	41	37	13	7	2	SX	PL	0	0	0	60	40	0	0	0
PL	SX	BL	AT	ACT	65	16	11	7	1	SX	PLI	AT	ACT	EP	50	34	12	2	2
PLI	AT	SX	0	0	76	18	6	0	0	SX	PLI	AT	0	0	50	32	18	0	0
PLI	AT	SX	0	0	77	16	7	0	0	SX	PLI	AT	0	0	50	34	16	0	0
PLI	AT	SX	ACT	EP	73	12	10	2	2	SX	PLI	AT	ACT	EP	50	34	12	2	2
PLI	SX	ACT	BL	AT	55	37	5	2	1	SX	PLI	ACT	BL	AT	55	37	5	2	1
PLI	SX	BL	AT	ACT	59	34	4	2	1	SX	PLI	AT	ACT	BL	55	37	5	2	1
SX	PL	AT	0	0	54	39	7	0	0	SX	PLI	AT	0	0	50	33	17	0	0
SX	PL	AT	ACT	EP	38	29	15	9	5	SX	PL	0	0	0	60	40	0	0	0
SX	PL	AT	BL	ACT	40	27	24	5	4	SX	PLI	AT	0	0	50	34	16	0	0
SX	PL	AT	BL	ACT	54	28	9	7	2	SX	PLI	ACT	BL	AT	55	37	5	2	1
SX	PL	AT	BL	ACT	54	28	9	7	2	SX	PLI	AT	ACT	BL	55	36	5	2	2

3.4 Succession

In the Base Case Scenario, beetle attacked stands not harvested before the volume falls below the merchantability threshold of 140 m³/ha begin to regenerate on natural stand yield curves.

In the Base Case, recovery of MPB depleted stands along succession pathways began at 20 years into the planning horizon. Stands are assumed to regenerate from an age of zero. The implications of this are that all residual live volume was lost and that stands are set back to an early seral stage. Due to the large scale of the MPB epidemic and preponderance of pine, large areas of forest were “locked-down” due to early seral constraint binding. This effect contributed to the depth of the harvest trough.

In the FRPA Implementation Scenario, recovery of MPB depleted stands along succession pathways begins at an age when the volume of the recovery curve “matches” that of the depleted curve being left behind. The two curves were assumed to have matching volumes if the volume difference was less than 20 m³/ha. Succession in the FRPA Implementation Scenario begins on average 45 years into the planning horizon, and the average age of stands after succession has occurred is 60 years.

This “volume-matching” approach allowed stands to retain some older seral characteristics and all their residual live volume. This approach avoided the widespread binding of early seral constraints that occurred in the Base Case. It also advanced the recovery of depleted stands.

3.5 Decreased Stump Height

A Babine EFMPP study revealed that a 15cm reduction in stump height (i.e. 30cm to 15cm) resulted in 2% increase in volume. TIPSYS and VDYP do not allow stump heights other than 30cm to be modeled. Therefore, a 2% increase to volume curves is applied in the scenario.

4.0 Protection

4.1 Unsalvaged Losses

In both the Base Case and the FRPA Implementation Scenario fixed unsalvaged losses amounts were used that correspond with those used in TSR2. In the short term MPB losses are accounted for using yield curve adjustments (see Appendix 6). These are based on Marvin Eng’s Mountain Pine Beetle project for BC. After the first 25 years the fixed unsalvaged loss amounts for MPB resumed as these are designed to represent endemic infestation levels. *Table Error! Reference source not found.13* shows the unsalvaged losses used for the first 25 years of the planning horizon. The unsalvaged loss amounts shown in *Table 14* were used for the rest of the planning horizon,

Table 13. Unsalvaged Losses (First 25 Years)

Description	Annual Unsalvaged Loss (m ³ /year)
Fire	2,819
Wind	18,357
Insects (MPB)	0
TOTAL	21,176

Table 14. Unsalvaged Losses (Remainder of Planning Horizon)

Description	Annual Unsalvaged Loss (m ³ /year)
Fire	2,819
Wind	4,000
Insects (MPB)	10,800
TOTAL	31,976

5.0 Integrated Resource Management

A number of non-forest resource management objectives have been expressed as a need to maintain specified forest cover structures. These forest cover requirements will be used to model various issues including:

- Landscape level biodiversity; and
- Species specific habitat requirements;
- Visual Resources;
- Recreation Resources
- Green up requirements
- Patch size distribution.

