V.1 Timber Supply Information Package

BRITISH COLUMBIA

File: 19710-40-TFL-41

June 1, 1999

Damian Keating
Administrative/Silviculture Forester
Skeena Sawmills
West Fraser Mills Ltd.
PO Box 10
Terrace, British Columbia V8G 4A3

Dear Damian Keating:

RE: Information Package Review and Acceptance for Management Plan 6 on TFL 41

I am writing to inform you that I have completed my review of the information package (IP) for Management Plan 6 (MP#6) from Sterling Wood Group Inc., under a covering letter dated May 12, 1999. The IP is accepted for use in completing MP#6.

I will provide a brief summary of the issues various ministry staff have raised regarding the IP. While there is still some disagreement about certain issues, given the breadth of sensitivity analyses and land base options proposed, enough information should be available to assess what risks the issues pose for timber supply on the TFL. The following issues were raised:

1. Kalum Forest District (KFD) staff are comfortable with the definition of conventional land base. Given uncertainty with respect to non-conventional systems, they will encourage caution in timber supply dependence in areas requiring non-conventional systems.

2. Soils ESAs for the Kalum Timber Supply Area Data Package, the document you used as a template for much of the IP ,were carefully compared with terrain stability mapping prior to assigning netdown values. KFD staff feel that the 20% reduction for Es2s on the TFL may not adequately describe terrain stability issues. As you have noted almost 81% of the total Es2 areas are considered unavailable for timber supply. However the amount of Es2 in the timber harvesting land base (5902 hectares or about 8.5% of the planned management land base) is still significant and the 20% reduction on a polygon basis may be optimistic.

3. KFD staff were pleased with the approach and detail provided in your Riparian review, Wildlife tree patch and landscape biodiversity sections.

.../2

Ministry of Forests
Timber Supply Branch/ Research Branch
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4. A recent review of the unclassified roads, trails and landings on the TFL indicated a loss of 7.8%. While KFD staff indicate that the figure of 6% reflects historic performance over a longer period of time, the recent review is more reflective of the conditions you will face in current and future harvest operations.

5. Staff in Resources Inventory Branch indicate that the natural stand yield tables are acceptable for the current timber supply analysis. A comparison of the analysis unit mean volume with the inventory/polygon mean volume for the timber harvesting land base was requested at the time of the presentation of the analysis report to facilitate a review of aggregation procedures.

6. Research Branch staff have accepted both the methodology for assigning site index to inventory polygons and the managed stand yield tables generated using TIPSY. It was re-iterated that the Kalum Coastal Western Hemlock site index adjustments were to be applied in the "base case", termed the "status quo" option in the IP.

The issues are listed to highlight the discussion to date. If you have any concerns, please contact me at 387-9360. I look forward to seeing your Analysis Report which is to be submitted on June 4, 1999 based on an accepted IP.

Yours truly,

Tim Bogle, RPF
Timber Supply Forester
Timber Supply Branch

pc: Charlie Klassen, Timber Tenures Forester, Resource Tenures and Engineering
John Perras, Kalum Forest District
Kathy Stuart, Kalum Forest District
Steve Smith, Sterling Wood Group Inc.
Steve Willis, SBFEP Forester, Prince Rupert Forest Region
Bud Koch, Senior Analyst-TFLs, Timber Supply Branch
Rob Drummond, Resources Inventory Branch
Albert Nussbaum, Research Branch

TREE FARM LICENCE 41
MANAGEMENT PLAN 6

INFORMATION PACKAGE

May 1999

Prepared for

Skeena Sawmills Division
West Fraser Mills Ltd.

by

Sterling Wood Group Inc.
Victoria, BC

Areas of Cedar Leading in AU's 4 and 5

Species	Analysis Unit	*Sum of Useable Area Now
CW	4	2,174.29
CW	5	1,431.65
YC	4	0.66
YC	5	84.92

*Areas in timber harvesting landbase that are Cedar leading in AU's 4 and 5.

Total area of AU 4 in net harvesting landbase is 18,979 ha. Total area of AU 5 in net harvesting landbase is 19,556 ha.

Riparian Management Zone for S4 streams: Table 10 in the data package shows a management zone of 20 metres for S4. According to the guidebook, this should have been 30, but the GIS exercise used 20 metres as shown in the table.

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INTRODUCTION

This information package is prepared for a timber supply analysis, part of Tree Farm Licence 41 Management Plan 6. The licence holder is West Fraser Mills Ltd. In this package the input assumptions and modeling procedures that will be used in the timber supply analysis are outlined. Sterling Wood Group Inc. has been engaged by West Fraser's Skeena Sawmills Division to undertake the timber supply analysis.

The purposes of the timber supply analysis information package are:

- to provide a detailed account of factors related to timber supply that the Chief Forester must consider under the Forest Act when determining an allowable annual cut (AAC) and how these will be applied in the timber supply analysis;
- to provide a means for communication between licensee, Forest Service and BC Environment staff;
- to provide Forest Service staff with the opportunity to review data and information that will be used in the timber supply analysis before it is initiated; and
- to ensure that all relevant information is accounted for in the analysis to a standard acceptable to Forest Service staff.

PROCESS

The Statement of Management Objectives, Options and Procedures (SMOOP) for TFL 41 was accepted by the Ministry of Forests (MoF) on November 12, 1997.

OPTIONS AND SENSITIVITY ANALYSIS

OPTIONS

The management objectives were presented in the SMOOP as follows:

- to harvest an annual volume of 400,000 cubic meters of logs and fibre (sawlogs, pulplogs and minor products) using harvesting techniques that maximize the economic utilization of fibre;

- maintain the productivity of the forest resources within the Licence and surrounding area through planned, environmentally sound forest management and harvest operations;

- to pursue forest management and harvesting strategies that will ensure a sustainable long term fibre supply and maintain the forest productivity in order to provide stable economic and social benefits for local communities;

- to co-operate with the MoF in the administration of a Small Business Forest Enterprise Program (SBFEP) allowable cut of 21,500 cubic meters.

A forest landbase can produce many different harvest levels depending on the management assumptions chosen and the net operable landbase used. A timber supply analysis will be completed to determine potential harvest level options and to prepare a rationale for the AAC that will be proposed to the provincial Chief Forester for approval.

BASE TIMBER SUPPLY ANALYSES

Several resource management options will be modelled and analyzed. The analysis will provide a range of harvest flow levels depending on the combination of management assumptions and landbase options used in each. The management options include:

1. ***Gross Operable Landbase*** – will determine the theoretical biological harvest level for the productive forest area unconstrained by non-timber resource factors. One harvest level will have no green-up or cover constraints applied. One harvest level will have a green-up and cover constraint applied.

2. ***Planned Management Landbase*** – will model the current management of TFL 41 with integrated resource management emphasis. It will include the conventional and non-conventional landbase, as well as Forest Practices Code requirements for adjacency, green-up and biodiversity. The two base case objectives of sustainable AAC (250 years) and proposed initial harvest volume for the first two decades with followed stepdown run (10 % reduction of the initial harvest volume after first two decades) will be achieved.

3. ***Conventional Landbase*** – will be the same as (2) but excluding all non-conventional operable landbase.

4. ***Status quo*** - will model the current landbase and management practices assumed by the MoF to be current.

SENSITIVITY ANALYSES

Sensitivity analysis and additional scenarios will be used to explore uncertainty in data and assumptions. During the analysis, more issues that require sensitivity analysis may become apparent. For the above management options and base case, a set of sensitivity analyses will be run. Table 1 lists the proposed set.

