

Cranberry Timber Supply Area Timber Supply Review

Data Package

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1. Introduction

The data package for the Timber Supply Review program is simply an organized format for supplying the basic inputs required for a 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 policy.

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;
- 3) The source of the data and comments.

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.

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
VQOs	Management for visual quality
Grizzly Bear, Fisher and Goshawk habitat	Wildlife management
Forest Practices Code	Riparian, lake, and wetland reserve zones, biodiversity and green-up

3. Inventories

3.1 Background information

The inventory listed below will be used to determine the timber harvesting land base and the associated management themes to be used in defining forest management activities. The data source and reliability of the information, including any irregularities in the data and assumptions used in deriving the information, is also indicated below.

Table 2. Inventory information

Data	Source	Vintage	Update	Scale
Forest cover	MoF	1994	none	1:20000

Data source and comments:

TFL 51 was surrendered by Westar Timber to the Crown on February 18, 1993. As part of the agreement all inventory data that was available was given to the Crown. The digital version of the inventory is available and up to MoF standards.

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 dataset can also be grouped by different variables. In addition, the non-contributing forest (land considered unavailable for timber harvesting) may 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 with 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
Fisher — coniferous — deciduous } Grizzly } Goshawk }	Polygon lists as provided by B.C. Environment — available from the Kispiox Forest District Office
Visual quality objectives	Retention and partial retention recommended recreation management code on inventory file
Integrated resource management	All area which is not in one of the above objectives

4.2 Analysis units

An analysis unit represents a combination of stands dominated by specific tree species or silvicultural regime within a set range of timber growing capability — as indicated by the species and site index in the forest inventory file. Each analysis unit is assigned its own timber volume projections for existing and future stands. While it is important for the district staff to fill out the following table in order to identify issues to the timber supply analyst, it should be noted that after determining the timber harvesting land base the timber supply analyst will review the amount of area found in specific analysis units and the similarities between the volume estimates to determine the final analysis units definitions in order to best reflect the management regime and the species/site profile of the stands in the TSA.

4. Division of the Area into Management Zones

Table 4. Definition of analysis units

Analysis unit	Criteria		
	Inventory type groups	Site index range	Age class
Hw/Cw	9–12, 14–17	G/M	All ages
Hw/Cw	9–12, 14–17	P	All ages
B (Bl and Ba)	18-20	G/M	All ages
B (Bl and Ba)	18-20	P	All ages
Sx	21, 23-26	G/M	All ages
Sx	21, 23-26	P	All ages
Pl	28, 30, 31	G/M	All ages
Pl	28, 30, 31	P	All ages
Act	35, 36	G/M	All ages
At/Ep	40-42	G/M	< 40

5. Timber Harvesting Land Base Definition

5.1 Identification of the timber harvesting land base

The timber harvesting land base for the 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;
- it is unavailable for timber harvesting.

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 timber harvesting land base for the TSA is determined by separating out the categories of area which do not contribute to timber harvesting in the area. The classification of 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 the 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. Areas with all other ownership codes will be excluded from the land base considered available for timber supply.

5.2.2 Land classified as non-forest

Type identity 6 and 8 non-forested areas such as alpine, lakes, rocks etc. will be excluded from the land base considered for timber supply.

5.2.3 Non-commercial cover

Type identity 5 represents those areas which were inventoried to have non-commercial brush species growing on them. These areas are considered to be unlikely sites for timber production and are excluded from the timber harvesting land base.

5. Timber Harvesting Land Base Definition

5.2.4 Environmentally sensitive areas

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

In the context of timber supply analysis, ESAs may result in a reduction in the harvesting opportunity on these sites. Two possible 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 should only deal with those areas in which harvesting will not occur.

Table 5. Description of environmentally sensitive areas

ESA category	ESA description	Reduction per cent (%)
Es1	Soils — high	100
Es2	Soils — moderate	75
Ep1	Regeneration — high	100
Ep2	Regeneration — moderate	0
Ew1	Wildlife — high	75
Ew2	Wildlife — moderate	50

Data source and comments:

Environmentally sensitive area reductions were established by Ministry of Forests (MoF) staff in collaboration with specialists from Ministry of Environment Lands and Parks (MoELP). The percentages reflect site sensitivity to forest management, value for other resources, and current management practices.

