

Kamloops Timber Supply Area Timber Supply Review

Data Package

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1. Introduction

This data package outlines the basic information and assumptions that are required for the Kamloops Timber Supply Area (TSA) timber supply analysis.

The completed data package contains those inputs that are a part of current performance for the timber supply area. For the purpose of the timber supply review, "current performance" can be defined:

- by the current forest management regime — the productive forest land available for timber harvesting, the silviculture treatments, the harvesting systems and the integrated resource management guidelines used in the area;
- by the standards used to approve or reject forest development (5-year development) plans;
- by fully implemented land-use plans;
- by land-use decisions approved by Cabinet;
- by approved higher level plans under the Forest Practices Code; and
- other approved B.C. Forest Service and joint agency forest management practices and policies.

This idea of current performance should be kept in mind at all times when completing the data package. In other words, the purpose of the timber supply review program is to model "what is" not "what if." Changes in forest management objectives and data, when and if they occur, will be captured in future timber supply analyses.

Each section of this data package is organized in the following way:

- 1) A short explanation of the data required;
- 2) Data table; and
- 3) The source of the data and comments.

This data package while representing the best available knowledge and information today is subject to change. As noted in several sections, until the timber harvesting land base is determined it is not possible to finalize the values shown in some of the tables in this package. In some cases the criteria are shown but the final value is not yet filled in. In these cases the columns show as gray shaded in the tables. In addition, if any major changes to management regimes occur over the next few months the timber supply analysis will attempt to capture these changes. The final timber supply analysis report will include a technical appendix which will highlight any changes made to this package.

2. Current Forest Management Considerations and Issues

2.1 Base case management assumptions

These assumptions reflect current performance with respect to the status of forest land, forest management practices and knowledge of timber growth and yield. The harvest forecast developed from these assumptions is termed the base case harvest forecast and is used as a baseline terms of reference. Section 7, "Sensitivity Analyses to be Performed," outlines areas where it is felt there is uncertainty with respect to any of the assumptions and outlines sensitivity analysis intended to be performed.

2.2 Statement of major forest management considerations and issues

The major forest management issues and considerations are listed in the table below. Where issues are defined within legislation, regulations or standards, a timber supply assessment will be made. Issues and factors that are difficult to quantify or assess using a timber supply model may be either analysed separately or noted as upward or downward pressure on the timber supply.

Table 1. Major forest management considerations

Consideration/issue	Description
Visual quality objectives (VQO)	Visually sensitive areas with objectives of preservation, retention, partial retention and modification visual quality.
Community watersheds	Community watersheds as defined in the <i>Forest Practices Code Act</i> and mapped by the Ministry of Environment, Lands and Parks (MELP), Water Management Branch.
Stand-level biodiversity	Forest practices code (FPC) requirements for retaining wildlife trees and wildlife tree patches.
Landscape-level biodiversity	Forest practices code requirements and Kamloops Land and Resource Management Plan (LRMP) requirements for interim biodiversity emphases.
Riparian requirements	Forest practices code requirements and Kamloops LRMP requirements for streamside reserve and management zones.
Caribou habitat resource management zone (RMZ)	Kamloops LRMP approved caribou habitat resource management zone, including early winter, late winter, corridors and a moratorium area.
Critical deer winter range	Kamloops LRMP approved critical deer winter range.
Protected areas (PA) and protection resource management zones	Several new parks and protection RMZs approved through the Kamloops LRMP.

3. Inventories

3.1 Background information

The inventories which will be used to determine the timber harvesting land base and the associated management themes to be used in defining forest management activities are listed in Tables 2 and 3.

Table 2. Forest inventory information

Data	Mapsheets / letter block	Year of re-inventory	Re-inventory photo age	Updated to ^a	Projection date
A. Kamloops Forest District					
FC1s					
- Forest cover	82L: 041, 051, 052, 061, 062, 071, 072	1996	1995	1995	1997
- Operability					
- Biogeoclimatic classifications	82L: 081, 082, 083, 091, 092, 093	1993	1990	1994	1997
- Ownership					
- Public sustained yield unit (PSYU)					
- Roads	82M: 001-003; 011-013, 021-023, 031, 032, 041	1993	1990	1994	1997
- District / TSA boundaries					
	82M: 033, 042, 043, 051	1996	1990	1995	1997
	82M: 052	1996	1990	1993	1997
	92I: 038-040, 044-047	1995	1991	1991	1997
	92I: 048-050, 052-060, 062-070, 072-080, 082-090, 092-100	1997	1995	1995	1997
	92P: 003, 004, 006-010, 016-020, 028-030, 038-040, 048-050, 058-060, 068, 069	1997	1995	1995	1997

(a) Unless otherwise noted all maps are updated to December 1996 using the disturbance layer.

continued

3. Inventories

Table 2. Forest inventory information (concluded)

Data	Mapsheets / letter block	Year of re-inventory	Re-inventory photo age	Updated to ^a	Projection date
B. Clearwater Forest District					
FC1s					
- Forest cover	82M: 013, 022, 041, 042	1992	1990	1995	1997
- Operability	82M: 023, 033-035,	1991	1990	1995	1997
- Ownership	043, 051, 052				
- PSYU	82M: 024, 053	1991	1985 and 1990	1995	1997
- Roads	82M: 044, 045	1991	1986 and 1990	1995	1997
- District / TSA boundaries	82M: 054-056, 061-065, 072-075, 081-085, 092-095	1991	1985	1995	1997
	82M: 066, 076, 086, 096	1991	1985	1997	1997
	82M: 071	1991	1991	1996	1997
	82M: 091	1991	1991	1995	1997
	83D: 003-005, 013-15, 023-25, 033-35, 042-45	1990	1985	1995	1997
	83D: 006, 016, 026, 036, 052-55, 062, 063, 065	1990	1985	1997	1997
	83D: 017	1997	1991	1997	1997
	83D: 037, 046, 056, 064, 072	1996	1991	1997	1997
	92P: 050, 059, 060, 069, 070, 080, 088-90, 099, 100	1997	1995	1995	1997
	92P:	1991	1991	1992	1997

(a) Unless otherwise noted all maps are updated to December 1996 using the disturbance layer.

3. Inventories

Table 3. Non-corporate inventory information

Data	Source	Date created	Update	Scale
Disturbance layer	Ministry of Forests (MoF) Kamloops and MoF Clearwater	1997	Dec. 1996	1:20 000
Stream, lake and wetland reserve buffers	MoF Kamloops and MoF Clearwater	1996 1996	1997 1996	1:20 000
Biogeoclimatic ecosystem classifications - Clearwater forest district	Research Branch	1990	1994	1:20 000
Community watersheds	MELP, Water Management Branch		1997	1:20 000
Visual quality objectives (VQOs)	MoF Kamloops MoF Clearwater	1995 1995	1997 1997	1:20 000
New protected areas	MoF / Ministry of Environment, Lands and Parks (MELP)	1995/1996/ 1998		1:20 000
LRMP critical deer management zones	MoF/MELP	1995	1997	1:50 000
LRMP caribou habitat resource management zones	MoF/MELP	1995	1997	1:50 000
Landscape unit boundaries and emphases	MoF/MELP	1996		1:20 000
Hudson's Bay Trail (designated portion)	MoF	1996		1:20 000
Tod Mountain development area	Sun Peaks Corp./MoF	1997	1997	1:20 000
New woodlots	MoF	1996/1997		1:20 000
Community watershed intakes	MELP, Water Management Branch		1997	1:20 000

Data source and comments:

Protected areas, landscape units, deer management areas, community watersheds, visually sensitive areas, caribou habitat RMZ, woodlots, stream, lake and wetland buffers, Tod Mountain development area and community watershed intakes used in this analysis do not appear on the current MoF inventory file. This information will be merged with the standard inventory file to produce the inventory file to be used in this analysis. All this information resides in the Kamloops Forest District.

