

TFL 38

Tree Farm License

Incremental Silviculture Strategy (Interim)

-- Version 1.0 --

Contents

Executive Summary.....	i	Opportunities to Improve Timber Quality	23
Strategic Issues.....	iv	Opportunities to Improve Habitat	
Introduction.....	1	Quality/Quantity	26
Basic Data.....	3	Incremental Silviculture Strategy	29
Issues	9	Silviculture Regimes and Investment Priorities	31
Incremental Silviculture History	11	Incremental Silviculture Program.....	32
Higher Level Goals and Objectives.....	12	Job Outcomes.....	34
Opportunities to Increase Timber Supply.....	13	References.....	36

British Columbia
Ministry of Forests

Funded By
Forest Renewal BC

March 30 2001

Executive Summary

This document addresses a contractual agreement between Forest Renewal BC (FRBC) and Ministry of Forests (MoF) for MoF to develop and FRBC to fund the development of an incremental silviculture strategy. Incremental silviculture is part of a suite of strategies, which together may influence the future quality and quantity of habitat and timber supply. This strategy document broadly analyzes the full potential range of silviculture activities in order to create a context for an incremental silviculture strategy. It is intended as an interim strategy until a more in-depth analysis-based review is completed.

This strategy is founded on readily available information such as TFL 38 Management Plan (MP) #8 and the knowledge of forestry professionals (through their input in a district working section). Interfor's MP#8 was approved in February of 1998 and MP#9 is currently being prepared. The information available for this report is considerably out-dated. Some of the more significant changes since MP#8 are:

- ~40% of the harvested area is currently variable retention (MP#8 had 100% clearcut); and
- Clendinning Park (29,730 ha) has since been removed from the timber harvest land base (THLB).

The M#8 information may not be ideal, but it is the best available information and suites the purpose of developing an interim silviculture strategy.

The TFL 38 timber supply is critically constrained at decade 14. Increases in timber supply at any point in the first 140 years are limited by the availability of timber in decade 14. For this reason, factors, which relate primarily to the productivity and availability of second growth stands have a significant impact on short and mid-term timber supply. Thus, silviculture investments in many cases can have an immediate economic impact. The potential treatments on TFL 38 are:

Available Information Regarding Potential Treatments and Treatable Area

	Treatment	Comment	Location	Treatable Area
IM 1	Planting	Planting 100% of the area harvested and using genetically improved stock where available.	Throughout	405 ha/year
IM 2	Early fertilization	Common practice. It provides more root growth and often removes the need for brushing	mostly poor sites	
ST 1	Late rotation fertilization	Not currently practiced	Fd medium sites	40 ha/year (400 ha decade)
ST 2	Spacing w/o CT	~800-1000sph high density for natural HwBa site	Not easily accessible (Heli)	55 ha/year
MT 1	Spacing good sites	~800sph for good Fd sites	Fd good	100 ha/year
MT 2	Spacing and/or pruning backlog	~800-1000 sph spacing and ~300-500 Fd sph pruning	Good sites	500 ha total
MT 3	Planting and/or brushing backlog			25 ha/year for 5 years
Q 1	Pruning	Fairly common practice	Fd good	180 ha/year

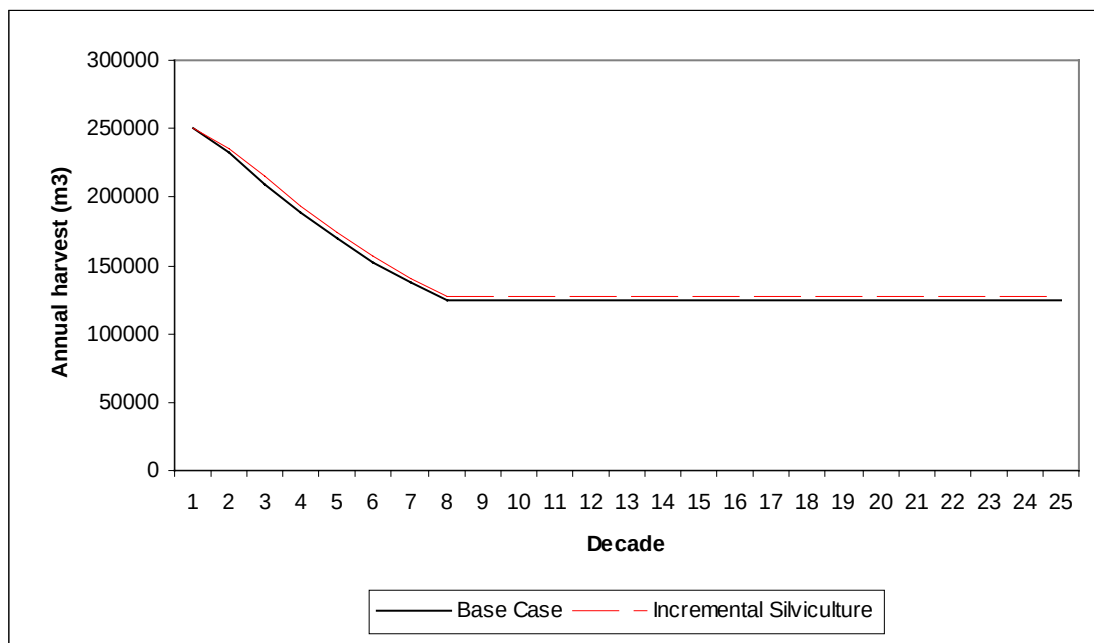
	Treatment	Comment	Location	Treatable Area
Q 2	Commercial thin	Not currently practiced	Fd good	100 ha/year
H 1	UWR		UWR	5 ha/year
H 2	Non-specific forage	Plant in clusters and use large seedling protectors		15 ha/year
H 3	Adjacent to Eagle Roost	May move eagle roost making them available for harvest		5 ha/year

