TIMBER SUPPLY ANALYSIS INFORMATION PACKAGE
FOR TREE FARM LICENCE 44

MANAGEMENT PLAN NO. 4

Weyerhaeuser Company Limited
B.C. Coastal Group
Nanaimo Woodlands

Prepared by:

Timberline Forest Inventory Consultants Ltd.

Version 2

June 2002

TABLE OF CONTENTS

LIST OF TABLES

1.0 Introduction

This Information Package has been prepared as a source document prior to the completion of the Timber Supply Analysis Report for Management Plan (MP) No. 4 for Tree Farm Licence (TFL) 44. It serves as a summary of the inputs and assumptions made in preparing for the timber supply analysis. Included are inventory and landbase summaries, growth and yield information and management assumptions for timber and non-timber resources related to timber supply. It follows the suggested format outlined in the *Tree Farm Licence Management Plan Guidelines* (March, 2001). The Base Case (Current Management Strategies) and a number of sensitivity analyses have been identified for analysis. These options will be reviewed and evaluated, and an allowable annual cut (AAC) will be recommended for acceptance by the Chief Forester.

2.0 Process

Version 1 of the Information Package was submitted to Timber Supply Branch, Ministry of Forests in September of 2001. The Information Package was accepted subject to some conditions in April 2002. A copy of the acceptance letter is included in Appendix IV of this report. Revisions have been made and are included in this document, Version 2 of the Information Package.

2.1 Growth and Yield

Weyerhaeuser Company Ltd., Nanaimo Woodlands has developed yield tables, using the yield model Y_XENO. The methodologies are documented in Section 8.0.

3.0 Timber Supply Forecasts and Sensitivities

3.1 Base Case

This option reflects current management performance based on the date of commencement for the preparation of MP No 4. The Base Case analysis will incorporate:

- Inventory updated to December 31, 1995 for changes in landbase and ownership, fire and reforestation. In addition the inventory has been updated to the end of 2000 for logging;
- Mature inventory volumes have been recompiled to incorporate more recent operational cruising and to exclude logged samples;
- Current management regimes;
- Updated map base to TRIM NAD 83;
- Existing physical operability mapping;
- Allowances for uneconomic areas;
- Some updated terrain mapping (revised netdowns for unstable terrain);
- Existing recreation features inventory;
- Updated visual landscape inventory and known scenic areas;
- Definition of biodiversity in accordance with Landscape Unit Planning Guide (LUPG);

- Definition of riparian buffers consistent with Riparian Management Area Guidebook;
- Grandparented ungulate winter ranges;
- Updated stream / riparian classifications;
- Updated inventory of Marbled Murrelet habitat areas;
- Community watersheds;
- Rate of harvest constraints from Coastal Watershed Assessment procedures;
- Forest Stewardship Zones and Variable Retention Harvesting (VRH);
- An allowance for Culturally Modified Trees (CMTs);
- Reduced green-up of 1.3m for adjacency in Enhanced Forestry Zones;
- Definition of merchantable stands and utilization standards;
- Definition of non-recoverable losses (NRLs); and
- Minimum harvest ages.

Three separate portions of TFL 44 will be modelled, specifically:

1. *Alberni East and Alberni West Working Circles*

   These areas will be analyzed (in both the timber supply analysis and the Twenty-Year Plan) and reported on as a single unit. The timber supply model (CASH6) can readily handle the larger data set, the two areas are geographically contiguous and similar management constraints apply. The sensitivity analyses described in Section 3.2 will be applied to this area.

2. *Clayoquot Working Circle (Upper Kennedy / Marion Creek and private lots mostly in the Kennedy Lake / Lower Kennedy River area)*

   The timber supply analysis of this area will recognize additional management requirements defined in the report by the Clayoquot Sound Scientific Panel (1995). These include rate of cut constraints by watershed basin and a minimum requirement for forest of 140 years of age and older. It is proposed that a report on the resulting rate of harvest by watershed basin is used to meet the Twenty-Year Plan requirement. The actual harvest footprint will be light compared to other areas and adjacency and other spatial constraints will not be an issue.

3. *Ucluelet Working Circle (also known as the Barkley Block)*

   Weyerhaeuser and the MoF are discussing the removal of this area from TFL 44 and the addition of it to the Arrowsmith TSA. It is expected that this process will be completed before the end of MP No.3. A separate timber supply analysis of the Ucluelet Working Circle will occur if it is still part of TFL 44 in early 2002. A Twenty-Year Plan will be completed for the Ucluelet Working Circle.

3.2 Sensitivity Analysis

Sensitivity analysis provides a measure of the upper and lower bounds of a "Base Case" harvest forecast that reflects the uncertainty of assumptions made in the Base Case. The magnitude of the increase and decrease in the sensitivity variable reflects the degree of uncertainty surrounding the assumption associated with that given variable. By developing and testing a number of sensitivity analyses, it is possible to determine which variables most affect results. To allow meaningful comparison of sensitivity analyses, they are usually performed using the Base Case option (*i.e.* current performance) and varying only the assumption being tested (*i.e.* all other assumptions remain the same as in the Base Case option). Each scenario will be fully documented with respect to the data and assumptions employed.

Table 3.1 summarizes the sensitivity issues to be addressed for the combined Alberni East and Alberni West Working Circles. A reduced set of sensitivities will be applied for the Ucluelet and Clayoquot Working Circles.. The sensitivity levels included in this table are starting levels only, and may be altered based upon the results of the analyses.

Table 3.1. Current management sensitivity analyses

Issue	Sensitivity Levels to be Tested
Landbase revisions	adjust timber harvesting landbase by +/- 5% exclude three first nations areas exclude mature areas classified as marginally economic
Growth and yield	adjust mature volumes by +/- 10% adjust second-growth stand yields by +/- 10% apply inventory site indices
Forest project	exclude forest project stewardship zones and variable retention apply higher levels of retention
Biodiversity	remove old seral constraint exclude forest ecosystem networks (FENs) exclude forest ecosystem networks (FENs) and remove old seral
Visual landscape	apply alternative higher Visually Effective Green-up (VEG) heights apply maximum disturbance in Scenic Area Zone 1 (c.f. mid-point)
Adjacency	apply 3m green-up for adjacency in enhanced forestry zones (c.f. 1.3m)
Minimum harvest ages	minimum harvest ages for second-growth based on 400 m^3/ha (c.f. 350 m^3/ha) apply longer rotations in scenic area zone 1, partial retention areas
Harvest flow	harvest the undercut during the first ten years attempt to maintain the current AAC for 20 years higher harvest levels in the first 50 years establish a non-declining even flow (NDEF) harvest level

3.3 Harvest Flows

In the Base Case analysis, the choice(s) of harvest flow will reflect the following objectives:

- Gradually adjust harvest levels towards the best estimate of the Long Term Harvest Level (LTHL) for the forest;
- Limit harvest reductions per decade to no more than 10% unless greater reductions are necessitated by timberland reallocation to higher land use; and
- Achieve a stable long-term harvest level.

A number of different harvest flows will be explored, based on tradeoffs between short and medium-term harvest levels. Forest cover constraints and biological capacity of the net operable landbase will dictate the harvest level.

4.0 Forest Estate Model

The simulation model CASH6 (Critical Analysis by Simulation of Harvesting), Version 6.2g will be used to develop harvest schedules integrating all resource management considerations, for all options and sensitivity analyses included in the MP No. 4 timber supply analysis. Timberline Forest Inventory Consultants developed this proprietary software.

The model uses a geographic approach to landbase and inventory in order to adhere as closely as possible to the intent of forest cover requirements on harvesting. Maximum disturbance and minimum thermal and old growth retention forest cover requirements, as well as biodiversity seral stage requirements are explicitly implemented.

A variable degree of spatial resolution is available depending on inventory formulation and resource emphasis area definitions. Forest stands in refuges such as environmentally sensitive and inoperable areas that do not contribute to the periodic harvest can be included to better model forest structure.

In their current implementation, forest cover objectives require a control area over which to operate. The control area for a constraint set should correspond to a realistic element in the landscape. For example, the requirements associated with visual quality objectives are designed to operate on the scene visible from discrete sets of viewpoints. Pseudo-geography may be employed to translate spatial constraints on harvesting into forest cover and static access constraints. The objective is to identify the "natural" constituency for forest cover constraints. CASH6 contains a hierarchical landbase organization to assist in implementing control areas. Numerous levels of land aggregation are used to define both geographically separate areas and areas of similar management regime. Forest cover constraints can be applied at up to 5 overlapping levels.

5.0 Current Forest Cover Inventory

The first forest inventory was completed in 1956. Since then, it has been maintained and improved by new cruises of both mature and the immature forest. The base for this analysis is an inventory updated to December 31, 1995 for changes in landbase and ownership, fire and reforestation. In addition the spatial data has been updated to 2000 for logging and 2001 for timber supply analysis.

The basic building block of the inventory is the "stand." Each stand is identified by the following variables:

1. A measure of site productivity: expressed by 3-meter site index classes.
2. Age of immature by year established.
3. Up to three species: in descending order of basal area.
4. A measure of stocking:
   - Volume class in mature and in older second growth cruised during the last 20 years;
   - Basal area in cruised second-growth stands; and
   - Number of stems per hectare and distribution in younger stands.

These measures of inventory permit highly specific aggregation of similar stands for yield projection and analysis.

5.1 Mature Inventory

The mature inventory is defined as stands greater than 100 years of age at time of the 1970s inventory of TFL 44. This corresponds to stands of greater than 125 years of age in the year 2000.

Since the original cruise in 1956, the inventory has been continuously upgraded and updated as follows:

1. In 1958, a more intensive cruise was made of Douglas-fir forests.
2. In 1963, more new cruising was completed and all volumes were recompiled.
3. In 1966, mature volumes were recompiled, as required by MoF, to close utilization standards (15 cm top diameter for trees 22.5 cm and larger).
4. In 1972, mature volumes were recompiled using new MB decay factors.
5. Between 1973 and 1977, the TFL was re-inventoried.
6. In 1987 and 2000, operational cruising was combined with the inventory to improve the less intensive original inventory on these areas.
7. On both occasions, in the remaining area (not included in the operational cruise), average lines were recalculated to reflect the samples remaining.
8. The volume recompilation in 2000 used MB's 1973 loss factors and Kozak's Taper Equation Version 4.1.
9. In addition, the inventory has been updated to reflect areas and volumes logged.

The 2000, mature volume less estimates of decay, before any other deductions, is 87,417,000 m^3. These volumes have been reduced for recent removals as Protected Areas.

Forty two percent of the mature timber volume is now estimated from operational cruising, a more intensive cruise than the earlier inventories.

Most of the remaining 1970s inventory has been subject to inventory audits during the last six years. Separate check cruises were conducted for Blocks1, 2, 3 and 4 of the TFL. The results show no significant difference between the check volumes and the inventory volumes for any of these Blocks. Overall, if the % differences indicated by the audit results were applied, then the total effect is a 0.5% decrease in the mature volume for the timber harvesting landbase. Hence no changes have been made to the inventory volumes in the base option. Refer to a summary of the audit results in Appendix I.

5.2 Mature Volume Adjustments

5.2.1 Cull (Z) Grades

The mature timber inventory includes cull (Z) grade timber that is not part of the AAC as it is neither scaled nor charged as residue. A 3.2% volume deduction for cull grades is based on the average proportion for the inventory.

5.2.2 Waste and Breakage

From the start of annual residue surveys in 1967 until 1989, MacMillan Bloedel Ltd. (Weyerhaeuser) measured all residue components including breakage and W2, resulting in a unique data set. Actual measured breakage and W2 are applied to the inventory as a netdown for analysis purposes. The average for the period from 1985 to 1989 of 6.73% is applied in the timber supply analysis. In aggregate, the volume deductions for cull grades, waste and breakage applied to the mature inventory amount to 8,488,180 m^3.

5.3 New Forest Inventory

During the 1970s forest inventory, all the immature forest was cruised and mapped. Each stand was described according to age, species, site index class and stocking. The new forest inventory is updated by a two-stage process. First, the stand information for new, planted and natural stands is added into the inventory annually. Annual updates are also made for any changes found by assessment of survival and free-growing status. Second, as the new stands reach "pole size", generally between 20 and 35 years, they are re-inventoried; site index is measured based on the growth of the new crop; and volume and basal area are obtained as measures of stocking. Since 1977, cruise data has been entered into the inventory database for 19,000 hectares of second growth that has been re-inventoried.

5.4 Not Satisfactory Restocked (NSR) Inventory

Areas logged or otherwise rendered unstocked, e.g., fire kill, are recorded in the inventory annually. For planning and control purposes, all NSR areas are categorized and summarized to show areas prescribed for site preparation, planting or natural regeneration, and the target date for achievement. NSR areas are re-classified as second growth when they meet or exceed inventory requirements.

5.5 Inventory Changes Since MP No.3 Timber Supply Analysis (July 1997)

Table 5.1 summarizes the changes in the total TFL 44 area between MP No.3 and MP No.4. The major change is the transfer of much of the Clayoquot Sound portion of the TFL to TFL 57 in 1999. A smaller area has also been removed as parks.

Table 5.1. Inventory change, MP No.4 vs. MP No.3

Issues	Total Area (ha)
MP No. 3	410,794
MP No. 4	321,939
Difference	***-88,855***
Transfer to TFL 57	87,664
Parks	196
Other	995
Total withdrawals	***88,855***

The remaining difference of 995 hectares results from a change in the map datum and adjustments to tenure boundaries. All TFL 44 inventories including forest cover have been shifted from NAD 27 (map datum) to NAD 83. This will provide greater consistency with the mapbase of government agencies and other organizations in Coastal BC. On-going quality control checks on NAD 83 map products are resulting in small changes. At the same time as the NAD shift, tenure boundaries were adjusted according to the Surveyor General's Cadastre. Some of these map changes do not appear to agree with the on the ground or legal descriptions of boundaries. In total, such differences are expected to be minor and they will be addressed over time.

6.0 Description of Land Base

This section describes the TFL 44 land base and the methodology used to determine the way in which land contributes to the analysis. Some portions of the productive landbase, while not contributing to harvest, may be available to meet other resource needs.

6.1 Timber Harvesting Landbase Determination

Table 6.1 presents the results of the landbase classification process to identify the timber harvesting or net operable landbase. Individual areas may have several classification attributes. For example, stands within riparian boundaries might also be classified as non-productive. These areas would have been classified on the basis of this latter attribute, prior to the riparian classification. Therefore, in most cases the net reduction will be less than the total area in the classification. Table 6.2 depicts the landbase classification by volume in mature stands (stand age > 125 years).

The net landbase has been determined using the "Highest Netdown" approach. For example, consider an area with a net-down of 50% for recreation and a net-down of 25% for riparian retention. The higher net-down of 50% is applied resulting in a total net-down of 50% for the area. It is assumed that the 25% riparian retention requirement is included in the area netted-down for recreation.

By contrast, using the "Multiplicative" approach the 50% net-down would have been applied and then the 25% net-down also applied to the remaining 50% of the area for a total net-down of 62.5% (50% plus 25% of 50%).

The "Highest Netdown" approach has been applied as many overlapping net-downs do coincide. Examples include recreation and water (riparian) features and unstable terrain concerns and riparian areas. The impact on the THLB is small. In a comparison of the two approaches, the "Multiplicative" method reduced the THLB by slightly less than 1% compared to the "Highest Net-down" approach.

Table 6.1. Timber harvesting landbase determination by working circle (area)

Classification	Productive (ha)	Net Area (ha)								Total (ha)
		Alberni East		Alberni West		Clayoquot		Ucluelet		
		Sched A	Sched B	Sched A	Sched B	Sched A	Sched B	Sched A	Sched B	
Total Landbase		**69,201**	**83,481**	**45,998**	**99,003**	**2,600**	**10,512**	**2,487**	**8,659**	**321,941**
Non-forest		3,524	1,514	2,259	20,567	114	2,246	115	308	30,647
Roads		1,846	2,887	1,296	1,872	42	78	80	349	8,450
Total Forested		***63,831***	***79,080***	***42,443***	***76,564***	***2,444***	***8,188***	***2,292***	***8,002***	***282,844***
Reductions to Forested:										
Non-productive		2,211	1,878	1,407	7,152	70	1,632	173	135	14,657
Total Productive	***268,187***	***61,620***	***77,202***	***41,036***	***69,413***	***2,374***	***6,556***	***2,119***	***7,867***	***268,187***
Reductions to Productive:										
Inoperable	9,454	1,053	1,024	1,084	5,340	85	869	0	0	9,454
Total Operable		***60,567***	***76,178***	***39,953***	***64,073***	***2,289***	***5,688***	***2,119***	***7,867***	***258,733***
Reductions (100%):										
Recreation	2,404	317	358	764	522	117	57	142	1	2,278
Community watersheds	13	0	0	0	13	0	0	0	0	13
Ungulate winter range	2,576	1,035	498	621	354	0	0	0	0	2,507
Marbled Murrelet	5,988	1,573	2,037	347	977	0	0	0	0	4,934
Nahmint old growth reserves	121	0	0	0	19	0	0	0	0	19
Riparian reserve	10,972	2,143	2,350	1,816	2,908	40	9	104	293	9,664
Uneconomic	11,745	1,068	438	1,055	5,306	96	539	87	181	8,771
Reductions (partial):										
Avalanche	718	2	0	2	13	0	12	0	0	29
Stream management	36,725	1,789	2,171	1,085	1,935	36	140	50	218	7,424
Lake & wetland management	2,273	33	58	158	198	2	2	1	8	461
Recreation	22,206	904	810	704	1,069	124	173	48	39	3,871
Slope / Terrain	83,950	4,155	4,446	1,589	4,763	16	824	55	452	16,299
Wildlife	4,259	626	48	438	765	34	71	0	0	1,982
Stewardship zones	268,187	2,672	3,625	2,140	4,235	148	290	109	348	13,567
Deciduous	3,267	321	419	114	102	1	0	23	3	982
Unmapped streams	268,187	439	589	292	411	17	36	15	63	1,862
Wildlife tree patches	268,187	1,087	1,458	723	1,016	41	88	37	157	4,608
Culturally modified trees	268,187	92	74	33	68	3	13	3	10	296
Clayoquot Sound Panel	8,930	0	0	0	0	472	1,004	0	0	1,476
NSR	3,027	1,038	589	491	304	0	0	0	0	2,422
Total Operable Reductions		19,294	19,968	12,373	24,978	1,147	3,258	675	1,772	83,466
Reduced Landbase		***41,273***	***56,210***	***27,579***	***39,095***	***1,142***	***2,429***	***1,444***	***6,095***	***175,267***
Future Changes:										
Less future roads		1,515	1,207	611	1,072	28	126	40	144	4,743
Plus NSR		1,038	589	491	304	0	0	0	0	2,422
Long-term Landbase		***40,796***	***55,592***	***27,459***	***38,327***	***1,114***	***2,303***	***1,403***	***5,951***	***172,946***

Table 6.2. Timber harvesting landbase by working circle (volume in mature stands)

Classification	Productive (ha)	Volume (m^3)								Total (m^3)
		Alberni East		Alberni West		Clayoquot		Ucluelet		
		Sched A	Sched B	Sched A	Sched B	Sched A	Sched B	Sched A	Sched B	
Total Landbase (Inventory)		**26,527,883**	**21,922,124**	**9,789,237**	**22,320,698**	**691,003**	**3,858,592**	**587,209**	**1,720,144**	**87,416,890**
Waste and breakage		2,575,857	2,128,638	950,535	2,167,340	67,096	374,669	57,018	167,026	8,488,180
Total Landbase (Net volume)		***23,952,025***	***19,793,486***	***8,838,702***	***20,153,359***	***623,906***	***3,483,923***	***530,191***	***1,553,118***	***78,928,710***
Non-forest		0	0	0	0	0	0	0	0	0
Roads		187,029	173,338	82,434	110,715	2,663	4,306	5,420	22,250	588,155
Total Forested		***23,764,996***	***19,620,148***	***8,756,268***	***20,042,644***	***621,243***	***3,479,617***	***524,770***	***1,530,868***	***78,340,556***
Reductions to Forested:										
Non-productive		0	0	0	0	0	0	0	0	0
Total Productive	***268,185***	***23,764,996***	***19,620,148***	***8,756,268***	***20,042,644***	***621,243***	***3,479,617***	***524,770***	***1,530,868***	***78,340,556***
Reductions to Productive:										
Inoperable	9,454	729,757	634,071	652,521	2,858,935	46,585	528,368	0	0	5,450,238
Total Operable		***23,035,239***	***18,986,076***	***8,103,747***	***17,183,708***	***574,658***	***2,951,250***	***524,770***	***1,530,868***	***72,890,317***
Reductions (100%):										
Recreation	2,404	179,029	103,951	130,711	239,558	51,792	25,197	60,558	386	791,181
Community watersheds	13	0	0	0	1,420	0	0	0	0	1,420
Ungulate winter range	2,576	816,680	375,894	365,556	208,510	0	0	0	0	1,766,639
Marbled Murrelet	5,988	1,390,183	1,557,772	244,616	674,995	0	0	0	0	3,867,567
Nahmint old growth reserves	121	0	0	0	16,307	0	0	0	0	16,307
Riparian reserves	10,972	426,074	293,851	487,291	680,683	668	6,042	21,493	75,124	1,991,226
Uneconomic	11,745	264,338	136,469	316,682	1,688,115	24,460	159,818	21,773	39,449	2,651,105
Reductions (partial):										
Avalanche	718	1,349	0	1,497	8,431	0	8,303	0	0	19,580
Stream management	36,725	546,860	355,422	207,574	428,344	6,506	68,329	7,873	42,175	1,663,083
Lake & wetland management	2,273	12,652	10,380	41,625	35,707	163	1,223	572	3,722	106,046
Recreation	22,206	307,037	96,187	143,758	315,674	36,868	80,778	17,273	9,475	1,007,052
Slope / Terrain	83,950	2,268,908	2,004,635	731,083	1,976,680	7,956	586,989	29,802	159,516	7,765,568
Wildlife	4,259	364,725	31,325	233,522	427,947	25,544	57,659	0	0	1,140,723
Stewardship zones	268,187	1,032,469	962,994	582,588	1,585,639	36,566	146,768	19,894	61,746	4,428,663
Deciduous	3,267	0	0	0	0	0	0	0	0	0
Unmapped streams	268,187	154,249	130,572	46,783	89,958	3,841	18,101	3,455	11,393	458,353
Wildlife tree patches	268,187	381,767	323,166	115,789	222,645	9,507	44,801	8,552	28,197	1,134,424
Culturally modified trees	268,187	74,444	63,017	22,273	42,915	1,854	8,736	1,667	5,498	220,402
Clayoquot Sound Panel	8,930	0	0	0	0	107,839	508,165	0	0	616,004
Total Operable Reductions		8,220,765	6,445,634	3,671,349	8,643,528	313,564	1,720,909	192,912	436,681	29,645,343
Reduced Landbase		***14,814,474***	***12,540,442***	***4,432,398***	***8,540,180***	***261,093***	***1,230,340***	***331,858***	***1,094,187***	***43,244,974***

6.2 Total Area

The total area of TFL 44 is 321,941 hectares, including 120,286 hectares of Schedule A (Crown Grant and Timber Licenses) and 201,655 hectares of Schedule B (Crown) lands (Table 6.3).