Table 1: TFL 41 proposed sensitivity analyses for current and planned management options

Landbase	Sensitivity Analyses
Gross Operable Landbase	Unconstrained by green-up or cover constraints Constrained by green-up or cover constraints
Planned Management Landbase	Existing stand volume +10% Existing stand volume –10% Regenerated stand volume +10% Regenerated stand volume –10% Cover constraint percentages +10% Cover constraint percentages –10% Minimum harvest age +10 years Minimum harvest age –10 years Green-up heights +2 metres Green-up heights –2 metres No visual constraints Landbase increased by 10% Landbase decreased by 10% Hemlock SI adjustment only No old growth site index adjustment - all species No wildlife tree patches Use 95% of the culmination MAI as the minimum harvestable age criteria
Conventional Landbase and Status Quo	Existing stand volume +10% Existing stand volume –10% Regenerated stand volume +10% Regenerated stand volume –10% Cover constraint percentages +10% Cover constraint percentages –10% Minimum harvest age +10 years Minimum harvest age –10 years Green-up heights +2 metres Green-up heights –2 metres No visual constraints Landbase increased by 10% Landbase decreased by 10% Hemlock SI adjustment only No old growth site index adjustment - all species No wildlife tree patches

MODEL

The following forestry software is being used to prepare the TFL 41 information package and timber supply analysis:

- The forest estate model TREEFARM;
- MoF Variable Density Yield Projection (VDYP) System;
- MoF Variable Density Yield Projection (VDYP Batch) System;
- MoF Table Interpolation Program for Stand Yields for Microsoft Windows (WinTIPSY).

FOREST ESTATE MODEL TREEFARM

TREEFARM is a forest estate model proprietary to Sterling Wood Group Inc. The model was first developed in 1979 and has undergone regular additions and upgrades. It has been used for a variety of industrial and government clients since 1984. Its use for tree farm licence allowable cut calculations was approved by the MoF in 1986. TREEFARM is now at version 6, upgrade 6 (version 6.6). The model is written in the programming language 'C' and is available for running under the Windows 95 and Windows NT operating systems. TREEFARM simulates the growth, harvesting and silvicultural treatment of a forest estate on an annual basis. The results are summarized at the end of each decade.

The initial inventory data represent the net landbase for a given allowable annual cut (AAC) calculation. The landbase is always stratified into land units. A land unit is the smallest piece of the landbase carried separately in TREEFARM. The number of land units is calculated by multiplying the number of forest types, site classes, age classes, silviculture treatment types and management zones. For example, a forest estate with 20 forest types, four site classes, 30 age classes, four management types, and four management zones will have a maximum of 38,400 land units. Each land unit is a grouping of polygons in the same forest type, site class, age class, management type, and management zone.

In TREEFARM, analysis units are those groupings that receive a separate yield curve. Typically, analysis units are defined by forest type and site class.

The reporting system for TREEFARM summarizes this level of detail in a practical, understandable way.

A unique feature of TREEFARM is the subdivision of the forest estate according to silvicultural treatment.

TREEFARM does not require that inventory age classes be the same width as the time period used in harvest projections. For example, 20-year inventory age classes and five-year time periods are acceptable. TREEFARM can use up to 30 age classes.

Harvesting rules determine which areas in the present and future forest inventories are candidates for harvest. The harvesting rules influence the harvest schedule but do not specify it. The harvest schedule is specified by the harvesting algorithm in the forest estate model.

In TREEFARM the harvesting rules are:

- the total annual harvest required during each time period;
- the present-day harvest profile by forest type and age class;
- the minimum volume per hectare, stand average diameter (dbh), and minimum age a stand must reach before it can be cut;
- the ranking of forest types in order of preference for harvest;
- the ranking of silvicultural management types in order of preference for harvest;
- cover constraints and green-up periods for groupings of analysis units which are specified by the user.

A selected subset of harvesting rules may be chosen for any given run.

Each land unit can be assigned to one or more set of cover constraints. Maximum age cover constraints are assigned independently from minimum age constraints. Both maximum and minimum age constraints can overlap. Cover constraints, which apply to an entire management zone, can overlap with cover constraints applied to subsets of the zone.

Partial cutting of various kinds may be applied. Examples are commercial thinning, shelterwood systems, or true all-aged selection cutting. The intensity of removals for a given system may be varied at each cutting cycle. Areas currently not under partial cutting systems may be converted to partial cutting. Using partial cutting systems requires the user to supply the appropriate yield tables.

To make projections for tomorrow it seems right to start where we are today. In its cutting procedure TREEFARM begins with today's harvesting profile. Over time the model departs from the starting profile in a systematic manner as the standing timber inventory changes. Technically any starting harvest profile may be provided to the model. If required a specific harvesting profile can be in force over the entire planning horizon.

TREEFARM includes a powerful three-stage harvesting algorithm. This produces many rotations for different forest type/resource zone combinations. TREEFARM can cut to a fixed profile, cut oldest first or cut to a combination of oldest first and species requirements. In most simulations a mix of all three types of harvest takes place.

For each time period the timber production objective is supplied to the model. When harvesting, TREEFARM will try to reach the objective but if this cannot be done in any time period it will get as close as it can without breaking any of the harvesting rules. Constant, declining, increasing and fluctuating series of timber production targets are all acceptable.

To qualify for harvest, a stand must reach a minimum volume, average dbh and age. Even then it cannot be cut if cover constraints are not satisfied.

TREEFARM can analyze many different silvicultural treatment regimes. Complete silvicultural programs involving planting, spacing, fertilization, thinning and rehabilitation of not sufficiently restocked (NSR) area can be constructed and included as part of the input file. Each part of the forest estate, treated and untreated, can be reported on separately. The future growing stock and future harvests from untreated and treated areas, plantations, spaced and fertilized areas are reported on specifically. Responses and harvest gains from incremental silviculture show up not only in the total harvest but in the harvest from the treated areas. TREEFARM can show harvest by silvicultural treatment type. The changing nature of the forest estate due to harvesting and silvicultural practices is very clearly shown.

Silvicultural programs can be targeted at analysis unit/site class combinations. For example, the proportion of Amabilis-fir areas planted after logging can be different from the proportion of logged hemlock areas which are planted. The forest type regenerated after logging can be different from the forest type which was logged. NSR areas from past logging can be re-claimed during a model run.

Changes to the landbase are included in three ways. The first is by applying netdown logic to the polygon inventory database file to produce a net landbase in a process completely independent of TREEFARM. Changing the netdown logic will change the net landbase. The second is by applying factors like accessibility factors during a model run. The third way is to prepare detailed area summaries of the areas to be added or subtracted as additional data files. TREEFARM looks for area summaries to be added to or subtracted from the landbase at the beginning of the first six time periods. Given the same input data as the MoF model FSSIM, TREEFARM will produce similar results.

MODELLING FOREST PRACTICE CODE REQUIREMENTS

Code requirements to be modelled or accounted for in the landbase netdown are:

- Adjacency and green-up
- Riparian reserves
- Riparian management zones
- Stand level biodiversity
- Landscape level biodiversity.

Adjacency and green-up constraints are modelled using maximum age cover constraints. These are shown in Tables 34a and 34b. Riparian reserves and management zones were identified using a GIS process. Single bank reserve and management zone widths used are shown in Table 10. Stand level biodiversity is modelled by a set of area reductions. For each landscape unit/biogeoclimatic subzone, the entry points for Table 20a in the Biodiversity Guidebook were calculated. A percentage area reduction for wildlife tree patches was calculated from Table 20a in the Biodiversity Guidebook for each landscape unit/subzone combination. These numbers are shown in Table 36. For each polygon in the timber harvesting landbase an area reduction was made for wildlife tree patches. If riparian zones were also present in the polygon, they were allowed to contribute to the required wildlife tree patch area. It is important to note that this procedure does not allow for the contribution from adjacent areas that are outside of the timber harvesting landbase.

