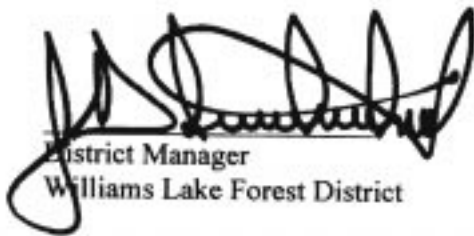


Williams Lake Timber Supply Area Timber Supply Review

Data Package

August 1999



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1. Introduction

This data package outlines the basic information and assumptions that are required for the Williams Lake 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;
- the standards used to approve or reject the currently approved forest development (5-year development) plans;
- fully implemented land-use plans;
- land-use decisions approved by Cabinet;
- approved higher level plans under the Forest Practices Code (FPC); and
- other approved British Columbia Forest Service and joint agency forest management practices and policy.

This idea of current performance should be kept in mind at all times when reviewing 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;
- 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 base case harvest forecast is developed from these assumptions and is used as a baseline reference. Section 7, "Sensitivity Analyses" identifies areas of uncertainty in data and assumptions and outlines intended sensitivity analysis. Additional sensitivity analyses may be performed if the initial results highlight areas of risk to timber supply.

2.2 Statement of major forest management considerations and issues

Table 1 lists the major forest management considerations for the Williams Lake TSA. Where issues are defined within legislation, regulations or standards, a timber supply assessment will be made. If there are important uncertainties in defining current management, sensitivity analysis may assist in assessing the potential timber supply implications and assigning degrees of risk to timber supply.

Table 1. Major forest management considerations

Consideration/issue	Description
Cariboo-Chilcotin Land Use Plan (CCLUP)	<p>The <i>Cariboo-Chilcotin Land Use Plan</i> (CCLUP) was announced by government in October of 1994. The <i>Cariboo-Chilcotin Land Use Plan 90-Day Report</i> (March 3, 1995) has been accepted by government and the objectives have been reflected in a higher level plan order. The <i>Cariboo-Chilcotin Land Use Plan Integration Report</i> (CCLUPIR), which demonstrated the CCLUP objectives could be achieved given some specific adjustments to the strategies, has been accepted by the Regional Resource Board (RRB) and the Inter-Agency Management Committee (IAMC).</p> <p>The Ministers of Forests; Environment, Lands and Parks; and Energy and Mines amended the <i>CCLUP Higher Level Plan</i> in an order effective July 31, 1999. In addition the CCLUPIR was confirmed as "official government policy" in a June 22, 1999 memorandum signed by the three deputy ministers.</p> <p>The management prescriptions contained in the CCLUP strategy reports, as modified by the <i>CCLUP Integration Report</i> (CCLUPIR), have been considered as key information sources in the January 15, 1999 Statutory Decision Makers (SDM) Forest Development Plan Direction letter. The CCLUP and CCLUPIR are important information for the timber supply review (TSR) process and those parts that can be modelled as prescriptions or constraints have been incorporated in this data package.</p>
Landscape-level biodiversity	<p>Draft landscape units and biodiversity emphasis options (BEO) were developed as part of the <i>Biodiversity Conservation Strategy for the CCLUP</i> and refined through the <i>Regional Landscape Unit Planning Strategy</i>. These have not been formally established under the Forest Practices Code (FPC). However the recommended <i>Biodiversity Conservation Strategy</i> seral targets, as modified by the CCLUPIR, are considered by the forest district managers to be appropriate for achieving biodiversity objectives outlined in the CCLUP.</p>

(continued)

2. Current Forest Management Considerations and Issues

Table 1. Major forest management considerations

Consideration/issue	Description
Stand-level biodiversity	Wildlife tree patch targets have been provided by each forest district manager. Productive forest that is not harvested for various reasons (e.g., riparian, etc.) contributes significantly to these targets. A study of harvested blocks between 1996 and 1998 was used to estimate this contribution and reduce the target required on the remaining productive forest. See Section 6.5.6. "Wildlife tree and tree patch retention" for complete details.
Pulpwood agreement (P.A.) # 16 timber supply	<p>A partition of 107 000 cubic metres per year within the Williams Lake TSA was set for P.A. 16 in TSR 1. Operations have been limited to the Horsefly Forest District at significantly lower harvest levels.</p> <p>P.A. 16 forest types will be segregated for the entire modelling period in the analysis. See Section 4.2 "Analysis units" and Section 6.1 "Harvesting priorities and targets."</p>
Problem forest types (PFT)	<p>In TSR 1 a partition of 100 000 cubic metres per year was set for PFTs. The PFT harvest has averaged in excess of 400 000 cubic metres per year over the 3 years since then. Refinement of the PFTs since TSR1 has been based on an assessment of performance. The performance details will be presented to the Chief Forester as additional information.</p> <p>As a result of the assessment, two new classifications: currently unharvested stand types (Section 5.2.6, "Currently unharvested stand types") and marginal forest types (MFT) (Section 4.2 "Analysis units") were created. Currently unharvested stands are not expected to be harvested, while MFTs are likely to be harvested and their contribution to TSA harvest levels will be reviewed as part of the timber supply analysis.</p>
Mountain pine beetle salvage harvesting	Concern was voiced in TSR 1 that the accelerated harvesting of timber damaged by mountain pine beetle may impact biodiversity objectives. This issue has been reviewed and new harvest criteria based on updated mapping are included in the base case. See Section 6.2.3 "Mountain pine beetle (MPB) attacked stands."
Inventory audit	An inventory audit of the Williams Lake TSA, completed in 1998, indicated the inventory overestimates mature volumes in the TSA. Trends derived from the inventory audit will be reflected in the analysis. See Section 3.2, "Inventory audit."
Old-growth site index	Current research indicates that site indexes derived for stands above 140 years do not reflect the true growth potential of those sites. The provincial site index adjustments will be applied as a sensitivity analysis, given the current lack of detailed local (regional) information. If such information becomes available, it will be incorporated into the analysis.
Lignum's innovative forest practices agreement (IFPA)	The IFPA is a new agreement that gives the holder the opportunity to investigate innovative forestry practices that could provide an increase for their licence AAC and then implement these practices on a land area within the TSA. Analysis and AAC decision making for the IFPA are not a part of the TSR. However, some information generated as part of the TSR may assist in evaluating timber supply in the IFPA area (or innovative resource management area (IRMA)).

(continued)

2. Current Forest Management Considerations and Issues

Table 1. Major forest management considerations (concluded)

Consideration/issue	Description
Anahim round table (ART) consensus document	<p>The ART consensus document is a stakeholder consensus plan completed prior to the establishment of the <i>FPC Act</i> and the <i>CCLUP</i> higher level plan declaration.</p> <p>Implications and consistency of the ART consensus document with the <i>FPC Act</i> and the <i>CCLUP</i> are being reviewed as part of the ART sub-regional plan (SRP). The ART document is providing background information to the ART SRP.</p> <p>In the interim period, before the ART SRP is finalized, the river buffers identified in the ART document may be modelled in a sensitivity analysis, time permitting.</p>
Goal 2 protected area candidates	<p>A review and approval process is ongoing. The additional 0.25% of the total land base which will be designated as protected area is yet to be determined. The potential impact to timber supply will be assessed in a sensitivity analysis, time permitting.</p>

3. Inventories

3.1 Background information

The inventories that will be used to define the timber harvesting land base and model forest management activities are listed in Table 2. The source, date and scale of the information are also shown.

Table 2. Inventory information

	Data	Source	Vintage	Year of update	Scale	Digitized non-standard data Yes/No
	Forest district/timber supply area	Ministry of Forests (MoF)		1997	1:15 840	
	Forest cover mapsheet numbers	MoF	See comments		1:20 000	
92 N	54, 92		See comments	1994		No
93 A	19, 28, 34, 37, 38, 43-47, 51-58, 67, 74, 78, 79, 87-89		See comments	1995		No
92 N	64, 74, 83,					
93 C	3-6, 13-16, 23-26, 33-36, 46					
92 N	34		See comments	1996		No
92 O	24, 34, 35, 43-45, 54, 55, 64-66, 70, 76-80, 87-90,					
92 P	96-100					
93 A	71, 81, 91					
93 B	11, 13, 24, 36, 42, 82					
93 C	61-63					
	84, 93					
92 J	91		See comments	1997		No
92 K	100					
92 N	10, 18-0, 23, 25-0, 35-0, 44, 45-0, 55-60, 65-70, 75-80,					
92 O	84-90, 93-100					
	1-3, 11-14, 21-23, 26, 27,					
92 P	31-33, 36-38, 41, 42, 51-53,					
93 A	61-63, 71-74, 81-84, 91, 92, 94					
93 B	61, 92					
93 C	1, 3, 21, 31, 61, 68, 69, 77, 73, 83, 84, 14, 59, 85					
	1-4, 5-12, 14-35, 39-44, 49, 50, 57-60					
	7-10, 17-20, 27-30, 37-40, 43-45, 47, 48, 53-56, 62-65, 67-69, 72, 73, 75-78, 82					

(continued)