Table 6.3. Total area – TFL 44

Working Circle	Schedule	Total Area (ha)	Productive Area (ha)
Alberni East	A	69,201	61,620
	B	83,481	77,202
Alberni West	A	45,998	41,036
	B	99,003	69,413
Clayoquot	A	2,600	2,374
	B	10,512	6,556
Ucluelet	A	2,487	2,119
	B	8,659	7,867
Total		**321,941**	**268,187**

6.3 Non-forest

All land classified as non-forest (lakes, swamps, rock, alpine, *etc*.) was excluded from the net timber harvesting landbase as shown in Table 6.4.

Table 6.4. Non-productive & non-forest reductions

Classification	Area (ha)
Non-forest	30,647

6.4 Roads, Trails and Landings

6.4.1 Reduction for Existing Roads, Trails and Landings

Forest operations create roads, trails and landings which can reduce the productivity of growing sites, and reduce the area available for growing trees. Existing roads, trails and landings are too small to be identified as polygons in the digital inventory files. In general, the timber for which roads, trails and landings have already been constructed has been logged. For this reason the areas of currently regenerating stands (those with a history of logging) are adjusted. In addition, there are changes in available growing area and productivity for future stands due to road building disturbance.

6.4.2 Classified Roads, Trails and Landings

Existing roads for the TFL are in the GIS database for TFL 44 as line features. The area degraded by roads is estimated by applying a buffer of 6.7 meters to either side of the line (Table 6.5).

Table 6.5. Existing classified road area summary

Road Description	Road Measurements (on net landbase)		
	Length (km)	Width (m)	Area (ha)
Permanent Road	6,306	13.4	8,450

6.4.3 Future Roads, Trails and Landings

Upon harvesting, a component of each stand is placed into a category that will remain in a disturbed state for perpetuity. If the area harvested is included in an area associated with forest cover constraints relating to integrated resource management, the road area will become part of the disturbance area permanently. Generally these stands will provide harvest volume on the first entry but not on further entries. The area contributing to the long-term sustainable harvest is net of this amount. In CASH6, a percentage reduction will be applied to reduce the area of each forest class the first time it is harvested. Area reductions for future roads are based on the following:

6.4.3.1 Mature Areas (stand age > 125 years)

For conventional harvesting areas, a 7% reduction is made after initial harvest. This is based on areas occupied by roads in survey results from the early 1990s.

No reductions will be made for future roads in non-conventional harvest areas. By definition, these areas will be harvested by aerial systems and they will be accessed by roads developed for adjacent conventional harvest areas.

6.4.3.2 Second-Growth Areas (stand age > 60 years and < 125 years)

For areas established prior to 1940, the productive area is reduced by 5% after the initial harvest. These areas were logged before truck logging. They are often of relatively easy terrain, with partial access provided by existing road systems.

6.4.3.3 Recent Data on Site Degradation due to Roads

The West Island Timberlands Sustainable Forest Management (SFM) Plan reports on the "Annual percent of opening areas in permanent access structures" for the Defined Forest Area (DFA) of the SFM. The DFA is predominately TFL 44. Results for the period 1996 to 2000 area are depicted in Table 6.6.

Table 6.6. Annual percent of opening areas in permanent access

Year	Gross Area (ha)	Measured Access (ha)	% Permanent Access
1996	1,770	101	5.7
1997	1,702	90	5.3
1998	1,375	91	6.6
1999	1,626	109	6.7
2000	2,501	155	6.2
Total (1996-2000)	**8,974**	**546**	**6.1**

These results provide a magnitude check on assumptions – they are comparable to the 7% assumed for conventional mature areas and the 5% for older second-growth. They however relate to gross areas and do not split out the contributions of existing roads.

The site degradation survey results for 56 mature timber blocks (1259 net harvested ha) harvested in the Sproat Lake operation have been summarised. Site degradation averages 7.6% of the net harvested area for these blocks. This is comparable to the 7% assumed for conventional harvest areas in the analysis. Road widths were compiled for 65 blocks. The average road width for this sample was 14.0 m compared to the 13.4 m assumed for existing roads in the analysis.

6.5 Non-productive

Land classified as scrub or non-productive was excluded as shown in Table 6.7. These areas are mostly mature stands, defined as having an inventory volume of less than 211 m^3/ha (the metric equivalent of the 3,000 ft^3/acre cutoff used in the 1970s inventory). Second-growth stands included in the timber harvesting landbase for the base option have a site index of 12 or greater. These non-productive areas can contribute to landscape level biodiversity. While not incorporated into the biodiversity calculations, these components (amounting to 14, 657 hectares) provide a margin of safety around the biodiversity requirements.

Table 6.7. Non-productive and non-commercial reductions

Classification	Area (ha)
Non-productive / scrub	14,657

6.6 Operability

6.6.1 Physical Operability

The mature productive forest has been assessed for physical operability and for broad classes of logging methods. The assessment was done in 1993. Three classes have been mapped, specifically:

1. Physically Inoperable Timber

   Timber on productive land that is so steep and/or rocky, that it cannot be safely felled or yarded or a significant proportion of the volume could not be recovered. An area of 9,454 hectares with 5,450,238 m^3 of timber is excluded from the working landbase as physically inoperable.

2. Conventional Harvest Systems

   Includes timber on productive, physically operable land that is harvestable by conventional methods, *i.e.*, grapple, high-lead, hoe-chuck, skidder, etc.

3. Non-conventional Harvest Systems

   Includes timber on productive, physically operable land that is harvestable only by non-conventional methods. These include helicopter, balloon or long-line cable systems.

All land classified as inoperable was excluded from the net timber harvesting landbase as shown in Table 6.8.

Table 6.8. Physical operability classification and reductions

Operability Category	Productive (ha)	Operability Reductions (1)		
		% Reduction	Area (ha)	Volume (m^3)
Conventional	229,646			
Non-conventional	29,087			
Subtotal (operable)	***258,733***			
Inoperable	9,454	100	9,454	5,450,238
Total	**268,187**		**9,454**	**5,450,238**

(1) Reductions for this stage of the netdown process, excluding productive areas removed in previous steps

6.6.2 Economic Operability

Interpretation of economic operability differs from that of the MoF. Weyerhaeuser's view is that over the next 100+ years, all of the mature timber, physically safe to fell and extract without unacceptable environmental damage, will be economically available for harvest.

It differs from the MoF position that the economically operable landbase for the TFL should be based on the last price cycle. The Ministry of Forest's (MoF's) view is examined by classifying the landbase for "currently economic", "marginal" and "currently uneconomic".

Economic operability changes with changing markets, technologies and regulations. A classification based on detailed fieldwork is likely out of date by the time the information is plotted on maps. The approach taken here (and in MP No. 3) is to classify for economic operability based on inventory (m^3/ha, percentage pulp and species) characteristics as summarized in Table 6.9.

Table 6.9. Economic operability standards(1)

Stand Type	Conventional (m^3/ha)(2)		Non-conventional (m^3/ha)(2)	
	Uneconomic	Marginal	Uneconomic	Marginal
Fir, Fir-Hem				
Fir-Cedar	< 278	278–389	< 444	444–556
Hemlock				
Hem–Bal	< 333	333–434	< 500	500–611
Hem-Bal-Cyp				
<40% X, Y, Z Grades	< 333	333–444	< 444	444–556
>40% C, Y, Z Grades	< 444	444–556	> 556	556–667
Cedar				
<40% X, Y, Z Grades	< 278	278–389	< 389	389–500
>40% X, Y, Z Grades	< 389	389–500	< 556	556–667
Total (ha)	**4,193**	**4,044**	**4,578**	**2,130**
Total (m^3)	**1,104,840**	**1,461,308**	**1,546,265**	**999,568**

(1) Based on characteristics identifiable in the inventory
(2) Volume is Close U less decay

An area of 8,771 hectares with 2,651,105 m^3 of mature timber is excluded from the Base Case option landbase as "currently uneconomic".

6.6.3 Harvest Performance in Mature Stands by Harvest Method and Operability Class

Table 6.10 compares the distribution of mature volumes by harvest method and operability classes with harvest from mature stands for the period 1994 to 2001. A sensitivity option will test the impact of excluding mature stands classified as marginal.

Table 6.10. Harvest performance in mature stands on the THLB by operability

Operability	Area (ha)	Volume (m^3)	Volume (%)	% of Mature Harvest (1994 to 2001)
Conventional economic	42,258	33,408,292	77	89
Non-conventional economic	9,485	7,375,805	17	8
Marginal	6,174	2,460,877	6	3
Total	**57,917**	**43,244,974**	**100**	**100**

6.7 Environmentally Sensitive Areas

Most of TFL 44 has been mapped for terrain stability. However, mapping in different areas has occurred at various times throughout the last 25 years, at various levels of detail and to different standards. Much of the terrain stability mapping for TFL 44 is presently being updated to current standards. This project will be complete in 2003.

The procedure developed for MP No.3 to better estimate netdowns for unstable terrain has been expanded upon for MP No.4. The procedure is detailed in Appendix II. In summary it involves comparing five-class mapping and Es mapping for a number of separate geographic zones. Netdowns are then applied separately by terrain Class IV and V and for Es units by the different geographic zones. In two zones, slope classes are used to apply netdowns in unmapped areas.

The general procedures, including changes from MP No.3, have been reviewed by the Vancouver Region soils specialist. Refer to Appendix II for a copy of the letter from Tom Millard dated December 17, 2001.

Significantly more conservative (higher) netdowns than used in MP No.3 have been defined for some soil zones including Zone 3 (Henderson), Zone 4 (Nahmint) and parts of Zone 5 (Cous-MacTush).

As this report was going to print, company and consultant soil specialists noted that the Nahmint watershed netdowns for unstable terrain are significantly higher than those noted in the adjacent Henderson Lake and Sproat Lake watersheds. They recommended reducing the slope class netdowns for Zone 4 in Table 6.11 from 15% to 8.4% for slope class 60%-75% and from 54.2% to 30.2% for slope class 75% plus. The result is a reduction in the total unstable terrain netdown (Table 6.1) by approximately 456 hectares. This change will be discussed in the sensitivity analysis on the timber harvesting landbase.

Table 6.11. Terrain stability and slope netdowns (partial)

Terrain Zone	Partial Netdown (%)					
	Terrain Classification				Slope (%)	
	Class IV	Class V	Es1	Es2	60-75	75+
1	20.0	90.0	18.9	6.0	n/a	n/a
2	30.0	90.0	36.0	13.2	n/a	n/a
3	9.3	24.2	34.7	16.3	n/a	n/a
4	20.0	90.0	n/a	n/a	15.0	54.2
5A	20.0	90.0	58.0	20.4	n/a	n/a
5B	20.0	90.0	36.7	7.8	n/a	n/a
5C	n/a	n/a	65.1	17.2	n/a	n/a
6	20.0	90.0	90.0	20.0	n/a	n/a
7	20.0	90.0	n/a	n/a	n/a	n/a
8	20.0	90.0	n/a	n/a	23.0	37.0

Results of the project to review and update the terrain stability mapping, that become available during the next six months, will be communicated to MoF, Timber Supply Branch.

Terrain stability and slope classifications have been excluded from the net timber harvesting landbase as depicted in Table 6.12.

Table 6.12. Terrain and slope reductions

Classification	Area (ha)
Terrain	15,064
Slope	1,235
Total	**16,299**

6.8 Community Watersheds

The Haggard Creek community watershed in Block 4 of TFL 44 has been excluded from the net timber harvesting landbase as shown in Table 6.13.

Table 6.13. Community watershed reductions

Community Watershed	Area (ha)
Haggard Creek	13

6.9 Ungulate Winter Range

Deer winter ranges are similar to those applied in MP No.3 and have been grandparented in 1998. These areas are excluded from the timber harvesting landbase based on the classifications depicted in Table 6.14.

Table 6.14. Ungulate winter range reductions

Ungulate Zone	Netdown (%)	Area (ha)
Ew1	100	2,507
Ew2	50	193
Ew zones	73	1,789
Total		**4,489**

6.10 Marbled Murrelets

Revisions have been made to some of the Marbled Murrelet (MARMs) areas included in the MP No.3 analysis. In some cases they have been shifted to another location. The major change is the addition of approximately 1,140 hectares in three new Marbled Murrelet areas in the Corrigan landscape unit. This occurred during a recent planning initiative (with District MoF and MoWLAP staff) in the Corrigan landscape unit.

The Marms are not formally recognized as are grandparented ungulate winter ranges. However, they have been part of current practice in TFL 44 for almost 10 years. They were recognized (netted down) in MP #3 and similarly are recognized in FDPs. We believe that the location of these reserves may change as landscape unit planning proceeds and if not called MARMs in the future they may represent future Old Growth Management Areas and Wildlife Habitat Areas.

The Marbled Murrelet areas are excluded from the timber harvesting landbase (Table 6.15). The incremental impact on the THLB is 2,806 hectares.

Table 6.15. Marbled Murrelet reductions

Classification	Area (ha)
Marbled Murrelet	4,934

6.11 Wildlife Habitat Areas

A Wildlife Habitat Area (WHA) was established and made known on May 14, 2001. The WHA provides protection around Queen Charlotte Goshawk nests on McLaughlin Ridge in Alberni East. The specific netdowns for the WHA are not modelled in the analysis. Much of the area reserved in the WHA corresponds to existing netdowns for a deer winter range zone and a Marbled Murrelet area. It is estimated that the net impact of these changes plus recommended changes to the associated deer winter ranges will be approximately 100 hectares. This difference will be included in the sensitivity analysis on the timber harvesting landbase.

6.12 Recreation

The recreation inventory was completed in 1995 to 1991 MoF standards. An attempt was made to "roll over" the inventory to MoF 1998 standards during preparation of the data for the MP No.4 analysis. This initial attempt at the "roll over" was unsuccessful. Hence the inventory attributes of recreation feature significance and management class refer to descriptors in the 1991 standards.

MoF District and Regional recreation specialists and Weyerhaeuser staff agreed that the global application of a 50% net-down to all C1A recreation polygons (feature significance of C and management class of 1A) would often be too high and inappropriate. A review of all C1A polygons was undertaken and netdowns applied specifically to each polygon. These revised netdowns contribute to the area netdowns and the timber harvesting landbase. The main reasons for reducing the netdowns for specific C1A polygons included:

- Many polygons along streams and shorelines are excessively wide;
- Some were rated C1A because of visual values and subsequently covered off by visual landscape inventories; and
- Many relatively large polygons identify areas where activities such as trail use, wildlife viewing and driving or camping may occur, but these activities apply to small specific areas within the polygon.

Recreation areas are excluded from the timber harvesting landbase as shown in Table 6.16.

Table 6.16. Recreation reductions

Recreation Feature Significance	Recreation Management Class	Netdown (%)	Area (ha)
A,B	0	100	2,278
A,B	1	50	1,386
C	1A	10	224
C	1A	25	1,202
C	1A	50	1,059
Total			**6,149**

6.13 Nahmint Old Growth Reserves

An old-growth reserve was defined in the Upper Nahmint Valley during the Nahmint Local Resource Use Plan process in the 1980s. Consistent with the approach taken in the MP No.3 analysis, this area is removed from the net timber harvesting landbase as depicted in Table 6.17.. A large portion of the reserve has also been designated a Marbled Murrelet (Table 6.15).

Table 6.17. Old growth reserve reductions

Classification	Area (ha)
Nahmint old growth reserve	19

6.14 Riparian Allowances

Riparian allowances are designed to exclude harvesting from areas immediately adjacent to waterbodies, including streams, lakes, swamps and wetlands.

6.14.1 Streams and Rivers

Stream classification ("S Class") is based on that prepared for and submitted with Forest Development Plans. This inventory is updated as operational inventories are completed for planned cutblocks. Stream reaches that are currently not inventoried are classified according to local knowledge (for example of stream gradients) and by relating to inventoried stream reaches. The number of mapped smaller streams has increased with the change in the map base to Datum NAD 83 and the application of enhanced TRIM map data.

The presence of fish and community watersheds are recognized in classifying the smaller streams. The netdowns for riparian management areas are the maximum values defined in the Riparian Guidebook. Riparian buffers and netdowns in the Nahmint Watershed correspond to those defined in the Nahmint LRUP. The classifications and associated stream buffer widths are summarized in Table 6.18.

Table 6.18. Landbase reductions for streams

Stream Class[1]	Stream Width (m)	Reserve Zone (m)	Management Zone		Area (ha)	
			Width (m)	Netdown (%)	Reserve Zone	Management Zone
S1[2]	20.1-100	50	20	50	1,367	349
S2	5.1 - 20	30	20	50	3,741	1,214
S3	1.5 - 5	20	20	50	4,181	1,792
S4	<1.5	0	30	25	0	526
S5	>3.0	0	30	25	0	3,341
S6	3.0	0	20	5	0	202
Total					**9,289**	**7,424**

(1) Stream classes 1 to 4 apply to fish streams and community watersheds
(2) Includes Nahmint (fish bearing), S1 and S1 large (S1 large streams are identified according to local knowledge)

6.14.2 Lakes and Wetlands

Buffers and management area netdowns are consistent with the Riparian Guidebook for wetlands and smaller lakes. Larger management zone buffers (30m) have been applied to "L1" lakes based on local planning experience. The buffers and netdowns for Nahmint and Gracie Lakes are consistent with the Nahmint LRUP and as requested by the Manager of the Vancouver Forest Region in point 7 of his letter of April 27, 2001. Buffers have been created adjacent to mapped (1:20 000) lakes and wetlands and netdowns applied as described in Table 6.19.

Table 6.19. Landbase reductions for lakes and wetlands

Classification	Size Class (ha)	Reserve Zone (m)	Management Zone		Area (ha)	
			Width (m)	Netdown (%)	Reserve Zone	Mgmt Zone
Lakes						
L1 large	> 1000	0	30	50	16	198
L1	5-1000	10	30	25	144	67
L2	1-5 (dry zone[1])	10	20	25	15	9
L3	1-5 (wet zone)	0	30	25	0	16
L4	0.5-1 (dry zone)	0	30	25	0	3
Nahmint & Gracie		60	30	90	98	44
Subtotal (lakes)					***273***	***337***
Wetlands						
W1	> 5	10	40	25	41	30
W2	1-5 (dry zone)	10	20	25	47	28
W3	1-5 (wet zone)	0	30	25	0	32
W4	0.5-1 (dry zone)	0	30	25	0	22
W5[2]	>5	10	40	25	14	12
Subtotal					***102***	***124***
Total					**375**	**461**

(1) The "dry" zone includes the CDF, CWHds, CWHdm and CWHxm biogeoclimatic zones. Other zones in TFL 44 are in the "wet" zone
(2) Classified as W5 if the area consists of 2 or more individual wetlands with overlapping riparian management areas and the combined size of the wetlands is 5 ha or larger

6.14.3 Stream Allowance

The streams that are not mapped at 1:20 000 are small and generally not expected to contain fish. Most will be stream Class 6 with a relatively small management reserve zone. A netdown of 1% (1,862 hectares) of the net landbase (after considering mapped netdowns) is made as an additional allowance for these areas.

6.15 Avalanche

Avalanche run-out zones have been mapped as Ea1 areas. A 20% net-down is applied to these areas. The avalanche areas are excluded from the timber harvesting landbase as depicted in Table 6.20.

Table 6.20. Avalanche reductions

Classification	Area (ha)
Avalanche	29

6.16 Stewardship Zones and Variable Retention

In June of 1998, MacMillan Bloedel Ltd. (Weyerhaeuser) announced a new forest management strategy (The Forest Project). Key components include phasing in variable retention over a five-year period and an increase in conservation of old-growth forests and wildlife habitat on Coastal BC lands managed by the company.

The initiative includes the classification of forestlands into three distinct stewardship zones (old-growth, habitat and timber) with decreasing levels of landscape and stand-level retention (from old growth to timber) and a range of silvicultural systems from group selection to aggregated retention. The general management strategy for each silvicultural zone is as follows:

- Old-growth Zone

  The old-growth zone includes areas of high biodiversity and/or environmental sensitivity. High cultural and recreation values are also priority criteria. The primary management objective is the conservation of old-growth values. About two-thirds of the landscape will be retained as old-growth reserves. Where it occurs, harvesting will include application of group selection and irregular shelterwood silviculture systems and uneven-aged management. Retention minimums are 20%.

- Habitat Zone

  The habitat zone includes areas that have high biodiversity values and a moderate amount of old-growth. The primary management emphasis is maintenance of wildlife habitat diversity. Silviculture systems utilized in this zone include various types of shelterwood, group selection and group retention and a mix of even and uneven-aged management. Retention minimums are 15%.

- Timber Zone

  The timber zone includes land designated low in biodiversity. The primary management objective is timber management. Silvicultural systems used include group retention and various types of shelterwood with even-aged management. Retention minimums are 10% for group retention and 5% for dispersed retention.

A current (August 2001) draft classification of stewardship zones will be applied in this analysis. It is recognized that changes may occur as a result of higher level plans, other regional planning initiatives and further discussion with MoF and MoELP staff.

The draft classification includes habitat zones in the Nahmint and Strathcona-Taylor SMZs and the adjoining Sproat Lake Watershed. The other major area is in the Caycuse / Walbran watersheds in Alberni East. Draft old-growth zones are dispersed throughout TFL 44. The larger ones are in the Nahmint and Strathcona-Taylor SMZs and an area on the west side of Henderson Lake.

The Forest Project (stewardship zones and variable retention) has area, yield and silvicultural effects that impact timber supply. The yield and silvicultural components impact long-term harvest levels. They are described in Section 8.0. Area effects can have both short-term and longer-term impacts on timber supply. They result from increased reserves in old-growth zones and from the additional retention throughout the forest landscape.

On average, approximately two-thirds of the forest in old-growth zones will be retained. One of these, the Uchucklesaht First Nation interest area, T'iiskin Paawats, located to the west of Henderson Lake, will be entirely netted out of the THLB in the base option.

Approximately two-thirds of the forest in old-growth zone will be retained. It is assumed that the incremental area impact of variable retention is half of the minimum retention level by stewardship zone. This assumes that existing reserves including WTPs contribute the rest of the required retention. Table 6.21 summarizes the incremental netdown according to stewardship zone.