5.2.5 Recreation areas

All preservation VQO areas will be excluded from the timber harvesting land base.

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.

5. Timber Harvesting Land Base Definition

Table 6. Recreation areas

Feature significance	Management class	Area inclusion factor
B	1	50

Data source and comments:

Based on current management and the potential harvest in these areas, half of these areas are considered unavailable for timber harvesting.

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.

Table 7. Description of inoperable areas

Inventory description	Code	Reduction per cent (%)
Operability	Inoperable (I) or Not typed (N)	100

Data source and comments:

Operability lines were obtained from Westar Timber when TFL 51 was surrendered to the Crown.

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. Any of these stands not considered to be harvestable need to be identified and removed from consideration for the timber harvesting land base.

5. Timber Harvesting Land Base Definition

Table 8. Description of sites with low timber growing potential

Species	Inventory type group	Characteristics	
		Site index (metres in height at age 50)	Reduction per cent (%)
Hemlock and cedar	9–17	< 9.0	100
Fir	18–20	< 8.8	100
Spruce	21, 23–26	< 10.0	100
Pine	28, 30, 31	< 11.0	100
Deciduous	35, 36, 40–42	< 18.0	100

Data source and comments:

Site index limits are based on an examination of the distribution of sites in the forested land base.

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 can be wholly or partially excluded from the timber harvesting land base.

Table 9. Problem forest types criteria

Species	Inventory type group	Characteristics			
		Age	Height	Stocking	Reduction per cent (%)
Lodgepole pine	28, 30, 31			2, 3, 4	100
All types except Lodgepole pine	9–11, 12–21, 23–26, 35, 36	> 7	< 2		100
Lodgepole pine	28, 30, 31	> 5	< 2		100
Aspen/birch	40, 41 & 42	> 2			100

Data source and comments:

Problem forest types have been identified by the TSR team based on current forest management practices and recent performance.

5. Timber Harvesting Land Base Definition

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 reductions are applied after stands are harvested for the first time in the simulation model. 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

	Road length (kilometres)	Road width (metres)	Reduction area (hectares) or per cent
Existing RTLs			
Secondary roads	57	25	142.5
Logging roads	272	20	544
Trails	299	10	299
Landings			250
Dispersed loss to productivity			545
Total			1 780.5
Future RTLs			
All			5.7% of the unaccessed timber harvesting land base

Data source and comments:

Area Reduction for Existing Roads, Trails, Landings and Dispersed Disturbance

Road lengths were obtained from a Geographic Information System (GIS) analysis conducted in the fall of 1996. Road width estimates were obtained from District engineering staff.

A soil survey conducted in the fall of 1995 estimated losses due to landings to be 1.6% of the gross logged area. This gross area was obtained from silviculture records (ISIS).

The same survey estimated dispersed disturbance to be 10.4% of the net logged area. According to FRDA research¹, about 40% of dispersed disturbance areas represent a loss in productivity. Therefore, losses due to dispersed disturbance represent 4.2% of the net logged area.

Area Reduction for Future Roads, Trails, Landings and Dispersed Disturbance

For future roads, trails, landings and dispersed disturbance, it was estimated that 80% of the land base is currently accessed (based on discussion with TSR team). A GIS analysis conducted in 1996 estimated the timber harvesting land base to be 39 254 hectares. Therefore, 31 403 hectares of the land base is accessed and 7850 hectares remains to be accessed.

Assuming that future areas to be roaded will have the same per cent area in roads as existing areas, the reduction for future RTLs and dispersed disturbance is 5.7% of the land base area to be accessed.

⁽¹⁾ Evaluation of Soil Degradation as a Factor Affecting Productivity in B.C.: A Problem Analysis (Phase 1). Utzig, G. and Walmsley, M. 1988. FRDA Report #25.

5. Timber Harvesting Land Base Definition

5.2.10 Cultural heritage resource reductions

Cultural heritage values include trap lines, and sites of archaeological or traditional use. The areas and appropriate protection or management measures are listed below.

Table 11. Cultural heritage resources

Excluded area (hectares)	Reason for exclusion
620	Cultural heritage trail

Data source and comments:

A portion of the “Grease Trail” runs through the Cranberry TSA.