Potential Harvest Forecast

The potential harvest level that may be attained through implementation of the silviculture strategies has a potential harvest increase resulting from:

- 1% improvement in timber flow throughout the planning horizon from late rotation fertilization assuming that there is a 10% increase in stand yield of 10% of the landbase (based on increasing managed stand yields sensitivity).
- A short-term increase in timber availability from spacing (based on decreasing the minimum harvest age sensitivity).
- 0.2% increase in timber flow throughout the planning horizon from a 2% increase in yields on 12% of the landbase (used the genetic sensitivity to represent the effects of early rotation fertilization).

These increases are applied to the base case as shown:



Potential harvest increase

Characteristic of a type I Silviculture Analysis, this forecast is at best highly speculative, requiring confirmation through timber supply analysis. This incremental silviculture strategy should not be confused with the allowable annual cut (AAC) determination process. AACs are

based on actual practice and current information at the time of the determination. This strategy, on the other hand, is about creating a future state of our forests.

Strategic Issues

General Strategy

Interfor feels that it is very difficult to predict the future demand for various forest products. With this in mind stands are not being managed with specific product objectives but rather the whole forest is being managed for maximum fibre flow. It is realized that the forest always has and always will produce a variety of species and sizes of trees. Some stands will be harvested earlier than culmination and others will be harvested at or much later than culmination age. Stands will be harvested at various ages for a wide variety of reasons including: wildlife, biodiversity, recreation and market demands.

Working Targets

Quantity:

In Management Plan #8, the AAC has been set at 250,500 m³. This is projected to be sustainable for 10 years, after which the harvest level decreases by 6% in the second decade, and then 10% in each succeeding decade to a minimum harvest level of 167,000m³ in decade 6. The long term level of 172,000 m³ is attained in decade 14.

Quality:

As stated in Management Plan #8, strategies are guided by fibre requirements that focus on the manufacture of solid wood products. Strategies aim to optimize the long-term use of the forest land base and stand development growth for the benefit of society, Interfor, communities and employment. Determination of product objectives contributes to this goal and provides objectives for silviculture treatment planning, budgeting and harvest scheduling.

Product objectives are intended to ensure that:

- to as great an extent as possible, H and I grade sawlogs or better, suitable for manufacture of clear, appearance-merch, select and structural lumber are produced (with 50 cm $\pm$ 15 cm average dbh for final harvest and 30 cm $\pm$ 5 cm average dbh for commercial thinning);
- a spectrum of log grades, including clear material will be produced over the long-term to provide opportunity for value-added manufacturing;
- rotation ages will dovetail with requirements for other resource values such as rate-of-cut and structural retention.

Currently Identified

The following points represent the major silviculture strategic objectives, which have been identified for TFL 38 in the Management Plan (MP #8):

- Maintain a silviculture program that will ensure all harvested areas are reforested promptly, with appropriate species, densities and stock types, and managed to meet government and corporate requirements.
- Examine different silviculture systems to determine and implement the most appropriate forest management activities.
- Develop and implement appropriate strategies that will protect the forest and minimize losses from fire, insects, disease and wind-throw.

Attainment of these objectives requires consideration of the following tactics:

1. Prompt reforestation utilizing genetically improved seed
2. Shortening regeneration delay
3. Converting stands from deciduous to coniferous types
4. Spacing natural stands for fibre and habitat values
5. Commercial thinning
6. Fertilizing
7. Pruning

Introduction

About the Interim Strategy

The terms of a service agreement between Forest Renewal BC (FRBC) and the BC Ministry of Forests (MoF) require the MoF to develop, and FRBC to fund, what is essentially an incremental silviculture strategy. This document addresses this contractual requirement.

Incremental silviculture is part of a suite of strategies, which together may influence the future quality and quantity of habitat and timber supply. This strategy document broadly analyzes the full potential range of silviculture activities in order to create a context for an incremental silviculture strategy.

An incremental silviculture strategy should not be confused with the allowable annual cut (AAC) determination process. AAC's are based on actual practice and current information at the time of the determination. This strategy, on the other hand, is about creating a future state of our forests. The degree to which the strategy proves appropriate and is achieved may influence future, but not necessarily present, AAC determinations.

