

Quesnel Timber Supply Area Timber Supply Review

Data Package

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District Manager
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Table of Contents

1. Introduction	1
2. Current Forest Management Considerations and Issues	2
2.1 Base case management assumptions	2
2.2 Statement of major forest management considerations and issues	2
3. Inventories	5
3.1 Background information	5
4. Division of the Area Into Management Zones	8
4.1 Management zones and tracking of multiple objectives (grouping)	8
4.2 Analysis units	10
5. Timber Harvesting Land Base Definition	12
5.1 Identification of the timber harvesting land base	12
5.2 Details on land base classification	12
5.2.1 Land administered by the British Columbia Forest Service for timber supply purposes	12
5.2.2 Land classified as non-forest	13
5.2.3 Non-commercial cover	13
5.2.4 Environmentally sensitive areas	13
5.2.5 Areas considered physically inoperable	14
5.2.6 Roads, trails and landings (RTL)	14
5.2.7 Wildlife habitat reductions	15
5.2.8 Cultural heritage resource reductions	15
5.2.9 Riparian reserve zones	15
5.2.10 Lower Blackwater LRUP	16
5.2.11 Cariboo River management area	16
5.2.12 Area inclusion factors	17
5.2.13 Low site exclusions	18
6. Current Forest Management Assumptions	19
6.1 Harvesting	19
6.1.1 Utilization levels	19
6.1.2 Volume exclusions for mixed species stands	20
6.1.3 Minimum harvestable age	20
6.1.4 Silviculture systems	21
6.2 Unsalvaged losses	22
6.3 Silviculture	23
6.3.1 Regeneration activities in managed stands	23
6.3.2 Immature plantation history	25
6.3.3 Selection harvesting	26
6.3.4 Not satisfactorily restocked (NSR) areas	26
6.4 Integrated resource management	26
6.4.1 Objectives managed using forest cover requirements	26
6.4.2 Reductions to reflect volume retention in cutblocks	30
7. Sensitivity Analyses	33

Table of Contents

Tables

TABLE 1. MAJOR FOREST MANAGEMENT CONSIDERATIONS	3
TABLE 2. INVENTORY INFORMATION	5
TABLE 3. OBJECTIVES TO BE TRACKED	9
TABLE 4. DEFINITION OF ANALYSIS UNITS	10
TABLE 5. DESCRIPTION OF ENVIRONMENTALLY SENSITIVE AREAS	13
TABLE 6. ESTIMATES FOR EXISTING AND FUTURE RTLs	14
TABLE 7. RIPARIAN RESERVE ZONE REDUCTIONS ON THE 54 MAPSHEET SAMPLE	16
TABLE 8. AREA INCLUSION FACTORS.....	17
TABLE 9. LOW SITE EXCLUSIONS ^A	18
TABLE 10. UTILIZATION LEVELS	19
TABLE 11. VOLUME EXCLUSIONS FOR MIXED SPECIES TYPES	20
TABLE 12. MINIMUM HARVESTABLE AGE CRITERIA	20
TABLE 13A. SILVICULTURE SYSTEMS-MULE DEER WINTER RANGE.....	21
TABLE 13B. SILVICULTURE SYSTEMS-CARIBOU AREAS	22
TABLE 14. UNSALVAGED LOSSES	23
TABLE 15. REGENERATION ASSUMPTIONS BY ANALYSIS UNIT	24
TABLE 16. IMMATURE PLANTATION HISTORY	25
TABLE 17. FOREST COVER REQUIREMENTS.....	27
TABLE 18A. APPLICABILITY OF "OLD" DRAW-DOWNS BY DRAFT LANDSCAPE UNITS	29
TABLE 18B. FOREST COVER REQUIREMENTS FOR "OLD" LANDSCAPE LEVEL-BIODIVERSITY TARGET % BY NATURAL DISTURBANCE TYPE (NDT) WITHIN LOW EMPHASIS LANDSCAPE UNITS	30
TABLE 19. RIPARIAN MANAGEMENT ZONE REDUCTIONS ON THE 54 MAPSHEET SAMPLE	31
TABLE 20. SENSITIVITY ISSUES SPECIFIC TO THE QUESNEL TSA.....	33
TABLE 21. STANDARD SENSITIVITY ANALYSIS	34

1. Introduction

This data package outlines the basic information and assumptions that are required for the Quesnel 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 (TSR), "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 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.

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 knowledge and information available 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 table columns are shaded gray. In addition, if any major changes to management regimes occur over the next few months, an attempt will be made to incorporate them into the timber supply analysis. The final timber supply analysis report will include a technical appendix that highlights 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.

The *Cariboo-Chilcotin Land Use Plan* (CCLUP) was announced by government in October of 1994. The *Cariboo-Chilcotin Land Use Plan 90-Day Implementation Report* was released on March 3, 1995 and includes land-based targets, objectives and strategy statements. A higher level plan order dated January 23, 1996 gives higher level planning status to the provisions regarding zones, objectives, targets and strategies where they are applicable to operational planning.

The Inter Agency Management Committee (IAMC), in consultation with the Regional Resource Board (RRB), was tasked by government to direct and monitor the implementation of the CCLUP. Under this mandate the *Cariboo-Chilcotin Land Use Plan Integration Report* (CCLUPIR) was completed and endorsed by RRB and IAMC. The CCLUPIR contains management strategies designed to meet the long- and short-term targets of the CCLUP.

The Statutory Decision Makers (SDM) of the Ministry of Forests (MoF) and the Ministry of Environment, Lands, and Parks (MELP) refer to the findings in the CCLUPIR in letters dated April 30, 1998 and January 15, 1999 which provide direction to forest development plan (FDP) proponents for the preparation of the 1999-2003 and 2000-2004 FDP submissions, respectively. To achieve consistency with the CCLUPIR, additional guidance on the application of wildlife tree patches in partial cutting was provided by the SDMs in a letter dated September 23, 1998.

The CCLUPIR provides direction to further levels of strategic planning through completion of the various strategies as outlined in the report. The Kluskus sub-regional plan is under development and once completed will provide an additional refinement to how resource values are balanced to achieve the CCLUP targets. Any additional changes that occur to the current management regime before the allowable annual cut (AAC) determination takes place, as a result of the CCLUPIR strategies or the sub-regional plan, will be presented to the Chief Forester for his consideration in the AAC determination.

2.2 Statement of major forest management considerations and issues

Table 1 lists the major forest management considerations for the Quesnel 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 implication and assigning degrees of risk to timber supply.

