Timber Supply Review 3

Strathcona Timber Supply Area

Data Package

September 2002

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1. INTRODUCTION

This Data Package outlines the basic information and assumptions that are required to complete a timber supply analysis for the Strathcona Timber Supply Area (TSA). It contains those inputs that are a part of current performance for the TSA. For the purpose of the timber supply review, current performance is 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
- in the standards used to approve or reject forest development (i.e., 5-year development) plans
- in fully implemented land-use plans,
- in land-use decisions approved by Cabinet
- in approved higher level plans under the Forest Practices Code, and
- in approved BC Forest Service policy and other joint agency forest management practices and policy.

The idea of current performance should be kept in mind when reviewing this data package given that the purpose of the timber supply review 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.

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

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 reference for quantifying other development scenarios. While there may be uncertainty around the assumptions used in the base case, adjustments to these assumptions are listed in the sensitivity analyses found in Section 7 of this report.

2.2 Statement of Major Forest Management Considerations and Issues

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

Table 1 Major Forest Management Considerations

Consideration	Detail
Economic and Physical Operability	Operability mapping describes the presence or absence of physical barriers or limitations to timber harvesting. Operability mapping for the Strathcona TSA was revised in 1997, in order to incorporate new information submitted by a consortium of licensees and a district review of harvest performance in areas previously considered inoperable. Prior to the last AAC determination, district staff conducted a harvest profile review that compared the timber types harvested in the period between 1996 and 1998 with the merchantable timber types currently existing in the timber harvesting land base. This review showed that although there was some difference in the profile of actual harvest and the distribution of merchantable timber it was uncertain if the trend was temporary, due to periodic market conditions, or affected by a statistical bias inherent in the methodology. The conclusion was that there was no persistent, systematic over- or underestimation in operability with respect to any of the characteristics studied
Forest Inventory	A forest inventory audit, which was completed in March 1999, showed that inventory volume estimates for operable forests in the Strathcona TSA were overestimated by about 13 percent compared to ground samples. However, sensitivity analysis completed prior to the last AAC determination showed that if inventory volumes estimates were adjusted according to area and age-specific ratios then the short-term harvest was the same as a forecast that assumed no inventory adjustment, although the mid-term harvest was lower.
Stand and Landscape Biodiversity	Stand-level biodiversity is managed in part by retaining reserves of mature timber within cutblocks to provide structural diversity and wildlife habitat. Achieving landscape-level biodiversity objectives involves managing a forests to allow for a variety of opening sizes, seral stages, and forest stand attributes, across an assortment of ecosystems and landscapes. The Vancouver Regional Landscape Unit Planning Strategy recommended biodiversity emphasis option (BEO) for each landscape unit. For the landscape units located in the TSA, the proportions of forested area in low, intermediate and high BEO are 40 percent, 55 percent, and 5 percent, respectively.

Consideration	Detail
Visual Quality	Management for visual quality is a major issue in the TSA given the large amount of coastline and the ever increasing recreational and tourism use of the area. In the Strathcona TSA approximately 144 454 hectares of visually sensitive areas have been identified in the productive forest. After support was received during public review of a visual landscape management strategy, measures were implemented to optimize the timber harvest in the TSA consistent with good visual management. The forest cover requirement in visually sensitive areas is now modelled at the maximum level of permitted disturbance.
Coastal Watershed Assessment Procedures	Coastal Watershed Assessment Procedures (CWAPS) have been completed for approximately 20 watersheds in the Strathcona TSA. CWAPs are applied where there is a concern that, as a result of past logging activities, flow regimes or in-stream sedimentation may vary significantly from natural levels. CWAPs examine nine categories of indices relating to: the percentage of the watershed which has been recently harvested (known as equivalent clearcut area – ECA), and ECA by various elevation bands; the total road density, length of road as a high sediment source, length of road on unstable slopes, and number of roads crossing streams; and within riparian areas, the length of stream with non-functional forest, and length of disturbed stream channel. Based upon CWAP recommendations, works such as road deactivation or reconstruction, riparian planting, and revegetation of exposed soils were completed under FRBC and other funding sources to address many of these indices. In addition, there has been significant recovery of ECA levels since the time many of these watersheds were first logged. Within a timber supply analysis, the only indices that could practically be modeled are those relating to overall ECA within a watershed, and ECA by elevation band. As noted above, there has been significant recovery of ECA levels within many of these watersheds to the point where the potential constraint to timber supply at the TSA level would be insignificant and on this basis CWAPS will not be modeled in this Timber Supply Review.
Community Watersheds	The Strathcona TSA currently contains three Community Watersheds officially designated under the Forest Practices Code. The total area in these drainages is approximately 2664 ha. Community Watershed management requirements of the Forest Practices Code will be modelled for these areas. Other domestic water sources affect only small areas of the THLB and are expected to have no impact on the timber supply.
Vancouver Island Land Use Plan	The Vancouver Island Land Use Plan (VILUP) increased the amount of protected area on Vancouver Island from 6 to 13 percent. The pervious AAC determination for the Strathcona TSA, which was announced on January 1, 2000, assumed no contribution from the new protected areas. In addition, a regional park at Seal Bay, has been announced, although it has not yet been formally designated by government. The VILUP also created three types of resource management zones; including Special Management Zones (SMZs), General Management Zones (GMZ), and Enhanced Forestry Zones (EFZ). Forest practices in SMZs are generally more constrained than in other areas. In the case of SMZs in the Strathcona TSA, constraints are related primarily to visual management and require that a minimum area of mature forest be retained. In EFZ harvest constraints associated with cutblock adjacency are relaxed somewhat by specifying a green-up height of 1.5 metres.