4. Division of the Area into Management Zones

4.1 Management zones and tracking of multiple objectives (grouping)

The concept of management zones is used to differentiate areas with distinct management emphasis and homogenous forest cover. For example, a zone may be based on a harvesting system, silviculture system, visual quality objective or wildlife consideration. The forest cover data set can also be grouped by different variables. In addition, the non-contributing forest (land considered unavailable for timber harvesting) may be included for consideration in attaining forest cover objectives. Grouping enables constraints to apply to different combinations of variables or zones as well as enhancing reporting structures. Groups may be thought of as layers of different objectives which must be tracked over time. Whether to put an objective into a group or a mutually exclusive management zone will be decided after data assessment by the timber supply analyst.

Further information on the forest cover requirements to be applied to these areas can be found in Section 6.4, "Integrated resource management."

Table 4. Groupings

Field	Values	Contents
Landscape units	1-33	There are 29 landscape units, four of which are partitioned by two different biodiversity emphasis options (BEOs).
Biogeoclimatic (BGC) variants / NDTs	1-37	Each biogeoclimatic variant will have its own numeric identifier. These variants also make up natural disturbance types (NDT).
Community watersheds	1-17	Each community watershed will have its own numeric identifier.
VQOs	1-4	Each VQO — preservation, retention, partial retention, modification, will have its own numeric identifier.
Caribou habitat zones	1-4	Each type of Caribou habitat — early winter, late winter, corridors and the research area, will have a unique identifier.
Standard management	1	The standard management zone.
Critical deer	1	Critical deer winter range as per LRMP.

Data source and comments:

Additional LRMP zones which will not be modelled individually in the timber supply review include settlement RMZs, recreation/tourism RMZs, and critical moose winter range. The crown portion of settlement zones will be modelled as per standard management. Management strategies for recreation/tourism zones include access management, stand level strategies and visual quality management. Visually sensitive areas within recreation/tourism zones will be modelled as per their approved visual quality objective. Critical moose winter range management strategies are primarily stand level operational strategies around access management, visual screening and brushing. Management strategies which require an average value for the Kamloops TSA will be determined using 55% for the Kamloops Forest District and 45% for the Clearwater Forest District.

4. Division of the Area into Management Zones

4.2 Analysis units

An analysis unit represents a combination of stands dominated by specific tree species or a silvicultural regime with a specific timber growing capability — as indicated by the inventory type group and site index in the forest inventory file. Each analysis unit is assigned its own timber volume projections (yield tables) for existing and future stands. The following table identifies draft analysis units. After determining the timber harvesting land base the timber supply analyst will determine the final analysis unit definitions.

4. Division of the Area into Management Zones

Table 5. Definition of analysis units

Analysis unit (leading species)	Inventory type groups	Criteria				
		Biogeoclimatic (BGC)	Site class (old)	Site index range ^a	Age (years)	
A. Conventional harvest land base						
1 Fir (Fd) / Dry – selection	1-8, 32	PPxh, IDFxh, IDFxw, IDFdk1, IDFdk3	All	All	All	
2 Fir (Fd) / Dry – small patch	1, 6, 32	IDFdk2, MSxk, except for FS, FH, FC, FB or FPL type groups	All	All	All	
3 Fir (Fd) / Wet	1-8, 27, 32-34	All except those specified in analysis units 1 and 2	Good / medium	15.1+	< 141	
4 Fir (Fd) / Wet	1-8, 27, 32-34	All except those specified in analysis units 1 and 2	Good / medium	15.1+	≥ 141	
5 Fir (Fd) / Wet	1-8, 27, 32-34	All except those specified in analysis units 1 and 2	Poor / low	0-15.0	< 141	
6 Fir (Fd) / Wet	1-8, 27, 32-34	All except those specified in analysis units 1 and 2	Poor / low	0-15.0	≥ 141	
7 Cedar (Cw)	9-11	All	Good / medium	17.1+	< 141	
8 Cedar (Cw)	9-11	All	Poor / low	0-17.0	< 141	
9 Hemlock (Hw)	12-17	All	Good / medium	16.1+	< 141	
10 Hemlock (Hw)	12-17	All	Poor / low	0-16.0	< 141	
11 Balsam (B)	18-20	All	Good / medium	13.1+	< 141	
12 Balsam (B)	18-20	All	Good / medium	13.1+	≥ 141	
13 Balsam (B)	18-20	All	Poor / low	0-13.0	< 141	
14 Balsam (B)	18-20	All	Poor / low	0-13.0	≥ 141	

(a) Site index reference age is 50 years.

continued

4. Division of the Area into Management Zones

Table 5. Definition of analysis units

		Criteria				Age (years)
		Analysis unit (leading species)	Inventory type groups	Biogeoclimatic (BGC)	Site class (old)	
A. Conventional harvest land base (continued)						
15	Spruce (S)	21-26	All	Good / medium	14.1+	< 141
16	Spruce (S)	21-26	All	Good / medium	14.1+	≥ 141
17	Spruce (S)	21-26	All	Poor / low	0-14.0	< 141
18	Spruce (S)	21-26	All	Poor / low	0-14.0	≥ 141
19	Pine (PI)	28-31	All	Good / medium	14.1+	< 141
20	Pine (PI)	28-31	All	Good / medium	14.1+	≥ 141
21	Pine (PI)	28-31	All	Poor / low	0-14.0	< 141
22	Pine (PI)	28-31	All	Poor / low	0-14.0	≥ 141
B. Cedar / hemlock partition						
32	Cedar (Cw)	9-11	All	Good / medium	17.1+	≥ 141
33	Cedar (Cw)	9-11	All	Poor / low	0-17.0	≥ 141
34	Hemlock (Hw)	12-17	All	Good / medium	16.1+	≥ 141
35	Hemlock (Hw)	12-17	All	Poor / low	0-16.0	≥ 141

(a) Site index reference age is 50 years.

continued

4. Division of the Area into Management Zones

Table 5. Definition of analysis units (concluded)

Analysis unit (leading species)	Inventory type groups	Biogeoclimatic (BGC)	Criteria		
			Minimum height (metres)	Maximum height (metres)	Age (years)
C. Pulpwood agreement #16 land base					
23 Fir / Dry (Fd)	1-8, 32	PPxh, IDFxh, IDFxw, IDFdk1, IDFdk3	≥ 10.5	≤ 19.5	> 80
24 Fir / Dry (Fd)	1, 6, 32	IDFdk2, MSxk, except for FS, FH, FC, FB or FPL type groups	≥ 10.5	≤ 19.5	> 80
25 Fir / Wet (Fd)	1-5, 7, 8, 27, 34	All except those specified in analysis units 1 and 2	≥ 10.5	≤ 19.5	> 80
26 Cedar (Cw)	9-11	All	≥ 10.5	≤ 19.5	80-140
27 Hemlock (Hw)	12-17	All	≥ 10.5	≤ 19.5	80-140
28 Balsam (Bl)	18--20	All	≥ 10.5	≤ 19.5	> 80
29 Spruce (S)	21-26	All	≥ 10.5	≤ 19.5	> 80
30 Pine	28-31	All	≥ 10.5	≤ 19.5	> 80
31 Deciduous	35-42	All			> 60

Data source and comments:

The site index ranges used to define the analysis units are approximate. The ranges are estimated natural breaks in the distribution of area by site index for each species. Once the timber harvesting land base has been defined a more detailed analysis will be performed to confirm the values shown.

