RIVERSIDE FOREST PRODUCTS LIMITED
TFL 49 - OKANAGAN TREE FARM LICENCE
MANAGEMENT PLAN #3

TIMBER SUPPLY ANALYSIS
INFORMATION PACKAGE

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1. INTRODUCTION

This Information Package has been prepared by Riverside Forest Products Limited as a source document prior to the completion of the Timber Supply Analysis for TFL 49 Management Plan #3. It serves as a summary of the inputs and assumptions made in preparing for the analysis. The analysis process is a dynamic one and inputs and assumptions may change. Included are inventory and land base summaries, growth and yield information and management assumptions for timber and non-timber resources related to timber supply. It follows the suggested format of the Timber Supply Analysis Information Packages for Tree Farm Licences (Version 2.0, February 1997).

The following options will be analysed for the Timber Supply Analysis Report:

- Current Management Option;
- Okanagan TSA IRM Timber Harvesting Guidelines Option; and
- Riverside Management Option.

Analysis of options will be undertaken using CASH_FM, a proprietary forest estate simulation model.

CASH 6 is a sequential forest inventory projection simulation model with the following key characteristics:

- Spatial - the locale of management activities is used to capture the spatial consequences of changes in management policy;
- Dissaggregate - forest inventory is not aggregated beyond mapable contiguous blocks;
- Discrete - separately identified harvest blocks are the basic spatial unit for simulation; and

Sequential - interaction of harvest and regeneration rules as modified by constraints results in a sequential progression of the forest state from current status into the future

CASH_FM is capable of explicitly simulating integrated resource management by regulating forest cover. A degree of spatial resolution is achieved by the use of compact and contiguous management zones within which cover constraints are applied. This allows an "integrated resource land base" approach with full and appropriate contribution of the entire productive forest to analysis of the non-timber resource values.

All options will be evaluated and an allowable cut will be proposed for acceptance by the Chief Forester of British Columbia. Drawing from the results of the various analyses and representing the intended management regime for TFL, a Riverside Management Option will be prepared in support of the proposed allowable cut.

2. PROCESS

Following acceptance, this Information Package will be included as an Appendix to the Timber Supply Analysis Report of TFL 49 Management Plan #3.

The contents of this Information Package reflect inputs from the previous Management Plan (MP) process, from public and resource agency review of MP #2 and the Statement of Management Objectives, Options and Procedures for MP #3 as outlined in the Management Plan Review Strategy.

Technical details have been reviewed with Ministry of Forests staff from the Timber Supply, Resources Inventory, and Research Branches.

This Information Package, including yield curves has been submitted for review directly to the following offices of the MoF:

- Resources Inventory Branch for review of natural stand yields (Mr. R. Drummond);
- Forest Productivity and Decision Support Section, Research Branch for review of managed stand yields (Mr. A. Nussbaum); and
- The designated MoF Regional growth and yield contact (Mr. I. Cameron).

The Information Package has been prepared in consultation with designated MoF Timber Supply Branch staff (Bud Koch and Greg Lawrance) to ensure that all information necessary to evaluate the timber supply situation of TFL 49 is available to the Chief Forester of B.C.

3. TIMBER SUPPLY FORECASTS

This section describes the various options, or possible management scenarios, that will be presented in the Timber Supply Analysis Report.

3.1 Current Management Option

The current management option will include:

- Management activity as defined by operations over the last 5 years;
- Implementation of the Forest Practices Code (FPC) as it was interpreted August 1997, including riparian management, stand level biodiversity, and low emphasis landscape biodiversity guidelines;
- An up-to-date Vegetation Resources Inventory (VRI);
- Partial implementation of adjustments for negative site index bias in old growth stands;
- VDYP natural stand yields and WinTIPSY managed stand yields;
- Current utilization standards;
- Visual quality objectives;
- Wildlife management;
- Genetic gains from tree improvement;
- Basic silviculture; and
- Consideration of problem forest types and forest health consistent with current management.

3.2 Sensitivity Analyses

Sensitivity runs for this option will address any issues that have significant uncertainty associated with them. Table 3-1 lists proposed sensitivity analyses.

Table 3-1 Sensitivity analyses

Issue	Sensitivity Levels to be Tested
Negatively biased old growth site index	Provincial interim OGSI values: 1)TFL Blocks A, C 2)Whole TFL
Existing yields	Existing yields +/- 10%, +15%, + 20%
Landscape biodiversity emphasis	45/45/10 weighted biodiversity emphasis objectives
Aggressive basic silviculture	1) All regeneration by planting 2) 2m green-up
Community watersheds	A disturbance constraint of 6m and 20% to reflect FPC hydrological green-up
Protected areas strategy	Goal One and Areas of Interest removed
Land base sensitivity	1) Boundary adjustments 2) Deciduous and overstocked pine 3) No wildlife tree patches
Harvest profile	Pine a priority

3.3 Additional Options

This section identifies proposed optional analyses.

Table 3-2 Optional analyses

Option	Issue	Analysis Methodology
Okanagan TSA IRM Timber Harvesting Guidelines	Timber supply costs associated with the Forest Practices Code	Drop Forest Practices Code requirements such as riparian management zones and biodiversity constraints
Riverside Management Option	Driven by results of the analysis	

3.3.1 Okanagan TSA IRM Timber Harvesting Guidelines Option

This Option is based on the Okanagan TSA Integrated Resource Management Timber Harvesting Guidelines and differs from the Current Management Option in that guidelines developed specifically as part of the Forest Practices Code (FPC) are not addressed. This option will be most closely comparable to the previous timber supply analysis. It is intended to illustrate any "timber supply cost" associated with the FPC (and the LRMP process, if completed).

3.3.2 Riverside Management Option

This option will reflect Riverside's commitments and intentions for management on TFL 49. It will form the basis for a proposed allowable cut.

4. MODEL

The proprietary simulation model CASH_FM (Continuous Area Simulation of Harvesting and Forest Management) uses a pseudo-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 depletion and minimum disturbance constraints on forest cover are explicitly implemented. A variable degree of spatial resolution is available depending on inventory formulation and management zone definition. Productive forest stands which do not contribute to harvest, such as environmentally sensitive areas and inoperable areas, can be included to better model forest structure and disturbance levels.

In their current implementation forest cover constraints require a control area over which to operate. Common sense indicates that the control area for a constraint set should correspond in some way to an element in the landscape. For example, the constraints associated with visual quality objectives are designed to operate on the scene visible from discrete sets of viewpoints. Pseudo-geography is employed to translate spatial constraints on harvesting into forest cover constraints applied to a “natural” constituency.

CASH_FM contains a hierarchical land base organisation to assist in implementing control areas. Two levels of land units are used to define both geographically separate areas and areas of similar management regime. Forest cover constraints can be applied at both levels.

CASH_FM will be used to determine harvest schedules, which incorporate all integrated resource management considerations.

CASH_FM has functionality, which allows height based green-up based on analysis unit yields.

5. FOREST INVENTORY

Completed in 1996, the TFL 49 Vegetation Resources Inventory includes forest cover attributes to MoF Phase I standards in a fully digital and spatial format compatible with the provincial inventory database. Colour photography flown in 1994 was used to delineate strata to Vegetation Resources Inventory 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 Kamloops Region MoF staff.

The forest cover inventory is updated for disturbance and projected for growth to January 1, 1996.

Inventory and ancillary data has been prepared using a geographic information system (GIS) in order that methods will be as "spatially aware" as possible. For example, existing roads are buffered to provide specific area reductions from the net harvesting land base.

For analysis purposes the inventory will be assigned to 10-year age classes.

6. DESCRIPTION OF LAND BASE

This section describes the TFL 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. The reclassification process is presented in map form in Appendix III.

6.1 Timber Harvesting Land Base Determination

Table 6-1 presents the results of the reclassification process to identify the timber harvesting land base.

Table 6-1 Timber harvesting land base determination

	Area (ha)			Net Merchantable Volume* ($000m^3$)		
	Schedule A	**Schedule B**	**Total**	**Schedule A**	**Schedule B**	**Total**
TFL 49 Total Area	799	142,961	143,760			
Non-productive:						
Non-forest, non-productive	79	6,450	6,529			
Roads	12	1,524	1,537			
Landings	0	271	271			
Total non-productive	91	8,245	8,337			
Productive Forest	707	134,716	135,424	83	21,613	21,696
Reductions to the productive forest:						
Non-commercial	0	92	92	0	0	0
Recreation reserves	0	540	540	0	82	82
Deciduous	51	3,802	3,854	5	122	127
Low volume	7	1,338	1,345	1	87	88
Low productivity	0	590	590	0	13	13
Overstocked pine	0	978	978	0	117	117
ESAs:						
Soils	4	1,542	1,546	0	271	272
Plantation	0	291	291	0	36	35
Riparian reserves	37	1,130	1,167	9	270	279
Total reductions	99	10,303	10,403	15	998	1,013
Current timber harvesting land base	608	124,414	125,022	68	20,615	20,683
less:						
Wildlife tree patches			5,501			
Modeling timber harvesting land base			119,521	65	19,708	19,773
Future roads			974			
Long term harvesting land base			118,547			

* Stand volumes not reduced for deciduous component, 12.5-cm dbh utilization for all species.
All figures are subject to rounding.

6.2 Total Area

The total area of TFL 49 is 143,760 ha. This is composed of 1,449 ha of water, 6,887 ha of non-forest and non-productive land and 135,424 ha of productive forest land.

6.3 Non-forest, 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 timber harvesting land base. 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.