Consideration	Detail
CCLRMP	The Central Coast Land and Resource Management Plan (CCLRMP) covers an area of approximately 4.8 million hectares of marine, foreshore and upland area on the west coast of British Columbia. On April 4, 2001, the Government endorsed Phase 1 of the CCLRMP. This framework agreement includes a negotiated map delineating areas within four proposed land-use categories; candidate protection areas, option areas, First Nations lead areas and special management zones. There are six small candidate protection areas that overlap the Strathcona TSA which cover a total of approximately 2400 hectares of the THLB. These areas have general agreement as to their future protection although final definition, designation and management planning for these areas must take into account the views of First Nations. There are no option areas or First Nations lead areas in the Strathcona TSA. Portions of three landscape units in the eastern part of the TSA fall within a Special management zones (SMZ) for visual quality. These areas are recognized for their high tourism and recreation values. Management of these areas will seek to accommodate industrial and commercial activities, while maintaining scenic values. Although, in May, 2002, twenty protection areas were established under the Environment and Land Use Act, none were located in the Strathcona TSA. Nor was the Strathcona TSA impacted by the Central Coast Designated Area, established under Part 13 of the Forest Act.
Sayward Landscape Unit Plan	The Sayward Landscape Unit (LU) is located on the east coast of Vancouver Island and makes up approximately 70 000 hectares of the Strathcona TSA. Until recently, forest harvesting activities in the LU have had a smaller presence while other values, including recreational uses and wildlife habitat, predominated. This existing balance is anticipated to change as the rate of harvest in the western portions of the TSA declines and the largely second growth forest in the Sayward area reach merchantable size. The Sayward LU plan describes goals, objectives, and strategies for management of values found within the LU. However, a Higher Level Plan Order for the Sayward LU has not been made and only objectives established under the Higher Level Plan Order provide legislated direction to forest development planning on Crown Land in the LU. The proposed objectives for the Sayward LU will not be specifically modelled in the timber supply analysis base case since they do not constitute current management. Sensitivity analysis will be conducted to examine the impact of objectives proposed in the plan. If these objectives are established prior to completion of this timber supply review, they can be considered for incorporation into the final AAC determination.
Riparian Management	The Strathcona TSA, like other coastal management units, contains an enormous network of freshwater streams, lakes and rivers. These watercourses provide valuable habitat for resident and anadromous fish species. The FPC requires specific measures to be adopted to maintain water quality and fisheries values. The riparian management netdowns proposed in this Data Package are based upon review of operational forest practices within the Strathcona TSA.

3. INVENTORIES

3.1 Background Information

The following data sources will be consulted during this Timber Supply Review.

Table 2 Inventory Information

Data	Unit	Source	Vintage	Update	Scale
Forest Cover	Kyuquot TSB	Ministry for Sustainable Resource Management	1987	2001	1:20 000
	Sayward TSB	Ministry for Sustainable Resource Management	1991	2001	1:20 000
	Loughborough TSB	Ministry for Sustainable Resource Management	1991	2001	1:20 000
Operability Mapping	Strathcona TSA	Ministry of Forests	1997	None	1:20 000
BEC variant	Strathcona TSA	Ministry for Sustainable Resource Management	1987	1994	1:250 000
Visual Landscape Inventory	Kyuquot TSB	Ministry of Forests	2001	2001	1:50 000
	Sayward TSB	Ministry of Forests	2001	2001	1:50 000
	Loughborough TSB	Ministry of Forests	2001	2001	1:50 000
Terrain Stability Mapping	Kyuquot TSB	Ministry of Forests	1992	1998	1:20 000
	Sayward TSB	Ministry of Forests	1993	1998	1:20 000
	Loughborough TSB	Ministry of Forests	1993	1998	1:20 000
ESA Mapping	Kyuquot TSB	Ministry for Sustainable Resource Management	1992	None	1:20 000
	Sayward TSB	Ministry for Sustainable Resource Management	1977	None	1:20 000
	Loughborough TSB	Ministry for Sustainable Resource Management	1977	None	1:20 000
Recreation Features Inventory	Kyuquot TSB	Ministry of Forests	1991	None	1:50 000
	Sayward LU	Ministry of Forests	2001	None	1:50 000
	Remainder of Sayward TSB	Ministry of Forests	1993	None	1:50 000
	Loughborough TSB	Ministry of Forests	1995	None	1:50 000
Karst Features Inventory	Strathcona TSA	Ministry of Forests	1995	None	1:50 000
Draft Landscape Units	Strathcona TSA	Ministry for Sustainable Resource Management	1997	2002	1:50 000
Resource Management Zones	Vancouver Island	Ministry for Sustainable Resource Management	2000	None	1:250 000
Community Watersheds	Strathcona TSA	Ministry for Sustainable Resource Management	1995	None	1:50 000
Ungulate Winter Range	Sayward LU	Ministry for Sustainable Resource Management	2001	None	1:20 000
Wildlife Habitat Areas	Patterson Lake	Ministry for Sustainable Resource Management	2002	None	1:20 000

Data Source and Comments:

The forest inventory to be used in this timber supply analysis was assembled in two projects. The data for the Kyuquot supply block was completed in 1987 while the data collected for the Sayward and Loughborough supply blocks was completed in 1991. Using satellite imagery, these data will be updated to reflect depletions and other changes that have occurred since the last inventory update.

Uncertainties in timber volumes identified during a previous timber supply review, particularly in the Loughborough supply block, led to an inventory audit, which was completed in March 1999. The audit reviewed heights, ages and volumes for stands over 60 years old, and heights, ages and derived site indices (i.e., productivity) for immature stands. The results showed that inventory volume estimates for operable forests in the TSA as a whole were overestimated by 13% compared to the ground samples. However, the inventory sampling was not uniformly distributed across the TSA. For instance, stratification of samples by area and species showed that most of the inventory error was due to the overestimation of volumes in old stands on the east side of the TSA which comprise only about 5% of the timber harvesting land base. Sensitivity analysis completed prior to the last AAC determination showed that if inventory volumes estimates were adjusted according to area and age-specific ratios then the short-term harvest was the same as a forecast that assumed no inventory adjustment, although the mid-term harvest was lower. The impact of adjusting the forest inventory volume estimates from the results of the inventory audit will be examined through sensitivity analysis.

Operability mapping has been updated by the forest district staff using information supplied by a consortium of licensee and an internal review of harvest performance in area previously deemed inoperable.

Reconnaissance level terrain stability mapping was completed for the entire TSA over a period between 1992 and 1998. This mapping delineates areas of unstable and potentially unstable terrain.

Wildlife habitat mapping, including ungulate winter range and bald eagle shoreline nesting area, was initially completed in the 1970's and last updated in 1992.

Recreation and visual landscape inventories were completed over the period of 1991 to 1995. In 1998, the visual landscape inventory was updated to correct digitization errors. Areas having karst features are identified on the recreation features inventory.

Landscape unit boundaries were delineated in 1997 as part of the Vancouver Region Landscape Unit Planning Strategy. In November 2000, resource management zones were created on Vancouver Island as part of the Vancouver Island Land Use Plan (VILUP). Specific resource management objectives and strategies are applied to these zones. In April 2001, the British Columbia Government endorsed Phase 1 of the Central Coast LRMP, termed a Framework Agreement. The agreement included a negotiated map delineating new proposed protection areas (PPAs), option areas, First Nations lead areas and special management zones.