3. Inventories

Table 2. Inventory information

	Data	Source	Vintage	Year of update	Scale	Digitized non-standard data Yes/No
92 J	82, 92-94		See comments	1998		No
92 O	4, 5, 7, 8, 15-18, 25, 28, 29, 39, 47-49, 56-60, 67, 68, 30,					
92 P	50, 69					
93 A	93					
	2, 4, 5, 6, 12, 15, 16, 17, 18, 22, 23, 25, 26, 27, 29, 32,					
93 B	33, 35, 41, 48, 55, 62-66, 72,					
93 C	75, 76, 97, 90, 98-100					
	36-38, 45, 46, 48, 49, 51-54, 59, 69, 70, 80					
	2, 12, 22, 32, 42, 52, 66, 70, 74, 79, 80, 83, 92					
	ART consensus document stream buffers	MoF	1998	—	1:20 000	Yes
	Biogeoclimatic zones	MoF	1996	1998	1:20 000	Yes
	Caribou habitat Eastern and Itcha-Ilgachuz (Western)	Ministry of Environment, Lands and Parks (MELP)	1985	1998	1:50 000	Yes
	Chilcotin harvest depletion 96-98	MoF	1998	—	1:20 000	Yes
	Draft landscape units	MoF	1997	—	1:20 000	Yes
	Existing roads	MoF	1997	—	1:20 000	Yes
	IFPA / IRMA sub-blocks	Lignum	1998	—	1:20 000	Yes
	Lakeshore management zones	MoF	1999	—	1:20 000	Yes
	Mule deer winter ranges (MDWR)	MELP	1989	1993	1:20 000	Yes
	P.A. 16 area	MoF	1998	1992	1:350 000	Yes
	Parks	Land Use Coordination Office (LUCO)	1995	1998	1:20 000	Yes
	Resource management zones — CCLUP	LUCO	1995	—	1:250 000	Yes

(continued)

3. Inventories

Table 2. Inventory information (concluded)

Data	Source	Vintage	Year of update	Scale	Digitized non-standard data Yes/No
South Chilcotin sub-regional plan (SCSRP)	MoF	1999	—	1:20 000	Yes
Steep/unstable slopes, by district	MoF	1998	—	1: 20 000 or 30 000	Yes
Taseko management zone	MoF	—	1995	1:20 000	Yes
Tatlayoko MDWR	MELP	1998	—	1:50 000	Yes
Visual resource management areas	MoF	1998	1999	1:50 000	Yes
Woodlots	MoF	1998	—	1:20 000	Yes

Data source and comments:

Forest cover inventory

The forest cover inventory maps, which were completed in the early 1970s have been updated and are projected for growth and aging to the dates shown in Table 2. Some irregularities have been found in polygons labelled as deciduous-leading. The original classification was essentially correct, however in some cases the stands, through ecological succession, have become conifer-dominated. Further study will be required to understand the magnitude of this change. For this analysis the classification and updates, as shown in the inventory file, provide the best available information and will be used for the analysis.

Additional resource inventory information

The additional inventory information listed in Table 2 defines the location of other resources to be managed in the Williams Lake TSA. The mule deer winter ranges, Eastern and Itcha-Ilgachuz caribou habitat and refinements to biogeoclimatic zones were all developed from various data sources by the Ministry of Environment, Lands and Parks (MELP) and the Ministry of Forests (MoF). Within the wildlife management zones, constraints on forest management activities will be modelled.

ART consensus document river buffers

The ART consensus document defines buffers on selected rivers (100-metres, 200-metres and 500-metres) in the Anahim supply block.

Caribou habitat — Eastern and Itcha-Ilgachuz (Western)

The 1998 Caribou Strategy Update Report describes modified harvest and no harvest zones.

Chilcotin harvest depletion 1996-1998

Recently harvested stands (1996-1998), in the Chilcotin Forest District are compiled as a non-standard geographic information system (GIS) layer. This layer is used to update the forest cover for harvesting activities to December 1998. As well, the layer assists in defining the area available for harvesting. This information accounts for the significant area of salvage harvesting in MPB-attacked areas over the last few years.

3. Inventories

IFPA / IRMA sub-blocks

As approved by the Cariboo Regional Manager in 1998 for Lignum's IFPA.

Lakeshore management zones (LMZs)

Williams Lake and Horsefly Forest Districts — classified Class A and B lakes have been included.
Chilcotin Forest District — the district manager has identified selected lakes for special consideration.

P.A. 16 area

As delineated in the 1995 Pulpwood Agreement 16 document.

Parks

The primary sources for the boundaries are the Ministry of Forests FC1 inventory file maps and the CCLUP maps augmented with information from the Ministry of Environment, Lands and Parks, Parks Branch (Cariboo office) and Surveyor Generals Branch (SGB).

Resource management zones (CCLUP)

The CCLUP zones (integrated resource management [IRMZ], enhanced resource development [ERDZ], special resource development [SRDZ]) define the overall management strategies that are to be followed on a broad, strategic basis. The CCLUP zones will be incorporated into the analysis to ensure reporting by these zones is possible.

South Chilcotin sub-regional plan (SCSRP)

The SCSRP boundary is as defined in the plan and will be used for reporting on contribution to timber supply.

Steep/unstable slopes, by forest district

Steep slope netdowns: Williams Lake and Chilcotin Forest Districts used GIS slope class analysis of TRIM maps to identify slope classes 40%-60%, and 60%+. Horsefly Forest District reviewed 1:30 000 TRIM maps in conjunction with licensees to determine steep/unstable slopes where operations are not currently feasible. See Section 5.2.5, "Areas currently considered inoperable."

Taseko management zone

The boundaries as delineated in the final report of the Chilko Lake study team will be used for reporting of contribution to harvest flow. This area is within the Williams Lake TSA and possesses the appropriate ownership codes for timber supply consideration (62C or 69C); however, according to the current status noted on the inventory it is not coded as part of the provincial forest. For the analysis, this area may, according to land base and management considerations described in this data package, contribute to timber supply.

Visual resource management areas

The visual management area maps were compiled by forest district and include scenic areas with established or recommended visual quality objectives, and visually sensitive areas (VSA) identified in the CCLUP. See Section 6.5.2, "Visual resource forest cover requirements."

3. Inventories

3.2 Inventory audit

In 1998, the Chief Forester released summary inventory audit results for the Williams Lake TSA forest cover inventory. The preliminary results indicated that mature stand yields in the inventory may be over-estimated by 13%. Subsequently, a review of the detailed polygon sample information gathered for the 1998 inventory audit revealed that the average ground-measured volume of a random sample of all timber types in the Williams Lake TSA was 12% less than the average inventory volume estimate adjusted by available disturbance history information. Comparisons cannot be directly made to results of the previous timber supply analysis (1994), as considerations for insect disturbance, stocking class projection and marginal forest types have changed significantly and are accounted for in the inventory audit information.

Disturbance history information was used in the following manner:

- Where insect disturbance history was available, the actual volume impact was assumed to be 10% higher than the recorded area disturbance for insect disturbance to account for the higher likelihood that the older, larger trees would be attacked by mountain pine beetles. This assumption is consistent with the inventory audit results as pine stands with insect attack have a much lower average ground-measured age than the inventory would indicate, while in unattacked stands, the ground-measured average age is very similar to the inventory age.
- Where disturbance was due to logging and no disturbance percentage was provided, the current selection volume removal of 50% in fir-leading stands was assumed.

An initial stratification of the audit samples into dominant species categories by disturbance code indicates that strata volumes of the various forest types within the Williams Lake TSA are not uniformly over-estimated, but that volumes are being over-estimated for some species groups, and under-estimated for others. Further review of the audit information, consideration of forest management practices and review of the inventory file will be required in order to determine how the audit information regarding mature stands will be used in the analysis.

4. Division of the Area Into Management Zones

4.1 Management zones and tracking of multiple objectives (grouping)

Management zones represent areas with distinct management emphasis. For example, a zone may be based on a harvesting system, silviculture system, visual quality objective or wildlife consideration. Sometimes one area of forest is subject to more than one management objective. The non-contributing forest (land considered unavailable for timber harvesting) may be included for consideration in attaining forest cover objectives. In the simulation model, groups can be used to represent and track different combinations of areas, and thereby allow application of overlapping management objectives. The timber supply analyst will decide whether to put an objective into a group or a mutually exclusive management zone after data assessment.

Further information on the forest cover requirements to be applied to these areas can be found in Section 6.5, "Multiple use management."

Table 3. Objectives to be tracked

Group	Inventory definition / variable name	Issue
3 Western supply blocks	TSA_SB = Anahim, Chilcotin, Tatla	Harvest forecasting to be done separately from main TSA.
CCLUP resource management zones: Integrated resource management Enhanced resource development Special resource development	Non-standard mapped layer. CCLUP = ERDZ, IRMZ, SRDZ	For reporting to assess whether results are consistent with CCLUP objectives.
Class B Lakeshore management zones	Buff colour = 7	Application of forest cover requirement.
Eastern and Itcha-Ilgachuz caribou habitat	From MELP data — non-standard mapped layer. Carib_moe = mod and no harvest	Managing for caribou.
IFPA/IRMA sub-blocks	Spec_area = IRMA	For reporting purposes, assessing timber supply contribution of the IRMA.
Landscape-level biodiversity: mature plus old and old seral		Report by: BEC ^a variant for each LU.
Mountain pine beetle attacked stands	Activity-cd = I (Insect) and species = PI	Reporting harvest levels and silviculture regimes for MPB-attacked stands.
Mule deer winter ranges	From MELP data — non-standard mapped layer. m_d_range = ## range name ##	Managing for mule deer winter ranges.

(a) BEC — biogeoclimatic ecosystem classification.

(continued)

4. Division of the Area Into Management Zones

Table 3. Objectives to be tracked (concluded)

Group	Inventory definition / variable name	Issue
Multiple use zone	All other areas where harvesting operations are not constrained for specific resource management issues such as visual quality, wildlife or watersheds.	Integrating timber and other resources.
Pulpwood agreement #16 supply	P.A. = 16	Timber contribution from specified forest types.
Selection harvesting	Leading-fir types in interior Douglas-fir (IDF), sub-boreal pine-spruce (SBPS) and interior cedar hemlock (ICH) biogeoclimatic zones.	For reporting purposes, assessing contribution of selection harvesting to TSA timber supply.
South Chilcotin sub-regional plan	Spec_area = SCSRP	For reporting purposes, assessing contribution to TSA timber supply.
Taseko management zone	In the TSA, out of the Prov. forest PF = (blank)	For reporting purposes, assessing contribution to TSA timber supply.
Visual resource management areas	VSA = R, PR VQO = R, PR, M	Managing for visual quality. For reporting purposes, assessing contribution to TSA timber supply.

