Lakes Timber Supply Area
Timber Supply Review

Updated Data Package
following completion of the
timber supply analysis

June 2010

District Manager
Nadina Forest District

Acting Director
Forest Analysis and Inventory Branch

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1. Introduction

This data package supplies the basic inputs required for the Lakes Timber Supply Area (TSA) timber supply analysis.

Information and comments for inclusion in this data package was requested from those First Nations whose asserted rights and title may be potentially affected: Burns Lake Band, Cheslatta Carrier Nation, Nee Tahi Buhn Band, Office of the Wet'suwet'en, Skin Tyee Band, Lake Babine Nation, Nadleh Whut'en Band, Stellat'en First Nation, Tl'azt'en First Nation, Ulkatcho First Nation, Wet'suwet'en First Nation and Yekooche First Nation.

Technical information was also gathered from the major forest licences operating in the Lakes TSA. This input was useful in defining current management practices and identifying assumptions for which uncertainties are present. Sensitivity analyses will be used to assess the impact of the uncertainties.

The data package contains those inputs that are part of current practices for the TSA. For the purpose of the timber supply review, "current practices" 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 for the review and approval of forest stewardship plans;
- fully implemented land-use plans;
- land-use decisions approved by Cabinet; and
- other approved BC Ministry of Forests and Range (MFR) 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:

- a short explanation of the data needed to properly fill out the data table;
- data table; and
- area for comments and the source of the data.

The information in this data package represents the best available knowledge at the time of publication, but is subject to change. A public review period has been established to allow submission of comments and concerns about the data package to the MFR. Submissions and new information made available prior to the analysis may lead to changes in the data listed in this package.

Until the timber harvesting land base (THLB) is determined, it is not possible to finalize the values shown in some of the tables in this document. Where the final value is not yet available, the applicable columns are shaded grey. In addition, should any major changes in management practices occur during the next few months, the timber supply analysis will attempt to capture them. The final timber supply analysis report will include a technical appendix that highlights any changes made to this data package.

2. Current Forest Management Considerations and Issues

2.1 Base case management assumptions

These assumptions reflect current performance with respect to the status of forest land, forest management practices and knowledge of timber growth and yield. The harvest forecast developed from these assumptions is termed the base case harvest forecast and is used as a baseline for assessing the impacts of uncertainties. Section 7, "Sensitivity Analyses" identifies areas of uncertainty in the data and assumptions and outlines intended sensitivity analyses.

2.2 Major forest management considerations and issues

Table 1 lists major forest management issues and considerations. Where possible, the issues will be assessed directly in the timber supply analysis. If the issue does not fall within the definition of current management as described in Section 1, "Introduction", the related timber supply impacts will be assessed in a sensitivity analysis. There may be significant uncertainties in defining some current management issues. In such cases, sensitivity analysis can assist in assessing the timber supply implications and assigning degrees of risk to timber supply during allowable annual cut (AAC) determination.

Table 1. Major forest management considerations — listed alphabetically

Consideration/issue	Description
Forest health	The Lakes TSA is experiencing an unprecedented level of mountain pine beetle infestation. It is estimated that about 76% of the pine trees have already been killed and the cumulative mortality is expected to peak at 81% by 2015. The British Columbia Mountain Pine Beetle (BCMPB) Version 5 model will be utilized to account for current pine mortality and to predict future mortality.
	There are also forest health issues such as rust and mountain pine beetle in younger forest stands. These factors will be accounted for based on data collected locally.
Mid-term timber supply	The protection of secondary stand structure, the fertilization of suitable stands, and the prioritization of attacked pine stands for harvest are important forest management considerations in the TSA to mitigate the impact of the MPB on mid-term timber supply.
	The protection of secondary stand structure is now required under the Forest Regulations. Since it is not possible to identify secondary stand structure from the forest inventory, this will not be modeled but will be assumed to occur operationally. Fertilization of suitable stands will be tested in a sensitivity analysis. Harvest priorities is discussed under Section 6.1.4.
	The efficacy of a partition to ensure non-pine timber types are harvested at sustainable levels will be assessed during the analysis.
Shelf life	The length of time dead pine stands remain commercially viable for sawlog production is unknown. In the Lakes TSA, stands killed 6 to 10 years ago are still transformed into lumber and licensees indicate that 70% of the timber in these stands is of sawlog quality.
	There are several studies in progress to clarify shelf life. Shelf life will be modelled on a potential sliding scale to estimate impacts on timber supply. This information on shelf life may allow the chief forester to establish a partition for dead pine.
Stand and landscape–level biodiversity	The targets associated with the objectives of the Lakes South and Lakes North Sustainable Resource Management Plans (SRMP) will be modelled for those landscape units included in the plans.
Timber harvesting land base	Since the last AAC determination, the THLB changed due to the establishment of old-growth management areas, and changes in area based tenures (community forests and woodlots).

3. Inventories

3.1 Background information

Table 2 lists the inventories that will be used to define the THLB, areas where specific forest management activities are currently applied, and areas where specific forest resource objectives must be accounted for.

Table 2. Inventory information

Data	Source	File name
Area-based tenures	LRDW (MFR)	WHSE_FOREST_TENURE.FTEN_MANAGED_LICENCE_POLY
Biogeclimatic zones	LRDW (MFR)	WHSE_FOREST_VEGETATION.BEC_BIOGEOCLIMATIC_POLY
Chelaslie caribou migration corridor	MFR (Nadina)	Caribou_MigrationCorridor
Deer winter habitat	MFR (Nadina)	LakesTSA_Deer
Environmentally sensitive areas	MFR	Lakes_ESA_Wildlife
Forest cover openings	LRDW (MFR)	Various (RESULTS, FTA, VRI)
Grizzly bear habitat	MFR (Nadina)	LakesTSA_Grizzly
Lakes North old growth management areas	ILMB (Skeena)	WHSE_LAND_USE_PLANNING.RMP_OGMA_LEGAL
Lakes North connectivity corridors	ILMB (Skeena)	bensv2_lnsrmp
Lakes South connectivity corridors	MFR (Nadina)	LakesSouth_Corridors
Lakes South old growth management areas	LRDW (ILMB)	WHSE_LAND_USE_PLANNING.RMP_OGMA_LEGAL_CURRENT_SVW
Landscape units	LRDW (ILMB)	WHSE_LAND_USE_PLANNING.RMP_LANDSCAPE_UNIT_POLY
Mineral/wildlife management resource management zone	MFR (Nadina)	MWM_RMZ
Moose winter habitat	MOE (Skeena)	LakesTSA_Moose
Mountain goat draft ungulate winter range	MOE (Skeena)	LakesTSA_Goats
Ownership	MFR (Nadina)	IR_BC_Polyon and DND_PrivateLand
Predictive ecosystem mapping	IFPA	pemdec
Protected areas	LRDW (MOE)	WHSE_PARKS.PA_PROTECTED_AREA_POLY

(continued)

Table 2. Inventory information (concluded)

Data	Source	File name
Riparian reserves and riparian management zones	MFR (Nadina)	IFPA_RMZ_DLA
Roads	MFR (Nadina)	RoadWidths
Takla caribou draft ungulate winter range	MOE (Skeena)	Lakes_Takla_Caribou
Vegetation resource inventory	LRDW (MFR)	WHSE_FOREST_VEGETATION. VEG
Visual landscape Inventory	MFR – NIFR	Lakes_Visuals

Data source and comments:

Area-based tenures: The area associated with woodlot tenures and with the community forest tenures (Burns Lake Community Forest and Cheslatta-Carrier Nation Community Forest) will be removed from the timber harvesting land base (THLB).