4. DIVISION OF THE AREA INTO MANAGEMENT ZONES

4.1 Management Zones and Tracking of Multiple Objectives (Grouping)

The concept of management zones is used to differentiate areas with different management emphasis or objectives. Zones may be defined from a wide range of criteria such as silviculture systems, landscape units, visual quality classes or wildlife areas. Grouping enables forest management constraints to be applied to different combinations of zones or other stand variables. Groups may be thought of as layers of different objectives, which must be tracked over time. An outline of the objectives to be tracked in this TSA analysis is provided in Table 3. 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

Grouping	Objectives	Inventory definition
Level 1	All Areas	Cutblock adjacency only
	Known Scenic Areas	RVQC code = P
		RVQC code = R
		RVQC code = PR
		RVQC code = M
Level 2	Timber Supply Block	Kyuquot Timber Supply Block
		Sayward Timber Supply Block
		Loughborough Timber Supply Block
Level 3	Draft landscape units and biogeoclimatic variant	Draft landscape unit number as indicated on mapping
Level 4	Community watersheds	Community watershed areas
Level 5	VILUP	Vancouver Island Land Use Plan, resource management zones
Level 6	CCLRMP	Central Coast Land and Resource Management Plan, Recommended Land Use Zones
Level 7	Ungulate Habitat	Elk visual coverage
		Deer spring forage
Level 8	Operability	Conventional
		Helicopter
Level 9	Patterson Lake WHA	General Foraging Area

4.2 Analysis Units

An analysis unit represents a combination of stands dominated by specific tree species or silvicultural regime as indicated in the forest inventory file. Each analysis unit is assigned its own timber volume projections (yield tables) for existing and future stands. In the Strathcona TSA, cedar (*Thuja plicata + Chamaecyparis nootkatensis*) , Sitka spruce (*Picea sitchensis*), hemlock (*Tsuga heterophylla and Tsuga mertensiana*), balsam (A*bies spp*.) and red alder (*Alnus rubra)* stands are grouped into analysis units on the basis of leading species and site index class. The analysis units to be defined in the analysis are listed in Table 4.

Table 4 Definition of Analysis Units

Species group	Inventory type groups	Site Index Group
Fir, good site	1-8	Good
Fir, medium site	1-8	Medium
Fir, poor site	1-8	Poor
Cedar, good site	9-11	Good
Cedar, medium site	9-11	Medium
Cedar, poor site	9-11	Poor
Hemlock/balsam, good site	12-20	Good
Hemlock/balsam, medium site	12-20	Medium
Hemlock/balsam, poor site	12-20	Poor
Spruce	21-26	All
Alder	37-38	All

Note: Sites index reference age is 50 years at breast height.

Data source and comments:

Site index will be used to classify stands into productivity groups as indicated in Table 4. The site index ranges for each group will be selected so as to divide the operable area of the inventory types into relatively equal sized units.

5. TIMBER HARVESTING LAND BASE

5.1 Identification of the Timber Harvesting Land Base

The THLB for the Strathcona TSA will be determined by separating out various categories of land that do not contribute to the timber supply of the TSA. This section outlines the steps used to identify the THLB within the TSA.

Land may be unavailable for timber harvesting for three principal reasons:
- it is not administered by the British Columbia Forest Service for timber supply (e.g., private land, parks);
- it is not suitable for timber production (e.g., non-forest, non-productive forest); and
- it is required for other forest values (e.g., recreation areas, riparian management areas).

Land may also be added to the THLB:
- by management activities which improve productivity or operability (e.g., the stocking of land currently classified as non-commercial brush);
- by the addition of productive forest land into the TSA (e.g., timber license reversions).

The classification of "unavailable for timber harvesting" will apply to land 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 is subject to stringent constraints.

Once all lands that do not contribute to the THLB have been identified, additional lands will be added to the land base (e.g., areas classified as not satisfactorily restocked that have been reforested). The resulting productive forest land base will define the current THLB for the TSA.

5.2 Details on Land Base Deductions

5.2.1 Land Not Administered by the British Columbia Forest Service for Timber Supply

Ownership codes included in the forest inventory file are used to identify whether or not land contributes to the timber supply for the TSA. Ownership codes 62C and 69C denote Crown land in a forest management unit and miscellaneous reserves respectively. Areas covered by Timber Licenses (i.e., ownership code 70N) are not administered by the government until they have been harvested and reverted to the crown. This is described further under Section 5.2.12 Timber License Reversions. Areas with other ownership codes will be removed from the THLB. These include parks, ecological reserves, the Beaver Lodge lands and woodlot licenses.

5.2.2 Land Classified as Non-forest

Lands labeled as inventory type identity 6 (e.g., non-forest alpine forest, lakes, rocks, etc.) and inventory type identity 8 (e.g., not classified) will be excluded from the THLB.

5.2.3 Non-commercial Cover

Lands labeled with inventory type identity 5 are areas occupied by non-commercial brush species. These areas are considered unlikely to support timber production and will be excluded from the THLB.

5.2.4 Environmentally Sensitive Areas

An environmentally sensitive area (ESA) is an area that is susceptible to disturbance (e.g., unstable terrain, or areas that are difficult to reforest) or is significantly valuable for fisheries, wildlife, water or recreation. ESA values are used to exclude areas from the timber harvesting land base where more specific and detailed information is not available about a particular forest resource. Areas can be identified as either very sensitive (E1) or moderately sensitive (E2) to disturbance, and are entirely or partially removed from the timber harvesting land base.

In the Strathcona TSA, environmentally sensitive areas are no longer identified from standard ministry ESA mapping. Instead, specific inventories are maintained for terrain stability (soils), forest recreation, domestic water supplies and wildlife values.

Sensitive Terrain

For area with sensitive soils, reconnaissance level mapping of terrain stability was completed by a qualified registered professional for the whole TSA between 1992 and 1998. District staff have accepted the accuracy of the mapping.

Harvesting operations are carried out in compliance with the Forest Practices Code on some areas with sensitive soil; thus their complete removal from the timber harvesting land base would be inappropriate. The percentage reduction to be applied for a particular class of sensitive soil is outlined in Table 5. These percentages were developed on the basis of professional geotechnical advice received during the last timber supply review and are consider to accurately reflect current management.

Table 5 Description of Soil Stability Categories and Reduction Factors

Stability category	Description	Location	Reduction per cent (%)
S1	Unstable	Entire TSA	95
S2	Potentially unstable	Kyuquot supply block	40
S2	Potentially unstable	Sayward and Loughborough supply blocks	50

Sensitive Wildlife Areas

Wildlife inventory information has been captured using two different variables added to the inventory file. The EW variable represents the value applied to a given polygon while the EW_MGMT variable identifies the applicable management regime. A EW_MGMT label of 50% is given to stands that should receive a maximum area reduction of 50% while a CC label represents stands to which a forest cover requirement are applied. These cover requirements ensure specific forest conditions are maintained within the area.