CURRENT FOREST COVER INVENTORY

A reinventory of TFL 41 was completed in 1998 and is current to 1996/97. The inventory is a standard forest inventory, not a vegetation inventory. The stratification, classification and digital forest cover maps and attributes conform to Resource Inventory Branch (RIB) standards for this type of inventory. The sample design and methodology was approved by RIB in 1996.

The forest cover was stratified and classified from new aerial photography taken in 1996 and 1997. Volume sampling was done in 1997. The digital mapping, area compilation and volume analysis was completed in 1998. A technical report documenting the re-inventory methodology and results has been submitted to RIB for review.

For the timber supply analysis, the inventory has been updated for depletion and silvicultural activities and is current to 1998. No other changes have been made to the inventory.

Inventory VDYP volumes were localized using the 1997 field samples in a two step process. First, 1974 sample volumes were updated to 1997. Thirty sample strips that were established during the previous inventory were revisited in 1997 and plots established in the same types. Ratio analysis of the 1974 and 1997 sample volumes was done from 176 samples established in age class 8 and 9, hemlock, balsam and cedar types. The results were used to update 1632 samples established in 1974. A second ratio analysis using these 1632 plots was then used to localize the VDYP inventory volumes to the updated sample volumes. These procedures are described in detail in a separate document entitled 'The 1997/98 Re-inventory of Tree Farm Licence 41'.

DESCRIPTION OF LANDBASE

TIMBER HARVESTING LAND DETERMINATION

Table 2 is a summary of the area reductions for the entire TFL 41 to determine the landbase that is available for timber harvesting in the schedule A and Schedule B. Table 2 includes the areas for conventional and non-conventional timber harvesting landbase. The non-conventional landbase was identified by Skeena Sawmills. A subset of this non-conventional area totalling 5,161 hectares is included in the timber harvesting landbase. This area represents 7.6% of the initial timber harvesting landbase. The volume reductions have also been calculated and presented in the Table 2. The netdown sequence is the same as the sequence shown in the Table 2.

Table 2. Timber harvesting landbase (option 2)

Description	Area Schedule A	Area Schedule B	Total Area	Volume Schedule A	Volume Schedule B	Total Volume
Total Landbase	906	702,838	703,745	214,583	98,080,745	98,295,328
Non-Forest	0	333,833	333,833	0	1,402,262	1,402,262
Non-Productive Forest	0	36,988	36,988	0	2,377,942	2,377,942
Total Productive Forest	906	332,018	332,924	214,583	94,300,541	94,515,124
Less:						
Inoperable/Inaccessible	66	240,170	240,236	22,704	59,440,423	59,463,126
NC (Non Commercial)	0	236	236	0	0	0
Low Site	0	68	68	0	7,449	7,449
Deciduous	2	2,824	2,826	41	533,528	533,569
Non-merchantable	3	1,176	1,178	901	311,020	311,922
ESAs	35	11,346	11,381	6,503	5,006,878	5,013,381
Riparian Reserves	23	4,128	4,151	6,230	1,949,041	1,955,271
Specific Geographically Defined Area	0	13	13	0	4,554	4,554
Unclassified Roads, trails and Landings	24	1,258	1,281	7	8,327	8,334
NSR	32	1,568	1,600	0	11	11
Wildlife Tree Patch	33	1,834	1,867	8,555	468,665	477,220
Total Current Reduction	218	264,619	264,837	44,940	67,729,896	67,774,836
Initial Timber Harvesting Landbase	688	67,398	68,086	169,643	26,570,645	26,740,288
Additions:						
NSR	32	1,568	1,600	0	0	0
Total Additions	32	1,568	1,600	0	0	0
Current Timber Harvesting Landbase	721	68,966	69,686	169,643	26,570,645	26,740,288
Future Reductions:						
Future roads, trails, landings	22	3,011	3,033	0	0	0
Future Timber Harvesting Landbase	699	65,954	66,653	169,643	26,570,645	26,740,288

TOTAL AREA

The total area of the TFL 41 is 703,745 hectares. This area differs from the area shown in Management Plan 5 due to deletion of the Kitlope drainage, inclusion of the Claque Mountain Municipal Park area, and other minor boundary adjustments. Also, the boundary was remapped on a TRIM base (NAD 83) for the re-inventory.

NON-FOREST

Table 3 presents the list of non-forest types of the TFL 41 and the area for each type of the land.

Table 3: Non-Forest

Description	Total Area (ha)
Alpine	239,593
Alpine Forest	78,988
Clearing	7
Gravel Bar	518
Gravel Pit	42
Lakes	2,512
Meadow	663
Mud Flat	11
Rock	6,774
River	3,187
Swamps	1,330
Tidal Flat	18
Urban	191
Total	333,833

NON-PRODUCTIVE FOREST

The non-productive forest has been classified in the TFL 41 inventory database and its total area is 36,988 ha including NP, NPBR and NPBU.

INOPERABLE / INACCESSIBLE

Table 4 shows the area reduction for each type of the inoperable or inaccessible area. In the Table 4, total area in the productive area refers to the entire area covered by this classification including other overlapping classifications. The area removed in the netdown step presents the same amount as in Table 2. The operable area presents the area left after

the entire netdown process is done. The following section gives more detailed information for each netdown step.

Table 4: Inoperable / Inaccessible

Description	% Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed In the Netdown step	Total Area removed by all Netdown steps	Operable Area (ha)
Non-harvestable	100	240,236	240,236	240,236	0

NC (NON-COMMERCIAL)

The area of non-commercial cover is identified by "Type Identity Projected" = 5 and shown in Table 5.

Table 5: NC (Non-commercial) area

Description	% Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed In the Netdown step	Total Area removed by all Netdown steps	Operable Area (ha)
NC brush	100	45,265	236	45,265	0

LOW SITE

Low site areas are considered not suitable for harvest due to its low timber growing potential. The areas of low site removed from the landbase are shown in Table 6.

Table 6: Low site

Leading Species	Site Index	% Reduction	Total Area (ha) In the Productive Area	Area (ha) Removed in the Netdown step	Total Area removed by all Netdown steps	Operable Area (ha)
Balsam	< 6.5	100	256	0	256	0
Western Cedar	< 8.5	100	219	21	219	0
Hemlock	< 7	100	18,406	47	18,406	0
Lodgepole Pine	< 8.5	100	6	0	6	0
Spruce	< 3*	100			0	
Total			18,887	68	18,887	0

* In fact, productive area for spruce leading and site index < 9.7 is 0 in the inventory but here 3 is from Kalum Timber Supply Analysis data package.

AREA REDUCTION FOR DECIDUOUS

Deciduous areas and volumes, including cottonwood, were removed from the landbase.

Table 7: Area reduction for deciduous

Inventory Type Group	% Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed in the Netdown step	Total Area removed by all Netdown steps	Operable Area (ha)
>=35 and <=42	100	4,088	2,826	4,088	0

NON-MERCHANTABLE AREA

Non merchantable stands were defined as any area with (age > 100 and height < 22.5) or (age > 60 and crown closure < = 25 %) or (age > 100 and volume < 250 m^3/h) was removed in the netdown. Table 8 is a result from the netdown process.