Biogeoclimatic zones: Together with landscape units and landscape units biodiversity emphasis options, the biogeoclimatic zones will be used to account for seral stage requirements and for wildlife tree retention requirements (Lakes South).

Chelaslie caribou migration corridor: The *Lakes South Sustainable Resource Management Plan (SRMP)* specifies seral stage distribution targets for the Cheslaslie Caribou Migration Corridor. This data file was created in the late 1990's.

Deer winter habitat: In the Lakes TSA, deer winter habitat — mapped in the early 1990's — is typically associated with steep south facing slopes which have shallow snow accumulations and which become snow-free in early spring. Specific forest cover requirements apply for deer winter habitat.

Environmentally sensitive areas: Areas identified as being significantly valuable for wildlife will be removed from the THLB.

Forest cover openings: Various sources of information will be used to account for harvesting that has occurred since the last VRI disturbance update. These include RESULTS, FTA, and the vegetation resource inventory.

Grizzly bear habitat: High value grizzly bear habitat mapping exists for Klaytahnkut Lake and the Sutherland River drainage areas. Forest cover requirements derived from the *Kalytahnkut, Tildesly Riparian Zone Timber Harvesting Guidelines (1990)* and from the *Notice – Indicators of the Amount, Distribution and Attributes of Wildlife Habitat Required for the Survival of Species at Risk in the Nadina Forest District* will be modelled.

Lakes North old growth management areas: Through the *Lakes North Sustainable Resource Management Plan* (SRMP) process, old growth management areas (OGMA) have been identified for the northern portion of the Lakes TSA. These OGMAs will be removed from the THLB.

Lakes North connectivity corridors: The *Lakes North SRMP* includes an objective aimed at maintaining habitat connectivity.

Lakes South connectivity corridors: The *Lakes South SRMP*, approved in 2003, includes a land use objective for habitat connectivity. The forest management requirements that apply to these corridors will be modelled as part of the base case.

Lakes South old growth management areas: Spatial old growth management areas (OGMAs) were legally established for the southern portion of the Lakes TSA in 2007. These areas will be removed from the timber harvesting land base.

3. Inventories

Landscape units: Landscape unit boundaries and their associated biodiversity emphasis options will be used to account for seral stages forest cover requirements. They will also be used to account for wildlife tree retention requirements. The table below lists the landscape units that are part of the Lakes South SRMP and of the Lakes North SRMP:

Landscape units in the Lakes South SRMP	Landscape units in the Lakes North SRMP
Cheslatta	Babine East
Chelaslie	Babine West
François East	Bulkley
François West	Burns Lake East
Intata	Burns Lake West
Ootsa	Fleming
	Taltapin

Mineral/wildlife management resource management zone: As per the *Order Establishing Resource Management Zones and Resource Management Zone Objectives for the Lakes District (2000)*, commercial timber harvesting is not permitted in this zone. This zone will be removed from the THLB.

Moose winter habitat: In the Lakes TSA, moose habitat — mapped in the early 1990's — is typically associated with lowland riparian areas where forage is available even under severe winter conditions. Specific forest cover requirements apply for moose winter habitat.

Mountain goat winter habitat: Forest cover requirements associated with the general wildlife measures identified in *the Proposed Order (Draft) for Ungulate Winter Range #U-006-017 Mountain Goat Winter Range within the Lakes TSA (2008)* will be modelled through a sensitivity analysis.

Ownership: Land areas corresponding to private lands, Indian Reserves, federal reserves and such will be removed from the THLB.

Predictive ecosystem mapping: In 2004, the Morice and Lakes Innovative Forest Practices Agreement (IFPA) undertook a predictive ecosystem mapping (PEM) project. The accuracy of the project was improved in 2007, and consequently, the Lakes TSA PEM meets accuracy requirements for timber supply analysis. The PEM will be used for growth and yield estimates and for an objective related to the Lakes North SRMP.

Protected areas: The following protected areas will be removed from the timber harvesting land base:

Babine Lake Marine Park	Sutherland River Park
Burns Lake Park	Tweedsmuir Corridor Protected Area
Dead Man's Island Park	Tweedsmuir Park (North)
Entiako Park	Uncha Mountains Red Hills Park
Ethel F. Wilson Memorial Park	Wisteria Park

Riparian reserves and riparian management zones: A GIS buffer was created (2008) to estimate the area that will be managed as riparian reserve zones and the area managed as riparian management zones. Specific forest cover requirements apply to these riparian areas.

Roads: A GIS buffer (roadwidths) was created (2008) to estimate the area of THLB occupied by roads in the Lakes TSA.

3. Inventories

Takla Caribou draft ungulate winter range: Forest cover requirements associated with the general wildlife measures identified in the *Northern Caribou Ungulate Winter Range Proposal – Takla Herd (2008)* will be modelled through a sensitivity analysis.

Vegetation resource inventory: Based on a sampling project (VRI Phase II) conducted in 2006 and 2007, growth and yield inventory attributes for the Lakes TSA have been adjusted. This updated information will used in the timber supply analysis.

Visual landscape inventory: A visual landscape inventory (VLI) has been completed for all scenic areas, and updated by the regional visual specialist in 2008. This VLI will be used to model the forest cover requirements associated with visual landscape management.

A sensitivity analysis will be conducted to test the sensitivity of the timber supply to variations in scenic areas and visual quality objectives. These variations represent the intent of the *Lakes District Land and Resource Management Plan* (LRMP) and reflect changes to the VLI that will require approval under the Government Action Regulation (GAR). The process associated with GAR will be undertaken in 2009.

4. Division of the Area into Management Zones

4.1 Management zones and multiple objectives

Management zones are used to differentiate areas with distinct management emphasis. For example, a zone may be based on a harvesting or silviculture system, visual quality objective or wildlife consideration. Sometimes, an area of forest is subject to more than one management objective. Areas subject to each objective will be placed into a management zone appropriate for the specific situation. Forest land that is unavailable for timber harvesting will contribute to meeting objectives for other forest values.

Table 3 outlines the zones or objectives to be incorporated into the timber supply model. Further information on the forest cover requirements to be applied to these areas can be found in Section 6.4, "Integrated resource management."

