TIMBER SUPPLY ANALYSIS
INFORMATION PACKAGE

OKANAGAN TREE FARM LICENCE (TFL 49)
MANAGEMENT PLAN NO. 4

Version 8

Prepared for:
Riverside Forest Products Limited
Kelowna, B.C.

Prepared by:
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Attention: Robert Kennett, RPF
Operations Forester

Reference: *TFL 49 MP No. 4 Information Package*

Enclosed please find the final *Information Package* in support of the Management Plan No. 4 Timber Supply Analysis for Riverside's TFL 49. Updates have been made based on feedback from Ministry of Forests and other agencies that submitted comments on the draft report. Also your comments have been addressed in this version. The document has been placed on the Management Plan No. 4 website for viewing by interested parties. A paper copy has been forwarded to MoF Timber Supply Branch in Victoria.

Please call if you have any questions or comments related to the document or any other aspect of the analysis. Thank you for your input during the preparation of the *Information Package*.

Yours truly,
TIMBERLINE FOREST INVENTORY CONSULTANTS LTD.

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DOCUMENT HISTORY

Revision Number	Description	Submitted Date	Submitted By:
1	Initial Outline	August 2002	David Carson
2	First Draft	January 2004	Bill Kuzmuk
3	Submission to MoF	January 2004	Bill Kuzmuk
4	Submission to MoF	February 2004	Bill Kuzmuk
5	Revised version to Riverside	April 2004	Bill Kuzmuk
6	Final submission to MoF	May 2004	Bill Kuzmuk
7	Appendix to Timber Supply Analysis Report	August 2004	Bill Kuzmuk
8	Final submission to MP No. 4	September 2004	Bill Kuzmuk

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1.0 INTRODUCTION

This *Information Package* has been prepared on behalf of Riverside Forest Products Limited (Riverside) as a source document prior to the completion of the timber supply analysis for Management Plan No. 4 (MP No. 4) for the Okanagan Tree Farm Licence (TFL 49). It provides a summary of the inputs and assumptions made in preparing the timber supply analysis data model.

Included are inventory and land base summaries, growth and yield information and management assumptions for timber and non-timber resources as they relate to timber supply. This *Information Package* follows the suggested format outlined in the *Guide for Tree Farm Licence Management Plans (20-month) and Calendar Year Reports* (BC MoF, 2001).

The following options will be modelled in the timber supply analysis:

- *Base Case*, which reflects current management on TFL 49; and
- *Mountain Pine Beetle*, which will review the impact of accelerating the harvest of high risk lodgepole pine stands during the next 10 years.

In addition, a number of sensitivity analyses will also be conducted to test the impact of different assumptions on timber supply for TFL 49. All analysis simulations will be completed using CASH6, Timberline's proprietary forest estate model.

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

Many of the inputs and assumptions included in the timber supply analysis will be based on information provided in the *Okanagan-Shuswap Land and Resource Management Plan* (OS-LRMP; BC MSRM 2001a). Although the guidelines provided in the OS-LRMP are not legislated requirements, they can be considered an agreed to policy for many aspects of the timber supply analysis.

2.0 TIMBER SUPPLY ANALYSIS PROCESS

Traditionally, the preparation of a timber supply analysis in support of a TFL management plan follows the *Guide for Tree Farm Licence Management Plans (20-month) and Calendar Year Reports* (BC MoF, 2001). The information package is submitted to the Timber Supply Forester at Timber Supply Branch 14 months prior to the expiry date of the present management plan for the license.

However, MoF Southern Interior Region has introduced an accelerated schedule. As a result this *Information Package* will be submitted 13 months prior to the expiry of the current Management Plan (MP No. 3). Upon acceptance, the *Information Package* will guide the timber supply analysis, and will be included as an appendix to the timber supply analysis report, which will be submitted by June 1, 2004.

Forest inventory and land base information have been collected in recent field projects and associated mapping updates, as well as from Riverside's existing inventory database. Ministry of Sustainable Resource Management (MSRM) and MoF have also provided land base information that will be used in the analysis.

The *Information Package* will be provided to Atmo Prasad, Timber Supply Forester, MoF Timber Supply Branch for review and acceptance prior to commencing with the timber supply analysis.

In addition to the submission of the *Information Package* to the Timber Supply Forester, growth and yield information will be submitted to the following ministry staff:

- Rob Drummond, Growth & Yield Prediction Specialist, MSRM Vegetation Resources Inventory Branch (natural stand yields tables and forest cover polygon volumes); and
- Mario Dilucca, Growth & Yield Application Specialist, MoF Stand Development Modelling (managed stand yield tables).

2.1 Missing Data

All necessary data is provided in the Information Package.

3.0 TIMBER SUPPLY OPTIONS

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

3.1 Base Case

This option reflects current management performance at August 2003, the date of commencement for the preparation of MP No. 4. The analysis will incorporate the following:

- Vegetation resources inventory (VRI), updated for disturbance to September 1, 2003;
- Phase II VRI inventory adjustment;
- Updated mapping of existing roads, trails and landings;
- Genetic gains from tree improvement;
- Current silviculture regimes;
- Current utilization standards;
- Environmentally sensitive areas (ESAs) for soils and regeneration;
- Cut-blocks from the current Forest Development Plan (FDP), for use in the *20-Year Spatial Feasibility Analysis*;
- Visual management zone 1 and visual quality objectives (VQO) as defined by the OS-LRMP;
- Landscape units as defined by the OS-LRMP;
- Definition of landscape-level biodiversity requirements in accordance with the OS-LRMP;
- Definition of stand-level biodiversity requirements in accordance with the Landscape Unit Planning Guide (LUPG);
- Riparian classifications for streams, lakes and wetlands, updated since MP No. 3;
- Lakeshore management zones defined by the Okanagan Timber Supply Area Lake Classification Project;
- Mule deer winter range (MDWR) zones refined by recent MSRM mapping;
- Resource management zones (RMZs) for Bighorn sheep, mountain goat, and moose as defined in the OS-LRMP; and
- New predictive ecosystem mapping (PEM) of TFL 49.

3.2 Mountain Pine Beetle Option

There is currently a serious outbreak of mountain pine beetle (*Dendroctonus ponderosae*) in the interior of the province. Some of the pine stands within TFL 49 are potential targets for the beetle as it spreads across the Okanagan and Shuswap regions. In this option, the impact of harvesting highly susceptible pine stands during the first 10 years of simulation will be evaluated. Highly susceptible pine stands are defined as:

- A minimum of 40% lodgepole pine;
- At least 80 years of age; and
- Within Block B of TFL 49.

In addition, risk mapping completed by Janis Hodge for Block B will also be considered in determining the high risk pine stands.

3.3 Sensitivity Analysis

Sensitivity analysis is used to assess the uncertainty of assumptions made in the base case. A specific variable is adjusted and the magnitude of the increase and decrease in the sensitivity variable reflects the degree of uncertainty surrounding the assumption associated with that given variable. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most affect results.

Each scenario will be fully documented with respect to the data and assumptions employed. Table 3.1 summarizes the sensitivity issues to be addressed in the analysis. In addition to the scenarios listed in the table, one or more composite sensitivity scenarios may be explored if warranted by the results of the individual sensitivity analyses.

Table 3.1 - Sensitivity analyses

Issue	Sensitivity Levels to be Tested
Land base	Timber harvesting land base ± 5%
Growth and yield	Natural stand yields ± 10% Managed stand yields ± 10% Natural stand minimum harvest ages ± 10 years Managed stand minimum harvest ages ± 10 years Regeneration delays ± 5 years
Resource management	Green-up heights ± 1 metre Non-IRM REA disturbance limits ± 5% IRM REA disturbance limits ± 5% Community watershed disturbance based on current state REA retention limits by ± 5% Community watershed disturbance based on ECA
Biodiversity	Manage TFL as one landscape unit

3.4 Alternative Harvest Flow

A number of different harvest flows will be explored, based on tradeoffs between short and mid-term harvest levels. Forest cover constraints and biological capacity of the timber harvesting land base (THLB) will dictate timber availability and harvest level options.

In all phases of the analysis, the choice(s) of harvest flow will reflect the following objectives:

- Maintain or increase the current harvest level for as long as possible;
- Limit changes in harvest level to less than 10% of the level prior to the reduction; and
- Achieve stability in the long-term harvest level and growing stock profiles.

3.5 Other Options

The 20-Year Spatial Feasibility Analysis (documented under separate cover) is the only additional scenario identified for MP No. 4 at this time.

4.0 FOREST ESTATE MODEL

4.1 Model Description

Analysis simulations in support of MP No. 4 on TFL 49 will be carried out using CASH6 (Critical Analysis of Schedules for Harvesting) version 6.2l, a proprietary timber supply model developed by Timberline Forest Inventory Consultants Ltd. (Timberline). The model uses a geographic approach to land base and inventory in order to adhere as closely as possible to the intent of forest cover constraints on harvesting. Maximum disturbance and minimum forest cover retention requirements are strictly enforced during simulation.

A variable degree of spatial resolution is available depending on inventory formulation and resource emphasis area definitions. Forest stands in refuges such as environmentally sensitive and inoperable areas that do not contribute to the periodic harvest are nonetheless counted for their contribution to forest structure at both the stand and landscape levels.

In their current implementation, forest cover objectives require a control area over which to operate. The control area for a constraint set should correspond to a realistic element in the landscape. For example, the requirements associated with visual quality objectives are designed to operate on the scene visible from discrete sets of viewpoints. Pseudo-geography may be employed to translate spatial constraints on harvesting into forest cover and static access constraints. The objective is to identify the "natural" constituency for forest cover constraints. Numerous levels of land aggregation are used to define both geographically separate areas and areas of similar management regime. CASH6 functionality also includes the capability to model height-based green-up.

A previous version, CASH5, was used for the timber supply analysis in support of MP No. 3. CASH6 differs in a number of ways from its predecessor including:

- Multiple forest cover constraints on areas with overlapping resource concerns;
- Partitioned harvesting using "cliqués" (land base aggregates);
- Relative oldest first harvest rule; and
- Additional reporting functionality.

4.2 Timber Supply Analysis

Timber supply analysis for the 250-year planning horizon will be carried out using CASH6 operating in aspatial mode. In the Base Case, a 400-year time frame will be modelled to ensure complete understanding of the factors influencing timber supply well into the long term.

4.3 20-Year Spatial Feasibility Analysis

Determination of a spatially feasible harvest schedule incorporating all integrated resource management considerations will be undertaken using CASH6 operating in spatial mode for the first 20 years of the planning horizon. Approved blocks from the current FDP will be given the highest priority for harvest. This analysis is fully documented under separate cover.

5.0 CURRENT FOREST COVER INVENTORY

5.1 Base Inventory

All spatial information is registered to the Terrain Resource Inventory Mapping (TRIM), North American Datum (NAD) 83 base. Inventory data has been prepared using the ARC/INFO™ Geographic Information System (GIS). Use of GIS ensures that spatial relationships between the various inventory attributes are maintained throughout the analysis process. For example, existing roads and streams have been buffered to provide specific area reductions from the THLB.

Completed in 2002 to MoF Phase II standards, the TFL 49 vegetation resources inventory provides forest cover attributes in a fully digital spatial format compatible with the provincial inventory database. Colour photography flown in 1994 was used to delineate strata to VRI standards. Non-productive polygons were delineated to 0.5 of a hectare or less. Mapping is on TRIM controlled NAD 83 1:10,000 BCGS base maps and includes a digital terrain model for slope analysis. An air and ground observation program supported classification. Classification was reviewed and approved by MoF staff from the former Kamloops Forest Region.

For the present analysis the VRI has been updated for disturbances to September 1, 2003. The update procedure was an informal process designed only to capture disturbances, and regeneration and silviculture since the 1996 inventory date with sufficient detail to support the MP No. 4 timber supply analysis. This process has not produced a formally updated VRI suitable for any purposes other than this timber supply analysis. Once updated, the inventory attributes were projected for growth to September 1, 2003.

The current inventory consists of timber in several land classes. Timber on the operable but excluded land base is not available for harvesting under the assumptions of the Base Case option. However, this land contributes to forest cover and seral stage requirements for non-timber resources.

5.2 VRI Attribute Adjustment

The phase 1 VRI attribute estimates have been adjusted for this analysis based on correction factors derived from phase 2 ground samples. A detailed description of the VRI phase 2 adjustment procedure is documented in *Vegetation Resources Inventory Phase 2 Adjustment Procedure* (Timberline, 2002). A brief summary is provided in the following paragraphs.

The complete phase 2 sample population consisted of 85 plots, with 67 plots in the mature stratum (81 years of age and older) and 18 plots in the immature stratum (between 60 and 80 years). Merchantable volume estimates were derived from the sample plot data using the loss factor (LF) method. This approach has been shown to result in more accurate merchantable volume estimates than the net volume adjustment factor (NVAF) method (Smith, 2001).

Adjustment factors were determined following VRI standard procedures in the *Fraser Protocol* (BC MSRM, 2001b). It was decided not to adjust attributes within the immature stratum due to unacceptably large sampling errors. Several approaches to stratifying the remaining samples were explored, resulting in the adjustment factors shown in Table 5.1

Table 5.1 - VRI phase II adjustment factors for TFL 49

Stratum		Height Adjustment Factor	Age Adjustment Factor	Residual Volume Adjustment Factor
Maturity	**Leading Species**			
Mature	Pine leading	1.032	1.053	1.033
	Douglas-fir leading	0.906	0.991	1.224
	Others leading	0.994	0.957	1.236

These factors were applied, in a two-step process, to adjust the phase 1 inventory attributes for use in the MP No. 4 analysis. Age and height adjustments were first assigned to the inventory stand values. These revised values were included in the inputs to VDYP for generating individual stand volumes. In addition the volume adjustment factors were applied to the natural stand yield table volumes that will be used in the timber supply analysis.

5.3 Data Sources

Many sources of data were compiled to provide input to the timber supply analysis for TFL 49 MP No. 4. These are documented in Table 5.2. Data was used for three general purposes:

- Netdowns (N) – classification of the land base into non-productive, non-harvesting, and harvesting components;
- TUMs (T), which are treatment units (blocks) for use in the analysis; and
- Resultant (R), which is the final analysis database.

Table 5.2 - Data sources

Description	TFIC Coverage	Source	Date Received	Analysis Use[1]		
				N	T	R
Grizzly Bear RMZ	agbrmz_tok	Riverside	Pre 2003			
Recreation Trails	arectrls_tok	Riverside	Pre 2003			
Red Blue species	areor_bc	MSRM Web Site	Nov 2003			
Creeks Polygon Buffer	creekbuf	TFIC	Oct 2003	Y		Y
Classified Drainage Network	creeks	Riverside	Oct 2003			Y
Kelowna Dirt Bike Club Recreational Area	dirtbikeclub	Riverside	Pre 2003	Y		Y
Forest development plan	fdp	Riverside	Oct 2003		Y	Y
Lakes	lakes_tfl	Riverside	Pre 2003	Y		Y
Landing Polygon Buffer - From roads points LANDX	landbuf	Riverside	Oct 2003	Y		Y
Mule Deer RMZ - Riverside	md_rmz_tok4	Riverside	Oct 2003		Y	Y
Blackwell Lake Management Area	mp4_blackwell	Riverside	Pre 2003		Y	Y
TFL 49 Boundary	mp4_bndy	Riverside - added two small exclusions	Oct. 2003	Y		Y
Water Intake Pipe upstream buffers	mp4_cwpbufup	Timberline created buffer	Pre 2003	Y		Y
Community Watersheds	mp4_cws	Riverside	Pre 2003		Y	Y
Parks - Goal 1	mp4_goal1	Riverside	Pre 2003	Y	Y	Y
Goat RMZ	mp4_goat	Riverside	Pre 2003		Y	Y
Landscape Units	mp4_lu	Riverside	Pre 2003		Y	Y
Moose RMZ	mp4_moose	Riverside	Pre 2003		Y	Y
Natural-Disturbance Type 4	mp4_ndt4	Riverside	Pre 2003			

Description	TFIC Coverage	Source	Date Received	Analysis Use[1]		
				N	T	R
Road Network	mp4_rds	Riverside	Oct 2003	Y	Y	
Recreation Reserves	mp4_recres	Riverside	Pre 2003	Y		Y
Shorts Creeks Area	mp4_shorts	Riverside	Pre 2003		Y	Y
Visual Quality Objectives - Zone 1	mp4_vqozone1	Riverside	Pre 2003		Y	Y
Wetlands	mp4_wetlands	Riverside	Pre 2003	Y		Y
Mule Deer RMZ - LRMP	ok_md	Riverside	Pre 2003			Y
PEM - 2003 (Approved 2002)	pem2	Timberline – Prince George	Oct 2003	Y	Y	Y
Biogeoclimatic Zones	prov_bgc	Timberline - extracted from BEC	Pre 2003			Y
Road Network - Updated to 2003	roads	Riverside	Oct 2003	Y	Y	Y
Ownership (with schedule A/B)	t_own	Riverside	Pre 2003	Y		Y
Recreation Points	t_recpts	Riverside	Pre 2003			
Recreation Trails	t_rectrails	Riverside	Pre 2003			
Wildlife Tree Patches	tfl_wtp	Riverside	Oct 2003	Y		Y
Lake Management Zones	tlmz_tok	Riverside	Pre 2003	Y	Y	Y
Pine Marten	u11hpmarrmztk	Riverside	Pre 2003			
Harvested Blocks - 2003	deplns	Riverside	Dec 2003		Y	Y
Forest Cover (updated to 2003)	mp4_vri	Timberline	Dec. 2003	Y	Y	Y
Small Business Harvest	sbfep	Riverside	Nov 2003			Y
ESAs	t_esa	Riverside	Pre 2003	Y		Y
Forest Inventory Zones	t_fiz	Riverside	Pre 2003	Y		Y
Public Sustaind Yield Units	t_psyu	Riverside	Pre 2003	Y		Y
Sheep RMZ	sheep	LRMP web site	Dec 2003		Y	Y
Elevation bands	elev_bands	Riverside	Jan 2004		Y	Y

[1] N = netdowns, T = TUMs, R = resultant

6.0 LAND BASE DESCRIPTION

This section describes the TFL 49 land base and the methodology used to determine the way in which land contributes to the analysis. Some portions of the productive land base, while not contributing to harvest, may be available to meet other resource needs.

6.1 Timber Harvesting Land Base Determination

Table 6.1 presents the results of the land base classification process to identify the timber harvesting land base (THLB). 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 on the basis of this latter attribute, prior to the riparian classification. Therefore, in most cases the net reduction will be less than the total area in the classification. The order of the entries in Table 6.1 corresponds to the sequence in which the land base classifications were applied.

Table 6.1 - Base Case timber harvesting land base determination

Description	Area (ha)			Net Merchantable Volume ($000m^3$)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	**794**	**143,551**	**144,345**	**88**	**21,126**	**21,214**
Goal 1 parks	0	2,951	2,951		286	286
Non-forest, non-productive	84	7,049	7,133			0
Existing roads & trails	13	1,765	1,778	1	109	110
Existing landings	0	48	48		4	4
Productive forested land base	**697**	**131,738**	**132,435**	**87**	**20,727**	**20,814**
Reductions to the productive forest:						
Non-commercial	0	75	75			0
Recreation reserves	0	306	306		64	64
Deciduous	25	1,170	1,195	1	23	24
Low volume	10	1,091	1,100	1	78	79
Low productivity	0	210	210		5	5
Overstocked pine	0	285	285		37	37
ESAs	4	1,706	1,710		304	304
Riparian reserves	44	3,072	3,116	11	707	718
Wildlife tree patches	0	670	670		163	163
Kelowna Dirt Bike Club	0	11	11		2	2
Current THLB	**614**	**123,142**	**123,757**	**74**	**19,344**	**19,419**
Less future roads	4	726	730			
Plus Kelowna Dirt Bike Club	0	11	11			
Long-term THLB	**610**	**122,427**	**123,038**			

6.1.1 Distribution of Area by Leading Age and Leading Species

Table 6.2 summarizes the distribution of area and coniferous volume by 10-year age class for both the productive and net timber harvesting land base.

Table 6.2 - Age class distribution

Age Class	MoF Age Class	Productive Area (ha)	Productive Volume (1000s m^3)	THLB Area (ha)	THLB Volume (1000s m^3)
1 [(1)]	1	11,609	0	11,394	0
2		13,788	0	13,557	0
3	2	9,428	27	9,124	27
4		3,546	37	3,326	34
5	3	2,252	80	2,147	76
6		4,308	272	3,897	259
7	4	4,913	412	4,742	402
8		6,021	638	5,680	613
9	5	6,040	746	5,673	719
10		7,063	1,149	6,445	1,098
11	6	7,789	1,587	7,170	1,491
12		11,329	2,597	10,717	2,498
13	7	9,101	2,455	8,427	2,287
14		5,008	1,321	4,511	1,201
15	8	2,485	717	2,208	648
16		2,363	570	1,877	493
17		3,387	880	2,806	777
18		2,266	614	2,075	582
19		2,719	814	2,446	753
20		2,297	701	2,063	643
21		7,804	2,611	7,030	2,410
22		1,062	378	1,007	359
23		2,487	892	2,336	837
24		515	198	469	181
25		385	142	339	127
26+	9	2,469	975	2,293	902
Total		**132,435**	**20,815**	**123,757**	**19,419**

- [(1)] Includes NSR

Figure 6.1 summarizes the area of the TFL by 10-year age class.

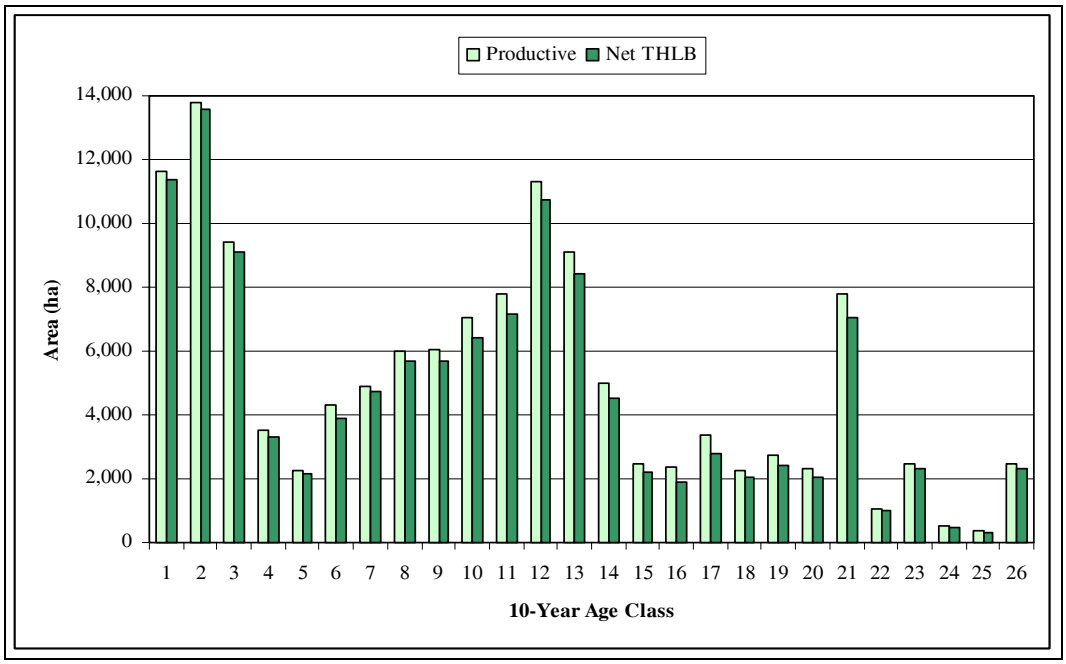

Figure 6.1 - Age class distribution

Table 6.3 summarizes the distribution of area by leading species for both the productive and timber harvesting land base.

Table 6.3 - Leading species distribution

Leading Species		Productive Area	Net THLB
Name	**Code**	**(ha)**	**(ha)**
No species label	N/A	2,979	2,884
Cottonwood	Ac	110	71
Aspen	At	3,266	2,355
Balsam	Bl	16,360	15,659
Cedar	Cw	704	552
Birch	Ep	806	444
Douglas-fir	Fd	35,552	33,042
Larch	Lw	283	280
Lodgepole pine	Pl	53,916	51,700
Yellow pine	Py	645	420
Spruce	Sx	17,814	16,350
Total		**132,435**	**123,757**

6.2 Total Area

The total area of TFL 49 is 144,345 hectares. This is composed of 876 hectares of water, 8,959 hectares of non-forest and non-productive land and 132,435 hectares of productive forest land. TFL 49 is divided into three blocks corresponding to former TFLs that have since been amalgamated. The distribution of area by TFL block is shown in Table 6.4.

Table 6.4 - TFL block productive area

Block	Total Area	Productive Area (ha)	Net THLB (ha)
A	79.305	71.479	66.495
B	51,524	48,310	45,217
C	13,516	12,646	12,045
Total	**144,345**	**132,435**	**123,757**

6.3 Protected Areas

Fintry is now a Goal-1 protected area designated in April 2001. The portion of Fintry that lies within the boundary of TFL 49 is excluded from the THLB. The forested component, 2,226 hectares, is available to meet non-timber resource objectives for wildlife, biodiversity, visual quality, *etc*.

6.4 Non-forest and Non-productive Forest

All land classified as non-forest or non-productive forest, such as lakes, swamps, rock, alpine, *etc*., (coded type identity 6 in the inventory) is excluded from the THLB. This includes road rights-of-way wide enough to be forest polygons. It does not include large hydro rights-of-way in Blocks B and C that were removed as non-TFL land. The specific components of this area reduction are shown in Table 6.5.

Table 6.5 - Non-forest area reductions

Description	Area Removed (ha)
Alpine	1
Rock	1
Gravel pit & gravel bars	13
Non-productive	1,972
Non-productive brush	376
Lakes	876
Rivers	40
Swamps	782
Clearings & meadow	505
Urban	1,214
Open range	1,349
No forest cover inventory available	4
Total	**7,133**

6.5 Roads, Trails and Landings

Forest operations create roads, trails and landings that can reduce the productivity of growing sites, and reduce the area available for growing trees. Reductions to the THLB are made to account for the loss of existing and future productivity associated with these areas. The methodology by which roads, trails and landings constructed during future harvesting operations will be accounted for is described in Section 6.5.2. The reduction made to account for existing roads, trails and landings is described in the following paragraphs.

6.5.1 Existing Roads

Existing roads, trails and landings are frequently too narrow to be identified as polygons in the forest cover (VRI). They have, however, been explicitly mapped for TFL 49 as linear features. Therefore GIS buffering techniques can be used to estimate the land base area made unavailable for forest growth by the roads, trails and landings constructed during past harvesting operations.

The digital inventory of existing roads, trails and landings on TFL 49 has recently been updated for entry into a spatial road information management system (RIMS). During this process recently constructed roads and trails were captured in the inventory, and the geographic location of previously digitized features were updated. However, width measurements for the existing roads and trails were not available from the RIMS database at the time that data was assembled for this *Information Package*.