Table 8: Area reduction for non-merchantable stands

Description	% Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed in the Netdown step	Total Area (ha) Removed after the Netdown	Operable Area (ha)
(Age>100 and Height < 22.5) or (Age > 60 and Crown Closure <=25 %) or (Age > 100 and Volume < 250m^3/ha)	100	52,754	1,178	52,754	0

ENVIRONMENTALLY SENSITIVE AREAS

ESA mapping was used to identify environmentally sensitive areas on TFL 41. Table 9 shows the area reductions for ESAs.

Table 9: Area reduction for ESAs

ESA Category	ESA Description	Nominal % Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed in the Netdown step	Total Area removed by all Netdown steps	Actual % of Reduction	Operable Area (ha)
Ea1	Snow Avalanche Area 1	100	30,764	986	30,764	100	0
Ep1	Regeneration Problem Area 1	100	47,510	1,140	47,510	100	0
Eh1	Water Area 1	90	338	261	317	94	21
Er1	Recreation Area 1	100	806	433	806	100	0
Ew1	Wildlife Area 1	50	2,422	721	1,848	76	574
Es1	Soils Area 1	90	26,793	4,000	26,381	98	412
Eh2	Water Area 2	20	903	157	302	33	601
Ep2	Regeneration Problem Area 2	20	5,319	279	4,259	80	1,060
Er2	Recreation Area 2	10	21,641	1,021	12,944	60	8,697
Ew2	Wildlife Area 2	10	3,932	194	2,496	63	1,436
Es2	Soil Area 2	20	30,633	1,578	24,730	81	5,902
P	Visual, Preservation	100	3,638	612	3,638	100	0
Total			174,697	11,381	155,995	89	18,702

The percentage reductions for soils, recreation, regeneration problems and avalanches in Table 9 were based on the Kalum TSA data package, January 1998 and professional judgement. The percentages for wildlife and water were based on professional judgement. It is important to note that the actual area removed in the netdown for environmentally sensitive areas is often greater than the nominal percentage reduction, and is never less. For example, in Table 9 the Ew1 label has a reduction of 50%, but 76% of these areas were actually removed in all stages of the netdown.

RIPARIAN ZONES

Streams

In TFL 41 the stream classification into categories S1 to S6 is incomplete. In the remaining areas, streams are classified as having fish present or absent, or having no classification. The reserve and management zone widths for these incompletely classified areas were based on GIS analysis of the areas that were completely classified.

In the GIS database, the following single bank riparian reserve and management zone definitions were used.

Table 10: Stream Reserves and Management Zones

Stream Classification	Length (m)	Reserve (m)	Management Zone (m)	Total RMA (m)
S1	514,454	50	20	70
S2	14,658	30	20	50
S3	5,887	20	20	40
S4	333	0	20	20
S5	37,661	0	20	20
S6	1,125	0	20	20
Fish present	756,794	27	20	47
Fish not present	743,346	0	20	20
Unclassified	14,114,288	5	20	25

Lakes and Wetlands

Lakes and simple wetlands were identified from forest inventory maps and classified using the key in the riparian management guidebook. The following reserve and management zone buffers were applied.

Table 11: Lake/Wetland Reserves and Management Zones

Class	Reserve (m)	Management Zone (m)	Total RMA(m)
L1 + L3	10	40	50
W1 + W3	10	40	50

Table 12 shows the area reduction for riparian zones of which were calculated and coded from the GIS processing according to Table 10 and 11. For the riparian management zone (RMZ) a reduction of 11% was estimated by weighting 20% for stream classes 1, 2, 3, 5 and fish present and 10% for 4, 6, fish not present and unclassified streams. A 100% reduction applied to the riparian reserve zone (RRZ).

Table 12: Area reduction for riparian zones

Zone Description	% Reduction	Total Area (ha) in Productive Area	Area (ha) Removed in Netdown step	Total Area (ha) Removed after Netdown	Operable Area (ha)
Reserve	100	11,846	3,299	11,846	0
Managed	11	37,783	852	31,088	6,695
Total		49,629	4,151	42,934	6,695

SPECIFIC GEOGRAPHICALLY DEFINED AREA

Archaeological Sites

An archaeological overview inventory of TFL 41 has been completed. Management zones have been defined for 14 specific sites that were identified in the inventory. The features found at these sites include pictographs, culturally modified trees, eulachan fishing sites and a village. Management zones were created for all sites using a 50 m circular buffer except the village where a 150 m circular buffer was used.

Recreation Sites

Six specific recreation sites have been identified and the following management zones defined. The nominal buffer distances were applied only to the operable area.

Table 13: Recreation sites

Site	Management Zone Definition
Campsite at Highway 37 and Kitimat River	125 m circular buffer
Campsite at Kitimat River near McKay Creek	125 m circular buffer
Robinson Ridge trail	10 m buffer
Mount Elizabeth trail	10 m buffer
Mount Elizabeth camp site	Adjacent forest inventory types
Enso Park	125 m circular buffer

The area reductions made for these are shown in table 14.

Table 14: Area reduction for specific geographically defined area

Description	% Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed in the Netdown step	Total Area removed by all Netdown steps	Operable Area (ha)
Archaeological Site	100	13	8	13	0
Recreation Reserve	100	18	5	18	0
Total		31	13	31	0

NSR

NSR areas have been previously logged or burned but have not restocked fully. Table 15 shows the area for NSR in the netdown, which includes 82 ha backlog and 1518 ha current NSR.

Table 15: NSR area

Description	% Reduction	Total Area (ha) in the Productive Area	Area (ha) Removed in the Netdown step	Total Area removed by all Netdown steps	Operable Area (ha)
Type Identity Projected = 4 or 9	100	2,447	1,600	2,447	0

ROADS, TRAILS AND LANDINGS

The classified and unclassified roads, trails, and landings are calculated as follows:

Classified Roads, Trails, and Landings

The area for calculation roads, trials, and landing is spatially identified and is included in the non-forest calculation of the TFL 41. The total removed area for classified roads, trails, and landings is 191 ha as shown in the Table 3 (coded to Urban in the TFL 41 inventory).

Unclassified Roads, Trails, and Landings

A 6% area reduction from forest stands 35 years or younger for unclassified roads, trails, and landings in the netdown was used. The total area reduction is 1,281 ha as shown in the Table 2. The area in unclassified roads is reasonable as it is similar to what would be obtained by applying average road widths to the approximately 700 km of logging and highways that are on the GIS files.

Future Roads, Trails, and Landings

For stands older than 35 years, 6% of the current timber harvesting landbase was removed for future roads, trails, and landings is shown in the Table 2 as 3,033 ha.

INVENTORY AGGREGATION

MANAGEMENT ZONES

Five management zones have been identified for TFL 41. These are general timber production, enhanced timber production, visual, riparian and Wathl community watershed. Table 16 shows the areas with overlapping in each zone. Table 17 shows the detailed area summary for the overlapped management zones.

Table 16: Management zones with overlapping

Management Zone	Productive Forest	Net Area
General	175,685	19,378
Enhanced Forestry	47,829	36,556
Visual	83,993	18,492
Riparian	49,629	6,697
Wathl Community Watershed	7,395	2,639

Table 17: Area summary for overlapping and non-overlapping management zones

Management Zone Combinations	Productive Forest	Net Area
E	28,633	23,310
ER	6,029	2,795
ERVm	774	416
ERVp	18	0
ERVpr	96	52
ERW	239	100
ERWVm	72	48
ERWVpr	15	9
EVm	8,230	6,883
EVp	154	0
EVpr	1,362	1,137
EW	1,321	1,001
EWVm	784	730
EWVpr	101	73
G	175,685	19,378
R	33,643	2,491
RVm	7,185	649
RVp	411	0
RVpr	221	60
RVr	165	23
RW	586	51
RWVm	132	3
RWVpr	44	0
Vm	56,687	7,365
Vp	3,052	0
Vpr	2,280	750
Vr	903	137
W	2,795	466
WVm	999	129
WVp	3	0
WVpr	306	28
Total	332,924	68,086

Note: G - General, E - Enhanced, V - Visual followed by VQO category, R - Riparian Management Zone, W - Wathl community watershed.