Data source and comments:

See Section 3.1, "Background information" for the sources of mapping and zones referenced above.

4.2 Analysis units

An analysis unit represents a combination of stands dominated by specific tree species or silvicultural regime with a set range of timber growing capability as indicated by the inventory type group and site index in the forest inventory file. Each analysis unit is assigned timber volume projections for both existing and future stands. Tables 4a and 4b identify draft analysis units. After determining the timber harvesting land base, the timber supply analyst may adjust the final analysis unit definitions.

4. Division of the Area Into Management Zones

Table 4a. Definition of analysis units

Analysis unit	Criteria		
	Inventory type groups	Other	Site index range (m@ 50 years)
MPB attacked stands (> 30%)	28-31	Disturbance = I	> = 7.0
Dry belt fir-leading (IDF and SBPS)	1-8		> = 7.0
Wet belt fir-leading (ICH)	1-8		> = 7.0
Mule deer selection (> = 40% fir) ^a	1-34	Low crown closure	> = 7.0
Mule deer selection (> = 40% fir) ^a	1-34	Moderate and high crown closure	> = 7.0
Mule deer even-aged (< 40% fir)	1-34		> = 7.0
Caribou (western) modified harvest — arboreal	21-26		> = 7.0
Caribou modified harvest — terrestrial lichen	1-20, 27-34		> = 7.0
Fd (poor, non-selection)	1-8, 33, 34		7.0 — 12.5
Fd (good/medium, non-selection)	1-8, 33, 34		> 12.5
Cw, Hw (poor)	9-17		7.0 — 12.5
Cw, Hw (good/medium)	9-17		> 12.5
Sx, Ba (poor)	18-26		7.0 — 12.5
Sx, Ba (good/medium)	18-26		> 12.5
PI (poor)	28-31		7.0 — 12.5
PI (good/medium)	28-31		> 12.5
Marginal forest types (volume @ 160 years = 65 m ³ /ha or less)	All		> 7.0

(a) Percentage based on species code / species per cent variables on the forest inventory file.

Data source and comments:

The analysis units do not include any portion of a type group that is listed in Table 4b for pulpwood agreement 16. The lists are mutually exclusive.

The site index ranges used to define the analysis units may be re-determined after examining the area distribution across the full range of site indexes in the timber harvesting land base for each inventory type group combination.

The marginal forest type analysis unit is a replacement for a portion of the previous PFTs. These are stands with an adequate expression of site productivity (greater than 7 metres in site index) but which do not achieve the minimum volume criterion based on current utilization.

4. Division of the Area Into Management Zones

Crown closure classes are assigned by assuming low crown closure will be met by poorer productivity sites while moderate and high crown closure sites will be met by the more productive sites for each MDWR. The *Regional Mule Deer Winter Range Strategy* for the CCLUP lists the MDWR and crown closure management targets and Section 6.3.1, "Normal and mule deer winter range (MDWR) selection harvesting" describes the respective silvicultural regime.

Although arboreal lichens, utilized by western caribou, are not restricted to spruce types, for the purposes of this analysis arboreal lichen sites are assumed to occur in spruce-leading and pure spruce types. Spruce-leading stands will be assigned to the arboreal-lichen analysis unit up to the maximum of 20% of the total western caribou area outlined in the caribou strategy. The caribou area has been included as a non-standard overlay with the forest cover information. This acts as a surrogate for the actual distribution that is expected to be confirmed as part of the ongoing caribou strategy work scheduled for completion by June 2000.

Table 4b. Pulpwood agreement 16 analysis unit definition

Old P.A. PFT analysis unit	Inventory type group	Site index (m @ 50 years)	Old-site class	Age (years)	Stocking class	Supply block	Per cent (%) area available
1	All		L			H, G, K, M	100
2	35-42	> = 7				H, G, K, M	100
7	28-31				4	H, G	100
10	All			140+		M	100

Data source and comments:

Supply block descriptions: Springhouse = H, Churn = G , Moffat = K, Upper Horsefly = M.

The P.A. forest type descriptions shown above have been used to simplify P.A. considerations for this analysis and do not affect the licence document. However, a review of forest cover inventory information indicates that about 95% of forest types associated with previous P.A. 16 PFTs are currently found within these four forest types. For modelling, only these four types within the P.A. 16 area will be assumed to be eligible for harvest. See Section 6.1, "Harvesting priorities and targets" for more details on P.A. 16.

5. Timber Harvesting Land Base Definition

5.1 Identification of the timber harvesting land base

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. The timber harvesting land base for the Williams Lake TSA is determined by removing categories of area that do not contribute to timber harvesting in the 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 (e.g., private land, parks, etc.);
- it is not suitable for timber production; and
- it is reserved to achieve objectives 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); and
- by the addition of productive forest land (e.g., timber licence reversions).

The classification "unavailable for harvest" is applied only to land where no harvesting will occur or has occurred in past or current forest development plans. It is recognized that the timber harvesting land base may change in future timber supply reviews based on changes in current management. In this timber supply review any area in which some timber harvesting will occur remains in the timber harvesting land base, even if the area is subject to harvest restrictions. Any such restrictions, or constraints on timber harvest, will be reflected in the analysis.

The area remaining after identifying all the areas that do not contribute to timber supply, and adding any suitable area, is defined as the "timber harvesting land base" for the TSA.

5.2 Details on land base classification

5.2.1 Land administered by the British Columbia Forest Service for timber supply

Ownership codes are generally used to identify whether the land can be considered to potentially contribute to timber supply. Ownership codes 62C and 69C indicate Crown land in a forest management unit and miscellaneous reserves respectively. All areas with other ownership codes will be excluded from the land base considered available for timber harvesting. Areas under woodlot licenses do not contribute to the TSA timber supply since their AAC's are determined independently of the timber supply review process as is harvest for the Alex Fraser Research Forest. An order-in-council has removed the new parks and protected areas created since the last timber supply review from availability to timber supply. Portions of the Taseko management zone are included in the timber harvesting land base.

5.2.2 Land classified as non-forest

Type identity code 6 areas such as alpine, lakes, rocks, and swamp, and type identity code 8 areas, where no typing is available, are removed from the land base considered for timber harvesting.

5.2.3 Non-commercial cover

Type identity code 5 represents areas currently occupied by non-commercial brush species. These areas are considered to be unlikely sites for timber production and no rehabilitation of these sites is planned, thus they are removed from the land base considered available for timber supply.

5. Timber Harvesting Land Base Definition

5.2.4 Environmentally sensitive areas

Some forest lands are environmentally sensitive and/or significantly valuable for other resources. Many of these areas are identified and delineated during a forest inventory as environmentally sensitive areas (ESAs). The ESA system uses the following classifications: sensitive soil (Es), forest regeneration problems (Ep), snow avalanche (Ea), recreation (Er), wildlife (Ew), water (Eh) and fisheries (fisheries symbols).

The following table lists the ESAs where there is a reduction in the timber harvesting opportunity.

Table 5. Description of environmentally sensitive areas

ESA category	ESA description	Per cent (%) reduced
Es1	Highly sensitive soils	100 ^a
Ep1	High concern for regeneration problem	100 ^a
Ea1	High avalanche hazard	100
Eh	Hydrology	100

(a) These reductions will not be applied to areas with logging history. It is recognized that over time, operations will lead to clarification of the areas that can be harvested.

Data source and comments:

Where areas have multiple ESA classifications, only the primary classification will be used.

Er (recreation) — no reduction will be made for Er1 and Er2 areas as recreation management is more adequately represented through visual resource management and lakeshore management (see Sections 6.5.2 and 6.5.4 respectively).

Ew (wildlife) — no reduction will be made for Ew1 areas. In their place:

- Mule deer winter ranges and caribou habitat been mapped and specific management regimes will be incorporated into the analysis.
- Riparian, wildlife tree (WT) and wildlife tree patch (WTP) reductions are assumed to protect most wetland habitat for moose and other species. A key wetland classification is being conducted by the Ministry of Environment, Lands and Parks.

5.2.5 Areas currently considered inoperable

Operability codes are generally used to describe the presence or absence of physical barriers or limitations to harvesting, appropriate logging methods (e.g., cable) and the merchantability of stands.

5. Timber Harvesting Land Base Definition

Since physical conditions vary across the Williams Lake TSA, two methods have been used to identify inoperable areas. Areas with a logging history on the inventory file will not be subject to the area reduction shown in Table 6.

Table 6. *Steep/unstable slopes*

Slope class	Reduction per cent (%)
Williams Lake Forest District > 40%	100
Chilcotin Forest District > 40%	100
Horsefly Forest District — identified areas	100

Data source and comments:

In the Williams Lake and Chilcotin Forest Districts, operations are currently not conducted on slopes > 40%. Steep slopes were identified via TRIM based analysis.

Steep/unstable slopes in the Horsefly Forest District were defined and mapped through a joint licensee/MoF exercise using local knowledge.