2. Current Forest Management Considerations and Issues

Table 1. Major forest management considerations

Consideration/issue	Description
CCLUP	The CCLUP has been accepted by government and the objectives have been reflected in a higher level plan order. In addition, the CCLUPIR has been accepted by RRB and IAMC. Numerous issues contained in these reports have been addressed in the 1998 and 1999 SDM forest development plan direction letters. These reports and the SDM letters provide direction for current management, and for developing the base case.
Landscape-level biodiversity	Draft landscape units (LUs) and biodiversity emphasis options (BEOs) were developed by the regional biodiversity conservation strategy committee. The draft LUs were revised by the <i>Cariboo Region Landscape Unit Planning Strategy</i> (CRLUPS) to better align with administrative boundaries. Using the same draft LUs developed by the biodiversity conservation strategy committee, seral stage target draw-downs were defined in the CCLUPIR (see Section 6.4.1, "Objectives managed using forest cover requirements"). The landscape-level biodiversity direction provided in the 1998 SDM letter reflects current practices, and will be used in developing the base case. Essentially, the SDMs expect FDPs to be consistent with the <i>CCLUP Biodiversity Conservation Strategy</i> as influenced by the CCLUPIR and the CRLUPS.
Pulpwood agreement (P.A.) # 5	The extent and timing of future harvesting under Pulpwood agreement # 5 is not clear at this time. No harvesting has been conducted in the past and none is currently proposed. Forest district staff have seen no indication that harvesting under this PA is likely in the near future.
Problem forest types (PFT)	A 1997 inventory study was conducted of the PFTs (based on the definition provided in the 1994 <i>Quesnel TSA Timber Supply Analysis Report</i> population west of the Fraser River). Forest cover information has been adjusted based on the results of the project and is available for use in this timber supply review. The information has been developed so the PFTs can be assessed separately from the rest of the timber supply area timber inventory.
Deciduous component in timber supply	A re-inventory of a portion of the TSA was completed in 1997. The re-inventory will provide improved information for assessment of the deciduous component in the TSA.
Site productivity	The Ministry of Forests (MoF) Research Branch has released studies on pine and spruce site index adjustments as part of the Old Growth Site Index (OGSI) project. These adjustments will be used in sensitivity analysis of the timber supply analysis. A sensitivity run will also be completed using biogeoclimatic ecosystem classification site index (SIBEC) information.
Not satisfactorily restocked (NSR)	There are currently 4698 hectares of backlog NSR area and 18 328 hectares of current NSR area. Restocking of NSR areas will be modelled in the analysis.
Species conversion	A district study was attempted after the last TSR to determine the extent of species conversion after harvesting, however could not be completed because the original forest cover type information in MLSIS was not considered accurate. Based on experience and current practice, district staff are of the opinion that species conversion is not a major issue in the TSA because most stands tend to regenerate to the species present prior to disturbance.

continued

2. Current Forest Management Considerations and Issues

Table 1. Major forest management considerations (concluded)

Consideration/issue	Description
Lower Blackwater LRUP	The local resource use plan (LRUP) Zone 1 has fish, wildlife and recreation priorities, which are addressed through a specific management prescription (see Section 5.2.10, "Lower Blackwater LRUP").
Roads, trails and landings (RTL)	The district reviewed the issue of roads and confirmed the following deduction factors to the gross productive forest land base (see Section 5.2.6, "Roads, trails and landings (RTL)": existing RTL 2.5%, future RTL 0.83%.
Inventory audit	An inventory audit of the Quesnel TSA is in the process of being completed by the MoF, Resources Inventory Branch, but results will not be available for incorporation for the analysis. If the audit report is completed prior to the AAC determination, it will be provided to the Chief Forester for his consideration.
Cariboo River management area	To ensure sufficient moose habitat is maintained, a specific forest cover requirement will be applied to the area. No more than 15% of the productive forest area may be below green-up height.
Candidate Goal 2 Protected Areas	Given that these areas have not been established by government through an "order-in-council" and may be relocated through sub-regional planning, the goal 2 areas will not be incorporated into the base case. The potential impact on the timber harvesting land base (THLB) will be assessed through sensitivity analysis. These goal 2 areas amount to 0.25% of the land base of the total CCLUP area. It is currently unclear how much and where the goal 2 areas will be in timber harvesting land base.
Contribution of Kluskus supply block to the THLB	A draft sub-regional plan for this area has a target submission date of August 1999 to IAMC and RRB. Approved five-year forest development plans have proposed operations in the Kluskus supply block. A sensitivity analysis will examine the contribution of the Kluskus supply block.

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

Digital data	Source	Vintage	Scale
Forest District/Timber Supply Area	MoF		1:20,000
Forest cover mapsheet numbers	MoF		1:20,000
93A061-62		1991	
93A071-73		1991-1995	
93A081-87		1988-1991	
93A091-98		1988-1995	
93B036-38		1988-1995	
93B046-49		1991-1995	
93B051-59		1988-1995	
93B061-100		1988-1995	
93C066		1992	
93C070		1992	
93C074-80		1988-1995	
93C083-90		1988-1995	
93C093-100		1988-1995	
93F003-10		1993-1995	
93F017-20		1992-1995	
93F029-30		1993-1995	
93F039-40		1993-1995	
93F049-50		1993-1995	
93G001-28		1988-1995	
93G030-37		1993-1995	
93G040-43		1993-1995	
93G046-47		1993-1995	
93G050		1993-1995	
93H001-8		1993-1995	
93B036-38		1993-1995	
93B046-49		1991-1995	
93B051-59		1988-1995	
93B061-100		1988-1995	
93C066		1992	
93C070		1992	
93C074-80		1988-1995	
93C083-90		1988-1995	
93C093-100		1988-1995	

MoF = Ministry of Forests.

continued

3. Inventories

Table 2. Inventory information (concluded)

Digital data	Source	Vintage	Scale
Forest cover mapsheet numbers			
93F003-10	MoF	1993-1995	1:20,000
93F017-20		1992-1995	
93F029-30		1993-1995	
93F039-40		1993-1995	
93F049-50		1993-1995	
93G001-28		1988-1995	
93G030-37		1993-1995	
93G040-43		1993-1995	
93G046-47		1993-1995	
93G050		1993-1995	
93H001-8		1993-1995	
93H011-17		1993-1995	
93H021-26		1993-1995	
93H031-36		1993-1995	
093H41		1993-1995	
Resource management zones (CCLUP)	LUCO	1995	1:250,000
Parks (from CCLUP)	LUCO	1995	1:20,000
Goal 2 Protected areas	MoF	1997	1:50,000
Caribou habitat (eastern and Itcha Ilgachuz)	MELP	1998	1:50,000
Mule deer winter ranges	MELP	1996	1:20,000
Interim Class A lakes classification	MoF	1999	1:20,000
Draft landscape units	MoF	1997	1:20,000
Biogeoclimatic zones	MoF	1998	1:20,000
Scenic areas	MoF	1996	1:50,000
Cariboo River management area	MoF	1999	1:50,000
TFL 5 and TFL 52 boundaries	MoF	1997	1:20,000
Lower Blackwater LRUP Zone 1	MoF	1995	1:50,000

MoF = Ministry of Forests;

MELP = Ministry of Environment, Lands and Parks;

LUCO = Land Use Coordination Office.