Buffer widths were estimated as part of the preparation of analysis data for MP No. 3. Riverside staff classified roads and trails into several types and, for each type, estimated the width of the right-of-way made unavailable for productive forest growth. The road classifications and width estimates are shown Table 6.6. For the MP No. 4 analysis, the updated roads and trails from the RIMS database were visually overlaid (using the GIS) on the road buffers created for MP No. 3, and each RIM road or trail segment was assigned the width of the associated MP No. 3 buffer.

Existing landings from the RIMS database (represented as point features) were buffered by using a 25 metre radius, the same assumption as applied in MP No. 3.

Table 6.6 provides a summary of the length, width, and area removed for each category of road.

Table 6.6 - Existing unclassified road area summary

Description	Road Length (km)	Road Width (m)	Total Area (ha)	Area Removed (ha)
BC Ministry of Transportation highway	0.5	20	10	0.6
Secondary roads	0	13	12	7.3
Main logging roads	361	10	361	203
Secondary logging roads	1,615	8	1,293	1,081
Trails	795	6	477	443
Secondary trails	154	3	46	43
Landings (25-metre radius)	N/A	N/A	63	6
Total			**2,262**	**1,826**

6.5.2 Future Roads

TFL 49 does not have complete road access at present. However, as part of the total chance planning (TCP) exercise for TFL 49 MP No. 3 additional roads were identified and incorporated into the TCP data. For use in the MP No. 4 analysis, the TCP road features have been updated by visual comparison to the existing road features from the RIMS database. Satellite imagery dating from February 2001 was used to provide an extra degree of quality control during this procedure. TCP proposed roads that have since been constructed have been deleted as part of the existing road system.

For the current analysis future roads will be estimated using the TCP proposed road area less roads constructed since the MP No. 3 analysis, as follows:

MP No. 3 TCP proposed road area:	974 ha
Roads constructed since MP No. 3 analysis:	-244 ha
MP No. 4 future road estimate:	730 ha

During analysis simulations land will be permanently removed from the THLB to reflect future road development. Over the first 40 years of simulation (four periods) the 730 hectares of future roads will be taken from all harvested stands.

Future road estimates for the MP No. 4 analysis will make no explicit allowance for the loss of productive forest area to future landings, since these areas are assumed to be adequately accounted for by the average 8-metre buffer width applied to the proposed future roads, and by the existing landing sites already removed from the THLB.

6.6 Operability

All of TFL 49 is considered operable except those areas removed for soil sensitivity or other reasons. Consequently, no land base reduction has been made for inoperability or inaccessibility.

6.7 Non-commercial Brush

As part of the VRI process, all land classified as non-commercial in the forest cover inventory database has no commercial tree species. Therefore all 75 hectares of non-commercial area were excluded from the timber harvesting land base.

6.8 Recreation Reserves

There are a total of 1,396 hectares in recreation reserves within the TFL. Of these, 1,091 hectares have been excluded from the THLB according to their membership in other reduction categories while 306 hectares have been removed from the THLB because of their status as recreation reserves. These areas remain in the data set to contribute to non-timber resource objectives but will not be eligible for harvesting during the analysis.

6.9 Non-merchantable Forest Types

Table 6.7 summarizes the criteria by which stands were identified as being non-merchantable, of low productivity, or of deciduous cover. These criteria were applied to the adjusted, updated and projected forest cover inventory attribute values. Stands meeting the indicated criteria have been removed from the THLB.

Table 6.7 - Non-merchantable stands

Problem Forest Type	Leading Species	Inventory Type Group	Site Index [1] or Volume (m^3)	Stocking Class	Age (years)	Productive Area [3] (ha)	Area Removed (ha)
Overstocked pine	pine	28-31	n/a	4	80+	2,487	285
Low productivity [2]	pine	28-31	9.5	n/a	≤100	610	2
	Douglas-fir	1-8, 27, 32	10		≤150	811	140
	balsam	12-20	7		≤150	164	46
	spruce	21-26	6		≤150	210	22
	cedar	9-11	7.5		≤150	31	0
Low volume[2]	pine	28-31	100 m^3/ha	n/a	>100	493	354
	other conifer	1-27, 32-34	100 m^3/ha		>150	993	603
Deciduous [2, 4]	deciduous	35-42	n/a	n/a	No logging history	1,198	1,195
Totals						**6,997**	**2,647**

[1] The site index limit is based on achieving 100m^3/ha (12.5 cm DBH Pl, 17.5cm others) at 100 years for pine, and 150 years for other species.
[2] Not applied where stands have logging history.
[3] Productive area refers to all productive land covered by this classification including other, overlapping classifications.
[4] For stands with a minor deciduous component, deciduous volumes are excluded from the analysis by adjusting the associated VDYP yield curves.

6.10 Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are mapped land units that have special management requirements. In the context of timber supply analysis, management constraints are reflected in the designation of high sensitivity ESAs as non-contributing to harvest. High sensitivity ESA designations exist in the inventory for the following concerns:

- Actual or potentially sensitive or unstable soils;
- Severe regeneration problems caused by geoclimatic factors; and
- Areas having critical importance to wildlife.

A complete summary of the ESAs on TFL 49 is presented in Table 6.8. Deductions are listed in the order in which they are applied. No reductions have been made for moderate ESAs.

Table 6.8 - Area reductions for ESAs

ESA Description	% Reduction	Total TFL Area (ha)	Productive Area (ha)	Area Removed (ha)
High regeneration	100	486	332	302
High soils	100	3,168	1,612	1,408
High wildlife	0	1,419	1,087	0
Total		**5,073**	**3,030**	**1,710**

Forest cover constraints applied to the wildlife resource management zones (RMZs) as defined by the OS-LRMP replace ESAs for wildlife (Ew). Consequently no land base reductions have been made for either highly or moderately sensitive wildlife areas identified in the ESA inventory.

There are no recreation ESA removals. However, recreation reserves identified as amendments to the TFL have been excluded from the THLB, as documented in Section 6.8.

ESA soil surveys remain the most reliable inventory of sensitive soils on the TFL. Terrain stability mapping on the TFL is considered to be poor quality by Riverside staff. Only the mapping in the community watersheds is marginally reliable. Riverside is initiating a program in the Government 2004/05 fiscal year to upgrade the terrain stability mapping. Until such time as this is ready, Riverside will continue to use soils ESAs which represent best available information.

6.11 Riparian Management Areas

Riparian management areas (RMAs) are designed to limit the impact of harvesting operations in areas immediately adjacent to aquatic habitats (*i.e.* streams, lakes, swamps and wetlands). A riparian management area consists of a riparian management zone (RMZ) in which harvesting activity is restricted through basal area retention requirements, and may also include a riparian reserve zone (RRZ) immediately adjacent to the water body in which harvesting is fully excluded. The presence of an RRZ is dependent on the classification assigned to the water body in question.

To facilitate timber supply analysis, the RMZ widths are reduced by the required basal area retention percentage and the reduced RMZ is treated as an extension of the RRZ (see Section 6.11.3 for an exception). GIS buffering techniques are then used to construct an effective riparian reserve zone inside of which harvesting activity is fully excluded. The benefit of this approach is that RMAs are treated as a simple reduction to the THLB, thus avoiding the complex alternative of modelling variable retention harvesting systems within a relatively small portion of the land base (i.e. the RMZ). Note that the composite buffer widths shown in Table 6.9 are applied to both sides of stream features, but only to the terrestrial side of wetland or lake features.

6.11.1 Streams

The *Riparian Management Area Guidebook* (BC MoF, 1995) defines the riparian classification system for streams and rivers. However the OS-LRMP prescribes dimensions and management objectives for the RRZs and RMZs on those streams, and will be applied for the MP No. 4 analysis.

Many streams within the TFL have been classified based on survey information and the local knowledge of Riverside engineering staff. However, a complete stream classification is not yet available for TFL 49. These classifications represent the best information available, and have been incorporated into the data set assembled for the MP No. 4 analysis. A summary of the stream riparian classifications and associated land base reductions is provided in Table 6.9.

6.11.2 Wetlands

The *Riparian Management Area Guidebook* (BC MoF, 1995) also defines the classification system for wetlands, as well as dimensions and retention requirements for the associated RMAs. Wetland features were extracted from digital data files distributed by the Okanagan Shuswap Forest District as known information. These data sets provided classification for some of the wetland features. GIS techniques were applied to classify the remaining wetlands according to the Guidebook definitions, using the TFL 49 PEM inventory to determine biogeoclimatic zone membership. A summary of the resulting wetland riparian classifications and associated land base reductions is provided in Table 6.9.

6.11.3 Lakes

Riparian classifications for lakes within TFL 49 were derived from two sources. First, the *Okanagan Timber Supply Area Lake Classification Project,* a collaborative planning process involving MoF, MoELP and DFO staff, applied the principles outlined in the *Lakes Classification and Lakeshore Management Guidebook: Kamloops Forest Region* (BC MoF, 1996a) to review all lakes greater than five hectares in size[1]. In addition, selected lakes less than five hectares in size as identified by the appropriate district manager (DM) and designated environment official (DEO) were considered. This process resulted in many of these lakes being assigned a class of A, B, C, D or E, each with associated lakeshore management zones (LMZs), management zone objectives, and recommended silvicultural practices. Any lakes not classified as a result of this planning process are subject to the *Riparian Management Area Guidebook* classifications and management objectives.

The *Lakes Classification and Lakeshore Management Guidebook, Kamloops Forest Region* stipulates that a lakeshore management zone (LMZ), approximately 200 metres wide will surround all lakes greater than five hectares. For lakes between five and 1000 hectares in area, the LMZ is established outward from a 10 metre RRZ established around the shoreline[2]. A small number (10) of lakes smaller than five hectares were also classified in the *Okanagan Timber Supply Area Lake Classification Project;* these have a 200 metre LMZ but no RRZ.

The *OS-LRMP Visual Quality Guidelines* provide direction on the integration of lake classification and visual quality management guidelines, thus replacing the basal area retention requirements given by the *Lakes Classification and Lakeshore Management Guidebook, Kamloops Forest Region*. Consequently, for class A, B, C, D and E lakes, only the 10 metre RRZ will be removed from the THLB. The LMZ will be managed through the application of forest cover constraints as described in Sections 7.1.2 and 10.2.2.

All lake features used for this analysis were extracted from digital data files distributed by the Okanagan Shuswap Forest District as known information. Lake classifications deriving from the *Okanagan Timber Supply Area Lake Classification Project* were contained in these files. In addition, classifications were

[1] These are L1 lakes according to the Riparian Management Guidebook.

[2] For lakes larger than 1000 hectares, no RRZ is required, however no lakes of this size exist within TFL 49.

provided for some of the lakes smaller than five hectares that were not classified through the latter planning process. GIS techniques were used to classify the remaining lakes according to the *Riparian Management Area Guidebook*, based on the biogeoclimatic ecosystem classifications described in the PEM for TFL 49. A summary of all lake classifications and associated land base reductions is provided in Table 6.9.

Table 6.9 - Riparian management area reductions

Riparian Class	RRZ Width (m)	RMZ Width (m)	RMZ Retention (%)	RMZ Buffer Width (m)	Total GIS Buffer Width (m)	Productive Area (ha)	Area Removed (ha)
Lakes:							
L1 5 - 1000 ha:							
A	10	n/a	n/a	n/a	10	7	4
B	10	n/a	n/a	n/a	10	35	27
C	10	n/a	n/a	n/a	10	10	7
D	10	n/a	n/a	n/a	10	12	5
FPC guidebook:							
L1	10	20	25	5	15	1	1
L3	n/a	30	25	7.5	7.5	5	0
L4	n/a	30	25	7.5	7.5	1	0
Wetlands:							
W1	10	40	25	10	20	50	43
W3	n/a	30	50	15	15	67	26
W4	n/a	30	25	7.5	7.5	0	0
W5	10	40	25	10	20	57	40
Streams:							
S2	36 (1)	20	50	12 (1)	48 (1)	860	767
S3	24 (1)	20	50	12 (1)	36 (1)	1,438	1,371
S4	12 (1)	30	30	10.8 (1)	22.8 (1)	400	374
S5	12 (1)	20	25	6 (1)	18 (1)	489	452
S6	n/a	n/a	n/a	n/a	0	0	0
Total						**3,432**	**3,116**

(1) Includes an additional 20% of buffer to account for the enhanced riparian reserve.

6.11.4 Enhanced Riparian Reserves

The enhanced riparian reserve (ERR) budget for TFL 49 is 1,236 hectares, of which 120 hectares is allocated to the B.C. Timber Sales programme (BCTS). There are approximately six hectares of explicitly mapped ERRs (as part of the Armstrong division WTP coverage) that will be removed from the THLB. Furthermore, the OS-LRMP requires a 10-metre RRZ on S5 streams, as well as on S4 fish bearing streams in low windthrow areas, which are allowed to drawdown the ERR budget.

There are approximately 192 km of classified S5 streams in the TFL, which contribute 304 hectares towards this budget. There are also about 89 km of known or assumed S4 fish bearing streams that contribute another 399 hectares to the ERR budget. These S4 streams are assumed to be in low windthrow areas. Therefore an additional 527 ha must be removed from the THLB to account for ERR.

All stream buffers were increased by a factor of 1.2 to account for ERR requirements. At this time, the location of the ERR is not known. However, by distributing the ERR budget across all stream RRZs, it is being assigned to areas which could potentially become part of the ERR.

The magnitude of reduction needed to complete the ERR area budget is developed in Section 10.3.3.

6.12 Stand-level Biodiversity (Wildlife Tree Patches)

Existing wildlife tree patches (WTPs) on TFL 49 have been explicitly mapped, and are incorporated into the spatial database for this analysis. A total of 670 hectares of existing WTPs have been removed from the THLB, but are retained in the modelling data set so that they may contribute to non-timber resource objectives.

No land base reduction will be made to account for WTPs retained within future cutblocks. Instead a reduction to the volume per hectare harvested will be made, as described in Section 10.3.2.

6.13 Exclusion of Specific Geographically Defined Areas

These excluded areas are recognized by legislation or Order-in-Council as not contributing to the THLB and have not already been accounted for in the land base classification process for any other exclusions.

The Kelowna Dirt Bike Club has a "Licence of Occupation" for use of a spatially defined area for a 10-year period. The total area under this licence is 11 hectares. The licence area will be excluded from the THLB at the start of the simulation, but will be allowed to revert to the THLB at the beginning of year 11.

7.0 INVENTORY AGGREGATION

In order to reduce the complexity of the forest description for the purpose of timber supply analysis, aggregation of individual forest stands is necessary. However, it is critical that this aggregation does not obscure significant differences in biological productivity or management objectives and prescriptions. It is important to note that aggregation of the land base will be consistent in all options and sensitivity analyses. This is to ensure that differences in results are a consequence of the modelled management regime, not the aggregation procedure.

Stands are grouped into analysis units, typically on the basis of similar species composition, site productivity and silviculture regime, thereby capturing similarities in growth and response to silvicultural treatments.

Stands are also aggregated into several potentially overlapping resource emphasis areas (REAs) in order to represent management objectives for non-timber resources. Landscape units and the associated old growth retention targets, known scenic areas, community watersheds, as well as winter habitat areas for mule deer, moose Bighorn Sheep, and mountain goats have all been designated by the OS-LRMP as resource management zones with timber supply implications for TFL 49. They have therefore been included in the analysis database.

Maximum disturbance (based on green-up height requirements) and/or minimum mature and old growth forest cover objectives will be assigned to each REA forest cover group to address needs of the resource. Where REA classifications overlap, areas must meet all overlapping forest cover objectives before harvesting will be permitted.

7.1 Okanagan – Shuswap Land and Resource Management Plan

TFL 49 is subject to all relevant resource management zone (RMZ) objectives established through the OS-LRMP (BC MSRM, 2001). However, many of the RMZ objectives prescribed in the OS-LRMP either have no implications for timber supply, or do not intersect the TFL 49 land base. Table 7.1 provides an overview of OS-LRMP issues and their applicability to this analysis. Those RMZs having a potential impact on the present analysis are discussed in the following sections.

Table 7.1 - Okanagan – Shuswap LRMP issues

Issue	Applicability to this Analysis
Protected Areas Strategy (PAS) Goal 1 and 2 areas and PAS corridor.	TFL 49 contains only PAS Goal 1 protected areas, which will be removed from the THLB, but will still contribute to non-timber resource objectives.
Visual RMZ Zone 1 – declared known scenic with visual quality objectives (VQOs) under the Forest Practices Code (FPC)	Zone 1 visuals replace previously mapped visual quality classes. Cover constraints as defined in the Okanagan TSR2 supplementary LRMP analysis.
Zone 2 – not scenic areas, no established VQOs.	No timber supply analysis impact
Zone 3 – foreground management.	No timber supply analysis impact
Lake Management Zones Classified under FPC and enshrined in LRMP.	Forest cover objectives will be used to meet objectives. Cover constraints as defined in the Okanagan TSR2 supplementary LRMP analysis.
Community Watersheds RMZ	Forest cover constraints applied to the forested land base at watershed level.
Enhanced Riparian Reserves Of the 10,000 hectares of ERRs recommended in the OSLRMP, 1236 are allocated to TFL 49.	Explicit reductions to THLB for mapped ERRs; allowance made for RRZs on S4 and S5 streams; balance addressed through expanded RRZ to other streams (see Sections 6.10.4 and 10.3.3).
Mule Deer Winter Range RMZ Replaces MP No. 3 ungulate winter range.	Disturbance limits and retention requirements will be applied (at LU-BEC variant level in lieu of defined planning cells).
Moose Habitat RMZ	Retention targets for early and late seral cover will be applied.
Goat Habitat RMZ	Disturbance limits, and max. block size of 5 ha will be applied.
Elk Habitat RMZ	Does not intersect TFL 49.
Bighorn Sheep Habitat RMZ	Retention targets for early and late seral cover will be applied.
Grizzly Bear Habitat RMZ	Does not intersect TFL 49.
Mountain Caribou Habitat RMZ	Does not intersect TFL 49.
Derenzy Sheep RMZ	Does not intersect TFL 49.
Marten Habitat RMZ	Only 4% of RMZ intersects TFL 49; will not be modelled.
Tourism, Fish, Recreation RMZ	No timber supply analysis impact.
Community Crown Interface	No timber supply analysis impact.
Stand Level Biodiversity (WTPs)	Explicit reductions to THLB for mapped WTPs; the balance to be addressed through yield curve reductions (see Sections 6.12 and 10.2.7).
Ecosystem Management Explicit area targets for old growth retention, intended to guide placement of OGMAs.	Modelled as a minimum required percentage of THLB to be greater than the minimum age for OLD on a LU BEC variant level.
NDT4	No timber supply analysis impact.
Mission Creek	Does not intersect TFL 49.
Joe Rich Total Resource Plan	Does not intersect TFL 49.

Forest cover constraints that will be assigned to the various non-timber resources in the following sections are summarized in Table 10.1.

7.1.1 Visual Management Zone 1

Of the three visual management zones defined by the OS-LRMP, only visual management zone 1 (known scenic areas) has established visual quality objectives (VQOs) with implications for timber supply modelling.

7.1.2 Lakeshore Management Zones

The OS-LRMP provides direction for the application of visual quality guidelines within the lakeshore management zone around lakes classified under the *Lakes Classification Guidebook* system. This approach to management within LMZs precludes the traditional timber supply analysis approach by which these areas are accounted for in the land base classification process. Instead they will be defined as REAs and subjected to forest cover constraints as described in Section 10.2.2.

7.1.3 Community Watersheds

The OS-LRMP has established a community watershed RMZ. TFL 49 contains all or part of the following designated community watersheds:

- Silver Creek;
- Norris Creek;
- Hope Creek;
- Lambly Creek; and
- Powers Creek.

Recommendations from the most recent Interior Watershed Assessment Programmes (IWAP) have been provided for the Lambly and Powers Creek watersheds. These recommendations apply mainly to operational activities.

For Lambly Creek the *equivalent clearcut area* (ECA) should not exceed current levels. Within the North Powers Creek watershed upstream from Lambly Lake, the ECA should be maintained at or below 42.5%. In addition, inactive roads must be maintained or deactivated. These recommendations do not apply directly to strategic timber supply analysis. Therefore, forest cover constraints will be applied within all community watersheds to address hydrologic green-up, as described in Section 10.2.3.

7.1.4 Bighorn Sheep Habitat

Habitat objectives are outlined in Part 4 of the OS-LRMP. Important habitat types are lambing grounds, escape terrain, and winter and spring ranges. Forested cover is necessary for thermal shelter and snow interception cover.

7.1.5 Mule Deer Winter Range

The OS-LRMP prescribes specific requirements for retention of snow interception cover within the mule deer winter range RMZ. In addition, a limit on disturbance within the mule deer winter range zone will be applied, following the precedent of the Okanagan TSA analysis for TSR2.

7.1.6 Mountain Goat Habitat

The OS-LRMP specifies cover requirements for areas of winter/natal goat habitat, specifically within the forested plateau portion of the RMZ. All of the mountain goat RMZ within TFL 49 is classified as plateau habitat.

7.1.7 Moose Winter Habitat

The OS-LRMP prescribes specific cover requirements for both early and mature seral forest within the moose winter habitat RMZ.

7.1.8 General Wildlife

Section 1.10 and 1.11 in Part 3 (page Wildlife 3-8) of the OS-LRMP discusses a 7,500 hectare budget of THLB (for the whole LRMP area) for protection of identified wildlife and rare elements, which can be

applied either through reserves or partial harvests. The available "element occurrence" spatial data (*i.e.* known locations of species, plant communities and big trees) from the Conservation Data Centre was reviewed to verify that none lie within the TFL. Consequently this analysis will make no allowance for any portion of the 7,500 hectare budget.

7.1.9 Special Status Areas

In addition to the Goal 1 protected area identified and removed from the THLB in Section 6.3, Part 5 of the OS-LRMP makes explicit mention of two other "special status areas": the Shorts-Chapperon connectivity corridor[3] and the Blackwell Lake proposed protected area[4].

At this time there is no clear management direction related to timber supply for either of these areas. However modelling constraints are applied in recognition of the trail network adjacent to Blackwell Lake. This area has a 200-metre buffer around the trails adjacent to the lakes in this area. Harvesting operations in this buffered area will be limited using the Lakeshore Management Zone B constraints.

The Shorts Creek-Chapperon connectivity corridor is also within TFL 49. However, unlike the Blackwell Lake area, no constraints will be applied to Shorts Creek-Chapperon. Mountain pine beetle has attacked this area and harvesting operations have occurred as a result. Therefore constraints on Shorts Creek-Chapperon are unnecessary until the mountain pine beetle issue has been solved.

7.1.10 Ecosystem – Natural Disturbance Type 4

At this time, the NDT 4 RMZ defined in Part 4 of the OS-LRMP has no immediate implications for timber supply modelling. Nonetheless, this RMZ will be incorporated into the spatial resultant database in anticipation of potential sensitivity analyses around NDT 4 management options.

7.1.11 Marten Habitat – Fly Hills

The OS-LRMP defines marten habitat within the Fly Hills area as a polygon specific RMZ that does carry some objectives with implications for timber supply analysis. Marten prefer forested ecosystems dominated by mature and old seral stages. Maintaining 33% of the RMZ in stands at least 19 metres tall is the recommended management stated in the OS-LRMP[5].

However the portion of this RMZ lying within TFL 49 is too small (about 4 % of the total RMZ) to manage in isolation from the rest of the RMZ. Consequently the pine marten RMZ has not been considered in this analysis.

7.2 Resource Emphasis Areas

The resource emphasis areas defined for this analysis are listed in Table 7.2. Maximum disturbance (based on green-up height or age requirements), minimum mature and old growth forest cover objectives will be assigned to each REA forest cover group according to the requirements of the particular resource. Where REA classifications overlap, areas must meet all overlapping forest cover objectives before harvesting.

[3] OS-LRMP, Part 5, page 5-35

[4] OS-LRMP, Part 5 page 5-41

[5] OS-LRMP, Part, pages 4-1 to 4-2

Table 7.2 - Resource emphasis areas (REAs)

Analysis ID	Resource Emphasis Area	Area (ha)		
		Total	**Productive**	**THLB**
1 - 101	VQO-M	4,823	4,525	4,319
	VQO-PR	12,275	11,684	11,011
	VQO-R	5,255	4,062	3,614
	VQO total	**22,352**	**20,271**	**18,944**
111 - 156	Lakeshore ARMZ	207	194	152
	Lakeshore BRMZ	828	760	634
	Lakeshore CRMZ	536	450	378
	Lakeshore DRMZ	175	146	134
	Lakeshore total	1,745	1,550	1,298
147	**Blackwell Lake Special MZ**	**259**	**181**	**157**
161	Hope-CWS	140	132	130
162	Lambly-CWS	18,854	17,452	16,375
163	Norris-CWS	165	149	127
164	Powers-CWS	9,264	8,577	8,016
165	Silver-CWS	444	429	393
	Community watershed total	**28,867**	**26,738**	**25,040**
105	OK_WSide-IRM	27,554	25,136	23,351
106	Trepanier-IRM	38,411	34,205	31,854
107	U_Salmon-IRM Block B	47,298	44,411	41,642
108	U_Salmon-IRM Block C	8,730	8,412	7,966
	IRM total	**121,993**	**112,164**	**104,813**
171	OK_WSide-ICHmk1-Sheep	103	81	81
172	OK_WSide-IDFdk2-Sheep	770	52	17
173	OK_WSide-IDFmw1-Sheep	633	444	374
174	OK_WSide-IDFxh1-Sheep	1,380	900	749
175	OK_WSide-MSdm2-Sheep	310	262	245
176	Trepanier-IDFdk2-Sheep	3,738	2,660	2,473
177	Trepanier-IDFmw1-Sheep	1,125	804	781
178	Trepanier-IDFxh1-Sheep	3,783	3,270	2,841
179	Trepanier-MSdm2-Sheep	2,297	1,790	1,610
	Bighorn sheep total	**14,138**	**10,263**	**9,169**
181	OK_WSide-MDWR-Deep	164	147	126
182	OK_WSide-MDWR-Mod-THLB	746	111	111
183	OK_WSide-MDWR-Mod-NTHLB	180	64	0
184	OK_WSide-MDWR-Mod-IDFmw	4,952	4,431	3,834
185	OK_WSide-MDWR-Shallow	1,036	588	541
186	Trepanier-MDWR-Mod-THLB	3,144	2,734	2,734
187	Trepanier-MDWR-Mod-NTHLB	1,093	332	0
188	Trepanier-MDWR-Mod-IDFmw	887	577	556

Analysis ID	Resource Emphasis Area	Area (ha)		
		Total	**Productive**	**THLB**
189	Trepanier-MDWR-Shallow	3,794	3,273	2,842
190	U_Salmon-B-MDWR-Mod-THLB	6,691	6,191	6,191
191	U_Salmon-B-MDWR-Mod-NTHLB	549	549	0
192	U_Salmon-C-MDWR-Mod-THLB	945	829	829
193	U_Salmon-C-MDWR-Mod-NTHLB	48	48	0
194	U_Salmon-C-MDWR-Mod-IDFmw	1,654	1,555	1,490
	Mule deer total	**25,884**	**21,429**	**19,256**
201	OK_WSide-ICHmk1-Goat	1,189	1,135	1,027
202	OK_WSide-IDFmw1-Goat	2.629	1,621	1,238
203	OK_WSide-IDFxh1-Goat	1,330	855	711
204	OK_WSide-MSdm2-Goat	894	829	714
205	Trepanier-IDFdk2-Goat	946	117	25
206	Trepanier-IDFmw1-Goat	546	250	233
207	Trepanier-MSdm2-Goat	697	424	327
	Mountain goat total	**8,231**	**5,232**	**4,275**
211	Trepanier-ESSFdc2-Moose	401	377	369
212	Trepanier-IDFdk2-Moose	2,110	1,885	1,586
213	Trepanier-IDFxh1-Moose	379	351	330
214	Trepanier-MSdm2-Moose	9,526	8,900	8,412
215	U_Salmon-IDFdk1-Moose	13,141	12,138	11,439
216	U_Salmon-IDFdk2-Moose	591	493	452
217	U_Salmon-IDFxh2-Moose	345	301	278
218	U_Salmon-MSdm2-Moose	1,825	1,716	1,633
	Moose total	**28,318**	**26,162**	**24,500**

Overlaps between different REAs exist, therefore the total area for all REAs in Table 7.2 will exceed the TFL area. VQO and Lakeshore areas will be modelled by the individual polygon identified in their respective inventories. All other areas are modelled within the REAs listed in Table 7.2.