The cedar/hemlock partition is defined by age classes 8 and 9 (> 140 years old) cedar and hemlock stands.

5. Timber Harvesting Land Base Definition

5.1 Identification of the timber harvesting land base

The timber harvesting land base for the Kamloops TSA is determined by separating out the following categories of area which do not contribute to timber harvesting in the area. This section outlines the steps used to identify the timber harvesting land base (the productive forest expected to support timber harvesting) within the timber supply area. Land may be unavailable for timber harvesting for three principle reasons:

- it is not administered by the British Columbia Forest Service for timber supply purposes (e.g., private land, parks, etc.);
- it is not suitable for timber production purposes; and
- it is required for other forest values.

Land may also be added to the timber harvesting land base:

- by management activities which improve productivity or operability (e.g., the stocking of land currently classified as non-commercial brush);
- by the addition of productive forest land (e.g., timber licence reversions).

The classification 'unavailable for timber harvesting' is applied only to land where no harvesting is anticipated to occur. Any area in which some timber harvesting will occur remains in the timber harvesting land base, even if area will be subject to stringent constraints.

After all areas that do not contribute to the timber harvesting land base have been identified, any additional lands are added to the land base. The resulting productive forest land base is defined as the "current timber harvesting land base" for the Kamloops TSA.

5.2 Details on land base classification

5.2.1 Land base contributing to timber supply and biodiversity seral-stage requirements

Ownership codes are generally used to identify whether the land can be considered to contribute to timber supply. Ownership codes 61, 62, 69 and 90 indicate Crown land in a use, recreation and enjoyment of public (UREP), forest management unit, miscellaneous reserves and grazing leases respectively. All areas with other ownership codes will be removed from the land base considered available for timber supply. This includes areas under woodlot licence as their AAC is determined independently of the timber supply review process. Timber licence area — ownership code 70N — is considered under Section 5.2.11, "Timber licence reversions."

Additional ownerships which will contribute towards biodiversity / seral-stage requirements but not the timber harvesting land base are ownership codes 51 (national parks), 60 (ecological reserves), and 63-68 (provincial parks).

5.2.2 Land classified as non-forest

Type identity 6 areas (non-productive land) such as alpine, lakes, rocks, etc., and type identity 8 area (no typing available) will be excluded from the land base considered for timber supply. Type identity 8 area may be included for the land contributing to biodiversity requirements if any is found to be forested.

5. Timber Harvesting Land Base Definition

5.2.3 Non-commercial cover

Type identity 5 represents those areas which are classified as having non-commercial brush species growing on them. These areas are considered to be unlikely sites for timber production and are excluded from the area considered available for timber harvesting.

5.2.4 Environmentally sensitive areas

Some forest lands are environmentally sensitive and/or significantly valuable for other resources. These areas are identified and delineated during a forest inventory and are called environmentally sensitive areas (ESAs). The ESA system uses the following classification: soil (Es), forest regeneration problems (Ep), snow avalanche (Ea), recreation (Er), water (Eh) and wildlife (Ew). Two ESA categories are recognized: high (ESA1) and moderately sensitive (ESA2).

In the context of timber supply analysis, ESAs may result in a reduction in the harvesting opportunity on these sites. Two strategies for accounting for this are: per cent area reductions, and the specific evaluation of individual ESA polygons for harvesting opportunity. This table deals with those areas in which harvesting will not occur.

Table 6. Description of environmentally sensitive areas

ESA category	ESA description	Reduction per cent (%)
Es1	Soils — high	100
Er1	Recreation — high	100
Ep1	Regeneration — high	100
Ea1	Avalanche — high	100
Eh1	Water — high	100

Data source and comments:

Wildlife habitat requirements for deer and caribou will be modelled using forest cover requirements rather than exclusions (see Section 6.4.1, "Objectives which require forest cover requirements").

All moderately sensitive areas (ESA2) are fully included in the timber harvesting land base.

Environmentally sensitive area reductions were established by the Ministry of Forests (MoF) staff in collaboration with specialists from the Ministry of Environment Lands and Parks (MELP). The percentages reflect site sensitivity to forest management, value for other resources, and current management practices.

5.2.5 Areas considered inoperable

Operability and inoperability codes are generally used to describe the presence or absence of physical barriers or limitations to harvesting, logging methods (e.g. cable), and the merchantability of stands. Since physical and economic conditions are highly variable across British Columbia, methodology, interpretation and mapping of these factors is highly variable.

5. Timber Harvesting Land Base Definition

Table 7. *Description of inoperable areas*

Inventory description	Code	Reduction per cent (%)
Inoperable	I	100

Data source and comments:

Operability lines for the Kamloops TSA were originally delineated by the Ministry of Forests, in consultation with licensees, in 1991.

5.2.6 Forest types not currently being harvested

Problem forest types are stands which are physically operable and are not currently utilized or have marginal merchantability. These types are wholly excluded from the timber harvesting land base.

5. Timber Harvesting Land Base Definition

Table 8. Forest types not currently being harvested

Species	Characteristics	Per cent (%) excluded
All	All mature and immature stands with a site index less than or equal to 8.	100
All species except fir and deciduous	All stands classified as residual stocking class, with a site index less than or equal to 15.	100
All species except pine (PI)	All species except pine outside PA 16 older than 80 years in age and less than 19.5 metres in height.	100
Balsam and spruce	Balsam and spruce stands outside PA 16 older than 140 years in age, less than 28.5 metres in height, and with a Crown closure of less than 36%.	100
Pine (PI)	Pine stands outside PA 16 older than 80 years in age, and less than 19 metres in height.	100
Pine (PI)	Pine stands outside PA 16 classified as 310 or 420, with a site index less than or equal to 10.	100
All species except Pine (PI)	All species except pine inside PA 16 older than 100 years in age and less than 10.5 metres in height.	100
Pine (PI)	Pine stands inside PA 16 older than 80 years in age and less than 10.5 metres in height.	100
Deciduous	Deciduous stands outside PA 16.	100
Deciduous	Deciduous stands inside PA 16 less than 61 years in age.	100

Data source and comments:

Pine 310 stands refer to pine-leading stands of age class 3 (41-60 years), height class 1 (0.1-10.4 metres) and stocking class 0 (immature). Pine 420 stands refer to pine-leading stands of age class 4 (61-80 years), height class 2 (10.5-19.4 metres) and stocking class 0 (immature).