- Cultural heritage trail (Grease Trail) is approximately 36 kilometres in length;
- Management strategy applied: total buffer of 200 metres (100 metres on each side of the trail);
- Total area = 720 hectares;

However, 100 hectares is in a riparian reserve on the Cranberry River; thus, the net reduction is:

- net total = 620 hectares.

5.2.11 Riparian management areas

The area of riparian reserve is calculated below and will be excluded from the timber harvesting land base. Similarly, the information to be used in the analysis to capture the effect on timber supply from the riparian management zone is described below.

Table 12. Riparian management areas

Riparian class	Reserve width (metres)	Reserve reduction area (hectares)	Management zone width (metres)	Management zone area (hectares)	Management zone reduction area (hectares)
S1	50	700	20	280	70
S2 — S3	20	2 867	20	2 867	717
Lakes and wetlands	10	138	40	552	69
Total		3 705		3 699	856
Total reduction					4 561

Data source and comments:

The riparian analysis was conducted using TRIM water coverage (1:20,000) with GIS (Arc/Info and ArcView).

5. Timber Harvesting Land Base Definition

Streams identified as S1 included the Cranberry, Kiteen and Nass rivers and some larger tributaries and a 20 metre reserve buffer was applied.

Streams requiring riparian reserves (S2, S3) within the ICHmc1 and ICHmc2 biogeoclimatic variants were identified and assigned a 20 metre reserve buffer. All S2 and S3 streams have been identified, however due to the methodology used and the difficulty in distinguishing some of the S4 streams from the S2 and S3s, some S4 streams were included in the GIS analysis. Since S4 streams do not require a buffer and since some S3 streams are buffered by less than 30 metres, the normal S2/S3 buffer of 30 metres was decreased to 20 metres for the purpose of the timber supply analysis.

The smaller streams in the CWHws2, ESSFwv, MHmm2, and AT were not assigned buffers. Most of the streams within the CWHws2, ESSFwv, and MHmm2, are S5 and S6 and as these do not require buffers, they were not included in the analysis.

All lakes and wetlands over five hectares were identified and a 10 metre buffer was applied.

Riparian management zone reduction areas were calculated using the reserve areas determined in the GIS analysis. The ratio of the management zone width to the reserves width was applied to the reserve reduction area. The maximum mature cover retention percentages recommended in the riparian management area guidebook are 50% for S1-3 streams and 25% for lakes and wetlands. It was assumed that an average one-half of this maximum value would be retained across the land base in the riparian management zones. To approximate the timber supply implications of this level of retention, 25% of the area in the riparian management zone of S1-S3 streams and 12.5% of the lakes and wetlands management zone was considered unavailable for timber harvesting. The remainder of the riparian management zone will be included as part of the adjacent management zone.

6. Current Forest Management Assumptions

6.1 Harvesting

6.1.1 Utilization levels

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

Table 13. Utilization levels

Analysis unit	Utilization		
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)
All PI units	12.5	30	10
All other conifer units	17.5	30	10
Deciduous	17.5	30	10

Data source and comments:

These levels are based on licence requirements and current performance.

6.1.2 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 interdecadal changes in harvest levels), most stands will be not be harvested until past “the minimum” timber production ages because management of other resource values take precedence (e.g., requirements for the retention of older forest).

6. Current Forest Management Assumptions

The purpose of this section is to identify the minimum criteria an analysis unit must meet to be eligible for harvest. For timber supply analysis purposes, criteria are converted to equivalent ages. This will be completed once the timber harvesting land base and the final analysis units are determined.

Table 14. Minimum harvestable age criteria

Analysis unit	Minimum criteria		Minimum harvestable age
	Diameter	Volume	
PI (G/M)		250	
Sx,Hw,BI (G/M)		300	
Sx,PI,Hw,BI (P)	17.5	200	
Act			80
At,Ep			80

Data source and comments:

The above criteria apply to both existing and regenerated stands. In the case of Sx, PI, Hw, BI stand on poor sites, both criteria must be met.

In most cases At and Ep grow in mixtures with conifers. For these mixed species stands, the deciduous and conifers are grown to at least 80 years and harvested together.