7.3 Ecosystem Types

Timberline completed a new predictive ecosystem mapping (PEM) inventory for TFL 49 (Timberline, 2000). This inventory will serve as the primary source of BEC and site series information for the growth and yield component of the MP No. 4 timber supply analysis.

However, certain resource objectives originating from the OS-LRMP (most notably the targets for old seral forest types) are specified in terms of ecosystem types derived from the Provincial BEC inventory. Thus the latter ecosystem inventory will also be included in the resultant database for the MP No. 4 analysis to facilitate the modelling of those objectives. Table 7.3 provides a summary of the TFL area by ecosystem type for both inventories.

Table 7.3 - Area Comparison, PEM and Provincial BEC

Provincial BEC	PEM BEC										Total Area (ha)
	ESSFdc2	ESSFxc0	ESSFxca	ICHmk1	IDFdk1	IDFdk2	IDFmw1	IDFxh1	IDFxh2	MSdm2	
ESSFdc2	20,457	55	44	250			9			4,173	**24,988**
ESSFxc	2,627	4,077	241							2,225	**9,170**
ICHmk2				3,940			129			1,488	**5,558**
IDFdk1					11,237	1,145				633	**13,015**
IDFdk2					8,705	4,326	815	908	184	3,553	**18,493**
IDFmw1				1,310		1,539	8,091	345		770	**12,056**
IDFmw2				543			1,399		743	123	**2,807**
IDFxh1						208	404	3,193	59	1	**3,866**
IDFxh2					1,587				2,062	1	**3,650**
MSdm2	2,129	722		2,124	385	351	689			36,180	**42,581**
MSxk	477				401	434				5,860	**7,171**
PPxh1								991		1	**992**
Total	**25,690**	**4,854**	**285**	**8,168**	**22,315**	**8,004**	**11,538**	**5,438**	**3,047**	**55,007**	**144,345**

7.4 Landscape Units

Portions of three landscape units (LUs) (as described by the OS-LRMP) intersect TFL 49: the Upper Salmon, Trepanier and Okanagan West Side. Biogeoclimatic ecosystem classification and natural disturbance types (BEC/NDT) are based on the Provincial BEC inventory. Table 7.4 summarizes the distribution of LU-BEC variants on TFL 49, and also shows the biodiversity emphasis option (BEO) assigned to each LU-BEC combination. Biodiversity emphasis options are assigned in accordance with the OS-LRMP.

In general, seral stage objectives applied at the LU-BEC variant level are intended to address biodiversity (seral stage) representation and ensure that an acceptable distribution of age classes is maintained. Biodiversity representation is modelled in the Base Case through explicit old-growth seral stage retention and recruitment targets in accordance with the OS-LRMP. The specific implementation of landscape level biodiversity objectives for the MP No. 4 analysis is described in greater detail in Section 10.3.1.

Table 7.4 - Landscape units, ecosystem types, and biodiversity emphasis

Landscape Unit	NDT	Provincial BEC variant	BEO	Area (ha)		
				Total	Productive	THLB
Okanagan West Side	3	ESSF dc2	Low	9,201	8,775	8,399
	3	ESSF xc0	Low	959	831	734
	3	ICH mk2	Low	5,558	5,318	5,012
	4	IDF mw1	Low	9,176	7,860	6,956
	4	IDF xh1	Low	1,669	1,145	963
	3	MS dm2	Low	7,351	6,815	6,438
Trepanier	3	ESSF dc2	Low	9,756	9,175	8,739
	3	ESSF xc0	Low	2,524	2,341	2,200
	4	IDF dk2	Low	6,252	5,699	5,178
	4	IDF mw1	Low	2,880	1,356	1,220
	4	IDF xh1	Low	2,137	1,852	1,597
	3	MS dm2	Low	20,981	19,561	18,411
	4	PP xh1	Low	992	835	689
Upper Salmon	3	ESSF dc2	Low	6,032	5,630	5,405
	3	ESSF xc0	Low	5,687	5,445	5,198
	4	IDF dk1	Low	13,015	12,009	11,329
	4	IDF dk2	Low	12,241	11,398	10,654
	4	IDF mw2	Low	2,807	2,630	2,432
	4	IDF xh2	Low	3,709	3,460	3,217
	3	MS dm2	Low	14,248	13,454	12,601
	3	MS xh	Low	7,171	6,848	6,386
Total				**144,345**	**132,435**	**123,757**

7.5 Analysis Units

Stands are grouped into analysis units to reduce modelling complexity. In previous management plans, analysis units were formed based on similar species mix, productivity, and age group. For this analysis, an ecologically-based system for grouping stands into analysis units was implemented. This approach was selected because it integrates more closely with ecologically-based productivity estimates. Additionally, many management and silviculture treatment decisions are determined based on the ecological classification of the stand being treated. For existing natural stands, thrifty and mature stands were assigned to separate analysis units to enable proper assignment of mature volume adjustments.

Stands were grouped using the BEC system (PEM) at the site series level. A cut-off was determined for site series that only represent a small proportion of the land base. All of these stands were grouped in their own analysis unit regardless of differences in leading species.

This ecological approach to assigning analysis units results in the following number of analysis units in each category, with a complete description of the analysis units provided Section 8.0:

- 185 existing thrifty (type identity 1) natural stands (AU 1 – 189);
- 183 existing mature (type identity 2) natural stands (AU 201 – 389);
- 53 existing managed stands (AU 401 – 453); and
- 50 future managed stands (AU 501 – 550).

7.5.1 Species – Productivity Classes

Natural stand groupings (analysis units 1 – 389) will be subdivided by leading species, productivity and age classes within each BEC site series. This will provide stand groupings that are not too broad to accurately model the volume yield of stands, since weighted-average AU-specific factors such as minimum harvest age and green-up age will be imprecise. Three productivity classes will be defined for each leading species group based on a classification of the distribution of primary site index[6] values.

The classification will attempt to establish a balance between the land base area assigned to each class and the range of site index values defining the class. Table 7.5 provides the productivity classes.

Table 7.5 - Site index break points

Species Group	Site Index[6] by Productivity Class		
	Poor (P)	Medium (M)	Good (G)
Balsam fir	< 12	12 - 15	> 15
Douglas-fir	< 14	14 - 17	> 17
Lodgepole pine	< 14	14 - 17	> 17
Spruce	< 13	13 - 17	> 17
Deciduous	< 15	15 - 19	> 19

The G/M/P references in Table 7.5 are not related to the historical forest cover classification for site productivity.

[6] Primary site index is defined in Section 8.0.

[6] Site index is height in metres at age base age 50 years.

8.0 GROWTH AND YIELD

Stand level growth and yield modelling for the MP No. 4 analysis will follow accepted methodologies, using established tools and processes.

Assumptions for managed stands will include genetic gains from tree improvement programs and be based on information provided by Riverside. The Forest Practices Code requires use of improved seed where it is available.

As was discussed in Sections 6.12 and 10.2.6, yield curve volumes will be reduced by up to 6.3% during modelling to reflect the anticipated impact of wildlife tree patches.

8.1 Site Index Assignments to Inventory Polygons

The growth potential of modelled stands is quantified using site index. Site index is defined as the potential height of a site tree at breast height age 50 grown on the site. All site index values are based on the standard set of site index curves used in the MoF software *Site Tools*. The site index values in this analysis are from two different sources:

- VRI age and height estimates; and
- Site index correlated to biogeoclimatic ecological classification (SIBEC).

8.1.1 VRI Site Index

VRI site index values are developed using the age and height attributes for each stand in the inventory which is at least 36 years old. Inventory age and height are passed through the MoF *Site Tools* software to determine site index. This site index value is then used to estimate current stand volume, and develop natural stand yield tables using the MoF yield model *Variable Density Yield Prediction* (VDYP) (Version 6.6d).

The VRI site index values assigned to existing natural stands are replaced with the managed stand (SIBEC) site index values when developing managed stand regeneration yield tables.

8.1.2 SIBEC Productivity Estimates

Managed stand site index estimates are taken from the results provided in *Site Index Correlated to Ecosystems – TFL 49* (Timberline, 2002b). The report describes how SIBEC site index estimates are assigned to a stand based on the BEC site series classification. For this analysis, the BEC site series information required to use SIBEC was derived from the PEM project for TFL 49 (Timberline, 2000; Timberline, 2002b). Ministry of Forests Research Branch (Del Meidinger) approved the PEM for use in the timber supply analysis in June 2003.

The SIBEC values were only applied to certain age class subsets of the land base for existing yield curve development. SIBEC values are particularly useful in stands where it is impossible to determine site productivity through analysis of past growth patterns. This occurs in very old stands where suppression prevents any tree from demonstrating the full growth potential of the site. It is also difficult to assess past growth patterns in very young stands due to their short growth history. SIBEC site index estimates were therefore assigned to the young existing managed stands less than 36 years old.

SIBEC site index estimates are also assigned to all future managed stands. This information is more reliable than other site index data for all stands due to the sampling intensity used in collecting this information for the TFL. A complete list of SIBEC site index assignments for each site series on TFL 49 is provided in Appendix I.

8.2 Site Index Assignment for Yield Tables

The application of the site index for developing the various yield tables is summarized in Table 8.1.

Table 8.1 - Site index estimate application

Age Range (Years)	Existing Stands		Future Stands	
	Yield Model	Site Index	Yield Model	Site Index
0 – 35	Managed (TIPSY)	SIBEC	Managed (TIPSY)	SIBEC
36 – 140	Natural (VDYP)	VRI age/ht	Managed (TIPSY)	SIBEC
141+	Natural (VDYP)	VRI age/ht	Managed (TIPSY)	SIBEC

8.3 Utilization Levels

The utilization levels modelled are listed in Table 8.2. They reflect current standards and performance.

Table 8.2 - Utilization levels

Leading Species	Minimum dbh (cm)	Stump height (cm)	Minimum top dib (cm)
Pine	12.5	20.0	10.0
All others	17.5	20.0	10.0

Note: dbh = diameter breast height, dib = diameter inside bark

Riverside has been harvesting to these utilization levels during MP No. 3. Since 1995 total waste associated with harvesting has been only 2 m^3/ha (Riverside, 2003), which demonstrates performance to these higher levels of utilization. A volume increase of 1.9% will be assigned to the yield tables to reflect the 20cm stump height.

8.4 Decay, Waste, and Breakage for Natural Unmanaged Stands

Decay is assigned to natural stand volumes automatically in VDYP, based on the PSYU location, which is interior. Waste and breakage (WB) factors associated with forest inventory zone (FIZ) D and the appropriate public sustained yield unit (PSYU) were used to generate both natural stand yield tables and standing inventory volumes assigned to each forest cover polygon. TFL Blocks A and C (former TFLs 9 and 32) use factors based on the Okanagan special cruise (#187), Block B (former TFL 16) from the Kamloops special cruise (#261).

8.5 Volume Reductions

Standing inventory volumes reported in this document are reduced for any deciduous component. Similarly, for the purposes of modelling, all yield tables are reduced by a percentage reflecting the deciduous component of the stand.

Yield tables will also be reduced to account for wildlife tree patches. These reductions are discussed further in Section 10.3.2. The deciduous component of natural stands can contribute to the wildlife tree patch percentage.

8.6 VDYP Natural Stand Yield Tables

VDYP (Version 6.6d) was used to develop natural stand yields at the analysis unit level. A yield table was first generated for each stand using the following attributes:

- Species composition;
- Crown closure (CC);
- VRI site index (base age 50) of the stand;
- Interior location (FIZ D) for decay; and
- FIZ D and PSYU 187 or 261 to account for waste and breakage.

These yield tables were then averaged (based on area weighting) to produce one yield function for each analysis unit. Volumes were calculated net of secondary deciduous species volume contributions. The average attributes for each analysis unit are summarized in Table 8.3. These are not the actual inputs to VDYP.

Table 8.3 - Average natural stand attributes by analysis unit

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
Thrifty Stands					
1	ESSFdc2-01-Bl-G	Bl62Sx25Pl12Fd1	469	17.2	34
2	ESSFdc2-01-Bl-M	Bl64Sx21Pl15	807	13.6	41
3	ESSFdc2-01-Bl-P	Bl73Sx18Pl9	674	9.7	31
4	ESSFdc2-01-Pl-G	Pl79Fd14Bl4Sx3	5	18.0	35
5	ESSFdc2-01-Pl-M	Pl88Bl6Fd4Sx2	81	15.7	51
6	ESSFdc2-01-Pl-P	Pl66Bl18Sx13At3	161	11.8	44
7	ESSFdc2-01-Sx-G	Sx56Bl33Pl6At5	54	20.1	29
8	ESSFdc2-01-Sx-M	Sx50Bl34Pl16	88	14.3	32
9	ESSFdc2-01-Sx-P	Sx54Bl39Pl7	12	9.0	26
10	ESSFdc2-02/03-Pl	Pl64Bl29Sx7	39	14.0	45
11	ESSFdc2-04-Bl	Bl68Pl18Sx13Fd1	115	12.3	40
12	ESSFdc2-04-Pl-M	Pl92Bl8	11	14.6	23
13	ESSFdc2-04-Pl-P	Pl67Bl24Sx9	20	11.9	28
14	ESSFdc2-04-Sx	Sx50Bl40Pl10	4	11.3	45
15	ESSFdc2-05-Bl	Bl77Sx16Pl7	95	12.0	19
16	ESSFdc2-05-Pl-M	Pl98Bl2	11	15.3	43
17	ESSFdc2-05-Pl-P	Sx40Pl38Bl22	17	11.1	36
18	ESSFdc2-06-Bl-G	Bl69Sx27Pl4	271	16.2	34
19	ESSFdc2-06-Bl-M	Bl61Sx28Pl10Fd1	106	13.1	38
20	ESSFdc2-06-Bl-P	Bl77Sx21Pl2	138	9.3	30
21	ESSFdc2-06-Pl-G	Pl81Sx11Bl8	3	18.4	55
22	ESSFdc2-06-Pl-M	Pl88Bl8Sx4	7	16.4	63
23	ESSFdc2-06-Sx-G	Sx64Pl20Bl16	42	18.5	44

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
24	ESSFdc2-06-Sx-M	Sx66Bl25Pl9	246	14.8	50
25	ESSFdc2-06-Sx-P	Sx61Bl35Pl4	58	11.5	26
26	ESSFdc2-07-Sx	Sx48Bl46Pl6	26	13.6	32
27	ESSFdc2-08-Bl	Bl53Sx38Pl9	30	12.3	24
29	ESSFxc-01-Bl-M	Bl56Sx27Pl17	54	12.7	32
30	ESSFxc-01-Bl-P	Bl71Sx19Pl10	51	10.7	46
32	ESSFxc-01-Pl-M	Pl60Bl30Sx10	11	14.4	55
33	ESSFxc-01-Pl-P	Pl40Sx30Bl30	2	10.5	50
34	ESSFxc-01-Sx-M	Sx50Bl39Pl11	21	14.2	53
35	ESSFxc-01-Sx-P	Sx58Bl36Pl6	4	12.8	41
36	ESSFxc-05-Bl	Bl65Sx19Pl16	32	13.0	45
37	ESSFxc-05-Pl-M	Pl90Bl5Sx5	40	14.4	40
38	ESSFxc-05-Pl-P	Pl48Bl26Sx26	18	10.5	49
39	ESSFxc-05-Sx	Sx65Bl29Pl6	93	11.6	50
40	ESSFxc-06-Bl-M	Bl64Sx21Pl15	71	14.0	48
41	ESSFxc-06-Bl-P	Bl71Sx21Pl8	14	11.2	56
42	ESSFxc-06-Pl-M	Pl100	8	14.5	54
44	ESSFxc-06-Sx-M	Sx53Pl27Bl20	5	14.1	63
45	ESSFxc-06-Sx-P	Sx53Bl38Pl9	25	12.7	51
46	ESSFxc-07/08-Sx-M	Sx52Bl41Pl7	38	14.3	47
47	ESSFxc-07/08-Sx-P	Sx71Bl28Pl1	19	11.2	38
48	ICHmk1-01-Bl-G	Bl50Sx26Fd13Pl11	247	18.9	42
49	ICHmk1-01-Bl-M	Bl32Cw32Fd18Sx18	74	13.6	60
50	ICHmk1-01-Bl-P	Bl52Sx25Pl12Fd11	19	11.0	39
51	ICHmk1-01-Fd-G	Fd67Pl14Sx9Cw10	376	18.7	53
52	ICHmk1-01-Fd-M	Fd70Pl18Sx6Bl6	323	15.8	38
53	ICHmk1-01-Fd-P	Fd77Pl17Cw4At2	38	12.3	23
54	ICHmk1-01-Pl-G	Pl58Fd18Sx15Bl9	27	17.9	40
55	ICHmk1-01-Pl-M	Pl73Fd19Sx6At2	117	15.5	52
56	ICHmk1-01-Pl-P	Pl67Fd22Sx7At4	33	13.1	43
57	ICHmk1-01-Sx-M	Sx53Fd18Pl16Bl13	23	23.3	44
59	ICHmk1-02/03-Fd-M	Fd69Pl17Cw11Sx3	99	15.8	34
60	ICHmk1-02/03-Fd-P	Fd77Pl17Py5At1	70	12.5	27
61	ICHmk1-04-Fd-G	Fd65Bl17Sx11Pl7	202	19.3	53
62	ICHmk1-04-Fd-M	Fd66Pl21Cw6Sx7	223	15.2	45
63	ICHmk1-04-Fd-P	Fd66Pl12Cw11Bl11	108	12.0	46
64	ICHmk1-04-Pl-G	Sx36Fd32Pl23Cw9	14	29.3	13
65	ICHmk1-04-Pl-M	Pl70Fd24At3Bl3	11	15.6	56
66	ICHmk1-04-Pl-P	Pl70Fd15Sx14Bl1	102	12.5	53
67	ICHmk1-05-Sx-G	Fd41Sx32Cw20Pl7	59	19.5	42
68	ICHmk1-05-Sx-M	Bl53Sx23Pl15Fd9	20	15.7	49
69	ICHmk1-05-Sx-P	Cw50Fd30Sx20	5	10.5	55
70	ICHmk1-06-Sx	Fd34Cw28Sx28Bl10	18	17.5	25
71	IDFdk1-01-Fd-G	Fd86Pl12At1Sx1	551	18.1	27
72	IDFdk1-01-Fd-M	Fd79Pl19Sx1At1	1,414	15.2	40
73	IDFdk1-01-Fd-P	Fd81Pl17At1Sx1	2,745	12.3	33
74	IDFdk1-01-Pl-G	Pl69Fd22At8Sx1	166	18.5	51
75	IDFdk1-01-Pl-M	Pl84Fd13Sx3	304	15.3	47
76	IDFdk1-01-Pl-P	Pl59Fd32At5Ep4	259	11.8	37
77	IDFdk1-02/03-Fd-G	Fd100	66	17.6	20

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
78	IDFdk1-02/03-Fd-M	Fd88Pl10Py2	216	15.2	27
79	IDFdk1-02/03-Fd-P	Fd87Pl11Py2	340	12.1	29
80	IDFdk1-03-Pl-M	Pl89Fd10At1	10	15.0	20
81	IDFdk1-03-Pl-P	Pl82Fd18	11	13.2	48
82	IDFdk1-04-Fd-M	Fd94Pl6	200	15.4	24
83	IDFdk1-04-Fd-P	Fd92Pl8	192	12.6	31
84	IDFdk1-05-Fd-G	Fd52Pl24Sx15At9	42	18.0	45
85	IDFdk1-05-Fd-M	Fd65Pl20Sx10At5	181	15.3	41
86	IDFdk1-05-Fd-P	Fd68Pl18Sx12At2	256	12.8	38
87	IDFdk1-05-Pl-G	Pl51Fd21At18Sx10	12	20.8	52
88	IDFdk1-05-Pl-M	Pl72Ac15Fd11Sx2	29	15.0	37
89	IDFdk1-05-Pl-P	Pl34At31Fd29Sx6	12	12.5	42
90	IDFdk1-05-Sx-G	Sx79Pl13Fd5At3	31	18.7	45
91	IDFdk1-05-Sx-M	Sx61Pl26Fd10Ac3	120	14.4	35
92	IDFdk1-05-Sx-P	Sx65Pl17At12Fd6	12	10.8	32
93	IDFdk1-06-Sx-M	Sx70Pl15Fd9Bl6	14	15.9	41
94	IDFdk1-06-Sx-P	Sx64Fd15Pl15Bl6	22	10.7	36
95	IDFdk2-01-Fd-G	Fd82Py7Pl7Lw4	400	18.7	36
96	IDFdk2-01-Fd-M	Fd81Pl11Py5Sx3	635	15.3	27
97	IDFdk2-01-Fd-P	Fd85Py11Pl3At1	165	13.2	23
98	IDFdk2-01-Pl-G	Pl68Sx13At10Fd9	64	17.8	54
99	IDFdk2-01-Pl-M	Pl85Fd10Sx5	109	16.1	53
100	IDFdk2-01-Pl-P	Pl67Fd19Sx13Bl1	54	13.2	60
101	IDFdk2-02/03-Fd-G	Fd87Py9Pl3At1	153	19.3	24
102	IDFdk2-02/03-Fd-M	Fd84Pl9Py6At1	521	15.0	20
103	IDFdk2-02/03-Fd-P	Fd86Pl8Py6	109	13.2	23
104	IDFdk2-02/03-Pl	Pl92Fd8	154	14.0	54
105	IDFdk2-04-Fd	Fd46Pl44Py7Sx3	64	16.9	29
106	IDFdk2-05/06-Sx	Sx58Fd21Pl18Bl3	112	18.2	41
107	IDFmw1-01-Cw-G	Cw67Fd25Pl5Sx3	80	20.4	49
108	IDFmw1-01-Cw-M	Cw55Fd30Ep14Sx1	73	15.2	38
109	IDFmw1-01-Cw-P	Cw55Fd28Ep11Pl6	69	11.1	34
110	IDFmw1-01-Fd-G	Fd80Pl13At4Cw3	764	18.9	46
111	IDFmw1-01-Fd-M	Fd77Pl13Cw5At5	1,521	15.6	40
112	IDFmw1-01-Fd-P	Fd86Pl6Lw4Cw4	787	12.1	32
113	IDFmw1-01-Lw	Lw53Cw28Fd17Pl2	69	15.4	55
114	IDFmw1-01-Pl-G	Pl85Fd11At2Ep2	301	19.3	56
115	IDFmw1-01-Pl-M	Pl55Fd20At17Lw8	113	15.5	47
116	IDFmw1-01-Pl-P	Pl37Fd26Ep22At15	106	13.0	48
117	IDFmw1-02-Fd-M	Fd82Pl12Py5At1	108	15.2	27
118	IDFmw1-02-Fd-P	Fd76Py17Pl5At2	99	12.3	25
119	IDFmw1-03-Fd-G	Fd84Pl8At6Py2	147	18.2	37
120	IDFmw1-03-Fd-M	Fd88Pl8Py3At1	328	15.3	31
121	IDFmw1-03-Fd-P	Fd90Ep6Py2Pl2	342	12.0	19
122	IDFmw1-04-Fd-G	Fd83Pl12Py3At2	83	18.7	44
123	IDFmw1-04-Fd-M	Fd68Pl24Py4At4	131	15.3	36
124	IDFmw1-04-Fd-P	Fd79Pl12Py9	72	13.2	24
125	IDFmw1-05-Fd-G	Fd52At18Cw17Lw13	71	18.3	45
126	IDFmw1-05-Fd-M	Fd49Cw21Ep17Sx13	164	15.5	35
127	IDFmw1-05-Fd-P	Fd46Cw19Ep17Pl18	36	12.2	31