5. Timber Harvesting Land Base Definition

5.2.7 Roads, trails and landings

Separate estimates are made to reflect the loss in productive forest land due to existing and future roads, trails and landings. Existing roads, trails and landings are applied as reductions to the current productive forest considered available for harvesting. Reductions for future roads, trails and landings are applied after stands are harvested for the first time in the simulation model. Estimates can be applied as the amount or percentages of area to be removed from specified age classes and zones. Estimates account only for the area that will be permanently removed from the timber harvesting land base.

Table 9. Estimates for existing and future roads, trails and landings

Location	Age	Road length (kilometre)	Road width (metre)	Reduction area (hectares) or per cent (%)
Existing primary roads	All		13	To be determined by Geographic Information System (GIS)
Existing secondary roads	All		10	To be determined by Geographic Information System (GIS)
Estimate for existing landings and on-block disturbance	< 31			5.9%
Future roads, landings and on-block disturbance	> 30			7.4%

Data source and comments:

The amount of area in existing roads is determined by applying a 13 metre or 10 metre buffer to all existing primary and secondary roads on the inventory file, and directly removing this area from the productive forest land base.

The estimate of area in existing landings and trails, that are too small to be captured in the inventory, was determined based on samples conducted between 1986 and 1992 to determine approximate site degradation. Based on this data, a 5.9% area reduction is applied to all areas younger than 31 years (assumed to have a harvesting history).

The estimate of future roads and landings is based on an estimated average of 6.2% for the Clearwater Forest District, and 5.2% for the Kamloops Forest District. For the Clearwater Forest District, this figure was derived from an average in-block disturbance over the past three years, as represented by the category NPUnnatural in silviculture records (Major Licensee Silviculture Information System (MLSIS) and the Integrated Silviculture Information System (ISIS)). For the Kamloops Forest District, this estimate was based on an unweighted average of the target permanent access documented in silviculture prescriptions for a one year period, between June of 1996 and June of 1997. The estimate of future on-block disturbance is 1.7%

5. Timber Harvesting Land Base Definition

5.2.8 Cultural heritage resource reductions

Archaeological overview and cultural heritage value inventories for the entire Kamloops TSA are yet to be completed or are not comprehensive. The impacts of measures required to protect known sites remain unquantified at this time.

5.2.9 Riparian reserve and management zones

Specific areas were removed from the productive forest land base to account for riparian reserve and management zones, as outlined in the following table.

5. Timber Harvesting Land Base Definition

Table 10. Estimates for riparian reserve and management zones

A. Reserve zones to be removed from the productive forest land base				
Riparian classification	Reserve zone (RRZ) width (metre each side)	Management zone (RMZ) width (metre each side)	RMZ maximum basal area retention (%)	Combined riparian zone width
Streams				
S1 streams	50	20	50	60
S2 streams	30	20	50	40
S3 streams	20	20	50	30
S4 streams — Kamloops (all) and Clearwater (fish bearing or community watershed)	10	20	25	15
S4 streams — Clearwater	0	30	25	8
S5 streams	0	30	25	8
S6 streams	0	20	5	0
Wetlands				
All wetlands	10	30	25	18
Lakes				
All 'A' lakes	200	0	N/A	200
All other lakes — Kamloops	10	(190 for B-E — see next table)	0	10
All lakes > 1 000 hectares — Clearwater	0	(200 for B-E — see next table)	0	0
L1 lakes — Clearwater (> 5 hectares and < 1 000 hectares)	10	(190 for B-E — see next table)	0	10
L3 lakes — Clearwater (1–< 3 hectares)	0	30	25	8
L3 lakes — Clearwater (3–5 hectares)	0	(200 — see next table)	0	0

continued

5. Timber Harvesting Land Base Definition

Table 10. Estimates for riparian reserve and management zones (concluded)

B. Lake management zones to be managed as per visual quality objectives (VQO) (in addition to reserve zone removals)		
	Management zone buffer (metre)^a	VQO objective
All B class lakes	200 (including reserve)	Retention
All C class lakes	200 (including reserve)	Partial retention
All D class lakes	200 (including reserve)	Modification
All E class lakes	200 (including reserve)	Modification

(a) The management zone buffer is actually 200 metres including the reserve zone buffer which will be netted out.

Data source and comments:

Riparian reserve areas were specifically removed from the productive forest land base through a buffering and overlay process in a Geographic Information System (GIS). Riparian zone widths accounted for both the reserve zone and a portion of the management zone according to the recommended maximum basal area retention in each management zone type (i.e., a management zone of 20 metres with recommended 50% basal area retention was modelled as a 10-metre reserve zone, in addition to the specified reserve zone width).

A 10-metre reserve zone was applied to all wetlands for this analysis, even though W3 and W4 wetlands do not require a 10-metre reserve, because of the number of additional smaller wetlands that are not captured in the inventory, that are being managed with a reserve zone.

In Kamloops all lakes are managed with a 10-metre reserve zone. In Clearwater L1 class lakes are managed with a 10-metre reserve zone, with the exception of lakes greater than 1000 hectares. Consistent with both the Kamloops and Clearwater Lakes local resource use plans (LRUPs) all Class A lakes have a 200-metre reserve zone in which timber harvesting is not permitted.

In addition to the land base removals for riparian reserve and management zones, a 200-metre management zone buffer is applied to all B, C, D and E class lakes (200 metres including the reserve zone within). A visual quality objective of retention and partial retention are assigned to each B and C class lake buffer respectively. A VQO of modification is assigned to lake class D and E buffers.

5.2.10 Exclusion of specific, geographically defined areas

The purpose of this section is to specify the location and total area to be excluded from the timber harvesting land base to account for any area exclusions that are part of current management but have not already been accounted for in the inventory file.

While areas recognized by legislation or Order-in-Council as not contributing to the timber harvesting land base are excluded, areas which have been deferred from harvesting because they are contentious or are under study (e.g., planning deferrals, potential parks) are considered available for timber harvesting. Any changes in official designation will be incorporated in the next timber supply review.

5. Timber Harvesting Land Base Definition

Table 11. Exclusion of specific, geographically defined areas

Identifying inventory variables (location descriptors)	Excluded area (hectares)	Reason for exclusion
Hudson's Bay Trail (designated portion)	To be determined	
Tod Mountain / Sun Peaks	383	Alienation for resort development purposes
Water intakes for community watersheds	1.57 hectare/intake	

Data source and comments:

A 200-metre buffer will be applied to the Hudson's Bay Recreation Trail, and the area removed from the productive forest land base. The area removed for Tod Mountain / Sun Peaks reflects the area being alienated from the provincial forest land base for further resort development. The water intakes used are per B.C. Environment Community Watershed maps and a 100-metre upland buffer has been identified.

5.2.11 Timber licence reversions

Timber licences (TLs) are old tenure arrangements that give a licensee exclusive rights to harvest merchantable timber within the licence area and do not contribute to the TSA allowable cut. Once these areas have been harvested, regenerated and attain free-growing status, the timber licence area reverts to B.C. Forest Service jurisdiction. Accordingly, these areas are included in the timber harvesting land base after the first harvest and contribute to medium- to long-term timber supply in the TSA.