Table 3. Objectives to be tracked

Objectives	Function
Landscape corridors	Landscape corridors have been established through the Lakes South SRMP and Lakes North SRMP to provide habitat connectivity and to permit movement and dispersal of plants and animal species. There are specific targets that apply to the corridors.
Management of non-timber objectives, other than visual quality	The integrated management of forest values requires the application of forest cover requirements. These requirements are derived from existing legislation and land use objectives. Most of these requirements apply to the crown forested area. Some, such as ungulate habitat targets, apply to the timber harvesting land base.
Seral stage distribution	Targets for seral stage distribution have been established for the Lakes TSA through the Lakes South SRMP and the Lakes North SRMP. These targets apply at the landscape unit level based on biogeoclimatic zone/variant and biodiversity emphasis option.
Species at risk habitat	Specific forest cover constraints apply in areas identified as critical habitat for grizzly bear.
Ungulate winter habitat	Forest cover constraints apply in areas identified as critical winter habitat for moose and deer.
Visual quality	Areas identified as visually sensitive, and established as scenic areas, require varying percentage of forest cover retention based on their associated visual quality class. The visual requirements apply to the crown forested area within a scenic area.
Volume retention in riparian management zone (RMZ)	For some riparian features, a proportion of the volume present in riparian management zone will be retained to meet riparian management objectives. The reduction will be applied to the crown forested portion of the RMZ.

4.2 Analysis units

An analysis unit represents a combination of stands that grow or are treated similarly. For this analysis, each analysis unit is composed of groups of forest stands that have similar tree species composition (as indicated by the inventory type group) and similar timber growing capability (as indicated by the site index in the PEM file). Each analysis unit is assigned its own timber volume projections (yield tables) for existing and future stands.

Yield tables for existing natural stands will be derived using the variable density yield projection (VDYP) model. Yield tables for recently established plantations and future stands will be developed using the table interpolation program for stand yields (TIPSY).

4. Division of the Area into Management Zones

Table 4 Definition of analysis units

Analysis unit	Species	Inventory type groups	Site quality	Age class
	F, B (Douglas-fir and Balsam)	1, 4, 5, 8, 18-20	All	0 -140
	F, B (Douglas-fir and Balsam)	1, 4, 5, 8, 18-20	All	141 +
	S (Spruce)	21-26	Good	All
	S (Spruce)	21-26	Medium	0-140
	S (Spruce)	21-26	Medium	141 +
	S (Spruce)	21-26	Poor	0 - 250
	S (Spruce)	21-26	Poor	251 +
	Pl (Pure Pine)	28	Good	All
	Pl (Pure Pine)	28	Medium	All
	Pl (Pure Pine)	28	Poor	All
	Pl (with F, B)	29-31	Good	All
	Pl (with F, B)	29-31	Medium	All
	Pl (with F, B)	29-31	Poor	All

Data source and comments:

Douglas-fir and balsam stands were grouped because of the small area occupied by these species in the Lakes TSA. The site index range for the various site quality class will be determined by the timber supply analyst.

In the model, stands outside of the THLB in the SBS will be considered dead after they reach 250 years of age and will be assumed to regenerate naturally with a 40-year regeneration delay. Stands outside of the THLB in the ESSF will be killed once they reach 350 years of age and will be assumed to be regenerated as 21-year old natural stands.

Pine stands that have been dead for more than 35 years will be regenerated to a 15-year old stand.

5. Timber Harvesting Land Base Definition

5.1 Identification and classification of the timber harvesting land base

This part of the data package outlines the steps used to identify the Crown forested land base and the timber harvesting land base (THLB). The Crown forested land base consists of provincial Crown land with forest cover that is managed by the BC Forest Service for TSA timber supply. The Crown forested land base excludes

- community forests;
- tree farm licences;
- woodlot licences; and
- private lands.

The THLB is that portion of the Crown forested land base that is available for timber harvesting. The THLB excludes:

- parks and protected areas;
- areas that are not suitable for timber production; and
- areas where timber harvesting is incompatible with management objectives for other resource values.

Land is considered outside the THLB only where no harvesting is anticipated to occur. Any area in which some timber harvesting will occur will remain in the THLB, even if the area will be subject to other management objectives, such as wildlife habitat and biodiversity. Such objectives will be modelled in the timber supply analysis. The Crown forested land base outside of the THLB will contribute to these other objectives.

Land may also be added to the THLB by:

- management activities that improve productivity or operability (e.g., the stocking of land currently classified as non-commercial brush with commercial tree species);
- the acquisition of productive forest land (e.g., timber licence reversions).

After identifying all areas that are not part of the THLB, any additional lands are added to the THLB. The result defines the current timber harvesting land base

5.2 Details on land base classification

5.2.1 Land not administered by the MFR for timber supply purposes

Only crown land in a forest management unit and miscellaneous reserves respectively, contribute to timber supply.

Areas under woodlot and community forest licences are administered separately. The area, and the corresponding allowable annual cut, corresponding to woodlot (crown land portion = 25060.6 hectares) and community forest tenures is excluded from the analysis. Since the last analysis, new woodlots licences have been issued, as well as a new community forest agreement (Burns Lake Community Forest).

Also excluded from the timber harvesting land base are areas corresponding to established old growth management areas, the mineral/wildlife management resource management zone, and parks and protected areas.

5.2.2 Land classified as non-forest

Areas with projected type identity 6 are non-forest or non-productive forest areas, and areas with projected type identity 8 have no typing available. These categories include alpine areas, lakes, rocks, and ice which do not contribute to timber supply.

5.2.3 Non-commercial cover

Areas with projected type identity 5 are occupied by non-commercial brush. These areas are considered to be unlikely sites for timber production and are excluded from the area considered available for timber harvesting.

5.2.4 Environmentally sensitive areas

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

Environmental sensitivity may reduce or preclude harvesting on identified sites, which can be accounted for through percent area reductions or specific evaluation of individual ESA polygons for harvesting opportunity.

With the exception of the wildlife category, ESA categories in the Lakes TSA overlap areas that are unavailable for harvest (e.g. parks, OGMAs) or are constrained for other values (e.g. visual management, connectivity corridors, riparian buffers). Therefore, only ESA categories associated with wildlife will be removed from the timber harvesting land base.

5.2.5 Inoperable areas

Operability codes are generally based on the presence or absence of physical barriers or limitations to harvesting and the merchantability of stands. Given the relatively easy terrain in the Lakes TSA, no areas are classified as inoperable due to terrain.

5.2.6 Sites with low timber growing potential

Sites may have low productivity either because of inherent site factors (nutrient availability, exposure, excessive moisture, etc.), or because they are not fully occupied by commercial tree species. Typically, these stands are intermixed with other stands within the forested land base. As these stands are not considered to be harvestable, they need to be identified and removed from the timber harvesting land base.