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
128	IDFxh1-01-Fd-G	Fd73Py21At3Pl3	779	18.9	37
129	IDFxh1-01-Fd-M	Fd76Py19Pl3At2	627	15.3	35
130	IDFxh1-01-Fd-P	Fd77Py22At1	459	12.8	27
131	IDFxh1-01-Py-M	Py56Fd29Pl15	107	17.8	40
132	IDFxh1-01-Py-P	Py65Fd28Pl6Sx1	90	12.9	16
133	IDFxh1-02/03-Fd/Py-G	Fd79Py17Ep2At2	14	18.3	27
134	IDFxh1-02/03-Fd/Py-M	Fd77Py13Pl7At3	92	15.3	14
135	IDFxh1-02/03-Fd/Py-P	Fd86Py14	121	12.7	16
136	IDFxh1-04-Fd	Fd68Py30Pl3	115	15.2	29
137	IDFxh1-05-Fd	Fd69Lw25Py5Ep1	137	12.5	18
138	IDFxh1-06/07-Fd-G	Fd61At19Pl13Py7	123	19.0	53
139	IDFxh1-06/07-Fd-M	Fd85Py11Pl3At1	109	15.6	42
140	IDFxh1-06/07-Fd-P	Fd88Py9Pl3	75	13.1	32
141	IDFxh2-01-Fd-G	Fd91Cw5Py3Pl1	110	17.9	44
142	IDFxh2-01-Fd-M	Fd99Pl1	139	15.3	49
143	IDFxh2-01-Fd-P	Fd97Py2Sx1	367	12.5	36
144	IDFxh2-02/03-Fd-M	Fd95Pl2Py2At1	108	15.7	29
145	IDFxh2-02/03-Fd-P	Fd89Py11	132	12.7	24
146	IDFxh2-04-Fd-G	Fd86Pl7At4Py3	134	18.1	44
147	IDFxh2-04-Fd-M	Fd97Pl2Py1	244	15.8	34
148	IDFxh2-04-Fd-P	Fd91Py8Ep1	370	12.3	31
149	IDFxh2-05/06-Fd-M	Fd71Sx12Cw10Py7	79	16.1	40
150	IDFxh2-05/06-Fd-P	Fd86Py12Pl2	156	12.8	40
151	MSdm2-01-Bl-G	Bl64Sx24Pl8Fd4	1,289	18.0	40
152	MSdm2-01-Bl-M	Bl65Sx17Pl11Fd7	677	13.4	39
153	MSdm2-01-Bl-P	Bl87Sx8Pl3Fd2	838	10.4	36
154	MSdm2-01-Fd-G	Fd68Pl19Bl7Sx6	229	18.5	43
155	MSdm2-01-Fd-M	Fd65Pl20Sx10Bl5	542	15.5	43
156	MSdm2-01-Fd-P	Fd65Pl25Sx6Bl4	143	11.8	31
157	MSdm2-01-Pl-G	Pl88Sx5Bl5Fd2	763	17.9	51
158	MSdm2-01-Pl-M	Pl86Bl6Fd5Sx3	1,592	15.1	55
159	MSdm2-01-Pl-P	Pl87Bl7Sx4Fd2	567	12.9	58
160	MSdm2-01-Sx-G	Sx51Fd18Bl17Pl14	104	18.5	51
161	MSdm2-01-Sx-M	Sx51Bl25Pl21At3	136	14.7	47
162	MSdm2-01-Sx-P	Sx63Bl20Pl15Fd2	28	12.3	44
163	MSdm2-03-Fd-M	Fd76Pl22Bl1Sx1	71	16.1	26
164	MSdm2-03-Fd-P	Fd47Bl28Pl15Sx10	107	12.0	30
165	MSdm2-02/03-Pl-M	Pl85Fd15	97	15.5	48
166	MSdm2-02/03-Pl-P	Pl90Fd9Bl1	124	11.6	40
167	MSdm2-04-Bl	Bl65Pl18Sx16Fd1	131	11.5	32
168	MSdm2-04-Fd-G	Fd74Pl17Bl5Sx4	50	18.7	43
169	MSdm2-04-Fd-M	Fd67Pl22Sx8At3	161	15.3	41
170	MSdm2-04-Fd-P	Fd76Pl18Bl3Sx3	97	12.2	40
171	MSdm2-04-Pl-G	Pl87Fd5Bl5At3	59	18.8	52
172	MSdm2-04-Pl-M	Pl84Fd10Bl3Sx3	303	15.0	53
173	MSdm2-04-Pl-P	Pl95Fd4Bl1	508	12.6	58
174	MSdm2-05-Bl-G	Bl61Sx25Fd7Pl7	105	17.3	39
175	MSdm2-05-Bl-M	Bl69Sx26Fd3Pl2	69	13.5	33
176	MSdm2-05-Bl-P	Bl76Sx14Pl8Ep2	58	11.2	19
177	MSdm2-05-Fd	Fd59Pl21At10Sx10	41	15.9	40

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
178	MSdm2-05-Pl-G	Pl60Sx24At14Bl2	15	19.3	34
179	MSdm2-05-Pl-M	Pl63Sx20Bl13Fd4	28	15.4	55
180	MSdm2-05-Sx-G	Sx57Pl27At9Bl7	49	18.4	38
181	MSdm2-05-Sx-M	Sx51Pl27Bl21Fd1	105	15.1	42
182	MSdm2-05-Sx-P	Sx61Bl28Pl11	4	11.0	34
183	MSdm2-06-Bl	Bl86Sx9Pl4Ep1	81	14.7	19
184	MSdm2-06-Pl-G	Pl50Fd29Sx13Bl8	16	18.7	54
185	MSdm2-06-Pl-M	Pl63Bl15Sx12Fd10	23	14.8	32
186	MSdm2-06-Sx-G	Sx64Bl20Pl13At3	22	18.9	41
187	MSdm2-06-Sx-M	Sx66Bl19Pl13Fd2	48	15.4	39
188	MSdm2-06-Sx-P	Sx67Bl13At11Pl9	11	10.9	30
189	MSdm2-07-Sx	Sx60Bl25Pl14Fd1	32	12.6	27
Mature Stands					
202	ESSFdc2-01-Bl-M	Bl61Sx29Pl10	340	12.7	45
203	ESSFdc2-01-Bl-P	Bl63Sx29Pl8	720	9.7	45
204	ESSFdc2-01-Pl-G	Pl69Bl18Sx12Fd1	917	18.0	50
205	ESSFdc2-01-Pl-M	Pl71Sx14Bl14Fd1	2,339	15.4	52
206	ESSFdc2-01-Pl-P	Pl71Bl18Sx10Fd1	1,174	12.7	52
207	ESSFdc2-01-Sx-G	Sx54Pl22Bl21Fd3	177	18.8	48
208	ESSFdc2-01-Sx-M	Sx62Bl22Pl16	956	14.4	45
209	ESSFdc2-01-Sx-P	Sx58Bl26Pl15Fd1	2,027	10.3	45
210	ESSFdc2-02/03-Pl	Pl55Bl27Sx15Fd3	129	11.9	42
211	ESSFdc2-04-Bl	Bl67Sx20Pl13	54	8.5	47
212	ESSFdc2-04-Pl-M	Pl72Bl17Sx11	114	15.6	51
213	ESSFdc2-04-Pl-P	Pl74Bl13Sx12Fd1	255	11.1	45
214	ESSFdc2-04-Sx	Sx58Bl31Pl11	110	10.0	43
215	ESSFdc2-05-Bl	Bl57Sx22Pl18Pa3	42	9.5	31
216	ESSFdc2-05-Pl-M	Pl66Bl23Sx9Fd2	52	15.3	43
217	ESSFdc2-05-Pl-P	Pl76Bl9Sx9Fd6	121	11.8	46
218	ESSFdc2-06-Bl-G	Bl50Sx40Pl10	5	15.0	45
219	ESSFdc2-06-Bl-M	Bl68Sx29Pl3	116	12.6	49
220	ESSFdc2-06-Bl-P	Bl70Sx29Pl2	644	10.1	33
221	ESSFdc2-06-Pl-G	Pl67Sx18Bl14Fd1	217	18.2	49
222	ESSFdc2-06-Pl-M	Pl63Sx19Bl18	210	15.2	48
223	ESSFdc2-06-Sx-G	Sx60Bl26Pl14	157	17.9	32
224	ESSFdc2-06-Sx-M	Sx66Bl22Pl12	387	15.1	41
225	ESSFdc2-06-Sx-P	Sx59Bl29Pl12	652	10.0	44
226	ESSFdc2-07-Sx	Sx48Bl30Pl22	146	11.7	37
227	ESSFdc2-08-Bl	Bl60Sx37Pl3	157	11.6	36
229	ESSFxc-01-Bl-M	Bl45Sx35Pl20	9	12.2	50
230	ESSFxc-01-Bl-P	Bl63Sx35Pl2	151	10.5	55
231	ESSFxc-01-Pl-G	Pl83Bl12Sx5	82	17.7	53
232	ESSFxc-01-Pl-M	Pl74Sx14Bl12	361	15.2	56
233	ESSFxc-01-Pl-P	Pl74Bl15Sx11	76	12.9	54
234	ESSFxc-01-Sx-M	Sx61Bl23Pl16	62	15.9	42
235	ESSFxc-01-Sx-P	Sx61Bl34Pl5	133	10.7	49
236	ESSFxc-05-Bl	Bl81Sx16Pl3	81	9.9	51
237	ESSFxc-05-Pl-M	Pl80Bl13Sx6Fd1	198	15.9	51
238	ESSFxc-05-Pl-P	Pl91Bl6Sx3	54	12.6	49
239	ESSFxc-05-Sx	Sx60Bl31Pl9	39	10.1	42

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
240	ESSFxc-06-Bl-M	Bl56Pl25Sx19	51	14.0	56
241	ESSFxc-06-Bl-P	Bl67Sx27Pl6	149	10.2	50
242	ESSFxc-06-Pl-M	Pl70Bl16Sx14	696	15.7	54
243	ESSFxc-06-Pl-P	Pl84Bl10Sx6	142	12.8	45
244	ESSFxc-06-Sx-M	Sx64Bl32Pl4	21	15.1	40
245	ESSFxc-06-Sx-P	Sx62Bl35Pl3	247	10.0	51
246	ESSFxc-07/08-Sx-M	Sx56Bl28Pl16	75	16.7	47
247	ESSFxc-07/08-Sx-P	Sx56Bl38Pl6	77	10.6	45
248	ICHmk1-01-Bl-G	Cw85Sx15	2	17.2	35
249	ICHmk1-01-Bl-M	Bl35Sx27Cw20Fd18	25	13.1	43
250	ICHmk1-01-Bl-P	Bl52Sx17Pl15Fd16	179	10.0	41
251	ICHmk1-01-Fd-G	Fd64Sx21Bl9Pl6	5	18.7	40
252	ICHmk1-01-Fd-M	Fd75Pl10Sx10Cw5	215	15.0	45
253	ICHmk1-01-Fd-P	Fd72Bl11Pl11Sx6	301	12.6	46
254	ICHmk1-01-Pl-G	Pl67Fd15Sx10Bl8	140	19.3	42
255	ICHmk1-01-Pl-M	Pl72Fd15Sx6Bl7	342	15.3	48
256	ICHmk1-01-Pl-P	Pl70Fd13Bl13Sx4	130	12.9	46
257	ICHmk1-01-Sx-M	Sx56Bl28Fd9Pl7	118	14.7	51
258	ICHmk1-01-Sx-P	Sx53Bl26Pl12Fd9	149	10.7	40
259	ICHmk1-02/03-Fd-M	Pl58Fd42	24	14.7	30
260	ICHmk1-02/03-Fd-P	Fd72Pl20Py7Sx1	227	11.9	33
261	ICHmk1-04-Fd-G	Fd90Cw7Sx3	9	17.8	45
262	ICHmk1-04-Fd-M	Fd66Sx16Bl12Pl6	157	14.9	52
263	ICHmk1-04-Fd-P	Fd77Pl9Cw8Sx6	438	11.9	43
264	ICHmk1-04-Pl-G	Pl63Fd27Sx7At3	59	18.2	44
265	ICHmk1-04-Pl-M	Pl75Fd21Sx3Cw1	103	15.1	47
266	ICHmk1-04-Pl-P	Pl63Fd21Sx9Bl7	80	11.7	49
267	ICHmk1-05-Sx-G	Sx36Pl28Fd22Bl14	17	19.0	42
268	ICHmk1-05-Sx-M	Fd39Sx37Bl17Cw7	87	14.8	44
269	ICHmk1-05-Sx-P	Sx43Bl41Cw13Pl3	188	11.6	50
270	ICHmk1-06-Sx	Sx52Bl20Cw15Fd13	146	14.0	46
271	IDFdk1-01-Fd-G	Fd92Sx8	30	17.1	33
272	IDFdk1-01-Fd-M	Fd88Pl11Sx1	568	15.1	41
273	IDFdk1-01-Fd-P	Fd84Pl15Sx2	1,076	12.7	35
274	IDFdk1-01-Pl-G	Pl82Fd14At2Sx2	299	18.2	46
275	IDFdk1-01-Pl-M	Pl80Fd18At1Sx1	1,425	15.3	42
276	IDFdk1-01-Pl-P	Pl83Fd17	547	13.2	48
277	IDFdk1-02/03-Fd-G	Fd90Pl6Sx4	2	17.1	11
278	IDFdk1-02/03-Fd-M	Fd88Pl9Py3	70	14.8	36
279	IDFdk1-02/03-Fd-P	Fd94Py3Pl3	407	12.2	29
280	IDFdk1-03-Pl-M	Pl73Fd27	152	15.1	35
281	IDFdk1-03-Pl-P	Pl90Fd10	39	13.4	58
282	IDFdk1-04-Fd-M	Fd95Pl5	127	15.1	43
283	IDFdk1-04-Fd-P	Fd88Pl11Py1	366	12.3	23
284	IDFdk1-05-Fd-G	Fd71Sx21Pl8	47	17.3	44
285	IDFdk1-05-Fd-M	Fd60Pl25Sx13At2	85	15.5	34
286	IDFdk1-05-Fd-P	Fd74Sx14Pl10At2	43	13.0	39
287	IDFdk1-05-Pl-G	Pl63Fd18Sx12At7	153	18.3	51
288	IDFdk1-05-Pl-M	Pl64Fd18Sx15At3	204	15.4	42
289	IDFdk1-05-Pl-P	Pl69Fd22Sx6At3	34	13.3	44

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
290	IDFdk1-05-Sx-G	Sx68Pl19Fd9At4	61	19.0	37
291	IDFdk1-05-Sx-M	Sx57Pl24Fd15Bl4	84	14.9	40
292	IDFdk1-05-Sx-P	Sx73Fd21At3Pl3	43	12.1	43
293	IDFdk1-06-Sx-M	Sx64Fd20Pl14Ac2	95	16.7	45
294	IDFdk1-06-Sx-P	Sx79Fd15Ac4At2	18	11.2	44
295	IDFdk2-01-Fd-G	Fd52Sx25Pl12At11	22	18.2	46
296	IDFdk2-01-Fd-M	Fd70Pl17Sx8At5	245	14.9	35
297	IDFdk2-01-Fd-P	Fd87Py6Pl4Sx3	102	13.0	37
298	IDFdk2-01-Pl-G	Pl88Fd9Sx1At2	286	18.4	36
299	IDFdk2-01-Pl-M	Pl85Fd10Sx3At2	101	15.7	51
300	IDFdk2-01-Pl-P	Pl78Py9Fd8At5	76	11.7	36
302	IDFdk2-02/03-Fd-M	Fd90Py5Pl3Sx2	34	14.6	23
303	IDFdk2-02/03-Fd-P	Fd88Py8Pl3At1	208	12.5	26
304	IDFdk2-02/03-Pl	Pl78Fd22	10	14.3	36
305	IDFdk2-04-Fd	Fd70Pl14Sx14Ep2	40	15.2	40
306	IDFdk2-05/06-Sx	Pl50Sx32Fd17At1	34	18.3	45
308	IDFmw1-01-Cw-M	Cw54Fd21Lw19Pl6	48	15.3	44
309	IDFmw1-01-Cw-P	Cw50Fd22Pl16Sx12	64	11.7	50
310	IDFmw1-01-Fd-G	Fd90Pl6Sx2Ep2	15	18.0	47
311	IDFmw1-01-Fd-M	Fd85Pl10Cw4At1	251	14.7	41
312	IDFmw1-01-Fd-P	Fd88Pl5Cw4Lw3	1,312	12.7	40
313	IDFmw1-01-Lw	Lw64Fd24At8Pl4	30	14.5	31
314	IDFmw1-01-Pl-G	Pl70Fd20Ep8Sx2	85	18.1	49
315	IDFmw1-01-Pl-M	Pl66Fd27Cw5Ep2	279	15.3	51
316	IDFmw1-01-Pl-P	Pl71Fd20Ep5Cw4	85	12.9	51
317	IDFmw1-02-Fd-M	Fd61Pl28At10Cw1	28	15.7	49
318	IDFmw1-02-Fd-P	Fd68Py30Pl2	134	13.1	27
319	IDFmw1-03-Fd-G	Fd46Pl46Lw6Py2	4	17.5	29
320	IDFmw1-03-Fd-M	Fd90Py8Pl2	103	14.4	30
321	IDFmw1-03-Fd-P	Fd82Py13Pl3Lw2	568	12.1	26
322	IDFmw1-04-Fd-G	Pl68Fd27Ep3Bl2	24	17.9	54
323	IDFmw1-04-Fd-M	Fd57Pl26At10Lw7	43	14.5	31
324	IDFmw1-04-Fd-P	Fd76Pl19Py4At1	61	11.7	37
325	IDFmw1-05-Fd-G	Lw33Fd31Cw25Pl11	6	20.8	53
326	IDFmw1-05-Fd-M	Fd50Pl24Cw14At12	21	15.6	35
327	IDFmw1-05-Fd-P	Fd53Cw30Pl9Sx8	51	12.9	45
328	IDFxh1-01-Fd-G	Sx40Fd32Cw25At3	10	20.5	55
329	IDFxh1-01-Fd-M	Fd87Py9Pl2Sx2	97	14.7	45
330	IDFxh1-01-Fd-P	Fd65Py31Pl4	458	12.8	23
331	IDFxh1-01-Py-M	Pl62Fd33Sx5	4	14.6	52
332	IDFxh1-01-Py-P	Py50Fd50	42	12.7	15
334	IDFxh1-02/03-Fd/Py-M	Fd92Py8	6	14.1	36
335	IDFxh1-02/03-Fd/Py-P	Fd67Py33	185	11.8	16
336	IDFxh1-04-Fd	Fd66Py34	24	11.8	17
337	IDFxh1-05-Fd	Fd69Pl21Sx6Ep4	9	15.7	46
338	IDFxh1-06/07-Fd-G	Sx50Fd27Cw20Py3	16	21.6	64
339	IDFxh1-06/07-Fd-M	Fd78Sx9Py8Lw5	9	15.5	53
340	IDFxh1-06/07-Fd-P	Fd72Py27At1	14	13.5	50
341	IDFxh2-01-Fd-G	Fd99Sx1	5	17.1	39
342	IDFxh2-01-Fd-M	Fd87Pl13	73	14.8	39

Analysis Unit	Description	Species Composition	Net THLB	Avg SI50	Avg CC
343	IDFxh2-01-Fd-P	Fd98Pl2	82	12.4	47
345	IDFxh2-02/03-Fd-P	Fd87Py13	293	11.8	23
346	IDFxh2-04-Fd-G	0	0	0.0	0
347	IDFxh2-04-Fd-M	Fd80Pl13Py7	14	14.5	41
348	IDFxh2-04-Fd-P	Fd91Py8Pl1	175	11.9	31
349	IDFxh2-05/06-Fd-M	Fd63Sx25Ac12	8	16.3	41
350	IDFxh2-05/06-Fd-P	Fd84Cw12Py3Ep1	6	13.2	49
351	MSdm2-01-Bl-G	Bl52Sx23Pl22Fd3	38	17.4	50
352	MSdm2-01-Bl-M	Bl58Sx23Pl14Fd5	194	13.0	47
353	MSdm2-01-Bl-P	Bl57Sx24Pl15Fd4	443	9.8	43
354	MSdm2-01-Fd-G	Fd63Sx16Pl13Bl8	137	18.1	42
355	MSdm2-01-Fd-M	Fd59Sx18Pl12Bl11	529	15.5	43
356	MSdm2-01-Fd-P	Fd70Pl16Sx8Bl6	575	12.5	44
357	MSdm2-01-Pl-G	Pl79Sx9Bl8Fd4	3,603	18.4	49
358	MSdm2-01-Pl-M	Pl81Bl8Sx8Fd3	6,016	15.6	52
359	MSdm2-01-Pl-P	Pl81Bl10Sx6Fd3	1,703	12.6	50
360	MSdm2-01-Sx-G	Sx48Bl23Pl16Fd13	424	18.3	49
361	MSdm2-01-Sx-M	Sx56Bl20Pl18Fd6	690	15.1	45
362	MSdm2-01-Sx-P	Sx52Bl25Pl19Fd4	1,125	11.2	48
363	MSdm2-03-Fd-M	Fd88Pl12	58	15.0	29
364	MSdm2-03-Fd-P	Fd82Pl10Bl5Sx3	279	11.3	24
365	MSdm2-02/03-Pl-M	Pl76Fd11Bl7Sx6	224	15.7	43
366	MSdm2-02/03-Pl-P	Pl77Fd10Bl7Sx6	236	11.7	45
367	MSdm2-04-Bl	Bl52Pl17Fd16Sx15	55	10.3	38
368	MSdm2-04-Fd-G	Fd40Sx20Pl20Bl20	16	19.2	42
369	MSdm2-04-Fd-M	Fd79Pl12Sx6Bl3	94	15.1	44
370	MSdm2-04-Fd-P	Fd75Pl16Bl5Sx4	440	12.2	38
371	MSdm2-04-Pl-G	Pl77Sx11Bl9Fd3	481	18.1	45
372	MSdm2-04-Pl-M	Pl88Bl5Fd4Sx3	1,179	15.5	52
373	MSdm2-04-Pl-P	Pl84Bl7Sx5Fd4	1,148	12.5	46
374	MSdm2-05-Bl-G	Bl50Sx35Pl15	5	15.0	50
375	MSdm2-05-Bl-M	Bl54Pl21Sx19Fd6	71	13.2	47
376	MSdm2-05-Bl-P	Bl64Sx28Pl7Fd1	49	10.8	46
377	MSdm2-05-Fd	Fd59Sx23Bl11Pl7	103	15.4	47
378	MSdm2-05-Pl-G	Pl66Sx20Bl12Fd2	357	18.7	47
379	MSdm2-05-Pl-M	Pl74Sx13Bl13	209	15.8	43
380	MSdm2-05-Sx-G	Sx63Bl19Pl10Fd8	124	19.2	38
381	MSdm2-05-Sx-M	Sx57Bl20Pl16Fd7	408	15.0	38
382	MSdm2-05-Sx-P	Sx60Bl26Pl8Fd6	279	11.0	41
383	MSdm2-06-Bl	Bl51Sx30Pl18Fd1	37	12.4	52
384	MSdm2-06-Pl-G	Pl62Sx26Bl10Fd2	110	18.8	44
385	MSdm2-06-Pl-M	Pl54Sx22Bl15Fd9	156	14.9	38
386	MSdm2-06-Sx-G	Sx68Bl24Pl6Fd2	77	18.3	39
387	MSdm2-06-Sx-M	Sx65Bl19Pl15Fd1	231	14.9	42
388	MSdm2-06-Sx-P	Sx58Bl25Pl15Fd2	206	10.5	42
389	MSdm2-07-Sx	Sx67Bl16Pl15Fd2	81	12.7	36

8.6.1 Existing Timber Volume Check

Table 8.4 presents a comparison of the total initial timber volume calculated from the yield tables and the inventory volume for each forest cover polygon. Volumes are net of deciduous in both cases.

Table 8.4 - Timber volume check

Polygon Volume	Yield Curve Volume	% Difference (polygon / yield curve)
19,419,182	19,591,350	-0.88%

8.7 Genetic Gains (Tree Improvement)

Seed planning units (SPUs) are the new organizational units that form the basis for breeding and seed production planning carried out by the Forest Genetics Council and the Tree Improvement Branch of the MoF. SPUs are polygon features that geographically delineate the extent of biologically feasible seedling use for stock originating from specific seed orchards throughout the province. Each SPU identifies the area throughout which seedlings of a given species originating from orchards within a specific region of the province may be used in regeneration. Note also that each SPU lies within a prescribed elevation band.

Estimates of future genetic worth and seedling availability are provided at the SPU level. Consequently these features must be incorporated into the resultant database in order to georeference the genetic gain estimates for subsequent yield curve construction.

The individual SPUs overlap each other in various combinations such that each unique combination of SPUs identifies a specific supply of seedlings of a certain species originating from specific orchards, each with a particular genetic gain factor. Therefore it is these unique combinations of overlapping SPUs that act as the common denominator for targeting genetic gain factors in the timber supply analysis.

Much of the information presented is from *Tree Farm Licence 49 – Implementation Strategy for Forest Level Modelling of Genetic Gains* (Timberline, 2003).

The following information is used in applying genetic gains to the managed stand yields:

- Elevation bands defined from the TRIM digital terrain model based on SPU elevation band definitions;
- Provincial seed planning zone boundaries and underlying BEC definitions;
- Species plans including genetic gain estimates; and
- BEC variant linework from the TFL 49 PEM project.

8.7.1 Geo-Referencing Genetic Gains

All genetic gains are geo-referenced based on MoF provincial seed planning zones (SPZ) and SPUs. Table 8.5 lists applicable Provincial SPUs for TFL 49.

Table 8.5 - Provincial seed planning units

Species	Class A Seed Planning Zone	Seed Planning Unit	Elevation Band (m)
Lodgepole pine	Thompson Okanagan (TO)	Pli TO High Pli TO Low	High (>1400) Low (<1400)
Douglas-fir	Nelson (NE)	Fdi NE High Fdi NE Low	High (>1000) Low (< 1000)
Western larch	Nelson (NE)	Lw NE Low	Low (< 1300)
Interior spruce	Thompson Okanagan (TO)	Sx TO High Sx TO Low	High (1300 – 1850) Low (< 1300)

As indicated in Table 8.5, SPUs are defined by tree species, SPZ, and elevation band. Rather than using provincial SPZs to spatially define SPUs, it is recommended that the zones be redefined with finer resolution TFL data. This involves locally remapped BEC variants at 1:20,000 scale and elevation bands derived from the TRIM digital elevation model.

The Tree Improvement Branch website (BC MoF, 2003) provides cross-reference tables which define seed planning zones by BEC variant. Reproduced in Table 8.6 are variants by species which roughly define the Nelson seed planning zone that are found on TFL 49. These are provided for information only and will not be used directly to redefine the Nelson zones. The Thompson-Okanagan zones are not included as the entire TFL falls within that zone for pine and spruce, and no internal definition is required.

Table 8.6 - BEC/SPZ cross-reference table.

Nelson Douglas-fir	Nelson Western Larch
Natural Disturbance Type 4	
IDFmw1 IDFmw2 (1)	IDFmw1
Natural Disturbance Type 3	
ESSFdc2 ESSFxc ICHmk1 (2) MSdm2	ESSFdc2 ESSFxc ICHmk1 MSdm2

(1) This variant appears in the TFL in the Provincial BEC classification but is not found in the new coverage.

(2) Percent gain in primary trait (stem volume).

BEC subzone/variant linework has been re-mapped on TFL 49 as part of the PEM. For use on the TFL, provincial seed planning zones were produced to reflect this improved resolution. It is the intent of MoF to make similar changes across the Province as more detailed mapping becomes available (personal communication, Leslie McAuley,).

Table 8.7 lists the final seed planning units for TFL 49.

Table 8.7 - TFL 49 seed planning units

Species	Zone A (< 1000 m)	Zone B (1000- 1300 m)	Zone C (1300 – 1400 m)	Zone D (> 1400 m)
Lodgepole pine	Pli TO Low	Pli TO Low	Pli TO Low	Pli TO High
Douglas-fir	Fdi NE Low	Fdi NE High	Fdi NE High	Fdi NE High
Western larch	Lw NE Low	Lw NE Low	none	none
Interior spruce	Sx TO Low	Sx TO Low	Sx TO High	Sx TO High

8.7.2 Genetic Gains for Managed Stands

Table 8.8 provides the published genetic gains for the applicable SPUs found in TFL 49. These were compiled from MoF Tree Improvement Branch species plans.

Table 8.8 - Tree improvement gains and seed availability

Species	Seed Planning Unit	Short-term Gain [(1)] (%)	Short-term Availability (% of SPU requirement)	Long-term Gain (%)	Long-term Availability (% of SPU requirement)
Lodgepole pine	Pli TO High	11	17%	16	100%
	Pli TO Low	9	18%	16	100%
Douglas-fir	Fdi NE High	22	0%	22	95%
	Fdi NE Low	26	0%	26	100%
Western larch	Lw NE Low	8	100%	12	100%
Interior spruce	Sx TO High	8	100%	15	100%
	Sx TO Low	8	100%	19	100%

[(1)] Percent gain in primary trait (stem volume).