This strategy is founded on readily available information and the knowledge of forestry professionals. It is intended as an interim strategy until a more in-depth analysis-based review is completed. MP#8 was accepted in 1998 and is somewhat outdated. Some of the more significant changes since MP#8 are:

- ~40% of the harvested area is currently variable retention (MP#8 had 100% clearcut); and
- Clendinning Park (29,730 ha) has since been removed from the timber harvest land base (THLB).

The information may not be ideal, but it is the best available information and suites the purpose of developing an interim silviculture strategy. In the case of TFL 38, MP #9 will be prepared in the near future. Therefore, this interim strategy will be useful in providing background for the development of this plan.

Methodology

This strategy was prepared through the following process:

1. Prior to the district working session, Timberline Forest Inventory Consultants had prepared a preliminary draft, summarizing available information relevant to a strategy and identifying opportunities to improve the future quantity and quality of timber supply.
2. A district working session was held on March 7,8 2001 in Squamish, to be attended by representatives of the MoF, MoELP and Interfor staff. Erik Wang of Timberline and Dave Southam of Interfor lead the session. The objective of the session was to review potential opportunities identified in the draft document along with others that may arise. The outcome of the session will include a silviculture regime table, complete with priorities.
3. The results of the working session were incorporated into this document along with attendant forecasts of future harvest quantity and quality and of job outcomes.
4. After review, a completed strategy document will be submitted to the MoF.

Acknowledgments

The project is being coordinated through Mr. Larry Sigurdson of the Ministry of Forests, Vancouver Forest Region. Forest Renewal BC is providing funding. We would like to gratefully acknowledge the participation of the following:

Agency

MoF-Vancouver Region
Intefor

Representative

Larry Sigurdson
Gerry Sommers, Wayne Wall,
Dave Southam, Dave Guilbride,
Joanne Leo, and Gord Prescott.

The format of this document, and the methodology to be employed in the upcoming working session, are based on previous work completed for the Strathcona TSA by L. P. Atherton & Associates, and Cortex Consultants Inc.

Basic Data

Land Area

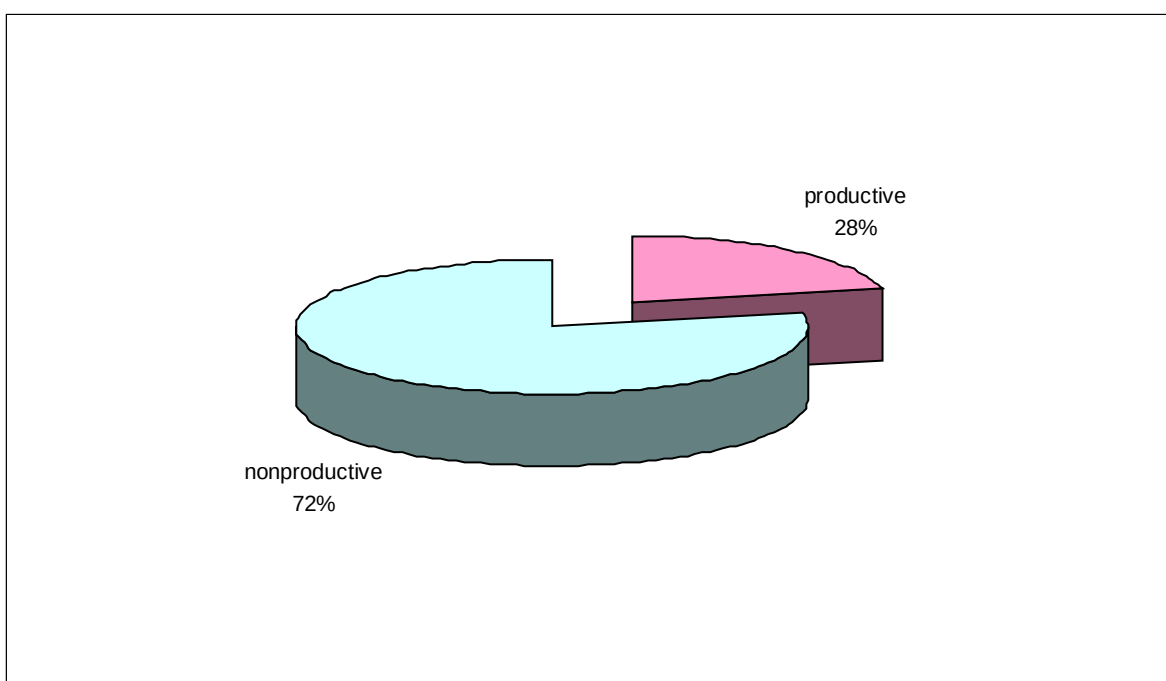
Description	Area (ha)	Area %
Total Area of TFL	218,616	100
Total Productive Crown Forest	60,723	27.7
Current NTH Land Base	36,144	16.56
Long-term NTH Landbase	35,436	16.2

