

TFL 1

Timber Supply Analysis Information Package

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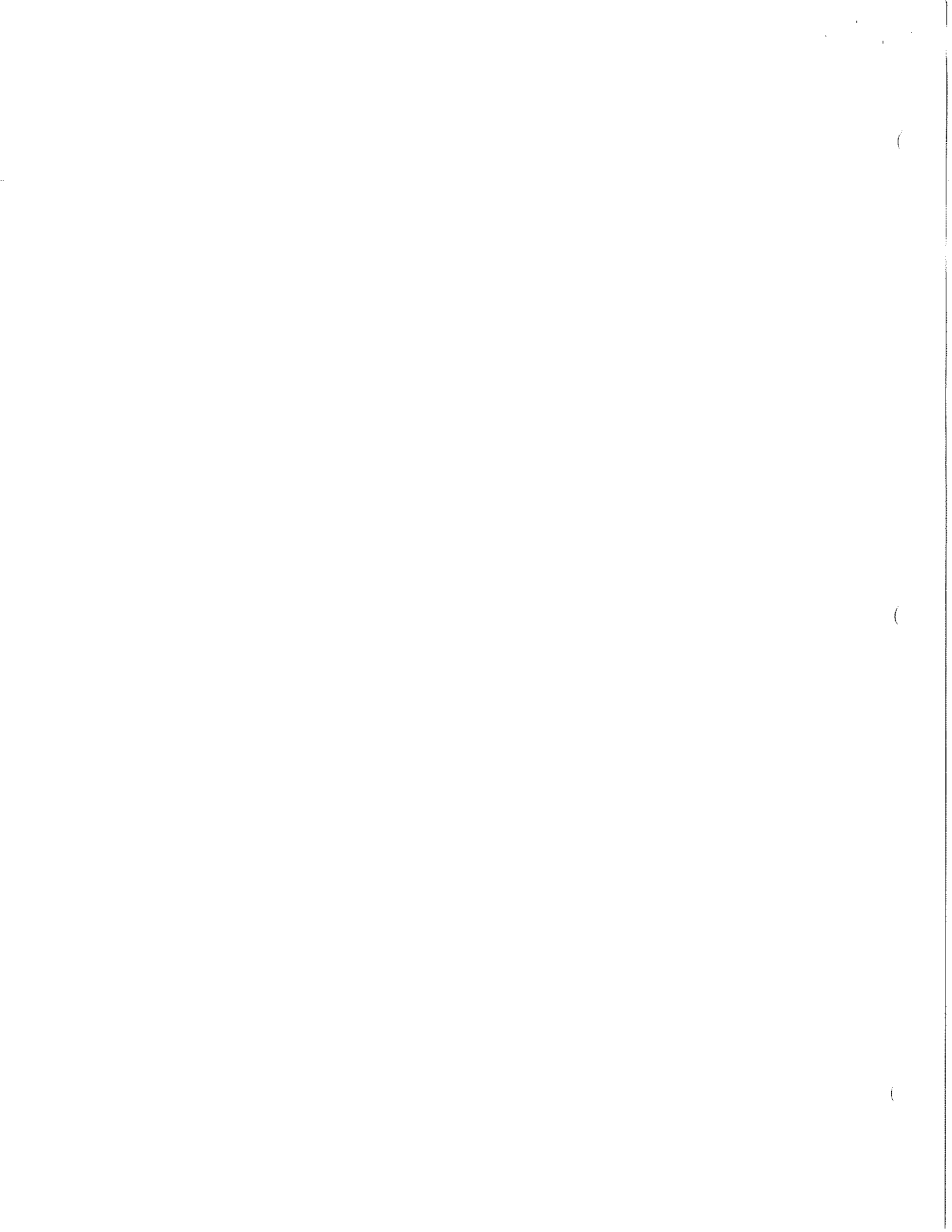
Table 1: Timber harvesting landbase determination

DESCRIPTION	Area Schedule A ha	Area Schedule B ha	Total Area ha
Total land base	635	517662	518297
Non-forest	92	273951	274042
Non-productive forest	12	14864	14876
Total productive forest	532	228847	229379
Less:			
Inoperable	64	118936	119001
Non commercial	0	87	87
Low site	0	2950	2950
Deciduous	28	1430	1459
Non-merchantable	8	1492	1500
ESAs	0	5519	5519
Alpine Tundra	0	112	112
Riparian zones	23	2530	2553
Specific geographically defined area	10	906	915
Goat winter range	0	1102	1102
Unclassified roads, trails and landings	5	2054	2059
NSR	11	2929	2940
Wildlife tree patch	25	2501	2526
Total Current Reduction	176	142547	142723
Initial Timber Harvesting Land Base	355	86301	86656
Additions:			
NSR	11	2929	2940
Total Additions	11	2929	2940
Current Timber Harvesting Land Base	366	89230	89596
Future Reductions:			
Future roads, tralls, landings	17	3418	3435
Future Timber Harvesting Land Base	349	85812	86161

*numbers may not add up exactly due to rounding

As shown in Table 1, the current timber harvesting landbase (THLB) is 89,596 ha, including 2940 ha NSR. The current THLB is 39% of the TFL 1 productive forest area. As harvesting proceeds, 6.0 % of harvested areas are withdrawn from the THLB for future roads. This reduction is applied to stands currently ≥ 35 years, resulting in approximately a further 3.8% reduction to the current THLB over time for future roads.

Figures 1 and 2 show area summaries of the current timber harvesting landbase by leading species and age class. Approximately 52% of the current THLB is greater than 120 years as shown in figure 2.



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Appendix 5-1: Existing and Managed Stand Yields

1.0 INTRODUCTION

This Timber Supply Analysis information package describes calculations of the timber harvesting landbase, analysis methods and input for various long term harvest scenarios for Tree Farm Licence 1 (TFL 1) in support of Management Plan 10. This information represents current forest management within TFL 1.

The main sections in this report are:

1. Options and sensitivity analysis
2. Model features
3. Landbase assumptions
4. Forest management assumptions
5. Growth and Yield
6. Integrated Resource Management

Main sources of information include: 1998 TFL 1 timber supply analysis, the Kalum Land and Resource Management Plan 2002 (LRMP), and the Kalum Timber Supply Area Analysis Report, March 1999.

2.0 OPTIONS AND SENSITIVITY ANALYSIS

The net timber harvesting landbase (THLB) includes conventional and non-conventional operable areas. Basecase management models the silviculture and harvesting systems in current use, existing legislation, and the current strategic planning environment. The management assumptions are therefore structured to be consistent with the Forest Practices Code, the Kalum LRMP, and the defined LRMP management zones. Area reductions and constraints are applied as defined in the next sections.