5.2.6 Currently unharvested stand types

Table 7. *Currently unharvested stands, excluding P.A. 16 areas*

TSR 1 PFT label	Supply block	Species	Inventory type group	Age (years)	Height class	Stocking class	Site index (m @ 50 years)	Per cent (%) area excluded
B	A-N		All				< 7	100
A	B, E-N	Decid	35-42				> = 7	100
F2-F4	N, M, L	Ba	18-20	> 120	2	1, 2	< = 12.5	100
G2	B, E-N	S	21-26	> 140	2	1, 2	> = 7	100
3W4	D	F	2, 3, 6, 7					100
Part of 3W5	A, C, D	Cw, Hw, Ba	13-20					100

Supply block Ids:

A = Anahim, B = Chezacut, C = Tatla, D = Chilcotin, E = Kloakut, F = Gaspard, G = Churn, H = Springhouse, I = Palmer, J = Skelton, K = Moffat, L = Cariboo, M = Upper Horsefly, N = Junction.

PFT labels 3W4 and 3W5 are from the 3 western supply blocks definition.

5. Timber Harvesting Land Base Definition

Data source and comments:

TSR 1 PFTs for the main TSA and the three western supply blocks have been reviewed by Regional, District and Timber Supply Branch staff. PFTs with less than 300 hectares will not be included in the currently unharvested stand type category because their small area does not warrant separate tracking and analysis. Also, although the old definition of PFTs included some immature stand types, the new definition does not, and therefore immature stands will not be included as unharvested stand types in the analysis. Some PFT types have been removed from the PFT group and renamed as Forest Inventory Operational Discrepancy Types (see Section 6.2.2).

5.2.7 Roads, trails and landings reductions

Separate estimates have been made to reflect the loss in productive forest land due to existing and future roads, trails and landings (RTLs). These estimates account only for the area on which timber production will not occur in the future, including effective reductions associated with reduced productivity.

Existing main roads will be removed from the productive forest land base using a method that identifies the polygon-specific area to be removed. Future RTL reductions are applied to the productive forest land base after stands are harvested for the first time in the simulation model. Future development is assumed to be similar to existing development patterns.

Table 8. Estimates for existing and future roads, trails, and landings

Location	Age class	Reduction area (hectares or per cent %)
Existing main roads and trails		Non-standard GIS layer (road atlas information)
Future main and secondary roads, trails and landings	> = age class 3 and not currently roaded	4.1% of timber harvesting land base – West ^a 6.2% of timber harvesting land base – East ^b

(a) 'East' includes all of the Horsefly Forest District plus the SBS in the Williams Lake Forest District.

(b) 'West' includes all of the Chilcotin Forest District plus the Williams Lake Forest District ESSF, MS, SBPS and IDF.

Data source and comments:

Existing roads and trails were extracted from all the forest cover maps and merged into one 'map'. The roads were buffered by class using the nominal road widths found in Table 9. The resulting map was then overlaid on the forest cover map to estimate the area from each forest cover polygon intersected by the road buffer. A file containing the road area by mapsheet and polygon will be provided to the timber supply analyst in order to reduce the productive forest area by the polygon-specific area in existing main roads. Regional Engineering staff estimate that 80 to 85% of the main roads required in the Williams Lake TSA have been built.

5. Timber Harvesting Land Base Definition

Table 9. Estimates for existing road and trails

Road class	Main	Secondary	Operational	Trail
Nominal width	30	20	15	8

Future RTL areas have been derived from information on timber harvesting that took place between January 1, 1994 to June 1998, for all BEC zones. The on-block area occupied by RTLs was assessed using data from post-harvest reports in the integrated silviculture information system (ISIS) and major license silvicultural information system (MLSIS). These systems reported that RTLs occupy 4.1% (west) and 6.2% (east). These percentages do not include the area of existing main roads outlined above.

Natural ingress of trees onto roaded areas is acknowledged but at present no specific information is available for use in the analysis.

5.2.8 Caribou habitat reductions

The *CCLUP* provided direction for management of mountain caribou habitat for two distinct herds known as the Eastern and Itcha-Ilgachuz herds. This direction established a broad deferral on harvesting to the year 2000. Within the deferral area, targets of 65% no-harvest and 35% modified harvest access were established. Detail is provided under option A of the *CCLUP Caribou Management Strategy Report* and in the *CCLUP Integration Report*.

The *1998 Caribou Strategy Update* revised the modified-harvest and no-harvest areas that will be specifically managed for Eastern and Itcha-Ilgachuz caribou. The linework of the *1998 Caribou Strategy Update* is considered during operational planning decisions and will be modelled as current management.

The *CCLUP Integration Report* included an assumption of access to 10% of the forest land base within the caribou no-harvest zone, primarily to salvage damaged timber. Details on how the salvage program will be implemented operationally are uncertain at this time. The approach to be used for estimating the timber supply implications of the salvage program in the caribou zone will be determined after reviewing the inventory.

5.2.9 Cultural heritage resource reductions

Archaeological overview assessments, cultural heritage overviews and band-specific traditional use studies are completed or ongoing at this time throughout the Cariboo Forest Region. Generally these cultural heritage areas overlap with some of the riparian, WTP, inoperable, class A lakes, etc. which, in this analysis, will be removed from the land base or have access constraints applied. Therefore, no deductions will be applied specifically to account for cultural heritage resources. If information becomes available after completion of ongoing studies that suggests deductions for other values do not adequately account for cultural heritage resources, it can be incorporated into future timber supply reviews.

5.2.10 Class A lakes reserve zones

Class A lakes have been identified on the forest inventory files. A no-harvest zone of 200 metres has been created around these lakes. This information is available on a non-standard geographic information system (GIS) layer, and will be incorporated into the analysis. No special consideration has been given to unclassified lakes at this time, with the two exception noted below.

See Section 6.5.4, "Lakeshore management forest cover requirements" regarding class B lakes.

5. Timber Harvesting Land Base Definition

All lakes in the Horsefly Forest District have been classified by the district manager under the FPC, or have received a draft classification from the Lakes Classification Interagency Planning Team.

The Williams Lake Forest District lake classification team has classified approximately 50% of the lakes larger than five hectares. There are 6 class A lakes and 37 class B lakes. Two class A lakes (Natsy, Owen) are identified in the *CCLUP* as important pelican feeding lakes. In addition a 200-metre reserve will also be applied to Rosita and Tautri Lakes, important pelican feeding lakes, which are as yet unclassified.

Lakes classification is ongoing in the Chilcotin Forest District.

5.2.11 Riparian management area (RMA) reduction

A reduction for the RMA (riparian reserve zones (RRZ) and riparian management zones (RMZ)) was derived from a district specific review of silviculture prescriptions from 1996 to 1998. The derived RMA factor which includes 100% of the RRZ and a portion of the RMZ will be applied to the productive forest after all other land base deductions discussed in previous sections.

Table 10. Reductions to reflect riparian management areas

Forest district	Area estimate on the timber harvesting land base (%)
Chilcotin	2.3
Williams Lake	1.4
Horsefly	2.1

6. Current Forest Management Assumptions

6.1 Harvesting priorities and targets

Harvest priorities for the timber harvesting land base will be relative oldest first (i.e., relative age as the difference between current age and the minimum harvestable age assigned to the stand type).

Low crown closure areas within MDWRs will be targeted for harvest before high and moderate crown closure areas.

Mountain pine beetle attacked stands over 30% attack in the Chilcotin Forest District:

- will be eligible for harvest at a rate of 500 000 cubic metres per year for five years comprised of green and dead potential volumes. An estimated average of twenty-five cubic metres per hectare of dead potential volume is salvaged from these stands.
- harvest of mountain pine beetle-attacked stands take precedence over harvest of the same stand types classed as marginal forest types for the first five years.

P.A. 16 harvest types are assigned discreet analysis units within the timber harvesting land base and harvest opportunity will be tracked in the simulation model. An average harvest of 54 000 cubic metres per year from aspen/conifer mixed stands in the Horsefly Forest District, and in the Moffat supply block within the Williams Lake Forest District will be modelled to emulate the current harvesting under P.A. 16 in this TSA. See Section 6.1.2, "Minimum harvest criteria."

Maximum rates of harvest have been determined for the caribou modified harvest areas. In arboreal lichen sites, the rate is 8% of the area every 20 years while in terrestrial lichen sites, the rate of harvest is 14% every 20 years. These the rate-of-harvest limits will be applied in addition to the forest cover requirements described in Section 6.5.3, "Caribou habitat forest cover requirements," which are designed to represent guidelines that restrict excessive concentration of 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 11. Utilization levels

Analysis unit	Utilization		
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
Pine leading	12.5	30	10
All other species	17.5	30	10
Pulpwood agreement 16 types	12.5	30	10

6. Current Forest Management Assumptions

Data source and comments:

These levels reflect current interior utilization standards, with the exception of P.A. 16. The operational utilization for P.A. 16 is a minimum top dib of 8 cm and a minimum dbh of 10 cm. This standard is not available from the variable density yield projection (VDYP) model. Managed stand yield curves will assume the utilization levels shown. While operational utilization standards differ from levels to be used in the analysis, the analysis results will still provide information that can be used to extrapolate timber supply from P.A. stand types.

6.1.2 Minimum harvest criteria

Harvesting may occur in stands just meeting the minimum requirements in order to satisfy forest level objectives (e.g., maintaining overall harvest levels for a short period of time or avoiding large changes in harvest levels between time periods). However, most stands will not be harvested until after the minimum harvest criteria are met in order to achieve management objectives for other resource values (e.g., requirements for visual management) or to maintain a desired harvest flow.

Table 12. Minimum harvest criteria

Analysis unit	Minimum criteria			
	Diameter @ breast height (cm)	Volume (m ³ / hectare)	Cruise height (metres) ^a	Age (years)
All pine not attacked by mountain pine beetle	12.5	65	Williams Lake and Horsefly — 14 Chilcotin — 12	
> 30% mountain pine beetle attacked pine	12.5	40 ^b	Chilcotin — 12	
All other conifers	17.5	65	16	
Deciduous (P.A. 16)	12.5	65	16	
All fir selection areas				120

(a) Heights are average cruise stand height and will be converted to inventory top height.