Table 6-2 Non-forest, non-productive forest area summary

Classification	Area (ha)
Ice, rock, alpine	338
Water	1,449
Range or agriculture	1,986
Road polygons	848
Roads and landings	1,808
Other non-forest	647
Non-productive forest	1,260
Total	**8,337**

6.4 Existing Roads, Trails and Landings

An initial reduction for road rights-of-way wide enough to be identified as forest polygons was made and 848 ha were removed. This does not capture the majority of roads. To address this, the existing roads, trails and landings captured as line features in the GIS data set (see Section 10.1.6) were buffered the appropriate width. These buffers were used in the overlay process to identify the hectares lost permanently from the productive land base (1,808 ha). Buffer widths represent the width lost to the long-term productive forest as determined by Riverside staff for each road segment. Buffers are 20 or 13 metres for highways, 10 or 8 metres for main roads, 3 or 6 metres for trails and .2 ha for landings.

Specific areas can be removed once only and there is no opportunity for double counting. A total of 2,656 ha are removed for roads which represents 2.1% of the net harvesting land base. This figure reflects current road deactivation and soil conservation measures.

6.5 Non-commercial Cover

Land classified as occupied by non-commercial species (coded type identity = 5 in the inventory) is excluded (92 ha).

6.6 Inoperable

There is no operability survey for TFL 49. All areas are operable except those removed for soil sensitivity or other reasons. No reduction to the net land base is made for inoperability.

6.7 Recreation Reserves

Recreation reserves identified as map notations, but not removed from the TFL, are removed from the net harvesting land base. These areas, and their forest cover, remain in our data set to contribute during modeling to non-timber objectives. Excluded from harvest are 540 ha.

6.8 Unmerchantable Stands

Unmerchantable stands are designated as non-contributing to harvest as defined in Table 6-3.

Table 6-3 Unmerchantable stands

Problem Forest Type	Leading Species	Inventory Type Groups	Site Index [1] Or Volume (m^3)	DBH at the margin (cm.)	Stocking	Age (yr.)	Area Removed (ha)
Deciduous	Deciduous	35-42	n/a	n/a	n/a	n/a	3,854
Low Volume[2]	Pine	28-31	100 m3/ha	n/a	n/a	>100	262
	other conifer	1-27, 32-34	100 m3/ha			>150	1,083
Low Productivity[2]	Pine	28-31	9.5	18.4	n/a	<=100	110
	Fir	1-8, 27, 32	10.0	25.4		<=150	339
	Balsam	12-20	7.0	20.3		<=150	80
	Spruce	21-26	6.0	20.3		<=150	61
	Cedar	9-11	7.5	17.3		<=150	0
	Larch	33,34	8.5	21.1		<=150	0
Overstocked Pine	Pine	28-31	n/a	n/a	stocking class 4	80+	978

[1] The site index limit is based on achieving 100 m^3/ha (12.5cm utilization) at 100 years for Pine and 150 years for other species.

[2] Not applied where stands have logging history.

6.9 Environmentally Sensitive Areas (ESAs)

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 areas classified as environmentally sensitive on TFL 49 is presented in Table 6-4. The table should be interpreted as follows:

Column 1 - ESAs identified in the inventory. Any polygon is classified as the highest priority ESA and contributes to only one category.

Column 2 - Percent reduction applied in the net down.

Column 3 - Total hectares of ESAs in the TFL.

Column 4 - Areas removed by the ESA net down. Due to previous net down reclassifications this figure is less than the total area.

Column 5 - Area of each ESA category remaining in the net operable land base.

Deductions are listed in the order in which they are applied.

Table 6-4 Distribution of area by ESA category

1	2	3	4	5
ESA Description	**% Reduction**	**Total TFL Land Base (ha)**	**Area Removed (ha)**	**Area Remaining (ha)**
High Soils	100	3,167	1,546	0
Moderate Soils	0	2,631	0	2,314
High Regeneration	100	486	291	0
High Wildlife	0	1,422	0	976
Moderate Wildlife	0	13,291	0	11,420

No reductions are made for moderate ESAs.

There are no avalanche ESAs on the TFL.

Forest cover constraints are considered to replace ESAs for wildlife (Ew). In support of this, there is a strong correlation bwtween the wildlife winter habitat inventory and wildlife ESAs. A significant area of high wildlife ESA in Block "B" does in fact fall into the winter wildlife management zone.

The landscape inventory provides classification of area by management code as a replacement for recreation ESAs. There are no management code = 0 areas on the TFL and therefore no recreation ESA removals. Note that some 540 ha of recreation reserves identified as amendments to the TFL have been excluded from the timber harvesting land base.

6.10 Riparian Reserves

Forest Practices Code stream, lake and wetland classifications were used to identify riparian reserve widths. In the GIS data set, all water features were buffered the appropriate widths and used in the overlay process to identify the reserve and management zones. The classification methodology is discussed in Section 10.1.7. Riparian reserves are removed from the harvesting land base.

Table 6-5 Riparian area removals

Riparian Classification	Area Removed (ha)
S2 stream reserves	386
S3 stream reserves	626
Wetland reserves	104

L1 lake reserves	51
Total	1,167

6.11 Future Roads, Trails and Landings

An area reduction in addition to the existing road reduction will be made for future roads. Assuming that future roads impacts do not change from current practice, during timber supply simulation and after a stand has been harvested, two percent of the harvested area will be permanently removed from the net harvesting land base. This reduction will apply to stands currently older than 40 years and will terminate in analysis year 40 when the TFL will be assumed to be fully roaded. In order to test this assumption an analysis of mature timber currently roaded indicates that 53% of the current mature timber is presently accessed. Preliminary analysis runs indicate that natural stands are eliminated by about year 80. This confirms that in order to access the remaining un-roaded old growth, approximately 40 years of major road construction will be required.

Preliminary analysis indicates approximately 1,000 ha of future road reductions based on our assumptions. In addition to land base reductions for roads of 2,656 ha the total area lost to roads is about 3,600 ha. An analysis of existing and proposed roads as part of the Total Resource Planning process on TFL 49 indicates 3,379 ha of roads total. This is based on 3,171 km of existing roads at an average of 7m wide and 1,931 km of proposed roads at 6m wide.

6.12 Wildlife Tree Patches

The land base reduction for wildlife tree patches (4.4%) is described in Section 10.2.5.

7. INVENTORY ORGANISATION

TFL 49 is divided into three Blocks corresponding to former TFLs that were amalgamated. The Blocks are identified in the key map at the beginning of this Information Package. Block A is 73,817 ha of productive forest, Block B 48,916 ha and Block C 12,690 net productive hectares.

7.1 Management Zones

Integrated resource management translates to restrictions on the removal of forest cover and the distribution of those removals—the use of forest cover constraints. For forest level modeling purposes, areas requiring the same management regime, that is having the same constraints, are grouped into management zones. Within a zone, specific forest cover guidelines are implemented. The management zone structure to be created for the TFL will be based on forest management zones described in the *Okanagan TSA Timber Harvesting Guidelines* and will follow the lead from the Okanagan Shuswap LRMP. The zones define areas within which certain measures are required to protect certain values. The zones are based on riparian values, visual quality objectives, critical wildlife habitat (ungulate winter range), and timber emphasis areas.

As a higher level of aggregation, biogeoclimatic zones and subzones are grouped into landscape units and natural disturbance types (NDTs) and used as control units to address landscape biodiversity; a Forest Practices Code requirement.

Management Zones and Landscape units summarized in Table 7-1. Management zones are presented in map form in Appendix IV.

Table 7-1 Management zones

Management Zone	Zone Number	Net Harvesting Area (ha)
Riparian Management	1	2,856
VQO Retention	3	5,742
VQO Partial Retention	4	6,453
Ungulate Winter Range	5	18,563
VQO Modification	7	5,250
Integrated Resource Management	8	86,157
Total		**125,021**
Landscape Unit	**BEC Zone**	**Net Harvesting Area (ha)**
Upper Salmon	ESSF	10,761
	IDF	27,727
	MS	19,235
Okanagan West Side	ESSF	8,123
	ICH	5,059
	IDF	7,775
	MS	6,396
Trepanier	ESSF	12,309
	IDF	8,226
	MS	18,530
	PP	877
Total		**125,021**

7.2 Analysis Units

Aggregation of species groups is necessary to facilitate forest level modeling. Species of similar biological, management and silvicultural attributes are grouped to reduce complexity. This must be balanced with creating groups small enough to allow accurate modeling of stand yields.

There are 12 basic analysis units – four species groups with three productivity groupings. Separated from these are stands over 140 years of age. This is done in order that old growth site index bias is isolated from the young thrifty stands. Different methodologies for the adjustment of old growth site index necessitates the separation of Block B old growth from Blocks A and C. Deciduous analysis units are outside the net land base but may contribute to non-timber resource needs. Analysis Units are listed in Table 7-2.

