

Canadian Forest Products Ltd.

TFL 37

Incremental Silviculture Strategy

Prepared as a Component of the 2002 – 2006 Resource Management Plan

Prepared by

Canadian Forest Products Ltd.

Englewood Logging Division

For



Ministry of Forests

Port McNeill Forest District

Vancouver Forest Region

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1.0 Basic Data

Following is the basic data as outlined in TFL 37 Management Plan 8 approved by the Ministry of Forests.

Land Area

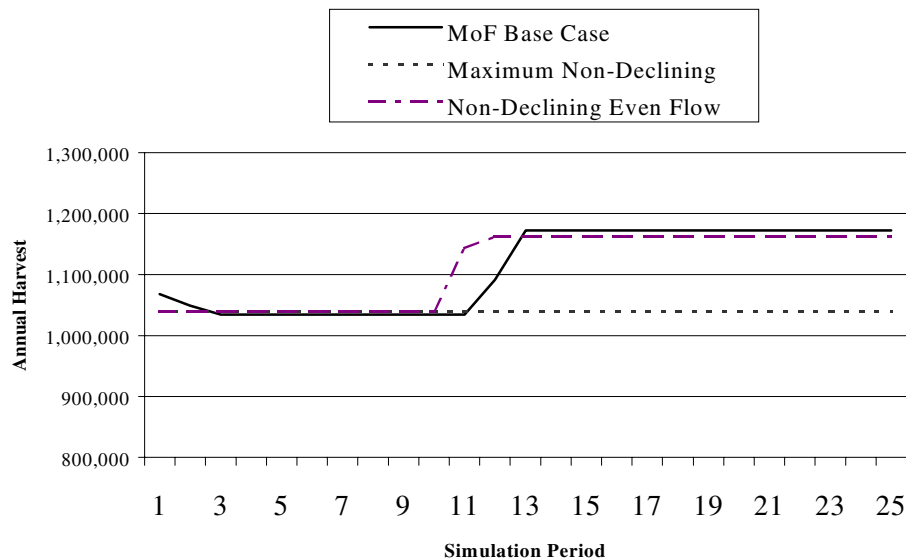
TFL 37 covers approximately 188,745 hectares on Northern Vancouver Island, of which 54% are considered within the net operable landbase for the long term. Schedule A lands within TFL 37 amount to 25,642 hectares (14%), including 4,725 hectares (2.5%) of private land and 20,917 hectares (11%) of private timber in Timber Licences (TLs).

AAC

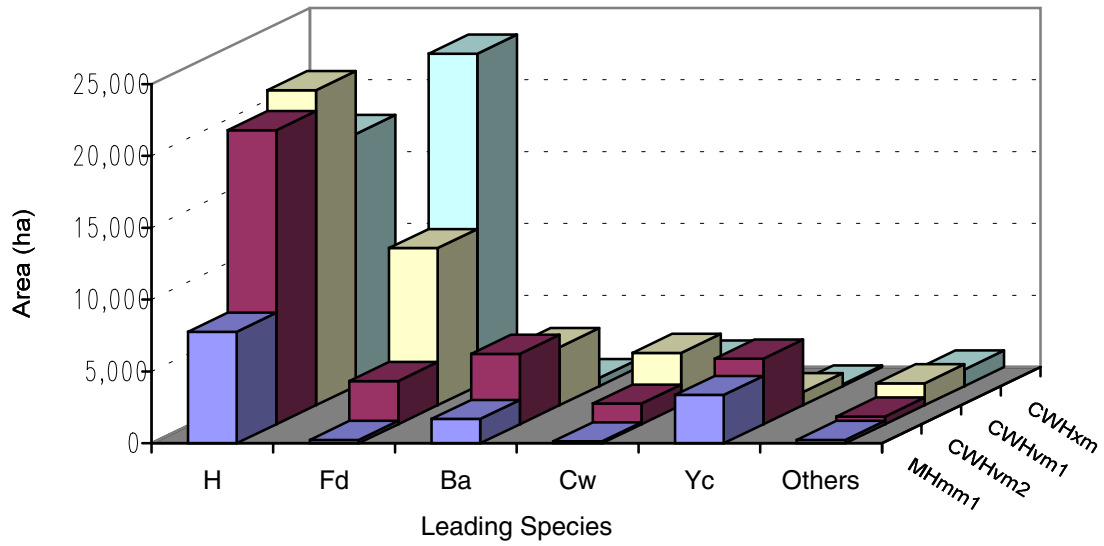
The current AAC is 1,068,000 m³ per year, under current management and the existing timber harvesting landbase for TFL 37.

Harvest Forecast

Harvest forecast based on most recent timber supply analysis.