DETERMINATION OF ANALYSIS UNITS

Eleven analysis units have been identified for TFL 41. They are defined in Table 18. Productivity classes are defined on Table 22.

Table 18: Criteria for determining analysis units

Analysis Unit	Leading Species	Inventory Type Group	Productivity Site Class	Age Range	Net Area (ha)
1	Hemlock & Cedar	9 - 17	1,2	All	2,899
2	Hemlock & Cedar	9 - 17	3	0 - 140	13,766
3	Hemlock & Cedar	9 - 17	4	0 - 140	454
4[1]	Hemlock & Cedar	9 - 17	3	140+	19,487
5[2]	Hemlock & Cedar	9 - 17	4	140+	20,108
6	Balsam	18 - 20	2	All	370
7	Balsam	18 - 20	3	All	5,828
8	Balsam	18 - 20	4	All	2,991
9	Spruce	21 - 26	1,2	All	375
10	Spruce	21 - 26	3,4	All	1,524
11[3]	Lodgepole Pine	28 - 31	3,4	All	284
Total					68,086

[1] 2,175 ha for Western Ceder leading and 1 ha for Yellow Pine leading
[2] 1,435 ha for Western Ceder leading and 85 ha for Yellow Pine leading
[3] 31 ha for Douglas Fir (DF) leading has been merged into AU = 11

DETAILED OPERABLE LANDBASE

Area By Management Zone, Analysis Unit And Age Class

Table 19 shows the area summary for all management zones by analysis unit and age class.

Volume by Management Zone, Analysis Unit and Age Class

Table 20 shows the volume summary for all management zones by analysis unit and age class. Volumes are in cubic metres.

Table 19: All management zones – timber harvesting landbase

Analysis Unit	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	121-130	131-140	141-150	151-160	161-170	171-180	181-190	191-200	201-210	211-220	221-230	231-240	241-250	>250	Net Area
1	523	608	951	177	232	30	136	83	34	24	49	49	0	5	0	0	0	0	0	0	0	0	0	0	0	0	2,899
2	3,806	5,637	2,189	674	122	186	68	131	35	30	132	357	204	193	0	0	0	0	0	0	0	0	0	0	0	0	13,766
3	0	27	8	96	21	1	9	11	0	13	11	12	81	164	0	0	0	0	0	0	0	0	0	0	0	0	454
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	501	11	145	140	44	1,121	40	318	45	131	16,941	19,487
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	64	14	1	68	4	425	2	302	29	88	19,107	20,108
6	38	90	98	5	14	6	51	25	0	0	0	24	0	0	0	0	20	0	0	0	0	0	0	0	0	0	370
7	904	331	435	32	19	17	2	5	5	40	13	28	39	17	9	104	6	41	34	0	304	17	32	0	0	3,395	5,828
8	0	30	10	5	11	0	0	0	0	0	0	0	0	10	5	4	0	0	11	0	119	20	13	6	21	2,724	2,991
9	28	103	83	4	32	8	8	2	3	13	38	6	0	4	0	0	9	5	15	0	0	0	0	0	0	15	375
10	42	214	238	3	0	7	6	0	3	19	39	42	29	18	10	86	0	0	25	0	224	0	46	0	0	473	1,524
11	4	208	57	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	284
Total	5,345	7,248	4,068	997	451	254	279	256	80	141	281	518	353	412	78	759	59	193	294	48	2,193	80	710	80	241	42,669	68,086

Table 20: All management zones – volume on the timber harvesting landbase

Analysis Unit	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	121-130	131-140	141-150	151-160	161-170	171-180	181-190	191-200	201-210	211-220	221-230	231-240	241-250	>250	Net Volume
1	0	2,574	41,133	30,263	70,911	13,066	66,299	44,403	22,787	19,887	36,803	37,368	0	4,048	0	0	0	0	0	0	0	0	0	0	0	0	389,542
2	0	1,049	15,027	24,175	14,447	48,796	26,914	57,363	18,080	15,406	74,145	206,620	114,398	114,156	0	0	0	0	0	0	0	0	0	0	0	0	730,576
3	0	0	1	0	146	37	1,208	1,775	0	2,767	3,485	4,160	28,840	61,127	0	0	0	0	0	0	0	0	0	0	0	0	103,545
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,552	261,094	5,673	81,697	76,623	27,519	617,660	20,953	187,693	24,582	82,383	9,959,641	11,366,069
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,144	20,895	4,524	541	23,907	1,397	166,301	772	120,728	13,119	37,808	8,868,145	9,259,281
6	0	7	2,421	699	5,233	3,189	30,348	17,615	0	0	0	20,530	0	0	0	0	14,096	0	0	0	0	0	0	0	0	0	94,139
7	0	9	1,922	956	2,257	3,099	572	1,557	2,116	20,130	7,442	15,182	23,861	11,590	3,135	53,370	3,521	20,906	17,085	0	161,592	8,785	15,826	0	0	2,014,462	2,389,374
8	0	0	0	0	12	0	0	0	0	0	0	0	0	4,933	1,435	1,266	0	0	4,130	0	46,394	6,887	5,100	2,560	9,028	1,302,315	1,384,059
9	0	1,563	3,924	622	14,947	4,101	3,787	1,218	1,601	8,764	27,137	5,179	0	3,521	0	0	8,728	4,800	14,465	0	0	0	0	0	0	17,342	121,698
10	0	1,217	8,042	391	0	2,190	2,127	0	1,019	12,473	23,506	25,097	19,779	12,524	8,617	53,688	0	0	22,032	0	188,572	0	44,705	0	0	465,554	891,535
11	0	7	159	0	0	0	0	0	0	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,214	10,470
Total	0	6,426	72,629	57,106	107,953	74,479	131,254	123,932	45,603	79,516	172,517	314,136	186,879	211,898	34,882	390,313	36,544	107,944	158,242	28,916	1,180,519	37,397	374,052	40,261	129,219	22,637,673	26,740,288

GROWTH AND YIELD

SITE INDEX ASSIGNMENTS

The Site Index Curves for coastal species have been used for timber supply analysis in the TFL 41. The following table shows the references.

Table 21: Site Index Curves Reference

Species	FIZ	Site Index Curves Reference
Sitka spruce	A	Barker and Goudie (1987)
Balsam	A	Kurucz (1982)
Western hemlock	A	Wiley (1978)
Western red cedar	A	Kurucz (1985)

A – Coastal

Source: Site Index Curves and Tables for British Columbia – Interior and Coastal Species. February 1991.

The site index for stand age over 30 years old and below 30 years old have been assigned for each polygon in the TFL 41 inventory database, respectively. Four types of productive site classes have been assigned in Table 22.

Table 22: Productive Site Classes

Productive site class 1	BH50 SI > 35
Productive site class 2	25 < BH50 SI <= 35
Productive site class 3	15 < BH50 SI <= 25
Productive site class 4	3 < BH50 SI <= 15

Site Index for Stand Age Equal or Over 30 Years Old

VDYP Batch version 6.4 has been used to generate BHA 50 site index for each polygon of 30 years or older.

Site Index for Stand Age Below 30 Years Old

The site index for stand age less than 30 years old is assigned by using the existing site index in the inventory.