Table 7-2 Analysis units

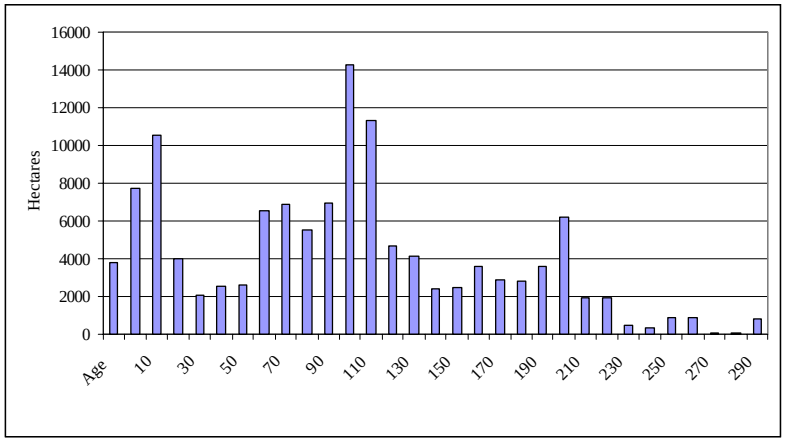
Analysis Unit #	Species	TSA Block	Site Index Class	Net Area (ha)	% of Net Land Base
1	Douglas-fir	A,B,C	1	4,905	3.92
2	(<= 140 years)		2	11,555	9.24
3			3	9,330	7.46
4	Pine	A,B,C	1	5,294	4.23
5	(<= 140 years)		2	21,669	17.33
6			3	20,834	16.66
7	Balsam	A,B,C	1	1,876	1.50
8	(<= 140 years)		2	4,801	3.84
9			3	4,927	3.94
10	Spruce	A,B,C	1	1,326	1.06
11	(<= 140 years)		2	4,171	3.34
12			3	2,948	2.36
31	Douglas-fir	A,C	1	625	0.50
32	(> 140 years)		2	3,321	2.66
33			3	2,838	2.27
34	Pine	A,C	1	791	0.63
35	(> 140 years)		2	3,061	2.45
36			3	1,624	1.30
37	Balsam	A,C	1	73	0.06
38	(> 140 years)		2	1,132	0.91
39			3	2,288	1.83
40	Spruce	A,C	1	1,452	1.16
41	(> 140 years)		2	4,256	3.40
42			3	3,131	2.50
51	Douglas-fir	B	1	125	0.10
52	(> 140 years)		2	910	0.73
53			3	3,044	2.43
54	Pine	B	1	48	0.04
55	(> 140 years)		2	438	0.35
56			3	433	0.35
57	Balsam (> 140 years)	B	1	15	0.01
58			2	50	0.04
59			3	415	0.33
60	Spruce	B	1	207	0.17
61	(> 140 years)		2	227	0.18
62			3	879	0.70
97	Deciduous	A,B,C	1	0	0
98			2	0	0
99			3	0	0
Total				**125,022**	**100**

7.3 Age Class Distribution

Table 7-3 provides the age class distribution of the TFL. Leading age is the oldest age in the age class. Most NSR is age zero.

Table 7-3 Age class distribution

Leading Age	Area (ha)
0	3,782
10	7,743
20	10,549
30	4,025
40	2,042
50	2,563
60	2,593
70	6,560
80	6,902
90	5,519
100	6,955
110	14,273
120	11,331
130	4,662
140	4,146
150	2,380
160	2,478
170	3,603
180	2,869
190	2,846
200	3,585
210	6,212
220	1,910
230	1,952
240	484
250	333
260	893
270	869
280	46
290	91
300	825



7.4 Seral Stage Distribution

Using the draft landscape units and managing to biogeoclimatic zone, the current TFL status with regard to low emphasis landscape requirements is summarized in Table 7.4. Also presented are initial requirements as directed in the MoF memorandum *Timber Supply Review Current Management Scenario Modeling Assumptions for Biodiversity and Landscape Units.*

Table 7-4 Seral stage distribution:

Draft Landscape Unit	BEC Zone	Seral Stage	Productive Area (ha)	Current % of Zone	Low Emphasis Requirement	Requirement as Modeled
Upper Salmon	ESSF	Early	2,362	21%	n/a	n/a
		Old	3,208	29%	14%	4.7
		Mature plus Old	3,891	35%	14%	n/a
	IDF	Early	4,218	14%	n/a	n/a
		Old	221	1%	13%	5.3
		Mature plus Old	14,650	49%	17%	n/a
	MS	Early	4,869	24%	n/a	n/a
		Old	2,898	14%	14%	4.7
		Mature plus Old	11,017	54%	14%	n/a
Okanagan West Side	ESSF	Early	2,311	27%	n/a	n/a
		Old	3,352	40%	14%	4.7
		Mature plus Old	3,666	43%	14%	n/a
	ICH	Early	909	17%	n/a	n/a
		Old	1,727	32%	14%	4.7
		Mature plus Old	2,681	50%	14%	n/a
	IDF	Early	724	8%	n/a	n/a
		Old	163	2%	13%	4.3
		Mature plus Old	4,929	53%	17%	n/a
	MS	Early	1,936	29%	n/a	n/a
		Old	2,318	35%	14%	4.7
		Mature plus Old	3,423	51%	14%	n/a
Trepanier	ESSF	Early	4,266	34%	n/a	n/a
		Old	6,022	48%	14%	4.7
		Mature plus Old	7,318	58%	14%	n/a
	IDF	Early	2,176	20%	n/a	n/a
		Old	2	0%	13%	4.3
		Mature plus Old	4,763	44%	17%	n/a
	MS	Early	7,003	35%	n/a	n/a
		Old	5,326	27%	14%	4.7
		Mature plus Old	8,998	45%	14%	n/a
	PP	Early	3	0%	n/a	n/a
		Old	0	0%	13%	4.3
		Mature plus Old	620	65%	17%	n/a

Notes to the table:

The table represents current TFL status with regard to low emphasis landscape requirements. Data is shown only for seral stages of interest, that is, areas between early and mature are not included. There is duplication, of course, between old and mature plus old.

8. GROWTH AND YIELD

Growth and yield modeling is significantly improved over methods used in support of MP #2. Key changes are as follows:

- Actual stand site index information based on inventory age/height data;
- Use of current base age 50 years site index curves;
- Actual stand level crown closure data;
- Use of the best available site index information for regenerated stands to compensate for old growth site index bias;
- Use of WinTIPSY managed stand yield curves; and
- Yield prediction based on TFL specific pooled inventory attributes.

Yield curves for stands of natural origin have been prepared using the MoF program Variable Density Yield Prediction (VDYP) version 6.4. These are referred to as natural stand yield tables. Managed stand yields have been prepared for stands regenerated and conforming to minimum stocking standards. These managed stand yield tables were created using the Table Interpolation Program for Stand Yields (WinTIPSY).

8.1 Site Index

The Vegetation Inventory assigns site index to all stands less than 30 years of age and an age and height data pair for all other stands.

Stands under 30 years of age have a base age 50 site index assigned to them based on the site index of the previous mature stand or an adjacent thrifty or mature stand with similar site characteristics. This process is similar to the assignment of a traditional MoF special site in that it is an estimate of productivity, not a measured attribute. These site index values are not considered to be adjusted for old growth site index bias and no such adjustment is made to the site index values.

For stands 30 years of age or over site index numbers are assigned using VDYP BATCHPROCESS using the inventory age and height. These are based on current MoF site curves and therefore are consistently base age 50 years.

Analysis unit site index is derived as the area-weighted average of the polygon site indices in that analysis unit (pooled species group and site index range). Polygons are assigned to site classes 1 - good, 2 - medium, and 3 - poor. This classification is based on site index break points listed in Table 8-1. These break points are chosen to balance the area in each class while keeping the spread in site index in each class to a minimum. This is of concern since the relationship between site index and volume is not linear. Numeric site classes are used to avoid confusion with MoF G, M, and P.

Block B old growth analysis units do not use this methodology to differentiate site classes. In this case, stands are pooled by SIBEC productivity group to facilitate yield curve reassignment at regeneration.

Table 8-1 Site index breakpoints

Species Group	Site Class 3	Site Class 2	Site Class 1
Balsam			
(<= 140)	<=13	> 13 and <= 16	> 16
(> 140)	<=11	> 11 and <= 14	> 14
Douglas-fir	<=14	> 14 and <= 17	> 17
Lodgepole pine			
(<= 140)	<=14	> 14 and <= 18	> 18
(> 140)	<=14	> 14 and <= 17	> 17
Spruce			
(<= 140)	<=13	> 13 and <= 17	> 17
(> 140)	<=11	> 11 and <= 15	> 15
Deciduous	< 15	>= 15 and <= 19	> 19

8.2 Site Index for Regenerated Stands

Species groups are split by age (at 140 years) into separate analysis units in order to isolate known negative site index bias in the older stands. When these old growth stands are harvested the site index of the regenerating stand must be adjusted to properly reflect the site productivity. Stands undergoing species conversion at regeneration will have site index recalculated using published MoF conversion factors.

8.2.1 Block B Old Growth Site Index Bias Methodology

The site association inventory for Block B (see Section 10.1.4) is used to assign a site index value to each stand based on site index biogeoclimatic ecosystem classification (SIBEC) values. These were drawn from the MoF report *Site Index Estimates by Site Series for Coniferous Tree Species in British Columbia, Draft #4, May 12, 1987*.

Table 8-2 provides a summary of SIBEC values and their reliability as assigned to stands in Block B over 140 years of age.

Table 8-2 SIBEC reliability ratings

Species	Site Index (m)	Reliability	Area (ha)	Species	Site Index (m)	Reliability	Area (ha)
Bl			1.7	Se			73.0
Bl	12	M	399.5	Se	12	L	97.7
Bl	15	L	9.7	Se	12	M	703.8
Bl	15	M	40.5	Se	15	L	97.4
Bl	18	L	14.9	Se	15	M	69.6
				Se	18	L	113.3
				Se	18	M	29.5
				Se	21	L	4.5
Fd			90.1	Pl			4.9
Fd	15	H	257.6	Pl	15	L	50.4
Fd	15	M	649.1	Pl	15	M	365.7
Fd	18	H	239.7	Pl	18	H	1.8
Fd	18	L	122.6	Pl	18	L	3.0
Fd	18	M	225.4	Pl	18	M	348.9
Fd	21	L	17.9	Pl	21	L	39.3
Fd	21	M	28.6	Pl	21	M	0.2

Reliability of the SIBEC values to be used on TFL 49 is: high 12%; moderate 70%; low 14%; and no correlation 4%. These values are pooled to provide a weighted-average site index by analysis unit to use for regenerated stands. Stands with no correlation will default to their inventory values.