5.1 Landscape Level Biodiversity

The following section outlines the forest management assumptions with respect to the forest cover constraints. Seral stage targets under the Base Case Scenario were developed for Biodiversity Emphasis Option areas (BEOs) and Biological Ecosystem Networks (BENs). Additionally, in the FRPA Implementation Scenario landscape corridors in the Lakes South SRMP landscape units are modeled.

5.1.1 Seral Stage Requirements in BENs

During the Lakes LRMP, BENs were created as part of landscape-level habitat connectivity strategies. They are meant to maintain and enhance habitat connectivity at the landscape level across the Lakes District planning area to provide opportunities for the distribution of species, populations and genetic material. Their geographic extent and associated seral targets are in place for both the Base Case and the FRPA Implementation Scenario. There are 4 categories of BEN: General (BEN GEN), Strong Link Deciduous (BEN SLD), Strong Link Moose (BEN SLM), and Strong Link Caribou (BEN SLC). In each of these BEN classes, at least 70% of the crown forested areas must be maintained in a mature seral stage (See *Table 15*). Mature forest is >100 years for SBS and > 120 for ESSF.

In TSR2, BENs were not modeled. However, other forest cover requirements were in place to manage wildlife habitat areas and migration corridors. These requirements prescribed maximum allowable disturbance levels area as a percentage of the entire forest land base.

Table 15. Base Case Forested Area within BENs

Landscape Unit	Crown Forested Area within BEN GEN	Crown Forested Area within BEN SLD	Crown Forested Area within BEN SLM	Crown Forested Area within BEN SLC
FLEMING	2,509.07	2,056.39	5,113.89	0.00
BABINE WEST	4,660.78	5,075.93	5,397.95	52.67
BABINE EAST	3,321.78	7,798.31	9,826.97	206.01
BULKLEY	5,522.04	5,672.52	7,736.56	0.00
TALTAPIN	8,214.73	1,441.83	4,376.57	0.00
BURNS LAKE WEST	3,544.54	4,070.28	4,868.19	0.00

Landscape Unit	Crown Forested Area within BEN GEN	Crown Forested Area within BEN SLD	Crown Forested Area within BEN SLM	Crown Forested Area within BEN SLC
BURNS LAKE EAST	3,528.45	11,706.71	14,461.15	0.00
FRANCOIS WEST	2,097.24	13,761.15	13,091.83	0.00
FRANCOIS EAST	1,558.16	7,833.25	9,934.18	0.00
OOTSA	1,443.38	6,170.41	5,961.57	0.00
CHESLATTA	9,385.22	8,669.62	13,918.55	0.00
INTATA	5,718.83	4,342.96	6,587.10	222.16
CHELASLIE	16,718.43	3,819.68	4,013.29	4,544.93
TETACHUK ENTIAKO	8,907.77	1,242.81	2,906.43	13,083.58

5.1.2 Seral Stage Distribution in BEOs

Landscape units and their associated Biodiversity Emphasis Options were approved through the LRMP. BEO targets were assigned as recommended in the *Landscape Unit Planning Guidebook (TableError! Reference source not found. 16)*. The Base Case Forested Area assessed within each BEN class is shown in *TableError! Reference source not found. 16*. These targets were also in place in TSR2. There is no difference in these targets between Base Case and FRPA Implementation Scenarios, however the assessment area increased in those landscape units that have community forests within them.