Table 5. Description of sites with low timber growing potential

Zone/group	Inventory type group	Leading species	Characteristics			
			Age ≥ (years)	Volume < (m^3/ha)	Site index (m)	Reduction %
ESSF	1-8	Douglas-fir	250	140	8.9	100%
	18-20	Balsam	250	140	5.0	100%
	21-26	Spruce	250	140	5.0	100%
	28-31	Pine	250	140	6.2	100%
SBS	1-8	Douglas-fir	140	140	11.0	100%
	18-20	Balsam	140	140	7.0	100%
	21-26	Spruce	140	140	7.1	100%
	28-31	Pine	140	140	8.7	100%

Data source and comments:

The volume criteria shown in this table reflect the minimum volume a stand must have to be productive enough to be currently considered for forest management. Stands must achieve the minimum volume by the time they reach ‘old growth’ status to be considered productive.

This netdown apply to areas outside of existing cutblocks.

5. Timber Harvesting Land Base Definition

5.2.7 Problem forest types

Problem forest types are stands that are physically operable and exceed low site criteria yet are not currently utilized or have marginal merchantability. These types are wholly or partially excluded from the timber harvesting land base.

Table 6. Problem forest types criteria

Description	Inventory type group	Age (years)	Reduction per cent (%)
Deciduous	35 – 42	All	100
Old Balsam-leading stands	18 – 20	250 +	100

Data source and comments:

Deciduous-leading stands are not currently being harvested. Additionally, due to their high decay incidence, old balsam-leading stands are not being utilized.

5.2.8 Roads, trails and landings

Separate estimates are made reflect the loss in productive forest land due to existing and future roads, trails and landings (RTL). Existing RTL estimates are applied as reductions to the current productive forest considered available for harvesting. Future RTL reductions are applied after stands are harvested for the first time in the simulation model.

Table 7. Estimates for existing and future roads, trails, and landings

Existing and future roads and trails	Road width (m)	Reduction %
Highways (Highway 16 + 35)	60	100
Secondary highways (graveled)	30	100
Forestry mainlines	30	100
Operational roads (e.g. branch)	18	100
In-block roads	10	100

Data source and comments:

Forestry mainlines are main arteries that provide access to a given geographic area. Examples of forestry mainlines in the Lakes TSA include the Augier, Maxan, Deerhorn, Ootsanee and the Marilla.

Operational roads typically branch off a mainline and lead to one or more cutblocks.

In-blocks roads are those roads sometimes referred to as ‘spur’. They are wholly contained within a cutblock and are not expected to continue outside the cutblock in the future.

A GIS buffering process was used to calculate current road network reductions. The road widths used correspond to the clearing widths used in the TSA and is based on estimates provided by MFR engineering staff and licensee staff.

Wood processing now occurs at roadside rather than on landings. Therefore, specific reductions will not be applied to account for landings.

5.2.9 Wildlife habitat reductions

In the *Managed Identified Wildlife Guidebook*, management prescriptions include core "no harvesting" areas around nesting sites or other valuable habitats for endangered species. Where these have been specifically identified geographically, they should be addressed for consideration in the determination of the timber harvesting land base.

Data source and comments:

Reductions associated with wildlife habitats are accounted for under Section 6.4.1, Forest Cover Requirements.

5.2.10 Cultural heritage resource reductions

Cultural heritage resources are continually being noted and documented throughout the Lakes TSA. They are generally accounted for through riparian, wildlife tree patch or other removals from the timber harvesting land base. The magnitude of this assumption may change as the extent of cultural heritage resources and their impact on timber harvesting activities becomes better understood.

5.2.11 Riparian management areas

Table 8 lists the area reductions that will be applied to account for riparian reserves zones and riparian management zones along streams and around lakes and wetlands.

Table 8. Riparian reserve zones and riparian management zones

Stream class	Description	Riparian reserve zone (m)	Riparian management zone (m)	Total RMA width (m)	% Reduction
S1	Fish stream, width > 20m	50	20	70	75%
S2	Fish stream, width > 5m	30	20	50	65%
S3	Fish stream, with >1.5 m	20	20	40	56%
L1B	Lake between 5 – 1000 ha	10	0	10	100%
W1	Wetland >5 ha	10	40	50	26%
W5	Complex of wetlands	10	40	50	26%

Data source and comments:

Reductions to the timber harvesting land base will only be applied for those classes of riparian areas that require a riparian reserve zone (RRZ) and a riparian management zone (RMZ). Reductions will not be applied for riparian classes where a riparian reserve zone is not required (e.g. S4 streams) as current practices in these riparian areas mainly consist in retaining non-merchantable conifer trees, deciduous trees, shrubs, and herbaceous vegetation within 10 metres of the channel or edge.

The current management practice is to retain 100% of the vegetation in areas designated as riparian reserve zones. Approved Forest Stewardship Plans (FSP), indicate that a minimum of 5 to 20% of the RMZ will be retained along streams where a RRZ is required. For lakes and wetlands where a RRZ is required, these plans indicate that a minimum of 3 to 17% of the RMZ will be retained.

To accommodate for modelling requirements, an area weighted netdown is applied to account for reductions associated with RRZ and RMZ requirements. The area weighted netdown is based on approved FSP commitments prorated to existing AAC apportionment.

6. Current Forest Management Assumptions

6.1 Harvesting

6.1.1 Utilization levels

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

Table 9. Utilization levels

Analysis unit	Minimum diameter at DBH (cm)	Maximum stump height (cm)	Minimum top dib (cm)
Lodgepole pine	12.5	30.0	10.0
Balsam	17.5	30.0	10.0
Spruce	15	30.0	10.0

Data source and comments:

Table 9 reflects the current practices of licensees in the Lakes TSA.

6.1.2 Volume exclusions for mixed-species stands

One or more species in mixed-species stands may be unmerchantable. For example, the deciduous species in a predominantly coniferous stand may not be harvested, or may only be partially harvested. The unharvested portion should not contribute to the estimated stand volume.

Table 10. Volume exclusions for mixed-species types

Inventory type group	Species	Volume exclusion (%)
All coniferous leading	Deciduous	100

Data source and comments:

In practice, deciduous-leading stands are not harvested in the Lakes TSA and are thus excluded from the land base. Deciduous volume within conifers-leading stands is also not harvested as a rule. Therefore, deciduous volume within coniferous stands will also be excluded from yield tables used in the analysis.

6.1.3 Minimum harvestable volume/age derivation

The minimum harvestable volume is the amount required for a stand to grow to a harvestable size. While harvesting may occur in stands at the minimum volume to meet forest level objectives (e.g. maintaining overall harvest levels for a short period of time or avoiding large changes in harvest levels), most stands will not be harvested until past the minimum volume because of management objectives for other resource values. Table 11 shows the criterion to be used in deriving minimum harvestable volume.

Table 11. Minimum harvestable volume criteria

Species	Minimum volume criteria (m^3/ha)
All species	140

Data source and comments:

A review of current practice confirms that stands above the threshold volume identified in Table 11 are considered for harvest.

6.1.4 Harvest scheduling priorities and salvage scenarios

For various reasons, it may be important to set priorities or minimum harvest levels on certain management zones or analysis units to reflect insect infestations, salvage operations or similar forest management activity.