(b) An additional 25 cubic metres is assumed to exist as dead potential volume as part of salvage operations.

Data source and comments:

Minimum volume information is from a Williams Lake and Chilcotin Forest District study of cutting permit cruise compilations for pine over a three-year period from October 1993 through October 1996.

Stands will be eligible for harvesting when they meet the minimum diameter, volume and height specified. An age based on these criteria will be developed for each analysis unit.

6. Current Forest Management Assumptions

6.2 Volume exclusions

6.2.1 Volume exclusions for mixed species stands

The deciduous species in predominantly coniferous stands are generally not harvested. These portions will therefore be excluded from the estimates of stand volumes. These exclusions do not apply to Pulpwood Agreement 16 analysis units.

Table 13. Volume exclusions for mixed species types

Analysis units	Species	Volume exclusion (%)
All	All deciduous	100

Data source and comments:

The exclusion pertains only to the deciduous portions of these analysis units. The deciduous portion does contribute to biodiversity and coarse woody debris objectives at the stand level and was considered in a cutting permit review of WTs and WTPs, Section 6.5.6, "Wildlife tree and tree patch retention."

6.2.2 Forest inventory operational discrepancy types (Cw, Hw)

The western redcedar (Cw) and western hemlock (Hw) forest inventory operational discrepancy types found in the Horsefly Forest District are distinguished by the fact that recovered volumes at harvest are significantly overestimated by VDYP (variable density yield prediction model) due to higher decay, waste and breakage (DWB) than the DWB factors in VDYP. The volumes on these areas are over-estimated by 50 to 60% compared to true recovery, based on scale returns, and forest district and licensee operational experience. The per cent volume exclusions shown in Table 14 will be reviewed against species information in the inventory audit information. It is expected that very little area remains in the two categories but this will be confirmed by review of the inventory file.

Table 14. Volume exclusions for forest inventory operational discrepancy types

TSR 1 PFT type	Supply block	Species	Type group	Age (years)	Height	Stocking class	Site index	Old-site class	Per cent (%) volume excluded
D2	J-N	Cw	9-11	141+	—	1, 2	> = 7.0	G, M, P	50
E2-E3	J-N	Hw	12-17	141+	—	1, 2	> = 7.0	G, M, P	60

6. Current Forest Management Assumptions

6.2.3 Mountain pine beetle (MPB) attacked stands

In the previous analysis, the estimated unsalvaged loss of merchantable wood within pine stands attacked by mountain pine beetle (MPB) over the proceeding 20 years was depicted by labelling 123 000 hectares of timber harvesting land base as NSR (complete loss of standing volume) and applying a 20-year regeneration delay.

A reclassification of most of the MPB-attacked portions of the Chilko and Stum PSYUs was done in the early 1990s using photos taken between 1985 and 1993. This allows modelling of MPB harvesting and its implications to biodiversity. The classification provides an estimate of the per cent of the polygon area which has been attacked. The peak of the beetle attack was in 1986. For this analysis, the epidemic levels of MPB attack are assumed to have been over by 1990; therefore this is the date to be used as the 'last year of attack' for stands > 30% attack. Stands with < 30% attack will be assigned to unattacked analysis units. A salvage harvest of stands with > 30% attack will be simulated for the first 5 years. Unharvested stands (> 30% attack) will retain their "age" over an extended period to reflect contribution to biodiversity seral stage requirements.

Some stands with more than 30% MPB attack will be assigned to the marginal forest type category after five years while others will be transferred to a young forest condition. Stands meeting the minimum harvest criteria of 40 cubic metres per hectare and 12 metres average height (see Section 6.1.2, "Minimum harvest criteria") and possessing less than 100 cubic metres per hectare (see licence conditions below) will be eligible for harvest until the harvest target of 500 000 cubic metres per year outlined in Section 6.1, "Harvest priorities and targets" is met. If stands have not been harvested, they will be transferred over the next 50 years to a young forest condition based on Table 15 below. However, if any stands possess more than 100 cubic metres per hectare, they will remain eligible for harvest. While only the timber harvesting land base portion of the MPB areas will be assumed to be harvestable, all stands in the productive forest that have more than 30% attack will be transferred to a young forest condition to reflect the potential loss of old forest attributes. Table 15 is based on relatively equal portions of productive forest in each per cent-MPB-attack category. It is assumed that in all cases, regeneration is occurring in attacked stands and that all attacked stands will have roughly the same age within 50 years.

Table 15. *Harvesting and silvicultural assumptions for mountain pine beetle attacked stands*

Per cent mountain pine beetle attack	Yield reduction if harvested (%)	Time from 1990 until stand converts to young forest (years)	Age of young forest after conversion (years)
< 30	Area-weighted average	N/A	N/A
30	40	50	40
40	50	40	30
50	60	30	20
60	70	20	10
70-90+	100	10	0

6. Current Forest Management Assumptions

In the Tatla Lake area, substantial mountain pine beetle attacked areas were not assigned an attack level. Stands with no attack percentage indicated are believed to have the same distribution as the classified areas, and the implementation of this assumption will be reviewed when the inventory file is finalized. The analyst will use forest cover label and stand attributes and information extrapolated from them to create a distribution to be applied to the unclassified mountain pine beetle attacked stands.

All areas harvested will convert to managed stands. Adjacency (green-up) and selection harvest rules do not apply within these mountain pine beetle attacked areas until after harvest. After harvest, the areas would be grouped with adjacent unattacked areas, and be subjected to appropriate forest cover constraints that reflect adjacency guidelines, or assigned to an analysis unit with a selection management regime.

The current wording contained in the mountain pine beetle licenses reads:

- m) "insect-damaged Lodgepole stands" means
 - (i) stands of trees, based on cruise measurements, of which 80% of the volume is comprised of lodgepole pine, in which 30% or greater of total stems from the merchantable diameter classes are dead due to insect attack; and,
 - (ii) where the live stem volume of the area to be harvested does not exceed 100 cubic metres per hectare based on the cruise measurements compiled to the Ministry of Forests' interior utilization standards.

Information from the inventory audit will provide guidance for an inventory age sensitivity analysis. Because the beetles attack the oldest trees in a stand, they have the effect of reducing average stand age. Rather than assuming stands are currently regenerating, ages of young stands will be adjusted based on the audit results for beetle attacked stands.

6.3 Silvicultural systems

Approximately 80% of the volume harvested from the Williams Lake TSA will be by even-aged silviculture systems with varying levels of retention. Selection harvesting will be modelled in two major situations as shown below in Tables 16 and 17.

6.3.1 Normal and mule deer winter range (MDWR) selection harvesting

The harvesting prescription for normal-selection-harvesting is to remove 50% of the stand volume in the first entry, re-enter the stand every 30 years thereafter and remove only the growth that has occurred during the 30 year interval. Fir-leading forest types with logging disturbance records will be assumed to have just been logged and are currently between entries.

6. Current Forest Management Assumptions

Table 16. Selection silvicultural systems for IDF/SBPS, MDWR and IDF/SBPS in VQO areas

Silvicultural system	Description	Per cent (%) retention	Yield level	Time between entries (years)
Normal selection harvest	IDF/SBPS fir-leading outside MDWRs and MDWR low CC areas with fir $\geq 40\%$	50 (first entry)	Periodic yield, estimated to be $1 \text{ m}^3/\text{ha}/\text{year}^a$	30
MDWR selection and VQO R	MDWRs — all stands with fir $\geq 40\%$, in moderate and high crown closure classes	80	66% of normal selection harvest MAI above	50

(a) MAI will be reviewed by the analyst and growth and yield staff.

Data source and comments:

The *CCLUP Regional Mule Deer Winter Range Strategy* modified by the *CCLUPIR* identifies the selection harvest methods to be applied to stands with more than 40% fir to achieve the crown closure (CC) objectives. The long-range objective in the MDWRs is to create three different crown closure levels with no young age classes. CC class targets for each MDWR are identified in the *CCLUP Regional Mule Deer Winter Range Strategy*. The CC class distribution will be assigned on an individual MDWR basis such that the low CC target will be met by stands with lower site indexes, with the remainder of the stands assumed to be moderate and high crown closure.

To ensure fir leading ($\geq 40\%$) stands in MDWRs have attained the required CC prior to initial harvest, the risk assessment contained in the *CCLUP Regional Mule Deer Winter Range Strategy*, which identifies winter ranges at greatest risk of not meeting CC requirements, will be used to determine the harvest deferral (years) required prior to the first entry for the analysis.

Table 17. Harvest deferrals by risk category for mule deer winter range

Risk that harvesting will impact crown closure targets	Harvest deferral in years
Low	0
Moderate	20
High	40
Very high	50

6. Current Forest Management Assumptions

Mule deer winter range stands with less than 40% fir (based on inventory species-per cent) will be harvested using even-aged silvicultural systems.

Over the long term, it is expected that the selection harvest regime in the moderate and high CC classes will maintain some mature and old seral characteristics. To reflect this, the *CCLUPIR* expected that 25% of the area in these classes will contribute to meeting the mature plus old and the old seral requirements. This contribution will be considered in deriving mature and old seral forest cover requirements.

6.3.2 Caribou partial cutting and shelterwood

For Eastern and Itcha-Ilgachuz caribou modified harvest areas, the intent is to maintain lichen-bearing habitat throughout the management period by employing extended rotations, while minimizing fragmentation of the landscape. This is accomplished through implementation of a silvicultural system described in Table 18 that retains significant stand structure in the treated areas and concentrates development activity in parts of landscapes over specified time periods which will allow long periods over which no harvesting occurs in those areas. See the forest cover requirements listed in Table 22c, Section 6.5.3, "Caribou habitat forest cover requirements."