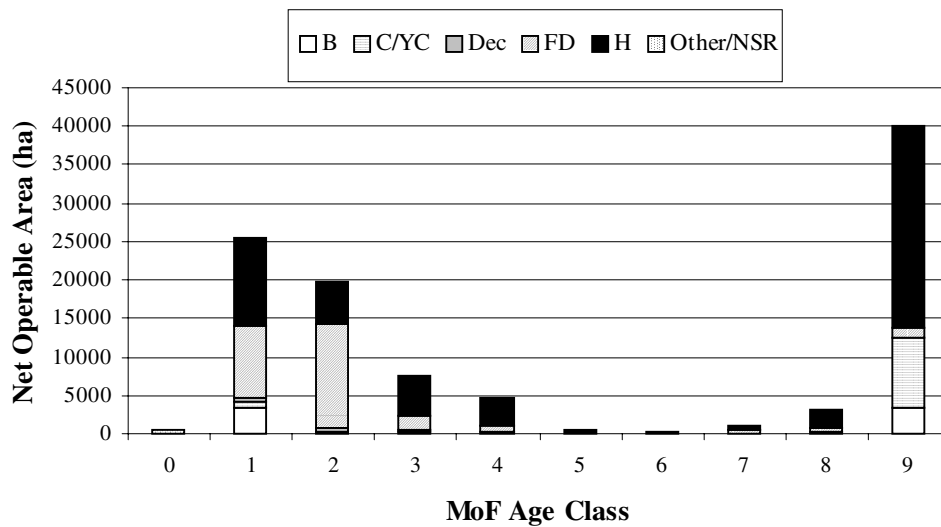


Site Types

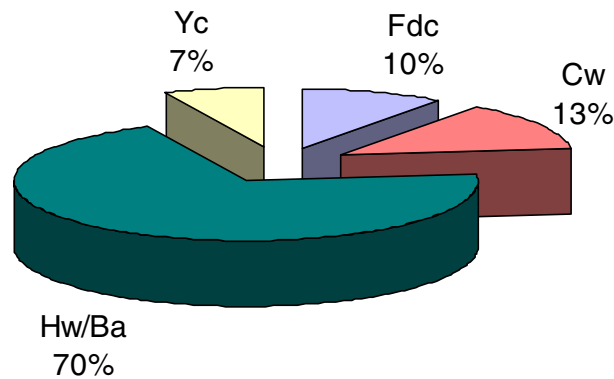


Age Class

Current Age Class Structure for TFL 37.



Current Species Distribution



2.0 Issues

The following comments and sensitivity analysis is taken from the Timber Supply Analysis Report for TFL 37.

Harvest Schedule

In the MoF Base Case the current AAC (1,068,000 m³) is maintained for one decade with minor declines of 1.8% in year 11 and 1.4% in year 21. After year 110 the harvest rate rises considerably to 1,172,100 m³ for the remainder of the 250-year planning horizon.

Timber Availability

The existing inventory of mature timber on TFL 37 is approximately 40 million cubic metres. Short term harvesting utilizes this inventory until existing and future managed stands become available. The key factors influencing the short-term harvest rate are:

1. The amount of mature timber on the TFL.
2. The timing of the availability of managed stands for harvest.

The critical period for determining the short-term harvest level occurs 50 to 70 years into the future at which time managed stands are required to make up a significant portion of the annual harvest.

Sensitivity Analysis

Adding Uneconomic Stands

Adding 3,169ha of stands classified as uneconomic allows the current AAC to be maintained for 10 years longer than in the MoF Base Case. There is still a required drop of approximately 1.5% during the same mid-term period until year 110.

Removing Technically Inoperable Areas

Excluding technically inoperable areas, 6,998ha (7%) of the net operable forest, results in declines throughout the planning horizon. In this sensitivity a 10% drop in harvest rate is required after maintaining the current AAC for 10 years. The long-term rate is approximately 4% lower than in the MoF Base Case. This indicates that the sites occupied by technically unconventional areas are of lower productivity on average than the stands remaining in the net operable landbase.

Removing Marginally Economic Areas

In this simulation 8,493ha of mature timber designated as marginally economic are removed from the timber harvest landbase. The current AAC cannot be maintained in this sensitivity without having a more noticeable reduction in the mid-term harvest level. Therefore a drop of approximately 1.5% is required in the first decade of the simulation with a further drop of 10% to the mid-term level.

Forest Cover

Forest cover requirements related to REA disturbance and green-up do not significantly constrain the harvest schedule at any time during the planning horizon. Only in a few cases does the disturbance level reach the maximum permitted. The Woss-Zeballos LIA (REA 54) and Tsitika GFA (REA 61) reach maximum disturbance limits during periods 3 and 4. Other smaller REAs reach maximum disturbance limits on a very infrequent basis, but these areas only make up a very small component of the timber harvesting landbase.

Growth and Yield

Any change in the time required for managed stands to reach minimum harvest age results in a modified harvest schedule. Similarly, adjusting managed stand volumes changes the harvest level developed in the MoF Base Case.

Sensitivity Analysis***Changes in Regeneration Delay***

Reducing regeneration delay to zero makes a minor improvement in the harvest schedule. Alternatively, increases to regeneration delay result in decreased harvest rates. An increase to two years causes a mid-term reduction of approximately 1.5% compared to the MoF Base Case. There is less than a 1% difference in the long-term harvest rate. Increasing regeneration delay impacts negatively on the harvest for two reasons:

1. Areas take longer to reach minimum harvest age.
2. Harvested areas take longer to reach minimum green-up height.

Changes in MSYT Minimum Harvest Age

Increasing managed stand yield table (MSYT) minimum harvest age by 10 years has a more significant impact on the harvest schedule compared with increased regeneration delays. The MoF Base Case initial harvest rate of 1,068,000m³/year cannot be sustained in this scenario without having a significant drop in harvest after year 10. The short and mid-term harvest is 3 – 13% below that of the MoF Base Case. There is virtually no difference in the long-term harvest between this scenario and the MoF Base Case. This is because not all stands are harvested as soon as they reach minimum harvest age in the later decades of the simulation. In the short and mid-term, managed stands are harvested as soon as they become merchantable in both simulations.

Reducing MSYT minimum harvest age by 10 years improves the short and mid-term harvest levels by as much as 5%. It is important to note that there is no mid-term decline in this scenario

compared with the MoF Base Case. In addition, the rise to the long-term harvest level occurs 20 years earlier in this scenario. The long-term harvest rate is slightly lower than in the MoF Base Case because the harvested stands are providing less volume at minimum harvest age. Harvesting of managed stands begins in year 51, as in the MoF Base Case. However, 7,130,000m³ of managed stand volume are harvested between years 51 and 60 in this sensitivity compared to 4,768,000m³ in the MoF Base Case during the same decade. The Products-Based Silviculture option examines MSYT minimum harvest ages that are likely to be reduced in future to meet log product objectives.

Changes in Managed Stand Yield Table Volume

Reducing managed stand volumes by 10% does not significantly impact the short-term harvest rate until year 21. At that point the harvest is approximately 7% below that of the MoF Base Case. Although volumes are reduced the minimum harvest ages were not changed from the MoF Base Case. Therefore the harvest reduction is not as immediate or significant as increasing minimum harvest age for these stands. The long-term harvest rate is 10% below that of the MoF Base Case, equivalent to the drop in volume for long-term stands.

Increasing managed stands volumes by 10% improves the harvest rate by 3% in the mid-term and 10% in the long-term. The full impact of improving the yields from these stands is realized in this scenario. Figure 6.8 illustrates the harvest rate over time for some of the growth and yield sensitivity runs.