Table 16. Seral Stage Assessment Units and Targets

Landscape Unit	BEO	BEC Zone	Early Seral Age Threshold (yrs)	Maximum Percent of Forested Area Required in Early Seral	Old and Mature Seral Age Threshold (yrs)	Minimum Percent of Forested Area Required in Old and Mature Seral	Old Seral Age Threshold (yrs)	Minimum Percent of Forested Area Required in Old Seral	Base Case Forested Area (ha)
BABINE EAST	Intermediate	ESSF	40	36	120	28	250	9	12,576
BABINE EAST	Intermediate	SBS	40	54	100	23	140	11	31,228
BABINE WEST	Low	ESSF	no target	no target	120	14	250	9	14,772
BABINE WEST	Low	SBS	no target	no target	100	11	140	11	44,552
BULKLEY	Intermediate	ESSF	40	36	120	28	250	9	16,085
BULKLEY	Intermediate	SBS	40	54	100	23	140	11	51,560
BURNS LAKE EAST	Low	ESSF	no target	no target	120	14	250	9	11,466
BURNS LAKE EAST	Low	SBS	no target	no target	100	11	140	11	71,320

Landscape Unit	BEO	BEC Zone	Early Seral Age Threshold (yrs)	Maximum Percent of Forested Area Required in Early Seral	Old and Mature Seral Age Threshold (yrs)	Minimum Percent of Forested Area Required in Old and Mature Seral	Old Seral Age Threshold (yrs)	Minimum Percent of Forested Area Required in Old Seral	Base Case Forested Area (ha)
BURNS LAKE WEST	Low	ESSF	no target	no target	120	14	250	9	1,734
BURNS LAKE WEST	Low	SBS	no target	no target	100	11	140	11	58,508
CHELASLIE	High	SBS	40	40	100	34	140	16	23
CHESLATTA	Intermediate	ESSF	40	36	120	28	250	9	9,013
CHESLATTA	Intermediate	SBS	40	54	100	23	140	11	95,507
FLEMING	Intermediate	ESSF	40	36	120	28	250	9	10,644
FLEMING	Intermediate	SBS	40	54	100	23	140	11	39,195
FRANCOIS EAST	Low	ESSF	no target	no target	120	14	250	9	4,135
FRANCOIS EAST	Low	SBS	no target	no target	100	11	140	11	67,669
FRANCOIS WEST	Intermediate	ESSF	40	36	120	28	250	9	3,911
FRANCOIS WEST	Intermediate	SBS	40	54	100	23	140	11	64,683
INTATA	Intermediate	ESSF	40	36	120	28	250	9	393
INTATA	Intermediate	SBS	40	54	100	23	140	11	20,119
OOTSA	Intermediate	SBS	40	54	100	23	140	11	22,159
TALTAPIN	Low	ESSF	no target	no target	120	14	250	9	21,099
TALTAPIN	Low	SBS	no target	no target	100	11	140	11	47,818

5.1.3 Lakes South SRMP Landscape Corridors

In the Base Case, the landscape corridors identified in the Lakes South SRMP were not modeled. However, in the FRPA Implementation Scenario these mature seral constraints were in place. The requirement from the Lakes South SRMP was to maintain a minimum of 70 % of the crown forested area within these landscape corridors in a mature state. In the SBS, stands are considered mature when they are at least 70 years old. And in the ESSF stands must be a minimum of 100 years to contribute to the target. In total, 95,700 hectares CFA and 60,100 hectares THLB were subject to these constraints in the FRPA Implementation Scenario.

5.2 Species specific habitat requirements

5.2.1 Seral Stage Requirements in Caribou Migration Corridors

Consistent with TSRII, early and mature seral stages are applied as forest cover constraints, i.e., aspatially. These requirements were consistent in both the Base Case and the FRPA Implementation Scenario. 17 illustrates the management strategy for Caribou Winter Range areas. The specifications for these constraints did not change from the Base Case to FRPA Implementation Scenario. However, the

assessment areas did change due to the changes in net down assumptions described in Section 2 of this document. Only the Base Case areas are shown in *Table 17*.