Data source and comments:

Forest cover inventory

The forest cover inventory maps, which were completed in the late 1980s and early- to mid-1990s, have been updated for harvesting and disturbance to December 31, 1996. Stands will be projected to include growth to December 31, 1998.

The results of the problem forest type inventory completed in 1997 are available and will be used in this review.

An inventory audit is being completed by MoF, Resources Inventory Branch. If the final audit report is completed prior to the AAC determination, it will be provided to the Chief Forester for his consideration.

3. Inventories

CCLUP resource development zones

The CCLUP development zones define the area over which the higher level plan targets are to be achieved (the CCLUP area is not the same as the area used in this timber supply review). While there are no specific constraints applied to the CCLUP zones in this timber supply review, the zones are being incorporated into the analysis to allow reporting on timber supply levels by these zones for monitoring and planning purposes.

Additional resource inventory information

The additional inventory information listed in Table 2 defines the location of other resources to be managed over the landscape. The mule deer winter ranges, Itcha Ilgachuz and eastern caribou habitat, pelican lakes, watershed management objectives, scenic areas, biodiversity requirements, and refinements to biogeoclimatic zones were all developed over the last 10-15 years, from various data sources by the MELP and the MoF. The analysis will reflect modifications to timber management activities, including land base deductions and forest cover requirements, in the wildlife and other resource zones.

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, silvicultural system, visual quality objective or wildlife consideration. Sometimes one area of forest is subject to more than one management objective. 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 the various management areas can be found in Section 6.4, "Integrated resource management."

Table 3 provides a summary of the management objectives to be tracked.

4. Division of the Area Into Management Zones

Table 3. Objectives to be tracked

Group	Inventory definition	Issue
Draft LUs as per CRLUPS and seral stage target draw-downs as defined by the CCLUPIR.	Non-standard mapped layer.	Managing for biodiversity.
CCLUP resource development management zone targets as per integration report: Integrated resource management Enhanced resource development Special resource development.	Non-standard mapped layer.	Area-based summary for reporting purposes only.
PFT	MoF non-standard layer forest cover data.	The information is provided to facilitate a decision on how to address PFTs within the AAC.
Mule deer winter range	MELP non-standard, mapped data layer.	Managing mule deer winter ranges.
Itcha Ilgachuz and eastern caribou habitat	MELP non-standard, mapped data layer.	Managing for caribou.
Scenic areas under <i>FPC Act</i> .	Non-standard mapped layer produced by the Quesnel Forest District.	Managing for visual quality.
Interim class "A" lakes classification	MoF data, non-standard mapped layer.	Managing for various lake-related resources
Deciduous-leading stands	MoF	The information is provided to facilitate a decision on how to address deciduous volume within the AAC.
Cariboo River management area	MoF non-standard layer.	Maintain moose habitat.
Lower Blackwater LRUP	MoF non-standard layer.	Management prescription for zone 1 to address fish, wildlife and recreation priorities.
Multiple use zone	All areas within the THLB where harvesting operations are not constrained for specific resource management issues such as visual quality, wildlife or watersheds.	Integrating timber and other resources.

4. Division of the Area Into Management Zones

Data source and comments:

Sources for mapping and zones referenced above included MoF, MELP and LUCO standard and non-standard data (see Section 3.1, "Background information").

4.2 Analysis units

An analysis unit represents a combination of stands dominated by specific tree species or a 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. Table 4 identifies draft analysis units. After determining the timber harvesting land base the timber supply analyst will determine the final analysis unit definitions.

Table 4. Definition of analysis units

Analysis unit	Criteria	
	Inventory type groups	Site index range
Douglas-fir Fd (poor, non-selection)	1-8	All
Douglas-fir Fd (medium, non-selection)	1-8	
Douglas-fir Fd(good , non-selection)	1-8	
Spruce/balsam Sx,Ba (poor)	20-26	
Spruce/balsam Sx, Ba (medium)	20-26	
Spruce/balsam Sx, Ba (good)	20-26	
Lodgepole pine PI (poor)	28-30	
Lodgepole pine PI (medium)	28-30	
Lodgepole pine PI (good)	28-30	
Pine leading PFT	28-31	
Deciduous leading (medium)	35-36, 40-42	
Deciduous leading (good)	35-36, 40-42	
Mule deer selection (> = 40% fir)	1-34	
Mule deer even-aged (< 40% fir)	1-34	

4. Division of the Area Into Management Zones

Data source and comments:

In TSR I, analysis units were based on groupings of inventory type groups and site classes. The site classes were good, medium, poor and low. For TSR II site index ranges rather than site classes are used. Table 4 shows the number of site index ranges Quesnel Forest District staff anticipate for the groupings of inventory type groups. Labels of good, medium and poor are not those included on the inventory, but rather apply only to the ranges that will be defined for the timber supply analysis. To date no pre-analysis has occurred to estimate preliminary site index ranges. After the data package receives public review the analysis will start and at that point the ranges of site index will be defined for each analysis unit. In addition to defining analysis units on the basis on site index ranges, additional analysis units may be required if the difference in mean site index between thrifty stands (age greater than 30 years and less than 141) and old-stands (age greater than 141 years) is greater than two metres.

The definition for PFT to be used in this TSR will be the same as in the last TSR, however area inclusion factors will not be applied to the PFT population. Essentially PFTs for the Quesnel TSA are all pine leading, stocking class 4 stands with a piece size greater than 0.1 and less than 0.2 cubic metres per stem.

After harvest, the PFT stands are regenerated to sawlog stands.

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 (THLB) for the Quesnel 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 license 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 the area is subject to harvesting restrictions. Any such restrictions will be reflected in the analysis.

The area remaining after identifying all areas that do not contribute to timber supply, and adding any suitable area, is defined as the "current 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 purposes

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 allocated to woodlot licenses do not contribute to the TSA timber supply since their AACs are determined independently of the timber supply review process.

The CCLUP included the official designation of 17 new parks within the Cariboo Forest Region, four of which are found in the Quesnel TSA. These areas have an ownership code other than 62C or 69C and thus are removed from the timber harvesting land base. Park lands contribute to non-timber resource requirements such as biodiversity targets when the landscape unit crosses the park boundary. The goal 2 candidate protected areas have not been declared, and will be retained in the land base until official designations are made, as discussed in Table 1 above.

5. Timber Harvesting Land Base Definition

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 timber harvesting land base.

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.

5.2.4 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 and are called environmentally sensitive areas (ESAs). The ESA classifications currently applicable or relevant to the Quesnel TSA are: soil (Es), and snow avalanche (Ea). Other ESA classifications, for example, wildlife and recreation, used in the past for the Quesnel TSA have been replaced with more current information for the present timber supply review (see Sections 5.2.7, "Wildlife habitat reductions" and 6.4, "Integrated resource management").

ESAs may result in a reduction in the timber harvesting opportunity on these sites. Two possible strategies for accounting for this are: per cent area reductions, and specific evaluation of individual ESA polygons for harvesting opportunity. The first approach will be used for the Quesnel TSA.