Management Considerations

Management considerations include landscape level biodiversity, wildlife management and inclusion of the 20-Year Plan.

Sensitivity Analysis

Changes in Disturbance and Green-up

In the Increase Maximum Disturbance scenario, REA disturbance was increased to a “3-pass” approach for most areas (maximum 33% < 3 metres) or up one level for visually sensitive areas (visual 1 to visual 2, etc.). There was virtually no difference in the periodic harvest rate (< 0.5%) compared with the MoF Base Case at any time. Similarly, decreasing the maximum disturbance limit to simulate a “5-pass” system (maximum 20% < 3 metres) or increasing visually sensitive areas (visual 2 to visual 1 etc.) there was less than 1% difference in the harvest rate developed for the MoF Base Case. These results confirm that maximum disturbance is not a crucial element in determining the harvest potential from TFL 37.

A number of alternative green-up height requirements were assigned to the Nimpkish HIA and the Tsitika and Woss-Vernon GFAs for this series of analyses. As noted for the maximum disturbance adjustments, these changes to green-up height had no impact on the harvest rate at any time during the planning horizon compared to the MoF Base Case. This is because managed stands achieve green-up in a short time (i.e. many in less than 10 years) because of the high productivity of the landbase. More important is the timing of managed stands reaching minimum harvest age. It is expected that green-up on the Nimpkish HIA will be lower than 3.0m and this will provide an improved harvest potential for the TFL. This is also noted in the 20-Year Spatial Analysis scenario.

Sensitivity to Incorporating the 20 Year Plan

As an alternative to the typical 20-year plans included in management plan submissions a spatial timber supply analysis was conducted for TFL 37. In addition to the landbase netdowns, growth and yield assumptions and management considerations included for the MoF Base Case option, cutblocks were identified and included in the landbase. The majority of the cutblocks were designed by Canfor engineers and covered the mature and older immature stands. Additional cutblocks were designed in the GIS environment based on similar age categories. These

cutblocks were then added to the analysis database and allowed cutblock adjacency and silviculture green-up rules to be included in analysis simulation.

The spatial analysis is not intended to represent an operational plan but it does provide one possible solution to locating the harvest on the ground. The results provide an important link between the harvest schedule developed in the non-spatial analyses and operational planning which requires specific harvest locations on an annual basis. Results of the 20-Year Spatial Analysis are then mapped to identify which cutblocks are harvested during each 5-year period of the simulation. Note that 5-year simulation periods were used in the 20-Year Spatial Analysis. The total planning horizon was 20 years. The results indicate that the initial harvest level of 1,068,000m³/year (the current TFL 37 AAC) developed for the MoF Base Case non-spatial analysis option can be carried for at least 5 years in all of the 20-Year Analysis scenarios. **A reduction of 4.5% between the first and second periods in the MoF Base Case spatial analysis is required to meet the 3.0m silviculture green-up requirements.** All other forest cover requirements are met during all periods of the spatial analyses as they were in the non-spatial analysis.

Silviculture green-up is a key issue in developing the short-term harvest rate on TFL 37. This was not clearly identified in the non-spatial analysis because of the model's ability to harvest small forest stands (as small as 0.25ha) compared with the larger units selected for harvest in the spatial analysis.

Reducing silviculture green-up in the Nimpkish HIA to 2.25m allows the non-spatial MoF Base Case harvest schedule to be carried for the entire 20 years of the planning horizon. Similarly, reducing silviculture green-up by approximately one year in the Enhanced Green-up scenario allows the harvest schedule to match that of the MoF Base Case non-spatial analysis.

3.0 Incremental Silviculture History

Stand Tending

Stand tending on the TFL has included spacing, commercial thinning (CT), fertilization, conifer release, and pruning. Juvenile spacing and fertilization assumptions were integrated into the most recent timber supply analysis. Table 1 outlines incremental silviculture treatments back to 1970.

Table 1 Incremental Silviculture Summary 1970 to 2001

Year	Juvenile Space (ha)	Prune (ha)	Fertilize (ha)	Commercial Thinning (m ³)	Commercial Thinning (ha)	Residual Falling (ha)	Site Conversion (ha)	Conifer Release (ha)
1970							92	
1971								
1972								
1973								
1974								
1975								
1976								
1977	9							
1978	42		15					
1979	168		383					
1980	842		740		15			42
1981	983	20	965				40	72
1982	1,726	65	1,465				13	103

Year	Juvenile Space (ha)	Prune (ha)	Fertilize (ha)	Commercial Thinning (m ³)	Commercial Thinning (ha)	Residual Falling (ha)	Site Conversion (ha)	Conifer Release (ha)
1983	937	112	687				139	51
1984	400	262					50	
1985	389	139		724	8		45	
1986	361	78		721	4		27	
1987	520	53						62
1988	280	48	60	1,110	9	740		
1989	409	49	184	7,986	55	606	6	
1990	408	46	1,515	5,301	35	526	8	
1991	1,177	43		11,902	74	494		
1992	148	13	135	8,567	80	275		
1993	312	9		8,567	108			
1994	672	127	619	12,800	89	340		
1995	530	160	323	12,228	7			
1996	160	13	305	6,386	37	400		
1997	363	191	319	9099	56			
1998	256	133						
1999	154	125	1658					
2000	54	54	1488					
Totals	11,300	1,740	10,861	85,391	648	3,381	420	
Annual Average	470	87	678	7116	54			

4.0 Opportunities to Increase Timber Supply

Products Based Minimum Harvest Ages

The Enhanced Silviculture (tree improvement) MSYTs provide higher volumes for future MSYTs and therefore the overall harvest rate is higher in this scenario. In some situations reduced MSYT minimum harvest ages can result in decreased long-term harvest rates because the volumes provided at younger ages are insufficient to support the harvest target. The productive capacity of the landbase is therefore not achieving its potential. This is not the case for the Products-Based Silviculture scenarios as revisions to the minimum harvest ages were not great and forest cover disturbance is not constraining.

Products Based MSYTs

The positive results of adjusting minimum harvest ages are clearly demonstrated in the two Products-Based Silviculture option scenarios. Future MSYT minimum harvest ages were reduced between 5 and 10 years for many of the MSYTs. The additional volume available in the short-term is due to managed stands becoming available for harvest earlier during the critical period when the existing mature inventory is at a low point. Long-term harvest levels are also improved because stands reach merchantable age in less time.