Table 17. Seral Stage Requirements in Caribou Migration Corridor

Tweedsmuir Caribou Migration Corridor (CMC)	Crown Forested Area	Current THLB	Min % of Forested Area greater than 140 years of age	Min % of Forested Area greater than 80 years of age	Max % of Forested Area less than 40 years of age	Max % of THLB below 5m
High Value CMC Chelaslie ESSFmc	19,804	17,030	40	60	25	2
High Value CMC Chelaslie SBSdk	11,782	9,004	40	60	25	2
High Value CMC Chelaslie SBSmc2	29,075	24,066	40	60	25	2
Moderate Value CMC Tetachuk / Entiako SBPSmc	10,433	0	30	45	40	
Moderate Value CMC Tetachuk / Entiako SBSdk	8,574	0	30	45	40	
Low Value CMC Tetachuk / Entiako ESSFmc	305	0	20	30	54	
Low Value CMC Tetachuk / Entiako SBPSmc	4,765	0	20	30	54	

5.2.2 Seral Stage Requirements for Specified Wildlife

Table 18 illustrates the habitat preservation requirements for specified wildlife. These requirements are designed to preserve and enhance winter range habitat for these species. These requirements did not change between the Base Case and FRPA Implementation Scenarios. However, Crown Forested Area (CFA) may have increased in those landscape units with community forests. Only the Base Case CFA and THLB figures are shown in *Table 18*.

Table 18. Habitat Preservation for Specified Wildlife

Habitat Type	Base Case Crown Forested Area	Current THLB	Min% of Crown Forested Area above specified age	Max % of THLB below specified height
Mountain Goat	1,290	307	N/A	(5m) 5%
Grizzly Bear	10,920	1,272	(120yrs) 50%	(5m) 33%
Moose Winter Range	295,683	152,234	(120yrs) 30%	(3m) 33%
Deer Winter Range	6,455	1,385	(100yrs) 50%	(5m) 33%

5.3 Visual Resources

A visual landscape inventory was completed for the Lakes TSA, and the denudation target for each VQC is consistent with the LRMP recommendations and TSR2. The viewscape management zones are extensive and the associated maximum denudation factors are constraining. As a result, viewscape management has a significant impact on the scheduling of harvest operations and the associated yields obtained from harvesting operations. This is particularly true in the Base Case. However, in the FRPA Implementation Scenario, the maximum denudation levels within scenic areas were adjusted using plan to perspective ratios.

5.3.1 Base Case Visually Sensitive Area Requirements

Under the Base Case Scenario, all visually sensitive units (VSUs) are managed using a clearcut silviculture system. Consistent with TSR2 and the Lakes LRMP, within each visually sensitive unit maximum denudation limits are set. For partial retention VQO polygons in scenic areas, no more than 12.6% of the forested area may be less than the visually effective green-up (VEG) height at any time. For partial retention VQO polygons in visually sensitive areas, no more than 10.7% of the forested area may be less than VEG height. Within retention VQO polygons in scenic areas, no more than 3.4% of the forested area may be less than VEG height. Within retention VQO polygons in visually sensitive area, no more than 2.3% of the forested area may be less than VEG height. There are no preservation VSUs in the Lakes TSA, and there are no targets set for modification VSUs in the TSA.

To ensure harvest opportunities exist within each VSU, the size of blocks delineated within each polygon was rationalized to the denudation targets¹ set by VQC (*TableError! Reference source not found. 19*). This was done to ensure that the scheduling model has an option to clearcut at least one block in each VSU polygon without violating denudation targets and thereby preventing a VSU polygon from being isolated from any harvest opportunity.

Table 19. Percent Denudation Targets for Visually Sensitive Units.

Visually Sensitive Unit	Scenic Area	Recommended Visual Quality Class	Maximum Forested Area Allowed Below Visually Effective Green-up Height	Base Case Crown Forested Area	Number of VQC Polygons in Class
Partial Retention Visually Sensitive Area	No	PR	10.70%	28,987	262
Retention Visually Sensitive Area	No	R	3.40%	6,252	11
Partial Retention Scenic Area	Yes	PR	12.60%	163,622	333
Retention Scenic Area	Yes	R	2.30%	55,488	127

¹ Denudation targets specify the maximum area permitted to be below the visually effective green-up height (VEG) at any time for each VSU. The VEG height represents the average height trees must achieve so that alterations to forest cover due to disturbances are no longer visible from selected viewpoints.