Act stands usually contain a Sx component. The minimum harvestable age is based on the age that will provide sufficient Sx volume to be merchantable.

6.1.3 Logging methods and silvicultural systems

In the Cranberry TSA both conventional and cable harvesting systems are used, however both these systems are used for clearcutting. Thus, for analysis purposes the entire timber harvesting land base will be modelled as clearcut harvesting.

6. Current Forest Management Assumptions

6.2. Unsalvaged losses

The purpose of this section is to provide an estimate of average annual unsalvaged volume loss to insect and disease epidemics, fires, wind damage or other agents 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 15. Unsalvaged losses

Cause of loss	Total loss (m ³ /year)	Annual unsalvaged loss (m ³ /year)
Fire	397	397
Total	397	397

Data source and comments:

History records indicate an estimate for fire loss over the last 10 years of 397 cubic metres per year. This volume is attributed to isolated fire occurrence (lightning) and it is anticipated that harvesting will not occur due to access limitations. The 40 year average is about 15 000 cubic metres per year due to some large burns that occurred in the 1950s and 1960s. It is possible that some large fires will still occur even with improved fire fighting ability; however, current management practice would be to salvage these areas.

6.3 Silviculture

6.3.1 Regeneration activities in managed stands

Recent plantations and future stands will be grown on managed stand yield tables (MSYT) produced using two growth and yield models— TIPSYP (Table Interpolation Program for Stand Yields) and VDYP (Variable Density Yield Prediction). The table below contains the inputs required to produce MSYTs for this analysis. A MSYT may be built from a number of tables if more than one regeneration method is used within an analysis unit. When this is the case, tables are produced for the different regeneration methods (each method x species combination) and then area weighted into one table.

6. Current Forest Management Assumptions

Table 16. Regeneration assumptions by analysis unit

Analysis unit	Composition	Rege n delay	OAFs		Method		Species		Density	
			1	2	Type	%	Code	%	Initial	Thin
Hw (G/M)	Sx 50 PI 25 H25	2	15	5	plant	30	Sx	50	800	1400
							PI	25	600	
					natural	70	Hw At ^a	25	2000 3000	
Hw (P)	Hw 50 PI 50	2	15	5	plant	30	PI	50	1400	1400
					natural	70	Hw At ^a	50	3000 2000	
BI (G/M)	Sx 75 BI 25	2	15	5	plant	40	Sx	75	1400	1400
					natural	60	BI	25	500	
							At ^a		2000	
BI (P)	PI 75 BI 25	2	15	5	plant	40	PI	75	1400	1400
					natural	60	BI	25	500	
							At ^a		2000	
Cw (G/M)	Cw 50 Sx 30 Act 20	2	15	5	plant	60	Cw	50	900	1400
							Sx	30	500	
					natural	40	Act	20	2000	
Cw (P)	Cw 40 Hw 30 PI 30	2	15	5	plant	50	Cw	40	800	1400
							PI	30	600	
					natural		Hw	30	3000	
Sx (G/M)	Sx 70 Act 30	2	15	5	plant	35	Sx	70	1600	1400
					natural	65	Act	30	3000	
Sx (P)	PI 60 Sx 40	2	15	5	plant	50	PI	60	800	1400
							Sx	40	600	
					natural	50	At/Ep ^a		2000	
PI (G/M)	PI 60 Hw 20 Sx 20	2	15	5	plant	35	PI	60	800	1200
							Sx	20	600	
					natural	65	Hw At/Ep ^a	20 20	3000 3000	
PI (P)	PI60 Hw 40	2	15	5	plant	25	PI	60	1400	1200
					natural	75	Hw At/Ep ^a	40 40	2000 2000	
Act (G/M)	Act 50 Sx 50	2	15	5	plant	20	Sx	50	1400	1400
					natural	80	Act	50	5000	
At/Ep (G/M)	At/Ep 50 PI 30 Hw 20	2	15	5	plant	20	PI	30	1400	1600
					natural	80	Hw At/Ep	20 50	1000 5000	

(a) The deciduous component shown is natural ingress, which is thinned out and therefore not represented in the final stand composition.