Table 6.21. Forest area by stewardship zone and working circle

Working Circle	Stewardship Zone	Netdown (%)	Area (ha)			
			Total	Productive	Net	Net Removed
Alberni East	Timber	5(1)	139,492	126,549	90,190	5,041
	Habitat	7.5(2)	10,868	10,404	7,035	611
	Old-growth	70(3)	2,322	1,869	257	646
Subtotal			***152,681***	***138,821***	***97,482***	***6,297***
Alberni West	Timber	5(1)	75,050	62,619	43,220	2,396
	Habitat	7.5(2)	56,688	40,778	23,003	1,965
	Old-growth	70(3)	13,263	7,052	450	2,014
Subtotal			***145,001***	***110,448***	***66,674***	***6,375***
Clayoquot	Timber	5(1)	0	0	0	0
	Habitat	7.5(2)	13,082	8,912	3,569	425
	Old-growth	70(3)	30	18	4	13
Subtotal			***13,112***	***8,930***	***3,572***	***438***
Ucluelet	Timber	5(1)	10,098	8,986	6,790	371
	Habitat	7.5(2)	1,007	966	738	63
	Old-growth	70(3)	42	35	10	23
Subtotal			***11,147***	***9,987***	***7,539***	***457***
Total			**321,941**	**268,187**	**175,267**	**13,567**

(1) 5% is half the minimum retention of 10%
(2) 7.5% is half the minimum retention of 15%
(3) 66% retained plus 10% of the remaining 33% for variable retention

An option (Section 3.2) will exclude the stewardship zones and will not make the additional allowances for variable retention. Comparison of the results of this option with those of the base option will provide a measure of the timber supply impacts of the Forest Project.

A second option (Section 3.2) will provide a sensitivity of timber supply to higher levels of incremental retention due to variable retention. In this option the incremental net-downs in the timber zone will be increased from 5% to 10% and in the habitat zone from 7.5% to 12.5%.

There are potential gains from using the variable retention approach to access timber in otherwise reserved areas. There are substantial opportunities for harvesting individual trees or small patches of timber economically while having minimal impacts on the site, and hence, not detracting from non-timber objectives. Helicopter logging techniques, including lifting individual tress from the stump, have added substantially to these opportunities. These opportunities will be discussed in the section on the THLB sensitivity analysis.

6.17 Deciduous

In 2000, Northwest Hardwoods (a subsidiary of Weyerhaeuser) purchased Coast Mountain Hardwoods. This has resulted in an increased interest in the supply of alder from Weyerhaeuser tenures, including TFL 44, for the alder sawmill in Delta. This expectation of alder supply from TFL 44 to the Delta sawmill is the basis for retaining some of the deciduous area in the analysis. The net deciduous area (after other net-downs) has been reduced by 50% to allow for areas with poor quality alder (for example deterioration in older stands) and for the possibility of additional reserves of hardwoods for habitat and biodiversity objectives. The result is that approximately 936 ha (out of a total deciduous area of 3, 267 ha) is retained for harvest and management in the analysis. This is less than 0.6% of the timber harvesting land base. Harvest in these deciduous areas will be reported and considered in developing assumptions for the MP No. 5 analysis.

Volumes in these deciduous areas are projected according to hemlock yield curves.

The net forest area after making allowances for sensitive sites, non-timber resources and the 50% reduction in deciduous stands includes 982 hectares of deciduous forest (Table 6.22). This includes stands with a deciduous species (usually red alder) as the leading species.

Table 6.22. Deciduous inventory components

	Productive Area (ha)			Reductions	
Classification	Total	Inoperable	Operable	% Reduction	Area (ha)
Deciduous	3,267	2,331	936	50	982

6.18 Stand-level Biodiversity

6.18.1 Wildlife Tree Patches

The approach was first to assume an average incremental net-down of 2.5%. A review of the South Island Forest District WTP targets indicates that an average of 10% is reasonable. The rationale for making a net allowance of 2.5% is that 75% of the WTP requirements will be met by forest areas retained as sensitive sites (riparian areas and unstable terrain) on inoperable slopes and for non-timber values (e.g. recreation and wildlife).

The second approach was to compare operational and strategic net-downs for a sample of recent harvest blocks. The data set used consisted of 109 harvest blocks, a total area of 2,859 ha, complete with spatial details on all the operational net-downs. Most of these blocks are located in the Franklin operating area (Alberni East) and the majority are variable retention blocks.

It is difficult to objectively compare "strategic analysis" and operational netdowns for small areas such as WTPs. The strategic analysis takes a generalized view (e.g. a broadly typed terrain polygons) while issues are specifically located in an operational plan.

The operational netdowns were broadly classified as WTPs, RMA (riparian management areas not classified as WTPs) and Timber Leave Zones (includes additional retention left in variable retention blocks). These operational netdowns totaled 592 ha or 20.7% of the 2,859 ha. If the harvest blocks that did not have Timber Leave Zones (not variable retention blocks) are excluded then the total retention (netdown) averages 21.7%.

The harvest blocks were intersected with the strategic data set spatial netdowns. Using the strategic netdown approach (proposed for the MP No. 4 base option), the total retention (netdown) is 600 ha, or 21.0% of the total area of 2,859 ha. Approximately 63% of the strategic netdown is from spatial netdowns and the remaining 37% is from factor netdowns (the 1% for small streams, 2.5% for WTPs, 0.5% of mature timber for CMTs and a 5.5% allowance for VR (assumes most in the timber stewardship zone at 5%)).

The "strategic analysis (base option)" netdowns and the operational netdowns are very similar for the 109 harvest block sample. The results support the netdown assumption of an additional allowance of 2.5% for WTPs in the base option. Overall, the 2.5% netdown for WTPs resulted in a net landbase reduction of 4,608 ha.

6.19 Culturally Modified Trees

Comment from operational foresters is that there is very little if any additional net-down because of CMTs. Generally there is flexibility to locate WTPs and retention patches (variable retention) to coincide with CMTs that are to be reserved.

Recent Franklin operation harvest blocks that have been digitally stored in Planner (operational planning software) were queried for blocks with CMTs. A review of the operational plans for these blocks showed that most of the CMTs identified did not result in further netdowns because they were:

- Located in WTPs or VR retention patches (these netdowns are allowed for with other netdown factors);
- Individual trees that were left and so had minimal impact;
- Disqualified on further examination;
- Released for harvest; and
- Sampled and delivered to First Nations.

It was determined that CMTs in 4 harvest blocks may have resulted in further netdowns. Most of these were small areas (less than 0.4 ha). The total estimated net-down area of 3.73 ha is less than 0.3% of the estimated harvest area represented by the sample of harvest blocks.

This result has been rounded up to an incremental netdown of 0.5% for CMTs, that will be applied to mature timber in the base option. The resulting additional netdown area will be approximately 296 ha (Table 6.23).

Table 6.23. CMT reductions

Classification	Area (ha)
Culturally modified trees	296

6.20 Clayoquot Sound Scientific Panel (CSSP) Recommendations

The TFL 44 net-downs do not reflect all of the Clayoquot planning requirements. For example they do not include allowances for hydro-riparian and watershed plan ecosystem reserves.

Net-downs in the draft Information Package for TFL 57 more fully reflect the Clayoquot Sound Scientific Panel (CSSP) recommendations. The TFL 57 THLB is approximately 40% of the productive forest (using the TFL 44 definition that excludes existing roads and low productivity stands). By contrast the preliminary THLB for the Clayoquot portion of TFL 44 is approximately 56.5% of the productive forest (5,047/8,930 from Table 6.1).

Therefor, for simplicity, the TFL 44 THLB is reduced by 40/56.5 to also equal 40% of the productive forest area. This is expected to better reflect the extent of reserves and other net-downs according to the CSSP recommendations. The effect is to further reduce the Clayoquot (within TFL 44) THLB by 1,476 ha.

6.21 NSR Areas

In the timber supply analysis, the current not satisfactorily restocked (NSR) area listed in Table 6.24 will be added back into the timber producing landbase in the first decade of the simulation, as it is assumed that it will be regenerated within 2 years.

As described in section 5.0, the inventory base for this analysis is the inventory at the end of 1995, updated to 2000 for harvest depletion. The NSR at the start of 2001 is approximated by the area harvested in 1999 and 2000 and not established. The resulting net area is 2,422 ha, very similar to the 2,066 ha of NSR reported for 2000 in the West Island Timberlands Defined Forest Area Data Set (Canadian Standards Association (CSA) Sustainable Forest Management (SFM) Plan).

Table 6.24. NSR classification and reductions

	Area (ha)		Reductions	
NSR Category	Total	Productive	% Reduction	Area (ha)
NSR	3,259	3,027	100	2,422

7.0 Forest Inventory Organization

In order to reduce the complexity of the forest description for the purposes of timber supply analysis simulation, aggregation of individual forest stands is necessary. However, it is critical that this aggregation does not obscure either the biological differences in forest stand productivity or differences in management objectives and prescriptions. It is important to note that aggregation of the landbase will be consistent in all options and sensitivity analyses. This is to ensure that differences in results reflect differences in management decisions and not inventory aggregation. Grouping stands into analysis units on the basis of similar species composition, site productivity and silviculture regime captures similarities in growth and response to silvicultural treatments.

Biodiversity planning is done in accordance with the Landscape Unit Planning Guide, and the definition of "priority biodiversity" planning described within. This priority biodiversity planning is the current focus of landscape unit planning and consists of two objectives: retention of old-growth forest; and stand structure through WTPs.

Unique management characteristics are modelled by grouping areas into two CASH6 forest cover groups:

1. Landscape level biodiversity will be modelled at the landscape unit biogeoclimatic classification and natural disturbance type (LU-BEC/NDT) level. Old growth requirements (based on biodiversity emphasis option (BEO) assignments) from the Landscape Unit Planning Guide (LUPG) will be assigned to each LU-BEC/NDT in order to address landscape level biodiversity. Landscape level biodiversity is described in greater detail in Section 10.2.2 (Landscape Level Biodiversity – Rationale).

2. Resource emphasis areas (REAs) are aggregates of area with similar non-timber resource concerns. These include visual sensitivity, wildlife habitat, and timber emphasis areas. Maximum disturbance (based on green-up age requirements), minimum mature and old growth forest cover objectives will be assigned to each REA forest cover group to address needs of the resource. REAs are aggregated within each landscape unit to reflect operational management of the resource. Where REA classifications overlap, areas must meet all overlapping forest cover objectives before harvesting.

7.1 Landscape Units

Landscape level biodiversity is modelled according to the draft landscape units and biodiversity emphases (as directed by the Manager of the Vancouver Forest Region in point 13 of his letter of April 27, 2001). Portions of 31 landscape units covering the TFL are recommended as part of the ongoing provincial landscape level planning process (Table 7.1). For the purposes of this analysis, most small landscape unit / BEC variant combinations (< 200 hectares in the timber harvesting landbase) have been combined with the same BEC variant in a nearby landscape unit. For example, the Puntledge landscape unit (CWH mm 2 net area of 19 hectares) has been combined with CWHmm2 in the Ash landscape unit. All the ATp (alpine tundra) areas have been combined into a single unit for the analysis. With this simplification the number of landscape units modelled is 23. The landscape units within the Clayoquot are covered by another planning process (Section 11.0).

Table 7.1. Landscape unit area summary

Landscape Unit	BEC Variant	Biodiversity Emphasis Option	Natural Disturbance Type	Area (ha)		
				Total	Productive	Net
Ash	CWH mm 1	Intermediate	2	2,357	2,274	1,616
Ash	CWH mm 2	Intermediate	2	2,995	2,655	1,955
Ash	CWH xm 2	Intermediate	2	12,520	11,526	8,647
Ash	MH mm 1	Intermediate	1	1,834	952	553
Ash Total				**19,707**	**17,407**	**12,772**
Barkley Sound Islands	CWH vh 1	Low	1	181	173	61
Barkley Sound Islands Total				**181**	**173**	**61**
Cameron	CWH mm 2	Intermediate	2	4,459	3,897	2,030
Cameron	CWH xm 2	Intermediate	2	1,891	1,773	943
Cameron	MH mm 1	Intermediate	1	2,934	1,681	850
Cameron Total				**9,285**	**7,351**	**3,824**
Caycuse	CWH mm 1	Intermediate	2	414	382	321
Caycuse	CWH vm 1	Intermediate	1	4,337	4,119	2,818
Caycuse	CWH vm 2	Intermediate	1	1,243	1,197	796
Caycuse	CWH xm 2	Intermediate	2	616	602	435
Caycuse Total				**6,609**	**6,299**	**4,369**
China	CWH mm 2	Intermediate	2	2,679	2,370	1,567
China	CWH xm 2	Intermediate	2	5,340	4,582	3,134
China	MH mm 1	Intermediate	1	1,637	1,134	708
China Total				**9,656**	**8,086**	**5,410**
Corrigan	CWH mm 2	Intermediate	2	4,060	3,698	2,863
Corrigan	CWH vm 1	Intermediate	1	10,181	9,449	7,171
Corrigan	CWH vm 2	Intermediate	1	2,336	2,055	1,148
Corrigan	CWH xm 2	Intermediate	2	7,273	6,800	5,075
Corrigan	MH mm 1	Intermediate	1	1,589	824	419
Corrigan Total				**25,439**	**22,826**	**16,675**
Cous	CWH mm 1	Low	2	6,095	5,707	4,254
Cous	CWH mm 2	Low	2	1,638	1,511	1,197
Cous	CWH vm 2	Low	1	2,768	2,534	1,546
Cous	CWH xm 2	Low	2	4,108	3,743	2,661
Cous Total				**14,608**	**13,495**	**9,658**
Effingham	CWH vm 1	Intermediate	1	1,643	1,479	823
Effingham	CWH vm 2	Intermediate	1	590	403	115
Effingham Total				**2,232**	**1,882**	**938**
Great Central	CWH mm 1	Intermediate	2	3,903	3,149	1,789
Great Central	CWH mm 2	Intermediate	2	6,931	5,033	2,701
Great Central	CWH xm 1	Intermediate	2	1,605	1,227	826
Great Central	CWH xm 2	Intermediate	2	15,789	10,013	7,023
Great Central	MH mm 1	Intermediate	1	3,066	1,066	500
Great Central Total				**31,292**	**20,488**	**12,839**

Table 7.1 (continued). Area summary by landscape unit and BEC/NDT

Landscape Unit	BEC Variant	Biodiversity Emphasis Option	Natural Disturbance Type	Area (ha)		
				Total	Productive	Net
Henderson	CWH vm 1	Low	1	15,298	12,358	7,299
Henderson	CWH vm 2	Low	1	3,532	2,538	977
Henderson Total				**18,830**	**14,896**	**8,276**
Kennedy Flats	CWH vh 1	N/A	1	1,542	1,416	732
Kennedy Flats	CWH vm 1	N/A	1	212	199	160
Kennedy Flats	CWH vm 2	N/A	1	66	35	24
Kennedy Flats Total				**1,819**	**1,649**	**916**
Klanawa	CWH vm 1	Intermediate	1	23,207	22,007	14,623
Klanawa	CWH vm 2	Intermediate	1	1,450	1,434	890
Klanawa Total				**24,658**	**23,441**	**15,513**
Little Qualicum	MH mm 1	Intermediate	1	622	401	313
Little Qualicum Total				**622**	**401**	**313**
Maggie	CWH vh 1	Low	1	4,071	3,500	2,564
Maggie	CWH vm 1	Low	1	6,480	5,923	4,524
Maggie	CWH vm 2	Low	1	324	306	241
Maggie Total				**10,875**	**9,729**	**7,329**
Nahmint	CWH vm 1	High	1	11,088	9,471	4,850
Nahmint	CWH vm 2	High	1	5,593	4,587	2,065
Nahmint	MH mm 1	High	1	3,494	1,133	130
Nahmint Total				**20,175**	**15,190**	**7,046**
Nitinat	CWH mm 1	Intermediate	2	239	215	187
Nitinat	CWH mm 2	Intermediate	2	1,766	1,577	1,203
Nitinat	CWH vh 1	Intermediate	1	534	512	374
Nitinat	CWH vm 1	Intermediate	1	21,225	20,110	15,058
Nitinat	CWH vm 2	Intermediate	1	3,490	3,271	2,229
Nitinat	MH mm 1	Intermediate	1	1,322	528	360
Nitinat Total				**28,576**	**26,214**	**19,410**
Puntledge	CWH xm 2	Low	2	521	453	290
Puntledge Total				**521**	**453**	**290**
Rosewall	CWH xm 2	Intermediate	2	1,204	1,061	864
Rosewall Total				**1,204**	**1,061**	**864**
Sarita	CWH vh 1	Low	1	3,709	3,253	2,287
Sarita	CWH vm 1	Low	1	30,049	28,092	20,689
Sarita	CWH vm 2	Low	1	2,371	2,269	1,636
Sarita Total				**36,128**	**33,613**	**24,612**
Somass	CWH mm 2	Low	2	351	266	204
Somass	CWH xm 1	Low	2	796	648	499
Somass	CWH xm 2	Low	2	6,941	6,340	4,694
Somass Total				**8,088**	**7,253**	**5,397**

Table 7.1 (continued). Area summary by landscape unit and BEC/NDT

Landscape Unit	BEC Variant	Biodiversity Emphasis Option	Natural Disturbance Type	Area (ha)		
				Total	Productive	Net
Sproat Lake	CWH mm 1	Intermediate	2	7,931	6,775	3,654
Sproat Lake	CWH mm 2	Intermediate	2	2,647	1,988	1,099
Sproat Lake	CWH vm 1	Intermediate	1	477	436	207
Sproat Lake	CWH vm 2	Intermediate	1	6,202	5,156	2,050
Sproat Lake	CWH xm 1	Intermediate	2	4,674	2,490	1,830
Sproat Lake	CWH xm 2	Intermediate	2	8,355	5,807	3,757
Sproat Lake	MH mm 1	Intermediate	1	3,489	1,228	153
Sproat Lake Total				**33,776**	**23,880**	**12,750**
Upper Kennedy	CWH mm 1	N/A	2	2	1	0
Upper Kennedy	CWH vm 1	N/A	1	5,151	4,367	1,900
Upper Kennedy	CWH vm 2	N/A	1	4,473	2,842	902
Upper Kennedy	MH mm 1	N/A	1	1,755	284	48
Upper Kennedy Total				**11,381**	**7,495**	**2,850**
Walbran	CWH vm 1	Intermediate	1	3,571	3,431	2,319
Walbran	CWH vm 2	Intermediate	1	1,299	1,272	741
Walbran	MH mm 1	Intermediate	1	165	154	79
Walbran Total				**5,036**	**4,857**	**3,138**
At	AT p	N/A	5	1,243	46	15
At Total				**1,243**	**46**	**15**
Total				***321,941***	***268,187***	***175,267***

7.2 Resource Emphasis Areas

The landbase has also been segregated into zones to facilitate the application of management criteria. Recommended Visual Quality Class (RVQC) zones are defined on the basis of an updated visual landscape inventory and known scenic areas. Community Watersheds (CWS), avalanche and Coastal Watershed Assessment Procedures (CWAP) zones are also identified. Forest cover constraints will be applied separately within each zone combination, as shown in Table 7.2. The remaining area is classified as Integrated Management with conventional cover class constraints applied.

Table 7.2. Resource emphasis areas

Zone	Description	Area (ha)		
		Total	Productive	Net
CWS	Little Qualicum (Cameron River portion)	9,827	7,622	4,047
	China Creek (Basins 0,1 &2)	5,330	4,399	2,590
	Cold Creek (Basin 2 of the Somass River)	385	351	270
	Cousteau Creek	162	153	96
	Malachan Creek (Caycuse Watershed Basin 8)	241	213	121
	McFarland (Basin 5 of the China Crk Wshd)	857	786	603
	Sugsaw Lake	613	515	388
	Haggard Lake	15	13	0
	Puntledge River	573	497	314
	Sproat Lake	33,704	23,853	12,740
	Itatsoo Creek	247	212	129
	Mack Creek	55	52	27
	Mercantile Creek	1,079	1,012	778
Total		***53,087***	***39,677***	***22,103***
CWAP	Cameron – sub-basin 1	2,129	1,098	459
	Cameron – sub-basin 2	1,117	865	455
	Cameron – remainder	6,501	5,601	3,075
	Hatton Upper (Caycuse Basin 2A)	1,012	960	726
	Cous Creek Basin 3 (includes sub basins 3,3A,3B&3C)	2,919	2,618	1,647
	Mactush	2,818	2,681	1,739
	Nahmint Basin 2	1,195	1,113	651
	Nahmint Basin 4	525	464	220
	Nahmint Basin 7	670	562	366
	Sproat Lake Basins 2 & 2A (Gracie Creek)	2,388	2,055	828
Total		***21,272***	***18,019***	***10,166***
RVQC(1)	R (retention)	1,367	1,019	423
	PR (partial retention)	29,662	25,274	15,170
	M (modification)	5,006	4,168	1,993
RVQC(2)	R (retention)	506	426	219
	PR (partial retention)	21,321	20,016	13,659
	M (modification)	17,414	15,909	11,465
Total		***75,277***	***66,812***	***42,929***
Avalanche	Avalanche zones	935	718	110
IRM	Integrated management zone	188,809	159,134	109,404

(1) Scenic Area Zone #1
(2) Scenic Area Zone #2

These zones are created to address concerns not accounted for through landbase withdrawals in the netdown process.

7.3 Analysis Unit Definitions

Areas are aggregated into analysis units for assigning and projecting volume development. Factors used in this aggregation process include species, site index (site productivity), stand density, current stand age, harvest economics, and stewardship zone. For more detail on the application of these descriptors refer to Section 8.0.

7.3.1 Species

Species are combined into two species associations (types):

- Douglas-fir – includes stands where the primary species is Douglas-fir, cypress or pine; and
- Western hemlock – includes stands where the primary species is Western hemlock, Mountain hemlock, Sitka spruce, true firs or Western red cedar.

7.3.2 Site Index

The inventory has been grouped into four site index classes. Site index is based on the leading species in each stand.

- High: SI 32 plus;
- Good: SI 26 to SI 31;
- Medium: SI 20 to SI 25; and
- Poor: SI 11 to SI 19 (SIs less than 11 are excluded from the analysis).

Average area-weighted site indexes were determined for each site index class and species association. These average site indexes were then used to derive the yield tables for the analysis. The average site indexes are depicted in Table 7.3.

Table 7.3. Average site indexes

	Species	
Site Index Class	**Douglas-fir**	**Western hemlock**
High (32 plus)	35.5	33.5
Good (26 to 31)	28.5	28.5
Medium (20 to 25)	23.0	22.5
Poor (11 to 19)	17.0	17.0

7.3.3 Stand Density

This applies to stands currently younger than 125 years and all future regenerated stands. Six basic stand densities are applied to each species association. This includes one planted density and five natural stocking densities. The assignment of stand densities to the inventory varies with stand age and the availability of cruise information (Section 8.0).