Sensitivity analysis is done to assess uncertainty in data and assumptions. During the analysis, more issues that require sensitivity analysis may become apparent. Table 1 describes the analyses proposed for the timber supply analysis. Site index adjustment is described in the timber supply analysis report.

Table 1: Proposed sensitivity analysis

Option	Description
I	Unadjusted inventory-see section 4.1
	<ol style="list-style-type: none"> 1. no OGSI adjustment 2. base OGSI adjustment
II	VRI adjusted inventory- base OGSI adjustment
	1. base
	2. 10% THLB increase
	3. 10% THLB decrease
	4. 10% volume increase
5. 10% volume decrease	
III	VRI adjusted inventory-SI adjustment options
	1. no OGSI adjustment
	2. 5m SI adjustment AUs 4 & 5
	3. 10m SI adjustment AUs 4 & 5
4. veteran study SI adjustment	
IV	Current landbase with MP9 management assumptions, yield curves, and operability

3.0 ANALYSIS MODEL

TREEFARM version 6.5, a forest estate model proprietary to Sterling Wood Group, will be used for this timber supply analysis. TREEFARM simulates the growth, harvesting, and silvicultural treatment of a forest estate on an annual basis, with results summarized by decade.

TREEFARM 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. The model is written in the programming language 'C'.

The initial inventory data determines the net landbase. The landbase is stratified into analysis units which may be defined by forest type, site, silvicultural treatment, user allocation or resource protection category. TREEFARM can accommodate a large number of analysis units. Each analysis unit is further broken down into age classes.

A feature of TREEFARM is the subdivision of the forest estate according to silvicultural treatment. At all times the unmanaged and untreated, planted, spaced, fertilized, spaced and fertilized and partially cut areas are visible. Initial inventory summaries are also organized in this way.

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 possible. In addition, inventory age classes need not be uniform. For example, an age class sequence of 1-20 years, 21-35 years, 36-80 years, 80-110 years, 111-150 years and 150-200 years will work in TREEFARM. 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.

The TREEFARM harvesting inputs are:

- the total annual harvest required during each time period;
- the present-day harvest profile by forest type and age class;
- the minimum harvest volume per hectare, stand average diameter (dbh), and age;
- the ranking of forest types in order of preference for harvest;
- the ranking of silvicultural management types in order of preference for harvest;
- forest 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 determined for any given run.

TREEFARM allows the user to model cover constraints and green-up periods in a variety of ways. At the most detailed level, a separate cover constraint and green-up period for each forest type/silvicultural treatment combination can be identified. For example, natural hemlock stands can have different constraints and green-up periods than planted and spaced hemlock stands. Similarly, constraints can be applied to a group of forest types or silvicultural treatment types, or to different visual quality objectives (VQOs) or other resource zones. In every case the ability is retained to have a range of rotations as long as the overall cover constraint and green-up period for each forest type or zone is satisfied. In other words, both silvicultural programs and cover constraints can be modelled concurrently, and the amount of future harvests can be identified by silvicultural treatment within each resource zone. In addition, future harvest schedules are identified by management zone.

Cover constraints can be applied to a minimum or a maximum age. Examples are: up to 15% of a particular zone or analysis unit can be less than 20 years old; and 20% must be greater than 150 years old. Minimum and maximum age constraints may be applied singly or in combination.

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.

TREEFARM usually is set to begin with the current 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 possible.

A specific desired harvest schedule is reached by running the model, inspecting the results and re-running. This cycle is repeated several times. Maximum even-flow harvests are achieved in the same way.

To qualify for harvest, a stand must reach the given minimum volume, average dbh and age. Even then it cannot be cut if resource zone cover constraints and green-up objectives 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 areas, plantations, spaced, fertilized, 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 as analysis unit/site class combinations. For example, the proportion of Douglas-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 net down logic to the inventory file to produce a net landbase in a process completely independent of TREEFARM. Changing the net down logic will change the net landbase. The second is by applying factors such as for accessibility during a model run. The third way is to prepare detailed area summaries of the areas to be added or subtracted. 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.

All forest practice code requirements are accommodated either in the timber harvesting landbase determination or by TREEFARM, including: adjacency and green-up; riparian zones; stand and landscape level biodiversity. These items are further discussed in the following sections.

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4.0 LANDBASE ASSUMPTIONS

4.1 FOREST COVER INVENTORY

The re-inventory completed in 1992 has attributes projected to December 2001 and silviculture history and labels updated to December 31, 2001. The inventory meets MOF standard inventory specifications. The classification of second growth forest cover types has been updated based on the vegetation resources inventory (VRI) project which involved sample plot establishment in 2001, and final compilation in 2003 (see TFL 1 Vegetation Resources Inventory Adjustment report, available with final timber supply analysis report). This project resulted in age, height, and site index adjustment for forest stands currently aged 30 to 110, and age and height adjustment for stands 10 to 29 years, excluding stands with silviculture plot information. The updated attributes are used in the timber supply analysis for the current stand attributes. As noted, a sensitivity analysis will be run with unadjusted attributes. Site index adjustment is further discussed in the growth and yield section.

4.2 TIMBER HARVESTING LANDBASE DETERMINATION

The following table shows the area reductions applied to determine the net timber harvesting landbase for schedule A and schedule B lands. Landbase reductions are made in the order listed in this table.

Table 2: Timber harvesting landbase determination

DESCRIPTION	Area Schedule A ha	Area Schedule B ha	Total Area ha	Volume Schedule A m ³	Volume Schedule B m ³	Total Volume m ³
Total land base	635	517662	518297	127380	86968768	87096148
Non-forest	92	273951	274042	929	1926847	1927776
Non-productive forest	12	14864	14876	0	656543	656543
Total productive forest	532	228847	229379	126451	84385378	84511829
Less:						
Inoperable	64	118936	119001	25468	48050936	48076404
Non commercial	0	87	87	0	0	0
Low site	0	2950	2950	0	1085624	1085624
Deciduous	28	1430	1459	1741	81544	83285
Non-merchantable	8	1492	1500	1406	326277	327683
ESAs	0	5519	5519	0	2903618	2903618
Alpine Tundra	0	112	112	0	59613	59613
Riparian zones	23	2530	2553	2934	630137	633071
Specific geographically defined area	10	906	915	2448	545123	547571
Goat winter range	0	1102	1102	0	536226	536226
Unclassified roads, trails and landings	5	2054	2059	55	26027	26082
NSR	11	2929	2940	0	0	0
Wildlife tree patch	25	2501	2526	5758	1019253	1025011
Total Current Reduction	176	142547	142723	39810	55554459	55594269
Initial Timber Harvesting Land Base	355	86301	86656	86641	28830919	28917560
Additions:						
NSR	11	2929	2940			
Total Additions	11	2929	2940			
Current Timber Harvesting Land Base	366	89230	89596	86641	28830919	28917560

DESCRIPTION	Area Schedule A ha	Area Schedule B ha	Total Area ha	Volume Schedule A m ³	Volume Schedule B m ³	Total Volume m ³
Future Reductions:						
Future roads, trails, landings	17	3418	3435			
Future Timber Harvesting Land Base	349	85812	86161			

*numbers may not add up exactly due to rounding

Definitions and excluded areas are as follows. Total netdown areas in the following tables may differ slightly due to rounding.