The table below shows various scenarios that will be analysed with regards to the mountain pine beetle outbreak. These scenarios represent a different approach to timber supply modelling. With this approach, the first 20 years of the planning horizon will be modelled in greater details than in previous analyses. The projected spread of the MPB and harvesting will be tracked on an annual basis.

The scenarios also take into consideration the draft management strategies developed by Nadina Mid-Term Timber Supply Mitigation Team. The strategy recommends the following:

- Direct harvest of the existing AAC to pine stands and/or pine species. For the Lakes TSA, it is anticipated that 70% of the total harvest will be from pine trees for the 2008-2015 period;
- Operationally retain stands that have a suitable secondary structure component; and
- Develop monitoring procedures for harvesting performance.

Given the scope of the mountain pine beetle outbreak in the Lakes TSA, and given the amount of non-recoverable losses, scenarios analyzing timber supply from dead pines are also presented below.

Table 12. Priorities for scheduling the harvest and salvage scenarios

Scenario*	Description/assumptions
Non-pine	Maintaining — for the entire planning horizon — the highest sustainable harvest level from non-pine stands. Priority for harvest is to be given to stands with the highest volume.
Live pine	Maximize harvest from live pine stands for as long as possible. Priority for harvest is to be given to stands with the highest volume.
< 5 years grey pine	Maximize harvest from pine stands that have been dead for up to 5 years. Priority for harvest is to be given to stands with the highest volume.
5-10 years grey pine	Maximize harvest from pine stands that have been dead for 5 to 10 years. Priority for harvest is to be given to stands with the highest volume.
> 10 years grey pine	Maximize harvest from pine stands that have been dead for more than 10 years. Priority for harvest is to be given to stands with the highest volume.
> 60% pine	Harvest stands with a minimum of 60% content pine first: Priority to stands with highest volume; No more than 30% of total harvest from non-pine stands until 2015; Defer pine-leading stands with less than 200 m^3/ha from harvest until 2020; Maintain — for the entire planning horizon — the highest sustainable harvest level from stands with less than 60% pine content.

(*) Different scenarios may be analysed by the timber supply analyst.

Shelf life

This TSR will use the latest version of the provincial BC MPB model to project the spread of the MPB in the Lakes TSA. The forecast produced by the model will indicate the "years since attack" on each stand.

The grouping of "years since attack" and breakdowns of sawlogs versus other wood products in Table 13 has been proposed by the major forest licensees operating in the Lakes TSA. The grouping for time since attack is similar to what is proposed above and the analyst may decide to incorporate additional grouping. Once the timber supply analysis is completed, the volume available in each category of wood products will computed.

Table 13. Percentage of sawlogs versus other wood product by year since attack

Years since attack	Sawlog %	Other wood product %
1 to 5 yrs	85	15
6 to 10 yrs	70	30
11 to 15 yrs	50	50
16 to 20 yrs	30	70
> 20 yrs	0	100

Although there is a general consensus that once pine trees have fallen over they no longer contribute to timber supply, there is still uncertainty with respect to when attacked trees actually begin to fall over, which is believed to be closely related to local soil moisture conditions. The base case assumption will be that trees begin to fall over 35 years after initial attack and a sensitivity analysis will examine the implications of using 15 years to falldown.

6.1.5 Logging method

The purpose of this section is to describe the logging methods used in the TSA. There is no timber supply modelling assumptions related to Table 14.

Table 14. Logging method

Zone or analysis unit	Logging method	Volume of wood (m^3 OR percent of annual harvest (*rounded to the nearest percentage)
All	Conventional	100%*

6.1.6 Silvicultural systems

Clearcut with reserves is the predominant silvicultural system in use in the Lakes TSA. Under this system, a range of patch sizes (one hectare to several hundreds of hectares) of even-aged forest is being produced. Cutting of adjacent blocks is restricted until green-up conditions are met. A characteristic of this system is the maintenance of older forest remnants within harvest blocks. These remnants are intended to function as wildlife tree patches, riparian reserves and management zones, and island remnants to conserve old-growth characteristics.

6. Current Forest Management Assumptions

6.2. Unsalvaged losses

Table 15 shows the estimate of average annual unsalvaged volume loss to epidemics caused by insects or diseases, fires, wind damage or other agents on the timber harvesting land base. The unsalvaged loss column reflects only areas where the volume is not expected to be recovered or salvaged.

Table 15. Unsalvaged losses

Cause of loss	Total loss (m^3 for the 2003-2007 period)	Annual unsalvaged loss (m^3/year)
Blowdown	0	0
Spruce Bark Beetle	25,929	5,186
Balsam Bark Beetle	51,736	10,347
Spruce Budworm	1,587	317
Fire	51,292	7,418

Data source and comments:

Blowdown

An aerial reconnaissance and ground survey in 2007 indicated a total of 4.0 hectares of fresh blowdown in the Lakes TSA. This represents a miniscule volume in the overall big picture.

A sampling of cruise compilations from 2003 to 2005 in the Lakes TSA showed an average of 6% down trees. This number is not representative of average annual blowdown as it does not distinguish the year of falldown.

The calculation of blowdown losses in the previous TSR were based on harvest block perimeters, road right-of-ways and catastrophic blowdown. This method is not reliable as it over estimates the amount of annual blowdown as not every cutblock or road right-of-way has blowdown.

Catastrophic blowdown events occur approximately every 9 years in the Lakes TSA. The last large event occurred in 2004 which accounts for < 1% of the TSA volume and where approximately 50% of that volume was recovered.

All insects (excluding MPB)

The provincial overview flight data from 2003-2007 was used to calculate non-recoverable losses (NRLs) from Spruce Bark Beetle, Balsam Bark Beetle, Douglas-fir Bark Beetle, and 2 year Budworm. Losses from Mountain Pine beetle were not part of these calculations as it will be calculated using the BCMPB model.

Fire

Fire losses were calculated based on suppression data from the NorthWest Fire Centre for the 2001-2007 period. All suppression data overlapping parks, private lands and points not confirmed by orthophotos or satellite imagery were removed from the analysis.

Historically, a large fire event occurs in the Lakes TSA every 6 or 7 years (the latest occurred in 2004). The number included in the above table takes these large fire events into consideration.

Mountain Pine Beetle

Existing and future losses associated with the mountain pine beetle in stands greater than 60 years of age will be modelled with the BCMPB v.5 model.

Table 16. BCMPMv.5 volume attack in cubic metres in the Lakes TSA

2007 annual attack (m^3)	2007 cumulative attack (m^3)	2008 projected attack (m^3)	2008 projected cumulative attack (m^3)	2015 projected cumulative attack (m^3)	2024 projected cumulative attack (m^3)
6,168,336	50,865,296	3,416,448	54,184,832	57,112,880	57,426,800

6.3 Silviculture

6.3.1 Regeneration activities in managed stands

Recent plantations and future stands will be grown on managed stand yield tables (MSYTs) produced using the MFR TIPSY growth and yield model. The table below contains the inputs required to produce MSYTs 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 x species combination) are then aggregated into one table.