The proportions of ESAs unavailable for timber harvesting for the Quesnel TSA are listed in Table 5.

Table 5. Description of environmentally sensitive areas

ESA description	Per cent (%) reduced
Highly sensitive soils	90
Moderate sensitive soils	50
High avalanche hazard	90

Data source and comments:

ESA reduction factors and mapping were reviewed by MoF staff in collaboration with MELP staff. The results reflect sensitivities to forest management and values for other resources in current management practices.

5. Timber Harvesting Land Base Definition

5.2.5 Areas considered physically inoperable

Quesnel Forest District staff have estimated that, with today's logging methods, approximately 2000 hectares may be physically inoperable over the entire TSA. Given uncertainty regarding locations and practices, it is not possible to make area-specific land base deductions. Since the area involved is small, the planned approach is not to deduct any area due to inoperability. If new, more specific information becomes available prior to the analysis, it will be incorporated.

5.2.6 Roads, trails and landings (RTL)

Separate estimates are made to reflect the loss of productive forest land due to existing and future RTLs. Existing RTL estimates are applied as reductions to the current productive forest considered available for harvesting, and future RTLs reductions are applied after stands are harvested for the first time in the simulation model. Estimates account only for the area on which timber production will not occur in the future, and include effective reductions associated with reduced productivity. Table 6 shows the reductions for existing and future RTLs.

Table 6. *Estimates for existing and future RTLs*

Location	Reduction area (hectares or per cent)
Existing RTLs	2.5% area reduction to the gross TSA land base
Future RTLs	0.83% area reduction to the gross TSA land base

Data source and comments:

These RTL figures were determined by the district for the last TSR, have been reviewed and remain valid. Access routes and structures in the TSA are across all forest age classes, and therefore the reductions are applied in the same manner.

Existing RTLs

Most of the existing RTLs are not accounted for in the inventory file. A 2.5% reduction is being applied to the gross forested land base.

Future RTLs

The Quesnel TSA is presently 75% accessed by roads. Assuming that access to the remaining 25% will entail construction of structures similar to those presently in place, an allowance for future RTLs of 0.83% ($= 2.5\% \times 25/75$) is made in the analysis. Future RTL areas contribute once to the harvest, and are assumed to be non-productive thereafter.

5. Timber Harvesting Land Base Definition

5.2.7 Wildlife habitat reductions

Mule deer winter ranges (MDWR) will be maintained in the land base. Selection and even-aged harvest methods will be applied to achieve the objectives of the *CCLUP Mule Deer Strategy* and the CCLUPIR. See Section 6.1.4, "Silviculture systems," for management prescriptions.

Eastern and Itcha Ilgachuz caribou habitat will be modelled in accordance the *CCLUP Caribou Strategy*, CCLUPIR and zone adjustments of the *Eastern and Itcha Ilgachuz Caribou Strategy 1998 update*. Current direction permits timber access to 35% of the deferral areas starting in 2000, which will be reflected in the base case. The remaining 65% of those areas are currently not available for timber access.

The CCLUP lists the three Kluskus lakes and Pantage Lake as important pelican feeding lakes. The Kluskus lakes were classified as "Class A" lakes (with 200-metre buffer) in the recent interim lakes classification completed for the district. Pantage Lake will also have a 200-metre buffer modelled in this timber supply analysis.

For the Quesnel TSA wildlife tree patches (WTP) cover 9% of cutblocks. A study has determined that of this 9%, 1% of the cutblock area in WTPs overlap with riparian reserve zones. Of the remaining 8% WTP area, 50% is assumed to be persistent and a land based reduction will be applied, and 50% is assumed to be harvested and replaced in the second rotation. In this TSA 95% of WTPs are larger than two hectares.

Work is currently underway to identify key wetlands for moose, consistent with the CCLUP.

The *Identified Wildlife Management Strategy* was recently announced. However, there are currently no "identified wildlife" or "wildlife habitat areas" established in this TSA.

5.2.8 Cultural heritage resource reductions

An Archaeological Overview Assessment (AOA) for the Quesnel Forest District was completed in 1998. This assessment will provide information to the District Manager to consider in deciding where more extensive archaeological work is required prior to harvesting and road building. In consultation with the Archaeology Branch of the Ministry of Small Business, Tourism and Culture, mitigating measures will be taken where archaeological sites are found.

Most archaeological sites are found on gentle slopes and near water bodies. Thus, an area of high archaeological potential is often excluded from the timber harvesting land base for other reasons, such as riparian reserve zones and wildlife tree patches.

It is not yet known if there will be any impact to the timber harvesting land base. The AOA will be tested in upcoming field seasons. Any impact to the timber harvesting land base will be considered in future TSRs.

5.2.9 Riparian reserve zones

Forest Practices Code stream, lake and wetland classifications were used to inventory and establish riparian reserves on 54 mapsheets within the Quesnel TSA that were of predominately crown forest. Once the riparian areas were classified a geographic information system (GIS) analysis was completed to estimate stream lengths. Table 7 shows the results of the GIS analysis. Treatment of riparian management zones is described in Section 6.4.2, "Reductions to reflect volume retention in cutblocks".

5. Timber Harvesting Land Base Definition

Table 7. *Riparian reserve zone reductions on the 54 mapsheet sample*

Riparian class and stream length (km)		Reserve zone ^a (m)	Area retained for reserve (hectares)
S1 > 20 metres	143.62	50	1 436.2
S2	242.5	30	1 455.0
S3	1 202.1	20	4 808.4
S4	5 498.9	0	0.0
S5	42.4	0	0.0
S6	2 038.4	0	0.0
Total			7 699.6

(a) To account for both sides of stream this width is multiplied by 2.

Data source and comments:

Within the 54 mapsheets, the total area occupied by riparian reserves is 7699.6 hectares and the average area per mapsheet is 142.59 hectares. Assuming each map has an area of 15 000 hectares then riparian reserves comprise 0.95% of land base. After accounting for area not managed by the forest service and non-productive forest the estimate was revised to 0.92%.

In the timber supply analysis, riparian reserves will accounted for by reducing the productive forest by 0.92%.

A similar analysis was performed for wetlands and lakes, and will result in an additional 1.43% reduction to the productive forest.

5.2.10 Lower Blackwater LRUP

The 10% of zone 1 available for timber harvesting is constrained by partial retention visual quality objectives (no more than 15% under three metre green-up height) to help achieve non-timber objectives.

5.2.11 Cariboo River management area

To ensure moose habitat is maintained in the area, a specific forest cover constraint will be applied to the management area. No more than 15% of the productive forest area is to be below green-up height (see Table 17).

5. Timber Harvesting Land Base Definition

5.2.12 Area inclusion factors

Table 8 describes by inventory type group, the area inclusion factors to be included in the timber harvesting land base. These inclusion factors describe current merchantability and apply to all supply blocks in the Quesnel TSA.