1. Total landbase: the entire area of TFL 1. The 1998 total landbase was 610,691 ha, a difference of 92,394 ha. This area is accounted for by removal of the Nisga'a area from the TFL and a new TFL boundary provided by the MOF since the 1998 analysis.
2. Non-forest: the following non-forest types are 100% excluded from the THLB.

Table 3: Non-forest areas

Description	Total area ha	Area removed in netdown step ha
NTA- no typing available	3904	3904
Classified roads, trails, landings	3887	2005*
Alpine	239581	239581
Alpine forest	13600	13600
Gravel bar	428	428
Gravel pit	3	3
Lakes	1201	1201
Rock	1458	1458
River	5389	5389
Swamp	5248	5248
Urban	1225	1225
Total	275924	274042

*1882 ha of classified road overlaps with other non-forest types

3. Non-productive forest: the following non-productive types are 100% excluded from the THLB.

Table 4: Non-productive forest areas

Description	Total area ha	Area removed in netdown step ha
NP	6447	6426
NPBR	8312	8291
NPBU	160	160
Total	14919	14876

4. Inoperable: The productive forest area is classified into operability classes based on combinations of accessibility, harvesting systems, and merchantable volume. The landbase was reclassified for operability in 2002 with the following inoperable areas 100% excluded from the THLB.

Table 5: Inoperable classes

Class	Total area ha	Total productive area ha	Area removed in netdown step ha
Conventional low volume	11506	11233	11233
Inoperable	393403	107767	107767
Total	404909	119000	119000

Conventional low volume areas were determined in the 2002 total chance planning to be unavailable for harvesting due to insufficient volume at maturity, defined as volume less than 250 m³/ha. Inoperable areas are defined as not suitable for harvesting due to a combination of low volume, very poor quality, or inaccessibility. Inoperable areas do not include alpine forest. Volume per hectare was used only as a general guideline for viability when operability was being determined. Operability designations are also based on local knowledge of site conditions and wood quality.

5. Non-commercial: the following non-commercial types are 100% excluded from the THLB.

Table 6: Non-commercial areas

Description	Total area ha	Total productive area ha	Area removed in netdown step ha
NC	17	17	17
NCBR	458	456	70
Total	475	473	87

6. Low site: the following leading species-fiz-site index combinations are considered not suitable for harvest due to low timber growing potential, and are 100% excluded from the THLB.

Table 7: Low site areas

Leading species	FIZ	Site Index m, age 50	% reduction	Total area ha	Total productive area ha	Area removed in netdown step ha
Balsam	A	<6.5	100	157	36	0
Balsam	J	<6.5	100	5350	1369	21
Cedar	A	<8.5	100	0	0	0
Cedar	J	<9.0	100	47	26	2
Hemlock	A	<7.0	100	2025	653	47
Hemlock	J	<7.5	100	32872	25703	2868
Spruce	A	<3.0	100	0	0	0
Spruce	J	<5.0	100	23	9	5
Pine	A	<8.5	100	0	0	0
Pine	J	<9.5	100	175	115	0
Cottonwood	A	<8.0	100	1	1	0
Cottonwood	J	<7.0	100	8	8	7
Total				40659	27921	2950

Source: Kalum Timber Supply Area Analysis Report, March 1999

7. Deciduous: all deciduous except cottonwood is 100% excluded from the THLB as follows.

Table 8: Excluded deciduous areas

Inventory Type Group	Total area ha	Total productive area ha	Area removed in netdown step ha
37 - 42	2063	2026	1459
Total	2063	2026	1459

8. Non-merchantable: the following problem forest types are 100% excluded from the THLB.

Table 9: Problem forest types

Species	Description	Total area ha	Total productive area ha	Area removed in netdown step ha
All	Age>100 and height <22m or age >60 and crown closure <25 or age>100 and volume <250m ³ /ha	6510	6478	1500
Total		6510	6478	1500

Source: Kalum Timber Supply Area Analysis Report, March 1999

9. Environmentally sensitive areas: ESAs have been evaluated for TFL 1 and are included in the inventory landbase. The ESAs identified for exclusion from the THLB are listed in the following table: Ea-avalanche areas; Es-areas with unstable soils that may deteriorate unacceptably after harvesting; Ep-areas where regeneration will likely be difficult; and Er-areas with high recreation features. ESA categories are either 1-high sensitivity or 2-moderate sensitivity. Percent reductions are based on the March 1999 Kalum Timber Supply Area Analysis Report. Wildlife management areas identified in the LRMP replace the previous Ew designations.

Table 10: Environmentally sensitive areas

ESA Category	% reduction	Total area ha	Total productive area ha	Operable area ha	Area removed in netdown step ha
Ea1	100	158	144	21	21
Ep1	100	42028	31768	2440	1608
Er1	100	0	0	0	0
Es1	50	10809	10097	1961	882
Esa1	100	15	0	0	0
Esp1	100	19616	12666	504	365
Ep2	50	5426	4986	838	257
Es2	30	48631	43826	9070	2323
Esp2	50	1978	1961	138	63
Esr2	30	1	1	0	0
Total		106366*	88115*	14105*	5519

* individual areas do not add up to total area because some areas have both high and moderate ESA classifications.

10. Alpine Tundra: areas in the alpine tundra biogeoclimatic zone are 100% excluded from the THLB.

Table 11: Alpine Tundra areas

Description	Total area ha	Total productive area ha	Area removed in netdown step ha
Alpine Tundra	123923	3870	112
Total	123923	3870	112

11. Riparian zones: riparian reserve and management zones are spatially defined in the TFL 1 inventory. The following reductions are made to the THLB for these zones.