Timber licence areas need to be accounted for from the time stands have been or are estimated to be harvested. Time of harvest is used as the reference point so that impact of these harvests on forest cover requirements is given full consideration in the timber supply analysis. In some cases stands that have been harvested and legally reverted have not had the necessary ownership change on the inventory file (e.g., change from 70-N to 62-C).

Table 12. Timber harvest reversion schedule

Area of timber licence (TL) harvested (hectares) (year of harvest)
220 hectares each year

Data source and comments:

It is estimated that approximately 220 hectares of timber license area is harvested each year, and subsequently reverts to Crown management. There are approximately 11 000 hectares of timber license area.

6. Current Forest Management Assumptions

6.1 Harvesting

6.1.1 Utilization levels

The utilization levels define the maximum stump height, minimum top diameter inside bark (dib) and minimum diameter at breast height (dbh) by species and are used in the analysis to calculate merchantable volume.

Table 13. Utilization levels

Analysis unit / species	Utilization		
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
Lodgepole pine	12.5	30	10
Cedar >140 years	17.5	30	15
All other coniferous species	17.5	30	10
PA16 coniferous	7.5	30	8
PA16 deciduous	12.5	30	10

Data source and comments:

Table 13 reflects current regional standards, licence requirements and current performance.

6.1.2 Volume exclusions for mixed species stands

One or more species in mixed species stands may be unmerchantable. For example, the deciduous species in a predominantly coniferous stand may not be harvested, or may only be partially harvested. The unharvested portion should not contribute to the estimated stand volume. The species that do not contribute and that will be excluded from the estimation of stand volume are shown in the table below.

Table 14. Volume exclusions for mixed species types

Species	Volume exclusion (%)
All deciduous volumes in all analysis units except PA16 types.	100

Data source and comments:

Table 14 reflects current regional utilization standards, licence requirements and current performance.

6. Current Forest Management Assumptions

6.1.3 Minimum harvestable age derivation

Minimum harvestable ages are simply minimum criteria. While harvesting may occur in stands at the minimum requirements in order to meet forest level objectives (e.g., maintaining overall harvest levels for a short period of time or avoiding large inter-decadal changes in harvest levels), most stands will not be harvested until well past the minimum timber production ages because the management for other resource values take precedence (e.g., requirements for the retention of older forest).

Table 15. Minimum harvestable ages

Analysis units	Species	Priority age	Volume (m ³)
2-4, 19-30	Douglas-fir (G/M), lodgepole pine, PA 16 coniferous	81	150
5-18	Douglas-fir (P/L), spruce, balsam, cedar, hemlock	101	150
32-35	Cedar/hemlock partition	141	
31	PA 16 deciduous	61	

Data source and comments:

Minimum harvestable ages are based on forest district cutting priorities weighted by area for each species and do not necessarily reflect biological culmination ages. The minimum volume required for clearcut harvesting is 150 cubic metres per hectare.

6.1.4 Harvest scheduling priorities

Generally, older available stands are favored for harvesting when all other objectives have been met. Table 16 reflects average per cent harvested by species in the Kamloops TSA, over the last 5 years.

Table 16. Harvest scheduling history

Analysis units	Species	Per cent (%) of total harvest by period
		Decade 1
11-14, 28	Balsam	11
7, 8, 26, 32, 33	Cedar	6
1-6, 25	Douglas-fir	22
9, 10, 27, 34, 35	Hemlock	4
19-22, 30	Lodgepole pine	32
15-18, 29	Spruce	25

6. Current Forest Management Assumptions

6.2 Unsalvaged losses

Table 17 shows the estimated average annual unsalvaged volume loss to catastrophic events such as insect epidemics, fires, wind damage or other agents over the long term on the timber harvesting land base. The unsalvaged loss column reflects only the volume that will not be recovered or salvaged.

Table 17. *Unsalvaged losses*

Cause of loss	Annual unsalvaged loss (m ³ /year)
Bark beetles	3 900
Defoliators	36 130
Wind damage	9 250
Fire	12 210
Miscellaneous	1 100
	62 590

Data source and comments:

Several methodologies have been proposed to calculate the volume of unsalvaged loss for timber supply reviews (TSRs) across the province. The procedure used for the Kamloops timber supply review is a modified version of the technique proposed by the Invermere Forest District and the Kamloops Forest District. Data from the last five years is summarized to give an annual value of unsalvaged loss. The agents contributing to the unsalvaged volume are not considered in inventory growth plots. Only losses in the operable forest land base were considered. Inoperable areas, private land, parks, and protected areas were not included in the calculation.

Mortality events contributing to unsalvaged losses:

- 1) Unsalvaged fire-killed trees;
- 2) Unsalvaged bark beetle infestations;
- 3) Unsalvaged blowdown (catastrophic events or along cutblocks);
- 4) Unsalvaged dead trees caused by miscellaneous abiotic events (flood, etc.);
- 5) Unsalvaged defoliator-killed trees.

6. Current Forest Management Assumptions

1) Unsalvaged fire-killed trees

Major fire events in the last five years were identified. Detailed maps describing the fire killed area and salvaged cutblocks were used. By subtracting the total fire area from salvaged areas, reserved areas (i.e., riparian zones) and inoperable areas, the number of unsalvaged hectares was estimated. A volume was estimated by multiplying the unsalvaged hectares by the average volume per hectare extrapolated from scale returns and total area logged.

2) Unsalvaged bark beetle infestations

All salvage cutting permits (CP 999, 998) from the last five years were compiled. The volume salvaged, area and cause of tree mortality were noted. Bark beetle infestations and other mortality factors identified in annual aerial surveys were mapped on 1:50,000 maps. The location of the CP 999 (998) salvage permits were then mapped with the infestations. Any infestation that was not salvaged (or not scheduled for salvage) in the timber harvesting land base is considered an unsalvaged loss. The volume unsalvaged was estimated using bark beetle probe data (if available) or using aerial photographs (35 mm oblique).

Any infested trees disposed without harvest are unsalvaged losses. This includes bark beetle attacked trees treated with monosodium methanearsenate (MSMA), fall and burn and fall and peel. Using the Ministry of Forests historical records, the number of pine and spruce trees treated were compiled over the last five years. It is assumed that these trees will never be harvested. The total number of trees treated was averaged over the five year interval to give an annual loss. The volume of the treated trees was estimated using records of DBH and heights obtained from the contractor while the treatments were executed. Balsam bark beetle mortality is assumed to be accounted for in the yield curves.

3) Unsalvaged blowdown

Any major blowdown events (greater than 200 cubic metres) in unharvested stands in the last five years were identified by the Ministry of Forests staff. If the blowdown was in the timber harvesting land base and was not harvested, it is considered an unsalvaged loss. The blowdown along cutblock edges which is not salvaged is also an unsalvaged loss. Based on the experience of the Ministry of Forests staff, a value of 50 cubic metres/block (over two hectares) is attributed to blowdown on the edge of the block which is not harvested. This value is an average and was multiplied by the number of cutblocks in the Kamloops TSA over the last five years, then divided by five to give an annual loss.

4) Unsalvaged dead trees caused by miscellaneous abiotic events (flood, etc.)