For strategic analysis it is appropriate to use long-term genetic gain values. Modelling takes place over extended time frames (250 years) which means that the short-term values are usually of little importance. An exception to this is the case in which timber availability is very sensitive to specific height based short-term constraints which could be significantly affected by the genetic gains.

For timber supply analysis and resource sustainability modelling, managed stand yields should reflect long-term genetic worth values. This will result in an overestimate for the first few years only. Although Riverside has been using improved seed on the TFL since 1992, no genetic worth inputs to yield estimation would be appropriate for existing managed stands because the majority of those stands would not have been established with improved seed. This assumption will result in a small underestimate to the extent that improved materials have been used.

8.8 Operational Adjustment Factors for Managed Stands

Deductions for decay waste and breakage are inherent in VDYP forecasts based on the decay, waste and breakage factors for the assigned FIZ and special cruise. However when using BatchTIPSY (Version 2.1) operational adjustment factors (OAFs) will be 10% (OAF1) and 5% (OAF2). Operational adjustment factors are applied to TIPSY yields to reflect the difference between potential yields and operational conditions. The main sources of the difference are:

- Spatial arrangement of stems in the stand including regularity of spacing (clumpiness) and areas lacking trees (gaps);
- Non-commercial competition; and
- Loss of volume by pests, disease or waste and breakage.

TIPSY accounts for these adjustments using two adjustment factors. OAF1 is a magnitude adjustment across the entire age range of the curve to address items 1 and 2 listed above. An OAF2 reduction increases with advancing age and addresses item 3.

MoF Research Branch has recommended default values for OAF1 and OAF2 of 15% and 5% respectively, where no local data is available.

An OAF1 of 15% is used on TSA inventories which have non-productive polygons with minimum areas of 2 ha or greater. The TFL 49 inventory methodology accepts non-productive polygons to a minimum of 0.5 ha or less. Although 10% is not documented for TFL 49, it is conservative given the treatment of non-productive areas in the inventory. Table 8.9 presents the change in distribution of polygon size between the former inventory and the new vegetation inventory.

Table 8.9 - Number of inventory polygons by polygon size

Size Class	Number of Polygons 1996 VRI Inventory	Number of Polygons Pre-1996 Inventory (FIP)
0 – 0.5 ha	1898	65
0.51 - 1 ha	2337	129
1.1 - 2 ha	3687	385
2.1 - 5 ha	5496	1489
5.1 - 10 ha	3522	1905
10.1 - 15 ha	1557	1170
>15 ha	2493	2676
Non-productive Aggregate Polygons	n/a	250
Total	**20,990**	**8,069**

8.9 Silviculture Management Regimes

This section describes how each stand is regenerated after harvesting. In the management of TFL 49, both natural regeneration and planting are used. The current silviculture practices used on the TFL were considered for this analysis. It was found that clearcutting was used almost exclusively across the TFL. The planting species compositions and densities prescribed by Riverside for each ecological zone were used as inputs to the yield model.

Table 8.10 describes the silviculture regimes for managed stands based on Riverside information. Not all of these original regimes have been used to define future managed stand analysis units because they are too small to model in the analysis. Planting density listed in Table 8.10 indicates the expected density including infill, it is not necessarily the input to TIPSY.

Table 8.10 - Regeneration scheme

BEC Variant	Site Series (PEM)	Natural Regen (%)	Planted species	Natural Infill	Planting Density	Expected Species Distribution
ESSFdc2	1		Sx/Pli	Bl	1400	Pli60/Sx40
ESSFdc2	3		Pl	Bl	1200	PLI100
ESSFdc2	4		Sx/Pl	Bl	1200	PLi70/Sx30
ESSFdc2	5		Sx/Pl	Bl	1200	PLi60/Sx40
ESSFdc2	6		Sx/Pl	Bl	1400	PLi50/Sx50
ESSFdc2	7		Sx/Pl	Bl	1400	PLi50/Sx50
ESSFdc2	8		Sx/Pl	Bl	1400	PLi50/Sx50
ESSFxc	1		Sx/Pl	Bl	1400	Pli70/Sx30
ESSFxc	5		Pl	Sx Bl	1200	PLi60/Sx40
ESSFxc	6		Sx/Pl	Bl	1400	PLi60/Sx40
ESSFxc	7		Sx/Pl	Bl	1400	PLi60/Sx40
ICHmk1	1		Sx/Pl/Df/Lw	Cw/Bl	1400	Pli40/Sx30/Dfi30
ICHmk1	3		F/L/Pl	S/Bl/Cw	1200	Pli40/Sx30/Dfi30
ICHmk1	4		F/L/Pl	Sx/Bl/Cw	1400	Pli40/Sx30/Dfi30
ICHmk1	5		Pl/Sx	F/Lw/Cw/Bl	1400	Pli40/Sx30/Dfi30
ICHmk1	6		Pl/Sx	F/Lw/Cw/Bl	1400	Pli40/Sx30/Dfi30
IDFdk1	1		F/Pl	Lw/Py/Sx	1200/800	Pli70/Dfi30
IDFdk1	3	20	F/Pl	Py/Sx	1000/700	Pli70/Dfi30
IDFdk1	4	20	F/Pl	Py/Sx/Lw	1200/800	Pli70/Dfi30
IDFdk1	5		F/Sx	Bl/Pl/Lw	1200	Sx50/Dfi50
IDFdk1	6		F/Sx/Pl	Bl/Lw	1200	Sx70/Dfi30
IDFdk2	1		F/Pl	Lw/Py/Sx	1200/800	Pli70/Dfi30
IDFdk2	2	20	F/Pl	Py/Sx	1000/700	Py60/Dfi40
IDFdk2	3	20	F/Pl	Py/Lw	1200/800	Pli70/Dfi30
IDFdk2	4		F/Pl	Py/Sx/Lw	1400/1000	Pli70/Dfi30
IDFdk2	5		F/Sx/Pl	Bl/Cw/Lw	1400	Sx70/Dfi30
IDFmw1	1		F/Lw/Pl	Py/Cw/Sx/Bl	1400	Pli60/Dfi40
IDFmw1	2	20	F/Py	Pl/Lw	1000/800	PY60/Dfi40
IDFmw1	3	20	F/Py	Pl/Lw	1000/800	PY60/Dfi40
IDFmw1	4	20	F/Lw/Pl/Py	Cw/Sx	1200/800	Pli60/Dfi40
IDFmw1	5		F/Lw/Sx	Pl/Bl/Cw	1400	Sx50/Dfi50
IDFxh1	1		F/Py		1200/800	Fdi50/Py50

BEC Variant	Site Series (PEM)	Natural Regen (%)	Planted species	Natural Infill	Planting Density	Expected Species Distribution
IDFxh1	2					Fdi50/Py50
IDFxh1	3		Py	Fd	1000/600	Fdi50/Py50
IDFxh1	4		Py	Fd	1000/600	Fdi50/Py50
IDFxh1	5		Py	Fd	1000/600	Fdi50/Py50
IDFxh1	6		F/Py	Lw	1200	Fdi50/Py50
IDFxh1	7		F/Py	Lw	1200	Fdi50/Py50
IDFxh2	1		F/Py		1200/800	Fdi50/Py50
IDFxh2	3					Fdi50/Py50
IDFxh2	4		Py	Fd	1000/600	Fdi50/Py50
IDFxh2	5		F/Py		1200/800	Fdi50/Py50
IDFxh2	7		F/Py		1200	Fdi50/Py50
MSdm2	1	50	Pl/Sx	Bl/Fd/Lw	1400/1000	Pli90/Sx10
MSdm2	2					Pli90/Sx10
MSdm2	3	50	Fd/Pl	Bl/Sx	1200/800	Pli90/Dfi10
MSdm2	4	50	Pl	Fd/Sx/Bl/Lw	1400/1000	Pli90/Sx10
MSdm2	5		Pl/Sx	Bl/Fd/Cw/Lw	1400	Pli80/Sx20
MSdm2	6		Pl/Sx	Bl/Fd/Lw	1400	Pli60/Sx40
MSdm2	7		Pl/Sx	Bl	1200	Sx70/Pli30

8.10 Regeneration Delay

Regeneration delay is the time elapsed between harvesting and the establishment of a new stand of trees. The end of the regeneration delay is time zero for a yield table; it is the point in time when stand growth begins. Regeneration delay is two years for all species except Douglas-fir and natural pine which have a four year delay.

8.11 TIPSY Managed Stand Yield Tables

Existing and future managed stand yields were developed using MoF BatchTIPSY (Version 2.1). TIPSY incorporates the following inputs to generate a yield table for each analysis unit:

- Species mix;
- Initial density - based on TFL 49 silviculture survey results;
- Regeneration method (planting or natural);
- Treatments - all stands will be untreated (i.e. no thinning);
- Genetic worth (weighted average of the seed planning units in each analysis unit)s;
- Area-weighted average site index (with SIBEC);
- Area-weighted genetic gains (see Section 8.7);
- Operational adjustment factors (OAF1 = 10%, OAF2 = 5%); and
- No regeneration delay (delays are incorporated in forest level modelling).

Table 8.11 presents the managed stand analysis units, species and site index values that were input to TIPSY during yield curve preparation.

Table 8.11 - Managed stand analysis unit descriptions (TIPSY Inputs)

Analysis Unit	Description	THLB	Species Comp	Avg SI50	Genetic Gains			Method
					Sp1	Sp2	Sp3	
Existing	**Managed Stands**							
401	ESSFdc2-01-Bl	2,133	Bl61Sx26Pl13	17.7	0	0	0	P
402	ESSFdc2-01-Pl	1,957	Pl62Sx23Bl15	17.6	0	0	0	P
403	ESSFdc2-01-Sx	1,568	Sx66Bl21Pl13	17.6	0	0	0	P
404	ESSFdc2-03-Bl	45	Bl51Pl40Sx9	16.5	0	0	0	P
405	ESSFdc2-04/05-Bl	270	Bl59Sx26Pl15	16.0	0	0	0	P
406	ESSFdc2-04-Pl	140	Pl53Bl24Sx23	16.0	0	0	0	P
407	ESSFdc2-05-Pl	76	Pl71Bl18Sx11	15.9	0	0	0	P
408	ESSFdc2-06-Bl	706	Bl63Sx29Pl8	19.8	0	0	0	P
409	ESSFdc2-06-Pl	145	Pl67Sx18Bl15	19.8	0	0	0	P
410	ESSFdc2-06/07-Sx	250	Sx49Bl29Pl22	18.7	0	0	0	P
411	ESSFxc-01-Bl	379	Bl54Pl26Sx20	19.0	0	0	0	P
412	ESSFxc-01-Pl	138	Pl70Bl16Sx14	19.0	0	0	0	P
413	ESSFxc-01-Sx	231	Sx57Bl33Pl10	19.5	0	0	0	P
414	ESSFxc-05/06-Bl	288	Bl56Pl25Sx19	16.8	0	0	0	P
415	ESSFxc-06/05-Pl	153	Pl67Bl22Sx11	16.7	0	0	0	P
416	ICHmk1-01-Bl	218	Bl61Pl26Sx13	19.1	0	0	0	P
417	ICHmk1-01-Lw	98	Pl39Lw37Fd24	19.2	0	0	0	P
418	ICHmk1-01-Pl	681	Pl87Bl13	19.1	0	0	0	P
419	ICHmk1-01-Sx	312	Sx77Bl11Pl12	19.1	0	0	0	P
420	ICHmk1-03-Pl	65	Pl69Fd17Bl14	19.6	0	0	0	P
421	ICHmk1-04-Pl	276	Pl76Bl17Fd7	18.0	0	0	0	P
422	ICHmk1-05-Sx	193	Sx54Bl39Cw7	21.0	0	0	0	P
423	ICHmk1-05-Pl	44	Pl52Sx30Bl18	21.0	0	0	0	P
424	ICHmk1-06-Sx	148	Sx49Bl34Pl17	21.0	0	0	0	P
425	IDFdk1-01-Fd	1,112	Fd66Pl30Sx4	19.0	0	0	0	P
426	IDFdk1-01-Pl	3,641	Pl78Fd18Sx4	19.1	0	0	0	P
427	IDFdk1-03-Fd	157	Fd85Pl15	15.5	0	0	0	P
428	IDFdk1-03-Pl	106	Pl73Fd24Sx3	15.2	0	0	0	P
429	IDFdk1-05/04-Fd	47	Fd52Pl43Sx5	19.8	0	0	0	P
430	IDFdk1-05/06-Pl	537	Pl66Fd24Sx10	19.0	0	0	0	P
431	IDFdk2-01-Fd	167	Fd75Pl20Sx5	20.8	0	0	0	P
432	IDFdk2-01-Pl	972	Pl94Fd6	20.9	0	0	0	P
433	IDFdk2-03-Pl	195	Pl92Fd8	18.5	0	0	0	P
434	IDFdk2-04/05-Fd	69	Pl57Fd38Sx5	19.6	0	0	0	P
435	IDFmw1-01-Fd	143	Fd56Pl27Lw17	19.3	0	0	0	P
436	IDFmw1-01-Pl	292	Pl82Fd18	19.5	0	0	0	P
437	IDFmw1-03-Fd	72	Fd79Lw11Pl10	21.0	0	0	0	P
438	IDFmw1-04/05-Pl	132	Pl39Fd33Pl28	20.7	0	0	0	P
439	IDFxh1-Fd	106	Fd65Py26Pl9	17.1	0	0	0	P
440	IDFxh2-Fd	80	Fd77Pl12Py11	15.5	0	0	0	P
441	MSdm2-01-Bl	1,096	Bl57Sx21Pl22	19.1	0	0	0	P

Analysis Unit	Description	THLB	Species Comp	Avg SI50	Genetic Gains			Method
					Sp1	Sp2	Sp3	
442	MSdm2-01-Fd	223	Fd60Sx26Bl14	18.8	0	0	0	P
443	MSdm2-01-Pl	8,046	Pl80Bl11Sx9	19.1	0	0	0	P
444	MSdm2-01-Sx	1,538	Sx70Pl19Bl11	19.2	0	0	0	P
445	MSdm2-03-Pl	300	Pl88Bl7Fd5	16.8	0	0	0	P
446	MSdm2-04-Bl	423	Bl50Pl27Sx23	18.4	0	0	0	P
447	MSdm2-04-Fd	61	Fd47Bl27Sx26	18.6	0	0	0	P
448	MSdm2-04-Pl	3,024	Pl82Bl11Sx7	18.4	0	0	0	P
449	MSdm2-04-Sx	599	Sx64Pl22Bl14	18.4	0	0	0	P
450	MSdm2-05-Bl	60	Sx49Bl34Pl17	20.6	0	0	0	P
451	MSdm2-05-Pl	199	Pl72Sx18Bl10	20.8	0	0	0	P
452	MSdm2-06/07-Sx	104	Sx52Pl27Bl21	21.9	0	0	0	P
453	MSdm2-06/07-Pl	69	Pl66Bl19Sx15	21.4	0	0	0	P
Future	**Managed Stands**							
501	ESSFdc2-01-PlSx	16,742	Pl60Sx40	17.7	16	15	0	P
502	ESSFdc2-02/03-Pl	216	Pl100	17.2	0	0	0	P
503	ESSFdc2-04-PlSx	883	Pl70Sx30	16.0	16	15	0	P
504	ESSFdc2-05-PlSx	627	Pl60Sx40	16.0	16	15	0	P
505	ESSFdc2-06-PlSx	4,265	Pl50Sx50	19.8	16	15	0	P
506	ESSFdc2-07-PlSx	213	Pl50Sx50	17.3	16	15	0	P
507	ESSFdc2-08/09-PlSx	249	Pl50Sx50	17.2	16	15	0	P
508	ESSFxc/a-01-PlSx	1,766	Pl70Sx30	18.9	16	15	0	P
509	ESSFxc-05-PlSx	635	Pl60Sx40	17.0	16	0	0	P
510	ESSFxc-06-PlSx	1,795	Pl60Sx40	16.9	16	15	0	P
511	ESSFxc-07/08-PlSx	214	Pl60Sx40	15.9	16	15	0	P
512	ICHmk1-01-PlSxFd	4,193	Pl40Sx30Fd30	19.0	16	18	25	P
513	ICHmk1-02/03-PlSx	485	Pl60Sx40	20.6	16	0	0	P
514	ICHmk1-04-PlSxFd	1,781	Pl40Sx30Fd30	18.0	16	0	25.7	P
515	ICHmk1-05-PlSxFd	611	Pl40Sx30Fd30	20.9	16	17.1	0	P
516	ICHmk1-06/07-PlSxFd	311	Pl40Sx30Fd30	21.0	16	17.2	0	P
517	IDFdk1-01-PlFd	14,720	Pl70Fd30	19.1	16	26	0	P
518	IDFdk1-03/02-PlFd	1,596	Pl70Fd30	15.4	13	21	0	P
519	IDFdk1-04-PlFd	909	Pl70Fd30	17.1	16	26	0	P
520	IDFdk1-05-SxFd	2,100	Sx50Fd50	19.6	19	26	0	P
521	IDFdk1-06-SxFd	183	Sx70Fd30	15.6	19	26	0	P
522	IDFdk2-01-PlFd	3,472	Pl70Fd30	20.9	16	26	0	P
523	IDFdk2-02-PyFd	81	Py60Fd40	18.0	0	21	0	P
524	IDFdk2-03-PlFd	1,310	Pl70Fd30	18.5	13	21	0	P
525	IDFdk2-04-PlFd	104	Pl70Fd30	18.6	16	26	0	P
526	IDFdk2-05/06-SxFd	219	Sx70Fd30	19.8	19	26	0	P
527	IDFmw1-01-PlFd	6,529	Pl60Fd40	19.4	16	26	0	P
528	IDFmw1-02-PyFd	369	Py60Fd40	21.0	0	21	0	P
529	IDFmw1-03-PyFd	1,564	Py60Fd40	20.8	0	21	0	P
530	IDFmw1-04-PlFd	468	Pl60Fd40	20.5	13	21	0	P
531	IDFmw1-05/06-SxFd	425	Sx50Fd50	21.0	19	26	0	P

Analysis Unit	Description	THLB	Species Comp	Avg SI50	Genetic Gains			Method
					Sp1	Sp2	Sp3	
532	IDFxh1-01-FdPy	2,710	Fd50Py50	18.6	26	0	0	P
533	IDFxh1-02-FdPy	64	Fd50Py50	16.6	0	0	0	N
534	IDFxh1-03-FdPy	412	Fd50Py50	15.9	0	0	0	P
535	IDFxh1-04-FdPy	142	Fd50Py50	18.2	0	0	0	P
536	IDFxh1-05-FdPy	146	Fd50Py50	18.5	0	0	0	P
537	IDFxh1-06-FdPy	255	Fd50Py50	18.4	26	0	0	P
538	IDFxh1-07/08-FdPy	109	Fd50Py50	18.0	26	0	0	P
539	IDFxh2-01-FdPy	806	Fd50Py50	16.8	26	0	0	P
540	IDFxh2-03/02-FdPy	546	Fd50Py50	15.2	0	0	0	N
541	IDFxh2-04-FdPy	972	Fd50Py50	15.0	0	0	0	P
542	IDFxh2-05/06-FdPy	202	Fd50Py50	16.0	26	0	0	P
543	IDFxh2-07/08-FdPy	59	Fd50Py50	15.6	26	0	0	P
544	MSdm2-01-PlSx	34,106	Pl90Sx10	19.1	8	8	0	P
545	MSdm2-02-PlSx	92	Pl90Sx10	19.2	0	0	0	N
546	MSdm2-03-PlFd	1,421	Pl90Fd10	16.8	8	12	0	P
547	MSdm2-04-PlSx	8,987	Pl90Sx10	18.4	8	0	0	P
548	MSdm2-05-PlSx	2,371	Pl80Sx20	20.8	16	17	0	P
549	MSdm2-06-PlSx	1,201	Pl60Sx40	21.6	16	17	0	P
550	MSdm2-07-SxPl	119	Sx70Pl30	19.2	16.7	16	0	P

Some gains have been reduced to reflect the contribution of natural regeneration to the managed stand.

8.12 Silviculture History

All stands age 35 or younger are assigned to managed stand yield curves, reflecting the silviculture history of the TFL. Site preparation and planting began on the TFL in 1971. Stands older than 35 years will be assigned to the appropriate VDYP natural stand yield table for input to the simulation model. All regenerated stands, natural or planted will be assigned to managed stand yields reflecting adherence to minimum stocking standards.

8.12.1 Immature Managed Stands

Table 8.12 summarizes the immature inventory on the TFL by leading species and 5-year age class.

Table 8.12 - Immature inventory by leading species and 5-year age class

Leading Species	Area by 5-Year Age Class (ha)							
	0 –5	**6 – 10**	**11 – 15**	**16 –20**	**21 – 25**	**26 –30**	**30 – 35**	**Total**
No species	2,884	0	0	0	0	0	0	2,884
Balsam	85	329	941	839	1,249	697	1,187	5,326
Cedar	0	0	25	0	0	0	0	25
Douglas-fir	172	185	313	203	451	376	465	2,164
Larch	4	26	45	26	29	1	0	132
Lodgepole pine	2,794	3,903	3,815	3,353	3,286	907	69	18,128
Ponderosa pine	13	1	27	21	0	0	0	62
Spruce	331	440	1,230	1,486	582	552	261	4,882
Deciduous	24	203	600	633	668	326	61	2,515
Total	**6,307**	**5,087**	**6,997**	**6,560**	**6,266**	**2,858**	**2,043**	**36,118**

A portion of the area with "No species" is not satisfactorily restocked (NSR). Some of the inventory labels from recently harvested and re-planted areas were incomplete, so they do not show a leading species.

8.12.2 Not Satisfactorily Restocked Areas

The inventory shows 1,563 ha of recently logged stands as not satisfactorily restocked NSR. These NSR areas have species and age data based on stand survey or photo-interpretation. Site index is based on the SIBEC information outlined in Section 8.2. These areas are assigned age zero for modelling.

9.0 PROTECTION

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

For MP No. 3, NRLs were estimated using a prorating of the figures reported in the Okanagan Shuswap LRMP Analysis Data Package using the net operable hectares of the TFL. For the current MP No. 4 analysis these same estimates will be used for insects, wind damage, and wildfire.

Although there was measurable damage from the Cedar Hill fire in 2003, the salvage from that area accounted for a large portion of the affected timber. In addition, this has been the only fire where some losses have been encountered. In most cases the damaged timber has been recovered. A review of the long-term fire history indicates that fires on TFL 49 do not occur frequently.

Therefore non-recoverable losses attributed to wildfire will remain at 0 m^3/yr for the analysis.

The annual unsalvaged losses are summarized in Table 9.1. In total, 15,600 m^3/yr will be discounted from the annual harvest levels indicated in the timber supply model.

Table 9.1 - Estimated non-recoverable losses

Loss Agent	Estimated NRL (m^3/yr)
Insects	12,800
Wind damage	2,800
Wildfire	0
Total	**15,600**

10.0 INTEGRATED RESOURCE MANAGEMENT

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

10.1 Forest Resource Inventories

A complete summary of the non-timber resource inventories along with approximate dates of completion and approvals are presented in Section 5.3.

10.2 Forest Cover Objectives – Rationale

The analysis will apply forest cover objectives to model wildlife habitat guidelines, biodiversity, hydrologic green-up, and visual quality objectives. Silvicultural green-up requirements will be explicitly modelled as part of the 20-year Spatial Feasibility Analysis, described under separate cover.

The use of forest cover objectives improves forest management modelling by ensuring that non-timber resources are given appropriate consideration. Cover constraints are applied at different levels of spatial resolution depending on the REA in question.

Forest cover objectives place maximum and/or minimum limits on the amount of young second growth and/or old growth found in land base aggregates (LU-BEC/NDTs and REAs). The land base aggregates defined for this analysis were previously discussed in Section 7.0. Timberline's proprietary simulation model CASH6 defines the following three classes of forest cover constraint for modelling management objectives within each land base aggregate.

1. Disturbance: the maximum area that can be younger than a specified age or shorter than a specified height. This is intended to model cutblock adjacency and green-up requirements.
2. Mature retention: the minimum proportion of area that must be retained over a lower retention age. This is intended to model thermal cover for wildlife or mature biodiversity requirements. Mature and old growth retention forest cover objectives overlap and area that qualifies for both is counted in both.
3. Old-growth retention: the minimum area that must be older than, or as old as, a specified age. This is intended to model both retention of cover and retention of old growth.

A summary of forest cover constraints that will be assigned to the REAs in the timber supply analysis is provided in Table 10.1.

Table 10.1 - Forest cover requirements – Base Case

Resource Emphasis Area	Maximum Disturbance	Minimum Old Retention
Visual Management Zone 1:		
Retention visual quality	See Table 10.2	n/a
Partial retention visual quality	See Table 10.2	n/a
Modification visual quality	See Table 10.2	n/a
Lakeshore Management Zones:		
Class A	See Table 10.3	n/a
Class B	See Table 10.3	n/a
Class C	See Table 10.3	n/a
Class D	See Table 10.3	n/a
Class E	See Table 10.3	n/a
Community Watersheds:		
Hope Creek	30% of PFLB < 6 m	n/a
Lambly Creek	34% of PFLB < 6 m	n/a
Norris Creek	30% of PFLB < 6 m	n/a
Powers Creek	42.5% of PFLB < 6 m	n/a
Silver Creek	30% of PFLB < 6 m	n/a
Integrated Resource Management	33% of THLB < 2 m	n/a
Bighorn Sheep	n/a	33% of PFLB > 16 m
Mule Deer Winter Range:		
Shallow snowpack zone	30% < 20 years	15% of PFLB > 140 yrs
OK_Wside_Mod snowpack - THLB	n/a	15.5% > 175 yrs
OK_Wside_Mod snowpack - NTHLB	n/a	15.5% > 120yrs
OK_Wside_Mod snowpack - IDFmw	n/a	31.0% > 175 yrs
Trepanier_Mod snowpack - THLB	n/a	12.2% > 120yrs
Trepanier_Mod snowpack - NTHLB	n/a	14.7% > 175 yrs
Trepanier_Mod snowpack - IDFmw	n/a	29.8% > 175 yrs
U_Salmon_Mod snowpack - THLB	n/a	16.5% > 175 yrs
U_Salmon_Mod snowpack - NTHLB	n/a	16.5% > 175 yrs
Deep snowpack zone	n/a	60% of PFLB > 100 yrs
Mountain Goat Winter Plateau Habitat	33% of PFLB < 33 yrs	150-yr rotation (100 for Pl)
Moose Winter Habitat:	n/a	33% of PFLB > 16 m

PFLB = productive forest land base

NTHLB = (productive) non-timber harvesting land base

If no disturbance constraint is specified a default of 33% of THLB < 2 metres will be applied. Descriptions of each forest cover requirement for the resource emphasis areas listed in Table 10.1 are described in the following sections.