Table 8. *Area inclusion factors*

Inventory type group	Area inclusion factor (%)
35, 36, 40, 41, 42 (deciduous types)	100
1-8 (Douglas-fir leading)	100
9-17 (Cedar/hemlock leading)	0
18-19 (Balsam-leading)	0
20 (Balsam-spruce)	100
21-25 (Spruce-leading)	100
26 (Spruce-deciduous)	0
28-30 (Lodgepole pine)	100
1-31 (residual types—multi-layered stands resulting from non-clearcut logging or natural events such as fire)	0
31 (Lodgepole pine-deciduous)	0
32-33 (Ponderosa pine and larch)	0
37-39 (Deciduous/coniferous and maple)	0

Data source and comments:

This information was provided by the forest district and represents current performance in the Quesnel TSA except for the deciduous-leading types. The deciduous types are included to allow an assessment of the potential timber supply contribution of deciduous stands.

5. Timber Harvesting Land Base Definition

5.2.13 Low site exclusions

Table 9 presents the minimum site index by leading species or inventory type group, necessary for a stand to be considered eligible for inclusion in the timber harvesting land base.

Table 9. *Low site exclusions*^a

Leading species in the inventory type group	Minimum site index (SI=m @ 50 years)
Douglas-fir	9
Balsam	7
Spruce	7
Lodgepole pine	7
Aspen/cottonwood/birch	8

(a) Stands with a logging history will remain eligible for inclusion in the timber harvesting land base regardless of site index.

Data source and comments:

The Quesnel Forest District staff assessed the merchantability of naturally-regenerated and planted stands with site indices ranging from 5 to 14 metres based volume tables generated using the table interpolation for stand yields (TIPSY) model. The estimated feasibility of harvesting stands with specific site indices was assessed by reviewing factors including growth rate, and minimum volume and diameter produced over a 200-year growing period. The results of the assessment were minimum site index requirements by leading species for a number of inventory type groups.

6. Current Forest Management Assumptions

6.1 Harvesting

6.1.1 Utilization levels

The utilization level defines the maximum stump height, minimum top diameter inside bark (dib) and minimum diameter at breast height (dbh) by species and is used in the analysis to calculate merchantable volume. Utilization standards are described in Table 10.

Table 10. Utilization levels

Analysis unit	Utilization		
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
Sawlogs			
Pine	12.5	30	10
Other species	17.5	30	10
PFTs			
Pine species	7.5	20	5-7 ^a
Other species	12.5	20	7.0

(a) There are currently 294 000 cubic metres of timber to be harvested per year under the PFT licences, of which 121 000 cubic metres is scheduled to be harvested to a 5-cm top dib. The remaining 173 000 cubic metres will be harvested to a 7-cm top dib. The two major licensees who were awarded the latter volume have committed, as a condition of the award, to harvest their normal sawlog quota at the same utilization levels as stated under their PFT license. This represents an additional 670 898 cubic metres per year that is being utilized at the PFT level within the Quesnel TSA. Under the 121 000 cubic metres award, the licensee has elected to harvest only the pine to a 7.5 cm dbh and all other species will be harvested to a 12.5 cm dbh. This would represent only a small percentage of the total volume scheduled for harvest.

Data source and comments:

These levels, provided by the Quesnel Forest District staff reflect current utilization standards, licensee requirements and current performance.

The variable density yield prediction (VDYP) model being used to generate volume projections for this timber supply analysis is limited to a 10 cm minimum top dib.

6. Current Forest Management Assumptions

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. 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 volumes are shown in Table 11.

Table 11. Volume exclusions for mixed species types

Analysis units	Species	Volume exclusion (%)
Deciduous leading	All coniferous in deciduous leading	100
Conifer leading	All deciduous in conifer leading	100

Data source and comments:

The volume exclusions provided by the forest district are based on current practice.

6.1.3 Minimum harvestable age

Minimum harvestable ages reflect the time required for a stand to grow to a harvestable condition. They define the lower limit for harvesting. Harvesting may occur in stands at the minimum age to meet a harvest target for a short period of time, or avoid large and abrupt changes in harvest levels. However, in most cases, stands are not projected for harvest until after the minimum timber production ages because of management objectives for other resource values (e.g., requirements for the retention of older forest), or the objective to maintain reasonably consistent, as opposed to widely fluctuating, timber supply. Table 12 provides age at minimum volume per hectare considered harvestable criteria.

Table 12. Minimum harvestable age criteria

	Minimum volume per hectare considered harvestable provided utilization criteria in Table 10 are met (cubic metres/hectare)	Age at minimum volume per hectare considered harvestable
Sawlog analysis units	150	
PFT analysis unit	150	

Data source and comments:

Based on information provided by the forest district, stands will be considered eligible for harvesting at the age where they meet the minimum volume per hectare figures in Table 12, at the utilization criteria described in Table 10. Ages will be determined when the timber harvesting land base has been defined.

6. Current Forest Management Assumptions

6.1.4 Silviculture systems

Due to species composition of forests in the Quesnel TSA, even-aged silvicultural systems are predominant. Uneven-aged selection harvesting is practiced in fir-leading mule deer winter range (MDWR). MDWRs exist in all inventory type groups as listed in Table 4 (analysis units).

The *CCLUP Caribou Strategy*, CCLUPIR and zone adjustments of the interim *Eastern and Itcha Ilgachuz Caribou Strategy 1998 Update* describe how harvesting will take place in the near future. The silvicultural systems for MDWR and caribou areas are summarized in Tables 13a and 13b respectively.

Table 13a. Silviculture systems-mule deer winter range

Silvicultural system	Eligible analysis units or locations	Per cent (%) volume retention	Growth rate ^a	Time between entries (years)
Selection harvesting	Mule deer winter range — fir-leading (> 40%) moderate and high crown closure classes (once canopy closure requirements are met); age class 6 and greater; intent is to remove volume produced since last entry.	80% (fir only)	Based on 66% of normal selection harvest MAI estimated to be one cubic metre/hectare/year ^b	50
	Low crown closure areas, with fir > 40%, are managed through normal fir-leading IDF harvesting prescriptions. (For Baker Creek, Dragon — Australian, Nazko, and Upper Quesnel winter ranges the low crown closure target area is 0% as per the MDWR strategy — prescription is retention; no harvest).	50% (first entry)	Yield estimated to be one cubic metre/hectare/year.	30
Even-aged silvicultural system	No additional harvest restriction on pine harvest in pure pine or in mixed stands of < 40% fir.			

(a) Harvest level equals growth rate times the number of years between entries.

(b) The one cubic metre/hectare/year yield indicated was used for the Williams Lake TSA in the last TSR. For this TSR, the MAI will be reviewed using the Quesnel TSA growth and yield data.

Data source and comments:

Mule deer winter range (MDWR)

MDWR according to the *Mule Deer Winter Range Strategy* as modified by the CCLUPIR.