7.3.4 Harvest Economics

Stands older than 125 years are grouped into the two classes "economic" and "marginally economic" (refer to section 6.6.2 on economic operability). Volumes in the marginally economic type are lower on average.

7.3.5 Stewardship Zone

This applies to future regenerated stands. Different levels of stand retention will occur in the three stewardship zones (timber, habitat and old-growth). Hence different volume adjustments (by stewardship zone) are made for the expected negative impact of higher levels of retention on growth of the regenerating stands.

7.3.6 Summary of Analysis Unit Definitions

Tables 7.4 to 7.7 summarize the classification of analysis units for different age classes.

Table 7.4. Stands older than 125 years

Species	Merchantability	Site Index(1)
Douglas-fir	Economic	H, G, M, P
	Marginal	H, G, M, P
Hemlock	Economic	H, G, M, P
	Marginal	H, G, M, P

(1) Site Index classes are High, Good, Medium and Poor

Table 7.5. Stands from age 39 years (established prior to 1962) to 125 years

Species	Site Class	Density (stems / hectare)
Douglas-fir	H, G, M, P	300, 600, 1500, 3000, 3000A(1), 6000
Hemlock	H, G, M, P	300, 600, 1500, 6000, 6000A (1)

(1) Volumes adjusted to reflect cruised stands

Table 7.6. Stands younger than 39 years

Species	Site Class	Density (sph)
Douglas-fir	H, G, M, P	1200 planted, 600 natural, 3000 natural
Hemlock	H, G, M, P	1200 planted, 1500 natural, 4000 natural,

Table 7.7. Future stands

Species	Site Class	Density (sph)	Stewardship Zone(1)
Douglas-fir	H, G, M, P	1200 planted, 600 natural, 3000 natural	T, H, O
Hemlock	H, G, M, P	1200 planted, 1500 natural, 4000 natural,	T, H, O

(1) Stewardship Zones are Timber, Habitat and Old-growth

7.4 Age Class Distributions

Table 7.8 summarizes the initial distribution of area by age class for both the productive forest and the net operable components of the TFL 44 inventory.

Table 7.8. Area by age class

Age Range	Area (ha)	
	Productive	Operable
1-20[1]	44,989	35,334
21-40	51,643	39,754
41-60	41,085	30,839
61-80	16,009	11,920
81-100	2,294	1,604
101-125	555	404
125+	111,611	57,834
Total	**268,187**	**177,689**

(1) Includes NSR

8.0 Growth and Yield

For the analysis of TFL 44, Weyerhaeuser Company Ltd., Nanaimo Woodlands undertook the development of growth and yield relationships.

8.1 Silvicultural System Scenarios

Table 8.1 lists the silvicultural systems by Stewardship Zone developed as part of Weyerhaeuser BC Coastal Group's Forest Project that will be used in the Base Case yield analysis. The amount of stand left refers to area (aggregated) or volume/basal area (dispersed) remaining within the specified cutblock.

Table 8.1. Overview of base case silvicultural systems

Zone	System	Zone (%)	Description	Age Type	Notes
Timber	Retention systems	90	aggregated, 10% left	even-aged	
			dispersed, 5% left	even-aged	
	Shelterwood	10	dispersed, 10% left	even-aged	group, uniform or natural on harsh sites
Habitat	Retention systems	50	aggregated, 15% left	even-aged	
			dispersed,15% left	even-aged	
	Shelterwood	25	generally aggregated, 15% left	even-aged	emphasis on group shelterwood
	Irregular Shelterwood	13	generally aggregated, 15% left	uneven-aged	leave groups, create more than two age classes
	Group selection	12	<1ha patches	uneven-aged but composed of small even-aged openings	at least three age classes; 20-40 year cutting cycle
Old-growth	Irregular Shelterwood	30	dispersed + aggregated, 66% left	uneven-aged	create more than two age classes
	Group selection	70	0.25ha-0.5ha (less than 1ha) patches	uneven-aged but composed of small even-aged openings	at least three age classes; 30-50 year cutting cycle
	Second-growth areas		thinning/ species conversion	portions of second-growth in Old-Growth Zone	restore old-growth attributes in previously cut stands

8.2 Forest Regeneration Models

8.2.1 Yield Table Sets

Table 8.2 shows the yield model sets generated by XENO. The models incorporate a generalised range of planting, natural regeneration and management scenarios. Yield tables are summarised in Appendix III.

Table 8.2 Regeneration models used in the timber supply analysis

Yield Table ID[1]	No. of Planted Stems per Hectare	No. of Natural Stems	Percent Survival Planted	Percent Distribution Natural[2]	Regen Lag (natural) negative = early	Years of Natural Regen
Hemlock						
h2	1 200	1 200	90	75	-2	5
h9		300		50	0	5
h5		600		70	0	5
h6		1 500		90	0	5
h11a		4 000		100	0	5
h7a		6 000		100	0	5
Fir						
f1a	1 200	500	85	60	0	4
f8		300		50	0	4
f4		600		70	0	5
f5		1 500		90	0	5
f6		3 000		90	0	5
f7		6 000		90	0	5

(1) ID is consistent with yield tables in TFL 39 MP No.8
(2) Percent of fully stocked plots

8.2.2 Regeneration Allocation Framework

The regeneration model framework is based on stewardship zone, biogeoclimatic variant, and two species associations (hemlock and fir). Previous approaches have been simplified to more easily and transparently apply the regeneration models. The framework is directed at resultant management (which implicitly incorporates current levels of management) that is necessary to achieve a specific yield rather than building from a natural succession model base as in TFL 44 MP No.3. An important component is a broad scale representation of the future forest as envisaged by The Forest Project.

Fir species associations include Douglas-fir, yellow cedar and lodgepole pine while hemlock species associations included all other species- the hemlock species associations being generally higher yielding.

Table 8.3 shows how the yield tables were applied to each stand. The first step was to apply the yield tables to existing stands. Existing stands were either cruised or uncruised. Generally cruised stands were 31 years or greater in age at time of cruise.

8.2.2.1 Cruised Stands

Based on the basal area or volume data and age at time of cruise the closest yield table was assigned for a given site index class from among the 5 yield tables fir and the 4 yield tables for hemlock (Table 8.3). Prior analyses showed that these yield curves reasonably bounded and covered the range of the data. This procedure was the same one followed in TFL 39 MP No.8.

8.2.2.2 Uncruised Stands (pre 1962 establishment)

Uncruised stands were further split into stands established before 1962 (the start of the Intensive Forest Management Program at MacMillan Bloedel Ltd) and those established since. For those stands established before 1962 a single yield curve was assigned. A correction factor was assigned based on a analysis of cruised stand mean annual increment trends for stands established before 1962 compared to the yield table for a given site index class. For fir stands the correction factor was 0.89 (i.e. Yield Table F6 x 0.89); for hemlock the correction factor was 0.81 (i.e. H7A x 0.81). These results are similar to those derived on a Block basis for TFL 39 MP No.8 using the same yield table comparison except that a higher stocked yield table (12,000 stems per hectare initial) was used for the hemlock comparison in TFL 39.

8.2.2.3 Uncruised Stands (post 1962 establishment)

These stands are assigned the yield tables listed in Table 8.4 (Timber Zone only). Basically stands are assigned to one of the three yield tables in the assigned percentages by matching with the actual assigned percentage cumulative area for a given biogeoclimatic variant.

Table 8.3. Usage of the various models listed in Table 8.2

Yield Table ID	Stems/Ha	Cruised	Uncruised <1962	Uncruised[2] >=1962	Regeneration Model[3]
Hemlock					
h2	1 200			Yes	Yes
h9	300	Yes			
h5	600	Yes			
h6	1 500	Yes		Yes	Yes
h11a	4 000			Yes	Yes
h7a	6 000	Yes	Yes[1]		
Fir					
f1a	1 200			Yes	Yes
f8	300	Yes			
f4	600	Yes		Yes	Yes
f5	1 500	Yes			
f6	3 000	Yes	Yes[1]	Yes	Yes
f7	6 000	Yes			

(1) adjust by 0.81 (hemlock) and 0.89 (fir)
(2) use regeneration model Table 8.4 (Timber Zone only)
(3) use regeneration models Tables 8.4 to 8.6

8.2.2.4 Regeneration Model (all stands once harvested)

Stewardship Zone divides the regeneration models shown in Tables 8.4 through 8.6. In turn, each table is based on three common yield tables (one planted and two natural) with distributions varying by biogeoclimatic variant. These tables were derived by first splitting each Stewardship Zone into either dispersed/aggregated retention (90% Timber Zone, 50% Habitat Zone) or shelterwood/selection systems (10% Timber Zone, 50% Habitat Zone and 100% Old-growth Zone) based on Table 8.1.

The resultant tables are an attempt to mimic likely regeneration patterns across the Stewardship Zones. For instance, planting predominates in the Timber Zone (~90% for fir and ~75% for hemlock), is lower in the Habitat Zone (~80% fir and ~65% hemlock) and lower still in the Old-growth Zone (~40% fir and ~20% hemlock). Respectively, there is a greater amount of natural regeneration at both higher and lower densities in the Old-growth and Habitat Zones. The regeneration models described here are fit to every stand.

Table 8.4. Regeneration models for Timber Zone by biogeoclimatic variant

Yield Table ID	MAI SI=27	Planted/ Natural	Regeneration (%)								Operable Area (ha)	
			CWH xm1	CWH xm2	CWH vm1	CWH vm2	CWH mm1	CWH mm2	MH/ AT	CWH vh1	Total	%
Hemlock												
h2	11.5	1200/1200	99.0	79.0	77.0	77.0	68.0	68.0	70.0	78.0	68,105	**48**
h6	9.1	0/1500	0.5	11.0	1.5	1.5	10.5	10.5	20.0	1.0	3,524	**2**
h11a	11.7	0/4000	0.5	10.0	21.5	21.5	21.5	21.5	10.0	21.0	18,145	**13**
Douglas-fir												
f1a	8.5	1200/500	98.0	98.0	87.0	78.0	69.0	70.0	70.0	70.0	46,955	**33**
f4	5.5	0/600	1.0	1.0	1.0	1.0	10.0	10.0	19.0	19.0	1,441	**1**
f6	8	0/3000	1.0	1.0	12.0	21.0	21.0	20.0	11.0	11.0	3,979	**3**
Total			**1,389**	**32,791**	**70,919**	**8,920**	**6,186**	**13,109**	**3,685**	**5,151**	**142,151**	**100**

Table 8.5. Regeneration models for Habitat Zone by biogeoclimatic variant

Yield Table ID	MAI SI=27	Planted/ Natural	Regeneration (%)								Operable Area (ha)	
			CWH xm1	CWH xm2	CWH vm1	CWH vm2	CWH mm1	CWH mm2	MH/ AT	CWH vh1	Total	%
Hemlock												
h2	11.5	1200/1200	95.0	75.0	65.0	65.0	60.0	60.0	70.0	70.0	**14,232**	**41**
h6	9.1	0/1500	2.5	15.0	7.5	7.5	12.5	12.5	20.0	5.0	**1,899**	**5**
h11a	11.7	0/4000	2.5	10.0	27.5	27.5	27.5	27.5	10.0	25.0	**5,732**	**17**
Douglas-fir												
f1a	8.5	1200/500	90.0	90.0	75.0	70.0	65.0	70.0	70.0	70.0	**10,232**	**29**
f4	5.5	0/600	5.0	5.0	5.0	5.0	10.0	10.0	15.0	15.0	**860**	**2**
f6	8	0/3000	5.0	5.0	20.0	25.0	25.0	20.0	15.0	15.0	**1,852**	**5**
Total			**1,859**	**5,293**	**12,612**	**6,438**	**5,581**	**1,702**	**389**	**934**	**34,807**	**100**

Table 8.6. Regeneration models for Old-growth Zone by biogeoclimatic variant

Yield Table ID	MAI SI=27	Planted/ Natural	Regeneration (%)								Operable Area (ha)	
			CWH xm1	CWH xm2	CWH vm1	CWH vm2	CWH mm1	CWH mm2	MH/ AT	CWH vh1	Total	%
Hemlock												
h2	11.5	1200/1200	20	20	20	20	20	20	20	20	**125**	**17**
h6	9.1	0/1500	20	20	10	10	20	30	30	30	**104**	**14**
h11a	11.7	0/4000	60	60	70	70	60	50	50	50	**397**	**54**
Douglas-fir												
f1a	8.5	1200/500	40	40	40	40	40	40	40	40	**42**	**6**
f4	5.5	0/600	10	10	10	10	20	20	20	20	**14**	**2**
f6	8	0/3000	50	50	50	50	40	40	40	40	**49**	**7**
Total			**0**	**5**	**267**	**166**	**135**	**40**	**67**	**50**	**730**	**100**

8.2.3 Mature

The mature inventory is defined as stands greater than 100 years of age at time of the 1970s inventory of TFL 44. This corresponds to stands of greater than 125 years of age in the year 2000.

The mature inventory is assumed static as in previous timber supply analyses and is supported by twenty-year analysis of Weyerhaeuser BC Coastal Group's old-growth plots (*twenty-year re-measurement of old-growth permanent plots, N.J. Smith, 5-28-97, Report available on request*).

8.2.4 Species Succession

For areas where there is no species information (areas awaiting restocking) Table 8.7 lists the assumed proportional species allocation.

Table 8.7. Species allocation: non-stocked and successional changes

Biogeoclimatic Variant	Species Percent				
	Fd	Hw	Cw	Ba	Cy
CWH xm 1	100				
CWH xm 2	80	15	5		
CWH vm 1	5	60	20	10	5
CWH vm 2		60	15	20	5
CWH mm 1	20	50	10	20	
CWH mm 2		50		40	10
MH		50		40	10
CWH vh 1		50	40	5	5

8.3 Yield Adjustments

8.3.1 Utilization Levels

Mature: all trees 50% sound and greater, "MB" loss factors

- Minimum dbh: 22.5 cm
- Stump height: 30 cm
- Top dib: 15 cm

Note that these "utilization standards" for mature timber are the standards used in compiling the mature inventory and hence are used in the analysis. They are not the same as standards (17.5cm dbh) used in cutting permit cruises or for recovery.

Second Growth: all live trees

- Minimum dbh: 12.5 cm
- Stump height: 30 cm
- Top dib: 10 cm

8.3.2 Regeneration Delays

A one-year regeneration delay is assumed in all Stewardship Zones. The one-year regeneration delay represents on average an interval of one year between harvest and germination of seed for the next rotation. For planted stands this corresponds to an average delay of 2 years between harvest and planting of one-year-old seedlings. Recent practices have included more planting (as a proportion of areas harvested) and more prompt planting—generally within 2 years.

8.3.3 Growth Impacts of Brush Competition

Growth impacts of brush are handled implicitly in the regeneration models in terms of likely survival rates (of planted trees) and percent distribution of naturals. The increased emphasis on planting, fertilization at time of planting and brush control has led to a general reduction on the impacts of brush. The yield model allocation is an average yield response assuming some brush competition on some sites and none on others.

8.3.4 Tree Improvement

The schedule of volume gains from tree improvement was simplified to enable a tractable analysis. Volume gains for tree improvement are attributed to all stands planted from 2001 onwards. The volume gains are those expected from second-generation seed orchards. Although these gains are not expected until about 2006 (planting stock), for simplicity they are applied from the start of the analysis. The additional gains for the planting years prior to 2006 are largely offset by the assumption that variable retention is 100% of all harvest from the start of the model runs compared to the transition strategy (100% in 2003) that is currently underway.

The volume gains have been reduced by 19% to approximate the average expected gain over the range of harvest ages (it is expected that the percentage gain will decline as stands age). Percentage volume gains assigned to stands planted from 2001 are as follows:

- Douglas fir: 13%
- Western hemlock: 6.5%

In collaboration with Timber West, Canadian Forest Products and Weyerhaeuser Western Timberlands, Weyerhaeuser BC Coastal Group has a secure supply of second generation seed.

8.3.5 Operational Adjustment Factors

Adjustments are based on the previous TFL 44 MP No.3 numbers:

1. Non-productive areas (5%)
2. Insects and disease (2%)
3. Decay, waste and breakage

- Fir types: 5%
- Hemlock types: 6.5%

8.3.5.1 All Stands After Harvest

The factors are applied as follows: *i.e.* hemlock 0.95 (non-productive) x 0.98 (insects/disease) x 0.935 (decay, waste and breakage).

8.3.5.2 Existing Cruised Stands

Cruised stands have already been adjusted for non-productive areas, thus only the insect/disease and decay, waste and breakage factors are applied.

8.4 Site Index and Early Height Growth

8.4.1 Site Index Assignment

Weyerhaeuser BC Coastal Groups biophysical site index model (BSIM) approach will be used for the analysis—this is the same model structure used for the base case in TFL 39 MP No.8 (2000) and TFL 44 MP No.3 (1997).

The BSIM model uses species, biogeoclimatic variant and geographic location (latitude, longitude as well as operating area) to assign site index based on the leading species for each stand. This model form is the most appropriate one—consistent with available biophysical attributes for the landbase. Note that BSIM uses Barker and Goudie's (1987) model for Sitka spruce rather than Nigh's (1996) - the differences are minor at younger ages (less than 80 years, breast height) where the site index estimates are made.

Cruised site index is used where a valid cruise had been undertaken (measured age and tree height), generally for stands greater then 31 years and less than 120 years total age (55,000 hectares). All other stands (213,000 hectares) use BSIM estimates.

Table 8.8 shows that the mean site index for the TFL is 27.8 (this uses a combination BSIM and cruised estimates where valid). More recent cruising for hemlock types (1995+) shows the inventory site index to be higher than the biophysical estimate (30.7 vs 29.3) but this situation is reversed for all cruised hemlock species types (27.8 vs 28.4) though both numbers round to the same closest integer (28). There is little discrepancy for the fir site index estimates between cruised and BSIM.

Table 8.8. Comparison of biophysical and recent cruise stand site index estimates

Species	Inventory(1)	Biophysical	Area (ha)
Hemlock types-all cruised stands	27.8	28.4	22,000
Fir types-all cruised stands	30.4	30.2	33,000
Hemlock types-cruised since 1995	30.7	29.3	2,200
Fir types-cruised since 1995	34.9	35.2	1,600
All species in TFL 44	24.3	27.8(2)	268,000

(1) for cruised second growth stands cruised site index is the inventory site index
(2) includes cruised estimates where applicable

8.4.2 Early Height Growth of Western Hemlock

The early height growth of western hemlock is underestimated – an adjustment was previously approved for use in TFL 44, MP No.3. Table 8.9 shows the magnitude of the impact.

Table 8.9. Years to reach 3m, 5m and 7m using Wiley's and MB hemlock height model

Height: Site Index	3m		5m		7m	
	Wiley	*Adj*	*Wiley*	*Adj*	*Wiley*	*Adj*
21	12	10	16	14	21	19
27	10	9	14	13	17	16
39	7	6	9	8	11	10

The adjusted ages are incorporated in determining years to achieve visually effective green-up.

8.4.3 Site Index Classes

The eleven (12-42) 3m site index classes initially compiled from the inventory were grouped into four site index classes by species association. This reduces the number of yield tables making the timber supply analysis tractable. The groupings are presented in Table 8.10.

Table 8.10. Site index groupings

Site Index Class	Range of 3m SI Classes Included
Poor	11 to 19
Medium	20 and 25
Good	26 and 31
High	32+

The average area weighted site index for the four classes were calculated for both inventory (using old-growth ages and heights) and BSIM based site index estimates (Section 8.4.1).

Table 8.11. Average weighted site index for inventory and BSIM estimates

Site Class	BSIM	INVENTORY
Douglas-fir		
Poor	17.0	16.5
Medium	23.0	23.0
Good	28.5	28.5
High	35.5	36.0
Western Hemlock		
Poor	17.0	15.5
Medium	22.5	22.5
Good	28.5	27.5
High	33.5	35.0

8.5 Additional Adjustments to Yield

8.5.1 Fir

All fir yields are capped at 1650 m^3/ha based on likely expected upper yields.

8.5.2 Effects of Forest Project on Yields

The total yield consequence of The Forest Project are two-fold:

1. Area/volume reduction for the leave trees; and
2. Effects of leave trees on growth of the trees growing in the remaining area.

This section deals only with the second component—the area/volume reductions are discussed in Section 6.16.

The yield tables in Appendix III are clearcut yields. The increased edge and leave tree amount is thought to negatively impact growth (though direct experimental evidence have yet to confirm the amount). Table 8.12 shows the framework of stewardship zones and silvicultural systems used to derive average yield adjustment factors by stewardship zone. These average factors are summarized in Table 8.13. They are applied directly to the yield tables, for future rotations, as a proportional yield adjustment for each zone, *i.e.* yields of future rotations in the Habitat Zone are all reduced by 11%, e.g. a 600 m^3/ha stand would become 534 m^3/ha.

Table 8.12. Framework for applying variable retention yield adjustment factors

Stewardship Zone	Silviculture		Description	Zone Area (%)	System Yield Factor (%)	Type Yield Factor (%)
	System	Type[2]				
Timber	Retention	Disp/Aggreg	aggregated – 10% left	80	2	2
			dispersed – 5% left	10	5	
	Shelterwood	Shelter/Group	dispersed – 10% left	10	10	10
			Zone Total	***100***		***3***
Habitat	Retention	Disp/Aggreg	aggregated – 15% left	40	5	7
			dispersed – 15% left	10	15	
	Shelterwood	Shelter/Group	15% left	25	15	14
	Irregular SW[1]		15% left	13	15	
	Group Selection		less than 1 ha patch	12	10	
			Zone Total	***100***		***11***
Old-growth	Irregular SW[1]	Shelter/Group	2/3rd left	30	66	30
	Group Selection		0.25 – 0.5 ha patches	70	15	
			Zone Total	***100***		***30***

[1]SW shelterwood
[2]Dispersed/Aggregated or Shelterwood/Group selection (see Table 8.1)

Further discussion concerning these factors is available in *Effects of Alternative Silviculture on Yield: Coastal BC Forests*. N.J. Smith 1999 (Weyerhaeuser BC Coastal Group report).

Table 8.13. Average yield adjustment factors by stewardship zone

Stewardship Zone	Yields Adjustment Factor (%)	Total Area (ha)	Net Area (ha)
Timber	3%	224,641	142,151
Habitat	11%	81,645	34,807
Old-growth	30%	15,655	730
Total		**321,941**	**177,688**

8.6 Silviculture History

8.6.1 Current and Backlog Not Satisfactorily Restocked Areas (NSR)

Not satisfactorily stocked areas (NSR) originally contained operable timber, were harvested and have not yet regenerated to commercial species. For every stand scheduled for harvest there is a target period for regeneration following harvest. Land that fails to regenerate during this period is considered backlog. Under the Silviculture Regulations, land is not allowed to become backlog. It must be planted within the regeneration delay period if it has not regenerated naturally before that. Land that has been harvested recently, for which the regeneration delay period has not yet expired, is current NSR. Current NSR is part of the working forest and is expected to be regenerated on schedule. In the case of TFL 44, all NSR is considered to be current.