6. Current Forest Management Assumptions

Data source and comments:

1. Based on a review of immature plantation history it is evident that in most instances there is an abundance of species and stocking. To ensure that high initial stocking levels are recognized, this is accounted for by the natural ingress of hemlock and deciduous. Normal silviculture operations reduce stocking to less than 2000 sph. to meet free-growing obligations.
2. The species per cent shown represents the post thinning proportions.
3. Provincial average operational adjustment factor (OAF) values are assigned as no local values are available. It should be noted that spruce leader weevil infestation is common. Loss in productive growth has not been quantified for this insect. In most cases it appears, on the ground, that the stands survive the attack (often 2–4 attacks per stem) and will still attain merchantable size and stem quality.
4. The deciduous analysis units are modelled using VDYP. The deciduous components of coniferous leading stands are also modelled using VDYP.
5. Sources:
 - a. Immature plantation history (ISIS);
 - b. Prince Rupert Forest Region free-growing stocking standards;
 - c. Local knowledge.
6. Thinning (free-growing obligation) occurs generally between age 10 and 20 years.

6.3.2 Immature plantation history

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

Table 17. Immature plantation history

Analysis unit	Area managed (per cent)	
	Age 1-10	Age 11-20
Hw (G/M)	100	100
Hw (P)	100	0
Cw (G/M)	0	100
Sx (G/M)	100	85
Sx (P)	100	65
PI (G/M)	100	95
PI (P)	100	0

Data source and comments:

Source: ISIS Silviculture and Inventory label information.

6. Current Forest Management Assumptions

All stands less than 20 years old are assigned to TIPSy managed stand yield curves, with the exception of those stands with less than 700 well-spaced conifers per hectare. These stands have a large component of deciduous crop trees; as a result, the use of TIPSy is not appropriate for modelling their growth and yield.

6.3.3 Not satisfactorily restocked (NSR) areas

Land classified in the TSA FIP file as type identity 4 or 9 is included in the current timber harvesting land base. These type identities indicate not satisfactorily restocked land base. The purpose of this section is to identify the total NSR area currently existing in the timber harvesting land base, and the estimated rate at which the NSR area will be restocked. The inventory file NSR records have been assigned to analysis units based on the species proportions shown in the silviculture records for the TSA.

Table 18. Not satisfactorily restocked (NSR) areas

Analysis unit		Total area (hectares)	Hectares of NSR (age range years from now)	
			Restocked	1-10
Hw	(G/M)	315	305	10
Sx	(G/M)	1 281	671	610
Pl	(G/M)	1 153	118	35
Act	(G/M)	300		300
At /Ep	(G/M)	187		187
Total		3 236	2 094	1 142

Data source and comments:

ISIS, February 1997

FIP, April 1997

1. Most Sx (G/M), Act (G/M), and At/Ep (G/M) currently have sufficient stems per hectare to be managed as deciduous/coniferous mixtures. The stand tending objective is to create mixtures complementing existing conifer stocking with deciduous by thinning deciduous (and sometimes conifers) to total stocking of 1400-1600 sph.

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)”, forest cover requirements may be examined at a number of different levels. These may be considered as layers in 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 (productive forest which does not contribute to the timber harvesting land base) may be considered in the forest cover requirements (i.e., maximum allowable disturbance or minimum area retention).

Table 19. Forest cover requirements

Zone or group	Maximum allowable disturbance (% area)	Green-up height (metres)	Minimum retained area (%)	Minimum age	Consideration of non-contributing forest (per cent)	
					Maximum	Minimum
Grizzly bear	30	3	10	100	100	
Fisher zone ^a	30	3	10	140	100	
Goshawk nesting habitat	30	3	4	140	100	
IRM	25	3			none	N/A
VQO	9 ^b	6			100	

(a) This zone will also be modelled to ensure that at least 15% of the area has a deciduous component older than 100 years.

(b) Initial value, see Section 6.4.1.1, “Visual quality objectives (VQOs)”, for details on further refinement required.

Data source and comments:

Wildlife objectives are to maintain sufficient habitat for identified wildlife species occurring in the Cranberry TSA include grizzly bear, fisher and northern goshawk. The forest cover requirements defined above were developed based on technical reports, local information and interpretation of forest cover maps by B.C. Environment personnel in April 1997.