Note: landbase includes Clendinning park

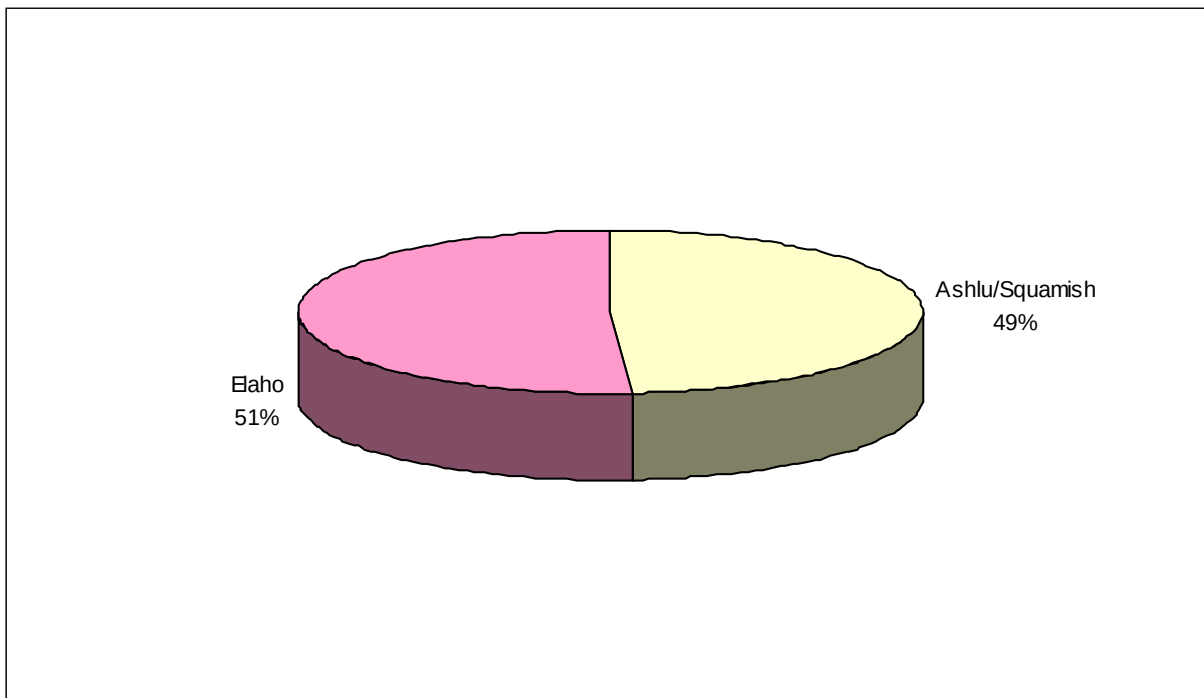
AAC (existing and proposed in MP#8)

	Pre-MP 8	Current	Change (%)
Licensee	237,419	237,382	0
SBFEP	25,581	13,118 ⁽¹⁾	-49%
Total	263,000	250,500	-4.7