Site Index for Each Analysis Unit

Table 23 shows the area-weighted averages for site index in each analysis unit.

Table 23: Site index for each analysis unit

Analysis Unit	Unadjusted SI	Adjusted SI for Age > 140
1	27.6	
2	22.2	
3	13.5	
4	16.7	25.0
5	13.2	22.9
6	27.9	
7	19.0	22.7
8	13.4	22.4
9	28.5	
10	21.0	
11	20.9	

In Table 23, the column entitled "Adjusted SI for Age > 140" contains adjusted site index volumes for stands 140 years or older. A SI of Hemlock in the CWH biogeoclimatic zone was adjusted by increasing a 10 meters for any old growth derived SI between 8 meters and 18 meters. This method is presented by the MoF in "Site Index Adjustment for Old-Growth Coastal Western Hemlock Stands in the Kalum Forest District." by G. Nigh and B. Love, March 3, 1998 (MoF Research Working Paper 27).

Site index adjustment equations for other leading species stands such as Hemlock (not in the CWH zone) and Balsam leading were obtained from MoF Research Working Paper 36.

In the timber supply analysis base runs for TFL 41, these adjusted site index values for old growth and analysis units 4, 5, 7 and 8 will be used for regenerated stand yields, after the existing old growth has been logged.

UTILIZATION LEVEL

Table 24 presents the utilization levels that are used to develop the merchantable yield table.

Table 24: Utilization levels

Species	Minimum DBH (cm)	Maximum Stump Height (cm)	Minimum Top dib (cm)
All commercial species	17.5	30	10

DECAY, WASTE AND BREAKAGE FOR UNMANAGED STANDS

The VDYP generated yield tables in Appendix I are net decay, waste and breakage. PSYU #341 (TFL 41) was used to deduct waste and breakage when VDYP was run.

OPERATIONAL ADJUSTMENT FACTORS

Operational adjustment factors (OAF) were used in WinTIPSY to reduce potential yields to operational yields. These factors are shown in Table 28.

YIELD TABLE DEVELOPMENT

Yield tables were prepared for each analysis unit. VDYP software calculated the existing stand yield tables and WinTIPSY software calculated the regenerated stand yield tables. All yield tables are presented in Appendix I.

A regeneration delay of four years for natural and two years for plantations was added to the WinTIPSY yield tables for regenerated stands. The regeneration delay is the number of years from disturbance (e.g. harvesting or fire) until a stand is planted or until the first successful seed year. VDYP tables describe existing stands and no regeneration delay is required.

For the yield analysis, existing volumes will be obtained from VDYP generated yield curves, except for stands 141 years or older. In these ages the localized inventory database volume will be used. This will ensure that correct volumes for existing old growth timber are used in the yield analysis. Table 25 shows the adjusted factors from the re-inventory report and the average mature volumes per hectare in the database, after localization of VDYP volumes

For regenerated curves, standard TIPSY yield tables will be used to predict future yields.

Table 25: Average localized VDYP volumes for existing stands 140 years or older

Leading Species	Age Class	Adjusted Factors	Localized VDYP m^3/ha
Hemlock	8, 9	0.8057	526
Balsam	8, 9	0.7170	536
Cedar	8, 9	0.8446	467

Base Yield Tables

Crown Closure Assignments

Crown closure is the percentage of ground area covered by the vertical projection of tree crowns. Crown closure values are only used to produce VDYP yield tables (VDYP Interactive Application User Guide, version 6.3, May 1995.), not WinTIPSY yield tables.

The crown closure values used in the VDYP tables are area-weighted averages over all age classes.

Table 26: Crown closure for each analysis unit

Analysis Unit	Crown Closure (%)
1	50
2	38
3	58
4	60
5	61
6	50
7	50
8	61
9	53
10	52
11	53

Species Composition

Species composition for each analysis unit is area-weighted. The three species with the largest percent composition are prorated to sum to 100% as shown in Table 27. Table 27 was used to calculate the existing stand yield table. The managed stands yield tables can be created by modifying Table 27 where balsam was changed to hemlock and its percentage was added upon the percent related to hemlock. For example, managed stand species composition for analysis unit 1 will be 92 % for hemlock and 8 % for sitka spruce, where 25% balsam is changed to hemlock and added to 67%.

Table 27: Species composition

Analysis Unit	Species 1	Species 1 Percent	Species 2	Species 2 Percent	Species 3	Species 3 Percent
1	Hw	67	B	25	S	8
2	Hw	66	B	26	Cw	8
3	Hw	71	Cw	17	B	11
4	Hw	60	B	25	Cw	15
5	Hw	61	B	23	Cw	16
6	B	58	Hw	37	S	5
7	B	60	Hw	34	S	6
8	B	60	Hw	37	S	3
9	S	62	Hw	29	B	9
10	S	64	Hw	24	B	12
11	Pl	73	Hw	21	Cw	6

Aggregated Yield Tables

An aggregated or area weighted site index is calculated and assigned to each analysis unit, then a representative yield table is produced for each analysis unit for existing and regenerated stands, using the crown closure, species composition and silvicultural regimes shown in tables 26, 27 and 28.

EXISTING STAND VOLUMES

Timber volumes for existing stands were derived by applying VDYP batch and a localization factor for stands 140 years and older shown in Table 25 to the forest cover attributes of every polygon. A new yield table of the timber supply analysis for the existing stands will be calculated from Table 19 and 20 where the blank areas will be replaced by the existing stand yield table in Appendix I.

YIELD TABLES FOR MANAGED STANDS

Silviculture Management Regimes

Table 28 presents the silviculture management regimes that are used to develop the yield tables for managed stands by running WinTIPSY.

Table 28: Silviculture management regimes

Leading Species	Inventory Type Group	Productive Site Class	AU	Unadjusted Site Index	Adjusted Site Index	Type	%	Initial	% OAF1	% OAF2	Regen Delay
Hemlock & Cedar	9 – 17	1,2	1	27.6		Planted Natural	70 30	3000 6000	15	5	2 4
Hemlock & Cedar	9 – 17	3	2 4	22.2 16.7	25.0	Planted Natural	70 30	3000 6000	15	5	2 4
Hemlock & Cedar	9 – 17	4	3 5	13.5 13.2	22.9	Planted Natural	70 30	3000 6000	15	5	2 4
Balsam	18 – 20	2	6	27.9		Planted Natural	70 30	3000 6000	15	5	2 4
Balsam	18 – 20	3	7	19.0	22.7	Planted Natural	70 30	3000 6000	15	5	2 4
Balsam	18 – 20	4	8	13.4	22.4	Planted Natural	70 30	3000 6000	15	5	2 4
Spruce	21 – 26	1,2	9	28.5		Planted Natural	100	3000 6000	15	5	2 4
Spruce	21 – 26	3,4	10	21.0		Planted Natural	100	3000 6000	15	5	2 4
Lodgepole Pine	28 – 31	3,4	11	20.9	21.3	Planted Natural	90 10	3000 6000	15	5	2 4

Regeneration Matrix

Table 29 shows the stand type an existing old growth area will regenerate to after logging. The rows show the existing analysis unit. The columns show what stand types each existing analysis unit will regenerate to. The letter 'N' stands for natural regeneration and 'P' stands for planted. Each row is the existing analysis unit. Each column shows what analysis units each existing one will regenerate to after logging. For example, existing analysis unit 1 regenerates back to analysis unit 1, but 70% of the regenerated stands will be planted and 30% will regenerate naturally.