MDWR stands with less than 40% of fir are harvested applying even-aged silvicultural systems. WTPs are required in these MDWR harvest areas only.

6. Current Forest Management Assumptions

To ensure MDWRs have attained the required crown closure prior to initial harvest, the risk assessment contained in the mule deer strategy will be used to identify winter ranges at greatest risk of not meeting crown closure requirements, and to determine the delay (years) required prior to the first entry. For low risk areas, the delay is 0 years; for moderate 20 years; for high 40 years and for very high 50 years.

Table 13b. *Silviculture systems-caribou areas*

Management emphasis	Silvicultural system	Planned rotation (years)	Years between entries	Volume removal per entry
Itcha Ilgachuz caribou area — terrestrial lichen sites	Irregular group shelterwood	140	70	50% volume removal
Itcha Ilgachuz caribou area — arboreal lichen sites and Eastern caribou area	Partial cut	240	80	33% volume removal

Data source and comments:

Caribou habitat

Eastern and Itcha Ilgachuz caribou will be modelled in accordance with the *CCLUP Caribou Strategy*, CCLUPIR and zone adjustments of the interim *Eastern and Itcha Ilgachuz Caribou Strategy 1998 update*.

Timber harvesting will be restricted to one-third of the forested "modified" harvest area within a landscape unit during each entry.

As per CCLUPIR, once harvesting has occurred in a specific area of the modified harvest area, that area is assumed to contribute to the "mature" biodiversity targets.

The CCLUPIR provides for "up to 10%" salvage harvest in no-harvest areas. This harvest will not be modelled because location and characteristics of the timber are unknown. This information will be provided to the Chief Forester for his consideration.

6.2 Unsalvaged losses

Table 14 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 those volumes that will not be recovered or salvaged.

6. Current Forest Management Assumptions

Table 14. *Unsalvaged losses*

Analysis unit	Cause of loss	Annual unsalvaged loss(cubic metres per year)
All	Fire	1 861
All	Insects	15 000
All	Wind	7 800
	Total	24 661

Data source and comments:

The unsalvaged losses data in Table 14 has not been revised since the last TSR. A review conducted by the forest district and regional staff of unsalvaged losses data for other TSAs within and outside of the Cariboo Forest Region did not provide information regarding the certainty of the unsalvaged losses in the Quesnel TSA.

6.3 Silviculture

6.3.1 Regeneration activities in managed stands

Stands regenerated after 1959 and in the future 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 15 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. When this is the case, tables are produced for the different regeneration methods (each method by species combination) are then aggregated into one table.

6. Current Forest Management Assumptions

Table 15. *Regeneration assumptions by analysis unit*

Analysis unit	Analysis unit #	Regen delay (years)	Regen method	Per cent regen method (%)	Expected species	Per cent (expected composition %)	Initial density (stems/ha)	Density thinned (stem/ha)
Fd (poor, non-selection)	1	7	Natural	100	Fd/PI	70/30	2200	N/A
Fd (medium, non-selection)	2	2	Plant	100	Fd/PI	50/50	3600	2000
Fd (good, non-selection)	3	2	Plant	100	Fd/PI	60/40	2300	2000
Sx,Ba (poor)	4	2	Plant	100	Sx/PI	60/40	2000	N/A
Sx, Ba (medium)	5	2	Plant	100	Sx/PI/Ba	70/20/10	2500	N/A
Sx, Ba (good)	6	2	Plant	100	Sx/PI/Ba	70/20/10	3000	2000
PI (poor)	7	5	Plant/ Natural	50/50	PI/Sx	85/15	4000	2000
PI (medium)	8	4	Plant/ Natural	50/50	PI/Sx/Fd	80/15/5	4000	2000
PI (good)	9	2	Plant	100	PI/Sx/Fd	65/25/10	2700	2000
PFT (pine leading)	10	5	Plant/ Natural	40/60	PI/Sx/Fd	80/15/5	4000	2000
Deciduous leading (medium)	11	2	Natural	100	At/PI/Sx	50/30/20	5500	N/A
Deciduous leading (good)	12	2	Natural	100	At/PI/Sx	55/25/20	5100	N/A
Mule deer selection (> = 40% fir)	13	4	Plant/ Natural	75/25	Fd/Sx/PI	60/30/10	N/A	
Mule deer even-aged (< 40% fir)	14	2	Plant	100	Fd/PI	50/50	3600	2000

Data source and comments:

Regeneration assumptions provided by the Quesnel Forest District staff and are based on historic records and represent current and expected performance.

In Table 15 "expected species" is a result of planting and expected ingress.

6. Current Forest Management Assumptions

In constructing MSYTs in TIPSYS, the operational adjustment factor (OAF) 1 will be 15%, and the OAF 2 will be 5%. 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.

The selection harvesting analysis units do not have a regeneration delay. Density initial and density thinned numbers are averages for all sites by analysis unit and are not site-specific.

The majority of planting stock is one year old.

The Quesnel Forest District staff estimate that 100% of the spruce and 10% of Lodgepole pine seedlings will come from class A seedlots. Class A seedlots are seedlings with improved genetic worth and result in increased tree growth in the short- and medium-term. Ministry of Forests staff from Timber Supply and Tree Improvement Branches will collaborate to ascertain how the increased tree growth is represented in the managed stand yield curves used in the timber supply analysis.

6.3.2 Immature plantation history

The purpose of this section is to identify areas of existing immature forest where the density (stems per hectare) was controlled and which therefore should be assigned to a managed stand yield table (MSYT). Growth of all not satisfactorily restocked (NSR) and future clearcut harvested stands will be projected using MSYTs.

To clarify the types of management that will occur in harvested stands, the following assumptions were made:

- "managed" means that a new stand was established naturally or artificially, and density control was done at or near the free-growing stage, or the established stand had densities not exceeding the desired densities;
- stands created prior to 1959 were too old for density control and therefore will be modelled as natural rather than managed stands.

Managed stand yield tables will be used for existing stands outlined in Table 16 according to the rationale discussed under data source and comments.

Table 16. *Immature plantation history*

Analysis unit	Area managed (hectares or per cent)			
	Age 1-10	Age 11-20	Age 21-30	Age 31-40
Clearcut areas	100%	100%	100%	75%

Data source and comments:

Clearcut harvesting

Stands aged 1-10 years (logged since October 1, 1987) must by law be regenerated to defined stocking standards within acceptable time frames as defined in approved silviculture prescriptions (SPs).

6. Current Forest Management Assumptions

Stands aged 11-30 years have been closely monitored and many have received density control treatments since 1981. Others either have densities less than maximum density or are eligible for treatment under ongoing forest renewal enhanced forestry and backlog programs. It is assumed that all stands needing treatment will be treated within 20 years.

About 75% of stands aged 31-40 years are assumed to be managed. This is based on stands that have been treated or considered free growing according to historic records.