9.0 Non-recoverable Losses

Fire, insects, disease and other natural factors can cause catastrophic losses of whole stands of trees. Over the long term the probability of losses to natural causes can be predicted. Where losses occur in merchantable stands some of the dead or dying timber may be salvageable. When modelling the timber supply, the unsalvaged losses are added to the desired harvest forecast and then subtracted from the forecast upon completion of the modelling exercise.

Loss of timber to fire has been small. Records for the last 25 years indicate that fire has, on average, damaged only 11 hectares of mature stands per year. The impact during the last 10 years has been significantly less with an annual average of only 3 hectares of mature stands damaged by fire. Timber losses (unsalvaged) to epidemic outbreaks of disease and insects have been minor.

Surveys indicate that on average in recent years, windthrow has occurred on an area equivalent to 2.8% of the harvested area. Weyerhaeuser expects that the current strategy of more aggressive windthrow management treatments will reduce operationally induced windthrow to within 2% of the area harvested. A West island Timberlands objective is to salvage at least 30% of the merchantable operationally induced windthrow within 2 years of occurrence. In addition, a substantial proportion of the total windthrow (perhaps 40%) is expected to occur in reserve areas. The expectation is that non-recoverable losses of the THLB to windthrow will be less than 1% of the harvest (for example 2% in total of which 30% (plus) is recovered and 40% is in reserves – leaves less than 30% of 2% or 0.6% of harvest not recovered). In this analysis an **allowance of 1%** of the harvest volume is made for non-recoverable losses.

10.0 Integrated Resource Management

This Section details how modelling methodology will address non-timber resource requirements.

10.1 Forest Resource Inventories

This section documents the status of all non-timber resource inventories. Approximate dates of completion and approvals are presented in Table 10.1.

Table 10.1. Non-timber resource inventory status

Inventory Category	Standard	Date of Completion	Status
Recreation	MoF 1991	1995	Approved in June 1996 for MP No.3 Reviewed by MoF (2001) for use in MP No.4
Visual Landscape	MoF 1997	2000	Reviewed by MoF in 2001 for use in MP No.4
Physical Operability	Company standards Section 6.6.1	1993	Approved in January 1996 for MP No.3
Terrain [1]	Various Refer to Appendix II	Developed over 25 years	Discussed with Vancouver Region Specialist – Refer to letter Appendix II
Ungulate Winter Ranges	Developed over the years with MoWLAP specialists	1998	Grandparented in 1998
Marbled Murrelet Areas	Developed over the years with MoWLAP specialists	Includes changes since the MP #3 analysis	Current status
Riparian Classifications	Operational inventories and local knowledge. Refer to Section 6.14	2001	Discussed and presented during meetings with MoF and MoWLAP staff.

[1] An FRBC funded project will update much of the terrain inventory over the next two years

10.2 Forest Cover Requirements

The analysis will apply forest cover objectives to model management of community watersheds, recommendations of coastal watershed procedures, avalanche run-out zones, biodiversity, and visual landscapes. Forest cover objectives place maximum and/or minimum limits on the amount of young second growth and/or old growth found in landbase aggregates.

Timberline's proprietary simulation model CASH6 has the option of using a pseudo-geographic or full spatial approach to modelling timber availability, giving considerable flexibility depending on data structure and analysis objectives. This allows the analysis to mirror, as closely as possible, the intent of forest cover objectives on harvesting in operations.

Maximum depletion and minimum old growth objectives on forest cover are explicitly implemented. Productive forest stands such as inoperable and uneconomic forest types which have been excluded from the timber harvesting landbase may be included to better model forest structure and disturbance levels. These non-harvesting areas are referred to as non-contributing forest.

Any number of forest cover groups may be used to aggregate forest stands for the purpose of modelling forest cover objectives. For example, a forest cover group will be created to model community watersheds within a specific region of the TFL and this will be overlapped with landscape level biodiversity requirements for landscape units.

There are three forest cover constraint classes available for modelling within each forest cover group:

1. Disturbance - the maximum area that can be younger than a specified age or shorter than a specified height. This is intended to model cutblock adjacency and green-up requirements.
2. Mature Retention - the minimum proportion of area that must be retained over a lower retention age. This is intended to model thermal cover for wildlife or mature biodiversity requirements. Mature and old growth retention forest cover objectives overlap and area that qualifies for both is counted in both.
3. Old growth Retention - the minimum area that must be older than, or as old as, a specified age. This is intended to model both retention of cover and retention of old growth.

The use of forest cover objectives as described above improves forest management modelling by ensuring that non-timber resources are given appropriate consideration. Forest cover objectives to be applied to the forest cover groups representing REAs are presented in Table 10.4.

10.2.1 Forest Cover Objectives – Rationale

Forest cover requirements for Resource Emphasis Area (REAs) are based on the following sources:

10.2.1.1 Visual Landscapes

The visual landscape inventory has been revised and updated to MoF 1997 standards during MP No.3. Visual Quality Objectives (VQO) have not yet been defined by the District Manager. Hence, the Recommended Visual Quality Classes (RVQC) in the inventory are applied in the analysis.

The South Island Forest District Manager has made Scenic Areas known throughout TFL 44. Two scenic area zones are defined. Zone 1 includes the more visually sensitive areas such as the area around Port Alberni, the Alberni Canal, the Port Alberni to Ucluelet Highway and the Nahmint Watershed. Zone 2

identifies somewhat lower priority visual landscape areas such as the Great Central Lake and the highway from Port Alberni to Bamfield.

The two main variables used to define visual landscape cover class constraints are the Visually Effective Green-up age (VEG) and the maximum allowable area below VEG. The two variables, and therefore, the forest cover constraints vary according to both scenic area zone and RVQC. Table 10.2 summarizes the constraints and areas for each combination of scenic area zone and RVQC.

Table 10.2. VQO forest cover requirements

Option	Scenic Area Zone	RVQC	VEG Height (m)	VEG Age (years)	Max Area Below VEG (%)	Area (ha)	
						Productive	Net
Base	1	R	5.0	16	3	1,019	423
		PR	5.0	14	10	25,274	15,170
		M	5.0	13	20	4,168	1,993
	2	R	5.0	12	5	426	219
		PR	5.0	14	15	20,016	13,659
		M	5.0	14	25	15,909	11,465
Sensitivity	1	R	6.1	18	3	1,019	423
		PR	7.0	18	10	25,274	15,170
		M	7.1	17	20	4,168	1,993
	2	R	7.7	16	5	426	219
		PR	7.1	17	15	20,016	13,659
		M	7.1	17	25	15,909	11,465

In a sensitivity (Section 3.2), VEG heights are based on spatial data provided by the GIS group at the Vancouver Forest Region Office. This includes a map of heights that correspond to slope classes, derived according to the procedure outlined in the report, "Procedures for Factoring Visual Resources into Timber Supply Analyses (MoF, 1998).

Ages to achieve the VEG heights are area weighted ages according to the "years to breast height" and site index curves for the species and site indexes of the contributing stands. Units (combinations of scenic area zone and RVQC) with higher site indexes on average, have fewer years to achieve VEG.

In the Base Case option, ages to obtain VEG are based on a stand top height of 5 meters. The average regeneration delay of one year is added to these ages when determining years of VEG from the previous harvest.

The mid-point of the range of maximum allowable area below VEG is applied to the RVQCs in scenic area Zone 1 and the upper end of the range is applied to scenic area Zone 2. The percentages refer to the forested area within the RVQCs.

It was suggested that the results in the report, *Visual Impacts of Partial Cutting* (BC Ministry of Forests, 1997) could be used to better model the interaction between variable retention and management of visual landscapes. The data in the report primarily refers to prescriptions in which the partial cutting is evenly distributed throughout the cut-block. Most variable retention prescriptions include an uneven distribution of

retention with groups of retention and occasionally individual trees. It is expected that dispersed retention will occur on only a small percentage of the managed area. Hence, the data from the 1997 report will not be applied in the analysis. It is understood that the Ministry of Forests is working on a similar study of variable retention areas – the resulting report will be of considerable interest.

The new visual landscape inventory includes many relatively small polygons (some are less than 10 ha). In practice, visual landscape management may apply to a number of polygons depending on the view. The inventory of RVQC polygons will be reviewed to determine if there is a practical and acceptable approach for combining polygons in the same viewshed and of the same RVQC for the analysis. If an acceptable procedure is not available then the cover class constraints will be applied to each RVQC polygon.

10.2.1.2 Avalanche

Avalanche run-out zones have been mapped as "Ea1" areas. A 20% netdown is applied to these areas. In addition, a cover class constraint is applied to these zones. The constraint allows no more than 20% of the forested area to be less than 30 years of age at any time.

10.2.1.3 Coastal Watershed Assessment Procedures (CWAPs)

Some of the CWAP reports include recommendations on maximum harvest rates for specific watershed basins. These rates of harvest constraints will be applied for the first ten years of the analysis as described in described in Table 10.3.

Table 10.3. CWAP forest cover requirements

Watershed Name	Area (ha)		Available Area (5 Years) (ha)
	Productive	Net	
Cameron sub-basin 1	1,098	459	375
Cameron sub-basin 2	865	455	169
Cameron – remainder	5,601	3,075	435
Hatton Upper (Caycuse Basin 2A)	960	726	75
Cous Creek Basin 3 (incl. sub basins 3,3A,3B & 3C)	2,618	1,647	140
Sproat Lake Basins 2 & 2A (Gracie Creek)	2,681	1,739	270
Macktush	1,113	651	0 first 5 years, 140 second 5 years
Nahmint Basin 2	464	220	70
Nahmint Basin 4	562	366	Max of 10ha in 10yrs
Nahmint Basin 7	2,055	828	60

The maximum harvest rates are taken directly from the CWAP recommendations or they reflect the soil specialist's calculations based on age class distributions and Equivalent Clearcut Area (ECA) targets. The harvest constraints assume that 75% of the harvest is in the rain on snow zone (300m to 800m elevation) and include the 1.5 factor weighting of these areas in the ECA calculation.

The constraints are applied for ten years. It is expected that stream restoration and recovery and changing management practices and age class distributions will reduce these concerns in the future.

10.2.1.4 Community Watersheds

The MoWLAP's map of designated community watersheds has been included in the data set. Table 7.2 lists the 13 community watersheds in TFL 44.

The Haggard Creek community watershed is very small (approximately 15 hectares). For the purposes of this analysis, the total area has been removed from the timber harvesting landbase.

The smaller stream classes in the community watersheds are classified as S3 and S4 in the timber supply analysis (refer to the Riparian Guidebook).

The Roger's Creek watershed has been de-listed and is no longer included in this analysis.

A cover class constraint is applied to each community watershed. The constraint allows no more than 5% of the total area to be less than 5 years of age at any one time.

10.2.1.5 Green-up Requirements

CASH6 functionality includes the capability to model age-based green-up. Green-up age requirements within the RVQC zones (5 meters in the base option) will be modelled based on height/age relationships using Y-XENO. Green-up age requirements of 10 and 5 years in the Integrated Resource Management (IRM) zones will be modelled for the Special Management Zones (SMZs)/ General Management Zones (GMZs) and for the Enhanced Forestry Zones EFZs) respectively. Refer to further discussion of the Vancouver Island Land use Plan in Section 10.3.

A summary of forest cover constraints is provided in Table 10.4.

Table 10.4. Forest cover requirements

REA	Description	Disturbance Class		
		Maximum Age	Minimum Height	Maximum %
VQO – Scenic Area 1	R	16	5.0	3
	PR	14	5.0	10
	M	13	5.0	20
VQO – Scenic Area 2	R	12	5.0	5
	PR	14	5.0	15
	M	14	5.0	25
CWS		5		5
CWAP	*Reference: Table 10.3*			
Avalanche		30		20
IRM	SMZ, GMZ	10		25
IRM	EFZ	5		25

10.2.2 Landscape Level Biodiversity – Rationale

Biodiversity planning is done in accordance with the Landscape Unit Planning Guide, and the definition of "priority biodiversity" planning described within. This priority biodiversity planning is the current focus of landscape unit planning and consists of two objectives: "retention of old growth forest; and stand structure through wildlife tree retention (WTR)."

Twenty-three landscape units will be modelled for TFL 44. Old-growth seral stage requirements are established within each landscape unit at the BEC variant level. The productive forest within each LU/BEC contributes to the old growth seral stage requirement. The forest cover requirements used to model landscape biodiversity are based on the Biodiversity Guidebook (September 1995). Requirements are based on low, intermediate and high emphasis. Requirements are summarized in Table 10.5.

Table 10.5. BEC/NDT old growth seral stage requirements

Natural Disturbance Type	Biogeoclimatic Zone	Age Range for Constraint (yrs)	Biodiversity Emphasis		
			Low(1)	Intermediate	High
Old Seral Constraints (minimum %)					
NDT1	CWH	>250	13	13	19
NDT1	MH	>250	19	19	28
NDT2	CWH	>250	9	9	13
NDT 5	AT	>250	85	85	85
Mature+Old Seral Constraints (minimum %)					
NDT1	CWH	>80	18	36	54
NDT1	MH	>120	19	36	54
NDT2	CWH	>80	17	34	51

(1) In low Biodiversity emphasis units the requirement is to achieve at least one third of the target percentage now and to meet the full target by the end of three rotations (approximately 210 years)

The non-productive forest (scrub) does not contribute to old seral in the analysis. Also, for this analysis, the additional netdowns for variable retention in timber stewardship zones (5%) and habitat stewardship zones (7.5%) are assumed not to contribute (refer to discussion in the next paragraph). All other netdowns including those for old-growth stewardship zones contribute to old seral.

The intention has been that the Forest Project (variable retention and old-growth zones) would provide an alternative way to achieve landscape biodiversity objectives. Agreement on the contribution that variable retention makes has not yet been resolved

10.3 Vancouver Island Land Use Plan (VILUP)

The VILUP Higher Level Plan Order became effective on December 1st, 2000. The Higher Level Plan establishes resource management zones and objectives for these zones.

Special Management Zones (SMZs) have been established in areas where conservation of one or more resource values, such as biodiversity, wildlife, recreation or scenery have been defined as a priority.

Five SMZs occur in TFL 44. The Nahmint and Strathcona-Taylor SMZs are largely in TFL 44 and the Barkley Sound, Alberni Canal and Walbran Periphery SMZs are partially within the TFL. The non-timber resource emphasis is largely reflected in the current inventories and other landscape unit or zone classifications:

- The known scenic areas and the visual landscape inventories recognize the high scenic values in the Nahmint, Barkley Sound and Alberni Canal SMZs. Harvest rates are more constrained in these areas.
- High biodiversity values are recognized through the classification of intermediate and high biodiversity emphases and the designation of the company classified habitat and old-growth forest stewardship zones. The Nahmint SMZ is in a high BEO and is mostly a habitat stewardship zone with some smaller old-growth zones. The result is higher target levels for old seral and higher levels of stand retention compared to other areas. Similarly the Strathcona – Taylor SMZ has an intermediate BEO and is partly an old-growth stewardship zone with the remainder in a habitat stewardship zone. Finally the small area in TFL 44 that is in the Walbran Periphery SMZ is in an intermediate BEO and a habitat stewardship zone.
- The analysis includes additional allowances in the Nahmint Watershed, a result of the earlier Nahmint Watershed Local Resource Unit Planning Process. These include wider management buffers on the main streams and lakes and an old-growth reserve.

The implications of specific objectives for the SMZs will become clearer as the landscape unit planning process proceeds. No additional net-downs or constraints will be applied in this analysis.

The Corrigan, Cous, Klanawa, Maggie and Sarita Enhanced Forestry Zones (EFZs) are largely within TFL 44. The Effingham EFZ is partially within the TFL. The management emphasis of EFZs is on timber production (larger cutblocks and less constraining green-up requirements for adjacency) while maintaining the FPC's requirements for environmental protection. The TFL 44 areas in EFZs are classified as either low or intermediate biodiversity emphasis (draft) and are primarily in Weyerhaeuser's draft timber stewardship zone.

Potential timber supply benefits may occur in EFZs because of the reduced requirement for adjacency (1.3m green-up) and the provision for larger sized cutblocks. The base option includes a reduced requirement of 5 years (1.3m) for the Integrated Resource Management zones in the EFZs. Refer to Section 10.2.1.5. A sensitivity of 3m green-up (age 10) for these areas will be included.

The Higher Level Plan also allows for variations in old seral constraints in the Corrigan and Sarita resource management zones. In the Corrigan (with an intermediate BEO) CWHvm1 variant, up to one third of the old seral target may be recruited from second-growth, provided specific conditions are met. In the Sarita (with a low BEO) there may be additional retention requirements for marbled murrelet habitat. The extent of these variations will be clearer as landscape unit planning occurs. The analysis will report old seral levels for these units over time and hence indicate whether these possible old seral variations might impact timber supply.

10.4 Cultural Heritage Resources

Operations on TFL 44 are conducted in consultation with many First Nations whose traditional territories coincide with the TFL.

Information on Culturally Modified Trees (CMTs) is being examined for impacts on timber supply that are incremental to other allowances (*i.e.* riparian areas and netdowns for wildlife tree patches and variable retention). Refer to Section 6.19.

The company has recognized some areas of special interest to First Nations in the classification of low impact Old-growth Stewardship Zones. One of these, the Uchucklesaht First Nation interest area, T'iiskin Paawats, located to the west of Henderson Lake, will be 100% netted out of the THLB in the base option.

One of the sensitivity analyses excludes a further two areas of special interest to First Nations from the timber harvesting landbase (Section 3.2). This includes two Hupacasath First Nation interest areas; Thunder Mountain adjacent to Great Central Lake and Devils Den Lake near Port Alberni.

10.5 Timber Harvesting

10.5.1 Second-growth Harvest Strategy

The second-growth harvest strategy introduced in MP No.3 will be continued in MP No.4. Harvest from second-growth has increased significantly in recent years from a negligible amount in 1996 to 20% of the harvest in 1999 and 2000.

The increased focus on second-growth harvest reflects the reduced harvest opportunities in mature timber, spatial constraints in second-growth areas and a goal of reducing the costs of transition to the spatial forest pattern implied by recent regulations.

The strategy, in the timber zone, is to plan for first pass harvest opportunities in second-growth at earlier ages than considered prior to MP No.3. Minimum harvest ages based on calculations of financial rotations in recent stand level analyses are used as a guide. These suggested first-pass "minimum harvest ages" vary between 40 and 70 years depending on site productivity and species. In practice, the first pass harvest entry age will vary with stand situation (timber type, silvicultural system etc) and markets. In some situations harvest ages may be younger than the suggested ages. Later harvest passes in similar aged timber will by definition occur at older ages.

This approach takes advantage of the considerable variability in stand conditions in many places and assists in the transition to the desired forest spatial pattern while helping to reduce impacts (of this transition) on timber supply in the medium-term.

The strategy assists in providing an initial focus for harvest planning. Collection of more detailed information from inventories and site visits will then indicate priority areas for harvest (e.g., forest health) and areas that must be deferred because of non-timber resource issues or because of harvest economics.

The variation in species, site productivity, terrain, stewardship zones, silvicultural systems and management concerns such as visual landscapes will result in a wide range of stand types and rotation ages across the forest.

10.5.2 Minimum Harvest Age Assumptions

Minimum harvest ages will be defined in the analysis as follows:

- A minimum volume of 350 m^3/ha;
- A minimum harvest age of 35 years; and
- An age of 200 (if the volume is below 350 m^3/ha at age 200).

Second-growth harvest operations, primarily on Southern Vancouver island and analysis of second-growth harvest opportunities on private land both show that harvesting of stands with volumes of 350 m^3/ha plus to be generally economic. Approximately 780,000 m^3 of second-growth was harvested in TFL 44 during the three years from 1999 to 2001. The distribution of this second-growth harvest by volume class (m^3/ha) is depicted in Table 10.6.

Table 10.6. Distribution of harvest volume by second-growth

Volume Class (m^3/ha)	Second-growth Harvest (%) 1999-2001
<350	1.0
351-400	3.2
401-500	28.3
501-600	19.0
601-700	28.5
701 plus	20.0
Total	**100**

The sensitivity analysis will include an option with minimum harvest ages defined by a minimum second-growth harvest volume of 400 m^3/ha or age 200 years.

In the analysis, areas are often harvested well beyond their "merchantability" ages, depending on the availability of "merchantable" timber and cover class constraints. The analysis will report on harvest ages.

10.5.3 Initial Harvest Rate

The strategy as outlined in earlier management plans is to gradually adjust harvest levels towards our best estimate of the Long Term Harvest Level (LTHL) for the forest.

Initial harvest levels for the Alberni East / Alberni West and Ucluelet portions of the forest are the projected harvest levels for the second period (2002-2006) in the Base Case option of the MP No.3 analysis.

Table 10.7. Initial harvest levels

Working Circle	Volumes (000 m^3/ha)	
	Estimated Contribution to the MP No.3 AAC	Initial Harvest Levels for the MP No.4 Analysis
Alberni East & West	1,724	1,675
Ucluelet	36	33
Total	**1,760**	**1,708**

These "initial harvest rates" provide a starting point for the analysis. However, the timber harvesting landbase and cover constraints have changed since the MP No.3 analysis. Therefore, the initial harvest levels may subsequently be adjusted to achieve harvest flow objectives over the entire planning period.

In the Clayoquot portion of TFL 44, rate of cut constraints for watershed basins have a major impact on harvest levels. Minimal harvest in these areas during the last 5 years could significantly effect the implications of these constraints on short-term harvest levels. Initial analyses of the Clayoquot area will explore a range of initial harvest levels (*i.e.* between 6,000 m^3/year and 20,000 m^3/year).

10.5.4 Harvest Rules

Harvest rules are used by the simulation model to rank stands for harvest. The standard rule is oldest first. With this rule, older stands are queued for harvest ahead of younger stands. Harvest rules interact with forest cover constraints to determine the actual order of harvesting within the model. If a higher ranked

stand is in a constrained zone and cannot be harvested then the model will choose the next highest ranked stand that can be harvested.

Recent harvest numbers and FDP projections indicate current second-growth harvest at approximately 15% to 20% of the TFL 44 harvest. Second-growth harvest in the Base Case option will commence at a similar level and will gradually increase over time until the transition to second-growth harvest is largely complete (small volumes of old-growth harvest may continue because of the scheduling impacts of cover class constraints).