Products Based Enhanced Silviculture (Tree Improvement) MSYTs

The Enhanced Silviculture MSYTs incorporate second generation tree improvement and provide greater volumes therefore the overall harvest rate is higher in this scenario. In some situations reduced MSYT minimum harvest ages can result in decreased long-term harvest rates because the volumes provided at younger ages are insufficient to support the harvest target. The productive capacity of the landbase is therefore not achieving its potential. This is not the case for the Products-Based Silviculture scenarios as revisions to the minimum harvest ages were not great and forest cover disturbance is not constraining. (Figure 1)

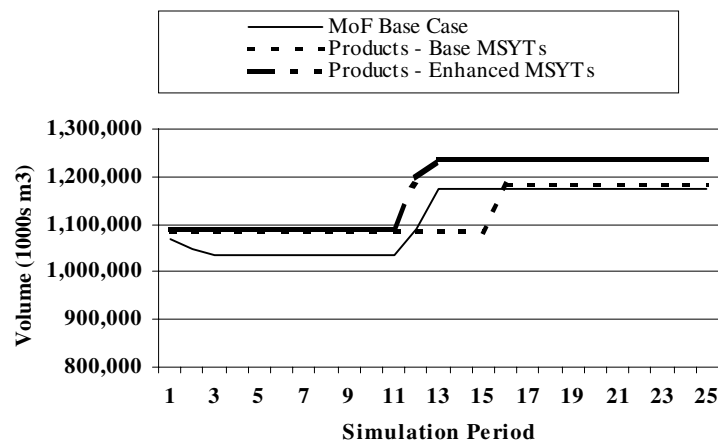


Figure 1 Products Based Harvest Flow

Enhanced Silviculture

The timber supply impacts of enhancing the level of incremental silviculture on managed stands were reviewed in this option. Canfor currently has an extensive program of spacing, fertilization, first generation seed orchards and commercial thinning. Gains from second-generation tree improvement, spacing and fertilization were evaluated in this set of analyses. A new set of managed stand yield tables incorporating gains related to these silviculture programs was developed for this option.

Additional Tree Improvement

Estimates associated with improvements from second-generation seed orchard planting stock are included in this scenario. **The analysis results show that short-term gains of about 2% are possible, while the long-term harvest level is increased approximately 8% over the MoF Base Case.** The increase to the long-term harvest rate occurs in year 101 in this scenario compared to year 111 in the MoF Base Case. Minimum harvest ages for the revised MSYT are only about three years less in this scenario compared with the MoF Base Case. In the long-term as the inventory of mature managed stands rises, the harvest increases to take full advantage of the enhanced productivity associated with tree improvement.

Tree Improvement plus Spacing

Similar gains are noted in the long-term for this scenario as were described for the Additional Tree Improvement scenario, approximately 8% above the MoF Base Case. However in the short-term the harvest level is slightly lower (1%) compared with the MoF Base Case. This is a result of older minimum harvest ages for the managed stands that include spacing programs. Minimum harvest ages were based on culmination of MAI for this scenario.

Tree Improvement plus Fertilization

Comparable short and long-term gains to those in the Additional Tree Improvement scenario are noted for this scenario, approximately 8% above the MoF Base. Very few stands were assigned to fertilization yield tables in this scenario because of limitations within the growth and yield models used to develop the tables. Some adjusting of SI50 values was necessary to develop the yield tables, which resulted in less definitive results. In addition, areas with SI50 of 35m or more are not expected to show any additional volume gains from fertilization. **Long term research results indicate that multiple fertilization treatments result in significant increases in merchantable volume over a rotation. Weetman et al (1997) report that Fd stands fertilized**

on 8 year intervals over an 80 year rotation will yield a 13% increase in merchantable volume and will provide a 7% return on invested funds.

Tree Improvement plus Spacing plus Fertilization

The harvest schedule developed for this scenario was virtually the same as the MoF Base Case up to year 100 when the increase to the long-term harvest rate commences. As with the other two scenarios in this option, this increase takes place one decade earlier than in the MoF Base Case because of the improved productivity associated with the enhanced MSYTs. The harvest rate up to year 100 is slightly lower than the MoF Base Case, as noted for the Tree Improvement plus Spacing scenario. Again, this is due to the older minimum harvest ages associated with the MSYTs that include spacing. Figure 2 provides a graphic summary of the harvest schedules for the Enhanced Silviculture option.

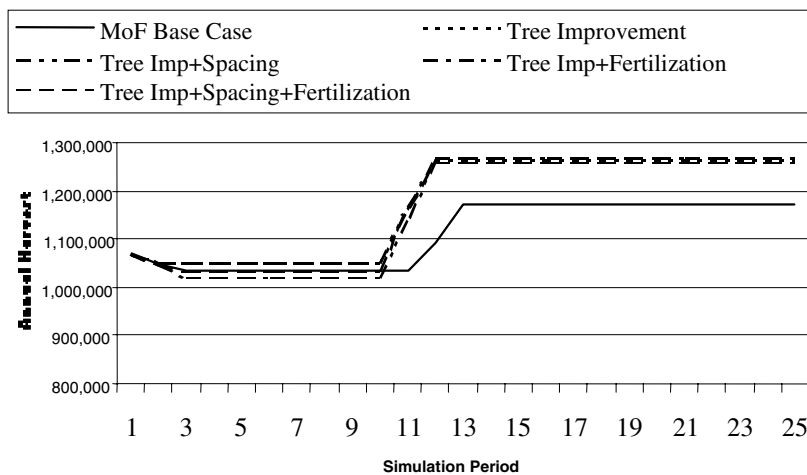


Figure 2 Enhanced Silviculture Harvest Flow

Note that increases in available volume in the various scenarios illustrated in Figure 2 are due to tree improvement and fertilization.