Research has found that tree height alone cannot adequately be used to determine visually effective green-up (VEG) height since the ability of trees to restore the viewscape to pre-disturbance condition is also dependant on slope. On flat ground, VEG may be achieved when trees achieve 3-metres in height, while it may take an 8.5-metre tree to achieve VEG on a 60% slope. *Table 20* outlines the VEG heights for each VSU to be used for the Base Case analysis.

Table 20. Visually Effective Green-up for Scenic Areas

VQO: Retention									
slope (%)	0	10	20	30	40	50	60	70	80+
tree ht (m)	3.5	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0+
VQO: Partial Retention in Scenic Areas									
slope (%)	0	10	20	30	40	50	60	70	80+
tree ht (m)	3.0	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5+
VQO: Partial Retention in Visually Sensitive Areas									
slope (%)	0	10	20	30	40	50	60	70	80+
tree ht (m)	3.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0+

Slope classes were derived from the DEM generated for the Lakes TSA and tree height will be tracked for each stand using natural and managed stand height over age curves² input into the Tesera Scheduling Model. VEG height will be specified by slope class and the denudation percent will be calculated and tracked for each of the 733 VSU polygons delineated under the VLI. The assessment area in each VSU will be based on the area considered forested in each polygon. All managed stands will be considered sufficiently stocked to achieve VEG once the regeneration delay period has expired.

5.3.2 FRPA Implementation Scenario Visually Sensitive Area Requirements

This scenario models the use of a plan to perspective VQO depletion adjustment, which increases the allowable disturbance within VQOs (*Table Error! Reference source not found.21*). These adjustments are based on methods outlined in a Forest Service Bulletin from December 12th, 2003 entitled ‘Modelling Visuals in TSR III’. This document is Appendix 8.

Table 21. Allowable Disturbance Parameters for VQO Depletion Adjustment

	Base Case Allowable Disturbance	FRPA Implementation Scenario Allowable Disturbance
Visually Sensitive Area Retention	2.3	9.1
Visually Sensitive Area Partial Retention	10.7	45.3
Scenic Retention Area	3.4	13.3
Scenic Partial Retention Area	12.6	49.6

² Note that both TIPSYP and VDYP only report the top height of the stand at a particular age and not the average height which is recommend for assessing VEG. Since top height reflects the average height of the 100 trees within a stand of largest diameter at breast height, use of this measure may result in more rapid achievement of VEG than if average height was used.

5.4 Recreation Resources

5.4.1 Backcountry lakes

Consistent with TSR2, certain recreation resources were identified within the landbase and netted out of the THLB as shown in *Table 8* “Reductions to Volume Based Tenure Agreement Lands”.

In TSR2, a forest cover requirement to meet VQO objectives, was applied to backcountry lake areas. Consistent with TSR2, no more than 2% of the Crown forested area of any backcountry lake polygon may be below 7m in height at any time. Also, no permanent roads are allowed in backcountry lake zones.

Recreation Areas

Consistent with TSR2 and the LRMP, no more than 7.5% of the Crown forested area of any recreation polygon may be below 5m in height at any time. Additionally, no permanent roads are allowed within in these zones:

Augier Lava Dome, Boo Mountain / Fish Lakes, Kager Star Lake, Nourse-Allin-Maxan Trail, Eagle Creek Opal Beds, Moose Lake, Nez Lake East, Taltapin Lake - Pinkut Creek, China Nose, Burns Lake south, Tchesinkut Lake East, Uncha-Bitna-Knapp Lakes, Takysie Lake, Knox Lake, Guyishton Lake

5.5 Adjacent Cutblock Green-Up

Forest Practices Code maximum cutblock size and green-up constraints are intended to prevent the creation of large aggregated openings, ensure harvests are evenly distributed within and area, and ensure a minimum level of hydrologic, visual and wildlife habitat recovery

In TSR2, a maximum cutblock size was not implemented. Instead, an aspatial forest cover constraint was applied to address green-up constraints. These targets assumed a three pass harvest schedule. As a result, a forest cover constraint was applied stating that no more than 33% of the integrated resource management zone (IRM zone) of the THLB could be less than 3 metres at any one time. The IRM zone is defined as that area outside of scenic areas, visually sensitive areas and areas with specified wildlife habitat preservation constraints.