Table 6 Description of Areas with High Wildlife Values

EW rating	EW_MGMT	Reduction per cent (%)
1	-	100
2	CC	0
2	50%	50

Sensitive Recreation Areas

Recreation areas such as campgrounds, trails and lookout sites are identified in the inventory file by specific feature and management class codes. Recreation management codes are more current and are used instead of ESA designations for the purpose of excluding areas with high recreation value. Areas with a recreation management class code of 0 are those areas such as established campsites that have very high, recreation values. These areas will be 100% excluded from contributing to the timber supply, as will areas with an RVQC label of “preservation”. Areas requiring special management for recreation will receive a 50% reduction.

Karst is a distinctive topography that develops from the dissolving action of water on carbonate bedrock, usually limestone, dolomite or marble. This geological process, occurring over thousands of years, results in features that include fluted rock surfaces, vertical shafts, sinkholes, sinking streams, springs complex sub-surface drainage systems and caves. In areas dominated by karst environments, timber harvesting must be managed with additional care or, in some areas, avoided altogether. Many of the karst features in the TSA lie in areas that are inoperable or that are excluded from the timber harvesting land base for other objectives. Areas identified as having potential karst values will receive an 8% exclusion from the timber harvesting land base.

Table 7 Description of Areas with High Recreation Values

Recreation management class code	Recreation feature significance code	Recreation value description	Reduction (%)
0	A, B, C	Managed exclusively for recreation	100
1	A, B	Special management required	50
L5	n/a	Karst feature not already reduced for special management (management class 1)	8

5.2.5 Cultural Heritage Resource Values

Archaeological resource values primarily relate to First Nations historic village sites and shell middens as well as culturally modified trees (CMTs). Historic village sites and shell middens are most frequently identified close to marine shorelines whereas CMTs are generally found within remaining old growth forest types, and most often red- or yellow-cedar leading forests. Remaining old growth forest types are primarily located in the Kyuquot Supply Block, and to a lesser extent, in the Loughborough Supply Block of the TSA. Identified CMTs have followed a similar pattern of distribution.

Traditional use sites are areas used by First Nations for spiritual, sustenance, or other traditional activities. These sites may not have physical evidence associated with them and can be identified by literature review, consultation with First Nations, or through the findings of a traditional use study. Potential constraints on timber harvesting operations are identified through consultation with First Nations.

Archaeological Overview Assessments have been completed for the Kyuquot and Loughborough Supply Blocks. This mapping provides information concerning the likely location archaeological resource values. The Campbell River Forest District has a Standard Operating Procedure to address the management and tracking of archaeological resources. Forest licensees are requested to report all findings (both positive and negative) of all archaeological assessments including archaeological reconnaissance, CMT inventories, and Archaeological Impact Assessments (AIAs). First Nations are generally included in these processes. Where there is potential for impact to an archaeological resource, an Archaeological Impact Assessment is required. This process identifies measures required to accommodate known archaeological resource values.

A review of operational forest practices indicates that a certain proportion of cutblocks proposed for harvest in this TSA are modified to address identified CMTs. These areas are often identified on forest development maps as wildlife tree patches or riparian reserves, however the proportion of reserved area which would be specifically attributable to CMTs has not been tracked. In addition, it is likely that there are areas in the TSA with significant CMT concentrations where harvest opportunities are simply not pursued due to the additional management measures which must be taken to identify and consider First Nations concerns and to ensure the appropriate permits are in place.

At this time, it is not possible to quantify the level of constraint which should be applied to the land base to account for cultural heritage resource values and as a result, no specific netdown will be applied for management of these resources in this timber supply analysis.

5.2.6 Areas Considered Inoperable

Operability codes are generally used to describe the presence or absence of physical barriers or limitations to harvesting. Since physical and economic conditions are highly variable across British Columbia, the methodology used to interpret and map operability is highly variable and district dependent.

Operability mapping will be used to distinguish operable and inoperable areas within the Strathcona TSA as outlined in Table 8.

Table 8 Description of Inoperable Areas

Inventory Description	Code	Reduction percent
Operable Areas -Conventional	C	0
Operable Areas - Helicopter	H	0
Inoperable Areas	I	100
Inoperable Areas – operability unreported	N	100
Inoperable Areas – growth and yield plots	B	100

Data source and comments:

In deriving the timber harvesting land base, those portions of the TSA which are not physically accessible for harvesting or which are not feasible to harvest economically, are excluded. Operability mapping in the TSA includes both physical and economic assessment current to 1997. A District review of operability included an examination of harvesting profiles shown on a sample of forest development plan maps from mid 1996 to the end of 1998. The review showed that although there was some difference in the profile of actual harvest and the distribution of merchantable timber on the timber harvesting land base it was uncertain if the trend was temporary, due to periodic market conditions, or affected by a statistical bias inherent in the review data. The conclusion was that there was no persistent, systematic over or underestimation in operability with respect to any of the characteristics studied.

5.2.7 Sites with Low Timber Growing Potential

Stands may have low productivity because of inherent site factors (e.g., nutrient availability, exposure, excessive moisture, etc.) that reduce the growth and density of commercial tree species. Typically, these stands are intermixed with other stands within the forested land base. As these stands are not considered eligible for harvest, they need to be identified and excluded from the THLB. This will be done as outlined on Table 9.

Table 9 Description of Sites with Low Timber Growing Potential

Species group	Inventory type group	Volume criterion	Minimum Site index [a]	Reduction [b]
Douglas Fir	1-8	NMV<350 m^3/ha	13.6	100%
Cedar	9 – 11	NMV<350 m^3/ha	12.4	100%
Hemlock	12 – 20	NMV<350 m^3/ha	11.3	100%
Spruce	21 – 26	NMV<350 m^3/ha	9.7	100%
Deciduous	37-38	NMV<350 m^3/ha	14.0	100%

a. The site index values in Table 7 are the site indices required for each stand type to achieve the specified Net Merchantable Volume (NMV) volume criteria at 150 years. Values will be finalized once final inventory file is assembled.
b. For a stand to be excluded it should fail to meet both the minimum volume criterion and the minimum site index requirement
c. Previously harvested areas are not excluded from the THLB

5.2.8 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 excluded from the timber harvesting land base.