Potential Strategies by Response Time Frame

The response time frame is the period in which the anticipated result is expected, not the period in which the actions must commence. Potential Strategies are outlined in Table 2

Table 2 Potential Strategy by Time Frame

Response Time Frame	Strategy/Action	Anticipated Result
Short Term (1 –20 yrs)	<p>1.Reduce time to 3m greenup by at least one year. (Currently spatial constraints result in a reduction in harvest of 4.5% in the short term) This would be accomplished by increased use of:</p> <ul style="list-style-type: none"> • Large planting stock at higher densities. • Time of planting fertilization. • Aggressive brush control and animal browse protection. <p>The above treatments are a part of our basic silviculture program, however opportunities exist to increase levels in investment. <i>These treatments are not currently eligible for FRBC Enhanced Forestry funding</i></p>	Maintain MoF base case harvest level.
Mid Term (21 – 150 yrs)	<ol style="list-style-type: none"> 1. Increase investment in second-generation seed orchards. With sufficient investment, all planting stock will originate from second generation Class A seed. 2. Increase levels of aerial fertilization. Treat all spaced and pruned stands plus selected Fdc leading stands on 8 year intervals (1500 ha per year) 3. Treat stagnating younger Fdc, Hw and Cw stands with SCHIRP fertilizer to reduce effect of salal competition (1500 ha per year) 	<ol style="list-style-type: none"> 1. Increase harvest level by 2%. (20,000 m³) 2. Increase stand yields by 13% on treated stands. (Weetman et al – 1997) 3. Reduce adjacency constraints. Additional monitoring is required to accurately determine effect on volume.
Long Term (151+ yrs)	<ol style="list-style-type: none"> 1.Increase investment in second generation seed orchards. By year 20 all planting stock is expected to originate from second generation Class A seed 2. Increase levels of aerial fertilization. (1100 - 3000 ha per year). 	<ol style="list-style-type: none"> 1. Increase harvest level by 8%. The increase to long term actually occurs in year 101 rather than 111 in base case. 2. Increase stand yields by 13%

The timber supply analysis indicates that the greatest opportunity for increasing timber supply across all time frames exists by ***increasing investment in tree improvement and multiple fertilization treatments (time of planting and intervals of 8 years)***.

5.0 Opportunities to Improve Timber Quality

Product Objectives

The following section on product objectives is taken from Management Plan 8 for the TFL.

Table 3 Product attributes for future managed stands

Product Grade	Product Attributes				
	Butt Diameter Range (cm)	Max Knot Size (cm)	Max Taper (cm/ 3m)	Minimum Length (m)	General Description
Premium	60 +	5.0	2.5	5.0	Large, clean sawlogs –dominant component of stands. Small knots and minimum taper. Pruned Fd and Hw unless knots will meet specification.
Standard	40 – 59	10.0	2.5	5.0	Logs too small or too rough to meet Premium. Other possible sorts include Cw poles and house/cabin logs.
Gang	25 – 39	10.0	2.5	5.0	Smaller, pole-sized material suitable for peeling or sawing.
Utility	0 – 24			3.0	Small material or rough large pieces unsuitable for sawlogs.

The fundamental component of our product strategy is the link between stand-level objectives and our forest estate model. Stand projection data used in the timber supply analysis was derived by grouping each BEC subzone and site series within TFL 37 into analysis units. The resultant yield tables provided additional stand and stock tables to explore our product strategy.

Tables 4 through 7 describe the product targets established for each BEC subzone and site series within TFL 37. These product targets consider our basic and incremental silviculture strategies, as well as the corresponding stand projection data used in the timber supply analysis. Our objective was to specify minimum harvest ages required to produce the desired attributes. The following approach was used:

- Select species that maximise yields while giving due consideration to unique species (Cw, Yc, and Pw) where possible and ecologically suitable.
- Set minimum volume per hectare limits that provide a reasonable expectation of economical harvesting operations.
- Set piece size targets. Table 3 provides a description of proposed second growth log grades. Butt diameters are used as TIPSy presents only DBH in output.
- Set minimum piece size targets for each site series (Tables 4 to 7). Dimensions chosen allow for a wide variety of potential products without the need to delay rotations beyond MAI culmination on the majority of our sites.

Table 4 MHmm1 Product Strategy

Site Series No.	Product Targets					
	Product Grade	Minimum DBH (cm)	Percent of Total Volume	Minimum Total Volume (m ³ /ha)	Minimum Harvest Age	Expected Species Mix at Rotation (Percent by Volume)
01	Gang	30	67	398	130	Hw/Hm (30) Ba (44) Yc (26)
01p	Gang	30	67	398	130	Hw/Hm (28) Ba (42) Yc (30)
03	Gang	30	67	398	130	Hw/Hm (24) Ba (44) Yc (32)
05	Gang	30	67	386	110	Hw/Hm (22) Ba (38) Yc (40)
07	Gang	35	75	350	125	Hw/Hm (24) Ba (30) Yc (46)

Table 5 CWHvm2 Product Strategy

Site Series No.	Product Targets					
	Product Grade	Minimum DBH (cm)	Percent of Total Volume	Minimum Total Volume (m ³ /ha)	Minimum Harvest Age	Expected Species Mix at Rotation (Percent by Volume)
01	Standard	45	33	750	70	Hw (60) Ba (21) Yc (19)
01s	Gang	35	67	640	85	Hw (65) Ba (8) Yc (21) Cw (6)
01p	Gang	35	67	663	95	Hw (63) Ba (8) Yc (21) Cw (8)
03	Gang	35	75	767	95	Fdc (20) Cw (41) Hw (38) Ba (1)
04	Standard	45	33	668	75	Hw (74) Yc (26)
05	Gang	35	75	767	95	Ba (56) Yc (30) Hw (14)
06	Gang	35	75	745	95	Ba (22) Yc (39) Hw (39)
06s	Gang	30	75	455	125	Hw (46) Ba (12) Yc (38) Cw (4)
06p	Gang	30	75	455	125	Hw (45) Ba (12) Yc (39) Cw (4)
07	Gang	35	75	751	85	Ba (52) Yc (30) Hw (18)
09	Standard	45	50	617	100	Cw (38) Yc (44) Hw (18)
11	Gang	35	75	414	130	Cw (42) Yc (48) Hw (10)