Table 12: Reductions for riparian reserves and management zones

Description	% reduction	Total area ha	Total productive area ha	Area removed in netdown step ha
Reserve Zone	100	20158	9041	1952
Management Zone	10	56644	23596	600
Total		76802	32637	2553

12. Specific geographically defined areas: the Upper Kitsumkalum and the Lakelse River Subzone 1 are identified as no logging zones in the Kalum Land and Resource Management Plan, 2002. These areas are excluded from the THLB as follows.

Table 13: Reductions for specific geographically defined areas

Description	% reduction	Total area ha	Total productive area ha	Area removed in netdown step ha
Upper Kitsumkalum	100	22399	6854	843
Lakelse River Subzone 1	100	172	152	73
Total		22571	7006	915

13. Ungulate Winter Range- Mountain Goat: a no timber harvesting zone has been established by the Kalum LRMP 2002 for goat winter range. Per personal conversation with the biologist that prepared the Mountain Goat Winter Range inventory (Brad Pollard, R.P.Bio), 82% of the identified goat winter range is unavailable for timber harvesting and has been excluded from the THLB as follows.

Table 14: Reduction for mountain goat winter range

Description	% reduction	Total area ha	Total productive area Ha	Area removed in netdown step ha
Goat winter range	82%	17513	10998	1102
Total		17513	10998	1102

14. Unclassified roads, trails, and landings: existing unclassified roads, trails and landings are defined for TFL 1 as 6% of the current productive stands available for harvesting, ≤ 35 years old. This reduction is made in addition to the spatially defined classified roads, trails and landings accounted for in the non-forest reductions. The total reduction is 2059ha.

15. NSR: not satisfactorily restocked areas do not currently contain sufficient stocking of acceptable trees, and are identified in the TFL inventory. These areas are excluded from the initial THLB, and are added back to the current THLB after a specified delay (see section 6.8).

Table 15: Reduction for NSR

Description	% reduction	Total area ha	Total productive area ha	Area removed in netdown step ha
Current NSR	100%	3948	3881	2940
Total		3948	3881	2940

16. WTPs: Wildlife tree patches were calculated using Table A3.1 of the Landscape Unit Planning Guide, March 1999. Draft landscape units and landscape unit objectives are incorporated into the timber supply analysis. Biogeoclimatic subzones with area available for harvest include the CWHws, ICHmc, and MHmm. From Table A3.1, 15 combinations of subzones and landscape units require wildlife tree retention between 1% and 10% of cutblocks. A total area of 7894ha is calculated for WTP requirements, with 32% of the area, 2526 ha, excluded from the THLB.
17. Future roads, trails and landings: reductions are made for future roads, trails and landings after the stands are harvested for the first time by the simulation model. A total area of 3435ha will be deducted from the current THLB as harvesting proceeds. This reduction is applied to stands currently greater than 35 years old, and is 6% of the harvest area.

5.0 FOREST MANAGEMENT ASSUMPTIONS

5.1 MANAGEMENT ZONES

The timber harvesting landbase is divided into management zones based on forest management objectives, consistent with the Kalum Land and Resource Management Plan, 2002. GIS coverages were used to define the following management zones for TFL 1.

Table 16: TFL 1 Management Zones

Management Zone	Characteristics	Productive forest area ha	Timber harvesting landbase ha
General	All areas not assigned to one of the other management zones.	149275	61,664
Lakelse River	LRMP, subzone 1 excluded from the timber harvesting landbase. No subzone 2 within landbase.	152	0
Upper Kitsumkalum	LRMP, excluded from the timber harvesting landbase.	6854	0
Mountain Goat winter range	LRMP, 82% excluded from the timber harvesting landbase.	10998	241
Copper watershed/ Grizzly Bear	LRMP, additional seral stage requirements. Critical grizzly patch habitats accounted for in the timber harvesting landbase determination.	22776	9237
Moose winter range	LRMP, includes Beaver, Nass, Skeena, and isolated primary and secondary zones. No green-up or biodiversity requirements in addition to General Management Zone.	19201	9253
Backcountry recreation	LRMP, no green-up or biodiversity requirements in addition to General Management Zone.	841	133
Miligit Valley	LRMP, within the Upper Copper special management zone. Portion included in the partial retention VQO zone, otherwise no green-up or biodiversity requirements in addition to General Management Zone. Sensitive area accounted for in the timber harvesting landbase determination.	421	175
Retention VQO zone	LRMP, includes 29ha of VQO preservation, and retention area in the Kiteen-Cedar low level pass retention area. Additional green-up constraints.	6200	1610
Partial retention VQO zone	LRMP, additional green-up constraints. Includes partial retention areas identified in the Miligit special management zone and the Kiteen-Cedar low level pass area.	18611	9043

* management zones overlap, therefore total productive forest and THLB areas do not add up to landbase determination totals

5.2 ANALYSIS UNITS

Individual forest stands are grouped into analysis units as defined below. Each analysis unit is associated with existing stands and regenerated stands yield tables. Analysis units are independent of management zones. Site classes are described in section 6.

Table 17: Analysis unit definitions

Analysis Unit	BEC zone	FIZ (for MH stands)	Leading species	Inventory Type Group	Site class	Age class	Current timber harvesting landbase (ha)
1	CWH	n/a	hemlock, cedar	9 - 17	1, 2	All	3331
2	CWH, MH	A	hemlock, cedar	9 - 17	3	1 - 7	14997
3	CWH, MH	A	hemlock, cedar	9 - 17	4	1 - 7	2796
4	CWH, MH	A	hemlock, cedar	9 - 17	3	8, 9	4046
5	CWH, MH	A	hemlock, cedar	9 - 17	4	8, 9	29667
6	CWH, MH	A	balsam	18 - 20	1, 2	All	1602
7	CWH, MH	A	balsam	18 - 20	3	All	6958
8	CWH, MH	A	balsam	18 - 20	4	All	3644
9	CWH	n/a	spruce	21 - 26	1 - 4	All	1246
10	CWH	n/a	pine	28 - 31	2 - 4	All	2577
11	CWH	n/a	cottonwood	35 - 36	2 - 4	All	626
12	ICH, MH	J	hemlock, cedar	9 - 17	2, 3	1 - 7	4511
13	ICH, MH	J	hemlock, cedar	9 - 17	4	1 - 7	775
14	ICH, MH	J	hemlock, cedar	9 - 17	3	8, 9	704
15	ICH, MH, ESSF	J	hemlock, cedar	9 - 17	4	8, 9	6420
16	ICH, MH	J	balsam	18 - 20	2, 3	All	1003
17	ICH, MH, ESSF	J	balsam	18 - 20	4	All	2544
18	ICH, MH	J	spruce	21 - 26	1 - 4	All	375
19	ICH, MH	J	pine	28 - 31	2 - 4	All	1492
20	ICH, MH	J	cottonwood	35 - 36	1 - 4	All	283
Total							89596

5.3 DETAILED TIMBER HARVESTING LANDBASE

The following tables show the THLB area and volume summaries by analysis unit and 10 year age classes.