Table 10 Problem Forest Types Criteria

Species	Inventory type groups	Reduction per cent (%)
Pine	27-32	100
All Deciduous - Kyuquot supply block	35, 36, 37, 38, 39, 42	100
Deciduous other than Alder - Sayward and Loughborough supply blocks	35, 36, 39, 42	100

5.2.9 Roads, Trails and Landings

Separate estimates are made to reflect the loss in productive forest land due to existing and future roads, trails and landings (RTL). Existing RTL estimates are applied as reductions to current productivity and future RTL reductions are applied after stands are harvested for the first time in the simulation model. Estimates can be applied as the amount or percentages of area to be removed from specified age classes and zones.

Table 11 Estimates for Existing and Future Roads, Trails and Landings

Location	Harvest System Class	Reduction per cent (%)
Existing Roads, trails and landings	All	6.6
Future Roads, trails and landings	All	4.1

Data source and comments:

The estimated area of existing RTLs was derived from a review of historic audit and monitoring measurements from 1991 to 1994 and information supplied in the Integrated Silviculture Information System (ISIS) data base of licensee reported non-productive natural area from 1994 to 1997. The area reviewed covered approximately 7600 hectares of which 6.6% was roads trails and landings.

The estimate for future RTLs was derived from a representative sample of silviculture prescriptions (SPs) approved in 2001-2002 covering 1100 hectares of the TSA. These data indicate the percent area of permanent roads in conventional and helicopter logging areas is 5.0 percent and 0.5 percent, respectively. The site degradation associated with helicopter logging is an estimate based upon off-site expansion of road surfaces and landings to accommodate helicopter logging operations.
Since approximately 80 percent of the harvestable land base remaining to be accessed is operable by conventional systems, and 20 percent by non-conventional systems, the mean area-weighted deduction for future roads, trails and landings is estimated to be 4.1 percent.

The percent reduction to be applied for future roads will be finalized once the timber supply analysis data file is assembled.

5.2.10 Wildlife habitat Reductions

Beyond the exclusion of wildlife based ESAs, described in Section 5.2.4, there are additional forest management requirements under the Forest Practices Code that maintain wildlife habitat at the stand level.

Wildlife Trees and Wildlife Tree Patches

The *Biodiversity Guidebook* describes two methods for maintaining stand structure over time, wildlife trees and wildlife tree patches. In the Strathcona TSA, wildlife tree patch (WTP) reserves are retained according to the percentages identified in Table A3.1 of the *Landscape Unit Planning Guide* (LUPG). These percentages will be determined for, and applied to each draft Landscape Unit in the TSA once the timber supply analysis data file is assembled.

District staff are of the opinion that there is sufficient suitable area removed from the THLB for reasons such as riparian reserve zones, terrain stability and low site to provide up to 50% of the required WTP area. Therefore, the timber harvesting land base that will be assumed reserved in WTPs will be 50% of the total WTP.

Data source and comments:

The percentage of the WTP retention target estimated to be met by areas not in the THLB was derived from a representative sample of SPs approved in the TSA since 1998. A total area of approximately 1000 hectares was reviewed.

Significant uncertainty exists regarding the actual amount of THLB that is being reserved in WTPs. Therefore, the analysis will examine the sensitivity of the Strathcona TSA timber supply to assumptions about WTP retention.

Identified Wildlife Management Strategy

The Identified Wildlife Management Strategy (IWMS) was announced in the spring of 1999, outlining a process to identify and establish Wildlife Habitat Areas (WHAs) and General Wildlife Measures (GWMs) to protect rare and endangered species. One WHA has been established in the Strathcona TSA for Queen Charlotte goshawk. This WHA has a total forested area of 2391 hectares including the following areas which are reserved from harvest: a post fledging area with 197 forested hectares and eleven proposed Old-Growth Management Areas with a total forested area of 687 hectares. This WHA is to be managed so that no more than 15% of its total forested area is in stands less than or equal to 20 years of age.

Table 12 Estimates for Wildlife Habitat Reductions to the THLB

Species under consideration	Identifying inventory variables (Location descriptors)	Excluded Area
Patterson Lake - Queen Charlotte Goshawk –Wildlife Habitat Area	post fledging area	100%
	Draft OGMAs	100%
	foraging area	cover constraints

5.2.11 Riparian Management

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting, in order to protect riparian and aquatic habitats. Stream classes (e.g., S1) described in the *Riparian Management Area Guidebook* are determined based upon the presence of fish, the presence of a community watershed designation and the average channel width. The stream class is then used to determine RRZs and RMZs requirements.

Prior to the 1999 Strathcona TSA timber supply analysis, Ministry of Forests staff reviewed a sample of 13 forest cover maps, covering a total forested land base of 137 356 hectares. The reserves and constraints specified in the Forest Practices Code *Riparian Management Area Guidebook* for streams, lakes and wetlands coupled with review of operational forest practices within riparian areas were used to determine appropriate levels of constraint. A GIS analysis, which examined the relationship of this study to the timber harvesting land base, resulted in a riparian management area reduction of 6.1 percent on the timber harvesting land base.

Table 13 Calculation of Reductions for Riparian Management

Riparian feature and Class	Length of Feature (m)	Width of RRZ (m)	Area of RRZ (ha)	Width of RMZ (m)	Percentage of RMZ Reserved from Harvest	Area of RMZ (ha)	Total Riparian Reduction (ha)
Lakes and swamps (L1, L2, W1, W2, W5)	670 250	9	603	36	32%	772	1 375
Fish Streams (S1)	34 165	100	342	40	32%	44	385
Fish Streams (S2)	289 200	60	1 735	40	79%	914	2 649
Fish Streams (S3)	54 223	40	217	40	65%	141	358
Fish Streams (S4)	18 075	0	0	60	63%	68	68
Non-Fish Streams (S5)	384 071	0	0	60	25%	576	576
Non-Fish Streams (S6)	1 152 214	0	0	40	8%	369	369
TOTALS for 13 map review	2 602 198		2 897			2 884	5 781

Data Source and Comments:

Feature length and perimeter estimates for stream class feature length or lake or swamp perimeter are based upon a sample of 13 map sheets within the TSA. The total length of streams and rivers and perimeter lengths of all lakes and swamps was generated using digital files and distance measurements in the district GIS. All double-lined streams are assumed to be S1. The stream class distribution was determined using local knowledge and information available on forest development plans.

Total Riparian Reserve Zone widths are specified according to the *Riparian Management Area Guidebook*. While all lakes and swamps should have a RRZ width of 10 metres, a width of 9 metres was used to reflect that 10% of areas are already accounted for through wildlife habitat, inoperable forest and shared net-down area with streams. Stream RRZ widths are shown for both sides of stream feature.

Total Riparian Management Zone widths are specified according to the *Riparian Management Area Guidebook*. Approximately 80% of these lakes and swamps have a RMZ width of 40 metres while the other 20% have an RMZ width of 20 metres. Stream RMZ widths are shown for both sides of stream feature.

The percentage of RMZ assumed reserved from harvest is based upon review of SPs for a sample area logged by TSA licensees. Where this sample did not gather any data for logging practices adjacent to lakes and swamps or S1 streams, the average for the entire sample (32%) was applied as a default value. District staff also anticipate that 50% of the management zones for S5 and S6 streams are already netted out for other reasons so the values from the silviculture prescription review have been reduced by 50% to account for these antecedent reductions.

5.2.12 Timber License Reversions

Timber Licenses are old tenure arrangements that give a licensee exclusive rights to harvest merchantable timber within the license area and do not contribute to the TSA allowable annual cut. Once these areas have been harvested, regenerated and attain free growing status, the timber license area reverts to Forest Service jurisdiction. Accordingly, these areas are included in the THLB after the first harvest where they contribute to the mid and long term timber supply.

There are approximately 4500 hectares of timber licenses in the Strathcona TSA. In the analysis, these areas will be assumed to be harvested and reverted to Crown jurisdiction at a rate of 170 hectares per year and will be assigned to regenerated analysis units consistent with the existing forest cover.

The total area within timber licenses will be finalized once the timber supply analysis data file is assembled.

5.2.13 Community Watersheds

There are three Community Watersheds in the Strathcona TSA as listed below.

Table 14 Community Watersheds

Name of the Community Watershed	Community Served	Area (ha)
John Hart Lake	Campbell River	2520
Barton Creek	Queens Cove	18
Andrews Creek	Kyuquot	126

Data Source and Comments:

The community of Kyuquot has recently completed a well system to supply them with potable water and the Andrews Creek Community Watersheds is no longer used as a source of drinking water. As the Andrews Creek watershed no longer meets the requirements to be designated as a Community Watershed, it will soon be de-listed. As such, this watershed will not be modeled in this Timber Supply Review.

In order to protect water quality a forest cover constraint will be applied which will limit the amount of harvesting within each watershed to one percent of the productive forest area each year. This constraint was developed based on guidance in the *Community Watershed Guidebook* that indicates that in the absence of a completed Coastal Watershed Assessment Procedure, harvesting activity should be limited to 5 percent of the productive forest area over a 5 year period.

6. CURRENT FOREST MANAGEMENT ASSUMPTIONS

6.1 Harvesting

6.1.1 Utilization Levels

The utilization levels 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.

Table 15 Utilization Levels

Analysis unit	Minimum dbh (cm)	Maximum Stump Height (cm)	Minimum Top dib (cm)
All stand types 140 years and older	17.5	30	10
All stand types less than 140 years	12.5	30	10

Data Source and Comments:

Table 15 reflects current regional utilization standards, license requirements and current performance except for the minimum top dib for stands above 140 years of age. Currently, the utilization standards for stands above 140 years of age is a minimum top dib of 15 cm but the variable density yield projection (VDYP) model only compile volumes at 10 cm top dib. The Resources Inventory Branch of the Ministry of Forests has indicated that the difference in yield between a 10 cm top dib and a 15 cm top dib is negligible.

6.1.2 Volume Exclusions for Mixed Species Stands

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

Table 16 Volume Exclusions for Mixed Species Types

Inventory Type Group	Species	Volume Exclusion (%)
All	All deciduous and pine components except alder in the Sayward and Loughborough supply blocks	100

Data Source and Comments:

Table 16 reflects current regional utilization standards, license requirements and current performance.

6.1.3 Minimum Harvestable Age Derivation

Minimum harvestable ages are simply minimum criteria. While harvesting may occur in stands at the minimum requirements in order to meet forest level objectives (e.g., maintaining overall harvest levels for a short period of time or avoiding large periodic changes in harvest levels), many stands will not be harvested until well past the minimum timber production ages because other resource values may take precedence (e.g., requirements for the retention of older forest, minimizing the area that can be less than a given height).

The minimum harvestable age for stands in each analysis unit will be defined as: a) the estimated age at which the stand is predicted to reach a required volume; and b) the age at which the stand's mean annual increment (MAI) achieves a value of 95% of the maximum (culmination). In order to be eligible for harvesting a stand must meet both of these criteria. The required minimum stand volumes and minimum MAI are listed in Table 17.

Table 17 Minimum Harvestable Age Criteria

Analysis unit	Volume at minimum harvestable age (m^3/hectare)	Mean annual increment
All analysis units	350	95% of MAI at culmination

Data source and comments:

For the previous timber supply review, minimum harvest age (MHA) was based upon the age at which forest stands had accumulated 350 m^3 per hectare of merchantable volume. This timber supply analysis proposes a MHA based upon achieving both the 350 m^3 per hectare volume criteria and 95% of culmination age. The change will not affect MHAs on poorer sites, which generally take longer than culmination age to reach the minimum volume however assumed harvest availability will be delayed on more productive sites where the minimum volume is generally reached well in advance of culmination age. This change is based upon review of operational performance in second growth forests which indicates that such early entries are only occurring where specific forest management objectives, such as root rot management or species conversion, are being pursued.

Minimum harvest age criteria do not apply to commercial thinning in Douglas-fir stands on medium sites in the Sayward supply block which will be carried out in stands between 45 and 65 years of age, as described in Section 6.1.6. In areas commercially thinned, final clear-cut felling will occur no sooner than 20 years after thinning.

Sensitivity analyses will be conducted within this analysis to determine the timber supply implications of basing MHAs strictly on the 350 cubic metres per hectare criteria and also strictly on culmination age.

6.1.4 Alder Stands

A partition currently exists for 16 000 cubic metres of harvest in deciduous-leading forest types A non-replaceable forest license was awarded to the Weyerhaeuser Company for an annual harvest of 8000 cubic metres of deciduous volume. The following alder leading stands will be excluded in this Timber Supply Review.

Table 18 Alder Exclusions

Supply Block	Average Stand Age (yr)	Rational
Kyuquot	all	not economic to recover
Loughborough	over 80	excessive decadence
Sayward	over 80	excessive decadence

6.1.5 Silvicultural systems

The majority of the TSA is currently harvested using the clear-cut method. There are no significant amounts of partial cut or selection harvest occurring at this time.

6.1.6 Commercial Thinning

Some commercial thinning is conducted within medium site Douglas-fir stands in the Sayward supply block. While commercial thinning is not considered to be a true silvicultural system, the application of this technique may have implications both for short and medium term timber supplies. The current strategy will be modelled in this timber supply analysis.

Table 19 Commercial thinning regime

Silvicultural system	Eligible analysis units or locations	% retention	# of entries before final felling	Time before final felling
Commercial thinning	Douglas-fir — medium site Sayward SB	70-75	one	Minimum 20 years

Data source and comments:

Commercial thinning is generally occurring within Douglas-fir stands of medium site productivity in the Sayward supply block. Operational practice is to remove 25-30% of the stand volume between 45 and 65 years of age and return for final clear-cut felling a minimum of 20 years later. For the purpose of this Timber Supply Review commercial thinning will be modeled to occur at a rate limited to 100 hectares per year for the first 5 years only.

6.2. Unsalvaged Losses

Table 20 shows the estimated average annual unsalvaged volume loss due to catastrophic events such as insect epidemics, fires, wind damage or other agents. The unsalvaged loss column only reflects those areas in which the volume will not be recovered.

Table 20 Unsalvaged Losses

Cause of Loss	Total Loss (m^3/yr)	Annual Unsalvaged Loss (m^3/yr)
Fire	2 500	1 750
Windthrow	60 000	30 000
Disease	11 400	11 400
Total	73 900	43 150

Data Source and Comments:

The windthrow and fire estimates are based upon district blowdown ledgers, district experience with salvage and district fire occurrence records. There is currently no other information available.

Ongoing monitoring of insect infestations within this TSA reveals that losses are relatively minor and would be accounted for in existing yield models. Key insect species which are monitored in this district are western black-headed budworm, western hemlock looper, balsam wooly adelgid, and conifer sawflies.

Laminated root rot (*Phellinus weiri*) occurs in the drier regions of the district, primarily in younger Douglas-fir forests in the Sayward area, on Quadra Island, and in minor pockets in the Gold River area. Current estimates of annual unsalvaged losses total 11 400 cubic metres.

6.3 Silviculture

6.3.1 Regeneration activities in managed stands

The silviculture program reflects the mix of treatments expected to be carried out. Table 21 shows the silviculture regime for each analysis unit and the expected average regeneration delay.

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

Table 21 Regeneration Assumptions By Analysis Unit

Analysis Unit	Regen Delay	OAF		Species	%	Regen Method	Initial Density [1] stems/ha	Percent thinned	Thinned Density stems/ha
		1	2						
Fir, good site	2	15	5	Fd	100	Plant	1200	0 *	750
Fir, medium site	2	15	5	Fd	100	Plant	1200	0 *	750
Fir, poor site	2	15	5	Fd	100	Plant	1200	0 *	750
Cedar, good site	3	15	5	Cw Ba	30 70	Plant	1200	N/A	N/A
Cedar, medium site	3	15	5	Cw Hw	50 50	Plant	1200	N/A	N/A
Cedar, poor site	3	15	5	Cw Hw	50 50	Plant	800	N/A	N/A
Hemlock/balsam, good site	3	15	5	Ba Hw	50 50	Plant	1200	N/A	N/A
Hemlock/balsam, medium site	3	15	5	Ba Hw	50 50	Plant	1200	N/A	N/A
Hemlock/balsam, poor site	3	15	5	Cw/Yc Hw	50 50	Plant	1200	N/A	N/A
Spruce	3	15	5	Ss Cw/Yc	20 80	Plant	1200	N/A	N/A
Deciduous	2	15	5	Dr	100	Plant	1600	0*	900

[1] Insignificant amounts of hemlock are planted in this TSA. All hemlock regeneration occurs from natural ingress on all hemlock/balsam and on cedar poor and medium site.

* These sites may be appropriate for thinning however there is currently no stand management funding to support this activity.

Data Source and Comments:

All values in the above table are based on current performance as estimated by the forest district staff. If site conditions are appropriate and funding is available Douglas-fir stands may be thinned to 750 stems per hectare and Alder stands may be thinned to 900 stems per hectare. No other analysis unit is thinned.

Regeneration delays reflect current operational practice. Regeneration delays will be applied in the FSSIM forest estate model, not in the TIPSY yield model.

Provincial average operational adjustment factors (OAFs) are applied to the managed stand yield curves as recommended by the Ministry of Forests, Research Branch. No local values are available.

6.3.2 Immature Plantation History

This section identifies areas of existing immature forest where the density (i.e., stems per hectare) is controlled and therefore should be assigned to a managed stand yield table curve (MSYT). All NSR and stands harvested in the future will be managed under MSYTs.

Table 22 Immature Plantation History

Analysis Unit	Area Managed (%)		
	Age 1 - 15	Age 16 - 25	Age 26 - 65
Douglas-fir	100	100	100
Cedar	100		
Hemlock and Balsam	100	100	
Spruce	100	100	

Data Source and Comments:

The proportion of immature stands considered to be managed is based upon the best professional estimate of district silviculture staff. Douglas-fir stands less than 65 years of age are considered to be managed due to the long history of forest management activities in the Sayward supply block.

6.3.3 Not Satisfactorily Restocked (NSR) Areas

There is currently about 15 000 hectares of NSR listed in MLSIS/ISIS records. All NSR is considered current and is assumed to regenerate within specified regeneration delay periods as per Table 21.

All NSR within conventional or helicopter accessible portions of the operable land base is included in the timber harvesting land base. Any NSR within the inoperable portion of the land base will be reviewed when the forest inventory files are available.

The amount of NSR in the forest inventory file will not be available until processing of the file is complete. Any discrepancy between the forest inventory files and MLSIS/ISIS records, aside from inoperable considerations, will be assumed to have already been restocked and is currently between 1 to 5 years old. This area of discrepancy will be assigned to analysis units in proportion to the overall distribution of analysis units within the TSA.

6.3.4 Fertilization and Genetic Gains

Since 1978, approximately 33 000 ha of medium site Douglas-fir have been fertilized. For this Timber Supply Review the following assumptions are being modeled.

Table 23 Fertilization Gains

Area Treated (ha)	Treatment Age (yr)	Assumed Treatment Response (m^3/ha)
2 000	30, 40 and 50	90
10 000	35 and 45	60
7 000	30	30

To account for gains already captured in site index estimates generated during the last re-inventory, the assumed treatment response will be reduced by 44%. The incidence of future fertilization is uncertain and therefore will not be modeled.

6.3.5 Tree improvement

Prior to the timber supply analysis, information on the proportion of planting stock that is Class A (improved) seed and on the expected genetic gain realized from Class A seed will be compiled for inclusion in the timber supply base case forecast.