Using the Ministry of Forest staff experience, major abiotic induced mortality was identified. The total volume of dead wood and the volume salvaged were estimated. Salvaged volume was estimated by compiling salvage permits issued for the area. Total volume of dead wood was estimated by analyzing aerial photography (35 mm oblique) or estimating number of hectares affected on the Ministry of Forests maps and estimating the volume per hectare. The volume per hectare was estimated by dividing the total volume scaled by the total area logged in the salvage blocks.

5) Unsalvaged defoliator-killed trees

In the case of defoliation where adequate maps and photographs do not exist, the annual volume of unsalvaged losses were estimated based on the experience of the Ministry of Forest personnel.

6. Current Forest Management Assumptions

6.3 Silviculture

6.3.1 Silviculture and regeneration activities in managed stands

The silviculture program reflects the mix of treatments expected to be carried out in the Kamloops TSA. This level of activity assumes basic silviculture on all sites plus incremental silviculture on some sites. Table 18 shows the proportion of each analysis unit to be treated under each silviculture regime and the expected average regeneration delay.

Recent plantations and future stands will be grown on managed stand yield tables (MSYTs) produced using the B.C. Forest Service table interpolation program for stand yields (TIPSY) growth and yield model. Stands where fertilization treatments are to be applied will have MSYTs produced using the B.C. Forest Service tree and stand simulator (TASS) growth and yield model. A MSYT may be built from a number of tables if more than one regeneration method is used within an analysis unit. When this is the case, tables are produced for the different regeneration methods (each method x species combination) are then aggregated into one table.

6. Current Forest Management Assumptions

Table 18. Regeneration assumptions by analysis unit

Analysis unit	Leading species	Site class / age	Regen delay	Method		Density (planted)		Stems / hectare
				Type	%	Species	Spp. %	
1	Fir / dry	N/A	N/A	Selection – natural	All	N/A	N/A	N/A
2	Fir / dry	N/A	2	Plant	100	Fd	70	1200
3	Fir / wet	G/M – < 141	2	Plant	100	PI	30	1200
						Fd	60	1400
						PI	25	1600
						Sx	15	1400
4	Fir / wet	G/M – ≥ 141	2	Plant	100	Fd	60	1400
						PI	25	1600
						Sx	15	1400
5	Fir / wet	P/L – < 141	2	Plant	100	Fd	25	1300
						PI	65	1500
						Sx	10	1300
6	Fir / wet	P/L – ≥ 141	2	Plant	100	Fd	25	1300
						PI	65	1500
						Sx	10	1300
7	Cedar	G/M – < 141	2	Plant	100	Fd	15	1400
						PI	10	1600
						Sx	45	1400
						Cw	20	1300
						Hw	10	1300
8	Cedar	P/L – < 141	2	Plant	100	Fd	30	1300
						PI	10	1500
						Sx	30	1300
						Cw	20	1300
						Hw	10	1300
9	Hemlock	G/M – < 141	2	Plant	100	Fd	30	1400
						PI	10	1600
						Sx	40	1400
						Cw	10	1300
						Hw	10	1300
10	Hemlock	P/L – < 141	2	Plant	100	Fd	10	1400
						PI	25	1500
						Sx	40	1300
						Cw	15	1300
						Hw	10	1300
11	Balsam	G/M – < 141	3	Plant	100	Se	80	1400
						BI	20	1400
12	Balsam	G/M – ≥ 141	3	Plant	100	Se	80	1400
						BI	20	1400
13	Balsam	P/L – < 141	3	Plant	100	Se	60	1300
						BI	25	1300
						PI	15	1500
14	Balsam	P/L – ≥ 141	3	Plant	100	Se	60	1300
						BI	25	1300
						PI	15	1500

continued

6. Current Forest Management Assumptions

Table 18. Regeneration assumptions by analysis unit

Analysis unit	Leading species	Site class / age	Regen delay	Method		Density (planted)		Stems / hectare
				Type	%	Species	Spp. %	
15	Spruce	G/M – < 141	3	Plant	100	Sx	60	1400
						PI	25	1600
						BI	15	1400
16	Spruce	G/M – ≥ 141	3	Plant	100	Sx	60	1400
						PI	25	1600
						BI	15	1400
17	Spruce	P/L – < 141	2	Plant	100	Sx	70	1300
						PI	10	1500
						BI	20	1300
18	Spruce	P/L – ≥ 141	2	Plant	100	Sx	70	1300
						PI	10	1500
						BI	20	1300
19	Pine	G/M – < 141	2	Plant	100	Fd	10	1400
						Sx	10	1400
						PI	80	1600
20	Pine	G/M – ≥ 141	2	Plant	100	Fd	10	1400
						Sx	10	1400
						PI	80	1600
21	Pine	P/L – < 141	2	Plant	100	Sx	10	1300
						PI	90	1500
22	Pine	P/L – ≥ 141	5	Plant	100	Sx	10	1300
						PI	90	1500
23	Fir / dry	PA 16	N/A	Selection – natural	All	N/A	N/A	N/A
24	Fir / dry	PA 16	2	Plant	100	Fd	70	1200
						PI	30	
25	Fir/Wet	PA 16	2	Plant	100	Fd	25	1300
						PI	65	1500
						Sx	10	1300
26	Cedar	PA 16	2	Plant	100	Fd	30	1300
						PI	10	1500
						Sx	30	1300
						Cw	20	1300
27	Hemlock	PA 16	2	Plant	100	Hw	10	1300
						Fd	10	1400
						PI	25	1500
						Sx	40	1300
						Cw	15	1300
28	Balsam	PA 16	3	Plant	100	Hw	10	1300
						Se	60	1300
						BI	25	1300
						PI	15	1500
29	Spruce	PA 16	2	Plant	100	Sx	70	1300
						PI	10	1500
						BI	20	1300

continued

6. Current Forest Management Assumptions

Table 18. Regeneration assumptions by analysis unit (concluded)

Analysis unit	Leading species	Site class / age	Regen delay	Method		Density (planted)		Stems / hectare
				Type	%	Species	Spp. %	
30	Pine	PA 16	2	Plant	100	Sx	10	1300
						Pl	90	1500
31	Deciduous	PA 16	2	Natural	All	Decid	100	2500
32	Cedar	G/M – ≥ 141	2	Plant	100	Fd	15	1400
						Pl	10	1600
						Sx	45	1400
						Cw	20	1300
						Hw	10	1300
33	Cedar	P/L – ≥ 141	2	Plant	100	Fd	30	1300
						Pl	10	1500
						Sx	30	1300
						Cw	20	1300
						Hw	10	1300
34	Hemlock	G/M – ≥ 141	2	Plant	100	Fd	30	1400
						Pl	10	1600
						Sx	40	1400
						Cw	10	1300
						Hw	10	1300
35	Hemlock	P/L – ≥ 141	2	Plant	100	Fd	10	1400
						Pl	25	1500
						Sx	40	1300
						Cw	15	1300
						Hw	10	1300

Data source and comments:

All values in Table 18 are based on current performance as estimated by the Kamloops Forest District staff. Age of planting stock is estimated at one year on average, and will be subtracted from the regen delay. Operational adjustment factors (OAF) of 15% and 5% will be applied to all managed stand yield curves to account for natural spatial patchiness and decay waste and breakage, respectively.