Table 6 CWHvm1 Product Strategy

Site Series No.	Product Targets					
	Product Grade	Minimum DBH (cm)	Percent of Total Volume	Minimum Total Volume (m ³ /ha)	Minimum Harvest Age	Expected Species Mix at Rotation (Percent by Volume)
01	Standard/Premium	45	50	816	60	Fdc(71) Hw(19) Cw (10)
01s	Gang	30	67	372	130	Hw (81) Cw (18) Ba (1)
01p	Standard	45	33	715	70	Hw (82) Cw (18)
03	Standard	45	33	692	55	Fdc(66) Hw(19) Cw (15)
04	Standard	45	50	708	80	Fdc(66) Hw(19) Cw (15)
05	Standard/Premium	45	67	959	55	Hw (56) Cw (15) Ba (29)
06	Standard	45	50	877	65	Hw (56) Cw (22) Ba (22)
06s	Standard	45	50	350	120	Hw (69) Cw (16) Ba (15)
06p	Gang	35	67	707	90	Hw (69) Cw (22) Ba (9)
07	Standard/Premium	45	50	906	80	Hw (38) Cw (40) Ba (22)
09	Standard/Premium	45	50	890	70	Hw (35) Cw (39) Ba (26)
12	Gang	35	75	418	130	Cw (40) Yc (40) Hw (19) Ba (1)
14	Standard	45	67	653	80	Cw (86) Hw (13) Ba (1)

Table 7 CWHxm Product Strategy

Site Series No.	Product Targets					
	Product Grade	Minimum DBH (cm)	Percent of Total Volume	Minimum Total Volume (m ³ /ha)	Minimum Harvest Age	Expected Species Mix at Rotation (Percent by Volume)
01	Standard/Premium	45	67	949	65	Fdc (64) Cw (11) Hw (25)
01p	Standard	45	33	640	65	Fdc (62) Cw (15) Hw (23)
03	Standard	45	50	756	70	Fdc (81) Cw (14) Hw (5)
05	Premium/Standard	45	67	884	50	Fdc (70) Cw (22) Hw (8)
06	Standard	45	33	780	70	Hw (70) Cw (30)
06p	Gang	35	75	813	100	Fdc (2) Cw (30) Hw (68)
07	Premium/Standard	45	67	876	55	Fdc (67) Cw (27) Hw (6)
08	Premium/Standard	45	67	961	50	Fdc (69) Cw (26) Hw (5)
12	Gang	35	67	762	75	Cw (81) Hw (19)

Each site series has a proposed product, minimum DBH, percent of total volume and minimum total volume requirements. All criteria must be met before the stand is harvested in the forest estate model. For example, for the CWHxm 01 site series, two thirds of the stand must be at least 45cm and net volume must be 949 m³/hectare before the stand will be cut. Based on our species and site quality assumptions for this site series, this will occur at age 65.

Potential Treatments

The following outlines potential treatments, some of which are ineligible for FRBC Enhanced Forestry funding, (Table 8). Stand selection criteria are outlined in TFL MP 8.

Table 8 Potential Treatments

Treatment	Potential Treatment Regimes	Treatable Area (annual)
High Density Plantations	Manage highly productive sites in the CWHxm and vm1 to high densities to promote rapid crown lift, low taper, and consistent log sizes. This treatment is aimed at reducing knot frequency and size on the dominant component of stands thereby increasing the proportion of premium sawlogs.	350 ha
Pruning	Remove branches on dominant component of stands on our best sites to maintain or increase proportion of premium sawlogs.	60 ha
Juvenile Spacing	Juvenile space to 1000 sph (overstory) and retain understory of 1/3 average stand height to create a two tiered stand. This is designed to ameliorate volume loss, encourage self-pruning, and provide a layer for subsequent commercial thinning from below. Stand level modelling for spacing indicates a reduction in volume at rotation with a higher mean diameter. Product piece size objectives can be met sooner at the cost of a reduced stand volume. Due to model limitations however, volume estimates did not take understory tier and interim commercial thinnings into account.	10 - 100 ha

Potential Strategies by Response Time Frame

The response time frame is the period in which the anticipated result is expected, not the period in which the actions must commence. The following is based on timber supply analysis assumptions and FRBC multi year funding levels. This does not include a financial analysis of potential returns/losses resulting from juvenile spacing and pruning expenditures.