10.2.1 Visual Quality Objectives

Visual management zone 1, as defined by the OS-LRMP, has established VQOs (Section 7.1.1). Cover constraints for these known scenic areas are outlined in the *Visual Management RMZ* section and *Visual Quality Guidelines* (Appendix VI) of the OS-LRMP document. These guidelines provide a range of management options for achieving the various VQOs through appropriate silvicultural systems, visually effective green-up (VEG) heights, basal area retention levels and harvestable percentages all as a function of visual absorption capacity (VAC) and viewing distance.

At this time, viewing distance is not available as an input to this timber supply analysis. Therefore a "midground" viewing distance (1 – 8 km) is assumed in developing forest cover constraints to address visual quality. Table 10.2 summarizes the constraints for each VQO-VAC combination that occurs within visual management zone 1 on TFL 49. The cover constraints will be applied at the level of individual scenic area polygons.

Table 10.2 - Visual quality cover constraints

VQO	VAC	LRMP % Visible Planimetric Alteration	LRMP VEG Height (m)
Retention	L	10	5
Retention	M	15	4
Retention	H	20	3
Partial Retention	L	15	5
Partial Retention	M	20	4
Partial Retention	H	25	3
Modification	L	25	5
Modification	M	30	4
Modification	H	35	3

10.2.2 Lakeshore Management Zones

The *OS-LRMP Visual Quality Guidelines* also provide direction for the integration of visual quality and lake classification guidelines. As this aspect of the *OS-LRMP Visual Quality Guidelines* is still under discussion, this analysis will adopt the constraints shown in Table 10.3. These constraints were developed by the Ministry of Forests to support the AAC determination for the Okanagan TSA (McRae, 2001; Pedersen, 2001). The cover constraints will be applied at the level of individual LMZ polygons.

Table 10.3 - Lakeshore management zone (LMZ) cover constraints

LMZ Class	VQO	VAC	LMZ % Visible Planimetric Alteration	LMZ-VEG Height (m)
A	P	L	3.5	6.5
A	P	M	4.0	5.5
A	P	H	4.5	4.5
B	R	L	7.5	6.5
B	R	M	10.0	5.5
B	R	H	12.5	4.5
C	PR	L	12.5	6.5
C	PR	M	15.0	5.5
C	PR	H	17.5	4.5
D	M	L	13.8	6.5
D	M	M	17.5	5.5
D	M	H	21.3	4.5

In addition to the LMZs, Blackwell Lake special status area will be modelled with the constraints listed for "LMZ-B" with moderate VAC.

10.2.3 Community Watersheds

Minimum heights for hydrologic green-up within the community watersheds are based on information provided by Riverside, and are consistent with values used in recent analyses on the Okanagan TSA. Current management practice within community watersheds is to limit harvesting to a maximum equivalent clearcut area, based on the total forested area within each watershed. This is within the limits provided in the IWAPs completed for the watersheds within TFL 49. In the absence of a recommended ECA limit, a maximum of 30% disturbance will be modelled in the analysis.s

10.2.4 Integrated Resource Management

The OS-LRMP defines the minimum silvicultural green-up height within the Integrated Resource Management zone as 2 metres[7]. No more than one third of the THLB is allowed to be less than this height at any given time. This disturbance constraint will be applied within each landscape unit to help distribute the harvesting activity across the TFL land base.

10.2.5 Bighorn Sheep

Habitat objectives are outlined in Part 4 of the OS-LRMP. Important habitat types are lambing grounds, escape terrain, and winter and spring ranges. Forested cover is necessary for thermal shelter and snow interception cover[8].

Timber supply analysis can address the forest cover requirement of maintaining at least 33% of the productive forest land base at a height of 16 metres[9]. These areas can include productive forest areas outside the THLB, with the exception of stocking class 4 and low crown closure (< 30%) stands.

[7] OS-LRMP, Part 3, page TIMBER 3-5

[8] OS-LRMP, Part 4, page WILDLIFE_BIGHORN 4-1

[9] OS-LRMP, Part 4, page WILDLIFE_BIGHORN 4-6

10.2.6 Mule Deer Winter Habitat

The OS-LRMP defines relatively complex operational management objectives for maintaining stands suitable for snow interception cover within both the moderate and shallow snowpack zones[10]. Based on OS-LRMP definitions, TFL 49 snowpack zones are defined by BEC variant as follows:

- Shallow – IDFxh1;
- Deep – ICH; and
- Moderate – all other BEC variants.

Within the shallow snowpack zone, at least 15% of the PFLB will be retained in stands older than 140 years of age.

The overall requirement for retention of snow interception cover within the moderate snowpack zone is 33% of the productive forested area. However, in BEC variants other than IDFmw1 and IDFmw2, up to 50% of that requirement is to be located on the productive-but-excluded portion of the land base (*i.e.* the non-timber harvesting land base, or NTHLB). In the IDFmw1 and IDFmw2 BEC variants, there is no upper limit on the contribution that can be located within the NTHLB.

In both these cases, stands providing adequate snow interception cover must meet the following criteria:

- Species composition ≥ 50% Douglas-fir;
- Age ≥ 120 years;
- Crown closure ≥ 4 in all BEC variants except IDFmw1 and IDFmw2,
  ≥ 5 in IDFmw1 and IDFmw2; and
- Slope < 80%.

Furthermore, the OS-LRMP stipulates that, where the moderate snowpack zone is directly linked to the shallow snowpack zone, the percent retention target in that portion of the moderate snowpack zone is reduced to the area-weighted average of the two areas. The reduced target percentage in the moderate snowpack zone is not permitted to fall below 20% except in the case where the moderate snowpack portion of the assessment unit is less than 10% of the whole (in which case the entire unit will be managed as a shallow snowpack zone).

A significant portion of the moderate snowpack zone deer wintering within TFL 49 is contiguous with the shallow snowpack zone. This distinction effectively divides the moderate snowpack zone into a "linked" portion and an "isolated portion". Each "linked" winter range polygon in the subzone will be evaluated to determine their proportion of the combined area of the two polygons, and the nominal 33% target value will be reduced according to the rules outlined in the preceding paragraph. This step of the analysis will look at the complete polygons as defined in the OS-LRMP spatial data (*i.e.*, irrespective of the TFL boundary). At this stage, each polygon within the "isolated" portion of the moderate snowpack zone will be assigned the full 33% retention target value.

The resultant database (within the TFL boundary) will then be examined to determine the contributions of acceptable cover (according to the above criteria) that can be located in the NTHLB. The retention target percentages of both "linked" and "isolated" moderate snow pack zone polygons will be further reduced to account for only the area required from the THLB component of each polygon. Finally, an area-weighted average retention percentage will be calculated for each of the "linked" and "isolated" portions of the moderate snowpack REA, from the individual polygon THLB retention targets. In the final timber supply analysis, the respective area-weighted retention targets will be applied to the THLB portion of the "linked" and "isolated" moderate snowpack zones in aggregate.

10.2.7 Mountain Goat Winter Habitat

Two of the OS-LRMP management objectives for the mountain goat RMZ have potential timber supply implications. Objective 3.1 limits the early seral component (0-33 years) within the forested plateau

[10] OS-LRMP, Part 4, page WILDLIFE_MDEER 4-6

portion of the winter/natal goat habitat to 33 % of the area as identified on the Mountain goat habitat RMZ map provided with the OS-LRMP[11].

For winter/natal range areas in general, Objective 3.2 requires either selective harvesting systems to achieve 50% basal area retention or clearcut-harvesting with a maximum block size of five hectares and "a three pass system over a 150 year rotation (100 years for lodgepole pine)"[12]. Stands within the mountain goat area were assigned extended rotation ages to reflect this management requirement.s

The mountain goat winter range areas lying within TFL 49 are all classified in the OS-LRMP spatial data as plateau habitats, therefore the cover constraint implied by Objective 3.1 applies. Since Objective 3.2 applies to winter/natal range habitats in general, the harvest block design developed for this analysis will impose a maximum block size of five hectares throughout the winter range portion of the Mountain goat RMZ.

10.2.8 Moose Winter Habitat

The OS-LRMP requires the maintenance of "a minimum of 15% of the net forested land base in young forests"[13]. Young forests are defined as less than 25 years in the IDF and ICH BEC zones, and less than 35 years in the MS and ESSF zones. This constraint cannot be explicitly modelled and was therefore not listed in Table 10.1. However, it will be monitored during the analysis scenarios.

The OS-LRMP also requires "a minimum of 33% of the stands in moose winter range at least 16 metres in height"[14] to provide thermal cover, where the percentage target refers to the productive forested land base (PFLB). This will be converted to a minimum age requirement based on the stand types within the moose winter habitat on the TFL. Note that, while the requirement for early seral habitat operates at the BEC zone level, the thermal cover requirement applies to the moose winter range RMZ as a whole.

10.3 Biodiversity

10.3.1 Landscape-level Biodiversity

Biodiversity planning is done in accordance with the OS-LRMP (Part 3: Ecosystem Management – Forests) and with the FPC *Landscape Unit Planning Guide* (LUPG). Three of the landscape units defined for the Okanagan Timber Supply Area through the OS-LRMP intersect TFL 49 (see Table 7.4). The OS-LRMP has established specific area targets for old growth retention and recruitment from the THLB and NTHLB components of each LU–BEC variant combination[15], as shown in Table 10.4. These targets are intended to guide the delineation of old growth management areas (OGMAs) throughout the OS-LRMP catchment area.

[11] OS-LRMP, Part 4, page WILDLIFE_GOAT 4-4

[12] OS-LRMP, Part 4, page WILDLIFE_GOAT 4-4

[13] OS-LRMP, Part 4, page WILDLIFE_MOOSE 4-2

[14] OS-LRMP, Part 4, page WILDLIFE_MOOSE 4-3

[15] OS-LRMP, Part 3, page EM-FOREST 3-11

Table 10.4 - OS-LRMP old growth retention targets

Landscape Unit	Provincial BEC/NDT	Old Seral Target (ha), THLB			Old Seral Target (ha), NTHLB		
		Reserve	Recruitment	Total	Reserve	Recruitment	Total
Okanagan Westside	ESSFdc2/NDT3	137		137	236		236
	ESSFxc/NDT3			0	27		27
	ICHmk2/NDT3	215		215	39		39
	IDFmw1/NDT4	0	0	0	0	346	346
	IDFxh1/NDT4	53	5	58			0
	MSdm2/NDT3	86		86	57	174	231
Trepanier	ESSFdc2/NDT3			0	364		364
	ESSFxc/NDT3			0	110		110
	IDFdk2/NDT4		183	183		67	67
	IDFmw1/NDT4			0		128	128
	IDFxh1/NDT4		78	78		15	15
	MSdm2/NDT3	254		254	92	548	640
	PPxh1/NDT4		42	42			0
Upper Salmon	ESSFdc2/NDT3			0	286		286
	ESSFxc/NDT3	166		166	68	26	94
	IDFdk1/NDT4	65	301	366		169	169
	IDFdk2/NDT4	71	291	362		148	148
	IDFmw2/NDT4	14	99	113		3	3
	IDFxh1/NDT4			0		1	1
	IDFxh2/NDT4`	80	59	139		15	15
	MSdm2/NDT3	546		546	95		95
	MSxk/NDT3	13		13	40	270	310

Since geo-referenced OGMAs have not yet been designated, this analysis will translate the OS-LRMP area targets into old seral cover retention constraints expressed as a percentage of the appropriate LU-BEC unit area. The Provincial BEC variants will be used to model landscape level biodiversity, which differ somewhat from the PEM BEC classification. This will allow the OS-LRMP targets to be modelled explicitly.

The reserve and recruitment targets have been summed for the NTHLB and THLB components, respectively, in each LU-BEC unit as listed in Table 10.4. Using the resultant analysis database the total old seral targets are expressed as percentages of the total area of each land base component in each LU-BEC unit. These percentage values are assumed to represent the underlying intent of the OS-LRMP targets with respect to proportional representation of each LU-BEC unit.

Old seral stages as defined by the LUPG, are summarized in Table 10.5. The full old seral retention targets will be applied to the THLB portion of each LU-BEC unit for the entire duration of the planning horizon.

Table 10.5 - Old seral definitions

Natural Disturbance Type	BEC Zone	Old (yrs)
NDT 2	ICH	> 250
NDT 3	ICH	> 140
	ESSF	> 140
	MS	> 140
NDT 4	IDF	> 250

10.3.2 Stand-level Biodiversity

After other land classification is complete additional reductions to the timber harvesting land base may be required to provide sufficient reserves of productive timber for wildlife at the site-specific level. These small reserves are also referred to as wildlife tree patches (WTPs).

Existing wildlife tree patches on TFL 49 have been mapped, and are incorporated into the spatial resultant database for this analysis. These WTPs were removed from the THLB as part of the land base classification process described in Chapter 6. However, these patches are not consistently identified and are insufficient to meet stand level biodiversity requirements across the TFL.

In order to identify the THLB area requiring additional WTP reserves, all areas removed from the productive forest land base were identified in the GIS dataset, and were buffered by 250 meters (half the maximum acceptable distance between WTPs). Those portions of the THLB remaining outside the buffered area were deemed to be subject to wildlife tree retention requirements. Yield table reductions were chosen over area reductions in order to maintain the integrity of the spatial analysis. Table 10.6 summarizes the areas and calculations used to develop the stand level biodiversity reductions. The "Net WTP Retention %" will be applied to the yield table volumes, which were developed using BEC classification.

Table 10.6 - Wildlife tree retention requirements

Landscape Unit	BEC Subzone	Productive Area (ha) (a)	THLB (ha) (b)	THLB Logged (ha) (c)	THLB Logged (%) (d) = (c/b)	Available (%) (e) = (b/a)	THLB Area > 250m from WTP (f)	Ratio of THLB > 250 to Productive (g) = (f/b)	Gross WTP Retention % from FPC (h)	Net WTP Retention % (g*h)
Okanagan Westside	ESSFdc	8,775	8,399	2,916	34.7	95.7	4,954	0.56	9	5.0
	ESSFxc	831	734	257	35.0	88.4	467	0.56	9	5.0
	ICHmk	5,318	5,012	1,282	25.6	94.2	3,436	0.65	9	5.9
	IDFmw	7,860	6,956	1,136	16.3	88.5	3,246	0.41	8	3.3
	IDFxh	1,145	963	71	7.4	84.1	446	0.39	6	2.3
	MSdm	6,815	6,438	2,338	36.3	94.5	4,292	0.63	10	6.3
Trepanier	ESSFdc	9,175	8,739	3,658	41.9	95.2	5,353	0.58	10	5.8
	ESSFxc	2,341	2,200	1,234	56.1	94.0	1,163	0.50	12	6.0
	IDFdk	5,699	5,178	2,572	49.7	90.8	2,538	0.45	11	5.0
	IDFmw	1,356	1,220	328	26.9	89.9	721	0.53	9	4.8
	IDFxh	1,852	1,597	402	25.2	86.2	941	0.51	9	4.6
	MSdm	19,561	18,411	7,630	41.4	94.1	10,897	0.56	10	5.6
	PPxh	835	689	105	15.2	82.5	491	0.59	7	4.1
Upper Salmon	ESSFdc	5,630	5,405	1,718	31.8	96.0	3,704	0.66	9	5.9
	ESSFxc	5,445	5,198	1,104	21.2	95.5	3,919	0.72	8	5.8
	IDFdk	23,407	21,983	10,037	45.7	93.9	10,747	0.46	11	5.1
	IDFmw	2,630	2,432	402	16.5	92.5	1,477	0.56	8	4.5
	IDFxh	3,460	3,217	813	25.3	93.0	2,094	0.61	9	5.5
	MSdm	13,454	12,601	4,794	38.0	93.7	7,085	0.53	10	5.3
	MSxk	6,848	6,386	1,033	16.2	93.3	3,328	0.49	8	3.9
Total		**132,435**	**123,757**	**43,832**			**71,299**			**5.2 (average)**

10.3.3 Enhanced Riparian Reserves

The enhanced riparian reserve (ERR) budget for TFL 49 is 1,236 hectares, of which 120 hectares is allocated to the BCTS. There are approximately six hectares of explicitly mapped ERRs (as part of the Armstrong division WTP coverage) that will be removed from the THLB. The OS-LRMP requires a 10-metre RRZ on S5 streams, as well as on S4 fish bearing streams in low windthrow areas, which are allowed to drawdown the ERR budget. In addition, the land base area reductions associated with S4 and S5 RMZs (based on basal area retention requirements) will also contribute to the ERR budget.

There are approximately 192 km of classified S5 streams in the TFL, which would contribute 304 hectares towards this budget. There are also about 89 km of known or assumed S4 fish bearing streams that, assuming them to all be in low windthrow areas, contribute another 399 hectares to the ERR budget. The method to determine and assign the remaining ERR budget is outlined below.

Total ERR requirement for TFL 49:	1,236 ha
less WTP (6 ha), S4 (304 ha) and S5 (399 ha) credit:	- 708 ha
Additional ERR required:	527 ha
Area of existing stream RRZ and RMZ:	2,542 ha
Add ERR requirement:	+ 527 ha
Total riparian reductions for streams:	3,069 ha
Factor to be applied to existing riparian buffers (3,069 / 2,542):	1.20

Therefore all stream buffers were increased by a factor of 1.2 to account for ERR requirements. At this time, the location of the ERR is not known. However, by distributing the ERR budget across all stream RRZs, it is being assigned to areas which could potentially become part of the ERR.

10.4 Cultural Heritage Resources

There are no known cultural heritage resources with any associated timber supply impact within the boundaries of TFL 49.

10.5 Timber Harvesting

10.5.1 Minimum Harvest Age

Minimum harvest ages for all AUs were modelled as the age at which stand volume achieves at least 95% of its culmination mean annual increment (MAI). The 95% culmination age was determined as the youngest age at which the MAI was greater than 95% of the culmination MAI Culmination is defined as the point where volume less decay, waste and breakage is maximized to one decimal place. This is a reasonable approach to avoid excessively high culmination ages resulting from small increases in MAI, but still ensures that the productive capacity of the land base is being utilized.

Tables 10.7 and 10.8 summarize the minimum harvest age attributes for the VDYP natural stand yield tables. The "Modelling OAF" value represents the reduction to the yield table for WTPs that has been assigned to the yield tables prior to input to CASH6.2. The deciduous (non-merchantable) content of a stand can contribute to the WTP requirement, and the Modelling OAF has been reduced to reflect deciduous trees in the stand. Volume reported in the Tables 10.7 – 10.10 is net of deciduous, but has not been reduced for WTPs with the Modelling OAF.

Table 10.7 - Minimum harvest age attributes for VDYP thrifty natural stands

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
1	ESSFdc2-01-Bl-G	469	80	28.0	21.4	184	2.25	5.9
2	ESSFdc2-01-Bl-M	807	110	29.1	21.3	192	1.70	5.9
3	ESSFdc2-01-Bl-P	674	130	28.0	17.9	144	1.09	5.9
4	ESSFdc2-01-Pl-G	5	80	23.5	21.9	195	2.38	5.9
5	ESSFdc2-01-Pl-M	81	90	22.0	20.4	206	2.22	5.9
6	ESSFdc2-01-Pl-P	161	110	21.6	17.8	162	1.43	2.9
7	ESSFdc2-01-Sx-G	54	80	28.2	24.6	211	2.57	0.9
8	ESSFdc2-01-Sx-M	88	110	29.3	23.3	207	1.84	5.9
9	ESSFdc2-01-Sx-P	12	160	31.3	22.0	177	1.08	5.9
10	ESSFdc2-02/03-Pl	39	90	22.7	18.3	172	1.89	5.9
11	ESSFdc2-04-Bl	115	120	29.3	20.7	187	1.52	5.9
12	ESSFdc2-04-Pl-M	11	100	23.7	20.2	187	1.81	5.9
13	ESSFdc2-04-Pl-P	20	100	21.7	16.9	142	1.40	5.9
14	ESSFdc2-04-Sx	4	130	29.0	22.1	190	1.43	5.9
15	ESSFdc2-05-Bl	95	110	28.5	18.7	147	1.31	5.9
16	ESSFdc2-05-Pl-M	11	90	21.6	19.8	192	2.09	5.9
17	ESSFdc2-05-Pl-P	17	130	27.3	20.5	184	1.38	5.9
18	ESSFdc2-06-Bl-G	271	80	27.2	20.1	174	2.14	5.9
19	ESSFdc2-06-Bl-M	106	110	28.9	20.4	174	1.55	5.9
20	ESSFdc2-06-Bl-P	138	140	29.9	19.4	159	1.10	5.9
21	ESSFdc2-06-Pl-G	3	70	20.8	20.7	209	2.88	5.9
22	ESSFdc2-06-Pl-M	7	80	20.4	20.0	206	2.51	5.9
23	ESSFdc2-06-Sx-G	42	100	29.6	25.5	262	2.54	5.9
24	ESSFdc2-06-Sx-M	246	110	29.2	24.0	232	2.04	5.9
25	ESSFdc2-06-Sx-P	58	130	31.1	22.3	182	1.37	5.9
26	ESSFdc2-07-Sx	26	110	29.6	22.1	188	1.66	5.9
27	ESSFdc2-08-Bl	30	120	30.4	20.9	167	1.36	5.9
29	ESSFxc-01-Bl-M	54	120	29.0	21.2	192	1.56	6.0
30	ESSFxc-01-Bl-P	51	130	28.5	19.9	173	1.30	6.0
32	ESSFxc-01-Pl-M	11	80	20.1	17.6	167	2.02	6.0
33	ESSFxc-01-Pl-P	2	110	20.3	16.1	141	1.24	6.0
34	ESSFxc-01-Sx-M	21	110	28.3	23.2	210	1.85	6.0
35	ESSFxc-01-Sx-P	4	120	28.9	22.8	206	1.67	6.0
36	ESSFxc-05-Bl	32	110	28.5	20.7	186	1.64	6.0
37	ESSFxc-05-Pl-M	40	100	22.6	19.8	197	1.90	6.0
38	ESSFxc-05-Pl-P	18	110	20.3	16.1	142	1.25	6.0
39	ESSFxc-05-Sx	93	130	29.1	22.4	203	1.53	6.0

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
40	ESSFxc-06-Bl-M	71	100	27.8	20.4	179	1.77	6.0
41	ESSFxc-06-Bl-P	14	130	28.0	19.7	175	1.32	6.0
42	ESSFxc-06-Pl-M	8	100	21.5	19.9	211	2.05	6.0
44	ESSFxc-06-Sx-M	5	120	28.4	24.7	273	2.22	6.0
45	ESSFxc-06-Sx-P	25	120	28.6	22.7	202	1.64	6.0
46	ESSFxc-07/08-Sx-M	38	100	27.9	21.2	187	1.83	6.0
47	ESSFxc-07/08-Sx-P	19	140	31.2	23.1	207	1.43	6.0
48	ICHmk1-01-Bl-G	247	80	29.4	23.6	208	2.53	5.9
49	ICHmk1-01-Bl-M	74	100	27.9	19.6	173	1.70	5.9
50	ICHmk1-01-Bl-P	19	130	29.3	19.3	158	1.19	5.9
51	ICHmk1-01-Fd-G	376	100	30.9	26.9	261	2.52	5.9
52	ICHmk1-01-Fd-M	323	110	30.8	24.0	188	1.67	5.9
53	ICHmk1-01-Fd-P	38	130	30.9	20.3	127	0.95	3.9
54	ICHmk1-01-Pl-G	27	70	21.7	20.2	173	2.38	5.9
55	ICHmk1-01-Pl-M	117	90	21.8	20.1	185	1.99	3.9
56	ICHmk1-01-Pl-P	33	100	22.1	18.4	147	1.44	1.9
57	ICHmk1-01-Sx-M	23	90	30.6	30.1	279	2.97	5.9
59	ICHmk1-02/03-Fd-M	99	110	30.8	23.8	176	1.58	5.9
60	ICHmk1-02/03-Fd-P	70	130	31.5	21.0	132	0.98	4.9
61	ICHmk1-04-Fd-G	202	90	30.0	26.1	228	2.49	5.9
62	ICHmk1-04-Fd-M	223	110	30.2	23.1	186	1.65	5.9
63	ICHmk1-04-Fd-P	108	120	28.5	18.9	130	1.07	5.9
64	ICHmk1-04-Pl-G	14	80	32.3	34.7	250	3.01	5.9
65	ICHmk1-04-Pl-M	11	90	21.9	20.3	185	1.99	2.9
66	ICHmk1-04-Pl-P	102	110	21.7	18.5	177	1.57	5.9
67	ICHmk1-05-Sx-G	59	90	30.7	26.1	234	2.55	5.9
68	ICHmk1-05-Sx-M	20	90	27.8	21.2	184	2.02	5.9
69	ICHmk1-05-Sx-P	5	120	27.0	16.4	132	1.07	5.9
70	ICHmk1-06-Sx	18	90	29.0	23.6	208	2.28	5.9
71	IDFdk1-01-Fd-G	551	110	34.1	27.2	198	1.76	4.1
72	IDFdk1-01-Fd-M	1,414	110	30.4	22.9	163	1.47	4.1
73	IDFdk1-01-Fd-P	2,745	120	29.4	19.5	115	0.95	4.1
74	IDFdk1-01-Pl-G	166	80	22.4	20.8	170	2.07	0.0
75	IDFdk1-01-Pl-M	304	90	21.8	19.9	187	2.02	5.1
76	IDFdk1-01-Pl-P	259	120	24.6	18.6	139	1.12	0.0
77	IDFdk1-02/03-Fd-G	66	120	37.2	28.0	178	1.44	5.1
78	IDFdk1-02/03-Fd-M	216	120	33.4	24.1	156	1.26	5.1
79	IDFdk1-02/03-Fd-P	340	130	31.0	19.9	114	0.86	5.1
80	IDFdk1-03-Pl-M	10	100	24.2	20.4	178	1.73	4.1
81	IDFdk1-03-Pl-P	11	110	22.6	19.4	190	1.67	5.1
82	IDFdk1-04-Fd-M	200	120	35.3	26.1	173	1.41	5.1
83	IDFdk1-04-Fd-P	192	130	31.6	20.7	121	0.91	5.1
84	IDFdk1-05-Fd-G	42	100	30.0	25.9	199	1.93	0.0
85	IDFdk1-05-Fd-M	181	110	30.0	22.9	169	1.51	0.1