Table 18: THLB area by analysis unit and 10 year age class

age/ AU	0-	11-	21-	31-	41-	51-	61-	71-	81-	91-	101-	111-	121-	131-	141-	151-	161-	171-	181-	191-	201-	211-	221-	231-	241-	total	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	>250	ha
1	62	769	155	1013	1175	148	0	1	0	7	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3332
2	2628	4051	3834	3297	719	46	4	12	26	89	4	242	24	12	0	0	0	0	0	0	0	0	0	0	0	0	14988
3	348	60	152	1317	725	2	3	6	0	0	0	69	75	39	0	0	0	0	0	0	0	0	0	0	0	0	2795
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	122	22	5	0	22	79	0	26	0	351	18	3402	4045
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	48	59	174	4	73	76	433	22	293	59	28377	29666
6	66	159	108	433	606	224	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1602
7	2905	1496	672	1059	368	75	0	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6958
8	305	580	343	136	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	1	10	167	0	32	20	2096	3643
9	155	98	140	512	42	22	0	0	1	0	0	0	0	0	0	1	11	0	0	19	0	101	0	8	1	136	1247
10	351	512	77	846	678	13	0	0	0	32	6	5	0	0	0	0	0	58	0	0	0	0	0	0	0	0	2578
11	100	39	54	93	283	12	0	0	4	11	4	0	0	0	4	0	0	0	0	0	0	0	0	21	0	0	625
12	433	1187	1522	759	6	0	0	0	70	6	162	298	57	0	0	0	0	0	0	0	0	0	0	0	0	0	4510
13	177	6	58	275	0	0	0	0	19	1	0	166	55	19	0	0	0	0	0	0	0	0	0	0	0	0	776
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	11	0	0	12	22	0	650	704
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	114	177	0	18	26	24	28	205	100	295	344	5088	6419
16	442	487	63	0	0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1004
17	108	288	214	35	0	0	0	0	0	0	0	0	0	4	44	0	0	1	0	223	1	168	0	37	122	1495	2540
18	0	0	11	231	0	0	0	0	0	0	0	13	3	0	0	8	0	6	0	0	0	78	0	0	0	0	374
19	158	203	158	317	21	0	0	0	2	56	24	433	34	0	0	0	0	87	0	0	0	0	0	0	0	0	1493
20	17	43	125	87	0	0	0	0	0	0	8	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	283
total	8254	9977	7686	10410	4623	541	13	20	122	206	208	1230	251	78	358	256	75	344	52	230	115	1178	135	1116	565	41539	89596

Table 19: THLB volume by analysis unit and 10 year age class

age/	0-	11-	21-	31-	41-50	51-60	61-	71-	81-	91-	101-	111-	121-	131-	141-	151-	161-	171-	181-	191-	201-	211-	221-	231-	241-	250	>250	total
AU	10	20	30	40	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250		volume
1	0	165	13327	232878	446573	72620	0	402	0	4619	0	0	2427	0	0	0	0	0	0	0	0	0	0	0	0	0	0	767212
2	0	809	58413	270450	125430	16103	1771	4815	14377	46016	2596	120443	11614	5355	0	0	0	0	0	0	0	0	0	0	0	0	0	678192
3	0	0	0	0	0	0	0	0	0	0	0	21469	26437	15792	0	0	0	0	0	0	0	0	0	0	0	0	0	80885
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63396	12751	2270	0	12465	50770	0	15858	0	281156	10505	0	0	3115658
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20991	22787	23274	84338	1815	34075	38882	263392	10585	159222	30722	0	0	16882206
6	0	0	8795	85418	213983	102538	2918	630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	414002
7	0	4	7294	24657	64421	23477	152	0	0	725	0	2439	257	0	0	0	0	0	0	0	0	0	0	0	0	0	0	441997
8	0	0	6	0	0	0	0	0	0	0	0	10	43	0	6663	0	0	0	0	454	4375	80652	0	15896	10889	0	0	1183644
9	0	91	769	24492	2916	1342	0	0	446	0	0	32	0	80	9	291	4455	0	0	15855	0	73654	0	8653	925	0	0	247451
10	0	0	720	33226	73178	2663	0	0	0	0	2810	3344	0	0	0	0	0	32569	0	0	0	0	0	0	0	0	0	148611
11	0	0	74	989	34188	2124	0	0	469	2573	1076	0	0	0	1026	0	0	5	0	0	0	0	0	0	0	0	0	48587
12	0	17	3901	15578	233	26	0	0	40195	2972	66150	116410	20217	0	0	0	0	0	0	0	0	0	0	0	0	0	0	271146
13	0	0	0	161	0	0	0	0	3933	126	0	49436	18353	6333	0	0	0	0	0	0	0	0	0	0	0	0	0	78243
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4059	0	0	0	0	7160	0	232	6219	14088	0	0	0	482471
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37027	58887	0	7066	11130	11199	13666	101320	46926	120892	144434	0	0	3295942
16	0	0	463	0	0	0	0	0	0	1152	0	0	0	0	1869	0	0	0	0	0	0	0	0	0	0	0	0	6195
17	0	0	0	8	0	0	0	0	0	0	0	1358	14115	0	0	0	0	411	0	11948	474	76336	0	19573	47923	0	0	880058
18	0	0	0	3203	0	0	0	0	0	0	0	4815	1365	0	0	4051	0	1794	0	0	202	39720	0	0	0	0	0	67450
19	0	45	647	6229	0	0	0	0	547	10584	7192	141971	13679	0	0	0	0	22097	0	0	0	0	0	0	0	0	0	202991
20	0	9	477	908	0	0	0	0	0	0	2406	0	0	970	0	0	0	0	0	0	0	0	0	0	0	0	0	4769
total	0	1142	95160	699799	968928	220612	5031	7047	59986	68767	82230	460768	94392	29888	151055	96768	31999	148281	25410	131061	57589	593164	63730	671167	245399	0	0	29251487

6.0 GROWTH AND YIELD

6.1 YIELD TABLE DEVELOPMENT

Existing stand yield tables and managed stand yield tables are developed for each analysis unit. Separate managed stand yield tables are also developed for analysis units that have spaced areas; these will be developed for the analysis in consultation with licensee and MOF staff. Existing and managed stand yield tables are in Appendix 1.