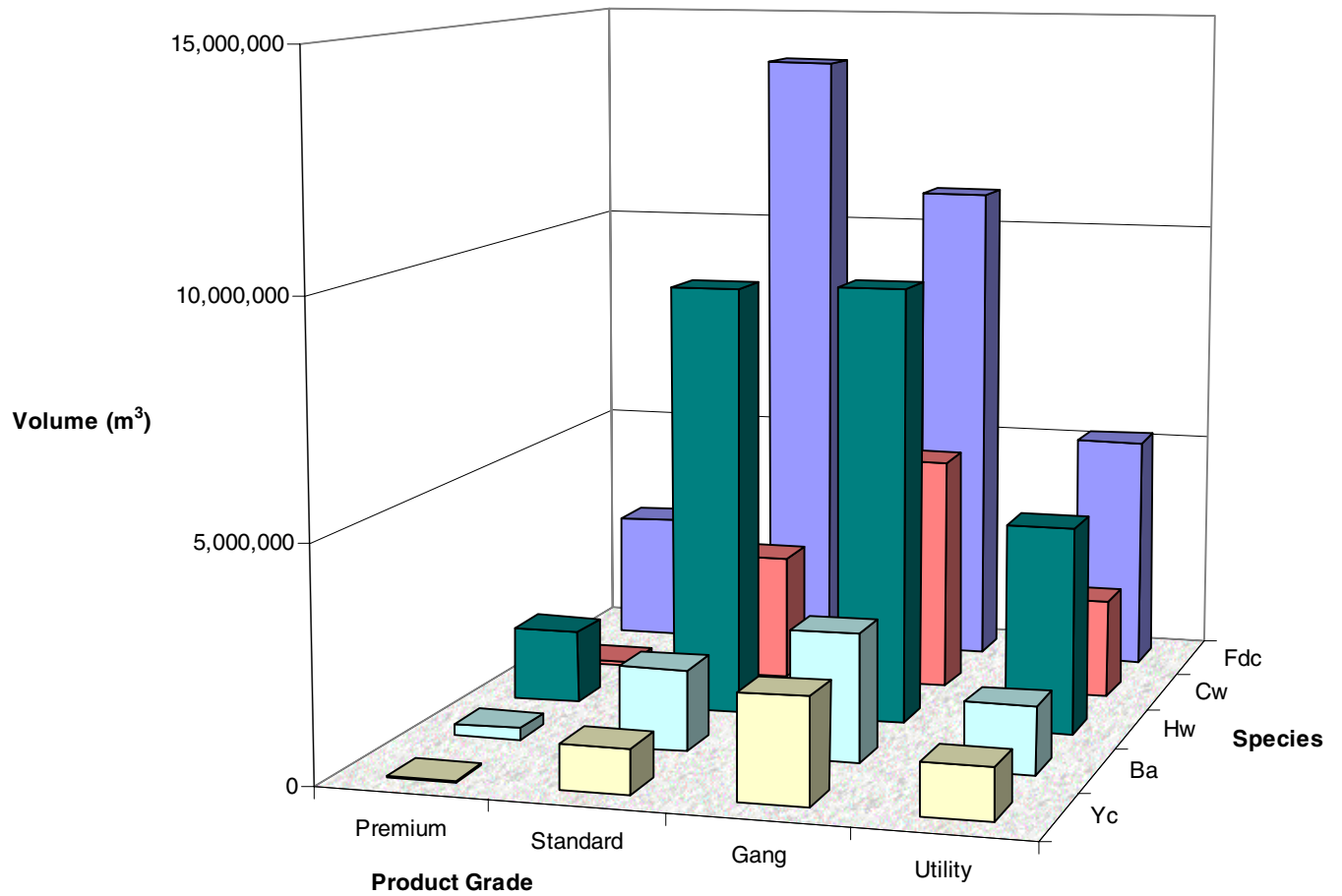
Table 9 Potential Actions to Increase Timber Quality

Response Time Frame	Strategy/Action	Anticipated Result
Short Term (1 - 20 yrs)	None	
Mid Term (21 - 150 yrs)	1. Juvenile space 300 ha. 2. Prune 150 ha.	1. and 2. Maintain historical proportion of premium sawlogs. Reduce proportion of utility grade.
Long Term (151+ yrs)	As above	As above

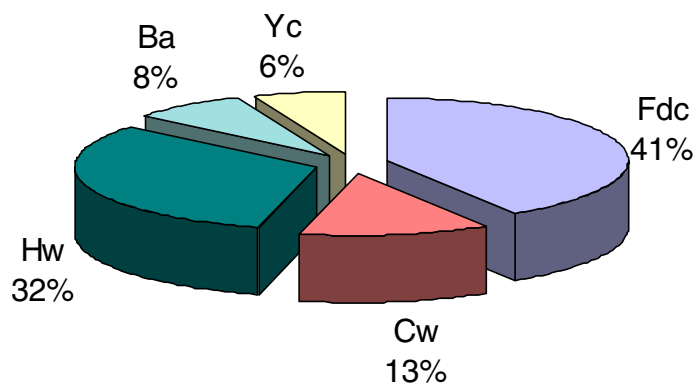
Timber Quality Forecast Scenarios

This quality scenario is based on the assumptions built into the most recent timber supply analysis.

To get a picture of species and grade distributions across the landbase, estimates of expected volumes at product rotation and net operable area were extrapolated into the long term. This provides the species and grade distribution illustrated in Figure 3.

Figure 3 Expected managed stand volumes by species and product

Figures 4 and 5 further clarify the picture by expressing expected percent species distribution and percent log grade distribution across the landbase.

**Figure 4 Projected Species Distribution**

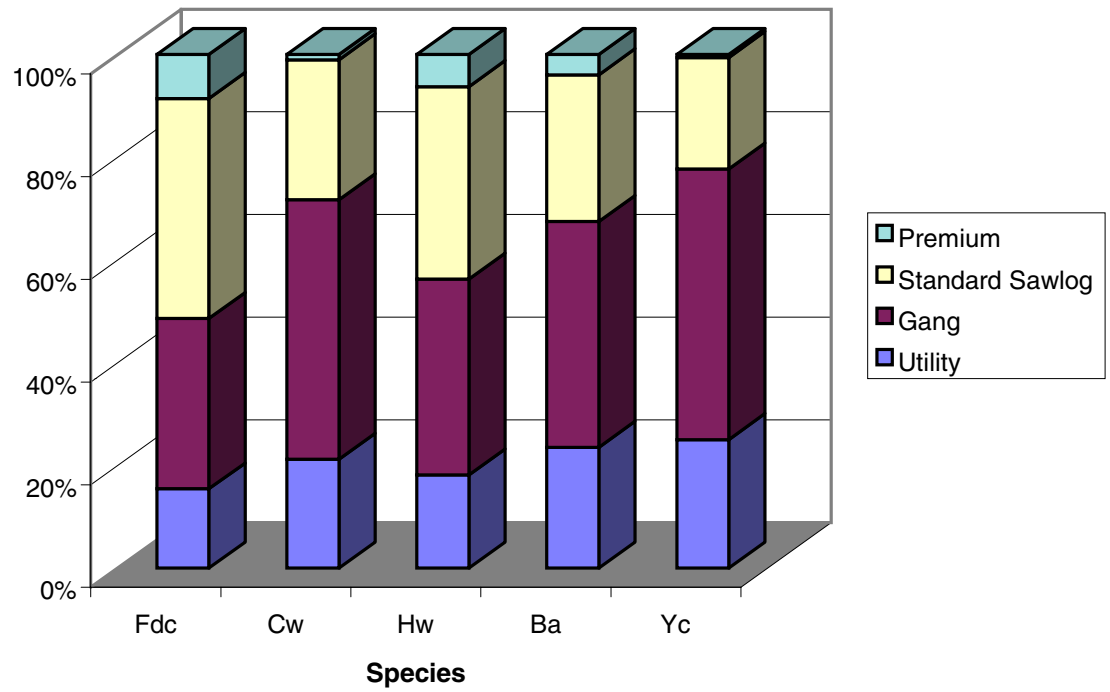
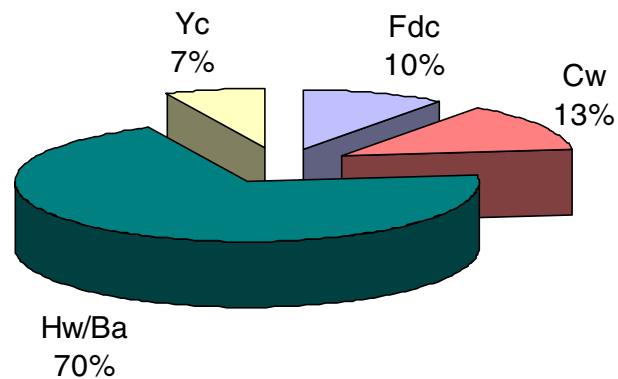