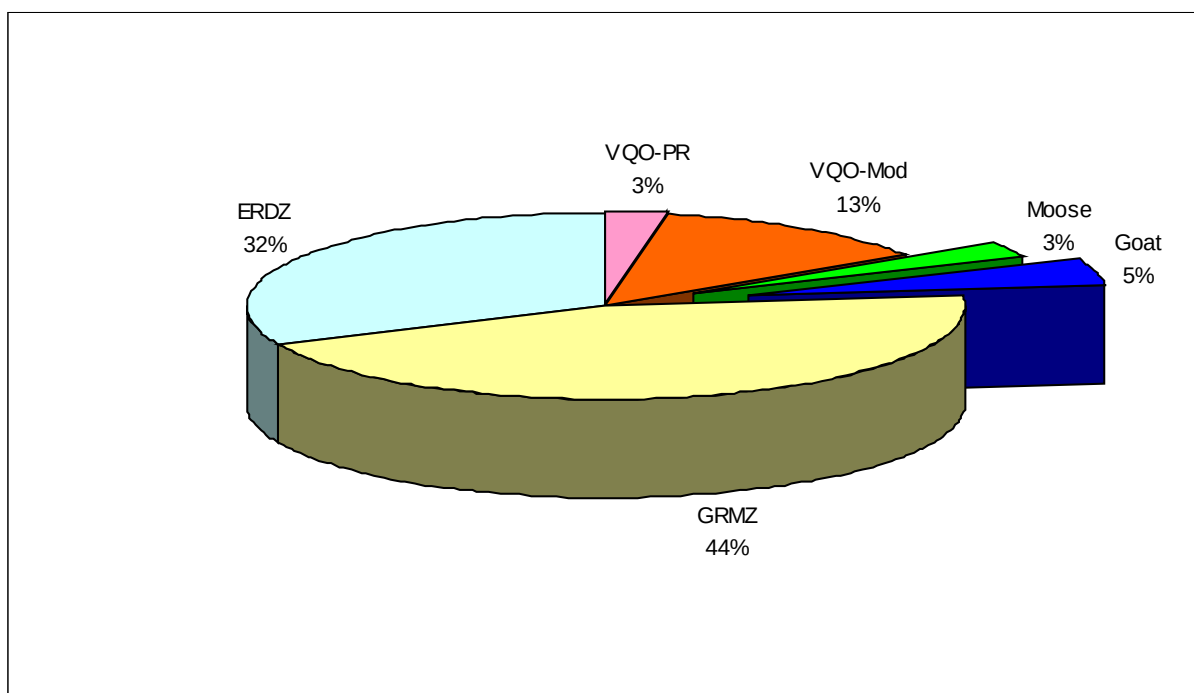
(1) Amended March 1998



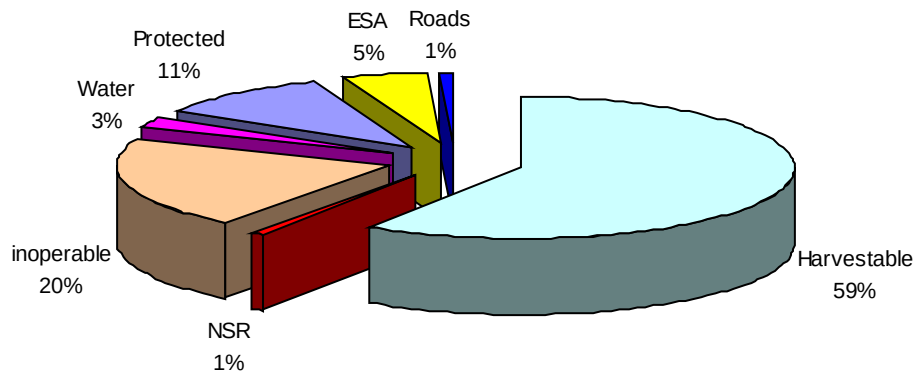
Distribution of total area (218,616 ha)



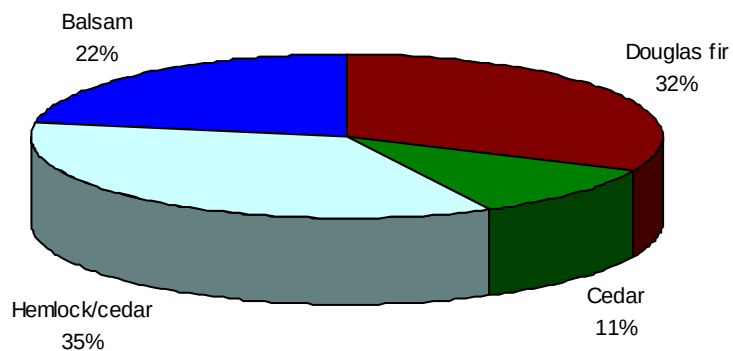
Distribution of productive area by landscape unit



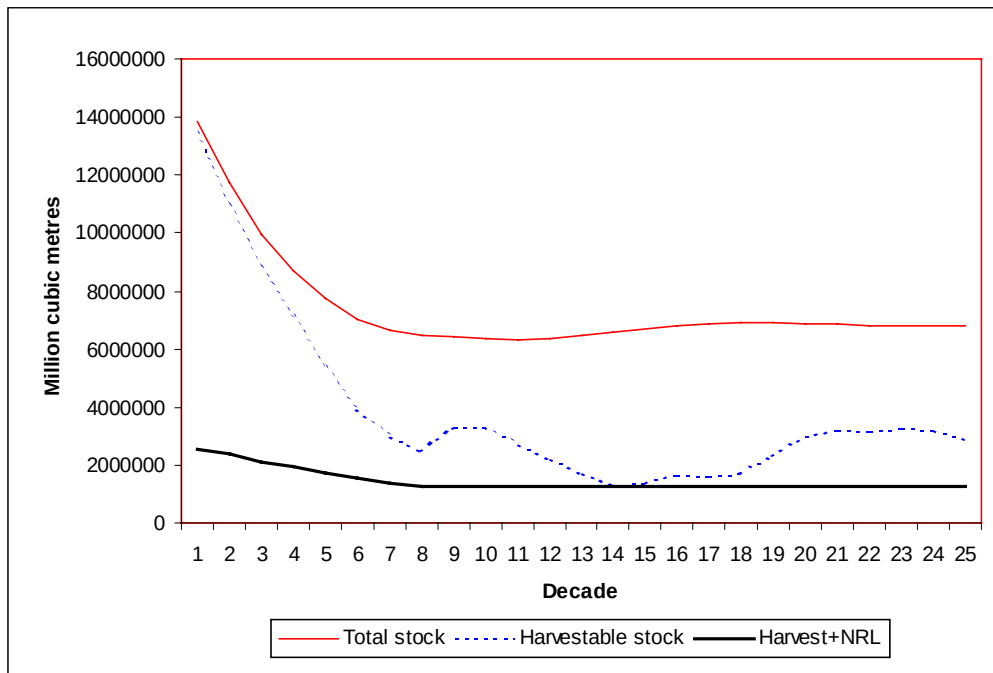
Distribution of Productive area by Management Zone