6.3.3 Selection harvesting

Natural stand yield curves will be used for areas logged with the selection system based on historical growth and yield data and professional judgment of MoF staff.

6.3.4 Not satisfactorily restocked (NSR) areas

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 is described in this section.

Forest district silvicultural records (MLSIS/ISIS) show 4698.4 hectares of backlog NSR (i.e., harvested prior to 1987) and 18 328 hectares of current NSR. In the analysis, NSR will be restocked in proportion to the current area of each analysis unit in stands younger than 20 years old, on the assumption that the overall distribution of harvest within analysis units has not changed significantly over the last 20 years. All backlog NSR will be restocked within 10 years. It is expected that 75% of this NSR will be restocked within the first 5 years and the remaining 25% in the last 5 years. Current NSR is assumed to regenerate within the regeneration delays provided in Table 15.

All NSR with a harvesting history is included in the timber harvesting land base.

The area classified as 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 will be assumed to have already been restocked and currently between 1 and 5 years old. This area will be assigned to analysis units in proportion to the distribution of analysis units by biogeoclimatic zone as the previous stand label is no longer available on the inventory file.

6.4 Integrated resource management

6.4.1 Objectives managed using forest cover requirements

This section describes analysis methods that will be used to represent management practices for integrated use, scenic areas, wildlife habitat and biodiversity. With the requirement to retain different forest characteristics across the landscape, it is important to identify the role of forest that does not contribute to the timber harvesting land base in achieving the forest cover requirements (i.e., maximum allowable disturbance or minimum area retention of mature or old forest).

6. Current Forest Management Assumptions

Green-up

Table 17 describes forest cover requirements for multiple use areas, scenic areas, Cariboo River management area and caribou habitat.

Table 17. Forest cover requirements

	Green-up height (metres)	Maximum allowable disturbance (% area)	Area of application
Multiple use areas	3	35%	Timber harvesting land base
Scenic areas (each known area has visual objectives specified)	3	5 to 15%	Forested area (includes timber harvesting land base and non-contributing forest areas)
Cariboo River Management Area	3	15%	Forested area
Itcha Ilgachuz Caribou area-terrestrial lichen sites	N/A	33% every 20 years	Forested "modified" harvest area within landscape unit
Itcha Ilgachuz Caribou area — arboreal lichen sites and Eastern Caribou area	N/A	33% every 20 years	Forested "modified" harvest area within landscape unit

Data source and comments:

All stand heights shown in Table 17 refer to top heights (inventory definition), not average stand height.

Quesnel Forest District staff indicate that the multiple use areas are generally large contiguous patches of harvestable forest and the maximum disturbance of 35% adequately describes the cutting pattern used at this time.

Visual objectives have been established for each known scenic area and those objectives in terms of maximum allowable disturbance will be modelled.

Forest cover requirements are established for the Caribou River management area to maintain moose habitat.

Eastern and Itcha Ilgachuz Caribou will be modelled in accordance with the *CCLUP Caribou Strategy*, CCLUPIR and zone adjustments of the interim *Eastern and Itcha Ilgachuz Caribou Strategy 1998 Update*. Full identification of the modified harvest areas should be completed by June 2000. Forest cover requirements are applied to restrict over-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 disperse the harvest activity within a caribou modified harvest area.

6. Current Forest Management Assumptions

Landscape-level biodiversity

The *CCLUP Biodiversity Conservation Strategy* provided draft biodiversity emphasis options and draft landscape unit boundaries for use in the regional landscape unit planning process. Table 7, page 40 of the strategy document provides seral stage definitions and forest cover target values. *Biodiversity Guidebook* seral stage targets for NDT4/IDF (Table 17, page 43 of the guidebook) were modified by separating fir and pine groups and revising targets consistent with local ecology (see Table 18b below).

The draft landscape units as altered by the CRLUPS and seral stage target draw-downs as defined by the CCLUPIR were referred to in the 1998 statutory decision makers letter which provided "landscape-level biodiversity" direction to licensees for the preparation of forest development plans. Since this "landscape-level biodiversity" direction reflected current management, it is also being used in development of the base case.

"Mature plus old" seral targets were applied in the CCLUPIR. The forest district is attempting to reach this target operationally; and it will therefore be included in the base case. As part of the analysis, it will be determined if this target is constraining on timber supply through sensitivity analysis.

The draft biodiversity emphasis objectives (as per CCLUPIR) of lower—, intermediate— or higher— set for each draft LU (as per the CRLUPS), and the full "old" draw-downs described in the CCLUPIR will be applied in the base case since they are considered current practice.

The following are the specific draw-downs for "old" as per the CCLUPIR:

Draw-down to 30% of residual "old" in the low emphasis LUs in the CCLUP Enhanced Resource Development Zone (ERDZ).

Draw-down to 50 % of residual "old" in the low emphasis LUs in the CCLUP Integrated Resource Management Zone (IRMZ).

Residual requirements are the portions of the total old-seral requirement recommended in the *Biodiversity Guidebook* not met by riparian, caribou or MDWR areas as per the CCLUPIR.

Where NDT-BEC units within a LU are split by CCLUP zones, the amount of "old" forest draw-down applied is calculated by prorating the above draw-downs according to the proportion of the NDT-BEC unit falling within each zone.

Tables 18a and 18b, show the LUs to which the draw-downs apply and the actual reduction in "old" targets.

The CCLUPIR also contains the assumption that there would not be a need for the draw-downs to be applied past the first rotation (100-years as per CCLUPIR) except in special circumstances. "Ramping-up" (or gradually increasing) of the "old" targets to the full value will be represented by turning on the "old" constraint at the start of the second rotation.

As per CCLUPIR, 25% of MDWRs are assumed to contribute to the old seral biodiversity target.

As per CCLUPIR, 25% of MDWRs are assumed to contribute to the mature seral biodiversity target.

6. Current Forest Management Assumptions

Table 18a. Applicability of "old" draw-downs by draft landscape units

Draft landscape unit	Draft biodiversity emphasis option (BEO)	CCLUP zone ^a	Draw-down (yes/no)
Eliguk	I (Intermediate)	S/PA	No
Pan	I	I/S/PA	No
Kluskus	I	I/S	No
Toil	L (Lower)	E/S	Yes
Chine	I	E/S/PA	No
Coglistiko	I	E/S	No
Downton	I	S/PA	No
Ahbau	L	E/S	Yes
Willow	L	E/S	Yes
Big Valley	L	E/S	Yes
Antler	I	E/S	No
Indianpoint	L	S/PA	No
Bowron	L	S/PA	No
Sandy	L	S/PA	No
Matthew	I	S/PA	No
Cunningham	L	S	No
Swift	L	E/S	Yes
Jack of Clubs	L	E/S	Yes
Lightning	L	E/S	Yes
Umiti	I	E	No
Victoria	H (Higher)	E	No
Gerimi	I	E	No
Baker	H	E	No
Narcosli	L	E	Yes
Twan	H	E	No
Dragon	I	E	No
Ramsey	L	E	Yes
Wentworth	L	E	Yes
Tibbles	L	E	Yes
Whittier	L	E/S	Yes
Pantage	I	E/S	No
Euchiniko	L	E/S/PA	Yes
Snaking	I	E	No
Marmot	L	E	Yes
Clisbako	I	E	No
Pelican	I	E/S/PA	No
Baezaeko	L	E/S/PA	Yes
Betty Wendle	N/A	PA	No

(a) S-special resource development zone; I-integrated resource management zone; E-enhanced resource development zone; PA-protected area.