Table 17. Regeneration assumptions by analysis unit

Composition	Site index	Regen delay	OAFs		Method		Species code %		Density initial
			1	2	Type	%			
Balsam leading		2 yrs	20	5	Plant	100	P6S4	80	1500
Balsam leading		2 yrs	15	5	Plant	100	S7P3	15	1500
Balsam leading		2 yrs	15	5	Plant	100	S4P4 B2	5	1500
Spruce leading		2 yrs	20	5	Plant	100	P6S4	80	1500
Spruce leading		2 yrs	15	5	Plant	100	S10	10	1500
Spruce leading		2 yrs	15	5	Plant	100	S7P3	10	1500
Pine leading		2 yrs	20	5	Plant	100	P6S4	95	1500
Pine leading		2 yrs	20	5	Plant	100	P10	5	1500

Operational adjustment factors (OAFs) are used to adjust timber yield estimates to account for operational conditions. OAF 1 is a constant percentage reduction to account for small unproductive areas within stands, uneven stem distribution, endemic losses and other random risk factors such as snow press. OAF 2 increases over time, in this case 5% per 100 years, accounting for decay, waste and breakage.

6. Current Forest Management Assumptions

Data source and comments:

OAF 1, in pine-leading plantations, has been kept at 20 to reflect rust levels affecting pine within the Lakes TSA. Where the plantation established is non-pine leading the OAF is in line with the provincial standard of 15 to account for small unproductive areas within stands, uneven stem distribution, endemic losses and other random risk factors. The recently published *Are Free-Growing Stands Meeting Timber Productivity Expectations in the Lakes Timber Supply Area? FREP Report #13, May 2008* provides more justification for OAF 1 being at 20 for pine-leading stands.

Regeneration delay was determined by using information from the RESULTS database, specifically the bbiological regeneration delay report which provides a consistent methodology to generate achieved biological date based either the submission of planting information or forest cover submission for natural regenerated area. This would be considered the 'biological' regeneration delay which is different than a 'regeneration declaration' which is a legal maximum limit. This report provides a consistent methodology in determining the 'biological regeneration' that can be used for the timber supply review process.

Species and densities are determined by further analysis of preliminary planted species reports using the RESULTS database, this report produces a summary of the tree species and seedlot planted based on the parameters specified by the user. These initial reports were broken apart by year and licence number to establish trends by year and company. The numbers were further analysed by prorating densities and species compositions by area. The species percentages and densities reflected in this data package are a direct reflection of licensee reporting, no bias or opinion is reflected in these numbers.

At the time of planting, the stock is one year old, on average.

Spruce currently being planted are class A, orchard stock with an estimated average gain of G + 17. This average gain was determined by extrapolating orders from planting year 2007 to 2010, to find the average gain being put into the ground for spruce.

Young pine mortality

This section summarizes recent MFR efforts to assess MPB mortality in young stands in the Lakes TSA.

When calculating mortality due to MPB the BCMPBv5 model only considers stands greater than 60 years old. At the time of the last AAC determination for the Lakes TSA (2004), very little beetle attack in young pine stands had been observed. This situation began to change in late 2005, with the biggest hits on young pine incurring with the late flights of 2006. This also corresponds to the time the mountain pine beetle infestation reached its peak. The mountain pine beetle population within the Lakes TSA is now in the declining phase due to host depletion.

From the spring of 2006 through to September 2008, 21 019 hectares of surveys have been completed on pine leading stands, whether through the Forest For Tomorrow or the Forest Investment Account programs. All measurements and findings are recorded in the RESULTS database which is where all numbers represented can be found.

Table 18. Summary of 2006–- 2008 survey in pine-leading plantations in the Lakes TSA

Age class	Total area (ha)	Total area with mPB (ha)	MPB %	NSR % MPB
1	6140	270	0.04%	0%
2	10874	3144	29%	1%
3	1699	819	48%	24%

6. Current Forest Management Assumptions

Total area (hectares), is the area surveyed at one plot/hectare within that given age class. MPB% is the actual percentage of area that has a population of mountain pine beetle attack within. NSR % MPB is the area within that given age class that has fallen below minimums and secondary structure minimum requirements, and in short can be considered, 'not contributing to mid-term timber supply'.

Table 19. Area of young pine-leading stands in Lakes TSA THLB by age class

	Area in hectares by age group					
Species	< 10	11-20	21-30	31-40	41-60	> 60
Pli	840	43,366	19,256	3,658	8,004	290,320
Other	753	14,278	6,190	1,808	7,631	214,595

Pine = stands with greater than 70% pine component.

6.3.2 Immature forest history

The purpose of this section is to identify areas of existing immature forest where the density (stems per hectare) was controlled and therefore should be assigned to a managed stand yield curve (TIPSY).

Table 20. Immature forest history

District Nadina Lakes TSA Activity	1960-70 Area (ha)	1970-80 Area (ha)	1980-90 Area (ha)	1990-2000 Area (ha)	2000-2005 Area (ha)	2006-2007 Area (ha)	Total
Planting	139	1653.6	40767.6	60078.4	24618.2	11659.6	138916.4
Brushing		82	6134.7	11928	3758.5	583.1	22486.3
Surveys	222.4	9930.9	127286.9	243962.5	77140.1	23726.3	482269.1
Spacing basic		0	0	690.3	615.9		1306.2
Spacing incremental		630	4339.9	11335.8			16305.7
Pruning				513.2			513.2
Fertilization		89	3715.8	1		1156.0	4961.8

Data source and comments:

After analysis of the RESULTS database, there has only been 1306.2 hectares of actual basic spacing (liability) completed by all licensees. Including this basic spacing, there has been 17611.9 hectares of pine-leading spacing. Some pine stands younger than 40 years have not been planted, but due to density control, they will be considered managed. Spruce and balsam are not represented in this table, as they generally do not require density control. The above noted spacing programs occurred in 15 to 65 year old pine-leading stands. As with the last TSR, all stands less than 40 years of age can be considered managed in this analysis.

From October 2006 to October 2008, there has been 1600 hectares of 50 to 70 year old spruce-leading stands fertilized within the Lakes TSA.

In 2009, there will be an additional 1000 hectares of spruce-leading plantations fertilized. From 2010 and onward there will be 3000 hectares of fertilization completed annually. This 3000 hectares/year will concentrate on 20 to 40 year old pine-leading plantations, working from the southern part of the Lakes TSA and moving north.

Fertilization is expected to increase yields by 7%.

2008 updates are not available due to reporting requirements (spring 2009).

6.3.3 Not satisfactorily restocked (NSR) areas

Land classified in the Lakes TSA inventory file as type identity 4 or 9 is included in the current timber harvesting land base. These type identities indicate *not satisfactorily restocked* 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.