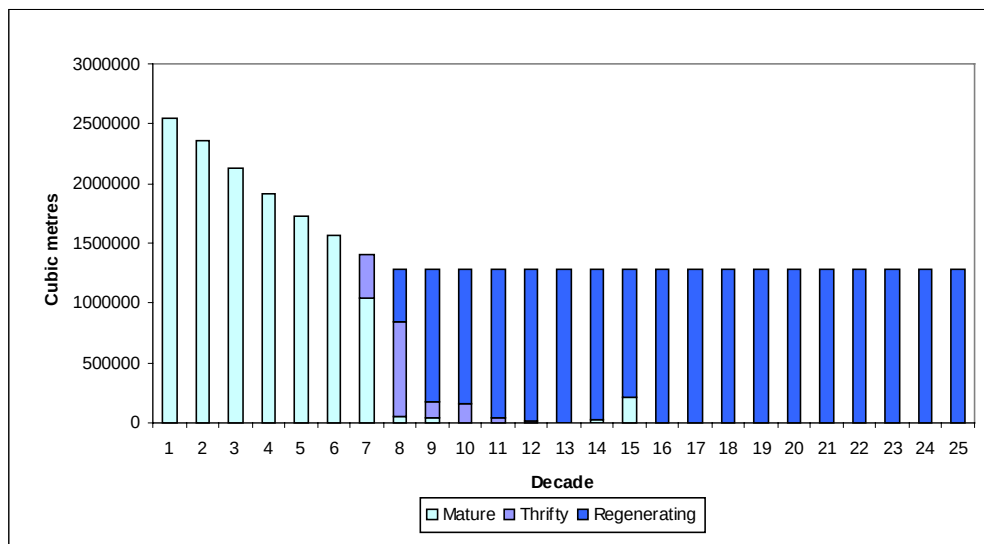
Distribution of productive area (60,723 ha)



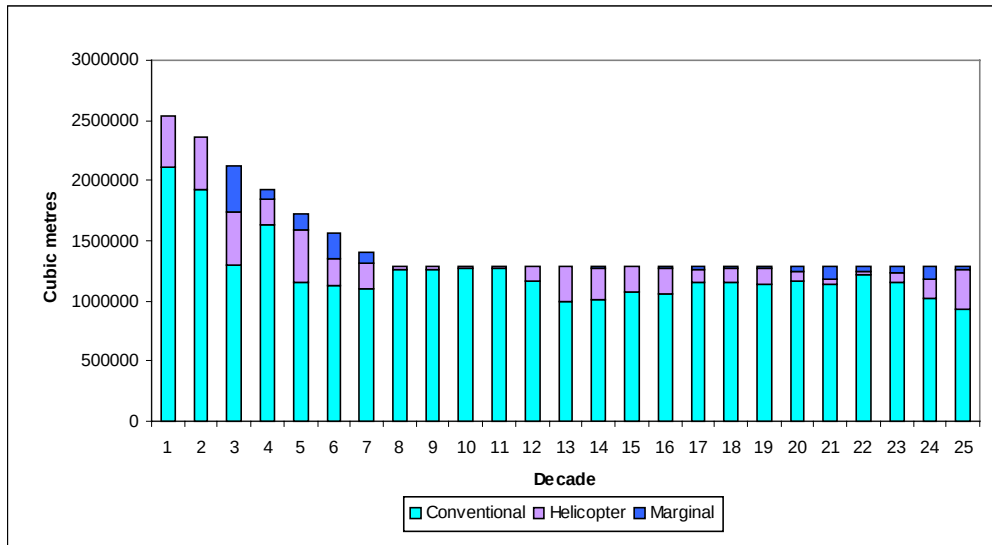
Distribution of net area by leading tree species