Table 8-3 provides the magnitude of improvement in site index related to use of the SIBEC values to correct old growth site index bias in Block B.

Table 8-3 Site index comparison Block B

Analysis Unit	Species	Area (ha)	Exhibited SI	SIBEC SI	Difference	Area Weighted Difference
51	Douglas-fir	125	17.8	21	3.2	1.1
52		910	14.4	18	3.6	
53		3044	14.8	15	0.2	
54	Pine	48	15.4	21	5.6	2.1
55		438	15.6	18	2.4	
56		433	13.6	15	1.4	
57	Balsam	15	11.3	18	6.7	2.4
58		50	10.8	15	4.2	
59		415	10.0	12	2.0	
60	Spruce	207	13.8	18	4.2	0.5
61		227	14.0	15	1.0	
62		879	12.5	12	-0.5	

8.2.2 Blocks A and C Old Growth Site Index Bias Methodology

On Blocks A and C where no site association inventory is available, site index is not adjusted for old growth site index. It is known that there is a negative bias to

site index in these areas, the difficulty lies in not knowing the appropriate adjustment to make. In absence of specific local information, or a site series inventory for these two blocks, the MoF has directed that no adjustment be made for Blocks A and C in this Current Management Option. Sensitivity analyses address old growth site index adjustments on Blocks A and C.

8.3 Genetic Gains From Tree Improvement

Riverside will continue to emphasize the use of genetically improved planting stock as it comes available from ongoing tree improvement programs.

Table 8-4 provides documentation of genetically improved seed use on TFL 49.

Table 8-4 Improved seed use

Year	Hectares	Number of Trees
1992	60	63,500
1993	157	196,000
1994	146	193,000
1995	333	528,000
1996	480	639,000
Total	**1,176**	**1,619,500**

Table 8-5 provides documentation of genetic gain expected from the various improved seed lots as it relates to the past and future planting regimes.

Table 8-5 Genetic gains

	Genetic Gain (Site Index)
orchard spruce planted 1992 through 1997	2%
orchard spruce planted after 1997	3.5%
pine planted 1998	4%
pine planted after 1998	5.5%

In order to capture gains from the genetic improvement program, managed stand yield curves for stands harvested by the forest estate model will be based on site index values adjusted by 5.5 percent for pine leading and 3.5 percent for spruce leading. This overestimates the gain for five years but underestimates for two years. Existing managed stands (less than 30 years of age) will have no genetic gain implemented. The assumption that 100% of planted stock will be genetically improved reflects operational planning.

8.4 Crown Closure

Crown closure is a major driving input for natural stand yields. Analysis unit crown closure values input to VDYP are area-weighted averages of the crown closure attribute of stands assigned to that analysis unit. Stands less than 50 years of age are assigned default crown closure values (taken from VDYP documentation) according to Table 8-6.

Table 8-6 Default crown closure for stands under 50 years

Leading Species	Default Crown Closure
Fir	48
Balsam	42
Spruce	46
Pine	50

8.5 Utilization Levels

Utilization levels that will be used in the development of the yield tables are documented in Table 8-7. A utilization level of 12.5 for all species reflects current management on TFL 49. Also standard on TFL 49 is a 20-cm stump which can not be modeled using standard yield models.

Table 8-7 Utilization levels

Stand Types	Utilization		
	Minimum DBH (cm)	Stump Height (cm)	Top DIB (cm)
All species	12.5	30	10

8.6 Decay, Waste and Breakage

VDYP generated volumes are net decay, waste and breakage using forest inventory zone (FIZ) D and TFL 49 loss factors (special cruise 472). TFL Blocks A and C (former TFLs 9, 32) use factors based on the Okanagan special cruise (#187), Block B (former TFL 16) from the Kamloops special cruise (#261).

8.7 Operational Adjustment Factors

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.

When using WinTIPSY operational adjustment factors (OAFs) will be 10% (OAF1) and 5% (OAF2).

Operational adjustment factors are applied to WinTIPSY yields to reflect the difference between potential yields and operational conditions. The main sources of the difference are:

1. Spatial arrangement of stems in the stand including regularity of spacing (clumpiness) and areas lacking trees (gaps);
2. Non-commercial competition; and
3. 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.

The 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 inventory methodology accepts non-productive polygons to a minimum of 0.5 ha or less. Although 10% is not documented for TFL 49, we feel that it is conservative given the treatment of non-productive areas in the inventory. Table 8-8 presents the change in distribution of polygon size between the former inventory and the new vegetation inventory.

Table 8-8 Number of Inventory Polygons by Polygon Size

Size Class	Number of Polygons - New Inventory	Number of Polygons - Old Inventory
0 - .5 ha	1898	65
.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

8.8 Volume Deductions

Volumes reported in this Information Package (Table 6-1) are not reduced by any deciduous component. For the purposes of modeling, all yield curves are reduced by the amount represented by the deciduous component of the stand.

8.9 Yield Tables for Natural Stands

Volumes reported in this Information Package are based on individual polygon estimates developed with the MoF program VDYP. For forest estate modeling, VDYP will be used for predicting existing stand yields at the analysis unit level. Inventory type group and site index range have been used to define analysis units.

The methods used to generate base yield tables are:

- Each polygon in the net land base has been assigned to an analysis unit on the basis of inventory type group and site index, as well as factors discussed in Section 7.2.
- Area-weighted average site index, crown closure and species composition attributes have been extracted for each analysis unit (pooled are stands over 30 years of age, stands between 30 and 50 years have default values for crown closure).
- These attributes, in addition to decay, waste and breakage factors associated with forest inventory zone and special cruise are used to drive VDYP.
- Yields are compiled to 12.5 cm dbh, 10.0 cm top and 30.0 cm stump for all species.

Inputs to VDYP are presented in Table 8-9.

Outputs from VDYP that will be used in modeling the existing natural forest are presented in Appendix I.

A summary of approximate culmination values derived from the VDYP yield curves is presented in Table 8-10. Culmination age was determined at the point when volume less decay, waste and breakage is maximized to one decimal place (i.e. further increases in MAI would be less than .05 cubic metres/ha/year). This is a reasonable approach to avoid excessively high culmination ages resulting from small increases in MAI.

It should also be recognized that the application of cover constraints in particular zones may delay stand entry well beyond these minimum ages. This will result in realized long term harvest levels which will be lower than the theoretical Long Run Sustained Yield (LRSY), which is based on harvesting all stands at culmination age.

Yield curves will be reduced by the deciduous component before use in modeling.

Table 8-9 Inputs for VDYP natural stand yield curves

Analysis Unit #	Description	Site Index @ 50 yr. (m)	Crown Closure	Species Composition (%)							
				Species 1		Species 2		Species 3		Species 4	
1	Douglas-fir	18.7	44	Fd	79	Pl	10	Py	7	Se	4
2	(<= 140 years)	15.3	40	Fd	80	Pl	13	Py	5	Se	2
3		12.5	37	Fd	82	Pl	12	Py	5	Se	1
4	Pine	19.2	53	Pl	80	Se	8	Fd	7	Bl	5
5	(<= 140 years)	16.3	54	Pl	82	Bl	6	Fd	6	Se	6
6		13.6	55	Pl	82	Fd	8	Bl	6	Se	4
7	Balsam	18.8	44	Bl	56	Se	25	Pl	10	Cw	9
8	(<= 140 years)	14.6	45	Bl	61	Se	22	Pl	13	Fd	4
9		11.1	47	Bl	69	Se	17	Pl	11	Cw	3
10	Spruce	19.6	49	Se	60	Pl	17	Bl	13	Fd	10
11	(<= 140 years)	14.8	48	Se	58	Bl	21	Pl	18	Fd	3
12		11.2	46	Se	61	Bl	24	Pl	13	Fd	2
31	Douglas-fir	18.5	48	Fd	66	Se	17	Bl	9	Pl	8
32	(> 140 years)	15.3	40	Fd	85	Se	6	Py	5	Pl	4
33		12.6	33	Fd	80	Py	13	Pl	4	Se	3
34	Pine	18.1	50	Pl	68	Se	19	Bl	13		
35	(> 140 years)	15.4	53	Pl	67	Se	18	Bl	14	Fd	1
36		12.3	51	Pl	65	Bl	17	Se	16	Fd	2
37	Balsam	15.2	47	Cw	58	Fd	22	Lw	14	Se	6
38	(> 140 years)	11.9	49	Bl	65	Se	28	Pl	5	Fd	2
39		9.3	47	Bl	63	Se	27	Pl	7	Fd	3
40	Spruce	17.2	46	Se	60	Bl	21	Pl	13	Fd	6
41	(> 140 years)	12.8	48	Se	60	Bl	23	Pl	14	Fd	3
42		9.1	46	Se	56	Bl	29	Pl	14	Fd	1
51	Douglas-fir	17.8	50	Fd	78	Se	14	Pl	7	Ac	1
52	(> 140 years)	14.4	39	Fd	87	Pl	10	Se	3		
53	(Block B)	14.8	39	Fd	91	Pl	6	Se	2	Py	1
54	Pine	15.4	52	Pl	65	Se	19	Bl	16		
55	(> 140 years)	15.6	50	Pl	80	Se	10	Bl	9	Fd	1
56	(Block B)	13.6	52	Pl	79	Bl	11	Se	9	Fd	1
57	Balsam	11.3	56	Bl	48	Se	37	Pl	15		
58	(> 140 years)	10.8	56	Bl	62	Se	30	Pl	8		
59	(Block B)	10.0	51	Bl	65	Se	28	Pl	7		
60	Spruce	13.8	46	Se	73	Bl	12	Fd	9	Pl	6
61	(> 140 years)	14.0	45	Se	67	Bl	14	Pl	12	Fd	7
62	(Block B)	12.5	48	Se	64	Bl	28	Pl	8		
97	Deciduous	20.4	46	At	51	Ep	22	Fd	17	Pl	10
98		16.8	40	At	66	Ep	16	Fd	11	Pl	7
99		13.2	32	At	54	Ep	27	Fd	14	Pl	5