Existing natural stands:

Volumes for existing natural stands are generated by VDYP (Variable Density Yield Projection) windows version 1.1, core version 6.6d using weighted average species composition and site index, and VDYP default crown closure. Existing natural stands are defined as stands currently ≥ 30 years old, excluding spaced stands. VDYP generated yields are net decay, waste and breakage, using TFL 1 waste and breakage factors. Deciduous volumes except cottonwood are netted out of the stand volumes based on the species composition assigned to each analysis unit.

Upon examination of these yields, concern was raised that the average volume per hectare of old growth stands was higher than expected for the TFL. Based on the extensive consideration given to old growth yields in the previous analysis, old growth existing stand yields were adjusted as follows.

1. 1998 analysis average volume per hectare for stands > 250 years calculated at $464 \text{ m}^3/\text{ha}$. This average applies to the THLB only. This average was considered reasonable, with yields in 1998 adjusted based on audit plot information.
2. 2003 analysis average volume per hectare for THLB >250 years, using yields from step 1 calculated at $493 \text{ m}^3/\text{ha}$.
3. Factor of 0.94 applied to all old growth volumes (>140 years) for all analysis units to create final existing stand yield curves.

Managed stands:

Volumes for existing and future managed stands are generated by WinTIPSY (windows version of the Table Interpolation Program for Stand Yields), version 3.0e using weighted average species composition and site index. For TIPSY yields, all stands are assumed to be natural regeneration with a 6 year regeneration delay incorporated in TIPSY. The operational adjustment factors (OAFs) used to generate yields are OAF1 of 15% to account for incomplete site occupancy, and OAF2 of 5% to represent losses that increase with stand age. Existing managed stands are defined as stands currently < 30 years old and all currently spaced stands. All existing natural stands become managed stands once harvested, except for cottonwood leading stands, for which the existing stand yield curves continue after harvest.

6.2 WEIGHTED AVERAGE SPECIES COMPOSITION AND SITE INDEX

The following table outlines the area weighted species composition and site index used to generate the yield tables. Weights are based on the THLB area for each analysis unit. Adjusted attributes refers to the inventory age, height, and site index resulting from the recent VRI adjustment. Unadjusted attributes refers to the inventory attributes prior to VRI adjustment, and are used in a sensitivity analysis.

Table 20: Analysis unit attributes

Analysis unit	Species composition	Site index BH age 50 adjusted attributes	Site Index BH age 50 unadjusted attributes
1	H ₆₂ B ₃₀ S ₄ C ₃ Ac ₁	27.6	25.0
2	H ₆₃ B ₂₇ C ₄ S ₄ Pl ₂	20.5	20.0
3	H ₆₆ B ₂₃ S ₅ C ₃ Pl ₃	12.4	11.9
4	H ₆₄ B ₂₆ S ₆ C ₄	16.7	16.7
5	H ₇₆ B ₂₂ S ₁ C ₁	11.9	11.9
6	B ₆₁ H ₃₇ C ₁ S ₁	28.1	25.6
7	B ₆₁ H ₃₄ S ₃ C ₂	20.7	20.5
8	B ₆₄ H ₃₄ S ₂	12.1	12.1
9	S ₅₇ H ₂₀ Ac ₈ B ₅ Pl ₄ C ₄ At ₂	16.0	15.5
10	Pl ₇₃ H ₁₈ At ₄ C ₃ S ₂	19.7	18.2
11	Ac ₆₆ D ₁₅ H ₇ S ₆ C ₄ Pl ₂	25.9	25.9
12	H ₆₀ B ₁₈ S ₉ Pl ₅ C ₄ Ac ₄	19.8	19.5
13	H ₆₀ B ₁₄ S ₁₄ Pl ₈ C ₄	13.9	13.3
14	H ₆₂ B ₂₃ C ₁₁ S ₄	17.1	17.1
15	H ₇₅ B ₁₉ S ₂ C ₂ Pl ₂	10.8	10.8
16	B ₆₄ H ₃₄ S ₂	21.4	21.4
17	B ₆₉ H ₂₈ S ₃	11.8	11.8
18	S ₅₄ H ₂₀ Ac ₈ E ₆ C ₅ Pl ₅ B ₂	20.3	20.3
19	Pl ₆₄ H ₁₈ At ₈ B ₅ S ₅	19.3	18.9
20	Ac ₅₀ S ₁₇ H ₁₅ D ₁₁ Pl ₄ C ₃	19.6	19.6

6.3 SITE INDEX ASSIGNMENT

Site index and site class have been assigned to each polygon in the inventory database as follows:

- Stands ≥ 30 years: VDYP Batch version 6.6d breast height age 50 site index
- Stands < 30 years: inventory site index

Four productive site classes are based on site index breast height age 50:

Site class 1:	BH50 SI > 35
Site class 2:	25 < BH50 SI \leq 35
Site class 3:	15 < BH50 SI \leq 25
Site class 4:	3 < BH50 SI \leq 15

6.4 UTILIZATION LEVEL

The following table shows the utilization levels used to calculate merchantable timber volumes.

Table 21: Utilization levels

Species	Minimum dbh cm	Maximum stump height cm	Minimum top dib cm
cottonwood	22.5	30	10
all conifer species	17.5	30	10

6.5 SILVICULTURE MANAGEMENT REGIMES

The following table shows TFL 1 silviculture regime assumptions used for this analysis. Current management practices are natural regeneration and no spacing.

Table 22: Silviculture management regimes

Analysis unit	Existing Stand Leading species	Regen delay	Regen method	Initial density
1	hemlock, cedar	6	natural	4000
2	hemlock, cedar	6	natural	4000
3	hemlock, cedar	6	natural	4000
4	hemlock, cedar	6	natural	4000
5	hemlock, cedar	6	natural	4000
6	balsam	6	natural	4000
7	balsam	6	natural	4000
8	balsam	6	natural	4000
9	spruce	6	natural	4000
10	pine	6	natural	4000
11	cottonwood	6	natural	n/a
12	hemlock, cedar	6	natural	4000
13	hemlock, cedar	6	natural	4000
14	hemlock, cedar	6	natural	4000
15	hemlock, cedar	6	natural	4000
16	balsam	6	natural	4000
17	balsam	6	natural	4000
18	spruce	6	natural	4000
19	pine	6	natural	4000
20	cottonwood	6	natural	n/a

6.6 REGENERATION ASSUMPTIONS

Existing stands regenerate to the following analysis units following harvest. Interior spruce leading stands regenerate to interior balsam stands in proportion to their site productivity. Regeneration is assumed to the same species composition as the existing stands except for AU 18 which regenerates to AUs 16 and 17 as shown.