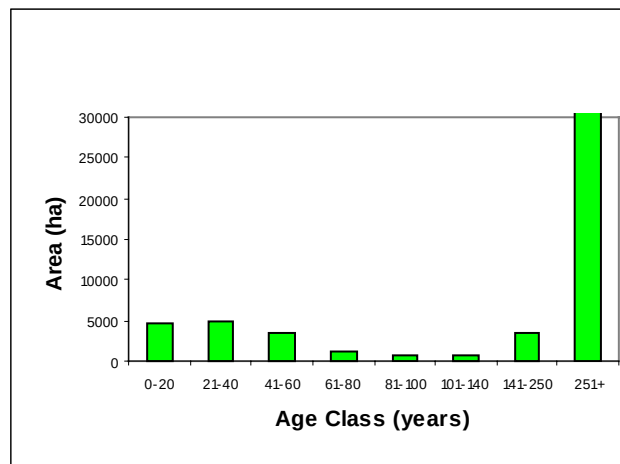
Base case growing stock profile



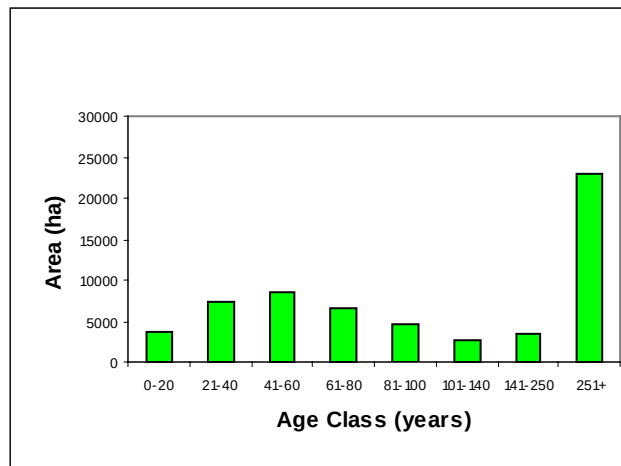
Gross harvest by maturity



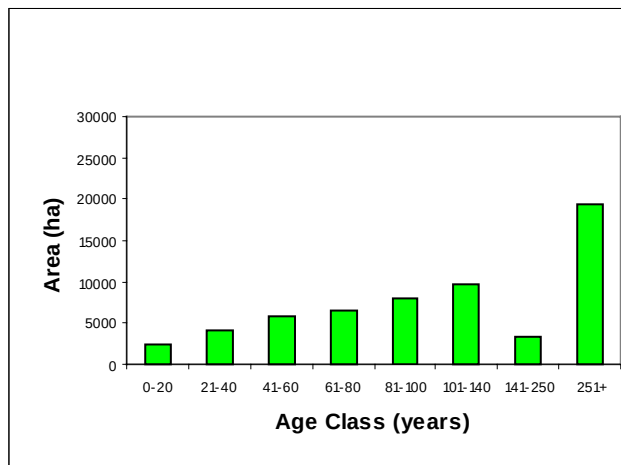
Gross harvest by harvesting method



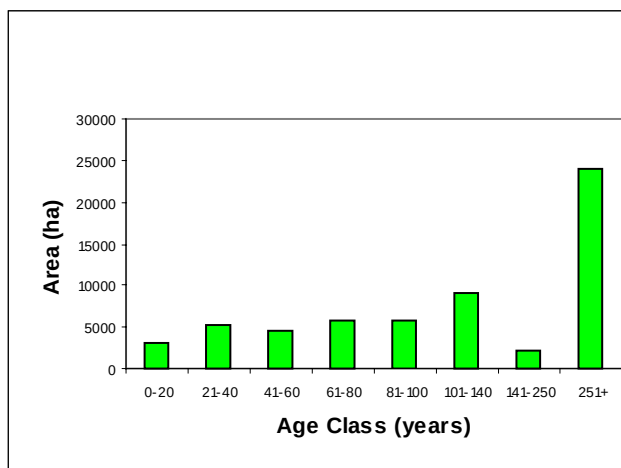
Age class distribution initial



Age class distribution decade 5



Age class distribution decade 10



Age class distribution decade 25

Issues

Individual Issue Analysis

The following information is primarily from documentation produced under Management Plan #8. Key statements are highlighted.

Abbreviations: AAC - allowable annual cut; THLB - timber harvesting land base; STHL - initial harvest level; MTHL mid-term harvest level, LTHL - long term harvest level; CF - chief forester; IRM – integrated resource management.

Species abbreviations: Fdc - coastal Douglas-fir; Hw - western hemlock; Cw - western redcedar; B or Ba - balsam fir.

Site class abbreviations: G - good; M - medium; P - poor.

◆ Harvest Forecast	<p>“Current AAC” is 250,500 m³ after a 3,700 m³ deduction for non-recoverable losses. Initial harvest level is reduced by 6% in the second decade, and then by 10% in each succeeding decade to a minimum of 167,000 m³ in decade 6. The long-term harvest level of 172,000 m³ is attained in decade 14. (36.5% below current AAC).</p> <p>Harvest levels must decline to avoid serious timber supply shortfalls in the future.</p> <p>Also note that the proposed harvest level has a significantly higher MTHL and LTHL than the base case.</p>
◆ Age Class	<p>66% of the THLB is mature (> age 250) forest, while 28% is second growth less than 50 years of age. The transition of harvest from the mature to second growth forest represents a challenge to avoid interruption in timber flow. The rate of harvest from the existing mature forest must be balanced with the rate at which regenerating stands become available.</p>
◆ Productivity	<p>Existing productivity estimates are deemed to be significantly understated, due to the bias in estimation of old growth site indices.</p> <p>Sensitivity: Increased site indices for regenerated types by 0.2 –7.2 metres, depending upon species and BGC subzone.</p> <p><u>Impact:</u> Significant impact on short, mid and long term supply.</p>
◆ Forest Cover (disturbance)	<p>IRM Zones: 76% of THLB. Base case requirement of at most 30% of THLB permitted to be < 3 m tall (3 pass system).</p> <p>Visual Quality Zones: 16% of THLB. Base case requirement of at most 12% (partial retention VQO) and 19% (modification VQO) below minimum height</p> <p>Moose and goat habitat (8% of THLB): Base case requirement of at most 20% (goat) and 30% (moose) of area less than age 20.</p> <p>Sensitivity test: +/- 5%</p> <p><u>Relaxation:</u> Insensitive Increasing disturbance levels by approximately 5% had no impact on harvest levels</p> <p><u>Increase:</u> Relatively insensitive. Reducing the maximum by 5% forced about a 1% reduction of the MTHL.</p>
◆ Minimum harvest age	<p>Sensitivity test: +/- 10 years</p> <p>Highly sensitive STHL and MTHL levels are sensitive to any changes in timber</p>