Table 18. Silvicultural systems for caribou zone selection harvesting

Management emphasis	Silvicultural system	Planned rotation (years)	Years between entries	Volume removal per entry
Terrestrial lichen sites	Irregular group shelterwood	140	70	50% volume removal
Arboreal lichen sites	Partial cut	240	80	33% volume removal

Data source and comments:

The main data sources are the *1998 Caribou Strategy Update*, regional and district MoF staff and MELP staff.

Eastern and Itcha-Ilgachuz caribou will be modelled in accordance with the caribou strategy, *CCLUP*, and the line work of the *1998 Caribou Strategy Update*.

Western caribou habitat (Itcha-Ilgachuz) — although arboreal lichens are not restricted just to spruce types, for the purposes of this analysis arboreal lichen sites are assumed to occur in spruce-leading and pure spruce types, to a maximum of 20% of the total caribou modified harvest area. This acts as a surrogate for the actual distribution that is being mapped.

6.4 Silviculture

The following assumptions were made to clarify the types of management that occur on harvested areas:

- managed means that a new stand was established naturally or artificially, that the established stand had densities not exceeding maximum densities listed in stocking standards and/or density control was done at or near the free-growing stage as needed;
- all areas disturbed prior to 1958 are not considered eligible for density control and will be regarded as unmanaged, natural stands. This date has been chosen to acknowledge that areas burned in large fires in the Horsefly Forest District in and after 1958 are eligible for density control.

6. Current Forest Management Assumptions

6.4.1 Regeneration activities in managed stands

Recently regenerated and future stands will be grown on managed stand yield tables (MSYTs) produced using the British Columbia Forest Service's table interpolation program for stand yields (TIPSY) growth and yield model. Table 19 contains the inputs required to produce managed stand yield tables for this analysis. A MSYT may be built from a number of tables if more than one regeneration method is used within an analysis unit.

Table 19. Regeneration assumptions by analysis unit

Analysis unit	BEC zone	Time to reach adequate stocking after harvest (years)	Regen type	Per cent (%)	Species	Per cent (%)	Density initial (stems/ha)	Density thinned (stems/ha) (% of AU thinned)
Fdi (dry belt)	IDF	—	Natural	50	Fdi	100	5542	1800 (20)
		7	Natural	50	Fdi	100	5542	1800 (20)
Fdi	ICH	2	Plant	90	Pli, Fdi, Sx	50 30 20	1525	1900 (15)
	ICH	2	Plant	10	Fdi Pli Sx	50 30 20	2345	1900 (15)
	SBS	4	Natural	60	Pli Fdi Sx	50 30 20	6150	1800 (35)
Pli (low)	All	4	Natural	80	Pli	100	5000	N/A (0)
	All	2	Plant	20	Pli	100	2000	N/A (0)
Pli	SBS	4	Natural	60	Pli Sx Fdi	80 10 10	6150	1800 (35)
	SBS	2	Plant	40	Pli Sx	75 25	3415	1800 (35)
	SBPS	4	Natural	80	Pli Sx	90 10	6145	1800 (10)
Pli	SBPS	2	Plant	20	Pli Sx	80 20	2501	1800 (10)
	ESSF, MS	4	Natural	60	Pli Sx	80 20	6053	1600 (5)
	ESSF, MS	2	Plant	40	Pli Sx	80 20	2409	1600 (5)

(continued)

6. Current Forest Management Assumptions

Table 19. Regeneration assumptions by analysis unit (concluded)

Analysis unit	BEC zone	Time to reach adequate stocking after harvest (years)	Regen type	Per cent (%)	Species	Per cent (%)	Density initial (stems/ha)	Density thinned (stems/ha) (% of AU thinned)
Pli	IDF	4	Natural	90	PLI	80	6061	1800 (40)
					Fdi	10		
					Sx	10		
	IDF	2	Plant	10	Pli	80	3059	1800 (40)
					Fdi	10		
					Sx	10		
Pli	ICH	2	Plant	100	Pli	60	1525	1800 (15)
					Sx	30		
					Fdi	10		
Cw, Hw	ICH	2	Plant	100	Pli	40	1525	1800 (15)
					Sx	30		
					Fdi	20		
					Cw	5		
					Hw	5		
Sx, Ba	SBS, SBPS, ICH, MS, ESSF	2	Plant	100	Sx	80	1746	N/A (0)
					Pli	20		
Mule deer selection (Fdi leading)		4	Natural	100	Fdi	100	5542	1800 (20)
Mule deer (Pli leading)	IDF, SBS, ICH	4	Natural	60	Pli	70	6061	1800 (10)
					Fdi	30		
	IDF, SBS, ICH	2	Plant	40	Pli	90	3059	1800 (10)
					Fdi	10		
At	All	4	Natural	100	A	100	8000	N/A (0)

6. Current Forest Management Assumptions

Data source and comments:

District ISIS and MLSIS data and district Silviculture Officers.

Stock age for planted areas is one year and is generally two years for naturally regenerated areas. The stock age has been accounted for in the regeneration delays listed in the third column of Table 19.

In constructing MSYTs in TIPSy, the operational adjustment factor (OAF) 1 will be 12%, and the OAF 2 will be 5%. In the Williams Lake TSA a review of ISIS data indicates that the average well-spaced stocking is over 90% of targets. The Ministry of Forests, Research Branch staff indicate that while stocking has implications for the development of OAF 1, stocking only represents about 3% of the factor. OAF 1 is a constant percentage reduction to account for small stocking gaps in stands. OAF 2 accounts for losses that increase with age, for example, due to disease. The value of OAF 2 increases from zero and passes through 5% when the stand is 100 years old.

Initial density was derived from ISIS and MLSIS forest cover information. Natural and artificial regenerated polygons were sorted by BEC and forest district. A weighted-average density of the leading species was calculated. Average ages of natural and artificial stands used to calculate the initial density were 9 and 7 years, respectively. In the artificial stands some more natural ingress is likely to occur especially in the ICH sub-zones.

The "Density thinned" column is an estimate of the average post-spacing density for each unit. The value in brackets is the average percentage of area in the unit that is spaced. The per cent spacing was derived from ISIS and MLSIS data which compared the area spaced to the area logged, sorted by BEC, from 1992-1998. In some areas the reason for the density thinned being greater than density initial is due to natural ingress.

Douglas-fir is the preferred species in the dry-belt Douglas-fir types and in the mule deer winter range. See Section 6.3, "Silvicultural systems."

Marginal forest types are assumed to regenerate naturally and will be assigned to a regenerated analysis unit with similar forest cover attributes to existing conditions (e.g., site index, species composition, management emphasis).

6.4.2 Immature history

The purpose of this section is to identify areas of existing immature forest where the density (stems per hectare) falls within the legal requirements for minimum and maximum levels and therefore should be assigned to a managed stand yield table (MSYT). Growth on all not satisfactorily restocked (NSR) and future clearcut harvested sites, after restocking, will be projected using MSYTs.

6. Current Forest Management Assumptions

Table 20a. Immature history — main TSA

Analysis unit	Area considered managed (hectares or per cent)			
	Logged since Oct '87 (under SP)	Age 13-20	Age 21-30	Age 31-34 ^a
All clearcut areas main TSA	Planted, managed 100%	Natural, managed 100%	Natural, managed ^a	Natural, managed ^a

(a) The analyst will review the data set and determine the proportion of stands in the 21 to 34 year age category which are above 10,000 stems per hectare. These stands will be regarded as unmanaged, natural stands. Those below 10,000 sph will be considered as managed.

Data source and comments:

Stands logged since October 1, 1987 (aged 1-12 years) must by law be regenerated to defined stocking standards within acceptable time frames as defined in approved PHSPs and SPs, thus are considered 'managed'.

Stands aged 13-34 years have been closely monitored and many have received density control treatments since 1980. It is assumed that all stands needing treatment will be treated within 20 years.

Forest district staff estimate, based on local experience, that 25% of stands aged 31-40 years are treated or have age and stand structures that will respond favourably to treatment for stand density. For modelling purposes it will be assumed that 100% of all stands from age 31 to 34 represent the equivalent area to the 25% of all stands in the 31-40 year-old group. This area includes the large fires in the Horsefly Forest District.

Table 20b. Immature history — 3 western supply blocks

Analysis unit	Area managed (hectares or per cent)
	Age 1-20 (under SP)
Clearcut areas 3 western supply blocks	100%

Data source and comments:

Chilcotin Forest District staff.

Two silvicultural systems are used in the Williams Lake TSA: even-aged and uneven-aged. Managed stand yield tables will be used for areas outlined in the above tables. Natural stand yield curves will be used for areas harvested using the uneven-aged selection system.

6.4.3 Not-satisfactorily restocked (NSR) areas

Land classified as type identity 4 or 9 in the Williams Lake TSA FIP file is included in the timber harvesting land base. These type identity classes 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.

6. Current Forest Management Assumptions

Table 21. NSR history

Williams Lake TSA NSR summary										
Forest district	Pre-87 NSR (backlog)			Post-87 NSR (current)						
				Outstanding 87-91			Not outstanding post-91			Total NSR
	Selection	Clearcut	Total	Selection	Clearcut	Total	Selection	Clearcut	Total	
Williams Lake ^a	1 003	1 941	2 944	87	412	499	6 839	15 143	21 982	25 425
Horsefly	218	3 264	3 482	20	466	486	291	4 175	4 466	8 434
Chilcotin ^b	6	824	830	0	1 998	1 998	1 279	48 359	49 638	52 466
TSA totals	1 227	6 029	7 256	107	2 876	2 983	8 409	67 677	76 806	86 325

(a) Military reserve not included.