Table 8-10 Culmination values for natural stand yield curves

Analysis Unit #	Description	Site Index @ 50 yr. (m)	Culmination Values				
			Age	Volume (m^3/ha)	DBH (cm)	Height (m)	MAI (m^3/ha/yr)
1	Douglas-fir	18.7	90	194	26.9	25.3	2.2
2	(<= 140 years)	15.3	90	131	24.2	20.5	1.5
3		12.5	130	137	27.6	20.6	1.1
4	Pine	19.2	70	203	21.2	21.5	2.9
5	(<= 140 years)	16.3	90	214	22.1	21.1	2.4
6		13.6	110	205	22.3	19.8	1.9
7	Balsam	18.8	70	201	24.5	21.1	2.9
8	(<= 140 years)	14.6	90	179	24.1	19.7	2.0
9		11.1	110	150	22.9	17.3	1.4
10	Spruce	19.6	90	296	26.6	26.3	3.3
11	(<= 140 years)	14.8	100	209	24.4	22.4	2.1
12		11.2	130	206	25.6	22.0	1.6
31	Douglas-fir	18.5	90	258	26.5	25.0	2.9
32	(> 140 years)	15.3	100	148	26.3	21.9	1.5
33		12.6	100	88.9	24.1	17.9	0.9
34	Pine	18.1	80	230	22.3	21.8	2.9
35	(> 140 years)	15.4	90	206	21.6	20.0	2.3
36		12.3	110	182	21.5	18.3	1.7
37	Balsam	15.2	80	165	23.5	18.7	2.1
38	(> 140 years)	11.9	90	131	21.3	15.8	1.5
39		9.3	140	147	23.5	17.2	1.1
40	Spruce	17.2	90	222	24.9	23.4	2.5
41	(> 140 years)	12.8	110	196	24.3	21.4	1.8
42		9.1	140	176	24.1	19.9	1.3
51	Douglas-fir	17.8	100	235	27.8	25.6	2.4
52	(> 140 years)	14.4	110	151	26.8	21.8	1.4
53	(Block B)	14.8	100	138	25.7	21.2	1.4
54	Pine	15.4	90	206	21.7	20.0	2.3
55	(> 140 years)	15.6	90	196	21.8	20.3	2.2
56	(Block B)	13.6	110	205	22.3	19.8	1.9
57	Balsam	11.3	110	162	22.5	17.6	1.5
58	(> 140 years)	10.8	120	163	23.1	18.0	1.4
59	(Block B)	10.0	110	128	21.3	15.5	1.2
60	Spruce	13.8	110	215	25.7	22.7	2.0
61	(> 140 years)	14.0	110	218	25.7	23.0	2.0
62	(Block B)	12.5	110	193	24.2	21.0	1.8
97	Deciduous	20.4	70	138	23.9	23.8	2.0
98		16.8	100	135	27.2	23.2	1.4
99		13.2	100	78	24.5	18.7	0.8

Table 8-11 provides a check of existing timber volume against that predicted at time zero by the yield curves.

Table 8-11 Volume predicted in year zero (000 m^3)

	Area (ha)	Polygon Specific	Analysis Unit Volume	Difference	Percent Difference
Net Harvesting Land Base	119,517	19,773	20,525	752	3.8%

8.10 Regeneration Scheme and Regeneration Delay

This section describes how each stand is regenerated and to which analysis unit. In the analysis of TFL 49, both natural regeneration and planting are used. Regeneration delays are not inherent in the yield curves, but are assigned in forest estate modeling. Table 8-12 describes the regeneration scheme incorporated into the timber supply analyses.

Table 8-12 Regeneration scheme

Pre-regeneration Species	Post-regeneration Species	Percent Allocation	Regen. Delay (yrs)
Balsam	Spruce	100	3
Douglas-Fir	Pine	90	3
	Douglas-fir	10	4
Spruce	Spruce	40	3
	Pine	60	3
Pine	Pine (natural)	48	4
	Pine	43	3
	Douglas-fir	9	4

Regeneration delays are area-weighted averages by regenerating leading species based on survey data from all areas harvested since 1987.

Table 8-13 presents the regenerated analysis units and the species and site index values that were used as input to managed stand yields curve preparation. Site index is calculated based on current site index and any adjustment for species conversion, old growth site index bias, and/or genetic gain as appropriate. The table is read left to right: existing analysis unit and description and target analysis units with species and site index values.

Table 8-14 provides the same information for existing managed stand yields (currently less than 30 years of age).

Table 8-13 Regeneration analysis units (Base Case only)

AU #	Description	Site Index (m)	Species	Regen AU	SI	Spc.	Regen AU	SI	Spc.	Regen AU	SI
1	Douglas-fir	18.7	Pine	601	20.3[1,3]	Fir	201	18.7			
2	(<= 140 years)	15.3		602	16.5[1,3]		202	15.3			
3		12.5		603	13.3[1,3]		203	12.5			
4	Pine	19.2	Pine	204	19.2	Pine	504	20.3[3]	Fir	304	18.7[1]
5	(<= 140 years)	16.3	natural	205	16.3		505	17.2[3]		305	15.9[1]
6		13.6		206	13.6		506	14.3[3]		306	13.4[1]
7	Balsam	18.8	Spruce	507	20.6[1,3]						
8	(<= 140 years)	14.6		508	15.5[1,3]						
9		11.1		509	11.4[1,3]						
10	Spruce	19.6	Spruce	510	20.3[3]	Pine	610	21.1[1,3]			
11	(<= 140 years)	14.8		511	15.3[3]		611	16.4[1,3]			
12		11.2		512	11.6[3]		612	12.9[1,3]			
31	Douglas-fir	18.5	Pine	631	20.1[1,3]	Fir	231	18.5			
32	(> 140 years)	15.3		632	16.5[1,3]		232	15.3			
33		12.6		633	13.4[1,3]		233	12.6			
34	Pine	18.1	Pine	234	18.1	Pine	634	19.1[3]	Fir	434	17.6[1]
35	(> 140 years)	15.4	natural	235	15.4		635	16.2[3]		435	15.1[1]
36		12.3		236	12.3		636	13.0[3]		436	12.2[1]
37	Balsam	15.2	Spruce	537	16.2[1,3]						
38	(> 140 years)	11.9		538	12.3[1,3]						
39		9.3		539	9.1[1,3]						
40	Spruce	17.2	Spruce	540	17.8[3]	Pine	640	18.8[1,3]			
41	(> 140 years)	12.8		541	13.2[3]		641	14.5[1,3]			
42		9.1		542	9.4[3]		642	10.9[1,3]			
51	Douglas-fir	17.8	Pine	551	22.9[2,1,3]	Fir	251	21[2]			
52	(> 140 years)	14.4		552	19.5[2,1,3]		252	18[2]			
53	(Block B)	14.8		553	16.1[2,1,3]		253	15[2]			
54	Pine	15.4	Pine	254	21[2]	Pine	654	22.2[2,3]	Fir	454	20.3[2,1]
55	(> 140 years)	15.6	natural	255	18[2]		655	19.0[2,3]		455	17.5[2,1]
56	(Block B)	13.6		256	15[2]		656	15.8[2,3]		456	14.7[2,1]
57	Balsam	11.3	Spruce	557	19.6[2,1,3]						
58	(> 140 years)	10.8		558	16.0[2,1,3]						
59	(Block B)	10.0		559	12.4[2,1,3]						
60	Spruce	13.8	Spruce	560	18.6[2,3]	Pine	660	19.5[2,1,3]			
61	(> 140 years)	14.0		561	15.5[2,3]		661	16.6[2,1,3]			
62	(Block B)	12.5		562	12.4[2,3]		662	13.7[2,1,3]			
97	Deciduous	20.4	Deciduous	97	20.4						
98		16.8		98	16.8						
99		13.2		99	13.2						

Note:

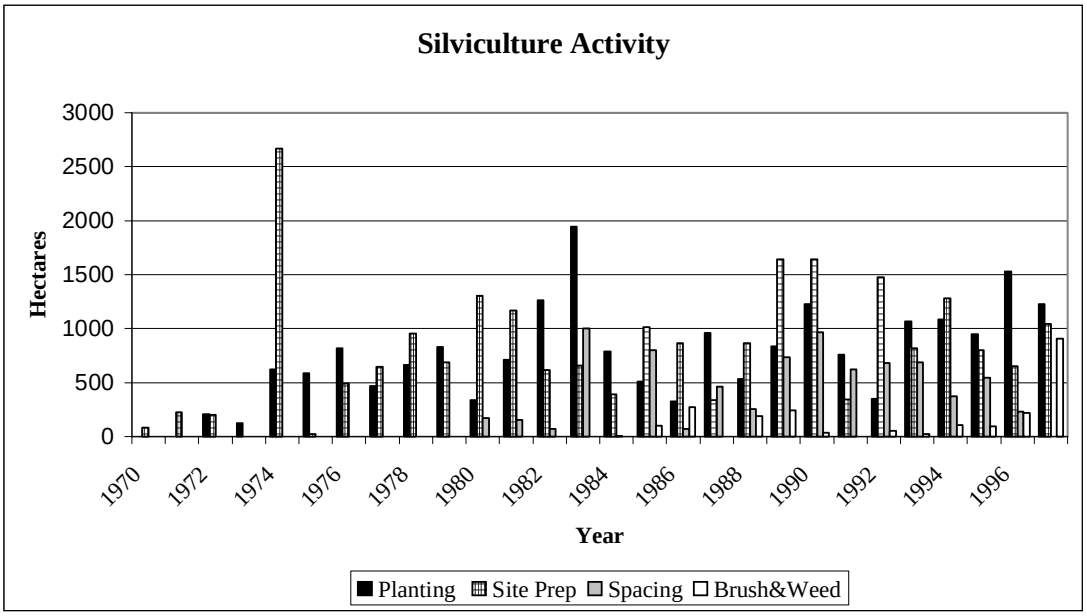
Superscripts indicate adjustments made to site index: [1] - Species conversion; [2] – SIBEC productivity adjustment; [3] - Genetic gain. The order in which they appear in the table implies the order in which the adjustments were made.