There is some discussion on what proportion of the regeneration really is planted in the field. This is due to variation in the actual planted proportion depending on how much prompt natural regeneration occurs. To deal with this issue in the yield analysis, we will use TIPSY natural yield curves for all regenerated stands.

Table 29: Regeneration Assumptions

From Analysis Unit		To Analysis Unit																						
		Hemlock & Cedar											Balsam						Spruce				Lodgepole Pine	
	AU	1N	1P	2N	2P	3N	3P	4N	4P	5N	5P	6N	6P	7N	7P	8N	8P	9N	9P	10N	10P	11N	11P
Hemlock & Cedar	1	30	70																				
	2			30	70																		
	3					30	70																
	4							30	70														
	5									30	70												
Balsam	6	30	54										16										
	7			30	54										16								
	8					30	54										16						
Spruce	9		50																50				
	10				60																40		
Lodgepole Pine	11																					10	90
	NSR		3.64		16.98		0.56		24.05		24.78		1.09		17.13		8.77		0.60		2.40		0.00

Existing Managed Immature

Existing managed immature was defined to be all those areas 30 years or younger. Table 30 summarizes these areas of which the regeneration stand yield tables will be applied for.

Table 30: Managed Immature Area (ha)

Analysis Unit	Areas by Age Range		
	1 - 10	11 - 20	21 - 30
1	523	608	951
2	3,806	5,637	2,189
3		27	8
4			
5			
6	38	90	98
7	904	331	435
8		30	10
9	28	103	83
10	42	214	238
11	4	208	57
Total	5,345	7,248	4,068

BACKLOG AND CURRENT NON-STOCKED AREA (NSR)

Table 31 presents 1,600 hectares of the NSR area, as shown in the Table 2, of including 82 ha backlog and 1518 ha current non-stocked areas. These areas are distributed to each analysis unit according to recent harvest patterns by forest type and regenerated in the first period.

Table 31: NSR distribution (ha)

Analysis Unit	NSR Area	Area %
1	57	3.58
2	272	16.99
3	9	0.56
4	385	24.05
5	397	24.82
6	17	1.09
7	274	17.12
8	141	8.79
9	9	0.59
10	39	2.41
11	0	0.00
Total	1,600	100.00

PROTECTION

UNSALVAGED LOSSES

These represent the unsalvaged volume losses from trees damaged or destroyed from catastrophic events such as fire, windthrow or epidemic insect attack and are additional to those accounted for in the VDYP decay, waste and breakage and the WinTIPSY operational adjustment factors. There have been no major fires on TFL 41 since the Kat fire in 1978. Prior to that there was a wildfire in 1958 up Hunter Creek. There have been no major losses from insect attack outside of the Alcan fume path. Nearly all losses from windthrow are salvaged as windthrow tends to be associated with logging. Table 32 shows the estimated average unsalvaged volume loss based on company experience and MoF fire occurrence records. During the timber supply analysis, these estimates will be deducted from the TREEFARM harvest flow results to determine net volume over time.

Table 32: Unsalvaged losses

Cause of loss	Net losses (m^3/year)
Fire	500
Windthrow	1000
Insects	500
Total	2000

INTEGRATED RESOURCE MANAGEMENT

FOREST RESOURCE INVENTORIES

The status of various source inventories covering TFL 41 is provided in the following table.

Table 33. Forest resource inventory status

Forest Resource Inventory	Standard	Date Completed	Approved/ Reviewed By	Status
Visual landscape	MoF	1998	Kalum Forest District	
Recreation	MoF	1998	Kalum Forest District	
ESA	RIB	1988-1991	RIB	Ea, Ep, Es, Ew, Eh
Stream classification	MELP	1997-1998		Partial coverage, balance in progress
Biogeoclimatic	RIB		Provided by RIB	

FOREST COVER REQUIREMENT

Forest cover requirements in this timber supply analysis will be directed at meeting green-up and biodiversity requirements.

The forest cover constraints to be used are shown in Tables 34a and 34b.

Table 34a: Forest Cover requirements for the general, enhanced, riparian, visual and Wathl community watershed management zones

Management Zone	Green-up Height (m)	Green-up Maximum Allowable Disturbance (% area)	Application	Modified %
General	3	35	Productive Forest	4.01
Enhanced	3	35	Productive Forest	28.05
Visual				
VQO = R	5	5	Productive Forest	1.51
VQO = PR	5	15	Productive Forest	14.73
VQO = M	5	25	Productive Forest	11.05
Riparian	5	25	Productive Forest	3.47
Wathl Watershed	9	25	Productive Forest	9.10

In the timber supply analysis, landscape biodiversity constraints will be applied explicitly by landscape unit, natural disturbance type, biodiversity emphasis and biogeoclimatic variant. Table 34b summarizes the biodiversity constraints that will be applied to the productive forest area.

Table 34b: Forest Cover requirements for Landscape level biodiversity

Landscape Unit	Biogeoclimatic			NDT	BEA	Minimum Retention Area (%)			Minimum Age
	Zone	Subzone	Variant			L	I	H	
Dala	CWH	vm		1	L	13	13	19	250
Dala	CWH	ws	2	2	L	9	9	13	250
Dala	MH	mm	1	1	L	19	19	28	250
Falls	CWH	vm		1	L	13	13	19	250
Falls	CWH	vm	1	1	L	13	13	19	250
Falls	MH	mm	1	1	L	19	19	28	250
Foch	CWH	vh	2	1	H	13	13	19	250
Foch	CWH	vm		1	H	13	13	19	250
Foch	MH	mm	1	1	H	19	19	28	250
Gilttoyees	CWH	vh	2	1	I	13	13	19	250
Gilttoyees	CWH	vm		1	I	13	13	19	250
Gilttoyees	MH	mm	1	1	I	19	19	28	250
Hawkesbury Island East	CWH	vh	2	1	L	13	13	19	250
Hawkesbury Island East	CWH	vm		1	L	13	13	19	250
Hawkesbury Island East	MH	wh	1	1	L	19	19	28	250
Hawkesbury Island West	CWH	vh	2	1	I	13	13	19	250
Hawkesbury Island West	CWH	vm		1	I	13	13	19	250
Hawkesbury Island West	MH	wh	1	1	I	19	19	28	250
Horetzky	CWH	ws	2	2	L	9	9	13	250
Horetzky	MH	mm	2	1	L	19	19	28	250
Hot Springs	CWH	ws	1	2	L	9	9	13	250
Hot Springs	CWH	ws	2	2	L	9	9	13	250
Hot Springs	MH	mm	2	1	L	19	19	28	250
Jesse - Bish	CWH	vm		1	L	13	13	19	250
Jesse - Bish	MH	mm	1	1	L	19	19	28	250
Kemano - Kildala	CWH	vm		1	I	13	13	19	250
Kemano - Kildala	CWH	vm	1	1	I	13	13	19	250
Kemano - Kildala	CWH	ws	2	2	I	9	9	13	250
Kemano - Kildala	MH	mm	1	1	I	19	19	28	250
Kemano - Kildala	MH	mm	2	1	I	19	19	28	250
Kitimat	CWH	vm		1	L	13	13	19	250
Kitimat	CWH	ws	1	2	L	9	9	13	250
Kitimat	CWH	ws	2	2	L	9	9	13	250
Kitimat	MH	mm	1	1	L	19	19	28	250
Kitimat	MH	mm	2	1	L	19	19	28	250
Kowesas	CWH	vm		1	L	13	13	19	250
Kowesas	CWH	vm	1	1	L	13	13	19	250
Kowesas	CWH	vm	2	1	L	13	13	19	250
Lakelse	CWH	ws	1	2	I	9	9	13	250
Lakelse	CWH	ws	2	2	I	9	9	13	250
Lakelse	MH	mm	2	1	I	19	19	28	250
Wedeene	CWH	vm		1	I	13	13	19	250
Wedeene	CWH	ws	1	2	I	9	9	13	250
Wedeene	CWH	ws	2	2	I	9	9	13	250
Wedeene	MH	mm	1	1	I	19	19	28	250
Wedeene	MH	mm	2	1	I	19	19	28	250

Emphasis Zones

Biodiversity emphasis ratings are included in TFL 41 database. Table 35 shows the area distribution of low, intermediate and high emphasis zones. The MoF recommends assumption of a 45%, 45% and 10% split between low, intermediate and high zones. The average area distribution of low, intermediate and high emphasis zones in Table 35 is 56%, 41% and 3%. The timber supply analysis will consider both distributions.