In the Base Case, and consistent with TSR2 the harvesting constraint associated with green-up adjacency was applied in the IRM zone. A spatially explicit green-up constraint was applied that ensured that a block (maximum 60 hectare) may not be harvested until at least 75% of each adjacent cutblock attains 3-metre height. However, this was not applied in the first 20 years of the planning horizon to allow the creation of larger openings during the MPB epidemic. *Table 22* summarizes the area of the Integrated Resource Management Zone where green-up adjacency applied in the Base Case.

Table 22. Integrated Resource Management Zone where Green-up Adjacency Applies

Description	Base Case Crown Forested Area	Base Case Current THLB
IRM zone	399,444	282,592

Unlike the Base Case, spatially explicit green-up adjacency constraints are not applied in the FRPA Implementation scenario. Instead the seral stage targets and patch targets are used to create an acceptable patch size distribution.

5.6 Patches

Management of patch sizes is intended to reduce the level of fragmentation on the landscape. In TSR2 no patch targets were used as the analysis was conducted aspatially. No patch targets were used in the Base Case either. However, in the FRPA Implementation scenario patch targets were applied to create a desired patch size distribution based on an interpretation of the Lakes South SRMP. This distribution is shown in *Table 23*.

Table 23. Desired Patch Distribution from Lakes South SRMP; Percent of forested area by NDT

Natural Disturbance Type	BEC Subzone	Small Patch	Medium Patch	Large Patch
2	ESSF mc	<40 ha	40 – 80 ha	>80 ha
		30 – 40%	30 – 40%	20 – 40%
3	SBS dk	<40 ha	40 – 250 ha	>250 ha
	SBSmc	10 – 30%	10 – 30%	40 – 80%

The seral stage definitions used for assessing patches are provided in *Table 24*.

Table 24. Seral Classes for Patch Definition

BEC zone	Early	Immature	Mid	Mature + Old
ESSF	<=20	>20 and <=40	>40 and <=120	>120
SBS	<=20	>20 and <=40	>40 and <=100	>100

Patch targets are very computationally intensive to model, so a selective approach was used to attempt to create the desired patch distribution. Analytical forecast indicators showed that in the Base Case the desired patch distribution was achieved over the long term in NDT3 without setting targets. Therefore no patch targets were set for NDT3 areas. In contrast, in the NDT areas a shortage of small patches and excess of medium and large patches was observed throughout the planning horizon. Patch targets were set to increase the amount of area within small patches in the ESSF throughout the TSA.

6.0 Timber Harvesting

6.1 Harvest Flow Policy

The harvest flow policy used in both the Base Case and the FRPA Implementation scenario was to match the AAC uplift for the first five years of the planning horizon, then minimize the depth and duration of the MPB epidemic induced harvest trough before returning to a maximum LTHL that is sustainable as evidenced by non declining THLB growing stock.

6.2 Initial Harvest Rates

The initial harvest rate for the Base Case Scenario was based on the current allowable annual cut of 3.13 million cubic metres per year for first five years set in the Expedited timber supply review in June of 2004.

6.3 Minimum Harvestable Age / Merchantability Standards

The Base Case Scenario and the FRPA Implementation scenario both used the same minimum harvest age definitions that were used in TSR2, MHA is set at the age when stands achieve a minimum volume per hectare (140 m³/ha) and a minimum height of 17.5m (19.5m for old balsam and spruce leading and regenerated balsam leading). Note that these are simply minimum criteria that TSM uses to assess when a stand can be harvested. Stands are often harvested well after MHA is attained depending on forest cover constraints and target harvest levels. Stands may be harvested prior to MHA when the scheduling model must build new roads to access harvest blocks.