Table 23: Regeneration assumptions

Existing analysis unit	Regenerated analysis unit	weighting %
1	1	100
2	2	100
3	3	100
4	2	100
5	3	100
6	6	100
7	7	100
8	8	100
9	9	100
10	10	100
11	11	100
12	12	100
13	13	100
14	12	100
15	13	100
16	16	100
17	17	100
18	16	75
18	17	25
19	19	100
20	20	100

6.7 EXISTING MANAGED IMMATURE

The following table identifies the immature management history for each analysis unit, and areas of existing managed second growth stands. NSR is excluded from this table.

Table 24: Immature management history

Analysis unit	Area < 30 years ha	Area spaced ha
1	917	332
2	9320	3243
3	189	175
4	0	0
5	0	0
6	331	292
7	41561	1358
8	1042	81
9	270	26
10	728	458
11	71	0
12	2726	868
13	108	0
14	0	0
15	0	0
16	928	41
17	526	92
18	2	3
19	426	67
20	164	0
total	21908	7035

6.8 NOT SATISFACTORILY RESTOCKED AREAS (NSR)

Currently 2940 ha of NSR is in the THLB. This area is distributed by analysis unit as shown in the following table, based on BEC subzone, FIZ, inventory type group and estimated site index data. NSR is assumed to regenerate over the first 10 year time period in TREEFARM.

Table 25: NSR distribution

Existing analysis unit	Analysis unit regenerated to	NSR area ha
1	1	43
2	2	637
3	3	344
4	2	0
5	3	0
6	6	0
7	7	814
8	8	144
9	9	112
10	10	204
11	11	99
12	12	184
13	13	124
14	12	0
15	13	0
16	16	24
17	17	82
18	75% AU16 and 25% AU 17	26
19	19	88
20	20	17
Total		2940

6.9 UNSALVAGED LOSSES

Unsalvaged losses are volume losses in addition to those accounted for by VDYP decay, waste and breakage, and TIPSYS operational adjustment factors, resulting from natural causes such as insects, disease, fire, and blowdown. The annual net unsalvaged loss is deducted from the TREEFARM harvest flow results to determine net harvest volumes. Unsalvaged loss is estimated at 2900 m³/year, which is proportionately consistent by THLB area with the 1999 analysis. Assumptions as stated in 1999 and consistent in 2003 are that there have been no fires in TFL 1 and nearly all losses from blowdown are salvaged. There have been no major losses from insect attacks.

7.0 INTEGRATED RESOURCE MANAGEMENT

7.1 FOREST RESOURCE INVENTORIES

Complete details regarding resource inventories are provided in the Management Plan section 3.0 and appendix 4. The following table summarizes the source and dates of the resource inventories.

Table 26: Resource inventory status

Inventory Type	Standard	Source	Date
Operability	SCI	Woodima	2002
Ecological-BEC	MSRM	MSRM	1996
Terrain	MSRM	Madrone, Timberline	1996-2000
Visual quality objectives	MSRM	LRMP	2002
Streams	MSRM	various	1997-2000
Wildlife-goat, moose, grizzly	MSRM	LRMP	2002
Biodiversity-LUs	MSRM	MSRM	2001

7.2 FOREST COVER REQUIREMENTS

The green-up period after logging is defined during which time the replacement stands are expected to reach a specified height. The following constraints are applied in TREEFARM.

Table 27: Green-up cover constraints by management zone

Management Zone	Green-up height m	Green-up maximum allowable disturbance % area	Application
General Moose winter range Mountain Goat winter range Backcountry recreation Miligut Valley, excluding VQO areas	3	35	THLB
Copper Watershed/ Grizzly Bear	5	25	productive landbase
Visual - retention	5	5	productive landbase
Visual - partial retention	5	15	productive landbase
Upper Kitsumkalum Lakelse	n/a	n/a	

Landscape biodiversity constraints are applied by landscape unit, biogeoclimatic variant, natural disturbance type, and biodiversity emphasis. Biodiversity emphasis is identified in the inventory database. The following old seral constraints are applied to the productive forest area, consistent with the Landscape Unit Planning Guide. Old seral age is >250 years throughout TFL 1. Constraints are identified only for the landscape unit - BEC combinations which contain area in the timber harvesting landbase.

Table 28: Old seral stage constraints

	Landscape Unit	Zone	Subzone	Variant	NDT	BEO	min retention area %
E-over M+OV	Beaver	CWH	ws	1	2	I	9
	Beaver	CWH	ws	2	2	I	9
	Beaver	MH	mm	2	1	I	19
	Clore	CWH	ws	1	2	I	9
	Clore	CWH	ws	2	2	I	9
E over M+OV	Clore	CWH	ws	1	2	L	9
	Clore	CWH	ws	2	2	L	9
	Clore	MH	mm	2	1	I	19
	Clore	MH	mm	2	1	L	19
	Dasque	CWH	ws	1	2	L	9
E-N/A M+OV	Dasque	CWH	ws	2	2	L	9
	Dasque	MH	mm	2	1	L	19
	Ishkheenickh	CWH	ws	1	2	I	9
E-V M+OV	Ishkheenickh	CWH	ws	2	2	I	9
	Ishkheenickh	MH	mm	1	1	I	19
	Kalum	CWH	ws	1	2	I	9
E-borderline M+O-OK	Kalum	CWH	ws	2	2	I	9
	Kalum	MH	mm	2	1	I	19
	Kiteen	CWH	ws	2	2	I	9
E-N/A M+OV	Kiteen	CWH	ws	2	2	I	9
	Kiteen	ICH	mc	1	2	I	9
	Kiteen	ICH	mc	2	2	I	9
	Kiteen	MH	mm	2	1	I	19
	Kiteen	MH	mm	2	1	L	19
	Kleanza-Treasure	CWH	ws	1	2	I	9
	Kleanza-Treasure	CWH	ws	2	2	I	9
E-N/A M+OV	Kleanza-Treasure	CWH	ws	1	2	L	9
	Kleanza-Treasure	CWH	ws	2	2	L	9
	Kleanza-Treasure	MH	mm	2	1	I	19
	Kleanza-Treasure	MH	mm	2	1	L	19
	Ksedin	CWH	ws	1	2	L	9
E-N/A M+OV	Ksedin	CWH	ws	2	2	L	9
	Ksedin	MH	mm	2	1	L	19
	Lakelse	CWH	ws	1	2	I	9
E-over M+O-OK	Lakelse	CWH	ws	2	2	I	9
	Lakelse	MH	mm	2	1	I	19
	Nass River Kalum	ICH	mc	1	2	H	13
Early over mature to old	Nass River Kalum	ICH	mc	2	2	H	13
	Nelson-Fiddler	CWH	ws	1	2	L	9
	Nelson-Fiddler	CWH	ws	2	2	L	9
E-N/A M+OV	Nelson-Fiddler	ICH	mc	1	2	L	9
	Nelson-Fiddler	ICH	mc	2	2	L	9
	Nelson-Fiddler	MH	mm	2	1	L	19
	Skeena River Kalum	CWH	ws	1	2	H	13
	Skeena River Kalum	CWH	ws	2	2	H	13
Early borderline M+OV	Skeena River Kalum	MH	mm	2	1	H	28
	Tseax	CWH	ws	1	2	I	9
	Tseax	CWH	ws	2	2	I	9
E-over M+OV	Tseax	ICH	mc	1	2	I	9
	Tseax	ICH	mc	2	2	I	9
	Tseax	ICH	mc	2	2	I	9
	Tseax	MH	mm	2	1	I	19