Table 35: Distribution of Biodiversity Emphasis

Biogeoclimatic			NDT	BEA	Productive Forest Area	Area %
Zone	Subzone	Variant				
CWH	vh	2	1	H	2,769	16.21
CWH	vh	2	1	I	9,622	56.33
CWH	vh	2	1	L	4,690	27.46
CWH	vm		1	H	4,092	3.84
CWH	vm		1	I	34,920	32.78
CWH	vm		1	L	67,519	63.38
CWH	vm	1	1	I	4,507	37.19
CWH	vm	1	1	L	7,611	62.81
CWH	vm	2	1	I	1,962	26.22
CWH	vm	2	1	L	5,521	73.78
CWH	ws	1	2	I	5,968	26.90
CWH	ws	1	2	L	16,220	73.10
CWH	ws	2	2	I	25,685	45.58
CWH	ws	2	2	L	30,670	54.42
MH	mm	1	1	H	1,317	1.81
MH	mm	1	1	I	30,254	41.62
MH	mm	1	1	L	41,115	56.57
MH	mm	2	1	I	21,454	63.97
MH	mm	2	1	L	12,082	36.03
MH	wh	1	1	I	861	64.71
MH	wh	1	1	L	469	35.29

WILDLIFE TREE PATCHES

Table 20(a) in the biodiversity guidebook is the correct one to apply because landscape units have been designated. Table 36 is calculated by interpolating the data from the Table 20(a) in the Biodiversity Guidebook that is based on the two entry points: % of the area available for harvesting that has already been harvested without wildlife tree retention, and % available for harvest. This has been done for each landscape unit (LU) and the results are shown in Table 36. The percentages in Table 36 have not been reduced to include the contribution of riparian reserves and management zones. In the landbase netdown, contributions to wildlife tree patches from inoperable, low site, environmentally sensitive and other areas which have been removed from the timber harvesting landbase, are accounted for.

Table 36: Wildlife tree patches

Landscape Unit	Biogeoclimatic		Guidebook table 20a row	Guidebook table 20a col.	Reduction Area %	Area Reduction
	Zone	Subzone				
Dala	CWH	vm	3.54	48.91	1.63	90
Dala	CWH	ws	2.80	35.31	0.62	8
Falls	CWH	vm	11.42	30.47	1.19	42
Hawkesbury Island East	CWH	vh	2.24	35.09	0.54	2
Hawkesbury Island West	CWH	vh	0.57	15.71	0.02	0
Horetzky	CWH	ws	11.79	37.46	1.92	8
Hot Springs	CWH	ws	52.44	54.68	7.71	84
Jesse - Bish	CWH	vm	1.03	27.57	0.09	1
Kemano - Kildala	CWH	vm	18.89	16.63	0.92	8
Kemano - Kildala	CWH	ws	16.73	16.02	0.74	14
Kitimat	CWH	vm	39.62	79.33	8.90	25
Kitimat	CWH	ws	37.17	45.44	5.26	744
Kitimat	MH	mm	10.76	3.27	0.01	0
Lakelse	CWH	ws	58.08	33.09	6.12	31
Lakelse	MH	mm	100.00	2.62	7.52	1
Wedeene	CWH	vm	59.39	34.01	6.34	376
Wedeene	CWH	ws	77.89	46.94	9.48	431
Wedeene	MH	mm	25.85	3.88	0.31	2
Total						1,867

* Reduction Area % is zero for other landscape units which BEC zones, subzones and variants are not shown.

TIMBER HARVESTING

Minimum Merchantability Standards

In the timber supply analysis a stand must satisfy all the minimum volume, DBH and age requirements before it can be harvested. Table 37 shows minimum harvest rules that will be used for each analysis unit. These minimums may not be reached until several decades from now. Even then, only some stands will be harvested at minimum volume, DBH and age. The minimum ages for natural and planted in Table 37 were calculated from old growth SI adjusted yield tables.

Table 37: Minimum harvest volume and age

Analysis Unit	Existing			Natural			Planted		
	Min Age	Min DBH	Min Vol	Min Age	Min DBH	Min Vol	Min Age	Min DBH	Min Vol
1	46	30	300	47	30	300	43	30	300
2	64	30	300	61	30	300	57	30	300
3	147	30	300	122	30	300	116	30	300
4	91	30	300	53	30	300	49	30	300
5	135	30	300	59	30	300	55	30	300
6	51	30	300	46	30	300	43	30	300
7	90	30	300	59	30	300	55	30	300
8	149	30	300	60	30	300	56	30	300
9	37	30	300	44	30	300	40	30	300
10	52	30	300	61	30	300	56	30	300
11	68	30	300	68	30	300	65	30	300

Operability

New operability mapping of TFL 41 was undertaken during 1998. The classification was completed under a terms of reference approved by the district manager on March 5, 1998. An operability report including a composite map was submitted to the district manager December 18, 1998. It describes the three categories that are based on a combination of harvesting system, stand quality and economic criteria.

Table 38 presents three categories of the operability.

Table 38: Three categories of the operability

Categories	Criteria	Productive		Net		Descriptions
		Area (ha)	Volume (m^3)	Area (ha)	Volume (m^3)	
Conventional	OPER =C	85,489	31,225,581	62,925	24,077,667	includes ground-based, grapple and highlead cable and A-frame to the ocean
Non- conventional	OPER = A and Height Class > 3 and SI > 10 and Hemlock species <= 50 %	7,199	3,826,412	5,161	2,760,495	includes helicopter yarding, skyline cable and other systems not included in the conventional
Inoperable	OPER = I or OPER = N or any area not in conventional and non-conventional landbases	240,236	59,463,131			includes timber either physically inaccessible or marginally economic to log in the foreseeable future

Initial Harvest Rate

The expected initial harvest rate will be 400,000 cubic metres per year.

Harvest Rules

Section 4.1 describes the harvest rules used by TREEFARM in more detail.

Harvest Profile

The current harvest species profile from TFL 41 is hemlock 65%, balsam 27%, cedar 5%, and spruce 3%.

Harvest Flow Objectives

The initial harvest level will be defined by attempting to maintain the current AAC for TFL 41 for as long as possible, declining by at most 10% in each of the following decades, and avoiding harvest shortfalls below the long term level. The long-term level is defined as the harvest that will maintain total timber growing stock at an even level so that harvesting can continue at a constant level in perpetuity.

If the current AAC can be achieved initially then the first decade harvest will be raised as high as possible followed by declining harvests to the long-term level as described above.

If the current AAC cannot be achieved initially then the initial harvest level will be as high as possible with reasonable declines in following decades, and avoiding harvest shortfalls below the long term level. If the harvest forecast must fall below the long term harvest level, the decline below the long term level will be kept as small as possible, while also attempting to increase the harvest back to the long term level as soon as possible.

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