6.3.2 Immature plantation history

For this analysis, it was assumed that all stands < 21 years will be assigned to a managed stand yield curve. These stands have a history of density control and stand tending and are considered managed stands.

6. Current Forest Management Assumptions

6.3.3 Not satisfactorily restocked (NSR) areas

Land classified in the Kamloops TSA as type identity 4 or 9 is included in the current timber harvesting land base. These type identities indicate not satisfactorily restocked (NSR) land base. The purpose of this section is to identify the total area of NSR currently existing in the timber harvesting land base, and the estimated rate at which the NSR area will be restocked. If the figures provided in this table (from the forest district silviculture records) differ from the NSR area showing on the inventory file, the figures in this table will be prorated to match the inventory file NSR total area.

Table 19. Not satisfactorily restocked (NSR) areas

By forest district	Backlog NSR area (hectares)	Current NSR area (hectares)
Clearwater Forest District	5 036	5 400
Kamloops Forest District	1 000	6 000
Total	6 036	11 400

Data source and comments:

The data for backlog NSR was derived from the Integrated Silviculture Information System (ISIS) and the Major Licensee Silviculture Information System (MLSIS). Current NSR reflects roughly 1.5 years of harvest area which has not yet been planted. Backlog NSR target date to be restocked is the year 2000.

6.4 Integrated resource management

6.4.1 Objectives which require forest cover requirements

As noted in Section 4.1, "Management zones and tracking of multiple objectives (grouping)," forest cover requirements may be examined at a number of different levels. These may be considered as layers in Geographic Information System (GIS) terminology. One possible layer may be landscape units, another may be wildlife areas, while another may be resource emphasis. With the requirement to retain different forest characteristics across the landscape, it is important to identify how non-contributing forest (forest which does not contribute to the timber harvesting land base) may be considered in the forest cover requirements (i.e., maximum allowable disturbance or minimum area retention).

Note: The following forest cover requirements will be applied to each resource emphasis group or zone.

6. Current Forest Management Assumptions

Table 20. Forest cover requirements

Management zone	Maximum % younger than minimum tree height / age		Minimum tree height / age		Minimum % area older than mature cover height/age		Minimum mature cover height/age	
	Gross forested area	Timber harvesting land base	Height (metres)	Age (years)	Gross forested area	Net operable area	Height (metres)	Age (years)
Community watersheds	25.2 ^a		6.6					
Caribou late winter		33	3		33			> 150
Caribou early winter (transitional)		33	3		20			> 150
Caribou corridors	20		3		30		20	
Critical deer winter range	20		3		25		20	
Standard management		33	3					

(a) Refers to gross area.

Data source and comments:

Community watersheds

An equivalent clearcut area (ECA) of 20% of the gross land base applies to the upper 60% of all community watersheds. The upper 60% (snowpack area) will be considered hydrologically recovered upon reaching 9 metres in height. The lower 40% of the watershed will be subject to standard management. On average then in each community watershed, no more than 25.2% of the gross area can be less than 6.6 metres in height.

Caribou late winter habitat

This area is managed to ensure that at all times one-third of the gross forested area is older than 150 years, to maintain lichen production. In addition, no more than one-third of the timber harvesting land base can be less than 3 metres in height, consistent with the standard integrated resource management (IRM) zone.

Caribou early winter habitat

In this transitional caribou habitat type, at least 20% of the gross forested area must be older than 150 years in age, and no more than 33% of the timber harvesting land base can be less than 3 metres in height.

6. Current Forest Management Assumptions

Caribou corridors

Within the caribou movement corridors, at least 30% of the gross forested area must be greater than 20 metres in height, in order to provide sufficient thermal cover, and no more than 20% of the gross forested area may be less than 3 metres in height.

Critical deer winter range

This area includes the Skull Habitat RMZ, and is managed to ensure sufficient thermal cover is maintained. At least 25% of the gross forested area must be greater than 20 metres in height, and no more than 20% of the gross forested area can be less than 3 metres in height.

Standard management

The standard management zone assumes a 3-pass harvesting sequence, requiring no more than 33% of the timber harvesting land base be less than three metres in height.

Table 21. Forest cover requirements for visually sensitive areas

Visual quality objective	Maximum % younger than green-up height								
	Low VAC			Intermediate VAC			High VAC		
	Green-up height (m)	% removal range	% removal mid-point	Green-up height (m)	% removal range	% removal mid-point	Green-up height (m)	% removal range	% removal mid-point
Preservation	3	5-7	6	3	6-9	7.5	3	8-10	9
Retention	5	5-10	7.5	4	10-15	12.5	3	15-20	17.5
Partial retention	5	10-15	12.5	4	15-20	17.5	3	20-25	22.5
Modification	5	15-20	17.5	4	20-25	22.5	3	25-30	27.5

Data source and comments:

Constraints for visually sensitive areas have been determined for each visually sensitive polygon, based on the *Kamloops Land and Resource Management Plan VQO Guidelines* and current management practices. The range of maximum per cent area removal (maximum per cent area below visual green-up height) was determined based on the existing visual absorption capacity and the visual quality objective for each polygon. The mid-point of this per cent removal range was determined for each VQO polygon, and each polygon will be modelled separately in the analysis.

6. Current Forest Management Assumptions

Retention old-growth forest in every landscape unit and natural disturbance type (NDT) is a requirement under the Forest Practices Code. Table 22 summarizes the percentage of old forest required for each NDT which will be modelled in this analysis. Requirements for retention of mature forest and constraints on early-seral forest will be considered in a sensitivity analysis.

Table 22. Old-seral requirements by landscape unit and natural disturbance type (NDT)

NDT	Biogeoclimatic unit	Minimum age (years)	Old-seral stage % area retention by minimum age				
			Low emphasis	Low emphasis	Low emphasis	Intermediate emphasis	High emphasis
			Time 0	Time 70	Time 140		
1	ICH	250	5	9	13	13	19
1	ESSF	250	7	13	19	19	28
2	ICH	140	3	6	9	9	13
3	ESSF	140	5	10	14	14	21
3	ICH	140	5	10	14	14	21
3	MS	140	5	10	14	14	21
3	SBS	140	4	8	11	11	16
3	SBPS	140	3	5	7	7	10
4	IDF	250	5	13	13	13	19
4	PP	250	5	13	13	13	19

Data source and comments:

The percentages for old-forest retention are based on recommendations in the *Biodiversity Guidebook*. These will be applied consistent with the biodiversity-emphasis option (BEO) assigned for each landscape unit in the Kamloops TSA (see Appendix A for BEOs by landscape unit). In keeping with the Deputy Minister's letter of August 27, 1997, landscape units assigned a BEO will have three rotations to meet the old-forest retention requirements (see also, Section 7, "Sensitivity Analyses to be Performed").

6.4.2 Wildlife trees (WT) and tree patches (WTP)

There are three different methods used in the Kamloops TSA for providing the maintenance of stand structure over time: single tree reserves, wildlife tree patches within cutblocks (WTPs) and wildlife tree patches adjacent to cutblocks (WTOs). Single tree reserves are unlikely to provide harvestable volumes in the future, and are therefore modelled as volume reductions. WTPs are generally less than two hectares in size, and are also unlikely to be harvested in the future, and will be modelled as volume reductions. WTOs are generally greater than two hectares in size, and the total area associated with WTOs will be considered as contributing towards seral-stage requirements (Table 22), and not modelled as a wildlife tree patch constraint.