Licence type	NSR area in ha
Backlog (pre '87)	1219.6
Majors	6007.8
BCTS	4035.8
NRFL	4069.5
Other	4958.1
Total	20290.8

NSR area pertaining to this TSR is 15 332.7 hectares (above figures without community forest and woodlot areas). All NSR, other than the backlog, is operational ground is will not remain NSR as there are legal requirement to restock these areas. Of the 1219.6 hectares classified as backlog NSR, approximately 20 to 30% would provide volumes of greater than 140 m^3/ha and can be logged, while another 20 to 30% are below current stocking standards, but will still contribute to mid-term timber supply. This leaves approximately 40% or 500 hectares which "may" be treated under the FFT program.

Data source and comments:

Data source for the NSR count and tracking is the RESULTS database, report RSTRPT_RDD008(1).

6.4 Integrated resource management

6.4.1 Forest cover requirements

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

6. Current Forest Management Assumptions

A. Seral stage distribution

Table 21. Seral stage distribution for the Lakes TSA outside of the Chelaslie Migration Corridor

Landscape unit	Biodiversity emphasis option and BEC zone	Early seral		Mature plus old seral		Old seral	
		Maximum allowable disturbance (%)	Age for retention (years)	Minimum retained area (%)	Age for retention (years)	Minimum retained area (%)	Age for retention (years)
Babine East	Intermediate - SBS	54	<40	23	>100	11	>140
	Intermediate - ESSF	36	<40	28	>120	9	>250
Babine West	Low – SBS	N/A	<40	11	>100	11	>140
	Low - ESSF	N/A	<40	14	>120	9	>250
Bulkley	Intermediate - SBS	54	<40	23	>100	11	>140
	Intermediate - ESSF	36	<40	28	>120	9	>250
Burns Lake East	Low – SBS	N/A	<40	11	>100	11	>140
	Low - ESSF	N/A	<40	14	>120	9	>250
Buns Lake West	Low – SBS	N/A	<40	11	>100	11	>140
	Low - ESSF	N/A	<40	14	>120	9	>250
Cheslatta	Intermediate - SBS	54	<40	23	>100	11	>140
	Intermediate - ESSF	36	<40	28	>120	9	>250
Fleming	Intermediate - SBS	54	<40	23	>100	11	>140
	Intermediate - ESSF	36	<40	28	>120	9	>250
Francois East	Low – SBS	N/A	<40	11	>100	11	>140
	Low - ESSF	N/A	<40	14	>120	9	>250
Francois West	Intermediate - SBS	54	<40	23	>100	11	>140
	Intermediate - ESSF	36	<40	28	>120	9	>250
Intata	Intermediate - SBS	54	<40	23	>100	11	>140
	Intermediate - ESSF	36	<40	28	>120	9	>250
Ootsa	Intermediate - SBS	54	40	23	>100	11	>140
	Intermediate - ESSF	36	40	28	>120	9	>250
Taltapin	Low - SBS	N/A	40	11	>100	11	>140
	Low - ESSF	N/A	40	14	>120	9	>250

Table 22. Seral stage distribution for the Chelaslie Migration Corridor

Caribou migration zones	Seral stages		
	< 40 years	> 80 years	> 140 years
High use	< 25%	> 60%	> 40%
Moderate use	< 32%	> 45%	> 30%
Low use	< 54%	> 30%	> 20%

The above table (Table 22) applies to the Chelaslie landscape unit and portions of the Intata and Ootsa landscape units.

SBS BEC Zone refers to the Sub-Boreal Spruce biogeoclimatic zone. It includes its subzones and variants.

ESSF BEC zone refers to the Engelmann Spruce Subalpine Fir biogeoclimatic zone. It includes its subzones and variants.

Seral stage distribution constraints (Tables 21 and 22) apply to the crown forested portion of the land base.

B. Adjacency

Table 23. Cutblock adjacency constraint

Zone or group	Maximum allowable disturbance (% area)	Green-up height (metres)/age for retention (years)	Land base to which constraints apply
Cutblock adjacency	25%	3 m/17 years	THLB

Cutblock adjacency is used to ensure that the structural characteristics left harvest is consistent with the temporal and spatial distribution of an opening that would result from a natural disturbance. The requirements for wildlife and biodiversity at the landscape level are set through the Lakes South and Lakes North SRMP and the *Forest and Range Practices Act*.

C. Landscape corridors

Table 24. Forest cover requirements in the Lakes South SRMP landscape corridors

BEC zone	Analysis units	Minimum area retained (%)	Minimum height retained (m)	Minimum crown closure (%)	Age for retention (years)
SBS	Conifer leading	70	-	-	≥ 70
ESSF	Conifer leading	70	-	-	≥ 100
SBS	All	70	15	25	≥ 100
ESSF	All	70	15	25	≥ 120
All	Deciduous leading	70	-	-	≥ 40

At least one of these criteria must be met in the landscape corridors. The timber supply analysis will model the minimum area and age requirements.

6. Current Forest Management Assumptions

Table 25. Forest cover requirements for the Lakes North SRMP landscape corridors

Zone	Analysis unit	Ecosystem	Minimum retained area (%)	Retention period
Vegetative cover important for biodiversity	Balsam and spruce-leading > 140 years of age	All	100	Until 2015
	Balsam and spruce-leading > 140 years of age	All	70	From 2016 on
Hydro-riparian ecosystems	All	SBS dk 07, 08, 09, 10	100	Until 2015
		SBS mc 07, 09, 10, 12	100	Until 2015
		ESSF mc 07, 08, 09, 10	100	Until 2015
		SBS dk 07, 08, 09, 10	70	From 2016 on
		SBS mc 07, 09, 10, 12	70	From 2016 on
		ESSF mc 07, 08, 09, 10	70	From 2016 on
Rare ecosystems	All	TBA	100	All times

The landscape corridor constraints apply to the crown forested portion of the land base.

D. Wildlife habitat

Table 26. Forest cover requirements for wildlife habitat

Species	Maximum allowable disturbance (% area)	Minimum green-up height (metres) / age (years)	Minimum retained area (%)	Minimum age for retention (years)	Maximum age for retention (years)	Land base to which constraint apply
Deer	33	3 m / 17 yrs				THLB
			50	101		Crown forest
Moose	33	3 m / 17 yrs				THLB
			30	101		Crown forest
Grizzly	50				121	Crown forest
	33	5 m / 28 yrs				THLB

6. Current Forest Management Assumptions

E. Visual quality

Visually effective green-up (VEG) heights and plan-to-perspective (P2P) ratios will be used to model scenic areas and visual quality objectives (VQO), as per the *Procedures for Factoring Visual Resources into Timber Supply Analyses*, and the update bulletin, *Modelling Visuals in TSR III*.

A GIS slope analysis was performed to determine the number of hectares of each slope class in each VQO unit. Table 27 shows the results of this analysis.