6.4 Harvest Rules

The scenarios for the IFPA analysis use a Relative Oldest First harvest rule. Relative age is the number of years past MHA. TSM area weight averages relative age by Treatment Unit (Harvest Block), and applies the queue within the priority classes

6.5 Harvest Priorities

Consistent with TSRII, portions of the agriculture/settlement zone were prioritized in both scenarios to promote agriculture land expansion. Additionally, stands infested by MPB or projected to be infested based on the BC Mountain Pine Beetle Project were prioritized in an attempt to maximize salvage and mitigate the impact of the MPB epidemic on harvesting activities.

6.5.1 Base Case Harvest Priorities

In the Lakes Base Case priorities were set on a worst first basis. At the end of the period for which we have MPB epidemic figures, 2013, for each stand group the difference between the original un-adjusted yield curve and the replacement epidemic adjusted yield curve in cubic metres per hectare was determined. Those stand groups where the difference was greatest became highest priority stands. There were ten of these descending priority classes. Only the existing natural stands containing pine were prioritised.

6.5.2 FRPA Implementation Scenario Harvest Priorities

The approach to harvest priorities used in the FRPA Implementation Scenario can be described as “best of the worst first”. That is, stands with the largest projected beetle related volume losses are high priority and within them more productive stands are higher priority. The intention is to salvage as much of the beetle killed wood as possible before the assumed 5-year shelf life has expired. Within this salvage priority, there is another priority intended to preferentially convert higher productivity sites to managed stands first as these have the potential to provide available timber the soonest. Also, spruce and balsam leading ITG are not being ignored since this priorities scheme is based on pine volume killed amounts. *Table 25* lists the recommended harvest priorities for the Mitigation Scenario.

Table 25. Mitigation Scenario Harvest Priorities

Mitigation Scenario Harvest Priorities 1 through 9			Site Productivity		
			High (SI>18)	Med (12<SI<18)	Low (SI<12)
Beetle Damage	High	>185 m ³ /ha lost	1	2	7
	Medium	>90 and <185 m ³ /ha lost	3	4	8
	Low	<90 m ³ /ha lost	5	6	9

6.6 Harvest Profile

No attempt has been made to harvest the species profile in either scenario.

6.7 Silviculture Systems

The clearcut silvicultural system was used in both scenarios on the entire Lakes TSA area.

Appendix 1 Decision Scenario Netdown Summary Table

FRPA Implementation Scenario

FRPA Implementation Scenario Classification - Community Forests represented as Areas where Land Based Tenure Agreements Apply	Gross Area (ha)	Net Area (ha)	Percent of Gross Area	Percent of Total Productive Area	Percent of Volume Based Tenure Agreement Lands
Lakes District	1,577,480.3	1,577,480.3	100%		
Reductions to Total Land Base					
Unclassified Lands	2,055.8	2,055.8	0%		
Natural Non-Treed Non-Productive	310,445.8	310,445.8	20%		
Total Productive Land Base		1,264,978.7	80%	100%	
Reductions to Total Productive Landbase:					
Deforested Lands for Agriculture and Settlement	29,485.1	29,485.1	2%	2%	
Deforested Lands for Timber Harvesting and Forest Management	12,146.8	10,841.4	1%	1%	
Natural Treed Non-Productive	78,718.0	78,691.3	5%	6%	
Net Productive Land Base:		1,145,961.0	73%	91%	
Lands to which Volume Based Tenure Agreements cannot be Granted (Includes Tweedsmuir Park)	652,429.8	395,258.8	25%	31%	
Forested Area where Land Based Tenure Agreements Apply:		750,702.2	48%	59%	100%
Reductions to Volume Based Tenure Agreement Lands:					
Non-Commercial Cover	4,111.2	2,581.0	0%	0%	0%
Non Merchantable Forest Types	74,279.7	39,018.6	2%	3%	5%
Low Productivity Sites	69,156.2	4,301.4	0%	0%	1%
Environmentally Sensitive Areas	36,440.6	25,716.8	2%	2%	3%
Inoperable	2,808.0	38.0	0%	0%	0%
Recreation Areas (ESA Rec)	4,839.8	2,532.3	0%	0%	0%
Riparian Management Areas	63,814.3	29,123.2	2%	2%	4%
Areas Unavailable due to Economic Constraints	0.0	0.0	0%	0%	0%
Old Growth Management Areas	61,489.2	44,155.8	3%	3%	6%
Wildlife Tree Retention	75,582.4	28,805.2	2%	2%	4%
Mountain Goat Habitat Access Management	6,601.7	2,504.8	0%	0%	0%
Current Timber Harvesting Land Base:		571,925.1	36%	45%	76%
Future Reductions:					
Conversion to Agriculture	2,010.0	1,236.9	0%	0%	0.0
Deforested Lands for Timber Harvesting and Forest Management	25,010.7	9,902.2	1%	1%	1%
Future Timber Harvesting Land Base:		560,786.0	36%	44%	75%