	availability associated with changes in minimum harvest age. Specifically, adjusting the minimum harvesting ages by +/-10 years had a +/-5% effect on the potential harvest in the short and mid terms.
◆ Poor site types	3400 ha of poor site, hemlock-leading types were included in the THLB. This represents about 10% of the THLB. 40% of this area was removed in a sensitivity analysis. This had a 3% impact on STHL, and a 2% impact on MTHL.
◆ Older Forests	The base case analysis included low emphasis old-growth seral stage requirements as specified in the Biodiversity Handbook. Sensitivity test: Intermediate emphasis in Clendenning/Elaho-North landscape unit Timber supply was insensitive
◆ Wildlife forest cover	Base case includes a requirement to maintain at least 20% of the forest cover in moose habitat above age 60. In addition, 20% of the forest cover in mountain goat habitat must be maintained above age 80. Sensitivity test: +/-5% Insensitive. Timber supply was insensitive to changes in these requirements.
◆ Silvicultural Systems	Under MP#8 most of the THLB was managed under a clearcut harvesting system (currently harvest approx 40% under VR in 2000 and are projecting 50% by 2002).
◆ Regeneration	Base case assumes regen delays of 2 years. Sensitivity test: +/- 1 year <u>Relaxation:</u> Insensitive. <u>Increase:</u> Moderately sensitive. Stands are regenerated to the same leading species in most cases, with the same site class. 100% of the future managed stands are assumed to be planted at 1,000 stems per hectare
◆ Estimates of Timber Volumes	Average volume lines (AVL) were used for all existing stands > age 140. VDYP used for existing stand volumes for all stands between ages 31-140. Sensitivity test AVL+ 15% Moderately sensitive TIPSY used for existing stands less than age 31, and all future regenerated stands. OAF1 – 15%. OAF-2 of 5. Sensitivity test none

Summary of current TFL-level Issues

The base case timber supply is critically constrained at decade 14. Increases in timber supply at any point in the first 140 years are limited by the availability of timber in decade 14. For this reason, factors, which relate primarily to the productivity and availability of second growth stands have a significant impact on short and mid-term timber supply. Thus, silviculture investments in many cases can have an immediate economic impact.

Future Issues

Changes to existing silvicultural systems, specifically the implementation of variable retention harvesting systems, are expected to have a significant, but as yet unquantified impact on timber availability.

Incremental Silviculture History

Treatment	Current Status (2000)
♦ Utilize genetically improved seed	Used for Fd where available
♦ Optimize species selection	Plant Fd, Cw, Hw and Ba naturally regenerate
♦ Space natural stands	Spaced 14 ha in 2000
♦ Increase utilization/minimize losses	
♦ Commercial thin	Anticipated future practice
♦ Fertilize	Some isolated fertilization projects
♦ Shorten regen delay	
♦ Accelerate early height growth	Fertilizing during planting.
♦ Prune	Pruned 72 ha in 2000
♦ Brush	Brushed 4 ha in 2000

The objective during the working session was to identify current levels of these and other Silviculture activities.

Higher Level Goals and Objectives

This section documents higher level goals and objectives relevant to an incremental silviculture strategy for TFL 38.

Provincial Goals

Fundamentally, government's goals can be characterized as:

- sustainable use;
- community stability; and
- a strong forest sector. (MoF, 1998a)

Provincial Objectives

Until provincial targets for timber quantity and quality are established, management unit strategies are to consider the following interim provincial strategic objectives (MoF, 1998a). Incremental silviculture strategies must also be in keeping with higher level plans under the Forest Practices Code.

- Objective 1:** Maintain current harvest levels as long as possible without creating disruptive shortfalls in future timber supply.
- Objective 2:** Create a long term timber supply capable of supporting a steady long term provincial harvest level similar to current levels
- Objective 3:** Minimize the interim shortfall in provincial harvest anticipated before a steady long term timber supply is achieved.
- Objective 4:** