

Strathcona Timber Supply Area
Timber Supply Review
Data Package

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1. Introduction

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

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

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

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

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

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

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

2. Current Forest Management Considerations and Issues

2.1 Base case management assumptions

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

2.2 Statement of major forest management considerations and issues

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

Table 1. Major forest management considerations

Consideration/issue	Description
Landscape level biodiversity	Draft landscape units and draft biodiversity emphasis options have been assigned but not yet established under the Forest Practices Code. For the base case, a weighting of biodiversity emphasis options will be employed. A sensitivity analysis will be performed to examine the timber supply implications of the draft strategy.
Vancouver Island Resource Targets (VIRT) zoning	The VIRT process proposes a number of changes in forest management which have not been approved by Cabinet and implemented. If the forest management regime is approved and implemented before the AAC determination, sensitivity analysis will be completed.
Visual quality objective mapping	VQOs will be modelled reflecting the current level of forest practice for the Strathcona TSA.
Central Coast Land and Coastal Resource Management Plan	Recommendations for land use are not scheduled to be completed prior to completion of the timber supply analysis. If land use decisions are made and implemented before the AAC determination is made, they will be considered.
Loughborough supply block volume discrepancy issue	A concern was expressed during the last AAC that available mature volumes in the Loughborough supply block are significantly overestimated. Further review of this issue is being performed.

continued

2. Current Forest Management Considerations and Issues

Table 1. Major forest management considerations (concluded)

Consideration/issue	Description
Commercial thinning	The commercial thinning program in the Strathcona TSA will be included in the timber supply analysis.
East/west distribution of harvest	There was concern expressed at the last AAC determination with harvest levels in the Kyuquot supply block and the Sayward/Loughborough supply blocks. Reporting will again be generated to highlight the harvesting activities expected from the two supply blocks.
Implementation of Forest Practices Code requirements	Requirements of the Forest Practices Code will be modelled. These include area constrained for riparian areas and wildlife tree patches.
Protected areas	New parks which have received an order-in-council designation are excluded from eligibility in the timber harvesting land base.

3. Inventories

3.1 Background information

The inventories which will be used to determine the timber harvesting land base and the associated management themes to be used in defining forest management activities are listed in Table 2. The data source and reliability of the information, including any irregularities in the data and assumptions used in deriving the information and quality assurance measures taken for non-standard data are also shown.

Table 2. Inventory information

Data	Unit	Source	Vintage	Update	Scale
Forest cover	Kyuquot Supply Block (SB)	Ministry of Forests (MoF)	1990	1996	1:20 000
	Sayward SB		1991	1996	1:20 000
	Loughborough SB		1991	1996	1:20 000
Terrain stability	Kyuquot SB	MoF	1992 ^a	1996 ^b	1:20 000
(Soils)	Sayward SB	MoF	1993 ^a	1996 ^b	1:20 000
	Loughborough SB	MoF	1993 ^a	1996 ^b	1:20 000
Wildlife (Ew)	Kyuquot and Sayward SB	Ministry of Environment, Lands and Parks (MELP) (non-standard layer)	1992		1:20 000
	Loughborough	MoF	1977		1:20 000
Recreation features	Kyuquot SB	MoF	1991		1:50 000
	Sayward SB	MoF	1993		1:50 000
	Loughborough SB	MoF	1995		1:50 000

(a) The date highly sensitive soils were inventoried

(b) The date moderately sensitive soils were inventoried

continued

3. Inventories

Table 2. Inventory information (concluded)

Data	Unit	Source	Vintage	Update	Scale
Visual landscape inventory	Kyuquot SB	MoF (non-standard layer)	1991		1:50 000
	Sayward SB	MoF (non-standard layer)	1993		1:50 000
Karst features inventory	Strathcona TSA	MoF (non-standard layer)	1995		1:250 000
Operability	Strathcona TSA	MoF	1997		1:20 000
Draft landscape units	Strathcona TSA	MELP/MoF	1997	N/A	1: 20 000
Resource management zones	Strathcona TSA	LUCO (non-standard layer)	1994/1997	N/A	1:250 000

Data source and comments:

The forest cover mapping originates from the 1990/1991 re-inventory which was completed using low level photography. The entire TSA has been updated for roads and logging to 1996 using orthophoto maps generated from 1996 photography. Active NSR from ISIS/ML SIS records will be assumed to be current while any additional area found in the forest cover inventory will be assumed to be SR which was not able to be captured in the update process. Further discussion on this topic can be found in Section 6.3.3, "Not satisfactorily restocked (NSR) areas."

Soils (terrain stability) mapping, was upgraded prior to the last analysis to identify areas having highly unstable soils however areas of moderate instability had not been mapped and consequently, could not be modelled in the previous analysis. This second phase of mapping has been completed in 1997 and will be included in this timber supply analysis. Both phases of mapping were completed by June Ryder and Associates; recommendations for timber availability are based upon estimates of harvest opportunity within mapped terrain units.

Wildlife mapping was initially completed in the 1970's and last updated in 1992. The Ministry of Environment, Lands and Parks staff indicate that while this is the best available information, it still requires updating to reflect wildlife habitat survey information collected since then. This is not available for the preparation of the current data package.

Recreation and landscape inventories were completed over the period of 1991 to 1995 in accordance with standards outlined in the Ministry of Forests, Recreation Inventory manuals. In the previous timber supply analysis, landscape inventories were identified as requiring upgrading. This work has been completed for this timber supply analysis. Areas having potential karst features are identified as 'L5' on the recreation features inventory. The most significant areas having karst features (including White Ridge, and the Artlish River Caves) are now within provincial parks and have been removed from consideration for the timber harvesting land base.

3. Inventories

Operability mapping has been updated by the forest district staff using information supplied by a licensee consortium coupled with district staff reviews of harvest performance in areas previously deemed inoperable.

Resource management zones are a tool under the Strategic Planning Regulation of the Forest Practices Code. The objectives for the zones have not been accepted by Cabinet and are currently under public review. They have been included with the inventory information to facilitate modelling if Cabinet declares any resource management zones as higher level plans and the Campbell River forest district is able to implement them before completion of the timber supply analysis.

4. Division of the Area into Management Zones

4.1 Management zones and tracking of multiple objectives (grouping)

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

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

Table 3. Objectives to be tracked

Objectives	Inventory definition
Landscape level biodiversity	Non-standard layer: landscape unit boundaries and draft biodiversity emphasis options defined on file.
Deer and elk habitat	Non-standard layer: Ew2d = deer habitat areas; Ew2e = elk habitat areas.
Visual quality areas	Recreation layer: VQO; R = Retention VQO; PR = Partial Retention VQO.
Distribution of harvest between eastern and western supply blocks	Supply block boundaries: Kyuquot = west coast supply block; Sayward/Loughborough = east coast supply blocks.
Integrated resource management	Areas where harvesting operations are not otherwise constrained by visual resources or wildlife habitat.

Data source and comments:

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

4. Division of the Area into Management Zones

4.2 Analysis units

An analysis unit represents a combination of stands dominated by specific tree species or a silvicultural regime with a specific timber growing capability — as indicated by the inventory type group and site index in the forest inventory file. Each analysis unit is assigned its own timber volume projections (yield tables) for existing and future stands.

Table 4. Definition of analysis units

Analysis unit (leading species)	Criteria	
	Inventory type groups	Site productivity range ^a
Douglas-fir (Fd)	1 - 8	Good
Douglas-fir (Fd)	1 - 8	Medium
Douglas-fir (Fd)	1 - 8	Poor
Cedar (Cw)	9 - 11	Good
Cedar (Cw)	9 - 11	Medium
Cedar(Cw)	9 - 11, 21 - 26	Poor
Hemlock/balsam (Hw/Ba)	12 - 20	Good
Hemlock/balsam (Hw/Ba)	12 - 20	Medium
Hemlock/balsam (Hw/Ba)	12 - 20	Poor
Sitka spruce	21 - 26	All
Deciduous	35 - 42	All

(a) Site productivity range will be based on the distribution of site index values for the timber harvesting land base and does not necessarily reflect site class designations found in the inventory file.

Data source and comments:

An analysis unit has been created for deciduous forest types to reflect the current partition for deciduous-leading forest types. See also Section 6.1.4, "Harvest scheduling priorities."

5. Timber Harvesting Land Base Definition

5.1 Identification of the timber harvesting land base

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

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

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

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

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

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

5.2 Details on land base classification

5.2.1 Land not administered by the British Columbia Forest Service for timber supply purposes

Ownership codes are generally used to identify whether the land can be considered to contribute to timber supply. Ownership codes 62C and 69C indicate Crown land in a forest management unit and miscellaneous reserves respectively. All areas with other ownership codes will be removed from the land base considered available for timber supply. This includes parks, ecological reserves, the Beaver Lodge lands and areas under woodlot licence as their AAC is determined independently of the timber supply review process. Timber licence area — ownership code 70N — will be assumed to be classified by the same reductions (Sections 5.2.2 through 5.2.12) as are applied to ownership codes 62C and 69C. The portion that is classed as eligible for timber supply is assumed to have been harvested or will be harvested over the next 30 years and is fully discussed under Section 5.2.12, "Timber licence reversions."

5.2.2 Land classified as non-forest

Type identity 6 areas and type identity 8 such as alpine, lakes, rocks, etc. area will be excluded from the land base considered for timber supply. Type identity 6 will be reviewed to determine if coniferous-leading stands are evident. These stands may be considered towards meeting biodiversity objectives.

5. Timber Harvesting Land Base Definition

5.2.3 Non-commercial cover

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

5.2.4 Sensitive terrain stability 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 were historically called environmentally sensitive areas (ESAs). Early inventories of these areas were performed in the mid-1970's using aerial photography. Since then, updates to this mapping have been made by specialists in the respective fields and the new mapping has superceded the older inventories. For easy reference the ESA system classification is compared to the new classifications: soil (Es) is replaced by terrain stability mapping, recreation (Er) is replaced by recreation feature class, and wildlife (Ew) uses similar descriptions.

In the context of timber supply analysis, ESAs may result in a reduction in the harvesting opportunity on these sites. Two strategies for accounting for this are: per cent area reductions, and the specific evaluation of individual ESA polygons for harvesting opportunity.

As noted previously it is important to ensure that only areas in which harvesting is expected to take place are allowed to contribute to the timber harvesting land base. Thus, it is important to separate the areas in which some limited harvesting will take place and those areas which are unavailable. This table deals with those areas in which harvesting will not occur.

Table 5. Description of sensitive terrain stability areas

ESA category	ESA description	Reduction per cent (%)
S1	Soils — high	90
S2	Soils — moderate	40

Data source and comments:

Recreation and wildlife issues are addressed under Sections 5.2.5, "Areas with high recreation values" and 5.2.10, "Wildlife habitat reductions" respectively.

Es (soils) Soils mapping was completed in 1997 by June Ryder and Associates using the reconnaissance level classification system (i.e., U = Unstable, P = Potentially Unstable, S = Stable) outlined in the *Mapping and Assessing Terrain Stability Guidebook*. The U and P types were coded as S001 and S002 respectively in a non-standard digital format which will be overlayed with the forest cover maps. Reductions are based upon recommendations provided by June Ryder, P.Geo.

5. Timber Harvesting Land Base Definition

5.2.5 Areas with high recreation values

Recreation areas such as campgrounds, trails and lookout sites are identified in the inventory file through the recreation feature significance and recreation management code variables. 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, identified recreation values. Recreation management class code of '1' are areas which require some special management considerations to protect or maintain recreational values.

Table 6. Description of recreation features

Recreation feature code	Recreation description	Reduction per cent (%)
A0	Provincially significant — managed exclusively for recreation	100
B0	Regionally significant — managed exclusively for recreation	100
C0	Locally significant — managed exclusively for recreation	100
A1	Provincially significant — special management to protect recreation values	50
B1	Regionally significant — special management to protect recreation values	50
Preservation VQO	Area of high visual value	100
Karst	Areas with high karst potential	8

Data source and comments:

Those areas of the TSA identified on recreation features maps as having karst potential, which have not already been addressed above, will have the area available for timber supply reduced to reflect reserves around likely karst features.

5. Timber Harvesting Land Base Definition

5.2.6 Areas considered inoperable

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

Table 7. Description of inoperable areas

Inventory description	Code	Reduction per cent (%)
Operable (inoperable)	I	100
Operable (growth and yield plots)	B	100
Operable (unreported)	N	100

Data source and comments:

TSA operability mapping was revised in 1997 to reflect:

- mapped information provided in 1996 by a licensee consortium;
- recent harvest performance in timber types previously considered inoperable.

Conventional and helicopter accessible areas are coded as 'C' and 'H' in the "OPERABLE" field in the forest inventory file.

Code 'B' represents permanent sample plots reserved for the Resources Inventory Branch to maintain and update growth and yield estimates for the province.

5.2.7 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 consideration for the timber harvesting land base.

Table 8. Description of sites with low timber growing potential

Species	Characteristics	Per cent (%) excluded
All	All stands which will not or have not reached height class 3 by age 120 will be excluded from harvest eligibility.	100

Data source and comments:

Currently, harvesting below height class 3 is generally not occurring in the Strathcona TSA.

5. Timber Harvesting Land Base Definition

5.2.8 Problem forest types

Problem forest types are stands which 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 9. Problem forest types criteria

Species	Inventory type groups	Reduction per cent (%)
Pine	27-32	100

Data source and comments:

While markets exist for lodgepole pine, stands where this species predominates are not consistently enough represented in the harvest profile to warrant their inclusion in the timber harvesting land base.

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 the current productive forest considered available for harvesting and future RTL are applied after stands are harvested for the first time in the simulation model. Estimates can be applied as the amount or percentages of area to be removed from specified age classes and zones. Estimates should only account for the area that will be permanently removed from the timber harvesting land base.

Table 10. Estimates for existing and future roads, trails and landings

Location	Age	Reduction area (hectares) or per cent (%)
Existing RTLs		
Roads	<= 80 years	5%
Future RTLs		
Conventional	> 80 years	6%
Helicopter	> 80 years	0.5%

Data source and comments:

The estimate for existing roads trails and landings was developed for use in the previous timber supply analysis completed in 1994 by sampling 35 mapsheets in the Strathcona TSA to determine aggregate road lengths; these values were multiplied by an assumed average road width of six metres to arrive at a total area of roads, trails and landings per mapsheet. This value was divided by the total area of forest which had been developed by timber harvesting (assumed to be all stands less than 80 years of age). The percentage obtained by these calculations, which was rounded to 5%, was assumed to be representative of the TSA as a whole. The original roads, trails and landings estimate has been reviewed by the forest district staff and is considered to be applicable for use in the current timber supply analysis.

5. Timber Harvesting Land Base Definition

The estimate for future roads, trails, and landings is based upon review of Major Licensee Silviculture Information System reports and silviculture prescription data. Separate estimates are provided for conventional and helicopter logging areas. The site loss associated with helicopter logging is an estimate based upon 'off-site' expansion of road surfaces and landings in order to land timber, and fuel and service machinery. Estimates for future roads, trails and landings are higher than for past logging due to two main factors: a change to generally shorter yarding distances associated with grapple yarding, and remaining unharvested areas are generally on rougher terrain requiring more roads.

5.2.10 Wildlife habitat reductions

Table 11. Wildlife habitat considerations

Inventory description	Species under consideration	Reduction area (hectares) or per cent (%)
Ew1d	Deer	100%
Ew1e	Elk	100%
Ew1b	General bird species	100%
Ew2d	Deer	0
Ew2e	Elk	0

Data source and comments:

The Ew2 areas are generally available for harvest and a forest cover constraint will be applied as per Table 21b. However, some specific areas, mainly in the Sayward supply block, will be considered unavailable for harvest. The total area of Ew2 polygons considered to be unavailable for harvest cannot be accurately given until the inventory file is available. Forest district staff estimate that a total area of 3000 hectares would be identified. Significant portions of these areas are considered inoperable.

5. Timber Harvesting Land Base Definition

5.2.11 Riparian management area considerations

The area reduction percentage has been developed based upon a sample of 12 mapsheets within the timber supply area. The total length of streams and double line rivers and perimeter lengths of all lakes and swamps was generated using digital files and distance measurements in the district GIS. The distribution of streams was determined using local knowledge and information available on forest development plans. Detailed calculations are described below.

Table 12. Riparian management areas

Riparian feature class	Feature length or perimeter (metres)	Total stream reserve width (metres)	Riparian Reserve zone area (hectares)	Total management zone width (metres)	Riparian Management zone area (hectares)
Lakes and swamps (L1, L2, W1, W2, W5)	670 250	9	603	10	670
Double-line streams (S1)	34 165	100	315	12	41
Fish streams (S2)	289 200	60	1 735	12	347
Fish streams (S3)	54 223	40	217	12	65
Fish streams (S4)	18 075	0	0	9	16
Fish streams (S5)	384 071	0	0	9	346
Fish streams (S6)	1 152 214	0	0	1	115
Total — 12 mapsheet review			2 870		1 600
Total forested area reviewed	137 365	hectares			

Data source and comments:

Lakes and swamps

Reserve zone — While all lakes and swamps measured in this review should have a reserve zone width of 10 metres; an assessed width of 9 metres was used to reflect that 10% of areas are already accounted for through wildlife habitat, inoperable forest, and shared perimeter between lakes and streams.

Management zone — Approximately 80% of these lakes and swamps have a management zone width of 40 metres while the other 20% have a management zone with of 20 metres. District staff assumed that generally riparian management zones are best represented with an area reduction. District staff expect that 30% of the management zone will be unavailable for harvest.

5. Timber Harvesting Land Base Definition

Streams — all double-line streams are assumed to be S1. The distribution of stream classes S2 through S6 was determined based upon information in forest development plans and local knowledge. Reserve zone and management zone widths are as specified in the *Riparian Management Area Guidebook*, December 1995. These are summed to reflect reserves and management zones on either side of a stream. Management zones are reduced to a 'residual' width by assuming an area equivalency for the portion of the management zone considered unavailable for harvest. District staff expect that stream classes S1 through S5 are 30% unavailable for harvest while those on S6 streams are 5% unavailable for harvest. District staff also expect that 50% of management zones for stream classes S5 and S6 have already been accounted for via other considerations such as inoperability, wildlife habitat, or terrain stability.

Using the totals from Table 12, riparian reserve area divided by total forested area reviewed yields an area reduction per cent for the total forested land base of 2.09%. Management zone area divided by total forested area reviewed yields an area reduction per cent for the total forested land base of 1.2%. These values will be adjusted once the inventory file is available to reflect the forested land base which is considered operable.

5.2.12 Timber licence reversions

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

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

Table 13. Timber licence harvest schedule

Currently free-growing	1997 – 2027
Stands < 100 years	Equal annual harvest of the remainder

Data source and comments:

Timber licence areas (ownership code 70N) will be assumed to be classified by the same reductions (Sections 5.2.2 through 5.2.12) as are applied to ownership codes 62C and 69C. The portion that is classed as eligible for timber supply is assumed to have been harvested or will be harvested over the next 30 years

In general, it is assumed that all timber licence areas with stands less than 100 years of age have already been harvested and are now free-to-grow, but for which application has not yet been made to adjust ownership status. These areas are assumed to revert in the first 5 years of the planning horizon and will be allocated to analysis units according to analysis unit distribution less than 20 years of age in the timber harvesting land base in the geographic location where they occur. Free growing is assumed to be 10 years of age.

All remaining timber licence areas is assumed to have never been harvested. For modelling purposes, the areas classified as will be assumed to be harvested in equal thirds over the next 3 decades. The first harvest from these areas does not count towards the AAC. Timber licence areas are assumed to revert to the same leading species as occupied the site prior to harvest.

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 14. Utilization levels

Analysis unit	Utilization		
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
All stand types older than 140 years	17.5	30	10
All stand types 140 years and younger	12.5	30	10

Data source and comments:

Table 14 reflects current regional utilization standards, licence requirements and current performance except for the minimum top dib for stands above 140 years of age. Current utilization standards for stands above 140 years of age is a minimum top dib of 15 cm. Utilization specifications in the variable density yield projection (VDYP) model currently 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 15. Volume exclusions for mixed species types

Species	Volume exclusion (%)
All deciduous and pine components	100

Data source and comments:

Table 15 reflects current regional utilization standards, licence requirements and current performance.

Deciduous and pine species will not contribute to the merchantable volume within coniferous-leading stands. An assessment will be made to determine if these species occur at sufficient percentages in the inventory file to actually contribute to stand-level biodiversity.

6. Current Forest Management Assumptions

6.1.3 Minimum harvestable age derivation

Minimum harvestable ages are simply minimum criteria. While harvesting may occur in stands at the minimum requirements in order to meet forest level objectives (e.g., maintaining overall harvest levels for a short period of time or avoiding large periodic changes in harvest levels), many stands will not be harvested until well past the minimum timber production ages because consideration of 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).

Table 16. Minimum harvestable age criteria

Analysis unit	Minimum criteria	Minimum harvestable age
Fir – good	550 cubic metres per hectare	
Other	Age when 95% of maximum average growth has occurred.	

Data source and comments:

In the previous analysis, it was assumed that harvesting would occur no earlier than the age at which the mean annual increment for each species and growing site had reached within 5% of its culmination value. This will continue to be used as a minimum. However, the only exception will be for Douglas-fir growing on 'good sites' where stands are assumed to be available once a minimum merchantable volume of 550 cubic metres per hectare has been achieved. This criteria is based upon harvest activity within the Sayward supply block in forests which are currently 50–60 years of age. These forests originated from fires and harvesting which occurred over a very short time frame resulting in an extensive area of even-aged forest. This practice of limited early entry is intended to set up a mosaic of different age classes in order to prevent possible adjacency problems in the future.

6.1.4 Harvest scheduling priorities

Commercial thinning is currently occurring at a rate of about 40 000 cubic metres per year. It will be assumed that this will continue for the first decade of the planning horizon, followed by 20 000 cubic metres per year thereafter. The silvicultural regime is outlined in Section 6.1.6, "Commercial thinning." Final harvest of commercially-thinned stands will be given higher priority than clearcut stands.

A partition currently exists for 16 000 cubic metres of harvest in deciduous-leading forest types. Harvest of deciduous-leading stands will be requested at this rate. A non-replaceable forest licence was awarded to Coast Mountain Hardwoods for an annual harvest of 8000 cubic metres of deciduous volume.

6. Current Forest Management Assumptions

6.1.5 Silvicultural systems

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

6.1.6 Commercial thinning

Significant amounts of commercial thinning are occurring 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 17. 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 clearcut felling a minimum of 20 years later.

6.2 Unsalvaged losses

Table 18 shows the estimated average annual unsalvaged volume loss to catastrophic events such as insect epidemics, fires, wind damage or other agents over the long term on the timber harvesting land base. The unsalvaged loss column only reflects those areas in which the volume will not be recovered or salvaged.

Table 18. Unsalvaged losses

Cause of loss	Total loss (m ³ /year)	Annual unsalvaged loss (m ³ /year)
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.

6. Current Forest Management Assumptions

Ongoing monitoring of insect infestations within this TSA reveals that losses are relatively minor (i.e., within-stand) 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) occurs in the drier regions of the district, primarily in younger Douglas-fir forests, in the Sayward forest, Quadra Island, and minor pockets in the Gold River area. Current estimates of annual unsalvaged losses total 11 400 cubic metres.

6.3 Silviculture

6.3.1 Silviculture and regeneration activities in managed stands

The silviculture program reflects the mix of treatments expected to be carried out. Table 19 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) growth and yield model. A MSYT may be built from a number of tables if more than one regeneration method is used within an analysis unit. When this is the case, tables are produced for the different regeneration methods (each method x species combination) are then aggregated into one table.

6. Current Forest Management Assumptions

Table 19. Regeneration assumptions by analysis unit

Composition	Regen delay	OAFs		Method		Species		Density	
		1	2	Type	%	Code	%	Initial	Thin
Douglas-fir G	2	15	5	Plant	100	Fd	100	900	750
Douglas-fir M	2	15	5	Plant	100	Fd H	50 50	1200	750
Douglas-fir P	3	15	5	Plant	100	Fd H	50 50	1200	750
Cedar G	2	15	5	Plant	100	Cw Ba	30 70	1200	750
Cedar M	3	15	5	Plant Natural	100 Ingress	Cw Hw	50 50	1200	850
Cedar P	5	15	5	Plant Natural	100 Ingress	Cw Hw	50 50	800	500
H/B G	3	15	5	Plant Natural	100 Ingress	Ba Hw	50 50	1200	850
H/B M	4	15	5	Plant Natural	100 Ingress	Ba Hw	50 50	1200	850
H/B P	5	15	5	Plant Natural	100 Ingress	Cw/Yc Hw	50 50	1200	850
SS	3	15	5	Plant	100	Ss Cw/Yc	30 70	800	
Deciduous	2	15	5	Plant	100	Decid Fd-G	25 75	1200 900	600 750

Data source and comments:

All values in the above table are based on current performance as estimated by the forest district staff. For some of the cedar and hemlock/balsam analysis units, a large amount of natural ingress occurs. The thinning densities reflect the remaining stems and the species composition of the stand is reflected by the species code and per cent for the given analysis unit.

Regeneration delays used 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) values are applied to the managed stand yield curves as recommended by the Ministry of Forests, Research Branch — as no local values are available.

6. Current Forest Management Assumptions

6.3.2 Immature plantation history

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

Table 20. Immature plantation history

Analysis unit	Area managed (%)		
	Age 1 - 10	Age 11 - 20	Age 21 - 60
Douglas-fir	100	100	100
Cedar	100		
Hemlock/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 60 years of age are considered to be managed recognizing the long history of forest management activities in the Sayward supply block.

6.3.3 Not satisfactorily restocked (NSR) areas

There is currently about 5430 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 19.

All NSR within the 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 (which are more up-to-date), aside from inoperable considerations, will be assumed to have already been restocked and is currently about 1 to 5 years old. This area of discrepancy will be assigned to analysis units in proportion to the distribution of analysis units by geographic unit.

NSR is restocked in proportion to the current area of each analysis unit in stands less than 20 years old on the assumption that the overall distribution of harvest within analysis units has not changed significantly over this period of time.

6. Current Forest Management Assumptions

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

Table 21a. Forest cover requirements

Note: The following forest cover requirements will be applied to areas that fall into each of following objectives within each landscape unit. VQO prescriptions will be adjusted to account for the non-contributing forest and to account for the dispersion of excluded areas within the timber harvesting land base where this is known. The forest cover requirement specified for the IRM zone is used to ensure that harvesting is not concentrated in any one location.

	Green-up height (metres)	Green-up maximum allowable disturbance (% area)
IRM	3	25
VQO = R	5	5
VQO = PR	5	15

Data source and comments:

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

Table 21b. Forest cover requirements

Note: The following forest cover requirements will be applied to wildlife rating 2 areas. The height requirement is for the area assumed to contribute to timber supply within these areas. Forest cover requirements were specified by the Ministry of Environment, Lands and Parks staff.

	Green-up height (metres)	Green-up maximum allowable disturbance (% area)	Minimum height (metres)	Minimum area above height (%)
Ew2	3	25	5	50

6. Current Forest Management Assumptions

Table 21c. *Forest cover requirements (concluded)*
Biogeoclimatic units and natural disturbance types (NDTs) within the Strathcona TSA
(based on gross productive forest)

Note: In order to ensure that the maintenance of older forests is spread out within the TSA the following forest cover requirements will be applied to the draft landscape units. The landscape units are not yet finalized, however, as the draft units are available in digital format they will be used to simulate the geographic retention of older forest characteristics across the Strathcona TSA. This does not imply these units are final. The numbers in the minimum retention area column coincide with the per cent requirement in the first, seventh and fourteenth decade respectively.

Biogeoclimatic unit	NDT	Old-seral stage			
		Minimum retention area by decade (%)			Minimum age (years)
		1	7	14	
CWH	1	10	12	14	250
MH	1	14	17	20	250
CWH	2	7	8	9	250

Data source and comments:

Biodiversity guidelines will be modelled using information from the *Forest Practices Code Biodiversity Guidebook*. Operationally, low biodiversity emphasis is assumed to apply to all landscape units, as the assignment of biodiversity emphasis options is not complete. However, as it is expected that biodiversity emphasis assignment will be completed within 1 to 2 years the timber supply analysis will use constraints more reflective of what may be expected when the emphasis levels have been assigned. As it is unknown at this time which landscape units will be assigned low-, intermediate- or high-emphasis a single weighted constraint for the old-seral stage will be developed based on the anticipated distribution of 45% low-, 45% intermediate- and 10% high-emphasis. The values shown in Table 21c above reflect the weighted *Biodiversity Guidebook* values. The modelling process will ensure the minimum older retained area will be achieved by the end of three rotations.

All stand heights shown in Tables 21a and 21b refer to top heights (inventory definition), not average stand height.

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

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. It is important to discuss the anticipated persistence of the particular method in different stand types. For instance, different silvicultural systems may provide the intended structural diversity through modifying the timing when timber is available. Consideration should be given to whether the trees will ever be harvested and whether areas in riparian management zones are regularly being used to produce either wildlife trees or tree patches.

6. Current Forest Management Assumptions

Table 20a of the *Biodiversity Guidebook*, which is to be used when biodiversity emphasis has been assigned to a landscape unit, has been used for deriving the wildlife tree patch target because a surrogate for biodiversity emphasis has been assumed for old-seral retention. Given that approximately 60% of the Crown forest area in this TSA is available for harvest and 50% of the area has already been harvested without regard for wildlife tree patch requirements, a wildlife tree patch target of 8% of each cutblock has been assumed. This figure was reduced by 75% following assumptions used in the *Forest Practices Code Timber Supply Analysis*, February 1996, that 75% of the wildlife tree patch requirements will be met by riparian reserves and management zones, unmerchantable or inoperable slopes and unstable soils. For this timber supply analysis, it will be assumed that 2% of the area otherwise available for harvest will be unavailable for harvest over the long term to account for stand level biodiversity requirements specified in the *Biodiversity Guidebook*.

An area reduction is used to model wildlife tree patch requirements rather than a volume reduction because it more accurately reflects the area upon which harvesting will occur. These wildlife trees, in conjunction with other riparian reserves and area removals, are generally larger than two hectares in size and are left to maintain stand structure within the landscape over time. As the wildlife tree patches are larger than two hectares in size this area will contribute to meeting old-seral stage forest requirements at the landscape level. It is assumed that these wildlife tree patches will not be economical to harvest at a later date, nor will they be available to harvest in subsequent harvesting of the stand.

7. Sensitivity Analyses to be Performed

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

Table 22. Sensitivity issues specific to the Strathcona TSA

Issue to be tested	Sensitivity levels
Landscape level biodiversity	Model biodiversity emphasis options as described in the draft Regional Landscape Unit Planning Strategy, October 31, 1997.
Vancouver Island Resource Targets	If the forest management regime for these zones is approved before the analysis is complete, sensitivity analysis will be completed.

Table 23. Standard sensitivity analysis

Issue to be tested	Sensitivity levels
Existing stand yields	+/- 10%
Regenerated stand yields	+/- 10%
Minimum harvestable age	+/- 10 years
Old-growth site index adjustments 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	
Green-up periods	+/- 2 years
IRM zone	Change maximum area below green-up age to 20%
Seral stage distributions	Apply the early and mature + old-seral stage requirements