10.5.5 Harvest Flow Objectives

In all phases of the analysis, the harvest flow will reflect a balance of the following objectives:

- Gradually adjust harvest levels towards the best estimate of the Long Term Harvest Level (LTHL) for the forest;
- Limit harvest reductions per decade to no more than 10% unless greater reductions are necessitated by timberland reallocation to higher land use; and
- Achieve a stable long-term harvest level.

Forest cover constraints and biological capacity of the net operable landbase will dictate the harvest level. If opportunities exist to increase the harvest at given points during the 250 year planning horizon, these opportunities will be taken.

11.0 Clayoquot

Most of the Clayoquot Sound portion of TFL 44 was transferred to TFL 57, and hence, to Iisaak Forest Resources in October 1999. Approximately 13,000 hectares of TFL 44 remains in Clayoquot Sound. The current (MP No.3) AAC contribution of this area is 6,200 m^3/yr.

The general procedure for assessing the timber supply in Clayoquot Sound for the determination of an Allowable Annual Cut (AAC) is consistent with that used by other tenure holders in Clayoquot. It includes the following:

1. The forest is divided into watersheds as defined by the Ministry of Forests (MoF). TFL 44 occurs in twenty-three of the watershed basins (Table 11.1). For this analysis these basins have also been grouped into two major watershed units:
    - Upper Kennedy – includes the Upper Kennedy River and Marion Creek Watersheds. This is the larger portion of TFL 44 remaining in Clayoquot Sound.
    - Lower Kennedy – includes crown granted lots that are located in the Kennedy Lake Basin and the Lower Kennedy River area.
2. The landbase is netted down according to current inventories for forest cover, operability, sensitive sites and non-timber resource values (Section 6.0). The Clayoquot portion of TFL 44 is within the habitat stewardship zone, and consequently, the stand-level long-term retention minimum is 15%.

The percentage netdown from productive forest to the timber harvesting landbase has been compared to results achieved in TFL 57. A further net-down has been applied based on this comparison. Refer to Section 6.20. The rationale for this additional net-down is that the TFL 57 results better reflect the Clayoquot Sound Scientific Panel (CSSP) concerns including watershed planning and inventories.

Two cover class constraints are applied exclusively to the Clayoquot portion of TFL 44. These are based on specific recommendations of the Clayoquot Sound Scientific Panel (CSSP) (April 1995). The CSSP recommended retention of a minimum of 40% of the forest in ages greater than 140 years. This constraint is applied to the two major watershed units of "Upper Kennedy" and "Lower Kennedy".

The CSSP also recommended that harvest rates are regulated at the basic watershed basin level. A cover class constraint that allows a maximum of 5% of the total area to be harvested in a five-year period will be applied to each of the 23 watershed basins. In a sensitivity analysis the same constraint will be applied to the timber harvesting landbase.

Table 11.1. Clayoquot Sound watersheds and basins

Basin	Max. Harvest (hectares/5year)	Old-growth[1] (% > age)	Area (ha)		
			Total	Productive	Net
Lower Kennedy					
2	2	40 > 140	39	37	17
2.1	4		82	82	46
3	2		45	43	27
3.1	1		20	20	13
4	30		593	529	279
4.1	10		207	174	97
4.2	1		17	17	10
4.2.1	1		21	21	13
4.3.6.8	1		20	2	1
4.4	7		141	136	71
4.5	10		209	202	91
4.7	1		22	21	12
200	6		119	119	51
Subtotal			***1,535***	***1,403***	***728***
Upper Kennedy					
4.12.6	63	40 > 140	1,260	1,056	384
4.12.6.1	34		685	425	129
4.12.6.2	21		424	353	113
4.12.7	24		484	358	144
4.12.7.1	38		761	480	177
4.12.7.2	0		8	8	4
4.12.8	15		309	164	81
4.12.9	29		577	401	162
4.12.10	11		215	47	15
4.12.11	82		1,640	874	331
4.12.11.1	19		370	96	23
4.12.11.2	19		380	25	9
4.12	206		4,120	3,137	1,252
Unclassified			344	103	19
Subtotal			***11,577***	***7,527***	***2,843***
Total			**13,112**	**8,930**	**3,571**

(1) Old-growth requirement is applied to the total area of each of the two major watersheds, *i.e.* Upper and Lower Kennedy

12.0 Twenty-Year Plan

As laid out in the MoF guidelines for the preparation of the Twenty-Year Plan (TYP), the spatial plan sets out a hypothetical sequence of harvesting over a period of at least twenty years. The TYP utilizes spatial constraints with little or no field information, to test the spatial feasibility of a harvest level that conforms to current standards and practices as defined for the Base Case in the Timber Supply Analysis Information Package. As such, it will be subjected to all of the zone-level spatial constraints incorporated into the long-term analysis.

In addition, it must demonstrate both a spatial distribution and size distribution of harvest blocks which adhere to prevailing operational regulations within the district(s), *and/or* which represent a forest structural pattern than is consistent with long-term patch size distribution requirements defined within the forest-level biodiversity guidelines.

The mapped TYP will be designed to identify:

- The timber harvesting landbase;
- All proposed harvested areas by 5-year period, color-themed by harvest method;
- Existing road access within the timber harvesting landbase;
- Main additional proposed access roads required over the 20-year period;
- Any blocks which are currently part of the existing 5-year forest development plan; and
- The spatial positioning of all scheduled blocks relative to current resource management constraint zones such as VQOs and riparian management zones.

The TYP analysis will be prepared with these objectives in mind. It is not designed to be an operational plan, but a test of timber availability given the current structural characteristics and spatial distribution of components of the resource, and the structural and spatial management objectives associated with current management and operational practices.

This TYP approach will be applied to the Alberni East and Alberni West working circles. It will also be applied to the Ucluelet working circle, if this area is still part of TFL 44 at the time of the analysis. A different approach will be applied to the small area remaining in the Clayoquot working circle. In this area the harvest footprint will be light and summaries of projected harvest by watershed basin will provide the spatial check relative to the CSSP recommendations.

12.1 Methodology

In general, the methodology will employ the existing 5-year development plan blocks as a starting point. The balance of the net timber harvesting landbase will then be subdivided into and “pseudo-blocks”, employing GIS features that would be expected to define logical block boundaries. The combination of the planned blocks and the and “pseudo-blocks” generated in the GIS environment will then used to test the 20-year spatial feasibility of alternative timber supply scenarios, using Timberline’s CASH6 timber supply model.

This model is a simulation tool, which can be used to model the forest cover and seral stage requirements defined by the Forest Practices Code and related current operational guidelines, using similar functionality to that employed by the Ministry of Forests FSSIM timber supply model. In addition, CASH6 has full spatial functionality, enabling the explicit allowance for cut block adjacency, and permitting the user to specify

maximum opening size requirements and long-term patch size distribution objectives. In the model, adjacent blocks are aggregated together if the resulting aggregated components do not exceed the maximum opening criteria for the management zone, and if such aggregation will improve the patch size distribution relative to the specified objectives.

12.2 GIS Data Preparation Steps

The entire timber harvesting landbase will be subdivided into forest development plan blocks and "pseudo-blocks" in the GIS environment. At this point, however, no harvest schedule will be assigned. Numerous spatial themes (e.g. RVQCs, age classes etc refer to list in section 12.2.4 below) will be overlaid, and the resultant polygons will form pseudo-blocks. The rationale for this approach is that, at some point, any and all of these feature boundaries could conceivably define a limit to harvesting, and therefore, would define harvest block boundaries.

Predictably, when constructing a block resultant with abundant Arc/Info™ GIS overlays a large number of undersized polygons result. Undersized polygons significantly reduce the efficacy of the analysis by increasing the number of blocks to be processed and creating blocks that are, in effect, operationally infeasible. To reduce the complexity of the dataset, and perhaps more importantly, move towards more favourable block size distributions these areas are targeted, eliminated and merged into adjacent polygons. An undersized polygon (stand area < 2.5 hectares) is considered a candidate for eliminating if:

- It does not share a legal boundary, or legislated reserve;
- It does not define a break between the harvestable and non harvestable landbase;
- It does not define a break between age classes; and
- It is not a forest development plan block.

The boundaries of the above features are considered to be hard lines and, for the purposes of these analyses, exist in perpetuity. Other boundaries are generally interpreted, and therefore, are considered soft lines. Polygon elimination is permitted across soft line boundaries only.

Elimination is a polygonal based function, and therefore, it does not assess area to perimeter ratios of resultant pseudo-blocks. Consequently, there are no attempts to "square-up" pseudo-blocks during the elimination process. Upon completion of the elimination process, these "*pseudo-block*" boundaries are permanent[1].

12.2.1 Net Harvestable Landbase Extent

This will be based on the netdown criteria identified in Section 6.0. Partial netdown areas will be separated from fully accessible areas.

12.2.2 Forest Development Plan (FDP) Blocks

Blocks from the approved forest development plan will be used as a starting point in the harvest scheduling assignments.

[1] For analysis purposes, these pseudo-blocks constitute the harvest block and become the atomic unit administered in the CASH6 timber supply model

12.2.3 Age Class Definition

Forest cover data will be generalised to define age-class polygons based on the following age categories: 1-20, 21-40, 41-60, 61-80, 81-100, 101-120, 121-140, 141-225, 226-250, 251+.

12.2.4 Resource Emphasis Areas (REA)

All spatially defined constraint zones will be included. The purpose of this is to ensure that blocks do not cross the boundaries of constraint zones.

In summary, the following GIS coverages will be overlaid in order to define blocks for the spatial analysis.

- Landscape units;
- BEC/NDT;
- Visual Quality Objective zones;
- Recreation zones;
- Wildlife habitat zones;
- Harvestable landbase classification;
- Age class distribution;
- Forest Development Plan blocks;
- Riparian management zones;
- Community watersheds;
- Avalanche zones;
- Coastal watershed assessments;
- Stewardship zones;
- Economic operability; and
- Terrain and slope mapping.

12.2.5 Within Block Stand Conditions Definition

The block is the basic unit of harvesting in CASH6. However, blocks can contain varying stand conditions, each with its own pattern of growth and regeneration. Growth and yield characteristics, as described in this document, are defined at the forest cover polygon level. Capturing the within-block stand detail is accomplished by overlaying the pseudo-block layer onto the forest cover.

12.3 Twenty-Year Harvest Schedule Development

Using CASH6, a 20-year schedule will be developed based on achieving the proposed annual harvest level for a period of 20 years. An allowance will be made for non-recoverable losses (NRLs) in the 20-year spatial feasibility analysis, in order to be consistent with the aspatial analysis. However, in reality harvest blocks would exclude these areas.

12.3.1 Forest Cover Rules

This analysis will incorporate all of the constraint zone forest cover requirements as described in this document.

12.3.2 Cut Block Adjacency

Blocks are considered adjacent if they touch at any point on their perimeters. A block cannot be harvested as long as any adjacent block is below green-up (3 meters). However, adjacency is waived if aggregation of blocks will improve size distribution of openings relative to the target distribution, and if the resultant block size does not exceed the maximum size(s).

12.3.3 Harvest Priorities

The following harvest block priorities were assigned in descending order of importance:

5 year development plan block > oldest non-plan block

No block, **including a forest development plan block**, can be harvested if doing so will violate forest cover objectives. With the exception of 5-year development plan blocks, all stands within a block must be above minimum harvest age before the block can be harvested. In the case of 5-year development plan blocks, it is assumed that they have been assessed operationally and meet minimum volume and piece size requirements regardless of stand age.

12.4 Twenty-Year Schedule Mapping

Once the schedule has been developed within the CASH6 environment, the results are returned to the GIS environment for mapping at the TFL level. It is proposed that the harvest schedule be mapped at a scale of 1 : 50 000, to facilitate assessment. In addition to a map layer showing the block locations, map layers depicting the net timber harvesting landbase, landscape units, existing and proposed road locations, and all applicable constraint zones will be prepared, in order that block positioning relative to these zones can be properly assessed.

Tabular summaries will also be provided depicting:

- Volume and area summaries of the harvest by landscape unit, for each of the four harvest periods;
- Volume and area summaries by operability class, for each of the four harvest periods;
- Volume and area summaries by quality and type of timber, for each of the four harvest periods; and
- Volume and area harvest summaries by REA, as well as forest cover status by constraint zone.

13.0 Sensitivity Analyses

This section describes the sensitivity analyses that will be performed on the Base Case option. The sensitivities reflect the stability of the Base Case in the face of uncertainty surrounding specific analysis assumptions. They also reflect the impact of alternative management or potential changes in forest practices.

13.1 Landbase Revisions

13.1.1 Adjust Timber Harvesting Landbase by +/- 5%

Area will be shifted between the inoperable and net landbase components to simulate changes in the operable landbase definition.

13.1.2 Exclude Three First Nations Interest Areas

Three First Nations interest areas will be removed from the timber harvesting landbase. These include the Tii'skin Paawats (area on the west side of Henderson Lake) that has been identified as a 100% reserve Old-growth Stewardship Zone in the Base Option. It also includes Thunder Mountain (just to the north of Great Central Lake) and the Devil's Club area (to the west of the top of the Alberni Inlet). Since the latter two areas are relatively small, their contribution to timber supply will be included in the discussion of the +/- 5% sensitivities.

13.1.3 Exclude Marginal Economic Areas

Mature forest (currently greater than 125 years of age) areas classified as marginally economic will be excluded from the operable landbase.

13.2 Growth and Yield Inputs

13.2.1 Adjust Mature Stand Yields by +/- 10%

All mature yield curves will be adjusted to measure the impacts on timber supply.

13.2.2 Adjust Second-growth Stand Yields by +/- 10%

All second-growth yield curves will be adjusted to measure the impacts on timber supply.

13.2.3 Apply Inventory Site Indices

The inventory site indices will be applied – instead of the BSIM estimates used in the Base Case.

13.3 Forest Project

13.3.1 Exclude Forest Project Assumptions

Exclude assumptions on stewardship zones and variable retention harvesting.

13.3.2 Higher Levels of Retention

Increase incremental netdowns due to variable retention from 5% to 10% in timber stewardship zones and from 7.5% to 12.5% in habitat stewardship zones.

13.4 Biodiversity

13.4.1 Exclude Forest Ecosystem Networks

Forest ecosystem networks (FENs) will be excluded from the timber harvesting landbase.

13.4.2 Exclude Forest Ecosystem Networks and Remove the Old Seral Constraint

Forest ecosystem networks (FENs) will be excluded from the timber harvesting landbase. In addition old seral requirements will not be applied.

13.4.3 Remove Old Seral Constraint

Old growth seral stage forest cover requirements will be removed.

13.5 Visual Landscape

13.5.1 Alternative Visually Effective Green-up (VEG) Heights

Alternative Visually Effective Green-up (VEG) ages/heights are examined as described in Section 10.2.1.1. These are based on the report "Procedures for Factoring Visual Resources into Timber Supply Analyses" (MoF, 1998).

13.5.2 Maximum Disturbance in Scenic Area Zone 1

Apply maximum disturbance percentages of 5%, 15% and 25% for retention, partial retention and modification RVQCs respectively in the Scenic Area Zone 1. Note that the base case includes maximum percentages for Scenic Area Zone 2 and mid-point percentages for Scenic Area Zone 1.

13.6 Adjacency

13.6.1 Three Meter Green-up for Adjacency in the Enhanced Forestry Zones

Apply 3m green-up for adjacency in the Enhanced Forestry Zones. The Base option assumes 1.3m in these areas.

13.7 Minimum Harvest Ages

13.7.1 Adjust Second-growth Minimum Volume Requirement

The minimum volume requirement within second-growth will be altered (400 cubic meters) to measure timber supply impact.

13.7.2 Longer Rotations for a Portion of the THLB

Input during the public review indicated some interest in management of a portion of the THLB on longer rotations. It is expected that the least impact on timber supply would be in areas in which harvest rates are already constrained. Hence areas in the Scenic Area Zone 1, Partial Retention areas are constrained to a maximum of 5% of the productive forest less than Visually Effective Greenup. This is expected to result in rotations that average more than 150 years.

13.8 Harvest Flow

13.8.1 Harvest the Undercut From the 1995 to 1999 Cut Control Period

The harvest will be increased during the first ten years to account for the undercut of 893,000 m^3.

13.8.2 Harvest at the Current AAC for Twenty Years Before Declining to the Long Term Harvest Level

Maintain existing AAC for 20 years.

13.8.3 Higher Harvest Levels for the first 50 years

Increase the harvest during the first 50 years to provide some insights on impacts on long-term harvest ages and harvest levels.

13.8.4 Non-Declining Harvest Schedule

A harvest schedule will be developed that is as high as possible and does not decline (ignoring change from the current AAC) over time.

APPENDIX I – INVENTORY AUDIT REPORT

TFL 44 Mature Inventory Audit

The TFL 44 inventory comprises a mixed variety of cruising methods and plot types. These include stand and forest type / volume class average lines, fixed area (1/4 acre) and prism plots. Some of this inventory data originated in the early 1960s.

In 1988 and 2000 the forest inventory was augmented by the replacement of "old" inventory stands by the unlogged Operational Cruising (OPC) stands, that overlaid them. The OPC stands were cruised as part of the Cutting Permit application process and as such contain the best information available.

In 1988 MacMillan Bloedel Ltd (predecessor company to Weyerhaeuser) initiated a program to test the pre OPC mature component in the company's TFLs. In 1995 permission was sought and granted by the MoF to conduct an audit in TFL 44. This audit was completed in Blocks 1 to 4 of TFL 44 between 1995 and 1999.

The audit sample design included:

It started with a randomized grid of 100m X 100m.

All points that fell in pre OPC mature stands were available for selection.

From these points the desired number of audit points plus extras for replacement were randomly selected.

If at time of establishment, a sample fell in a logged stand, it was replaced from the extra points. If the sample could not be established safely it was not replaced. (MoF instructions)

The field work was conducted by company inventory staff and compilation was done by the consultant firm Reid Collins.

All phases in the audit, including the field work, was monitored and approved by the MoF.

A paired t test was conducted between the audit points volume and the average volume/ha of the stands that the sample points occurred in.

The results are summarized in the following table. No significant difference occurred.

TFL 44 Block	Average volume (m^3/ha)		No. of Sample Points	T	Critical t Value
	Inventory	Audit			
1	732.9	758.5	69	0.5065	1.9955
2	962.5	960.3	98	-0.0427	1.9847
3	662.8	611.7	92	0.8744	1.9731
4	541.9	622.5	75	1.4793	1.9761

Application of the audit results to mature volumes in the Timber Harvesting Landbase

Summary of audit results:

Average volumes (m^3/ha) for 1973-1977 inventory

	Block 1	Block 2	Block 3	Block 4
Inventory	732.9	962.5	662.8	541.9
Audit	758.5	960.3	611.7	622.5
Audit as % of Inventory	103.49%	99.77%	92.29%	114.87%

Timber harvesting landbase volumes before deductions for cull (Z) grades and waste and breakage (000 m^3):
Inventory refers to stands with volumes from the 1973-1977 inventory
OPC refers to volumes estimated from operational cruising

	Block 1	Block 2	Block 3	Block 4	Block 5	Total
OPC	1,597	10,263	7,109	2,088	664	21,722
Inventory	3,592	14,996	6,532	1,122	1,034	27,277
Total	5,190	25,259	13,642	3,210	1,698	48,999
OPC	1,597	10,263	7,109	2,088	664	21,722
Adj Inventory (1)	3,718	14,962	6,029	1,289	1,034	27,031
Total	5,315	25,225	13,138	3,377	1,698	48,753
Difference	+125	-34	-504	+167	0	-246
% Difference	102.4%	99.9%	96.3%	105.2%	100.0%	99.5%

(1) inventory volumes are adjusted by audit % in the first table.

The audit has a negligible impact on the base option volume.

APPENDIX II – UNSTABLE TERRAIN PROCEDURES

BRITISH COLUMBIA

File: 19710-30/TFL44

December 17, 2001

Shelley Higman. P.Eng./P.Geo.,Terrain Specialist
Weyerhaeuser Company Limited
B.C. Coastal Group, Nanaimo Woodlands
65 Front Street
Nanaimo, British Columbia
V9R 5H9

Dear Shelley Higman:

I have reviewed Weyerhaeuser's document "Summary of the Procedures for Assigning Terrain Stability Net-downs for Tree Farm Licence 44 (TFL 44), Management Plan #4" (MP#4). The procedures are appropriate for assigning net-downs for terrain stability for use in MP #4. As noted in the document and in our discussions, mapping in several areas of TFL 44 is of limited utility, and as a result, the net-down estimates are broad approximations.

I understand that mapping in much of TFL 44 is currently being updated. The revised mapping should provide for more accurate net-down estimates in future management plans.

Yours truly,

Tom Millard

Tom Millard
Research Geomorphologist
Vancouver Forest Region

• THE GOVERNMENT OF BRITISH COLUMBIA IS AN 'EMPLOYMENT EQUITY EMPLOYER' •

Ministry of Forests
Vancouver Regional Office
Location: 2100 Labieux Road, Nanaimo
Mailing Address: 2100 Labieux Road, Nanaimo, BC V9T 6E9
Tel: (250) 751-7001
Fax: (250) 751-7190

Summary of the Procedures for Assigning Terrain Stability Net-downs

For TFL 44, MP #4

Purpose

Most of TFL 44 has been mapped for terrain stability. However, the mapping in different areas, has occurred at various times throughout the last 25 years, at various levels of detail and to different standards.

Much of the terrain stability mapping for TFL44 is presently being updated to today's current standard. This project will not be complete until 2003.

It is not appropriate to apply the same net-down rules across these varied inventories. Hence the procedures described below have been developed. These procedures are similar to those presented in MP #3, but have been updated as new information became available. As in MP #3, the primary objective of the procedure is to calibrate the Es (reconnaissance) mapping that was found to be too conservative.

General Procedure

TFL 44 has been divided into ten zones (numbered 1, 2, 3, 4, 5A, 5B, 5C, 6, 7 and 8) as shown on the attached map. The zones were chosen on the basis of logical geographic boundaries, regions of similar biogeoclimatic characteristics and areas where full-coverage, 5-class terrain stability mapping was available to "calibrate" the Es mapping.

In general net-downs of 20% were applied to Class IV areas and 90% to Class V areas. No net-downs were applied to Class IV_R terrain.

No adjustments were made in Zone 6 (Clayoquot) and Zone 7 (Ucluelet). These areas have mainly 5-class mapping and the small area of Es mapping in Zone 6 was treated the same (20% for Es2 and 90% for Es1).

For most of the other zones, areas of Es-mapping were related to areas of 5-class mapping and ratios between the two were used to adjust the net-downs for the Es mapping.

A conservative approach was used in calibrating the stability mapping in Zones 3 (Henderson), 4 (Nahmint) and 5C (Cous). For Zones 3 and 5C, the Es (and 5-class mapping in Zone 3) were related to the 5-class mapping in the Klanawa Watershed. More slope failures have been observed in the Klanawa than in the other two areas. Initially, the Nahmint Watershed was related to 5-class mapping in the Bulson and Tofino Watersheds. After review the recommendation was to use the Klanawa results as a reference.