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
86	IDFdk1-05-Fd-P	256	120	29.2	20.2	139	1.13	3.1
87	IDFdk1-05-Pl-G	12	80	23.2	20.4	142	1.72	0.0
88	IDFdk1-05-Pl-M	29	100	24.8	21.4	167	1.62	0.0
89	IDFdk1-05-Pl-P	12	100	22.1	17.6	82	0.80	0.0
90	IDFdk1-05-Sx-G	31	90	29.3	25.3	249	2.73	2.1
91	IDFdk1-05-Sx-M	120	120	31.3	25.0	247	2.00	2.1
92	IDFdk1-05-Sx-P	12	140	31.0	23.2	184	1.26	0.0
93	IDFdk1-06-Sx-M	14	110	30.7	25.0	253	2.21	5.1
94	IDFdk1-06-Sx-P	22	140	31.3	22.2	214	1.50	5.1
95	IDFdk2-01-Fd-G	400	110	35.0	28.4	226	1.99	5.1
96	IDFdk2-01-Fd-M	635	120	33.3	24.2	163	1.31	5.1
97	IDFdk2-01-Fd-P	165	130	33.5	21.8	117	0.87	4.1
98	IDFdk2-01-Pl-G	64	90	24.4	23.1	209	2.24	0.0
99	IDFdk2-01-Pl-M	109	90	22.0	20.9	211	2.27	5.1
100	IDFdk2-01-Pl-P	54	110	23.5	20.0	205	1.82	5.1
101	IDFdk2-02/03-Fd-G	153	110	36.9	29.4	193	1.70	4.1
102	IDFdk2-02/03-Fd-M	521	120	33.7	23.8	140	1.14	4.1
103	IDFdk2-02/03-Fd-P	109	120	31.5	20.9	114	0.94	5.1
104	IDFdk2-02/03-Pl	154	100	21.4	19.4	194	1.90	5.1
105	IDFdk2-04-Fd	64	100	29.2	23.9	184	1.81	5.1
106	IDFdk2-05/06-Sx	112	90	28.7	24.5	240	2.61	5.1
107	IDFmw1-01-Cw-G	80	80	32.4	25.2	248	2.98	4.8
108	IDFmw1-01-Cw-M	73	90	30.2	20.3	135	1.46	0.0
109	IDFmw1-01-Cw-P	69	120	29.7	17.4	113	0.94	0.0
110	IDFmw1-01-Fd-G	764	100	31.8	27.1	215	2.11	0.8
111	IDFmw1-01-Fd-M	1,521	110	30.8	23.6	160	1.43	0.0
112	IDFmw1-01-Fd-P	787	130	30.4	19.9	116	0.87	4.8
113	IDFmw1-01-Lw	69	120	31.6	25.9	210	1.73	4.8
114	IDFmw1-01-Pl-G	301	70	21.1	21.7	200	2.75	0.8
115	IDFmw1-01-Pl-M	113	90	23.5	20.3	133	1.44	0.0
116	IDFmw1-01-Pl-P	106	110	25.1	19.1	85	0.75	0.0
117	IDFmw1-02-Fd-M	108	120	33.3	24.0	157	1.27	3.8
118	IDFmw1-02-Fd-P	99	120	30.9	19.4	92	0.76	2.8
119	IDFmw1-03-Fd-G	147	110	34.0	27.5	181	1.60	0.0
120	IDFmw1-03-Fd-M	328	120	33.5	24.3	158	1.29	3.8
121	IDFmw1-03-Fd-P	342	130	31.5	19.7	90	0.67	0.0
122	IDFmw1-04-Fd-G	83	110	34.3	28.3	236	2.06	2.8
123	IDFmw1-04-Fd-M	131	110	30.1	23.0	160	1.43	0.8
124	IDFmw1-04-Fd-P	72	120	31.2	20.9	116	0.96	4.8
125	IDFmw1-05-Fd-G	71	90	29.7	24.7	151	1.66	0.0
126	IDFmw1-05-Fd-M	164	100	29.5	22.2	128	1.24	0.0
127	IDFmw1-05-Fd-P	36	110	27.0	18.3	95	0.86	0.0
128	IDFxh1-01-Fd-G	779	100	33.6	27.2	177	1.72	2.5
129	IDFxh1-01-Fd-M	627	120	34.0	24.3	153	1.23	3.5

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
130	IDFxh1-01-Fd-P	459	130	33.2	21.2	110	0.82	4.5
131	IDFxh1-01-Py-M	107	100	34.2	27.4	219	2.11	5.5
132	IDFxh1-01-Py-P	90	110	33.7	21.8	130	1.15	5.5
133	IDFxh1-02/03-Fd/Py-G	14	110	36.1	27.7	174	1.53	1.5
134	IDFxh1-02/03-Fd/Py-M	92	120	34.7	24.3	131	1.06	2.5
135	IDFxh1-02/03-Fd/Py-P	121	130	33.5	21.0	103	0.77	5.5
136	IDFxh1-04-Fd	115	110	33.4	23.4	135	1.20	5.5
137	IDFxh1-05-Fd	137	120	29.4	20.0	107	0.88	4.5
138	IDFxh1-06/07-Fd-G	123	90	29.5	25.3	165	1.81	0.0
139	IDFxh1-06/07-Fd-M	109	110	32.1	23.7	155	1.39	4.5
140	IDFxh1-06/07-Fd-P	75	130	33.0	21.8	125	0.94	5.5
141	IDFxh2-01-Fd-G	110	100	32.4	25.6	192	1.90	5.5
142	IDFxh2-01-Fd-M	139	120	33.0	24.3	180	1.46	5.5
143	IDFxh2-01-Fd-P	367	130	31.6	20.6	115	0.86	5.5
144	IDFxh2-02/03-Fd-M	108	120	34.3	24.9	160	1.30	4.5
145	IDFxh2-02/03-Fd-P	132	130	33.2	21.4	115	0.86	5.5
146	IDFxh2-04-Fd-G	134	100	31.5	25.8	177	1.75	1.5
147	IDFxh2-04-Fd-M	244	120	34.0	25.1	175	1.42	5.5
148	IDFxh2-04-Fd-P	370	130	31.8	20.2	106	0.80	4.5
149	IDFxh2-05/06-Fd-M	79	100	30.7	23.1	166	1.63	5.5
150	IDFxh2-05/06-Fd-P	156	130	32.2	21.2	124	0.93	5.5
151	MSdm2-01-Bl-G	1,289	80	28.1	22.3	195	2.37	6.3
152	MSdm2-01-Bl-M	677	110	29.3	20.9	180	1.60	6.3
153	MSdm2-01-Bl-P	838	140	29.5	19.3	161	1.12	6.3
154	MSdm2-01-Fd-G	229	100	31.0	26.5	224	2.19	6.3
155	MSdm2-01-Fd-M	542	110	30.2	23.5	195	1.72	6.3
156	MSdm2-01-Fd-P	143	120	28.4	18.6	118	0.98	6.3
157	MSdm2-01-Pl-G	763	70	20.6	20.1	188	2.63	6.3
158	MSdm2-01-Pl-M	1,592	90	21.2	19.7	197	2.12	6.3
159	MSdm2-01-Pl-P	567	100	20.5	18.2	179	1.77	6.3
160	MSdm2-01-Sx-G	104	90	29.1	25.5	261	2.83	6.3
161	MSdm2-01-Sx-M	136	110	28.8	23.9	218	1.95	3.3
162	MSdm2-01-Sx-P	28	130	30.1	23.5	221	1.64	6.3
163	MSdm2-03-Fd-M	71	110	31.8	24.4	170	1.53	6.3
164	MSdm2-03-Fd-P	107	130	30.4	20.3	148	1.09	6.3
165	MSdm2-02/03-Pl-M	97	90	21.8	20.1	191	2.06	6.3
166	MSdm2-02/03-Pl-P	124	120	22.5	18.1	175	1.42	6.3
167	MSdm2-04-Bl	131	120	28.9	19.6	168	1.38	6.3
168	MSdm2-04-Fd-G	50	100	31.6	26.8	220	2.17	6.3
169	MSdm2-04-Fd-M	161	110	30.1	23.1	178	1.59	3.3
170	MSdm2-04-Fd-P	97	130	29.7	20.2	135	1.00	6.3
171	MSdm2-04-Pl-G	59	70	21.0	21.1	193	2.68	3.3
172	MSdm2-04-Pl-M	303	90	21.2	19.6	190	2.06	6.3
173	MSdm2-04-Pl-P	508	110	21.1	18.6	194	1.73	6.3

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
174	MSdm2-05-Bl-G	105	80	27.5	21.3	177	2.18	6.3
175	MSdm2-05-Bl-M	69	100	28.6	19.6	158	1.53	6.3
176	MSdm2-05-Bl-P	58	120	29.6	18.7	134	1.09	4.3
177	MSdm2-05-Fd	41	110	30.3	24.0	170	1.49	0.0
178	MSdm2-05-Pl-G	15	70	22.5	21.7	158	2.18	0.0
179	MSdm2-05-Pl-M	28	80	20.6	19.0	178	2.17	6.3
180	MSdm2-05-Sx-G	49	100	30.3	26.7	253	2.45	0.0
181	MSdm2-05-Sx-M	105	120	30.8	25.9	273	2.19	6.3
182	MSdm2-05-Sx-P	4	140	30.9	22.9	197	1.37	6.3
183	MSdm2-06-Bl	81	80	27.2	18.0	131	1.62	5.3
184	MSdm2-06-Pl-G	16	70	22.4	21.1	176	2.49	6.3
185	MSdm2-06-Pl-M	23	90	23.1	19.4	166	1.80	6.3
186	MSdm2-06-Sx-G	22	90	29.3	25.4	237	2.56	3.3
187	MSdm2-06-Sx-M	48	110	30.4	24.7	242	2.12	6.3
188	MSdm2-06-Sx-P	11	140	31.1	22.5	172	1.19	0.0
189	MSdm2-07-Sx	32	120	30.2	22.2	197	1.62	6.3

Table 10.8 - Minimum harvest age attributes for VDYP mature natural stands

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
202	ESSFdc2-01-Bl-M	340	110	28.2	19.9	210	1.88	5.9
203	ESSFdc2-01-Bl-P	720	140	27.7	18.0	180	1.27	5.9
204	ESSFdc2-01-Pl-G	917	70	21.1	20.3	203	2.79	5.9
205	ESSFdc2-01-Pl-M	2,339	80	20.6	18.9	184	2.24	5.9
206	ESSFdc2-01-Pl-P	1,174	100	20.8	17.8	177	1.72	5.9
207	ESSFdc2-01-Sx-G	177	90	28.7	25.2	315	3.44	5.9
208	ESSFdc2-01-Sx-M	956	110	29.1	23.5	281	2.52	5.9
209	ESSFdc2-01-Sx-P	2,027	140	29.0	21.8	249	1.75	5.9
210	ESSFdc2-02/03-Pl	129	110	23.6	17.9	174	1.56	5.9
211	ESSFdc2-04-Bl	54	150	26.2	16.5	160	1.05	5.9
212	ESSFdc2-04-Pl-M	114	80	20.8	19.1	187	2.26	5.9
213	ESSFdc2-04-Pl-P	255	120	21.7	17.4	177	1.43	5.9
214	ESSFdc2-04-Sx	110	140	29.4	21.8	238	1.67	5.9
215	ESSFdc2-05-Bl	42	140	28.1	17.5	152	1.06	5.9
216	ESSFdc2-05-Pl-M	52	80	21.2	18.8	179	2.18	5.9
217	ESSFdc2-05-Pl-P	121	120	22.9	18.5	193	1.56	5.9
218	ESSFdc2-06-Bl-G	5	100	29.1	21.9	247	2.38	5.9
219	ESSFdc2-06-Bl-M	116	110	28.0	19.6	206	1.83	5.9
220	ESSFdc2-06-Bl-P	644	140	29.4	18.7	180	1.25	5.9
221	ESSFdc2-06-Pl-G	217	70	21.2	20.4	208	2.86	5.9
222	ESSFdc2-06-Pl-M	210	80	20.8	18.6	177	2.16	5.9
223	ESSFdc2-06-Sx-G	157	90	29.3	24.3	279	3.04	5.9
224	ESSFdc2-06-Sx-M	387	110	30.1	24.4	290	2.56	5.9

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
225	ESSFdc2-06-Sx-P	652	150	29.7	22.4	260	1.68	5.9
226	ESSFdc2-07-Sx	146	130	28.4	21.2	234	1.74	5.9
227	ESSFdc2-08-Bl	157	120	28.7	19.5	198	1.62	5.9
229	ESSFxc-01-Bl-M	9	120	28.3	20.3	225	1.85	6.0
230	ESSFxc-01-Bl-P	151	130	27.4	18.7	194	1.47	6.0
231	ESSFxc-01-Pl-G	82	70	20.5	19.8	195	2.72	6.0
232	ESSFxc-01-Pl-M	361	80	20.2	18.6	180	2.21	6.0
233	ESSFxc-01-Pl-P	76	100	20.8	18.2	187	1.81	6.0
234	ESSFxc-01-Sx-M	62	100	28.8	23.7	267	2.62	6.0
235	ESSFxc-01-Sx-P	133	140	29.5	22.5	250	1.74	6.0
236	ESSFxc-05-Bl	81	150	28.2	19.1	207	1.34	6.0
237	ESSFxc-05-Pl-M	198	80	20.9	19.4	193	2.36	6.0
238	ESSFxc-05-Pl-P	54	110	21.7	18.7	197	1.74	6.0
239	ESSFxc-05-Sx	39	140	29.5	21.9	244	1.70	6.0
240	ESSFxc-06-Bl-M	51	110	28.3	22.0	263	2.35	6.0
241	ESSFxc-06-Bl-P	149	140	28.1	19.0	198	1.37	6.0
242	ESSFxc-06-Pl-M	696	80	20.7	19.2	193	2.34	6.0
243	ESSFxc-06-Pl-P	142	110	22.0	18.8	197	1.74	6.0
244	ESSFxc-06-Sx-M	21	100	28.8	22.7	247	2.40	6.0
245	ESSFxc-06-Sx-P	247	150	29.4	22.5	254	1.64	6.0
246	ESSFxc-07/08-Sx-M	75	90	27.1	22.5	251	2.74	6.0
247	ESSFxc-07/08-Sx-P	77	140	29.1	21.2	228	1.58	6.0
248	ICHmk1-01-Bl-G	2	80	30.8	21.3	268	3.24	5.9
249	ICHmk1-01-Bl-M	25	110	29.3	20.1	211	1.87	5.9
250	ICHmk1-01-Bl-P	179	140	28.8	18.4	178	1.25	5.9
251	ICHmk1-01-Fd-G	5	90	30.3	25.2	275	2.99	5.9
252	ICHmk1-01-Fd-M	215	110	30.2	22.7	213	1.90	5.9
253	ICHmk1-01-Fd-P	301	120	28.8	20.0	164	1.35	5.9
254	ICHmk1-01-Pl-G	140	70	22.3	21.6	198	2.71	5.9
255	ICHmk1-01-Pl-M	342	90	22.0	19.9	192	2.05	5.9
256	ICHmk1-01-Pl-P	130	100	21.6	18.3	173	1.68	5.9
257	ICHmk1-01-Sx-M	118	110	29.5	23.9	281	2.48	5.9
258	ICHmk1-01-Sx-P	149	140	30.3	22.2	254	1.78	5.9
259	ICHmk1-02/03-Fd-M	24	110	27.2	21.6	195	1.71	5.9
260	ICHmk1-02/03-Fd-P	227	120	28.5	18.7	119	0.98	5.9
261	ICHmk1-04-Fd-G	9	110	34.5	26.9	271	2.38	5.9
262	ICHmk1-04-Fd-M	157	110	29.9	22.5	244	2.13	5.9
263	ICHmk1-04-Fd-P	438	130	29.4	19.6	155	1.16	5.9
264	ICHmk1-04-Pl-G	59	80	23.4	22.0	204	2.46	2.9
265	ICHmk1-04-Pl-M	103	90	22.1	19.8	187	2.03	5.9
266	ICHmk1-04-Pl-P	80	120	23.0	18.5	183	1.48	5.9
267	ICHmk1-05-Sx-G	17	70	24.2	21.4	210	2.95	5.9
268	ICHmk1-05-Sx-M	87	110	30.0	23.1	245	2.15	5.9
269	ICHmk1-05-Sx-P	188	130	29.2	21.7	240	1.81	5.9
270	ICHmk1-06-Sx	146	100	28.0	20.8	250	2.46	5.9

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
271	IDFdk1-01-Fd-G	30	110	33.8	25.9	219	1.95	5.1
272	IDFdk1-01-Fd-M	568	120	32.4	23.9	212	1.72	5.1
273	IDFdk1-01-Fd-P	1,076	130	31.1	21.0	163	1.21	5.1
274	IDFdk1-01-Pl-G	299	80	22.4	21.9	213	2.56	3.1
275	IDFdk1-01-Pl-M	1,425	90	22.1	19.9	184	1.99	4.1
276	IDFdk1-01-Pl-P	547	110	22.5	19.4	197	1.73	5.1
277	IDFdk1-02/03-Fd-G	2	120	36.7	27.1	200	1.62	5.1
278	IDFdk1-02/03-Fd-M	70	120	32.6	23.4	192	1.57	5.1
279	IDFdk1-02/03-Fd-P	407	130	31.5	20.0	130	0.98	5.1
280	IDFdk1-03-Pl-M	152	90	22.5	19.7	169	1.84	5.1
281	IDFdk1-03-Pl-P	39	100	20.8	18.8	194	1.91	5.1
282	IDFdk1-04-Fd-M	127	120	32.7	23.9	204	1.64	5.1
283	IDFdk1-04-Fd-P	366	130	31.4	20.2	136	1.02	5.1
284	IDFdk1-05-Fd-G	47	100	30.8	24.9	267	2.62	5.1
285	IDFdk1-05-Fd-M	85	110	30.5	23.4	220	1.95	3.1
286	IDFdk1-05-Fd-P	43	120	29.9	20.6	170	1.38	3.1
287	IDFdk1-05-Pl-G	153	70	21.3	20.6	172	2.41	0.0
288	IDFdk1-05-Pl-M	204	90	22.5	20.1	178	1.91	2.1
289	IDFdk1-05-Pl-P	34	100	22.0	18.6	159	1.56	2.1
290	IDFdk1-05-Sx-G	61	90	29.8	25.6	308	3.38	1.1
291	IDFdk1-05-Sx-M	84	120	31.5	25.6	323	2.60	5.1
292	IDFdk1-05-Sx-P	43	130	31.6	23.3	263	1.98	2.1
293	IDFdk1-06-Sx-M	95	100	29.3	24.2	283	2.75	3.1
294	IDFdk1-06-Sx-P	18	130	29.9	21.5	220	1.67	0.0
295	IDFdk2-01-Fd-G	22	90	29.0	24.5	236	2.58	0.0
296	IDFdk2-01-Fd-M	245	110	30.4	22.5	182	1.62	0.1
297	IDFdk2-01-Fd-P	102	130	32.0	21.4	157	1.16	5.1
298	IDFdk2-01-Pl-G	286	70	21.5	20.7	180	2.54	3.1
299	IDFdk2-01-Pl-M	101	90	21.8	20.4	203	2.19	3.1
300	IDFdk2-01-Pl-P	76	120	23.7	18.3	161	1.29	0.1
302	IDFdk2-02/03-Fd-M	34	120	33.4	23.1	150	1.23	5.1
303	IDFdk2-02/03-Fd-P	208	130	32.3	20.6	121	0.91	4.1
304	IDFdk2-02/03-Pl	10	100	22.9	19.7	182	1.78	5.1
305	IDFdk2-04-Fd	40	100	28.2	21.3	176	1.74	3.1
306	IDFdk2-05/06-Sx	34	80	24.6	22.3	233	2.87	4.1
308	IDFmw1-01-Cw-M	48	100	31.2	21.8	243	2.36	4.8
309	IDFmw1-01-Cw-P	64	120	29.0	18.7	215	1.76	4.8
310	IDFmw1-01-Fd-G	15	100	31.4	25.8	237	2.34	2.8
311	IDFmw1-01-Fd-M	251	120	31.7	23.3	197	1.60	3.8
312	IDFmw1-01-Fd-P	1,312	130	31.1	20.9	161	1.21	4.8
313	IDFmw1-01-Lw	30	120	30.1	24.8	153	1.24	0.0
314	IDFmw1-01-Pl-G	85	80	22.8	21.9	192	2.31	0.0
315	IDFmw1-01-Pl-M	279	90	22.2	19.9	178	1.92	2.8
316	IDFmw1-01-Pl-P	85	110	22.4	19.0	168	1.48	0.0
317	IDFmw1-02-Fd-M	28	110	29.2	23.6	208	1.83	0.0

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
318	IDFmw1-02-Fd-P	134	120	32.4	20.7	120	0.98	4.8
319	IDFmw1-03-Fd-G	4	80	23.8	21.3	159	1.95	4.8
320	IDFmw1-03-Fd-M	103	120	33.1	22.7	143	1.16	4.8
321	IDFmw1-03-Fd-P	568	130	31.9	20.1	118	0.88	4.8
322	IDFmw1-04-Fd-G	24	70	20.8	20.1	173	2.43	1.8
323	IDFmw1-04-Fd-M	43	110	28.2	21.4	142	1.26	0.0
324	IDFmw1-04-Fd-P	61	130	29.7	19.3	142	1.06	3.8
325	IDFmw1-05-Fd-G	6	90	31.3	27.9	294	3.14	4.8
326	IDFmw1-05-Fd-M	21	100	28.0	21.8	160	1.54	0.0
327	IDFmw1-05-Fd-P	51	130	29.2	21.4	206	1.54	4.8
328	IDFxh1-01-Fd-G	10	80	29.6	25.0	313	3.82	2.5
329	IDFxh1-01-Fd-M	97	120	32.7	23.3	194	1.57	5.5
330	IDFxh1-01-Fd-P	458	120	32.2	20.2	95	0.78	5.5
331	IDFxh1-01-Py-M	4	90	21.6	19.1	171	1.85	5.5
332	IDFxh1-01-Py-P	42	110	34.0	21.7	62	0.56	5.5
334	IDFxh1-02/03-Fd/Py-M	6	120	32.6	22.4	154	1.25	5.5
335	IDFxh1-02/03-Fd/Py-P	185	130	33.3	20.0	86	0.65	5.5
336	IDFxh1-04-Fd	24	130	34.5	21.0	80	0.60	5.5
337	IDFxh1-05-Fd	9	110	29.9	23.5	208	1.83	1.5
338	IDFxh1-06/07-Fd-G	16	80	29.9	26.2	364	4.39	5.5
339	IDFxh1-06/07-Fd-M	9	110	31.3	23.5	222	1.96	5.5
340	IDFxh1-06/07-Fd-P	14	120	31.7	21.4	153	1.24	4.5
341	IDFxh2-01-Fd-G	5	110	33.7	25.9	226	2.02	5.5
342	IDFxh2-01-Fd-M	73	120	32.0	23.3	198	1.60	5.5
343	IDFxh2-01-Fd-P	82	130	30.8	20.5	150	1.12	5.5
345	IDFxh2-02/03-Fd-P	293	130	31.9	19.4	110	0.84	5.5
346	IDFxh2-04-Fd-G	0	70	19.8	20.3	210	2.96	5.5
347	IDFxh2-04-Fd-M	14	110	30.2	21.8	169	1.52	5.5
348	IDFxh2-04-Fd-P	175	130	31.4	19.7	121	0.91	5.5
349	IDFxh2-05/06-Fd-M	8	100	30.5	23.4	196	1.93	0.0
350	IDFxh2-05/06-Fd-P	6	130	31.0	21.7	187	1.40	4.5
351	MSdm2-01-Bl-G	38	90	28.9	23.6	278	3.00	6.3
352	MSdm2-01-Bl-M	194	120	29.7	21.7	242	1.97	6.3
353	MSdm2-01-Bl-P	443	140	28.0	18.1	174	1.22	6.3
354	MSdm2-01-Fd-G	137	100	31.2	26.0	278	2.69	6.3
355	MSdm2-01-Fd-M	529	100	28.9	22.2	219	2.16	6.3
356	MSdm2-01-Fd-P	575	120	28.7	19.7	162	1.33	6.3
357	MSdm2-01-Pl-G	3,603	70	21.1	20.7	204	2.82	6.3
358	MSdm2-01-Pl-M	6,016	80	20.6	19.1	183	2.26	6.3
359	MSdm2-01-Pl-P	1,703	110	21.8	18.7	194	1.71	6.3
360	MSdm2-01-Sx-G	424	90	28.8	24.8	306	3.34	6.3
361	MSdm2-01-Sx-M	690	110	29.6	24.4	302	2.68	6.3
362	MSdm2-01-Sx-P	1,125	140	29.6	23.1	277	1.92	6.3
363	MSdm2-03-Fd-M	58	120	32.9	23.7	188	1.53	6.3

Analysis Unit	Name	THLB (ha)	Age (years)	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
364	MSdm2-03-Fd-P	279	130	30.2	18.6	119	0.89	6.3
365	MSdm2-02/03-Pl-M	224	80	21.2	19.2	174	2.15	6.3
366	MSdm2-02/03-Pl-P	236	110	21.7	17.6	164	1.47	6.3
367	MSdm2-04-Bl	55	140	29.4	19.1	189	1.30	6.3
368	MSdm2-04-Fd-G	16	80	28.2	24.1	279	3.45	6.3
369	MSdm2-04-Fd-M	94	110	30.5	22.8	208	1.86	6.3
370	MSdm2-04-Fd-P	440	130	29.9	20.0	164	1.22	6.3
371	MSdm2-04-Pl-G	481	70	21.2	20.4	196	2.71	6.3
372	MSdm2-04-Pl-M	1,179	90	21.5	20.1	208	2.23	6.3
373	MSdm2-04-Pl-P	1,148	110	22.1	18.6	189	1.67	6.3
374	MSdm2-05-Bl-G	5	100	28.6	22.0	252	2.43	6.3
375	MSdm2-05-Bl-M	71	120	29.7	22.1	250	2.03	6.3
376	MSdm2-05-Bl-P	49	130	28.3	19.0	195	1.47	6.3
377	MSdm2-05-Fd	103	100	28.7	22.1	229	2.25	6.3
378	MSdm2-05-Pl-G	357	70	21.5	21.0	211	2.89	6.3
379	MSdm2-05-Pl-M	209	80	21.3	19.3	184	2.24	6.3
380	MSdm2-05-Sx-G	124	90	30.1	25.9	296	3.17	6.3
381	MSdm2-05-Sx-M	408	110	30.2	24.2	289	2.57	6.3
382	MSdm2-05-Sx-P	279	140	30.7	22.8	259	1.80	6.3
383	MSdm2-06-Bl	37	120	28.5	20.7	232	1.90	6.3
384	MSdm2-06-Pl-G	110	70	21.8	21.1	212	2.89	6.3
385	MSdm2-06-Pl-M	156	80	21.7	18.3	159	1.97	6.3
386	MSdm2-06-Sx-G	77	90	29.5	24.8	289	3.11	6.3
387	MSdm2-06-Sx-M	231	110	29.8	24.1	288	2.56	6.3
388	MSdm2-06-Sx-P	206	140	29.4	21.9	248	1.74	6.3
389	MSdm2-07-Sx	81	120	29.5	22.4	241	1.95	6.3

Table 10.9 summaries the minimum harvest age attributes for the TIPSY yield tables representing existing managed stands.