Figure 5 Projected product grade breakdown by species

For comparison, a similar illustration of current species and grade profile was completed over a five year period (1993 – 1997). Figure 6 shows current species distribution and Figure 7 illustrates current grade distribution. Note that grade breakdown in Figure 7 is based on



current industrial log grade specifications.

Figure 6 – Current species distribution

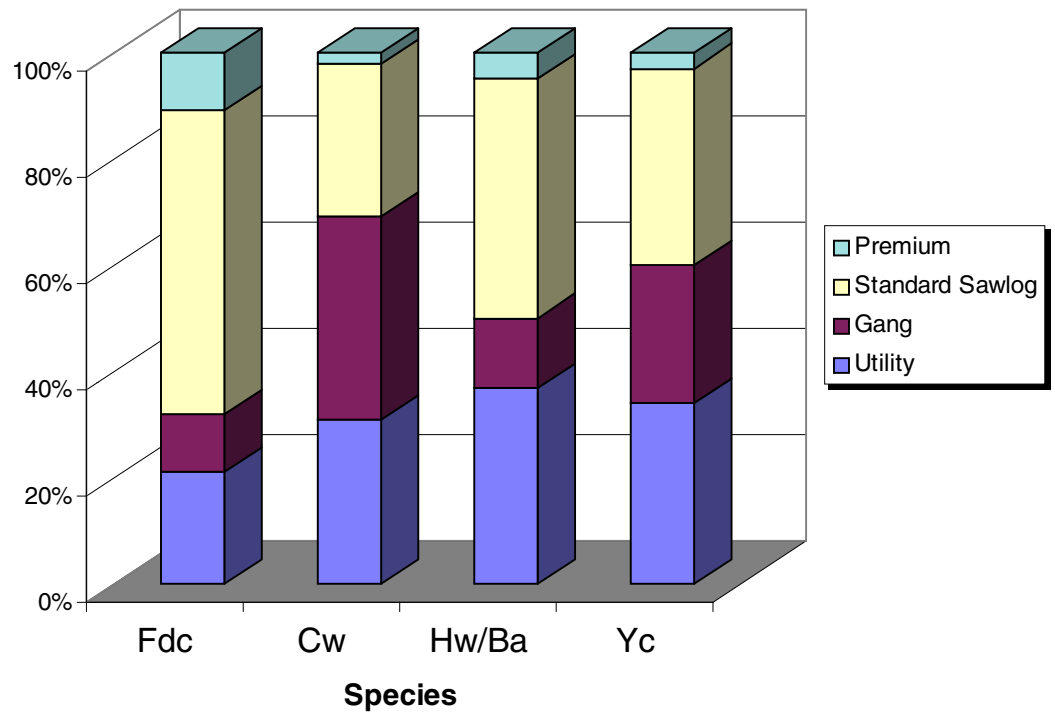


Figure 7 Current product grade distribution

This comparison of future and current species and product grade distributions indicates three major points:

1. Future managed stands will bring about a shift in species dominance from hemlock and balsam to Douglas-fir. Yellow cedar and western red cedar proportions will not change significantly, although management activities will focus on promoting these species where appropriate.
2. While overall piece sizes are smaller, the overall log quality distribution improves as the proportion of utility grade in future managed stands is lower. This is due to the nature of thrifty managed stands to be relatively low in disease and physical defects. Proportion of premium grade logs by species is forecast to be maintained at historical levels (approximately 5%).
3. Projected managed stands will result in a well diversified portfolio of species and grades allowing maximum flexibility in future wood products manufacturing.

This product strategy provides a foundation for the silviculture regimes outlined in the silviculture standards and procedures in Management Plan 8. Minimum harvest ages determined based on product piece size and minimum volume objectives are available at a stand level for operational planning and linked at a forest level for strategic planning. Accordingly, our silviculture strategies for future managed stands target species selection and stocking levels by site series according to both ecological suitability and future product objectives.

6.0 Incremental Silviculture Strategy

Working Targets

Working Target 1 (Quantity)

To sustain an annual harvest level as high as the current AAC of 1,068,000m³ in the short term, increase to 1,086,100 m³ in the mid term and finally increasing to a long term harvest of 1,182,500. This will require a combination of silviculture treatments which includes aggressive basic reforestation, increased investment in tree improvement and fertilization and harvest ages based on product targets. *Note: Harvest levels suggested here are based on potential opportunities identified in sensitivity analysis for the TFL Management Plan and are currently not approved by the Chief Forester.*

Working Target 2 (Quality)

To produce a product profile by species as outlined in Figure 5.

Silviculture Strategies

As per Potential Strategies by Response Time Frame, pages 11 and 16.

Product Objectives

As per Product Objectives page 12.

7.0 Incremental Silviculture Program

See Excel Sustainable Harvest Summary Tables in the Appendix.

8.0 References

Management Plan 8 for Tree Farm License 37 - Canadian Forest Products Ltd. 1998.

TFL 37 Annual Report of Operations, Canadian Forest Products Ltd., 1961 to 1999.

Ten –Year Growth Response of Coastal Douglas-fir on Vancouver Island to N and S Fertilization in an Optimum Nutrition Trial. G.F. Weetman, C.E. Prescott, F. L. Kohlberger, R.M. Fournier in: Canadian Journal of Forest Research - September 1997.