6.4 Integrated Resource Management

6.4.1 Objectives which require Forest Cover Requirements

As noted in Section 4.1, Management Zones and Tracking of Multiple Objectives (Grouping), the discussion on multiple objectives may be examined at a number of different levels. One possible level may be landscape units, another may be wildlife areas, while another may be resource emphasis. The objectives for each area may specify requirements to retain different forest characteristics across the landscape, such as a minimum percentage of old-growth forests or a maximum percentage of forest area below green-up height. With the requirement to retain different forest characteristics across the landscape, it is important to identify how non-contributing forest (i.e., forest which does not contribute to the timber harvesting land base) may be considered in the forest cover requirements.

In order to limit the impact of harvesting on visual, wildlife, hydrological and other values in the TSA, the forest cover requirements outlined in Table 24 will be applied to areas that fall into each of the "Level 1" groupings[1] (cutblock adjacency and visual quality).

Table 24 Forest Cover Requirements

Zone or group	Green-up Height (m)	Green-up age (years)	Maximum Allowable Area Below Green-up (%)	Area to Apply Constraint
IRM	3	-	25	timber harvesting land base per landscape unit (LU)
Enhanced Forestry Zone	1.5	-	25	timber harvesting land base per LU
RVQC – preservation	5	-	1	forested area per scenic polygon
RVQC – retention	5	-	5	forested area per scenic polygon
RVQC – partial retention	5	-	15	forested area per scenic polygon
RVQC – modification	5	-	25	forested area per scenic polygon
Community watersheds	-	5	5	forested area per CWS

Data Source and Comments:

Recommended Visual quality classes have been assigned by the Campbell River Forest District and the Vancouver Forest Region recreation staff.

Green-up height represents the top-height (average height of the 100 largest trees per hectare) for the regenerating forest which is required to meet general integrated resource management objectives associated with hydrology, wildlife, recreation, or other similar concerns.

[1] Grouping levels identified in Table 3 “Objectives to be tracked”.

The green-up height for RVQC areas is the Visually Effective Green-up (VEG). When VEG is achieved, the regenerated forest cover is generally assumed to block views of previously harvested openings. Known scenic areas in the Strathcona TSA are currently managed with a visually effective green-up height of 5 meters.

The forest cover requirement in visually sensitive areas will be modelled at the 'maximum' level of disturbance recommended in *Procedures for Factoring Visual Resources into Timber Supply Analyses.* This is consistent with measures implemented to optimise the timber harvest in the TSA consistent with good visual management, in accordance with policy direction from the Minister of Forests.

In addition to land base exclusions, management for wildlife habitat will be modelled using forest cover requirements applied to the appropriate identified sensitive areas. Specifically, a minimum of 50 percent of the timber harvesting land base in Ew2 areas with a CC management class (see table 6) will be maintained in forest stands over five metres in height, and in the same areas, no more than 25 percent of the timber harvesting land base will be in stands less than three metres in height.

Table 25 Forest Cover Requirements

Unit	Green-up Height (m)	Maximum Allowable Disturbance (%)	Minimum Height (m)	Minimum Area Above Height (%)
Ew2 - cc	3	25	5	50

Table 26 Patterson Lake WHA Cover Requirements

Unit	Age limit of forested area	Maximum Allowable Disturbance (%)
Patterson Lake WHA	20	15

In order to ensure that older forests are maintained reasonably evenly within the Strathcona TSA, the forest cover requirements outlined in Table 27 will be applied to each draft landscape unit/biogeoclimatic variant group. These requirements were derived from the *Forest Practices Code Biodiversity Guidebook.*

Table 27 Forest Cover Requirements

Biogeoclimatic zone and variant	Natural disturbance type (NDT)	% minimum old-seral stage retention by landscape unit			Minimum age of old growth (years)
		Biodiversity Emphasis Option			
		High	Intermediate	Low	
CWH vh1, vh2, vm1, vm2	1	19	13	1st rotation = 4 2nd rotation = 9 3rd rotation = 13	> 250
MH mm1, mm2	1	28	19	1st rotation = 6 2nd rotation = 13 3rd rotation = 19	> 250
CWH xm1, xm2 mm1, mm2, dm	2	13	9	1st rotation = 3 2nd rotation = 6 3rd rotation = 9	> 250

Data source and comments:

Biodiversity emphasis options (BEOs) have been assigned to each draft landscape unit within the Strathcona TSA through the *Regional Landscape Unit Planning Strategy*. While draft landscape unit and seral targets objectives have not yet been legally established, the old-seral stage targets for landscape units with higher or intermediate BEOs are currently being applied as per the *Landscape Unit Planning Guide*. With regards to low BEOs, only one-third of the old seral stage target is being met in the short-term (0-70 years), as per provincial direction, two-thirds of the targets in the mid-term (71-140 years) and the full target by 210 year from now.

The numbers in the minimum retention area column for low BEO in Table 27 coincide with the percent requirement in the first, second and third rotation of the forecast.

Sensitivity analysis will be conducted to examine the impact of not applying the one-third drawdown of the old-seral target in low BEO landscape units and on of applying the early seral and mature+old seral stage cover requirements in all landscape units.

7. SENSITIVITY ANALYSES TO BE PERFORMED

Sensitivity analysis provides a measure of the timber supply impact if uncertainty in management assumptions or data integrity exists. The magnitude of the increase or decrease in a particular variable should reflect the degree of uncertainty surrounding the assumption. For instance, minimum harvestable age may be developed based on some minimum stand attributes which currently appear to dictate the earliest time stands are eligible for harvest. Sensitivity analysis may indicate that a small reduction in these attributes may alleviate anticipated harvest level reductions in the future. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most affect results. Table 28 lists the sensitivity analysis that are to be conducted for this Timber Supply Review.

Table 28 Sensitivity Issues

Issue to be Tested	Sensitivity Levels
Minimum harvestable age	350 m^3/ha, culmination age, +/- 10 years
Existing stand yields	+/- 10%
Regenerated stand yields	+/- 10%
Old-growth site index adjustments provided by the Research Branch of the Ministry of Forests	Species specific adjustment equations will be applied to stands >140 years upon regeneration
Land base changes	+/- 10%
Visual quality objectives	Mid-range % denudation
Harvest flow alternatives	various scenarios
Green-up periods	+/- 2 years
WTP Requirement	+/- 10%
IRM zone	Change maximum area below green-up age to 20%
Seral stage distribution	Apply the early and mature + old-seral stage requirements
Landscape level biodiversity	No low BEO draw-down
Sayward Landscape Unit Plan	Objectives for biodiversity, wildlife habitat, and recreation

Note: At the time of the analysis the sensitivity levels tested may differ as required to best reflect the range of uncertainty in the assumption being tested.