(b) Breakdown of Chilcotin district NSR: main supply blocks – 6 ha selection, 808 ha clearcut; 3 western supply blocks – 16 ha clearcut.

Data source and comments:

Information derived from ISIS/MLSIS. Data extract date: 98-09-16.

Selectively harvested ISIS NSR accounts for 8743 hectares in the Williams Lake TSA and will be retained in the timber harvesting land base on a selection harvest growth curve.

NSR is restocked to analysis units in proportion to the current area of each analysis unit in stands less than 20 years old within a landscape unit (LU) on the assumption that the overall distribution of harvest has not changed significantly over the last 20 years. All backlog NSR is assumed to be restocked or reclassified within the next 10 years, whereas current NSR is assumed to be stocked within the time periods specified in Table 19.

The amount of NSR in the forest inventory file will not be available until processing of the file is complete. Any discrepancy in area between the forest inventory files and district MLSIS/ISIS records (which are more up-to-date), aside from inoperable considerations, will be assumed to have already been restocked and currently between 1 and 5 years old. A review of NSR by landscape unit and management emphasis will be used to distinguish these SR areas from NSR.

6. Current Forest Management Assumptions

6.5 Multiple use management

6.5.1 Multiple use area forest cover requirements

As noted in Section 4.1, "Management zones and tracking of multiple objectives (grouping)," the discussion on multiple objectives, forest cover requirements may be examined at a number of different levels, including landscape units, wildlife areas, and resource emphasis zones. With the requirement to retain different forest characteristics across the landscape, it is important to identify forest that is not part of the timber harvesting land base but aids in achieving the forest cover requirements (i.e., maximum allowable disturbance or minimum area retention).

Some areas in the Williams Lake TSA have objectives for specific values, such as visual quality or wildlife habitat. These are discussed in the following sections. Areas not assigned specific objectives or management emphases are managed for multiple uses. Green-up forest cover requirements are applied to these areas, as described in Table 22a.

Table 22a. Forest cover requirements for multiple use areas within each draft landscape unit

	Green-up height (metres)	Maximum allowable disturbance (% area) less than green-up height	Area of application
Multiple use areas ^a	3	30	Timber harvesting land base.
Chilcotin Forest District	3	30	Non-mountain pine beetle attacked timber harvesting land base.

(a) Does not include selection harvested areas.

Data source and comments:

Currently, adjacency guidelines only apply to cutblocks without evidence of mountain pine beetle attack. That is, salvage of beetle-attacked stands takes precedence over adjacency guidelines. However, once attacked areas are harvested, they impact on adjacent unattacked stands. For this reason, after harvests within the mountain pine beetle analysis unit, these areas will be combined with adjacent unattacked areas, and forest cover requirements that represent adjacency guidelines will be applied over the combined area.

6.5.2 Visual resource forest cover requirements

Visual resource management in dry-belt fir:

The selection harvesting systems for Douglas-fir leading stands in the dry-belt analysis unit (see Table 4a) will meet a partial retention VQO. Where Douglas-fir leading stands are found in a retention VQO, the volume removal will be modelled as MDWR selection harvesting as this regime meets the requirements for a retention VQO.

6. Current Forest Management Assumptions

Table 22b. Forest cover requirements for visual resource management within each draft landscape unit

Forest district	VQO or VSA	Green-up height (metres)	Maximum allowable disturbance (% area) less than green-up height	Application
Chilcotin/Williams Lake	R	3	5	Forested area ^a
Chilcotin/Williams Lake	PR	3	15	Forested area ^a
Chilcotin/Williams Lake	M	3	25	Forested area ^a
Horsefly	R	5	10	Forested area ^a
Horsefly	PR	5	20	Forested area ^a

(a) Forested area includes all productive forest within mapped visual areas.

Data source and comments:

Visual resource management areas in the Williams Lake Forest District:

- Scenic area with established VQOs — *Williams Lake Valley Management Plan*, September 1993. Use established VQOs.
- Scenic areas with recommended VQOs — highway and river corridor viewsheds, identified by the forest district manager in December 1996, and in April 1997. Use recommended VQOs from the visual landscape inventories.
- Visually sensitive areas identified in the *CCLUP* — visual quality area in the South Chilcotin and Taseko Lake special resource development zones as per map 6, Appendix 1 of the *CCLUP Integration Report*. Partial retention VQO.

Tourism operations (lodges and resorts) not covered by the visual areas above: Gaspard Lake, partial retention VQO; Tyee Lake and Blue Lake, recommended VQOs from visual landscape inventories.

Visual resource management areas in the Chilcotin Forest District:

Scenic areas for the Chilcotin Forest District have been established. These areas are being revisited through sub-regional planning. A forest cover requirement that limits visible disturbance to the upper end of the partial retention category (15%) represents a reasonable approximation of current visual management practices.

Visual resource management areas in the Horsefly Forest District:

- mapped viewsheds surrounding existing tourism operations will be modelled to a maximum allowable disturbance of 10% below visually effective green-up.
- mapped viewsheds around Quesnel, Horsefly and Cariboo Lakes; Quesnel, Horsefly, and Cariboo Rivers; and the Horsefly and Likely highway corridors will be modelled to a maximum allowable disturbance of 20% below visually effective green-up.

6. Current Forest Management Assumptions

6.5.3 Caribou habitat forest cover requirements

For Eastern and Itcha-Ilgachuz caribou modified harvest areas, the intent is to maintain lichen-bearing habitat by minimizing fragmentation of the landscape. While there is not an operational planning requirement to reduce harvest activity by landscape unit, a forest cover requirement by landscape unit will be used to simulate control over the concentration of harvesting activity in portions of the caribou habitat.

Table 22c. Forest cover requirements for caribou habitat within each draft landscape unit

	Maximum allowable disturbance (% area)	Application
Terrestrial lichen sites	33% every 20 years	Forested “modified harvest” area
Arboreal lichen sites	33% every 20 years	Forested “modified harvest” area

Data source and comments:

The modified area is delineated in the *CCLUP Caribou Strategy*.

The management regime is based on input from the Ministry of Forests' staff at the district, region and Timber Supply Branch levels with guidance from the Ministry of Environment, Lands and Parks regional staff.

As per the *CCLUPIR*, after harvesting has occurred in a specific area of the modified harvest area, that area is assumed to contribute only to the mature seral targets (and not to old-seral forest cover targets).

Eastern and Itcha-Ilgachuz caribou will be modelled using the forest cover requirements in Table 22c, which are based on recommendations from the *CCLUP Caribou Strategy*, *CCLUPIR* and zone adjustments described in the interim *Caribou Strategy 1998 Update* for Eastern and Itcha-Ilgachuz caribou. The interim strategy will be updated in the future once lichen sites have been identified and mapped.

These forest cover requirements are applied to restrict concentration of harvest in a given landscape unit and to simulate anticipated performance. The forest cover requirements are not meant to imply rigid limitations on harvest but are meant to limit the extent of the area disturbed by harvest activity within a caribou modified harvest area and minimize impact on landscape unit seral targets.

6. Current Forest Management Assumptions

6.5.4 Lakeshore management forest cover requirements

Table 22d. Forest cover requirements for lakeshore buffers within each draft landscape unit

Forest district	Green-up height (metres)	Maximum allowable disturbance (% area) less than green-up height	Area of application
Williams Lake ^a	3	10	Productive forest exclusive of selection AUs within lake buffer
Horsefly ^a	5	10	Productive forest exclusive of selection AUs within lake buffer
Chilcotin	3	15	Productive forest exclusive of selection AUs within lake buffer

(a) In the Williams Lake and Horsefly Forest Districts, Class B lakes have a 200-metre buffer where forest cover requirements apply. Management around unclassified lakes will not be represented. Lakes larger than 1000 hectares have no RRZ but some portions have 200-metre buffers applied.

In the Chilcotin Forest District, lakes are undergoing a classification process. A 200-metre buffer, in which forest cover requirements apply, has been assigned for specified lakes.

6.5.5 Landscape biodiversity forest cover requirements

The *Biodiversity Conservation Strategy* provides guidance for the retention of old and mature plus old forest conditions across the landscape. To ensure that old and mature plus old seral targets are met throughout the Williams Lake TSA, the forest cover requirements listed in Table 22e will be applied to draft landscape units and will be modelled using the assigned biodiversity emphasis option (BEO). Values reflect the *Biodiversity Guidebook* with the exception of the IDF where the *Biodiversity Conservation Strategy* will be reflected.

6. Current Forest Management Assumptions

Table 22e. Forest cover requirements for seral requirements within each draft landscape unit

NDT	BEC zone	Mature+old seral requirement by biodiversity emphasis			Old seral requirement by biodiversity emphasis		
		L	I	H	L	I	H
1	CWH	18	36	54	13	13	19
1	ICH	17	34	51	13	13	19
1	ESSF	19	36	54	19	19	28
1	MH	19	36	54	19	19	28
2	CWH	17	34	51	9	9	13
2	ICH	15	31	46	9	9	13
2	SBS	15	31	46	9	9	13
2	ESSF	14	28	42	9	9	13
3	SBPS	8	17	25	7	7	10
3	SBS	11	23	34	11	11	16
3	MS	14	26	39	14	14	21
3	ESSF	14	23	34	14	14	21
3	ICH	14	23	34	14	14	21
4	ICH	17	34	51	13	13	19
4	IDF - Fd	22	43	65	21	21	32
4	IDF - other	11	23	34	11	11	16

L = low biodiversity emphasis;

I = intermediate biodiversity emphasis;

H = high biodiversity emphasis.