Slope classes (60%-75% and 75% plus) have been used to spatially allocate net-downs in unmapped areas in Zones 4 (Nahmint) and 8 (Haddon / Rosander). The approach is to first define the target net-down (% of the physically operable productive forest) for unstable terrain, by relating the area of interest to another area with 5-Class mapping. Net-down factors are then assigned to the two slope classes so that together they equal the overall target net-down.

As mentioned above, a FRBC funded project is underway to upgrade the terrain stability mapping on crown lands in TFL 44. It is envisaged that additional information will be available from preliminary results of this project prior to submission of the analysis in February 2002 and the following AAC Determination.

The approach described below is similar to that used in MP #3. The main differences are that zone 5 has been split into 3 Zones (5A, 5B and 5C), 5-class mapping has been completed in the Sproat Lake Watershed and net-downs have been increased in Zones 2, 3, 4, 5A, 5C and 8.

All net-down areas and percentages described in the following notes refer to the physically operable productive forest.

Detail by Zone
Refer to the attached map of TFL 44 soil zones

Zone 1 (Alberni East – North)
The same Es adjustment factors are used as derived for MP #3. The derivation is shown below.

Boundaries: East of Stamp River and of the Alberni Canal. North of the Klanawa Watershed. Includes Block 1 and some of Block 2 of TFL 44.

Reference 5-Class Area: China Creek Watershed

Es Trial Area: Museum Creek Watershed and upper Franklin Watershed. This portion of the Es area in Zone 1 is used to derive the adjustment factors. These factors are then applied to all Es areas in the Zone.

5-Class mapping in China Creek occurs on operable productive forest as follows:

Class IV 8.6%
Class V 4.9%

These percentages are compared to Es mapping in the adjacent Museum Creek and Upper Franklin River to derive adjustment factors for all Es areas in Zone 1:

	% of Area	Factor to convert to Class IV or V Terrain	Resulting polygon net-down (%)
Es2	28.9%	8.6/28.9 = 0.30	0.3*20 = 6.0
Es1	23.1%	4.9/23.1 = 0.21	0.21*90 = 18.9

Note that the Es mapping in the Cameron Valley, used in the MP #3,analysis has now been replaced by 5-Class mapping.

Zone 2 (Klanawa / Sarita)
The same Es adjustment factors are used as derived for MP #3. The derivation is shown below.

Boundaries: Between the Alberni Canal and Nitnat Lake. Includes much of Block 2 of TFL 44.

Reference 5-Class Area: Klanawa River Watershed

Es Trial: East Side of Sarita River. This portion of the Es area in Zone 2 is used to derive the adjustment factors. These factors are then applied to all Es areas in the Zone.

5-Class mapping in the Klanawa Watershed occurs on operable productive forest as follows:
Class IV 20.8%
Class V 7.0%

These percentages are compared to Es mapping on the east side of the Sarita River to derive adjustment factors for all Es areas in Zone 2:

	% of Area	Factor to convert to Class IV or V Terrain	Resulting polygon net-down (%)
Es2	31.6%	20.8/31.6 = 0.66	0.66*20 = 13.2
Es1	17.7%	7.0/17.7 = 0.40	0.4*90 = 36.0

Stemming from recommendations from the Klanawa CWAP, and subsequent discussions with Glynnis Horel, P.Eng., the Class IV net-down in the Klanawa Watershed has been increased from 20% to 30% to reflect terrain stability concerns in that area.

Zone 3 (Block 4 – Henderson Lake)
Es and 5-Class adjustment factors are revised from MP #3, and are derived below.

Boundaries: Henderson/Uchuck area; Block 4 of TFL 44.

Reference 5-Class Area: Klanawa River Watershed.

It was agreed that the broad scale reconnaissance mapping (1:50,000 scale photos) used for 5-class mapping in Clemens Creek overstates the net-downs for sensitive soils. The recommendation was to relate to the 5-class mapping in the Klanawa Watershed as a more representative (still likely conservative) base for Zone 3.

The Klanawa Watershed results are applied to 5-Class mapping in Clemens Creek and to the Es mapping in the southern portion of the Block. I.e. it is assumed that the same overall net-down for terrain applies in both parts of Block 4.

5-Class mapping in the Klanawa Watershed occurs on operable productive forest as follows:

Class IV 20.8%
Class V 7.0%

These percentages are compared to the 5-Class mapping in Clemens Creek and to the Es mapping elsewhere in Block 4 as follows:

	% of Area	Factor to convert to reference area Class IV or V Terrain	Resulting polygon net-down (%)
Class IV	44.5%	20.8/44.5 = 0.465	0.465*20 = 9.3
Class V	26.0%	7.0/26.0 = 0.27	0.27*90 = 24.2
Es2	31.6%	20.8/25.5 = 0.815	0.815*20 = 16.3
Es1	17.7%	7.0/18.1 = 0.385	0.385*90 = 34.7

Zone 4 (Nahmint Watershed)
Terrain stability adjustment factors are revised from MP #3, and are derived below.
Boundaries: Nahmint Valley, part of Block 3

The Nahmint Watershed has been partially inventoried with 5-class mapping, but the remaining area is unmapped**.** A conservative approach has been applied to make allowances for unstable terrain in unmapped areas.

Initially the Bulson Creek and Tofino Creek 5-class mapping was used as a reference. This is the basis for the net-downs described in the Information Package. The result is an overall netdown for unstable terrain (of 15.3%) that is significantly higher than for surrounding areas (Henderson Lake and Sproat Lake) and for the more slide prone Klanawa Watershed. Consequently the recommendation from company and contract soil specialists was to reduce the overall terrain netdown to 10.3%, comparable to those used in the neighbouring Henderson lake and Sproat Lake watersheds.

This recommendation occurred after data preparation for the Information Package. The difference is a reduction in the unstable terrain netdown by 456 hectares. This difference is discussed in the report (Section 6.7) and will be referenced in the analysis.

Reference 5-Class Area: Bulson Creek and Tofino Creek Watersheds
Initially the five-class mapping in the Bulson and Tofino Creeks was used as a reference for the total terrain net-downs for the Nahmint Watershed. The target percentage net-down for unstable terrain was estimated by multiplying the physically operable productive forest areas (in the combined Bulson Creek and Tofino Creek Watersheds) in Class IV polygons by 20% and in Class V polygons by 90%. These areas were then expressed as a percentage of the total physically operable productive forest in the mapped area of the two watersheds. Refer to the following table.

The resulting net-down target of 15.3% is conservatively high when compared to the comparable percentage of 12.5% applied in the Klanawa Watershed. A greater incidence of slides has occurred in the Klanawa Watershed.

	Bulson Creek and Tofino Creek Watersheds		
	% of physically operable productive forest	Net-down applied to terrain polygons	Resulting net-down of physically operable productive forest
Class IV	25.3%	20%	5.1%
Class V	11.4%	90%	10.3%
Total			**15.3%**

Standard 20% and 90% net-downs in class IV and V polygons in the Nahmint result in a 4.0% netdown to the physically operable productive forest. The remaining 11.3% net-down (target of 15.3% less the 4.0%) is achieved by applying net-downs of 15% and 54.2% respectively to slope classes (excluding the Class IV and V areas) of 60% to 75% and greater than 75%. The net-down percentages of 15% and 54.2% were chosen to collectively achieve the 11.3% and to apply a higher net-down to the 75% plus slopes than the 60% to 75% slope class.

Slope Class	% of physically operable productive forest	Net-down applied to slope class polygons	Resulting net-down of physically operable productive forest
60%-75%	17.7%	15.0%	2.65%
75% plus	16.0%	54.2%	8.65%
Total			**11.3%**

Assume a Netdown of 10.3% for Unstable Terrain

The approach is similar to that described in the table above. The target overall netdown is 10.3%. Existing 5-class mapping accounts for 4.0%. Hence the remaining 6.3% is achieved by factoring the slope class netdowns in the above table by 6.3/11.3 or 55.75%. The resulting netdowns are shown in the following table.

Slope Class	% of physically operable productive forest	Net-down applied to slope class polygons	Resulting net-down of physically operable productive forest
60%-75%	17.7%	8.4%	1.5%
75% plus	16.0%	30.2%	4.8%
Total			**6.3%**

Zone 5

Es adjustment factors are revised from MP #3, and are derived below.

Block 3 except for the Nahmint and Kennedy Watersheds. Zone 5 has been divided into three sub-zones numbered 5A, 5B and 5C.

Zone 5A (Western portions of Sproat, and Great Central)

Boundaries: The wetter western portions of the Sproat Lake and Great Central lake Watersheds.

Reference 5-Class Area: Sproat Lake Watershed portion of this zone.

5-Class mapping in western portion of the Sproat lake Watershed occurs on operable productive forest as follows. Note that the Class IV polygons with the R (roads) feature have not been included. The R feature is to draw attention to operational planning of roads only.

Class IV 20.0%
Class V 6.9%

These percentages are compared to Es mapping in the remainder of the zone:

	% of Area	Factor to convert to Class IV or V Terrain	Resulting polygon net-down (%)
Es2	19.6%	20.0/19.6 = 1.02	1.02*20 = 20.4
Es1	10.7%	6.9/10.7 = 0.644	0.644*90 = 58.0

Zone 5B (Eastern portions of Sproat, and Great Central and the Ash Valley)

Boundaries: The drier eastern portions of the Sproat Lake and Great Central lake Watersheds and most of the Ash Valley.

Reference 5-Class Area: Sproat Lake Watershed portion of this zone.
5-Class mapping in western portion of the Sproat lake Watershed occurs on operable productive forest as follows. Note that the Class IV polygons with the R (roads) feature have not been included. The R feature is to draw attention to operational planning of roads only.

Class IV 6.9%
Class V 2.5%

These percentages are compared to Es mapping in the remainder of the zone:

	% of Area	Factor to convert to Class IV or V Terrain	Resulting polygon net-down (%)
Es2	17.7%	6.9/17.7 = 0.388	0.388*20 = 7.8
Es1	6.2%	2.5/6.2 = 0.407	0.407*90 = 36.7

Zone 5C (Cous Creek, Mctush Creek)
Boundaries: Area between the Nahmint Watershed, Sproat Lake Watershed and the Alberni Canal.

Reference 5-Class Area: Klanawa River Watershed

Es Area to which Procedure Applies:: Zone 5C.

5-Class mapping in the Klanawa Watershed occurs on operable productive forest as follows:

Class IV 20.8%
Class V 7.0%

These percentages are compared to Es mapping in Zone 5C River to derive adjustment factors for Es areas:

	% of Area	Factor to convert to Class IV or V Terrain	Resulting polygon net-down (%)
Es2	24.2%	20.8/24.2 = 0.859	0.859*20 = 17.2
Es1	9.7%	7.0/9.7 = 0.723	0.723*90 = 65.1

Zone 6 (Clayoquot)
Clayoquot Management Area. The major area is in the Upper Kennedy and Marion Creek Watersheds. It also includes smaller blocks of private land mostly in the Kennedy Lake and Lower Kennedy River areas.

Standard net-downs of 20% and 90% are applied to Class IV and Class V polygons.

Terrain class mapping in the Upper Kennedy / Marion Creek area occurs on operable productive forest as follows:

Class IV 1.0%
Class V 11.4%

There is also a relatively small area of Es mapping, adjacent to the Sproat Lake Watershed. Net-downs of 90% for Es1 and 20% for Es2 polygons are applied.

Zone 7 (Ucluelet)
The same procedure is used as derived for MP #3.

Boundaries: Maggie Lake / Mercantile Area, south of Clayoquot. This is the Ucluelet Working Circle of TFL 44

Terrain class mapping in this area occurs on operable productive forest as follows:

Class IV 3.3%
Class V 5.8%

Zone 8 (Haddon / Rosander)
Five class mapping has recently been completed in Haddon Creek. Applying 20% and 90% net-downs to Class IV and Class V polygons results in a 6.4% net-down for sensitive soils.

It is assumed that an overall net-down of 6.4% also occurs on the unmapped area in this zone. Slope classes have been used to apply the net-down.

The eastern portion of the Klanawa Watershed was used as a reference area, relating the coincidence of Class IV and Class V areas to slope classes 60% - 75% and > 75%. The coincidence and 20% and 90% net-downs for Class IV and Class V terrain respectively were then calibrated to the target net-down of 6.4%. The result was the following net-downs by slope class:

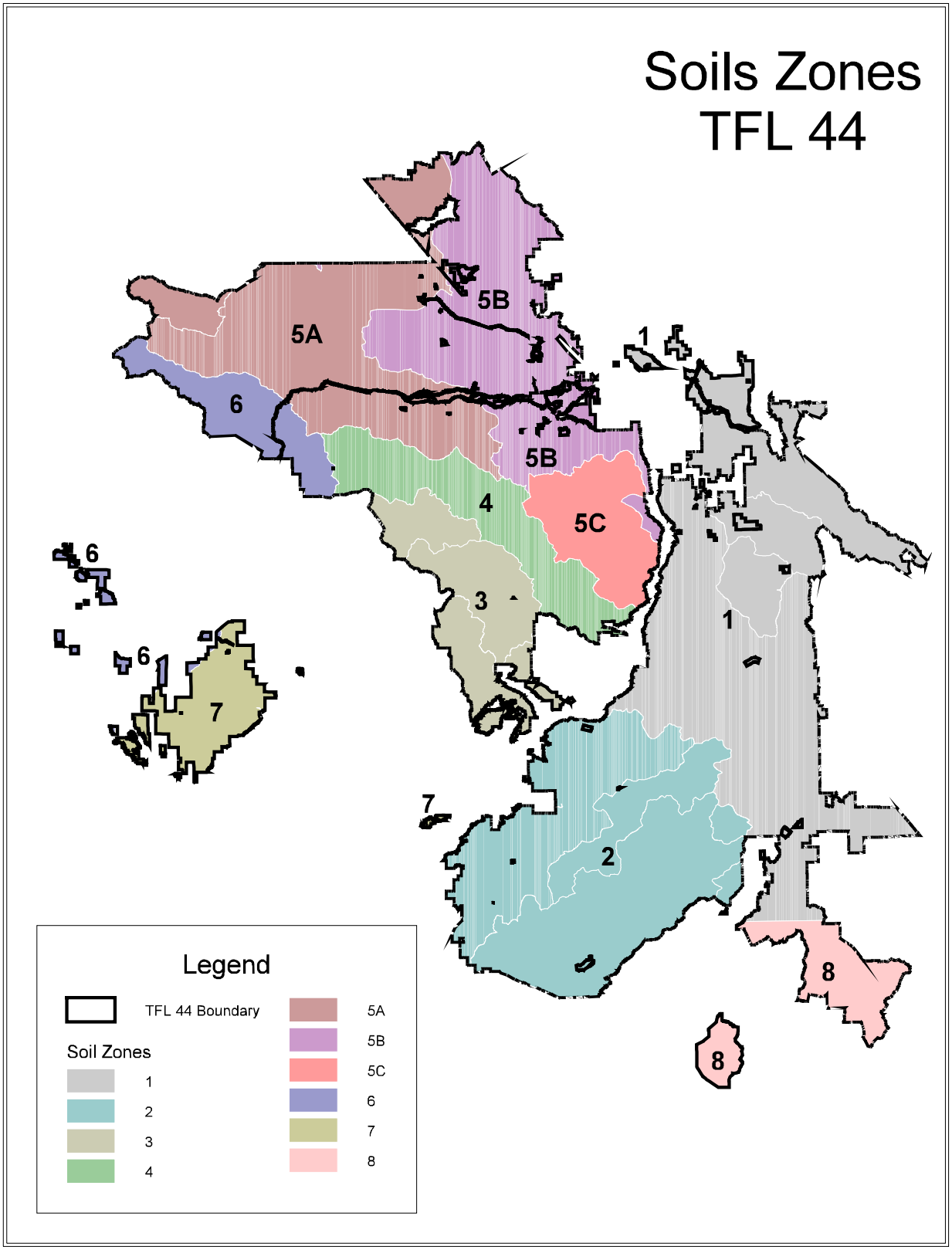
Slope Class	% of physically operable productive forest	Net-down applied to slope class polygons	Resulting net-down of physically operable productive forest
60%-75%	10.6%	23.0%	2.44%
75% plus	10.7%	37.0%	3.96%
Total			**6.4%**

Summary of Net-downs by Soil Zone
A) MP #4

Zone	% netdowns					
	Class IV	**Class V**	**Es1**	**Es2**	**60%-75%**	**75% +**
1	20.0	90.0	18.9	6.0	N/A	N/A
2	30.0	90.0	36.0	13.2	N/A	N/A
3	9.3	24.2	34.7	16.3	N/A	N/A
4	20.0	90.0	N/A	N/A	15.0	54.2
4 (revised)	20.0	90.0	N/A	N/A	8.4	30.2
5A	20.0	90.0	58.0	20.4	N/A	N/A
5B	20.0	90.0	36.7	7.8	N/A	N/A
5C	N/A	N/A	65.1	17.2	N/A	N/A
6	20.0	90.0	90.0	20.0	N/A	N/A
7	20.0	90.0	N/A	N/A	N/A	N/A
8	20.0	90.0	N/A	N/A	23.0	37.0

B) MP #3

Zone	% netdowns			
	Class IV	**Class V**	**Es1**	**Es2**
1	20.0	90.0	18.9	6.0
2	20.0	90.0	36.0	13.2
3	4.6	19.8	30.6	8.2
4	20.0	90.0	N/A	N/A
5 (5A, 5B & 5C)	20.0	90.0	18.9	9.6
6	20.0	90.0	N/A	N/A
7	20.0	90.0	N/A	N/A


Soils Zones
TFL 44
5A
5B
6
5B
4
5C
6
3
1
6
7
1
7
2
8
8
Legend
TFL 44 Boundary
Soil Zones
1
2
3
4
5A
5B
5C
6
7
8

APPENDIX III – YIELD CURVES FOR TFL 44

The yield tables listed in the following pages were generated with the yield model Y–XENO.

The index to the tables indicates the conditions each table represents.

The yields in the tables do not include adjustments for regeneration delays, tree improvement, breakage, decay, non-productive areas, or variable retention.

Table h2

Yield Table Volumes used in TFL 44 Management Plan No. 4							
Total Age	Site Index						
	15.5	17.0	22.5	27.5	28.5	33.5	35.0
10	0	0	0	0	0	0	1
15	0	0	0	0	1	6	11
20	0	0	1	9	12	43	59
25	0	0	7	34	44	123	155
30	1	2	22	91	110	245	293
35	2	4	59	176	205	384	447
40	5	16	116	273	309	528	604
45	20	43	181	375	419	674	762
50	47	79	250	477	526	811	903
55	79	118	320	575	630	936	***1021**
60	112	159	389	665	723	***1033**	1105
65	148	201	456	745	808	1106	1163
70	184	244	516	821	887	1162	1202
75	220	285	571	892	***958**	1196	1221
80	255	324	621	***956**	1018	1213	1227
85	287	359	667	1011	1066	1218	1227
90	317	391	715	1056	1106	1217	1222
95	343	421	760	1092	1135	1214	1215
100	369	449	804	1119	1157	1208	1208
105	393	476	***844**	1137	1169	1202	1203
110	415	501	880	1150	1177	1195	1200
115	437	***525**	913	1159	1179	1189	1200
120	***457**	548	943	1164	1177	1184	1198
125	476	568	969	1166	1175	1182	1197
130	494	586	993	1167	1174	1181	1196
135	511	604	1013	1166	1171	1180	1198
140	526	622	1030	1164	1169	1181	1199
145	541	640	1044	1161	1169	1181	1200
150	554	657	1058	1161	1167	1182	1200
155	566	672	1068	1160	1166	1183	1202
160	577	687	1077	1159	1163	1184	1202
165	588	701	1083	1157	1162	1185	1203
170	599	713	1089	1155	1161	1185	1203
175	609	725	1093	1153	1160	1186	1204
180	618	736	1098	1151	1158	1186	1205
185	628	746	1101	1149	1157	1186	1205
190	636	755	1104	1149	1155	1186	1205
195	644	764	1105	1148	1153	1187	1206
200	652	772	1106	1148	1152	1187	1206
Maximum MAI	3.8	4.6	8.0	11.9	12.8	17.2	18.6
Age for Maximum MAI	120	115	105	80	75	60	55

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of planted stems	1200/ha. Western Hemlock
Number of natural stems	1200/ha. Western Hemlock
Percent survival of natural stems	90%
Percent distribution of natural stems	75%
Regeneration delay for natural stems (negative = early)	-2
Years of natural regeneration	5

Table h9

Yield Table Volumes used in TFL 44 Management and Working Plan No. 4							
Total Age	Site Index						
	15.5	17.0	22.5	27.5	28.5	33.5	35.0
10	0	0	0	0	0	0	0
15	0	0	0	0	0	1	1
20	0	0	0	1	1	5	7
25	0	0	1	4	5	16	22
30	0	0	2	12	15	41	51
35	0	0	8	29	34	76	93
40	1	2	19	51	60	122	146
45	3	7	33	79	92	178	209
50	8	14	49	113	129	239	277
55	14	22	69	151	171	302	345
60	21	31	92	192	215	361	407
65	29	41	117	232	258	416	465
70	37	53	142	270	299	468	519
75	47	65	167	307	338	517	571
80	57	78	190	343	376	563	619
85	67	91	214	377	412	606	663
90	76	102	237	409	445	646	***704**
95	86	114	259	440	477	***683**	742
100	95	126	281	468	506	718	776
105	104	137	301	495	534	749	808
110	113	149	321	***520**	***560**	779	838
115	122	160	339	543	583	805	865
120	131	170	357	565	606	830	890
125	139	180	374	585	626	853	913
130	147	190	***389**	604	645	873	933
135	154	200	404	621	663	892	952
140	162	209	417	637	679	909	969
145	169	217	430	652	694	925	985
150	176	225	442	666	708	939	999
155	182	***233**	453	678	720	951	1012
160	***188**	240	463	690	732	963	1023
165	194	247	473	700	743	974	1033
170	199	253	481	710	752	983	1042
175	204	259	489	718	761	991	1050
180	209	265	497	726	769	999	1058
185	214	270	503	733	776	1006	1064
190	218	275	509	740	782	1011	1070
195	222	279	515	745	788	1016	1074
200	225	283	520	750	792	1020	1078
Maximum MAI	1.2	1.5	3.0	4.7	5.1	7.2	7.8
Age for Maximum MAI	160	155	130	110	110	95	90

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	300/ha. Western Hemlock
Percent distribution of natural stems	50%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table h5