Table 27. Area (hectares) of slope classes within VQO classes

Area (ha) VQO	Slope classes								
	0-5	5-15	15-25	25-35	35-45	45-55	55-65	65+	Total
M	6,726	25,495	11,720	4,225	1,650	675	271	240	51,002
PR	28,681	94,702	48,934	18,207	6,693	2,569	878	487	201,151
R	7,326	25,224	15,881	7,516	3,463	1,631	720	580	62,341
Total	42,733	145,421	76,535	29,948	11,806	4,875	1,869	1,307	314,494

The predicted P2P ratios calculated for all designs for slopes 0% (flat) to 70% (in increments of 10%) from *Predictive Models for Plan-to-Perspective (P2P) Ratios*, were used for each corresponding slope class from Table 27, as they represented the mid-point of these classes, except in the case of the 0-5 class, where the mid-point was calculated on a linear relationship. Though technically, it is a logarithmic relationship, using a linear calculation gives essentially the same number when rounded to 2 decimal places. In addition, the VEG tree heights were calculated based on Table 6 of *Procedures for Factoring Visual Resources into Timber Supply Analyses*, the same linear manner. Table 28 shows the P2P ratios and the VEG tree heights calculated for this TSR.

Table 28. Predicted P2P ratios (with 95% confidence limits), and tree height required to meet VEG, by slope classes

EV QO	Slope classes (%)							
	0-5	5-15	15-25	25-35	35-45	45-55	55-65	65+
P2P	4.45	3.77	3.04	2.45	1.98	1.60	1.29	1.04
VEG	3.00	3.75	4.75	5.75	6.50	7.25	8.25	8.50

6. Current Forest Management Assumptions

The next step is to determine a percent visible disturbance number for each VQO. The proposed percent alteration used for this TSA will be the mid-point of the permissible percent alteration outlined in *Modelling Visuals in TSR III*. To determine available denudation in plan view, the perspective number was converted to an area weighted average P2P value for each visual group. This number is then multiplied by the percent alteration, to derive a planimetric number for modelling purposes. Finally, an area-weighted average VEG tree height was determined for each VQO as well. These values area all displayed in Table 29.

Table 29. Percent alteration values for perspective and planimetric views, and area-weighted average values for P2P, and VEG tree height

VQO	Proposed % alteration in perspective view	P2P	% alteration (planimetric)	VEG tree height
M	12.55	3.470	43.552	4.228
PR	4.30	3.466	14.902	4.235
R	0.75	3.295	2.471	4.498

6.4.2 Reductions to reflect volume retention in cutblocks

The *Biodiversity Guidebook* describes two methods for providing the maintenance of stand structure over time. One method is wildlife trees while the other is wildlife tree patches.

The *Guidebook* also indicates that wildlife tree patches (group reserves) larger than 2 hectares in size within a cutblock boundary can contribute to old-seral stage forest requirements at the landscape level.

Table 30. Wildlife tree retention targets for the Lakes South SRMP area

BEC zone	% cutblock to be retained as WTP by landscape units					
	Chelaslie	Ootsa	Intata	Cheslatta	François West	François East
SBS	>12	>12	>16	>12	>13	>14
ESSF	>9	>9	>9	>9	>12	>9

Table 31. Wildlife tree retention targets for the Lakes North SRMP area

Landscape unit	Analysis unit	Persistence	% retention
Babine East Babine West Bulkley Burns Lake East Burns Lake West Fleming Taltapin	All	Long term	10

In the Lakes North SRMP planning area, the management practice is to retain a minimum of 5% of the gross area of each cutblock for WTR, and to retain a minimum of 10% of the total area of cutblocks harvested on an annual basis.

All wildlife tree retention targets apply to the THLB. The reductions will be applied as a yield table reduction in the timber supply model.

7. Sensitivity Analyses

Sensitivity analysis can provide a measure of the timber supply impact if uncertainty in management assumptions and/or data integrity exists. The magnitude of the increase or decrease in a particular variable should reflect the degree of uncertainty surrounding the assumption. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most affect results. The following table already includes some standard sensitivity analyses which are generally performed in all analysis.

Table 32. Sensitivity issues

Issue to be tested	Sensitivity levels
Minimum harvestable volume	Increase to 200 m^3/ha
Regenerated stand yields	± 10%
OAF 1	12% for pine-leading; 7% other
Fertilization of 20-40 years old pine-leading plantation	3000 ha/year
Road reductions: change buffer widths for operational and in-block roads	15 m for operational; 6 m for spur
Utilization levels	Use 15 cm diameter at stump height
Length of time before MPB-killed trees fall over	15 years
Land base changes	± 5% of SBS

Other sensitivities to be tested:

1. Draft ungulate winter range and associated general wildlife measures

A. Mountain goat

Table 33. Forest cover requirements for mountain goat ungulate winter range

Zone or group	Analysis unit	Minimum retained area (%)	Sensitivity levels
Mountain goat winter range	All	100	Crown forested

B. Northern caribou – Takla herd

Table 34. Forest cover requirements for northen caribou: Takla ungulate winter range

Zone or group	Analysis unit	Minimum retained area (%)	Age for retention (years)	Land base to which constraint apply
Winter range class - high	All	100	-	Crown forested
Winter range class - medium	All	70	> 80	Crown forested

7. Sensitivity Analyses

2. Visual quality

In order to assess the timber supply impact of the intent of the Lakes District Land and Resource Management Plan, the recommended VQC (rather than established VQO) will be used to account for visual management requirements for all scenic areas. In addition, the visual quality objective constraints will be eliminated for the following scenic areas.

All un-named lakes	Ailport Lake	Anders Lake
Beaver Lake	Bickle Lake	Boden Lake
Boyd Lake	Broman Lake	Castor Lake
Cheskwa Lake	Clatlatlently Lake	Craig Lake
Davidson Lake	Division Lake	Edlund Lake
Elwin Lake	Enz Lake	False Hill Lake
Fisher Lake	Froggy Lake	Hanson Lake
Hewson Lake	Highway 35	Hoult Lake
Innes Lake	Island Lake	Jack Weekes Lake
Jesson Lake	John Brown Lakes	Katharine Lake
Klaytahnkut Lake	Lewis Lake	Ling Lake
Little Boden Lake	Llgitiyuz Lake	Loch Garry Lake
Long Lake	Lu Lake	Mcdonell Lake
Mollice Lake	Moose Lake	Moss Lake
Moxiey Lake	Murdoch Lake	Nellian Lake
Newbird Lake	Nuphar Lake	Octupus Lake
Oknianski Lake	Old Woman Lake	Otto Lake
Owl Lake	Packrat Lake	Peace Lake
Pendleton Lake	Primer Lake	Ranier Lake
Richardson Lake	Richmond Lake	Robertson Lake
Robinson Lake	Sam Hardy Lake	Sams Lake
Sargent Lake	Savory Lake	Sedge Lake
Shaeffer Lake	Shovel Lake	Shuldham Lake
Skins Lake	Slug Lake	Small Trout Lake
Smith Lake	Snake Lake	Snowflake Lake
Spencha Lake	Sponge Lake	Spud Lake
Square Lake	Star Lake	Tatalaska Lake
Tatalrose Lake	Tercer Lake	Tom Allin Lake
Totem Pole Lake	Trout Lake	University Lake
Wapoose Lake	Wasp Lake	Westman Lake
White Eye Lake	Wiggins Lake	Wolf Lake