Appendix 2 Base Case Scenario Netdown Summary Table

Base Case Scenario

Base Case Classification	Gross Area (ha)	Net Area (ha)	Percent of Gross Area	Percent of Total Productive Area	Percent of Volume Based Tenure Agreement Lands
Lakes District	1,577,480.3	1,577,480.3	100%		
Reductions to Total Land Base					
Unclassified Lands	2,055.8	2,055.8	0%		
Natural Non-Treed Non-Productive	310,445.8	310,445.8	20%		
Total Productive Land Base		1,264,978.7	80%	100%	
Reductions to Total Productive Landbase:					
Deforested Lands for Agriculture and Settlement	29,485.1	29,485.1	2%	2%	
Deforested Lands for Timber Harvesting and Forest Management	12,146.8	10,841.4	1%	1%	
Natural Treed Non-Productive	78,718.0	78,691.3	5%	6%	
Net Productive Land Base:		1,145,961.0	73%	91%	
Lands to which Volume Based Tenure Agreements cannot be Granted (Includes Tweedsmuir Park)	735,888.4	468,321.7	30%	37%	
Forested Area where Land Based Tenure Agreements Apply:		677,639.3	43%	54%	100%
Reductions to Volume Based Tenure Agreement Lands:					
Non-Commercial Cover	4,111.2	2,295.7	0%	0%	0%
Non Merchantable Forest Types	74,279.7	34,138.6	2%	3%	5%
Low Productivity Sites	69,156.2	4,301.4	0%	0%	1%
Environmentally Sensitive Areas	36,440.6	21,912.4	1%	2%	3%
Inoperable	2,808.0	38.0	0%	0%	0%
Recreation Areas (ESA Rec)	4,839.8	2,058.9	0%	0%	0%
Riparian Management Areas	63,814.3	27,369.5	2%	2%	4%
Areas Unavailable due to Economic Constraints	0.0	0.0	0%	0%	0%
Wildlife Tree Retention	43,883.8	26,690.8	2%	2%	4%
Mountain Goat Habitat Access Management	6,601.7	1,471.3	0%	0%	0%
Current Timber Harvesting Land Base:		557,362.7	35%	44%	82%
Future Reductions:					
Conversion to Agriculture	2,010.0	1,596.5	0%	0%	0.0
Deforested Lands for Timber Harvesting and Forest Management	25,010.7	9,549.6	1%	1%	3%
Future Timber Harvesting Land Base:		546,216.6	34%	42%	79%

Appendix 3 Lakes Base Case Yield Curves Report
(in separate document)

Appendix 4 Lakes Ecosystem Yield Curves Report
(in separate document)

Appendix 5 Lakes Forest Productivity Yield Curves Report
(in separate document)

Appendix 6 Beetle Curve Adjustments

(in separate document)

Appendix 7 Riparian Methodology

(in separate document)

**Appendix 8 Forest Service Bulletin from December 12th, 2003
entitled 'Modelling Visuals in TSR III**

(in separate document)