Data source and comments:

This information was extracted for the *Cariboo Regional Landscape Unit Planning Strategy* (CRLUPS) utilizing information from the *CCLUP Integration Report* (CCLUPIR).

6. Current Forest Management Assumptions

Table 18b. Forest cover requirements for "old" landscape level-biodiversity target % by natural disturbance type (NDT) within low emphasis landscape units

NDT	BEC zone	Old-seral target (%)	Minimum retention target (residual "old" only ^a) %	
			50% draw-down (in IRMZ)	70% draw-down (in ERDZ)
NDT 1	ICH	13	6.5	3.9
	ESSF	19	9.5	5.7
NDT 2	ICH, ESSF	9	4.5	2.7
NDT 3	SBPS	7	3.5	2.1
	SBS	11	5.5	3.3
	MS	14	7.0	4.2
NDT 4	IDF-Fd group	21	11.5	6.3
	IDF-PI group	11	5.5	3.3

(a) "Residual old only" means that portion of the total old requirement recommended in the *Biodiversity Guidebook* that is not addressed by riparian, caribou or MDWR areas as per the CCLUPIR.

Data source and comments:

The values shown in Table 18b above reflect the *CCLUP Biodiversity Conservation Strategy* values (Table 7, page 40). The values are initially based on achieving 30% or 50% of the old-seral stage constraint in lower-emphasis LUs. Analysis will be required to determine the amount of Fd and PI in the draft Narcosli landscape unit for NDT 4 IDF as per the *CCLUP Biodiversity Conservation Strategy*, Table A5-3, page 159. Forest cover inventory type labels may require refinement or interpretation to determine the amounts of these groups in the Narcosli unit.

6.4.2 Reductions to reflect volume retention in cutblocks

Retention of volume within cutblocks may occur for a variety of forest management considerations. In the Quesnel TSA, volume is retained for WTPs, in riparian management zones (RMZ) and as part of partial cutting systems.

6. Current Forest Management Assumptions

Wildlife trees (WT) and wildlife tree patches (WTPs)

The *Biodiversity Guidebook* describes two methods for maintaining stand structure over time: WTs and WTPs. It is important to discuss the anticipated persistence of the particular method in different stand types. For instance, different silvicultural systems may provide the intended structural diversity through modifying the timing timber is available. Consideration should be given to whether the trees will ever be harvested and whether areas in riparian management zones (RMZ) are regularly being used to produce either WT or WTP. Recognizing the overlap between these two objectives will eliminate inappropriate reductions in the timber harvesting land base.

A district study determined that as of 1995, 9% of cutblocks were made up of wildlife tree patches (WTP). The study determined that of this 9%, 1% of the cutblock area in WTPs overlap with riparian reserve zones. Of the remaining 8% WTP area, 50% is assumed to be persistent and will be modelled as an area reduction, and 50% is assumed to be harvested and replaced in the second rotation. In this TSA, 95% of WTPs are larger than two hectares. WTPs will be modelled as a 4% reduction of productive forest area remaining after other deductions.

Riparian management zones and lakeshore management zones

As part of the stream, lake and wetland classification (see Section 5.2.9, "Riparian reserve zones") riparian management zones were also inventoried, and a GIS analysis was performed to estimate their area. Table 19 presents the riparian management zone reductions from the 54-mapsheet sample.

Table 19. Riparian management zone reductions on the 54 mapsheet sample

Riparian class and stream length (km)		Management zone ^a (metres)	Per cent area retained ^b (%)	Area in management zone (hectares)
S1 > 20 metres	143.62	20	50	287.24
S2	242.5	20	50	485.00
S3	1 202.1	20	50	2 404.20
S4	5 498.9	30	25	8 248.35
S5	42.4	30	25	63.60
S6	2 038.4	20	5	407.68
Total				11 896.07

(a) To account for both sides of stream this width is multiplied by 2.

(b) Per cent area retained was estimated from current practice as outlined in forest development plans.

6. Current Forest Management Assumptions

Within the 54 mapsheets the total area occupied by riparian management zones is 11 896.1 hectares, and the average area per mapsheet is 220.3 hectares. Assuming each map has an area of 15 000 hectares, riparian management zones comprise 1.47% of land base. After accounting for area not managed by the forest service and non-productive forest, the estimate was revised to 1.42%.

In the timber supply analysis, riparian management zones will be accounted for by reducing the productive forest by 1.42%.

Within the non-standard inventory file, Class A lakes have been labelled and have buffers for the lakeshore management zone. Reductions for the lakeshore management zones will be performed as part of the timber supply analysis. Buffers were applied as per the interim direction for Class A lakes.

7. Sensitivity Analyses

Sensitivity analysis provides a measure of the timber supply impact 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 20 shows issues that are particular to the Quesnel TSA. Table 21 lists standard sensitivity analyses.

Table 20. Sensitivity issues specific to the Quesnel TSA

Issue to be tested	Sensitivity levels
Deciduous-leading contribution to non-timber constraints	No harvest of deciduous-leading stands.
Goal 2 protected areas	Remove areas from the timber harvesting land base (modelled as in the land base for the base case).
Contribution to the timber harvesting land base of Kluskus timber supply block	Deduct from timber harvesting land base.
Landscape-level biodiversity	Weighted (45/45/10 low/intermediate/high) versus draft biodiversity emphasis options as modified by CCLUPIR. Full <i>Biodiversity Guidebook</i> seral stage percentages; no application of the draw-downs provided for in the CCLUPIR. No "mature plus old" targets, as applied in base case
Site index estimate for regenerated stands	Apply OGSi adjustments. Apply SIBEC adjustments.
OAF 1	Apply OAF1 of 10% (15% in base case).
Green-up height	2 metres and 4 metres (3 metres in base case).

7. Sensitivity Analyses

Table 21. *Standard sensitivity analysis*

Issue to be tested	Sensitivity levels
Existing stand yields	+/- 10%
Regenerated stand yields (non-selection)	+/- 10%
Minimum harvestable age	+/- 25 m ³ in minimum volume threshold
Land base (timber harvesting land base) changes	+/- 5%
Visual quality objectives	Lower and higher end of visual quality objective ranges for per cent disturbance.
Green-up periods	+/- 5 years
Multiple use zone	+/- 10% on the maximum per cent area below green-up age. Find level at which short-term timber supply is affected.
Regeneration delay	Increase and reduce by 2 years.