6. Current Forest Management Assumptions

Table 23. Reductions to reflect volume retention in cutblocks for wildlife tree patches

Wildlife tree patch type	Persistence	Anticipated harvest activity	Volume per year	Per cent (%) of annual harvested volumes	Area (hectares) per year
Single tree	Permanent	No		1.07	N/A
WTP	Permanent	No		1.05	N/A
Total				2.12	

Data source and comments:

Estimates of volumes retained in single tree reserves and wildlife tree patches were derived for the Kamloops Forest District. All information was gathered for the period October 1996 to October 1997.

Information on volumes retained in single trees was obtained from waste and residue surveys completed for 253 blocks (4153 hectares). A total volume of 13 257 cubic metres was left behind in single tree reserves, representing an average of 1.38% of harvested volumes for that year.

Volumes retained in wildlife tree patches were tracked by licensees and noted in silviculture prescriptions. Wildlife tree patches located within riparian management areas were not included in these volume estimates, as these areas were already removed from the timber harvesting land base through Section 5.2.9, "Riparian reserve and management zones." Total volumes per year were recorded and a per cent of annual harvest volumes derived. It was determined that 10 245 cubic metres was left behind in wildlife tree patches, representing an average of 0.86% of harvested volumes for that year.

For the Clearwater Forest District estimates were derived from reviewing the Kamloops Forest District results and providing professional judgment. Based on mainly having wet-belt timber types and very little dry-belt timber types, 50% of the single tree and 150% of the wildlife tree patch numbers for the Kamloops Forest District were used. This represents 0.69% for single tree reserves and 1.29% for wildlife tree patches. The values for both forest districts were area-weighted and summed as outlined in Section 4.1, "Management zones and tracking of multiple objectives (grouping)."

The total area retained in WTOs, which are patches located outside of cutblocks and greater than two hectares are considered as contributing to seral-stage requirements. These areas will be incorporated into old-growth management areas.

7. Sensitivity Analyses to be Performed

Sensitivity analysis provides a measure of the timber supply impact if uncertainty in management assumptions and/or data integrity exists. The magnitude of the increase or decrease in a particular variable should reflect the degree of uncertainty surrounding the assumption. For instance, minimum harvestable age may be developed based on some minimum stand attributes which currently appear to dictate the earliest time stands are eligible for harvest. Sensitivity analysis may indicate that a small reduction in these attributes may alleviate anticipated harvest level reductions in the future. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most affect results. The first table shows issues that are particular to this TSA. This is followed by a list of standard sensitivity analysis that are carried out in all TSAs.

Table 24. *Sensitivity issues specific to the Kamloops TSA*

Issue to be tested
Biodiversity — mature and old-seral forest constraint
Biodiversity — early-seral forest constraint
Biodiversity — old-seral constraint at 100% for low emphasis
No biodiversity — no seral-stage constraints or wildlife tree patches

Table 25. *Standard sensitivity analysis*

Issue to be tested	Sensitivity levels
Existing stand yields	+/- 10%
Regenerated stand yields	+/- 10%
Minimum harvestable age	+/- 10 years
Old-growth site index adjustments	PI – age class 8 and 9 after regeneration Sp – age class 8 and 9 after regeneration
Land base changes	+/- 10%
Visual quality objectives	Mid-range % denudation
Harvest flow alternatives	
Green-up periods	+/- 5 years
Watershed ECAs (community and LRMP high priority)	
IRM zone	Change maximum area below green-up age to 25%

Appendix A Numeric Identifiers for Management Zones

Table A-1. Biogeoclimatic variants / natural disturbance types (NDTs)

NDT	Subzone/variant	Numeric ID	NDT	Subzone/variant	Numeric ID
1	ESSFwc2	01	4	IDFdk1	19
1	ESSFvc	02	4	IDFdk1a	20
1	ESSFwk1	03	4	IDFdk2	21
1	ICHvk1 (&vk1c)	04	4	IDFdk3	22
1	ICHwk1	05	4	IDFmw2	23
2	ESSFmm1	06	4	IDFmw2a	24
2	ICHmm	07	4	IDFxh1a	25
3	ESSFdc2	08	4	IDFxh2	26
3	ESSFxc	09	4	IDFxh2a	27
3	ICHmk2	10	4	IDFxh2b	28
3	ICHmw3	11	4	IDFxm	29
3	MSdm2	12	4	PPxm	30
3	MSxm	13	4	PPxm2a	31
3	SBSdw1	14	5	ATp	32
3	SBSmm	15	5	ESSFdcx	33
3	SBSmc1	16	5	ESSFvcx	34
3	SBSdh	17	5	ESSFwcp	35
3	SBSxk	18	5	ESSFxcx	36

Appendix A Numeric Identifiers for Management Zones

Table A-2. *Landscape units*

Landscape unit #	Landscape unit name	Emphasis	Numeric identifier
1	Hat Creek	Intermediate	01
2	Lower Bonaparte	Intermediate	02
3	Ashcroft	High	03
4	Deadman	Intermediate	04
5a	Kamloops Lake North	High	05
5b	Kamloops Lake South	Intermediate	06
6a	Guichon West	Low	07
6b	Guichon East	Intermediate	08
7a	Tranquille North	Intermediate	09
7b	Tranquille South	High	10
8	Heffley	Intermediate	11
9	Campbell	Intermediate	12
10	Louis Creek	High	13
11	Barriere	Low	14
12	Adams Lake	Low	15
13	Lower Adams	Intermediate	16
14	Jamieson / Skull	Low	17
15a	N. Thompson / Dunn West	Intermediate	18
15b	N. Thompson / Dunn East	High	19
16	Bonaparte / Machete	Low	20
17	Nehalliston	Intermediate	21
18	Clearwater	Low	22
19	Vavenby	Low	23
20	Raft	Low	24
21	Mad	Low	25
22	Mica	Low	26
23	Cayenne	Intermediate	27
24	Tum Tum	Intermediate	28
25	Avola	Low	29
26	Thunder / Blue	Low	30
27	Mud	Intermediate	31
28	Albreda	Low	32
29	Upper N. Thompson	Intermediate	33

Appendix A Numeric Identifiers for Management Zones

Table A-3. Community watershed

Code	Watershed	Status	Numeric ID
129.003	Avola Creek	Active	01
120.009	Cornwall Creek	Active	02
128.008	Currie Brook	Active	03
129.006	Gill Creek	Inactive	04
129.007	Hascheak Creek	Active	05
120.015	Jimmies Creek	Active	06
129.009	Leonie Creek	Active	07
129.011	McDougall Creek	Active	08
129.012	Nelson Creek	Active	09
129.015	Paul Lake	Active	10
129.018	Peterson Creek	Active	11
129.021	Rosen Brook	Active	12
129.022	Russell Creek	Active	13
129.023	Skowootum Creek	Active	14
128.029	Toops Creek	Active	15
120.028	Tranquille River	Active	16
129.025	White River	Active	17

Table A-4. Visual quality objectives (VQOs)

VQO	VQO	Numeric ID
P	Preservation	01
R	Retention	02
PR	Partial retention	03
M	Modification	04