The January 15, 1999 Statutory Decision Makers' (SDMs) letter to the licensees recognizes the *CCLUPIR*. The potential old seral requirement reductions or draw-downs recommended in the *CCLUPIR* will only be applied where required during the first rotation and be used as needed to maintain harvest levels during the first rotation in low biodiversity emphasis landscape units within the IRMZ or ERDZ. A weighted approach will be used where a LU/BEC variant is split by land-use plan zones. Where this approach is required the old seral draw-down will be 50% of the guideline in the ERDZ and 70% in the IRMZ. Appendix A, "Landscape units with draw-down potential" shows the landscape units which have a potential for a reduction in the old seral requirement if there is insufficient area in old-seral stands outside the timber harvesting land base.

6. Current Forest Management Assumptions

Minimum old and mature plus old requirements are defined in the *Biodiversity Conservation Strategy* for the contribution of a stand to the seral stage requirements. The strategy defines different ages and seral requirements in the IDF by species groups. Where fir makes up more than 40% of a stand, the old seral age is 250 years, otherwise the old seral age is 140 years. Table 22e shows the seral requirements for the species groups in the IDF zone.

The inventory file will be reviewed to examine the LU/BEC variant combinations that exist in the timber harvesting land base. The *CCLUPIR* recognized the need to provide a reasonable scale for planning for old seral requirements and recommended special consideration be given to LU/BEC variants with less than 5000 hectares of timber harvesting land base. Therefore any LU/BEC variants with less than 5000 hectares of timber harvesting land base will be examined for possible amalgamation with other LU/BEC variants for old seral requirements. The analysis report will identify any LU/BEC variants where amalgamations were made.

6.5.6 Wildlife tree and tree patch retention

The *Biodiversity Guidebook* describes two methods for maintaining stand structure over time, wildlife trees (WTs) and wildlife tree patches (WTPs). Both methods are currently used in the Williams Lake TSA. For WTPs greater than two hectares, an appropriate area percentage will be deferred from harvest. This area can be considered for mature or old seral requirements depending on its age but will be eligible for harvest based on the minimum harvestable age of the managed analysis unit the stand is associated with. For WTs and WTPs less than two hectares, a volume equal to the WTP target minus the area in WTPs greater than two hectares will be removed from the analysis unit yield table. It is not expected that the volume left in WTs and small WTPs will be retrieved in the future, nor are the retained trees expected to negatively impact site occupancy.

WTP requirements for each draft landscape unit, based on Table 20b of the *Biodiversity Guidebook*, have been identified in correspondence to the licensees by each district manager. However, as the assigned BEOs will be used in the analysis, WTP targets will be reduced by 3% to reflect the lower WTP target when old seral objectives are employed at the landscape unit level.

A randomized study of major licensee cutting permits and small business blocks based on silviculture prescriptions approved in 1996 to 1998 indicated the contribution of RRZs, RMZs, ESAs and deciduous stands to WTPs and WTs. The contribution from these types is listed in Table 23. There is some uncertainty about the contribution from these types given the small sample size and the site specific rather than strategic nature of cutting permit information. However, the per cent contribution indicated in the study is the best available information.

WTP > two hectares:

$$W = [(T - 3) \times (1 - N/100)] \times A/100$$

Where:

W= percentage of WTPs > two hectares that will be managed on longer rotations and be replaced by adjacent forest at the next harvest

T= DM LU WTP target

N= percentage contribution from unharvested stands such as riparian, ESAs and deciduous stands

A= percentage of WTPs > two hectares in size

6. Current Forest Management Assumptions

Table 23. Forest district WTP characteristics based on a random sample of cutting permits

Forest district	Per cent (%) contribution from unharvested stands (N)	Percentage of WTs or WTPs less than two hectares	Percentage of WTPs greater than two hectares (A)
Williams Lake	21	0 ^a	100
Horsefly	11	60	40
Chilcotin	25	0 ^a	100

(a) Study found that less than 10% of WTPs are less than 2 hectares or are single WTs. Assumed to be insignificant for this analysis.

Data source and comments:

WTP targets will not be applied in selection management areas such as the dry-belt fir leading stands, MDWR selection and caribou modified harvest analysis units as the silvicultural systems used in these areas are assumed to maintain the desired structural diversity within stands.

6.6 Unsalvaged losses

Table 24 shows the estimated 20-year average for annual unsalvaged volume loss to catastrophic events such as fires, wind damage or other epidemic agents on the timber harvesting land base. The total unsalvaged losses have been adjusted to reflect what was salvageable from the timber harvesting land base and reflects only the unrecovered volumes. These figures do not include volumes not removed from forest inventory operational discrepancy types.

Table 24. Unsalvaged losses

Analysis unit	Cause of loss	Annual unsalvaged loss (cubic metres per year)
All	Fire	25 653
All	Insects	16 297
All	Wind	11 550
	Total	53 500

Data source and comments:

A study of the protection information system (forest cover losses) was completed to determine the unsalvaged losses due to fire for the Williams Lake TSA from 1977 to 1996. The regional and district forest health officers examined records from 1992 to 1997 pertaining to the other loss agents mentioned above.

6. Current Forest Management Assumptions

The above losses do not include the losses from mountain pine beetle. A harvest target will be modelled to harvest from stands with > 30% attack mountain pine beetle and < 100 cubic metres per hectare for the next 5 years in the Chilcotin and Williams Lake Forest Districts. The inventory audit revealed an average of 25 cubic metres per hectare of dead potential volume in mountain pine beetle attacked stands in excess of 30% attack and this will be added to the yield tables developed for mountain pine beetle attacked stands to reflect current salvage operations. After 5 years, these stands will be assumed to be unsalvageable and will have their stand age modified. See Section 6.2.3, "Mountain pine beetle (MPB) attacked stands." For stands with less than 30% attack, the per cent attack will be removed from the analysis unit yield table.

The majority of the unsalvaged fire losses have occurred in the Chilcotin Forest District.

7. Sensitivity Analyses

Sensitivity analysis provides a measure of the impact to timber supply of uncertainty in management assumptions and/or data. The magnitude of the increase or decrease in a particular variable should reflect the degree of uncertainty surrounding the assumption. By developing and performing a number of sensitivity analyses, it is possible to determine which variables most affect analysis results.

Table 25 lists standard sensitivity analyses that are to be carried out. Table 26 shows issues that are particular to this TSA. The analyst may also suggest changes to the listed sensitivity analyses as the timber supply analysis progresses, especially where the listed issue has very little likelihood of impacting timber supply to any degree.

Table 25. *Standard sensitivity analyses*

Issue to be tested	Sensitivity levels
Existing stand yields — audit results	+/- 10%
Green-up: age per cent below green-up	+/- 5 years +/- 5% points
Harvest flow	Alternatives to base case
Timber harvesting land base changes	+/- 5%
Multiple use zone	+/- 5% of the maximum per cent area below green-up age
Old-growth site index	Apply provincial OGSi adjustments
Regeneration delay	+/- 2 years
Regenerated stand yields (non-selection)	+/- 10%
Regional landscape unit planning strategy	Apply early seral guidelines No reduction in the old seral requirement (no “draw-down”)
VQOs and VSAs (% area below green-up)	- 5% Horsefly Forest District Partial retention and retention +/- 5% Williams Lake and Chilcotin Forest Districts

7. Sensitivity Analyses

Table 26. Sensitivity analysis issues specific to the Williams Lake TSA

Issue to be tested	Sensitivity levels
ART consensus river buffers	No harvest contribution.
Caribou modified harvest	Remove landscape unit constraint.
Class B lakes	Remove forest cover requirement.
Minimum harvestable volume	+/- 15 cubic metres per hectare
Minimum height at harvest	+/- 2 metres
Minimum harvestable age	- 20 years
Mountain pine beetle area old seral contribution	Convert all mountain pine beetle stands to immature stands immediately based on the relationship between the inventory audit ground age and map age.
Mountain pine beetle areas	Extend the salvage harvest for 20 years. Unharvested stands retain current age for 50 years then convert to immature young forest.
Taseko management zone	No harvest contribution.
Marginal forest types	No harvest contribution.

8. References

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Statutory Decision Maker Direction to Forest Development Plan Proponents. (SDM Letter). April 30, 1998.

Appendix A Landscape units with draw-down potential

Table A-1. Lower emphasis landscape units where draw-down potential exists

Draft landscape unit	Draft BEO	CCLUP zone(s) ^a	Draw-down potential in ERDZ or IRMZ
Beaver Valley	L	E	Yes
Big Lake	L	E	Yes
Moffat	L	E	Yes
Tautri	L	E	Yes
Haines	L	E/I	Weighted
Mackin	L	E/I	Weighted
Nazko	L	E/I/Pa	Review
Bambrick	L	E/S	Review
Cariboo Lake	L	E/S	Review
Likely	L	E/S	Review
Lower Cariboo	L	E/S	Review
MacKay	L	E/S	Review
McKusky	L	E/S	Review
Big Creek	L	E/S/Pa	Review
Dash	L	E/S/Pa	Review
Chilanko	L	I	Yes
Nimpo	L	I	Yes
Puntzi	L	I	Yes
Pyper	L	I	Yes
Tatla/Little Eagle	L	I	Yes
Colwell	L	I/Pa	Review
Big Stick	L	I/S	Review
Clearwater	L	I/S	Review
Tete Angela	L	I/S/Pa	Review

(a) CCLUP zones are: E = Enhanced Resource Development Zone; I = Integrated Resource Management Zone; S = Special Resource Development Zone; Pa = Park.