6. Current Forest Management Assumptions

6.4.1.1 Visual quality objectives (VQOs)

For areas with VQOs of retention and partial retention, a green-up of 6 metres was used, as per local estimates and the report *Procedures for Factoring Recreation Resource into the Timber Supply Analyses*. The following table shows the initial development of the maximum allowable disturbance per cent. This value will be further refined in the analysis by consideration of the dispersion pattern and the contribution of the non-timber harvesting land base areas.

Table 20. Per cent allowable denudation, partial retention VQO management zone

VQO class	VAC (visual absorption capability)						Weighted average
	High		Medium		Low		
	% area	% denudation	% area	% denudation	% area	% denudation	
Partial retention	7.5	15	65.6	10.0	26.9	6	9.3

Preservation VQO areas are excluded from the timber harvesting land base (see Section 5.2.6, “Areas considered inoperable”). Less than 30 hectares of the TSA are described as retention VQO areas; therefore, they are being considered part of the partial retention VQO management zone.

6.4.2 Stand level biodiversity — 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 the retention of wildlife trees while the other is the retention of 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 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. Recognizing the overlap between these two objectives will eliminate inappropriate reductions in volume or timber harvesting land base.

The guidebook also indicates that wildlife tree patches (group reserves) larger than two hectares in size within a cutblock boundary can contribute to old-seral stage forest requirements at the landscape level. Where this practice is occurring regularly, it will be considered in the analysis.

6. Current Forest Management Assumptions

Table 21. Reductions to reflect volume retention in cutblocks

Management zone	Analysis unit	Reason for residual volume	Persistence	Residual volume or area estimate on the timber harvesting land base (% or m ³ per hectare)
IRM	all	WTP	persistent	2.5% of volume
VQO	all	WTP	persistent	2.5% of volume
Wildlife	all	WTP	persistent	2.5% of volume

Data source and comments:

2.5% volume reduction for wildlife tree patches was determined by completing a sample of wildlife tree patches within the neighboring Kispiox TSA. Due to the transfer of tenure in the Cranberry there is no available information within the Cranberry TSA.

WTPs in the IRM areas are generally greater than two hectares in size and can be considered to contribute to old-forest retention.

6.4.3 Landscape level biodiversity — seral stage distribution

Considerations for landscape-level biodiversity will be accounted for by applying the low level biodiversity emphasis option to all areas of the timber supply area. The low biodiversity emphasis is applied because at this time, more detailed landscape-level biodiversity objectives have not been established in the Cranberry timber supply area. The following tables outline the seral stage distribution objectives within each biogeoclimatic unit. These objectives are consistent with the objectives described in the *Biodiversity Guidebook (FPC)* for managing for a low biodiversity emphasis.

6. Current Forest Management Assumptions

Table 22. Landscape level biodiversity — seral stage distribution

Biogeoclimatic unit	Natural disturbance type	Seral stage definitions		Distribution objectives	
			Mature		Old
ESSF - Englemann spruce - subalpine fir	NDT1	> 19%	> 120 years	> 19%	> 250 years
MH - Mountain hemlock	NDT1	> 19%	> 120 years	> 19%	> 250 years
CWH - Coastal western-hemlock	NDT2	> 17%	> 80 years	> 9%	> 250 years
ICHmc1 - Interior cedar-hemlock	NDT2	> 15%	> 100 years	> 9%	> 250 years
ICHmc2 - Interior cedar-hemlock	NDT2	> 15%	> 100 years	> 9%	> 250 years

7. Sensitivity Analyses to be Performed

Sensitivity analysis provides a measure of the timber supply impact for those factors in which 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 sensitivities that are carried out in all TSAs.

Table 23. Sensitivity issues specific to the Cranberry TSA

Issue to be tested
Riparian reserve zones
Wildlife parameters
Botanical forest products-mushroom picking
Increase unsalvaged losses to 5000 m ³ and 10 000 m ³ /year
Landscape level biodiversity

Table 24. Standard sensitivity analysis

Issue to be tested
Minimum harvestable age
Existing stand yields
Regenerated stand yields
Site index estimate for older stands
Age when forest achieves “old” forest characteristics
Land base changes
Visual quality objectives
Harvest flow alternatives
Green-up periods
Adjacency and green-up guidelines