Table 8-14 Existing managed stands analysis units

AU	Species	Site Index (m)
201	Fir	18.7
202		15.3
203		12.5
204	Pine	19.2
205		16.3
206		13.6
207	Balsam	18.8
208		14.6
209		11.1
210	Spruce	19.6
211		14.8
212		11.2

8.11 Yield Tables for Managed Stands

All stands age 30 or less were assigned to managed stand yield curves, reflecting the silviculture history of the licence. Please see the figure below. Site preparation and planting began on the TFL in 1971. Stands older than 30 years will be assigned to the appropriate VDYP curves. All regenerated stands, natural or planted will be assigned to managed stand yields reflecting adherence to minimum stocking standards.



Managed stand yields were developed using WinTIPSY. WinTIPSY incorporates the following inputs to derive a yield curve for each analysis unit:

- Leading species;
- Initial planting density - based on current MoF stocking objectives;
- Treatments - all stands will be untreated (i.e. no thinnings);
- Site index;
- Operational adjustment factors; and
- Regeneration delay - 0 (delays are incorporated in forest level analysis).

Specific inputs to WinTIPSY other than species and site index were:

- Utilization: 12.5 cm dbh for all species;
- OAF1 10%, OAF2 5% all species; and
- Initial stocking 1400 stems per hectare all species; and
- Regeneration planted (except where noted), no treatments.

A summary of culmination values for managed stands is presented in Table 8-15.

Appendix II contains WinTIPSY yield tables.

Table 8-15 Culmination values for managed stand yield curves

Analysis Unit	Age	Volume (m3/ha)	DBH (cm)	Height (m)	MAI (m^3/ha/yr)
201	120	413.6	25.7	29.9	3.5
202	120	261.6	21.3	24.5	2.2
203	130	179.1	18.7	20.8	1.4
204	70	265.3	24.5	21.5	3.8
205	90	250	24.1	21.1	2.8
206	100	189.9	22	19	1.9
207	90	430.7	26.2	26.5	3.4
208	120	414.9	25.9	26.1	3.5
209	140	347.9	24.3	23.8	2.5
210	80	406.0	25.4	25.4	5.1
211	110	386.8	25.1	24.9	3.5
212	140	352.8	24.4	23.9	2.5
231	120	403.9	25.4	29.6	3.4
232	110	236.5	20.5	23.4	2.2
233	110	148.4	17.6	19.2	1.4
234	80	272.8	24.8	21.8	3.4
235	90	222.1	23.1	20	2.5
236	120	189.3	22	19	1.6
251	100	437.5	26.2	30.6	4.4
252	120	379.6	24.7	28.8	3.2
253	110	226.2	20.2	22.9	2.1
254	70	320.4	26.5	23.4	4.6
255	80	269.7	24.7	21.7	3.4
256	100	236.1	23.6	20.6	2.4
304	120	413.6	25.7	29.9	3.5
305	110	258.7	21.1	24.3	2.4

Analysis Unit	Age	Volume (m3/ha)	DBH (cm)	Height (m)	MAI (m^3/ha/yr)
306	110	174.1	18.5	20.4	1.6
434	110	329	23.1	27	3
435	100	204.5	19.4	21.9	2.1
436	120	153.3	17.8	19.5	1.3
454	100	406.4	25.3	29.6	4.1
455	110	324.9	23	26.8	3
456	110	215.9	19.8	22.5	2
504	60	286.9	23	21.2	4.8
505	70	243.9	22	19.7	3.5
506	90	220.2	21.5	19	2.5
507	80	434.2	26.3	26.6	5.4
508	100	370.7	24.6	24.3	3.7
509	140	357.2	24.5	24.1	2.6
510	80	426.9	26	26.2	5.3
511	110	403.9	25.5	25.6	3.7
512	130	334.6	23.9	23.3	2.6
537	100	394.3	25.2	25.1	3.9
538	130	365.5	24.7	24.3	2.8
539	160	311.4	23.5	22.8	2
540	90	401.4	25.4	25.3	4.5
541	120	366.2	24.6	24.3	3.1
542	160	327.6	23.9	23.3	2.1
551	50	296.8	23.2	21.5	6
552	70	311.2	23.6	22.2	4.5
553	80	248.7	22.2	19.9	3.1
557	80	406	25.4	25.4	5.1
558	100	387.6	25.1	24.9	3.9
559	120	331.3	23.8	23.2	2.8
560	80	373.9	24.6	24.2	4.7
561	100	370.7	24.6	24.3	3.7
562	120	331.3	23.8	23.2	2.8
601	60	286.9	23	21.2	4.8
602	80	260.9	22.4	20.3	3.3
603	110	237.3	22	19.6	2.2
610	60	309.2	23.5	22	5.2
611	80	258	22.4	20.2	3.2
612	90	176.2	20.3	17.4	2
631	60	281.4	22.9	21	4.7
632	80	260.9	22.4	20.3	3.3
633	100	216.6	21.4	18.9	2.2
634	70	299.6	23.3	21.7	4.3
635	80	252.1	22.2	20	3.2
636	110	226.3	21.7	19.3	2.1
640	70	291	23.1	21.4	4.2
641	100	255	22.4	20.2	2.6
642	110	160.2	19.9	16.7	1.5
654	60	340.6	24.3	23.2	5.7
655	60	250.3	22.1	19.9	4.2
656	80	238.3	21.9	19.6	3
660	70	311.2	23.6	22.2	4.5

Analysis Unit	Age	Volume (m3/ha)	DBH (cm)	Height (m)	MAI (m^3/ha/yr)
661	80	263.8	22.5	20.4	3.3
662	100	227.3	21.7	19.3	2.3

8.12 Silviculture History

Existing stands under 30 years of age are assumed to be managed stands based on modern stocking standards. Please see Section 8.11 for details.

8.13 Non-Satisfactorily Regenerated

The inventory shows 3,806 ha of recently logged stands as not satisfactorily regenerated. These NSR stands have species, age, and site index data based on stand survey or photo-interpretation and are included in ageclass one for modeling.

9. UNSALVAGED LOSSES

Fire, insects, disease and other natural factors can cause catastrophic losses of whole stands of trees. Over the long term the probability of losses to natural causes can be predicted. Where losses occur in merchantable stands some of the dead or dying timber may be salvageable. When modeling the timber supply, the unsalvaged losses are added to the desired harvest forecast and then subtracted from the forecast upon completion of the modeling exercise.

Unsalvaged losses will be based on a proration of Okanagan Shuswap LRMP Analysis Data Package figures to the TFL 49 land base. Final TFL figures (slightly rounded) are proportional to the TFL net operable hectares.

Table 9-1 Unsalvaged losses (m^3 per year)

Cause of Loss	Okanagan TSA	TFL 49
Insects	99,480	12,800
Wind Damage	22,000	2,800
Fire	2,430	0
Total	123,910	15,600

Past records indicate that fire has been virtually eliminated from the TFL.

Unsalvaged losses of 15,600 m^3 per year represent 4% of the current AAC. This is a reasonable figure given demonstrated salvage and the nearly fully roaded state of the TFL.

10. INTEGRATED RESOURCE MANAGEMENT

This Section provides details on how modeling methodology will address non-timber resource requirements.

10.1 Forest Resource Inventories

This Section documents the status of all non-timber resource inventories. Approximate dates of completion and approvals are presented in Table 10-1.

Table 10-1 Non-timber resource inventory status

Inventory Category	Date of Completion	Approval
Environmentally Sensitive Areas	1991	MWP #2
Recreation	1993	MWP #2
Landscape	1994	June 1997.
Biogeoclimatic Classification	MoF Source - 1989	n/a
Site Association Mapping - Block B	1982	1982 Inventory
Canada Land Inventory - Wildlife	1991	MWP #2
Roads Classification	1997	not approved
FPC Stream Classification	1997	not approved

10.1.1 Environmentally Sensitive Areas

An inventory of Environmentally Sensitive Areas (ESAs) covering the entire TFL was captured digitally as an overlay to the forest inventory. This survey was undertaken by Silvatech and completed in 1991. Areas are classified as non-contributing to harvest based on:

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

10.1.2 Recreation and Landscape

Recreation and Landscape inventories are complete to MoF standards for the entire TFL area. Visual quality objectives defined in the Landscape inventory will be used to identify management zones in which visual management will emphasized.

10.1.3 Biogeoclimatic Zones/Subzones/Variants

Mapping of biogeoclimatic zones and subzones/variants is based on the MoELP provincial coverage.

10.1.4 Site Association Mapping Block B

A site association inventory was completed in 1982 by Timberline on TFL 49 Block B (former TFL 16) to MoF standards of the day. Site associations are correlated to current site series as per Table 10-2. This correlation was developed based on the Kamloops Site Identification field book and in discussion with Dennis Lloyd, Research Ecologist, Kamloops Forest Region.