Yield Table Volumes used in TFL 44 Management Plan No. 4							
Total Age	Site Index						
	15.5	17.0	22.5	27.5	28.5	33.5	35.0
10	0	0	0	0	0	0	0
15	0	0	0	0	0	1	2
20	0	0	0	2	2	9	13
25	0	0	1	7	10	31	41
30	0	0	4	23	29	75	93
35	0	1	15	53	63	136	163
40	1	4	35	92	108	210	247
45	5	12	60	140	161	294	340
50	14	25	89	194	220	381	433
55	26	40	122	252	283	464	519
60	38	56	158	311	346	536	594
65	52	74	197	367	404	601	659
70	67	93	235	418	456	660	721
75	83	114	271	465	506	715	***776**
80	100	134	305	509	552	***765**	827
85	116	154	338	550	594	811	874
90	132	172	370	588	633	853	918
95	147	190	399	***623**	***668**	891	958
100	161	208	427	655	701	928	994
105	175	225	454	685	732	961	1027
110	189	241	478	712	760	990	1057
115	203	257	***502**	737	786	1018	1084
120	215	272	523	761	809	1043	1109
125	228	286	543	782	831	1066	1132
130	239	300	561	802	851	1087	1153
135	250	313	578	820	869	1105	1172
140	261	***325**	594	837	886	1123	1189
145	271	336	609	853	902	1139	1204
150	***281**	347	622	867	916	1154	1219
155	290	357	635	880	930	1166	1232
160	298	367	646	892	942	1177	1243
165	306	376	656	903	953	1188	1254
170	313	384	666	913	963	1197	1263
175	320	392	674	922	972	1206	1272
180	327	399	682	930	980	1213	1279
185	333	406	689	937	987	1220	1286
190	338	412	696	944	993	1226	1291
195	343	417	702	950	999	1231	1295
200	348	422	707	955	1003	1235	1299
Maximum MAI	1.9	2.3	4.4	6.6	7.0	9.6	10.3
Age for Maximum MAI	150	140	115	95	95	80	75

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	600/ha. Western Hemlock
Percent distribution of natural stems	70%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table h6

Yield Table Volumes used in TFL 44 Management and No. 4							
Total Age	Site Index						
	15.5	17.0	22.5	27.5	28.5	33.5	35.0
10	0	0	0	0	0	0	0
15	0	0	0	0	0	3	5
20	0	0	0	4	6	22	31
25	0	0	3	17	22	71	92
30	0	1	10	52	65	160	195
35	1	2	33	114	134	271	318
40	2	8	74	190	218	389	445
45	11	26	123	275	311	514	576
50	29	52	179	363	404	626	691
55	53	82	238	450	494	720	783
60	79	115	298	528	573	***794**	***855**
65	106	149	358	595	640	857	918
70	135	184	413	653	698	915	978
75	164	220	462	***704**	***749**	967	1032
80	194	254	505	750	796	1014	1080
85	223	286	545	793	839	1058	1124
90	249	315	582	832	878	1099	1166
95	273	342	***616**	867	914	1137	1204
100	295	367	648	900	946	1172	1239
105	317	391	676	931	976	1205	1271
110	337	413	703	959	1004	1235	1301
115	356	434	729	984	1029	1261	1327
120	374	***454**	752	1007	1053	1286	1350
125	391	472	773	1027	1075	1309	1371
130	***407**	489	793	1047	1094	1332	1392
135	422	506	810	1065	1112	1352	1410
140	436	521	827	1081	1129	1369	1427
145	449	535	842	1097	1144	1384	1443
150	461	548	855	1111	1158	1397	1455
155	472	560	868	1124	1171	1409	1468
160	483	571	879	1136	1183	1420	1479
165	492	581	889	1147	1193	1431	1489
170	501	591	898	1157	1203	1439	1498
175	510	600	907	1166	1212	1448	1506
180	518	608	915	1174	1220	1455	1512
185	525	615	921	1182	1227	1460	1518
190	531	622	928	1188	1233	1465	1522
195	538	628	934	1194	1239	1470	1526
200	543	634	938	1198	1244	1473	1529
Maximum MAI	3.1	3.8	6.5	9.4	10.0	13.2	14.2
Age for Maximum MAI	130	120	95	75	75	60	60

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	1500/ha. Western Hemlock
Percent distribution of natural stems	90%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table h11a

Yield Table Volumes used in TFL 44 Management Plan No. 4							
Total Age	Site Index						
	15.5	17.0	22.5	27.5	28.5	33.5	35.0
10	0	0	0	0	0	0	0
15	0	0	0	0	0	7	12
20	0	0	0	9	14	52	72
25	0	0	7	39	51	149	189
30	0	1	23	107	131	297	353
35	1	4	67	214	249	453	515
40	5	16	138	336	379	590	648
45	20	47	222	456	503	723	783
50	52	93	309	563	611	825	884
55	93	145	394	652	697	899	958
60	137	199	472	721	763	958	1017
65	183	253	540	775	815	1010	1070
70	230	306	595	820	862	1062	1124
75	275	357	639	862	905	1108	1174
80	319	402	676	901	946	1154	1219
85	358	441	710	939	985	1194	1260
90	392	474	741	974	1019	1232	1299
95	421	503	771	1007	1053	1268	1335
100	448	529	798	1036	1083	1300	1369
105	473	553	824	1064	1111	1330	1397
110	495	574	848	1090	1135	1357	1423
115	515	594	871	1114	1159	1382	1447
120	533	612	892	1135	1180	1404	1470
125	549	630	911	1156	1201	1425	1491
130	564	645	930	1174	1219	1443	1511
135	578	659	946	1192	1237	1462	1528
140	591	672	961	1207	1253	1478	1543
145	602	683	976	1220	1268	1493	1557
150	613	694	989	1232	1280	1507	1567
155	623	703	1000	1244	1291	1518	1577
160	633	712	1011	1256	1301	1529	1588
165	642	721	1021	1265	1310	1540	1596
170	649	730	1030	1274	1319	1548	1604
175	657	737	1038	1282	1328	1556	1612
180	663	745	1046	1288	1335	1562	1618
185	670	752	1053	1295	1341	1567	1623
190	675	759	1059	1301	1347	1573	1627
195	681	764	1064	1306	1352	1577	1631
200	685	770	1068	1311	1357	1579	1634
Maximum MAI	4.5	5.3	8.5	12.0	12.7	16.5	17.7
Age for Maximum MAI	105	95	75	60	60	50	50

These volumes are from the Xeno yield tables with no reductions or netdowns

The initial conditions for this table are:

Number of natural stems	4000/ha. Western Hemlock
Percent distribution of natural stems	100%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table h7a

Yield Table Volumes used in TFL 44 Management Plan No. 4							
Total Age	Site Index						
	15.5	17.0	22.5	27.5	28.5	33.5	35.0
10	0	0	0	0	0	0	0
15	0	0	0	0	1	9	15
20	0	0	0	12	18	70	94
25	0	0	10	51	67	187	232
30	0	2	31	132	162	347	406
35	2	5	82	252	294	504	562
40	6	19	164	385	433	629	679
45	23	54	257	508	557	752	***802**
50	58	105	352	608	654	***841**	891
55	103	162	438	***687**	***728**	907	954
60	153	222	514	744	783	958	1007
65	204	281	576	789	826	1010	1059
70	255	338	***624**	828	867	1059	1111
75	304	390	661	864	907	1105	1156
80	350	436	693	902	946	1148	1199
85	390	472	721	940	982	1188	1241
90	424	***504**	748	973	1015	1224	1280
95	452	531	774	1005	1046	1256	1315
100	***479**	555	800	1034	1075	1288	1345
105	501	576	824	1060	1102	1317	1374
110	521	595	846	1084	1126	1342	1400
115	540	613	867	1105	1148	1366	1422
120	556	628	887	1124	1168	1388	1444
125	571	642	906	1141	1186	1406	1463
130	584	655	924	1159	1204	1423	1480
135	596	667	939	1173	1220	1441	1497
140	607	678	954	1189	1236	1455	1510
145	617	689	967	1203	1250	1468	1523
150	627	698	979	1216	1262	1482	1534
155	636	708	990	1226	1275	1494	1543
160	644	716	1001	1236	1287	1503	1553
165	652	724	1010	1245	1297	1511	1561
170	659	732	1018	1254	1305	1519	1568
175	665	739	1026	1262	1314	1526	1575
180	671	745	1033	1269	1321	1533	1581
185	676	751	1039	1275	1327	1539	1584
190	682	757	1044	1281	1331	1543	1588
195	686	762	1048	1285	1335	1547	1593
200	691	766	1052	1289	1339	1550	1595
Maximum MAI	4.8	5.6	8.9	12.5	13.2	16.8	17.8
Age for Maximum MAI	100	90	70	55	55	50	45

These volumes are from the Xeno yield tables with no reductions or netdowns

The initial conditions for this table are:

Number of natural stems	6000/ha. Western Hemlock
Percent distribution of natural stems	100%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table f1a

Yield Table Volumes used in TFL 44 Management Plan No. 4						
Total Age	Site Index					
	16.5	17.0	23	28.5	35.5	36
10	0	0	0	0	0	0
15	0	0	0	0	1	2
20	0	0	0	3	21	22
25	0	0	3	16	66	71
30	0	0	10	51	143	151
35	1	1	33	103	242	254
40	4	6	66	164	361	378
45	16	21	102	231	489	503
50	32	38	140	303	622	640
55	49	57	179	381	756	780
60	66	75	218	454	890	917
65	83	93	257	527	1021	1052
70	99	111	298	599	1144	1176
75	115	127	337	669	1258	1290
80	130	144	373	736	1360	1393
85	144	159	408	801	***1450**	***1485**
90	158	173	441	864	1528	1563
95	171	188	474	924	1594	1630
100	183	201	506	983	1650	1650
105	195	214	536	1038	1650	1650
110	207	226	565	***1089**	1650	1650
115	218	238	593	1137	1650	1650
120	228	249	***619**	1181	1650	1650
125	238	260	645	1223	1650	1650
130	***248**	270	669	1263	1650	1650
135	257	281	692	1299	1650	1650
140	265	***291**	715	1333	1650	1650
145	274	302	736	1365	1650	1650
150	283	311	757	1394	1650	1650
155	291	319	776	1421	1650	1650
160	299	327	796	1446	1650	1650
165	307	335	814	1470	1650	1650
170	314	342	831	1492	1650	1650
175	320	349	848	1512	1650	1650
180	327	356	864	1530	1650	1650
185	333	363	881	1547	1650	1650
190	338	369	897	1563	1650	1650
195	344	375	912	1577	1650	1650
200	349	381	926	1592	1650	1650
Maximum MAI	1.9	2.1	5.2	9.9	17.1	17.5
Age for Maximum MAI	130	140	120	110	85	85

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of planted stems	1200/ha. Douglas-fir
Number of natural stems	500/ha. Douglas-fir
Percent survival of planted stems	85%
Percent distribution of natural stems	60%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	4

Table f8

Yield Table Volumes used in TFL 44 Management Plan No. 4						
Total Age	Site Index					
	16.5	17.0	23	28.5	35.5	36
10	0	0	0	0	0	0
15	0	0	0	0	0	1
20	0	0	0	1	5	6
25	0	0	1	4	18	20
30	0	0	3	14	45	48
35	0	0	10	32	83	88
40	1	2	21	55	131	138
45	5	7	34	82	187	195
50	10	12	49	113	249	260
55	16	19	65	146	315	328
60	22	25	82	181	383	399
65	28	32	100	217	451	469
70	34	39	118	253	519	539
75	40	45	136	288	584	608
80	46	52	154	324	648	673
85	52	58	171	358	708	735
90	58	65	188	392	766	795
95	64	71	205	425	820	850
100	70	77	222	456	872	904
105	75	83	237	487	921	954
110	80	89	253	516	968	***1001**
115	85	95	268	544	***1012**	1046
120	90	100	282	572	1054	1088
125	95	105	296	598	1093	1129
130	99	110	310	***622**	1130	1167
135	104	115	323	646	1166	1204
140	108	120	335	668	1200	1238
145	112	124	***347**	690	1232	1271
150	***116**	***129**	359	710	1263	1303
155	120	133	370	730	1293	1333
160	124	137	381	749	1321	1362
165	127	141	391	767	1348	1389
170	131	144	402	784	1374	1416
175	134	148	411	801	1399	1442
180	137	152	421	816	1423	1466
185	140	155	430	831	1446	1489
190	143	158	439	845	1468	1511
195	146	162	447	860	1489	1533
200	149	165	455	873	1509	1554
Maximum MAI	0.8	0.9	2.4	4.8	8.8	9.1
Age for Max. MAI	150	150	145	130	115	110

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	300/ha. Douglas-fir
Percent distribution of natural stems	50%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	4

Table f4

Yield Table Volumes used in TFL 44 Management Plan No. 4						
Total Age	Site Index					
	16.5	17.0	23	28.5	35.5	36
10	0	0	0	0	0	0
15	0	0	0	0	1	1
20	0	0	0	2	10	11
25	0	0	2	8	34	36
30	0	0	6	26	77	81
35	1	1	17	54	134	141
40	3	4	35	90	203	213
45	9	11	55	131	283	293
50	17	20	78	176	368	381
55	26	31	103	222	456	472
60	36	41	128	270	545	564
65	45	51	153	318	632	655
70	55	62	178	366	717	742
75	64	72	203	413	799	826
80	73	82	227	459	876	905
85	82	91	251	504	948	980
90	91	101	274	547	1016	1049
95	99	110	296	589	1080	1113
100	107	119	318	629	***1140**	***1174**
105	115	127	339	667	1195	1231
110	123	135	359	704	1247	1284
115	130	143	379	739	1296	1334
120	137	151	397	***772**	1341	1382
125	143	158	415	804	1384	1427
130	150	165	***433**	834	1425	1469
135	156	172	449	862	1464	1509
140	***162**	***178**	465	889	1500	1548
145	167	184	481	915	1535	1584
150	173	190	496	939	1568	1618
155	178	196	510	963	1599	1650
160	183	201	524	985	1629	1650
165	188	207	537	1006	1650	1650
170	192	212	549	1026	1650	1650
175	197	217	562	1045	1650	1650
180	201	221	574	1063	1650	1650
185	205	226	585	1081	1650	1650
190	209	230	596	1097	1650	1650
195	213	235	607	1113	1650	1650
200	217	239	617	1129	1650	1650
Maximum MAI	1.2	1.3	3.3	6.4	11.4	11.7
Age for Maximum MAI	140	140	130	120	100	100

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	600/ha. Douglas-fir
Percent distribution of natural stems	70%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table f5

Yield Table Volumes used in TFL 44 Management Plan No. 4						
Total Age	Site Index					
	16.5	17.0	23	28.5	35.5	36
10	0	0	0	0	0	0
15	0	0	0	0	2	3
20	0	0	0	4	22	23
25	0	0	3	18	66	69
30	0	1	11	49	138	144
35	1	2	31	98	227	236
40	5	7	62	157	325	337
45	15	19	97	220	435	443
50	29	35	134	285	548	559
55	45	52	171	350	660	676
60	61	69	208	413	771	791
65	77	87	244	476	879	902
70	93	103	278	536	982	1008
75	108	120	311	595	1078	1107
80	123	135	344	652	1168	1198
85	137	150	374	706	1252	1283
90	150	164	404	759	***1329**	***1359**
95	162	178	432	809	1401	1431
100	174	190	459	857	1467	1498
105	185	203	486	902	1528	1559
110	196	214	511	***945**	1583	1616
115	206	225	***535**	987	1634	1650
120	216	235	558	1027	1650	1650
125	***225**	***245**	580	1065	1650	1650
130	234	254	601	1100	1650	1650
135	242	263	621	1133	1650	1650
140	250	272	641	1164	1650	1650
145	258	280	659	1194	1650	1650
150	265	288	677	1223	1650	1650
155	272	295	694	1250	1650	1650
160	279	303	711	1275	1650	1650
165	285	310	727	1299	1650	1650
170	291	316	742	1322	1650	1650
175	297	323	757	1344	1650	1650
180	303	329	771	1363	1650	1650
185	308	334	785	1383	1650	1650
190	313	340	798	1402	1650	1650
195	318	345	811	1420	1650	1650
200	323	351	823	1437	1650	1650
Maximum MAI	1.8	2.0	4.7	8.6	14.8	15.1
Age for Maximum MAI	125	125	115	110	90	90

These volumes are from the Xeno yield tables with no reductions or netdowns

The initial conditions for this table are:

Number of natural stems	1500/ha. Douglas-fir
Percent distribution of natural stems	90%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table f6

Yield Table Volumes used in TFL 44 Management Plan No. 4						
Total Age	Site Index					
	16.5	17.0	23	28.5	35.5	36
10	0	0	0	0	0	0
15	0	0	0	0	4	4
20	0	0	0	5	34	36
25	0	0	5	27	95	99
30	1	1	17	69	183	190
35	2	3	41	130	284	294
40	6	9	79	200	388	401
45	17	22	122	273	504	509
50	34	41	166	344	620	631
55	53	61	209	412	736	751
60	72	83	251	477	848	866
65	92	104	290	540	957	978
70	111	124	327	601	1060	1085
75	129	144	361	661	1159	1185
80	146	163	394	718	1250	1277
85	163	180	425	772	***1332**	***1361**
90	178	196	454	826	1409	1438
95	193	212	482	876	1478	1507
100	207	226	509	924	1541	1573
105	219	239	***535**	***971**	1597	1634
110	231	252	559	1014	1650	1650
115	243	***264**	583	1056	1650	1650
120	***253**	275	606	1096	1650	1650
125	263	285	627	1133	1650	1650
130	273	295	648	1169	1650	1650
135	281	305	668	1203	1650	1650
140	290	314	687	1235	1650	1650
145	298	322	705	1266	1650	1650
150	305	330	723	1295	1650	1650
155	313	338	739	1322	1650	1650
160	320	345	756	1347	1650	1650
165	326	352	772	1370	1650	1650
170	333	359	787	1392	1650	1650
175	339	366	802	1414	1650	1650
180	345	372	815	1434	1650	1650
185	350	378	829	1454	1650	1650
190	355	383	841	1472	1650	1650
195	360	389	854	1489	1650	1650
200	365	394	866	1506	1650	1650
Maximum MAI	2.1	2.3	5.1	9.2	15.7	16.0
Age for Maximum MAI	120	115	105	105	85	85

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	3000/ha. Douglas-fir
Percent distribution of natural stems	90%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

Table f7

Yield Table Volumes used in TFL 44 Management Plan No. 4						
Total Age	Site Index					
	16.5	17.0	23	28.5	35.5	36
10	0	0	0	0	0	0
15	0	0	0	0	4	5
20	0	0	0	7	46	50
25	0	0	6	36	123	130
30	1	1	22	87	220	228
35	2	3	50	156	324	334
40	7	10	92	233	428	440
45	18	23	140	310	545	547
50	34	42	189	382	657	667
55	54	63	237	449	768	785
60	74	85	280	511	879	899
65	95	108	321	572	985	1010
70	116	131	358	630	1089	1115
75	136	153	392	687	1186	1215
80	156	173	424	742	1277	1308
85	174	193	454	795	***1361**	***1392**
90	191	211	482	845	1437	1471
95	207	228	***509**	***893**	1507	1542
100	222	243	535	939	1569	1607
105	236	258	560	985	1626	1650
110	249	271	583	1029	1650	1650
115	***261**	***284**	605	1070	1650	1650
120	272	295	626	1108	1650	1650
125	282	306	647	1146	1650	1650
130	292	316	667	1181	1650	1650
135	301	326	687	1213	1650	1650
140	310	335	705	1245	1650	1650
145	318	343	722	1275	1650	1650
150	326	352	739	1303	1650	1650
155	333	359	756	1329	1650	1650
160	340	366	771	1355	1650	1650
165	347	373	786	1380	1650	1650
170	353	380	800	1402	1650	1650
175	359	386	814	1425	1650	1650
180	365	392	828	1445	1650	1650
185	370	398	840	1465	1650	1650
190	375	404	853	1485	1650	1650
195	380	409	865	1502	1650	1650
200	385	414	877	1518	1650	1650
Maximum MAI	2.3	2.5	5.4	9.4	16.0	16.4
Age for Maximum MAI	115	115	95	95	85	85

These volumes are from the Xeno yield tables with no reductions or netdowns
The initial conditions for this table are:

Number of natural stems	6000/ha. Douglas-fir
Percent distribution of natural stems	90%
Regeneration delay for natural stems (negative = early)	0
Years of natural regeneration	5

APPENDIX IV – INFORMATION PACKAGE ACCEPTANCE LETTER

BRITISH COLUMBIA

File: 12850-20/44

April 25, 2002

Peter Kofoed, RPF
Planning Forester
Weyerhaeuser BC Coastal Group
65 Fort Street
Nanaimo, British Columbia
V9R 5H9

Dear Peter Kofoed:

Ministry of Forests staff have reviewed the information package (IP) dated September 25, 2001. This IP is submitted in preparation for the timber supply analysis for Management Plan No. 4 (MP No. 4) of Tree Farm Licence 44 (TFL 44). All IP concerns raised during the agency/licensee meeting in Nanaimo on March 15th 2002 have been addressed to my satisfaction.

I accept the information package for use in the TFL 44 timber supply analysis, subject to the following comments and conditions:

- A revised IP will be submitted with the MP No. 4 reflecting the March 15th meeting action items.
- The recent Court of Appeal ruling between the Haida Nation and Guujaaw is still being assessed. We may require some additional information pending the outcome of this assessment.

• THE GOVERNMENT OF BRITISH COLUMBIA IS AN "EMPLOYMENT EQUITY EMPLOYER" •

Ministry of Forests Timber Supply Branch

Location:
3rd Floor, 595 Pandora Avenue
Victoria, British Columbia

Mailing Address:
PO Box 9512 Stn Prov Govt
Victoria, BC V8W 3E7

Tel: (250) 953-3631
Fax: (250) 953-3838

Peter Kofoed, RPF
Page #2

Should issues arise during the subsequent timber supply analysis and related review process, or if the Deputy Chief Forester requires additional information for his determination, I may request further documentation and/or analysis.

Yours truly,

Albert Nussbaum, RPF
Timber Supply Analyst
Timber Supply Branch

cc's: Ken Baker, Deputy Chief Forester, Ministry of Forests
Randy Dolighan, Ministry of Water, Land, and Air Protection
Dave Woodgate, Ministry of Sustainable Resource Management
Dan Biggs, South Island Forest District
Reg Brick, Resource Tenures and Engineering Branch
Greg Gage, Vancouver Forest Region
Nelson Harrison, Vancouver Forest Region
Bud Koch, Timber Supply Branch
Rob Drummond, Terrestrial Information Branch
Albert Nussbaum, Timber Supply Branch

Dave Coster
Timberline Forest Inventory Consultants
Suite 310 - 1207 Douglas Street
Victoria, BC, V8W 2E7