5L
6I
2H

The LRMP defines an additional forest cover constraint for grizzly bear management in the Copper watershed portion of the Kleanza-Treasure Landscape Unit. This management zone will have maximum retention of 30% of the productive forest landbase between the ages of 25 and 100 years.

7.3 WILDLIFE TREE PATCHES

Wildlife tree patches were calculated using Table A3.1 of the Landscape Unit Planning Guide, March 1999. Landscape units and landscape unit objectives are incorporated into the timber supply analysis. From Table A3.1, 15 combinations of subzones and landscape units require wildlife tree retention between 1% and 10% of cutblocks as shown in the following table.

A total area of 7894 ha is calculated for WTP requirements, with 32% of the area, 2526 ha, excluded from the timber harvesting landbase as shown in the landbase determination. Reduction % is zero for other landscape units for which BEC zones and subzones are not shown.

Table 29: Wildlife Tree Patches

Landscape Unit	Zone	Subzone	WTP%	SRMP
Beaver	CWH	ws	6	8
Clore	CWH	ws	4	6
Dasque	CWH	ws	7	7
Kalum	CWH	ws	10	10
Kiteen	CWH	ws	1	3
Kiteen	ICH	mc	6	7
Kleanza-Treasure	CWH	ws	3	7
Ksedin	CWH	ws	4	6
Lakelse	CWH	ws	7	7
Nass River Kalum	ICH	mc	6	7
Nelson-Fiddler	CWH	ws	9	8
Nelson-Fiddler	ICH	mc	1	5
Skeena River Kalum	CWH	ws	5	5
Tseax	CWH	ws	3	4
Tseax	ICH	mc	8	8

7.4 TIMBER HARVESTING

Minimum harvest volume is 300 m³/ha, except for the analysis units that contain the majority of the operable non-conventional volume. These analysis units, for which minimum harvest volume is 350 m³/ha, are 4, 5, 8, and 15.

The minimum ages for natural and managed stands are determined from the yield tables for each analysis unit as the age at which the minimum volume is attained, or 60 years, whichever is greater. Minimum age for cottonwood stands is designated as 60 years consistent with the Kalum Timber Supply Area Analysis Report, March 1999.

Table 30: Minimum harvest age

Analysis unit	existing natural stands		natural regen managed stands no OGSI adjustment	
	minimum harvest age	culmination age	minimum harvest age	culmination age
1	60	68	60	105
2	60	88	71	140
3	125	130	141	190
4	78	102	71	150
5	145	132	141	210
6	60	66	60	100
7	63	94	69	130
8	135	155	149	200
9	77	105	91	140
10	76	109	81	100
11	60	60	60	60
12	71	91	75	120
13	106	130	117	140
14	82	105	75	120
15	146	155	117	180
16	79	100	67	110
17	175	161	141	170
18	88	96	n/a	100
19	104	110	86	100
20	60	81	60	81

7.5 OPERABILITY/HARVEST METHODS

Operability mapping of TFL 1 was revised and completed in 2002, based on a combination of harvesting systems, accessibility, merchantable volume, and local knowledge of site conditions and wood quality. As shown in the landbase determination, reductions to the timber harvesting landbase are made for:

- conventional low volume areas which are unavailable for harvest due to insufficient volume at maturity, defined as volume less than 250 m³/ha;
- inoperable areas, defined as not suitable for harvesting due to a combination of low volume, very poor quality, or inaccessibility. Inoperable areas do not include alpine forest.

Table 31: Timber harvesting landbase and harvest methods

Analysis unit	Conventional		Non-conventional	
	area (ha)	volume (m ³)	area (ha)	volume (m ³)
1	3329	747709	3	55
2	14933	567467	64	24383
3	2739	73273	57	7504
4	3564	2726503	482	364705
5	27291	15387236	2376	1342614
6	1602	411123	0	3
7	6906	432363	52	14200
8	3300	988626	343	185534
9	1226	233551	19	16232
10	2577	150949	0	0
11	621	48432	6	413
12	4500	259262	6	2971
13	759	40168	16	4969
14	657	446579	52	35521
15	5827	2931137	594	313077
16	995	1812	7	4415
17	2264	756686	281	129849
18	373	67549	1	739
19	1490	195682	2	353
20	283	3919	0	0
total	85237	26470025	4359	2447537

7.6 INITIAL HARVEST RATE

The initial harvest rate will be determined during the timber supply analysis.

7.7 HARVEST RULES

Section 3.0 describes the harvest rules used by TREEFARM in more detail. Preference will be given for harvesting the historic harvest profile, with a secondary preference to harvest oldest stands first.

7.8 HARVEST PROFILE

The historic harvest profile is shown by analysis unit, area weighted for stands currently \leq 20 years old, including NSR.

Table 32: Historic harvest profile

Analysis unit	% THLB
1	4.5
2/4	36.6
3/5	2.3
6	1.2
7	24.2
8	4.8
9	1.4
10	4.7
11	0.8
12/14	8.9
13/15	1.0
16	4.9
17	2.1
18	0.2
19	2.0
20	0.3
Total	100

7.9 HARVEST FLOW OBJECTIVES

The initial harvest level will be set to maximize the AAC in the short term followed by a maximum decline of 10% in each of the following decades, and to avoid 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.

APPENDIX 5-1

Yield Tables