Table 10-2 Site Association and Site Series

Site Association	Site Series
IDFa	**IDFxh2**
IV	05
V	01
IDFb1	**IDFdk1**
I	03
III, IV	01
V	05
VI	06
IDFc	**IDFxh2**
II	04
III	06
IV	07
IDFd	**IDFdk2**
I	03
II	04
III,IV	01
V	05
V	06
VI	07
ESSFe	**ESSFxc**
I, II	05
III, V	06
VII, VIII	07
MSB1	**MSdm2**
I	03
II	04
III	01
IV	05
V	07
VI	06

10.1.5 Canada Land Inventory of Wildlife Habitat

The wildlife habitat inventory is loaded as a data overlay to the forest inventory from the Canada Land Inventory of wildlife habitat capability. This inventory, as updated and refined by the MoELP, will be used to define Ungulate winter range management zones for timber supply analysis following the lead of the *Okanagan TSA Integrated Resource Management Timber Harvesting Guidelines* and the Okanagan TSA Timber Supply Review.

10.1.6 Roads Classification

All roads and trails are classified based on MoF standard categories of main road, secondary road, and trail. In addition to this, roads are classified according to width reflecting area lost to the long-term production of trees. This classification is used to buffer roads using the GIS to make appropriate land base reductions.

10.1.7 Forest Practices Code Stream and Wetlands Classification

In order to model riparian reserves as required by the Forest Practices Code, streams and wetlands must be classified using the FPC system. Formal classification based on rigorous field verification is not available for TFL 49. Instead, the streams and wetlands of the TFL have been classified based on survey information where available and the local knowledge of the Riverside engineering staff. This represents best available information.

10.2 Forest Cover Requirements

The analysis will apply "cover class constraints" to model wildlife habitat guidelines, biodiversity, green-up and visual quality objectives. Cover class constraints place maximum and minimum limits on the amount of young second growth and/or old growth found in zones of the productive land base. Timberline's proprietary simulation model CASH_FM uses a pseudo-geographic approach, giving considerable spatial resolution to the inventory in order to adhere as closely as possible to the intent of forest cover constraints on harvesting. Maximum depletion and minimum disturbance constraints on forest cover are explicitly implemented. Forest stands such as environmentally sensitive areas that do not contribute to harvest can be included to better model forest structure and disturbance levels.

Two forest cover constraint classes will be used for modeling:

- 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; and
- 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.

The use of forest cover constraints as described above improves forest management modeling by ensuring that non-timber resources are given appropriate consideration.

In addition to those described above, CASH_FM allows a second level of constraints to be applied. These will be used to monitor seral stage distribution guidelines for the maintenance of landscape level biodiversity. Following direction in the MoF document "Higher Level Plans, Policy and Procedures" and the "Forest Practices Code Timber Supply Analysis" we will assume that the biodiversity emphasis will be low, and that the required seral stage distributions be achieved within three rotations. Draft Landscape Unit boundaries overlapping the TFL have been supplied by the Penticton District.

Forest cover constraints to be applied in the analysis of TFL 49 are presented in Table 10-3. Management Zone constraints are based on those used in the Okanagan TSR and the Okanagan Shuswap LRMP Data Package. Landscape level biodiversity constraints (Table 10-4) are based on the Biodiversity

Guidebook. In both tables, rotation ages implied by constraints are provided in order to make them more comparable.

Table 10-3 Forest cover constraints - management zones

Management Zone	Zone Number	Maximum Disturbance			Minimum Retention		
		% gross area	Min. Height (m)	Implied Rotation (approx.)	% gross area	Min. Age (yr.)	Implied Rotation
Riparian Management	1	n/a	n/a	n/a	16	100	119
VQO Retention	3	4.2	5	600	n/a	n/a	n/a
VQO Partial Retention	4	10.1	5	250	n/a	n/a	n/a
Ungulate Winter Zone	5	20	3	75	40	90[1]	150
VQO modification	7	19.5	5	130	n/a	n/a	n/a
IRM	8	33.3	3	50	n/a	n/a	n/a

Note [1] - based on minimum height = 20 metres

Constraints are calculated on the productive land base within each management zone. Non-forest, non-productive forest and non-commercial make no contribution to the analysis. All other areas are assigned a status with respect to modeling. Stands contribute either to harvest and forest cover constraints (net harvesting landbase) or cover constraints only. This allows full and appropriate contribution of the productive forests of TFL 49 to integrated resource management.

Table 10-4 Forest cover constraints - landscape biodiversity

Group	Early		Mature+Old		Old		
	% of Landscape	Age (yr.)	% of Landscape	Age (yr.)	% of Landscape*	Age (yr.)	Implied Rotation
NDT3							
MS	n/a	<40	n/a	>100	>4.7	>140	147
ESSF	n/a	<40	n/a	>120	>4.7	>140	147
ICH	n/a	<40	n/a	>100	>4.7	>140	147
NDT4							
IDF	n/a	<40	n/a	>100	>4.3	>250	261
PP	n/a	<40	n/a	>100	>4.3	>250	261

Note: Although constraints are set at the BEC zone level, NDT membership is defined at the variant level, and constraints are applied to zones within landscape units. That is, areas of like zone within a landscape unit are pooled for the constraint calculation.
* Old seral stage constraints are 1/3 of the guideline value as per MoF direction.

Many of the input assumptions for Tables 10-3 and 10-4 are documented in the following sub-sections.

10.2.1 Green-up and Adjacency

Green-up delay is the time required for a stand to reach a specified height. Current integrated resource management assumes green-up in adjacent stands before

harvesting is permitted. Due to the fact that forest cover constraint imposed to model this adjacency problem can have a large impact on harvest levels, time to green-up is an important input to analysis. Minimum heights for disturbance constraints follow the lead of the Okanagan Shuswap LRMP Data Package.

Green-up can be modeled using an age at which stands in a management zone are assumed to reach green-up height. This approach averages the age across units in a management zone. Alternately green-up can be driven by the height of each stand as defined in the yield curves. This provides a significant increase in model resolution. This second method will be used in the current management scenario.

Regeneration delay is additional to this period of disturbed state.

10.2.2 Riparian Management

The Riparian management zone is established as per the Riparian Management Area Guidebook for stream classes S1-S4, L1 lakes and W1 wetlands.

The retention requirements of the Guidebook as reflected in current practice are interpreted (as calculated in Table 10-5) as a 16% old growth retention constraint with 100 years the defining age.

Table 10-5 Riparian zone retention constraint calculation

Riparian Class	% Retention	Net Area
S2	50	260
S3	50	647
S4	0	1,879
S6	0	42
W1	40	42
Area Weighted Percent Retention - 16%		

Current operational standards on the TFL involve no in-block retention for S4 or S6 streams due to the nature of the stands (over mature or pine stands) and the risk of blow down due to lateral rooting.

10.2.3 Visual Quality Objectives

The MoF report *Procedures for Factoring Recreation Resources into Timber Supply Analyses* (1993) provides guidance in determining the appropriate visual quality constraints. Table 10-6 presents the allowable disturbance by VQO and illustrates how the range of values can be refined to the TFL using visual absorption capability (VAC) from the Landscape Inventory.

Table 10-6 VQO disturbance limits by Visual Absorption Capability

VQO	Visual Absorption Capability		
	High	Medium	Low
Retention	5	3	1
Partial Retention	15	10	6
Modification	25	20.5	16

Table 10-7 illustrates the calculation of TFL 49 specific VQO constraints by area weighting by VAC for each zone.

Table 10-7 VQO constraint calculations

VQO	Visual Absorption Capability						
	High		Medium		Low		Weighted
	% Area	% Dist.	% Area	% Dist.	% Area	% Dist.	Average
Retention	66	5	29	3	5	1	4.2
Partial Retention	12	15	75	10	13	6	10.1
Modification	0	25	78	20.5	22	16	19.5

The MoF procedure acknowledges the contribution of the inoperable and productive forest land base to the visual quality equation. The averages presented in Table 10-7 do not require further manipulation based on the assumption that the inoperable productive forest is evenly distributed through the operable land base.

10.2.4 Ungulate Winter Zone

Retention and disturbance constraints for the Ungulate winter zone are based on the Okanagan TSA IRM Timber Harvesting Guidelines. The assumption that harvesting guidelines of 5 ha blocks and 300-m reserves translates to 20% maximum disturbance is taken from the Okanagan Shuswap LRMP Data Package.

10.2.5 Stand Level Biodiversity

Maintaining biodiversity involves strategies at both the landscape and stand level. For the purposes of this forest level analysis stand level management is addressed through wildlife tree patches. These are modeled as per Table 20(a) of the Biodiversity Guidebook because they are being used in concert with landscape level constraints. The net harvesting area of TFL 49 is 92% of the productive land base. The inventory indicates 27% of the net harvesting land base has clear cut harvesting history. Based on these figures the percentage of a cut block required as wildlife tree patches is 9%.

The Biodiversity Guidebook instructs that other constrained areas will meet 50% of the WTP requirements. It also states that there is to be a maximum distance of 500 metres between wildlife tree patches. A spatial analysis was undertaken to determine the proportion of the net harvesting land base that does not require further land reserves for wildlife tree patches. The FPC guideline requires all harvest areas to be within 500 metres of a wildlife tree patch. GIS buffer technology was used to aid in determining the appropriate reductions required. While a 500-metre buffer would underestimate patch reserves required in some cases, 250 metres would overestimate in many situations. A 250-metre buffer was applied to all productive forest not contributing to harvest. This included ESAs, unmerchantable stands, *etc*. as well as riparian management zones and areas of selection harvest. We are not able to include areas reserved from harvest by old growth forest cover constraints, which makes our estimate conservative. This

buffer process indicated that 48% of the net land base is not within 500m of some retained forest. The percentage of the remaining harvest areas required to be in tree patches is then 48% of 9% or 4.4%. This will be applied as a land base net down to best model the actual balance between harvested and reserved areas as it relates to forest cover constraints.