Table 10.9 - Minimum harvest age attributes for existing TIPSY managed stands

Analysis Unit	Name	THLB (ha)	Age	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
Existing	**Managed Stands**							
401	ESSFdc2-01-Bl	2,133	90	24.8	24.4	359	3.92	5.9
402	ESSFdc2-01-Pl	1,957	80	23.0	21.7	302	3.70	5.9
403	ESSFdc2-01-Sx	1,568	90	24.9	24.5	362	3.96	5.9
404	ESSFdc2-03-Bl	45	90	23.5	22.5	304	3.39	5.9
405	ESSFdc2-04/05-Bl	270	100	24.3	23.7	338	3.33	5.9
406	ESSFdc2-04-Pl	140	90	22.6	21.1	282	3.10	5.9
407	ESSFdc2-05-Pl	76	80	21.6	19.5	243	3.00	5.9
408	ESSFdc2-06-Bl	706	80	25.3	25.1	383	4.66	5.9
409	ESSFdc2-06-Pl	145	60	22.3	20.5	274	4.55	5.9
410	ESSFdc2-06/07-Sx	250	80	24.4	23.8	344	4.29	5.9

Analysis Unit	Name	THLB (ha)	Age	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
411	ESSFxc-01-Bl	379	80	24.6	24.0	350	4.33	6.0
412	ESSFxc-01-Pl	138	70	23.1	21.6	304	4.23	6.0
413	ESSFxc-01-Sx	231	80	25.1	24.8	373	4.57	6.0
414	ESSFxc-05/06-Bl	288	90	23.8	23.1	318	3.54	6.0
415	ESSFxc-06/05-Pl	153	80	22.3	20.5	269	3.31	6.0
416	ICHmk1-01-Bl	218	80	24.6	24.1	354	4.36	5.9
417	ICHmk1-01-Lw	98	80	22.6	24.2	283	3.55	5.9
418	ICHmk1-01-Pl	681	60	22.1	20.0	261	4.33	5.9
419	ICHmk1-01-Sx	312	80	24.8	24.5	364	4.48	5.9
420	ICHmk1-03-Pl	65	60	21.7	20.3	256	4.23	5.9
421	ICHmk1-04-Pl	276	70	22.1	20.5	267	3.75	5.9
422	ICHmk1-05-Sx	193	80	26.4	26.7	430	5.21	5.9
423	ICHmk1-05-Pl	44	70	24.7	24.0	370	5.12	5.9
424	ICHmk1-06-Sx	148	70	24.7	24.3	361	5.12	5.9
425	IDFdk1-01-Fd	1,112	90	23.5	25.6	317	3.45	5.1
426	IDFdk1-01-Pl	3,641	60	21.4	19.9	245	4.08	5.1
427	IDFdk1-03-Fd	157	110	21.1	23.4	229	2.08	5.1
428	IDFdk1-03-Pl	106	80	20.4	18.8	206	2.55	5.1
429	IDFdk1-05/04-Fd	47	80	23.6	25.0	319	3.90	5.1
430	IDFdk1-05/06-Pl	537	70	22.3	21.6	284	3.92	5.1
431	IDFdk2-01-Fd	167	80	23.7	26.3	326	4.10	5.1
432	IDFdk2-01-Pl	972	50	21.8	19.8	254	5.11	5.1
433	IDFdk2-03-Pl	195	60	21.5	19.4	241	4.00	5.1
434	IDFdk2-04/05-Fd	69	70	22.2	22.2	264	3.74	5.1
435	IDFmw1-01-Fd	143	90	23.5	26.0	320	3.51	4.8
436	IDFmw1-01-Pl	292	60	21.8	20.4	259	4.26	4.8
437	IDFmw1-03-Fd	72	100	26.3	30.2	420	4.08	4.8
438	IDFmw1-04/05-Pl	132	60	22.0	21.5	276	4.46	4.8
439	IDFxh1-Fd	106	110	22.7	25.9	289	2.57	5.5
440	IDFxh2-Fd	80	120	21.8	24.5	252	2.07	5.5
441	MSdm2-01-Bl	1,096	80	24.6	24.1	355	4.39	6.3
442	MSdm2-01-Fd	223	90	23.8	25.9	330	3.59	6.3
443	MSdm2-01-Pl	8,046	60	21.9	19.9	259	4.28	6.3
444	MSdm2-01-Sx	1,538	80	24.9	24.5	365	4.49	6.3
445	MSdm2-03-Pl	300	70	21.4	19.2	236	3.31	6.3
446	MSdm2-04-Bl	423	80	24.0	23.3	327	4.12	6.3
447	MSdm2-04-Fd	61	90	24.1	25.7	339	3.71	6.3
448	MSdm2-04-Pl	3,024	70	22.7	21.0	287	3.99	6.3
449	MSdm2-04-Sx	599	80	24.2	23.5	336	4.20	6.3
450	MSdm2-05-Bl	60	80	26.0	26.1	411	4.98	6.3
451	MSdm2-05-Pl	199	60	23.1	21.7	308	5.04	6.3
452	MSdm2-06/07-Sx	104	70	25.5	25.3	393	5.43	6.3

Table 10.10 - Minimum harvest age attributes for future TIPSY managed stands

Analysis Unit	Name	THLB (ha)	Age	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
501	ESSFdc2-01-PlSx	16,742	70	23.0	21.7	303	4.28	5.9
502	ESSFdc2-02/03-Pl	216	60	21.9	19.6	252	4.12	5.9
503	ESSFdc2-04-PlSx	883	70	21.7	19.6	246	3.54	5.9
504	ESSFdc2-05-PlSx	627	80	22.7	21.2	290	3.57	5.9
505	ESSFdc2-06-PlSx	4,265	60	23.2	22.0	313	5.25	5.9
506	ESSFdc2-07-PlSx	213	80	23.9	23.0	342	4.14	5.9
507	ESSFdc2-08/09-PlSx	249	80	23.8	22.9	336	4.08	5.9
508	ESSFxc/a-01-PlSx	1,766	60	22.8	21.2	293	4.82	6.0
509	ESSFxc-05-PlSx	635	70	22.0	20.2	264	3.73	6.0
510	ESSFxc-06-PlSx	1,795	70	22.4	20.7	275	3.90	6.0
511	ESSFxc-07/08-PlSx	214	80	22.6	21.1	285	3.52	6.0
512	ICHmk1-01-PlSxFd	4,193	70	23.3	23.5	324	4.51	5.9
513	ICHmk1-02/03-PlSx	485	60	23.5	22.4	323	5.34	5.9
514	ICHmk1-04-PlSxFd	1,781	70	22.0	21.7	272	3.88	5.9
515	ICHmk1-05-PlSxFd	611	60	22.8	22.8	307	5.07	5.9
516	ICHmk1-06/07-PlSxFd	311	60	22.9	22.9	310	5.13	5.9
517	IDFdk1-01-PlFd	14,720	60	22.2	21.7	281	4.53	5.1
518	IDFdk1-03/02-PlFd	1,596	70	20.4	19.1	211	2.95	5.1
519	IDFdk1-04-PlFd	909	60	20.6	19.4	219	3.65	5.1
520	IDFdk1-05-SxFd	2,100	70	23.4	24.9	316	4.54	5.1
521	IDFdk1-06-SxFd	183	90	23.7	24.3	319	3.53	5.1
522	IDFdk2-01-PlFd	3,472	50	22.0	21.4	276	5.38	5.1
523	IDFdk2-02-PyFd	81	110	23.5	27.4	321	2.88	5.1
524	IDFdk2-03-PlFd	1,310	60	21.5	20.7	255	4.15	5.1
525	IDFdk2-04-PlFd	104	60	21.8	21.1	266	4.31	5.1
526	IDFdk2-05/06-SxFd	219	70	24.3	25.2	350	4.96	5.1
527	IDFmw1-01-PlFd	6,529	60	22.0	22.0	277	4.49	4.8
528	IDFmw1-02-PyFd	369	100	26.1	30.4	410	4.04	4.8
529	IDFmw1-03-PyFd	1,564	100	25.8	30.1	402	3.94	4.8
530	IDFmw1-04-PlFd	468	60	22.6	22.9	302	4.87	4.8
531	IDFmw1-05/06-SxFd	425	70	24.5	26.5	361	5.03	4.8
532	IDFxh1-01-FdPy	2,710	90	23.8	27.7	331	3.65	5.5
533	IDFxh1-02-FdPy	64	120	22.1	26.1	270	2.22	5.5
534	IDFxh1-03-FdPy	412	120	21.9	25.4	259	2.15	5.5
535	IDFxh1-04-FdPy	142	110	23.8	27.7	327	2.95	5.5
536	IDFxh1-05-FdPy	146	110	24.1	28.2	340	3.05	5.5
537	IDFxh1-06-FdPy	255	90	23.5	27.4	323	3.57	5.5
538	IDFxh1-07/08-FdPy	109	90	23.0	26.8	305	3.39	5.5
539	IDFxh2-01-FdPy	806	100	22.7	26.4	292	2.86	5.5
540	IDFxh2-03/02-FdPy	546	130	21.0	24.9	236	1.81	5.5
541	IDFxh2-04-FdPy	972	120	20.8	23.9	222	1.86	5.5
542	IDFxh2-05/06-FdPy	202	100	21.8	25.1	256	2.55	5.5
543	IDFxh2-07/08-FdPy	59	100	21.3	24.5	239	2.40	5.5

Analysis Unit	Name	THLB (ha)	Age	Diameter (cm)	Height (m)	Volume (m^3/ha)	MAI (m^3/ha/yr)	Modelling OAF (%)
544	MSdm2-01-PlSx	34,106	60	22.7	20.9	287	4.65	6.3
545	MSdm2-02-PlSx	92	70	22.0	21.4	266	3.71	6.3
546	MSdm2-03-PlFd	1,421	60	20.7	18.3	209	3.51	6.3
547	MSdm2-04-PlSx	8,987	60	22.1	20.0	263	4.33	6.3
548	MSdm2-05-PlSx	2,371	50	22.8	21.2	298	5.85	6.3
549	MSdm2-06-PlSx	1,201	60	25.1	24.4	386	6.23	6.3

It should be recognized that the application of cover constraints in particular zones may delay stand entry well beyond the minimum ages listed in Tables 10.7 - 10.10. This will result in realized long-term harvest levels that are lower than the theoretical long run sustained yield (LRSY), which is based on harvesting all stands at culmination age. LRSY values calculated on the basis of both natural and managed stand yield curves are shown in Table 10.11. The calculations assume that the entire land base will be occupied exclusively by either natural or managed stands.

Table 10.11 - LRSY estimates for natural and managed stands

Description	Natural	Managed
THLB, including NSR (ha)	123,757	123,757
- future roads (ha)	730	730
+ Kelowna Dirt Bike (ha)	11	11
= Long term THLB (ha)	123,038	123,038
* average MAI at culmination (m^3/ha)	1.92	4.68
= theoretical gross LRSY (m^3/yr)	237,613	578,682
- wildlife tree patch retention (m^3/yr)	14,851	34,652
- non-recoverable losses (m^3/yr)	15,600	15,600
= theoretical net LRSY (m^3/yr)	207,162	528,430

10.5.2 Silviculture Systems

The purpose of this section is to document the silviculture management regimes that are applied on the TFL and how these regimes are reflected in the analysis.

Various alternative harvesting and silvicultural systems are employed across TFL 49. Typically clearcuts of various sizes followed by site preparation as required. Harvesting methods include conventional, cable and helicopter systems. Prompt regeneration is achieved through either planting with the best available planting stock, or in some cases natural regeneration on some lodgepole pine and Douglas-fir sites.

The use of different silvicultural systems is evolving and includes clearcutting with prescriptions that include small blocks and green tree retention. Generally, lodgepole pine, Engelmann spruce, subalpine fir and western redcedar should be managed as even aged stands and are thus harvested by the clearcut system and reforested. The clearcut system will also be used in existing stands of western larch and Douglas-fir.

10.5.3 Initial Harvest Rate

The current AAC for TFL 49 is 380,000 m^3/yr, including allocation to the British Columbia Timber Sales Program (BCTS). In addition, an allowance must be made for non-recoverable losses. As the timber supply analysis is based on the net harvest plus NRLs, the initial gross harvest level for the Base Case analysis will be set to 395,600 m^3/yr, providing a starting point for the analysis.

10.5.4 Harvest Rule

Harvest rules are used by the simulation model to rank stands for harvest. The standard rule is "relative-oldest first". With this rule, the difference between stand age and minimum harvest age is calculated. Stands with the greatest difference between these ages are given the highest priority for harvest. Harvest rules interact with forest cover constraints to determine the actual order of harvesting within the model. If a higher ranked stand is in a constrained zone and cannot be harvested then the model will choose the next highest ranked stand that can be harvested.

10.5.5 Harvest Flow Objectives

In all phases of the analysis, the harvest flow will reflect a balance of the following objectives:

- Maintain or increase the current harvest level for as long as possible;
- Limit changes in harvest level to less than 10% of the level prior to the reduction; and
- Achieve stability in the long-term harvest level and growing stock profiles.

Forest cover constraints and biological capacity of the THLB will ultimately dictate the harvest level determined in the analysis.

11.0 SENSITIVITY ANALYSES

This section briefly describes the sensitivity analyses that will be performed on the Base Case. The sensitivities reflect the stability of the Base Case in the face of uncertainty surrounding specific analysis assumptions. They also reflect the impact of alternative management or potential changes in forest practices. Additional sensitivity analyses may be carried out based on the results of the analysis simulations. These will be documented in the timber supply analysis report.

11.1 Land base Definition

11.1.1 Timber Harvesting Land Base ± 10%

Area will be shifted between the noncontributing and net land base components to simulate changes in the operable land base definition.

11.2 Growth and Yield Assumptions

11.2.1 Natural Stand Yields ± 10%

All VDYP yield curves will be adjusted to measure the impacts on timber supply.

11.2.2 Managed Stand Yields ± 10%

All TIPSY yield curves will be adjusted to measure the impacts on timber supply.

11.2.3 Natural Stand Minimum Harvest Ages ± 10 Years

Natural stand minimum harvest ages will be altered to measure timber supply impact.

11.2.4 Managed Stand Minimum Harvest Ages ± 10 Years

Managed stand minimum harvest ages will be altered to measure timber supply impact.

11.2.5 Regeneration Delay ± 5 years

Regeneration delay will be altered to measure the timber supply impact.

11.3 Resource Emphasis Assumptions

11.3.1 Green-up Heights ± 1 Metre

Green-up heights will be altered to measure the impacts on timber supply.

11.3.2 Non-IRM Maximum Disturbance Limits ± 5 %

Disturbance constraints in all non-IRM REAs will be altered by ± 5%.

11.3.3 IRM Maximum Disturbance Limits ± 5 %

IRM disturbance percentages will be altered by ± 5%.

11.3.4 Community Watershed Disturbance Limits Based on Current Status

Maximum disturbance in the community watersheds will be set at the current level of disturbance within each watershed. These are summarized in Table 10.10.

Table 11.1 - Maximum disturbance for community watershed sensitivity

Description	Natural
Hope Creek	1% of PFLB < 6 m
Lambly Creek	34% of PFLB < 6 m
Norris Creek	1% of PFLB < 6 m
Powers Creek	30% of PFLB < 6 m
Silver Creek	5% of PFLB < 6 m

11.3.5 Wildlife REA Retention Limits ± 5 %

Minimum retention limits in the wildlife REAs will be altered by ± 5%.

11.4 Biodiversity Assumptions

11.4.1 Manage TFL as One Landscape Unit

The OS-LRMP targets for old seral retention will be applied across the entire landbase, treating the TFL as a single landscape unit.

11.5 Alternative Harvest Rules

This sensitivity will evaluate the impact of modelling alternative harvest rules, including:

- Oldest first;
- Maximum existing volume; and
- Maximize improvement in MAI from existing to managed stands.

12.0 MOUNTAIN PINE BEETLE OPTION

Mountain Pine Beetle (*Dendroctonus ponderosae*) (MPB) is currently attacking stands at epidemic levels across B.C. Lodgepole pine stands on TFL 49 are being affected by this outbreak. This analysis option will evaluate the impact on timber supply of harvesting, at an accelerated rate during the first decade, pine stands that are at serious risk to attack.

It is assumed that these pine stands will be harvested as a preventative measure or as part of salvage operations to recover attacked timber. There will be no adjustments to the pine yields. Susceptible pine stands are defined by the following characteristics:

- Pine composition of 40% or higher based on the forest cover label;
- At least 80 years of age; and
- Within Blocks A and B of the TFL.

A number of analysis scenarios will be modelled in the MPB option including:

- Direct the harvest to susceptible pine stands for the first decade;
- Maximize the harvest of susceptible pine during the first decade, without any adjustments to forest cover requirements; and
- Maximize the harvest of susceptible pine during the first decade, allowing forest cover constraints to be relaxed in order to access those stands.

Pine stands from outside the THLB will also be available for harvest. However, after the initial "salvage" of these NTHLB stands they will not be available for any further harvest. The results of maximizing the pine harvest (with or without any relaxation of forest cover constraints) will likely affect the mid-term harvest rate developed in the Base Case.

13.0 REFERENCES

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APPENDIX I

SITE INDEX ESTIMATES FOR MANAGED STANDS

Source: *Site Index Correlated to Ecosystems – TFL 49* (Timberline, 2002b pp 7 - 9)

TFL 49 hierarchy of site index estimates

Values to be used in the timber supply analysis are shaded grey.

				MATRIX VALUES LOCAL to TFL 49			STRATUM VALUES LOCAL to TFL 49			MATRIX VALUES from 2002 PROVINCIAL SIBEC DATABASE			1997 SIBEC
STRATUM	VARIANT	SS[16]	SPECIES	SITE INDEX (m)	NUMBER OF SAMPLES	STANDARD ERROR (m)	SITE INDEX (m)	NUMBER OF SAMPLES	STANDARD ERROR (m)	SITE INDEX (m)	NUMBER OF SAMPLES	STANDARD ERROR (m)	SITE INDEX (m)
13	ESSFdc2	01	Bl	**16.5**	6	0.8	16.5	6	0.8	16.5	9	0.8	12
13	ESSFdc2	01	Pli	**17.7**	8	0.8	17.4	9	0.8	17.3	9	0.6	15
13	ESSFdc2	01	Se	**15.6**	12	1.0	15.6	13	0.9	17.3	15	1.1	12
7	ESSFdc2	03	Pli	14.3	1		**17.6**	14	0.7	-	-	-	15
12	ESSFdc2	04	Bl	16.4	3	2.1	16.4	3	2.1	-	-	-	**12**
12	ESSFdc2	04	Pli	14.8	2	1.4	**15.0**	6	0.6	-	-	-	15
12	ESSFdc2	05	Pli	15.4	3	0.8	15.0	6	0.6	**16.9**	5	1.0	15
14	ESSFdc2	06	Bl	**18.1**	5	0.6	18.4	8	0.5	18.5	6	0.5	12
14	ESSFdc2	06	Pli	20.5	2	0.8	**19.8**	6	0.7	-	-	-	15
14	ESSFdc2	06	Se	**18.5**	7	1.5	17.2	10	1.3	18.2	9	1.2	15
14	ESSFdc2	07	Se	14.4	3	1.4	**17.2**	10	1.3	-	-	-	-
14	ESSFxc	01	Bl	18.9	3	1.1	18.4	8	0.5	**15.7**	9	1.1	12
14	ESSFxc	01	Pli	**19.5**	4	0.9	19.8	6	0.7	16.1	8	1.1	15
12	ESSFxc	05	Bl	-	-	-	-	-	-	**16.2**	7	1.3	15
12	ESSFxc	05	Pli	14.0	1		15.0	6	0.6	**16.9**	11	1.3	15
13	ESSFxc	06	Bl	-	-	-	-	-	-	**13.1**	11	0.9	12
13	ESSFxc	06	Pli	14.3	1		17.4	9	0.8	**15.3**	6	1.2	15
13	ESSFxc	06	Se	16.0	1		15.6	13	0.9	**15.7**	9	0.8	12
14	ESSFxc	07	Pli				19.8	6	0.7	**15.8**	6	1.0	18
8	ICHmk1	01	Fdi	22.7	2	2.5	**20.7**	13	0.9	-	-	-	21
8	ICHmk1	01	Pli	16.5	1		**19.2**	17	0.6	-	-	-	21
7	ICHmk1	03	Fdi	16.0	1		**19.1**	7	0.7	-	-	-	-
7	ICHmk1	04	Fdi	19.8	1		**19.1**	7	0.7	-	-	-	18
7	ICHmk1	04	Pli	**17.4**	5	1.9	17.6	14	0.7	-	-	-	21
9	ICHmk1	05	Se	21.7	2	5.5	**22.3**	7	1.4	-	-	-	21
3	IDFdk1	01	Fdi	19.3	2	2.0	19.4	14	0.6	**16.3**	9	0.9	15

[16] site series

				MATRIX VALUES LOCAL to TFL 49			STRATUM VALUES LOCAL to TFL 49			MATRIX VALUES from 2002 PROVINCIAL SIBEC DATABASE			1997 SIBEC
STRATUM	**VARIANT**	**SS[16]**	**SPECIES**	**SITE INDEX (m)**	**NUMBER OF SAMPLES**	**STANDARD ERROR (m)**	**SITE INDEX (m)**	**NUMBER OF SAMPLES**	**STANDARD ERROR (m)**	**SITE INDEX (m)**	**NUMBER OF SAMPLES**	**STANDARD ERROR (m)**	**SITE INDEX (m)**
3	IDFdk1	01	Pli	**19.2**	6	0.7	20.2	12	0.6	18.5	7	0.9	18
1	IDFdk1	03	Fdi	12.8	2	0.7	**14.3**	8	0.8	-	-	-	15
2	IDFdk1	04	Fdi	19.7	1		18.0	16	0.9	**18.0**	11	0.7	15
2	IDFdk1	04	Pli	18.9	1		17.6	2	1.3	**17.1**	11	0.8	15
4	IDFdk1	05	Fdi	**19.8**	4	0.2	20.6	6	0.9	19.9	8	0.8	18
4	IDFdk1	05	Pli	21.6	2	0.2	21.6	2	0.2	-	-		**21**
4	IDFdk1	05	Se	**20.4**	4	0.6	21.1	7	0.5	20.2	12	0.8	18
3	IDFdk2	01	Fdi	**19.2**	8	0.9	19.4	14	0.6	18.3	31	0.5	15
3	IDFdk2	01	Pli	**21.2**	6	1.0	20.2	12	0.6	18.4	21	0.8	18
2	IDFdk2	03	Fdi	**15.4**	5	0.8	18.0	16	0.9	16.4	12	0.9	15
4	IDFdk2	05	Fdi	19.3	1		20.6	6	0.9	**21.3**	7	1.3	21
4	IDFdk2	05	Se	22.0	3	0.8	**21.1**	7	0.5	-	-	-	18
8	IDFmw1	01	Cw	17.2	2	0.1	17.2	2	0.1	-	-	-	**15**
8	IDFmw1	01	Fdi	**20.7**	8	1.2	20.7	13	0.9	20.7	8	1.2	21
8	IDFmw1	01	Lw	20.8	1		20.8	1		-	-	-	**24**
8	IDFmw1	01	Pli	21.3	3	0.5	**19.2**	17	0.6	-	-	-	21
3	IDFmw1	04	Fdi	**20.0**	4	1.0	19.4	14	0.6	20.0	4	1.0	18
3	IDFmw1	04	Py	20.1	1		20.1	1		-	-	-	**18**
4	IDFmw1	05	Fdi	24.8	1		**20.6**	6	0.9	-	-	-	21
2	IDFxh1	01	Fdi	**19.1**	6	1.7	18.0	16	0.9	16.3	13	1.1	15
2	IDFxh1	01	Py	20.1	3	1.0	20.2	4	0.7	**16.9**	8	1.4	18
1	IDFxh1	03	Fdi	15.2	3	1.0	**14.3**	8	0.8	-	-	-	12
2	IDFxh1	04	Fdi	17.7	2	1.1	**18.0**	16	0.9	-	-	-	15
2	IDFxh1	04	Py	20.4	1		**20.2**	4	0.7	-	-	-	15
2	IDFxh1	05	Se	23.5	1		23.5	1		-	-	-	-
2	IDFxh2	01	Fdi	20.4	2	2.3	**18.0**	16	0.9	-	-	-	15
2	IDFxh2	01	Pli	16.4	1		17.6	2	1.3	-	-	-	-
1	IDFxh2	03	Fdi	15.2	2	2.9	14.3	8	0.8	**15.6**	5	1.0	12
1	IDFxh2	03	Py	17.1	1		17.1	1		**13.7**	6	1.3	12
1	IDFxh2	04	Fdi	12.7	1		**14.3**	8	0.8	-	-	-	15
8	MSdm2	01	Bl	**18.6**	8	0.7	18.6	8	0.7	17.4	18	0.7	15
8	MSdm2	01	Fdi	19.2	3	0.9	20.7	13	0.9	**18.9**	8	1.1	18
8	MSdm2	01	Pli	**18.9**	13	0.6	19.2	17	0.6	19.2	26	0.6	18
8	MSdm2	01	Se	**19.0**	7	0.9	19.0	7	0.9	17.2	20	0.7	15

				MATRIX VALUES LOCAL to TFL 49			STRATUM VALUES LOCAL to TFL 49			MATRIX VALUES from 2002 PROVINCIAL SIBEC DATABASE			1997 SIBEC
STRATUM	**VARIANT**	**SS[16]**	**SPECIES**	**SITE INDEX (m)**	**NUMBER OF SAMPLES**	**STANDARD ERROR (m)**	**SITE INDEX (m)**	**NUMBER OF SAMPLES**	**STANDARD ERROR (m)**	**SITE INDEX (m)**	**NUMBER OF SAMPLES**	**STANDARD ERROR (m)**	**SITE INDEX (m)**
6	MSdm2	03	Pli	**16.7**	5	1.1	16.7	5	1.1	15.2	12	0.9	18
7	MSdm2	04	Bl	-	-	-	-	-	-	**18.3**	7	1.2	15
7	MSdm2	04	Fdi	**19.6**	5	0.6	19.1	7	0.7	19.3	11	0.4	18
7	MSdm2	04	Pli	**18.1**	8	0.6	17.6	14	0.7	17.2	28	0.4	18
7	MSdm2	04	Se	21.4	2	0.4	21.4	2	0.4	-	-	-	**15**
9	MSdm2	05	Bl	**20.6**	4	0.7	20.6	4	0.7	21.3	4	0.4	18
9	MSdm2	05	Fdi	**19.1**	4	1.1	20.4	5	1.6	17.7	6	1.2	18
9	MSdm2	05	Pli	**20.4**	5	0.6	22.4	7	1.4	20.9	15	0.5	21
9	MSdm2	05	Se	21.6	3	1.5	22.3	7	1.4	**20.5**	14	1.2	18
9	MSdm2	06	Fdi	25.8	1		**20.4**	5	1.6	-	-	-	18
9	MSdm2	06	Pli	27.4	2	1.0	**22.4**	7	1.4	-	-	-	18
9	MSdm2	06	Se	23.7	2	1.0	**22.3**	7	1.4	-	-	-	15