10.2.6 Landscape Level Biodiversity

The control areas for landscape biodiversity constraints are defined by interim landscape units provided by the Ministry of Forests. Constraint values are drawn from the Biodiversity Guidebook. Taking direction from the MoF Memorandum "Achieving Acceptable Biodiversity Timber Impacts", the following is built into our analysis:

- Full use of non-contributing land base to fill requirements of landscape (and stand level) biodiversity requirements;
- In low biodiversity emphasis old growth reserves can be drawn down by 2/3;
- Apply mature plus old requirements only if non-constraining.

10.3 Current Management

This section describes current management on the TFL.

10.3.1 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. Harvesting methods include conventional, cable and helicopter systems.

The use of different silvicultural systems is evolving and ranges from clearcutting to prescriptions that include types of partial harvest and green tree retention. Generally, Lodgepole pine, Engelmann spruce, Subalpine fir and Western red cedar 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 even aged stands of Western larch and Douglas fir. In uneven aged Douglas fir, Yellow pine and Western Larch it may be appropriate to use the selective harvest system where extreme dry conditions inhibit regeneration after clearcut harvesting.

The majority of harvest opportunities on the TFL involve clear cut harvesting, site preparation if required, and prompt regeneration through planting of genetically improved growing stock.

10.3.2 Minimum Harvest Ages

Minimum merchantability will be assessed for each yield curve based on the age at which culmination of mean annual increment is reached.

The minimum merchantability characteristics, by analysis unit for the existing forest and managed stands, are presented in Section 8, Tables 8-10 and 8-15.

10.3.3 Harvest Profile and Harvest Rules

No harvest profiles are modeled.

Harvest rules are used by the simulation model to rank stands for harvest. For this analysis we will use relative oldest first. With this rule, older stands are queued for harvest ahead of younger stands, but oldest is relative to maturity characteristics. Harvest rules interact with forest cover constraints to determine the actual order of harvesting. 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.

10.3.4 Harvest Flow Strategy

The initial harvest rate for each analysis option will be determined during analysis.

In all phases of the analysis, the harvest flow objectives will be to:

- Begin the analysis at as high a harvest level as possible;
- Sustain the initial harvest level for as long as possible;
- Achieve short and midterm harvest levels which do not drop below a minimum long term sustainable harvest;
- Raise the long run sustainable harvest levels to reflect managed stand yields; and
- Keep shifts in harvest level to less than 10% per decade.

Forest cover constraints and biological capacity of the net operable land base will dictate the harvest level. If opportunities exist to increase the harvest at given points during the modeling horizon, those opportunities will be taken.

11. SENSITIVITY ANALYSES

This section describes analyses to be undertaken which test the sensitivity to changes in the Current Management Option input assumptions.

11.1 Old Growth Site Index

This sensitivity deals with the adjustment of productivity estimates to account for old growth site index bias, beyond that undertaken for the current management scenario.

On Blocks A and C, where no site association inventory is available, site index of an analysis unit will be adjusted based on interim results from the Ministry of Forests old growth project (*Interim Old Growth Site Index Adjustment Equations and Application Guidelines, Research Branch 1997*). Equations from that report will used to calculate the alternate site index value which will be used in an area weighted calculation identical to that used for current management scenario site index values.

Alternatively, productivity estimates for all stands, all Blocks, will be based on the MoF interim equations.

11.2 Existing yields

Riverside undertook to compare cruise volumes to volumes predicted by VDYP and used in the Current Management Option. Nine cutting permits cruised but not yet harvested were included in the comparison. Although the sampling methodology affords no ability to make inferences on as statistically reliable basis, the results indicated that VDYP was underestimating volumes in the order of 20-25%.

Phase II sampling of the TFL Inventory was undertaken in 1997 and results that will compare inventory and measured values of attributes used to calculate volumes will be available soon. These may remove the uncertainty associated with volume prediction in existing natural stands.

For this sensitivity, existing stand yield curves will be increased and decreased by 10% and increased by 15 and 20%.

11.3 Landscape Biodiversity Emphasis

No biodiversity emphasis levels have been determined for the draft landscape units. The current management scenario addresses this by assigning low emphasis to all landscape units as described in Section 10.2. The MoF have requested that an average of low, intermediate and high emphasis levels be applied based on the 45/45/10 breakdown anticipated by the FPC.

Three sensitivities will be undertaken. The 45/45/10 average will be applied for the old constraint fully implemented (see Table 11-1), for the old constraint at a 1/3 value (Table 11-2), and for all constraints fully implemented (Table 11-3).

Table 11-1 Biodiversity Emphasis - 45/45/10 Average - Old Constraint Only

Group	Early		Mature+Old		Old	
	% of Landscape	Age (yr.)	% of Landscape	Age (yr.)	% of Landscape	Age (yr.)
NDT3						
MS	n/a	<40	n/a	>100	>14.7	>140
ESSF	n/a	<40	n/a	>120	>14.7	>140
ICH	n/a	<40	n/a	>100	>14.7	>140
NDT4						
IDF	n/a	<40	n/a	>100	>13.6	>250
PP	n/a	<40	n/a	>100	>13.6	>250

Table 11-2 Biodiversity - 45/45/10 Average - Old Constraint at 1/3 value

Group	Early		Mature+Old		Old	
	% of Landscape	Age (yr.)	% of Landscape	Age (yr.)	% of Landscape	Age (yr.)
NDT3						
MS	n/a	<40	n/a	>100	>4.9	>140
ESSF	n/a	<40	n/a	>120	>4.9	>140
ICH	n/a	<40	n/a	>100	>4.9	>140
NDT4						
IDF	n/a	<40	n/a	>100	>4.5	>250
PP	n/a	<40	n/a	>100	>4.5	>250

Table 11-3 provides the full FPC biodiversity emphasis requirements using figures based on an average of high, moderate and low emphasis weighted in the proportions 45/45/10 respectively. Implied rotations are provided to facilitate comparison. Implied rotations include regeneration delay.

Table 11-3 Landscape Biodiversity Emphasis - 45/45/10 Average

Group	Early			Mature+Old			Old		
	% of Landscape	Age (yr.)	Implied Rotation	% of Landscape	Age (yr.)	Implied Rotation	% of Landscape	Age (yr.)	Implied Rotation
NDT3									
MS	<24.2	<40	182	>21.9	>100	133	>14.7	>140	169
ESSF	<24.2	<40	182	>20.1	>120	155	>14.7	>140	169
ICH	<24.2	<40	182	>20.1	>100	130	>14.7	>140	169
NDT4									
IDF	<15.8	<40	278	>28.1	>100	145	>13.6	>250	294
PP	<15.8	<40	278	>28.1	>100	145	>13.6	>250	294

11.4 Aggressive basic silviculture

All regeneration will be by planting. The current management scenario assumes that 48 percent of pine stands are regenerated naturally.

Another sensitivity will test the impact of a 2m green-up requirement.

11.5 Community watersheds

The Lambly, Powers, Norris and Silver Creek watersheds represent just under 15% of the TFL. Although they are designated community watersheds, they do not represent the typical watershed for which the Community Watershed Guidelines were designed. The Lambly and Powers (the vast majority of the area falls in these two) are controlled using surface storage. Current practice in these watersheds does not differ from the rest of the TFL. For these reasons, current management scenario constraints in the watersheds are based on the IRM zone constraints.

For this sensitivity, green-up will be implemented using 6 metres and a maximum denudation of 20% as per the Forest Practices Code. This does not reflect current management and the existence of surface water storage.

11.6 Protected Areas Strategy Sensitivity

Goal One areas and Areas of Interest as supplied by the Ministry of Forests in June of 1997 will be removed from the land base.

11.7 Land Base Sensitivity

Various versions of the TFL boundary have been represented in government and Riverside mapping in recent years. Work currently underway in redefining the TFL boundary indicates that approximately 1,000 ha of productive forest will be returned to the land base. This sensitivity will add this area in the form of a proration across analysis units and management zones. It will be implemented using an adjustment factor to area.

A second sensitivity with regard to land base will acknowledge natural succession in deciduous and overstocked pine stands. Deciduous stands will switch to a young spruce stand at 150 and pine stands will be harvested in 50 years and regenerated to pine by planting.

11.8 Harvest Profile Sensitivity

Recognizing the danger of mountain pine beetle, Lodgepole pine stands will be given the highest priority for harvesting.

12. IRM TIMBER HARVESTING GUIDELINES OPTION

This Option is based on the Okanagan TSA Integrated Resource Management Timber Harvesting Guidelines and differs from the Current Management Option in that guidelines developed specifically as part of the Forest Practices Code (FPC) are not addressed. This Option will be most closely comparable to the previous timber supply analysis. It is intended to illustrate any "timber supply cost" associated with the FPC (and the LRMP process, if completed).

We propose to model IRM using methodology similar to the Okanagan TSR methodology. This analysis would not address FPC riparian reserves, and no landscape or stand level biodiversity measures.

13. RIVERSIDE MANAGEMENT OPTION

This Option will be defined in the Timber Supply Analysis Report based upon results of the various sensitivity analyses.

NATURAL STAND YIELD CURVES

NATURAL STAND YIELD CURVES

MANAGED STAND YIELD CURVES

MANAGED STAND YIELD CURVES

LAND BASE CLASSIFICATION MAP

LAND BASE CLASSIFICATION MAP

MANAGEMENT ZONATION MAP

MANAGEMENT ZONATION MAP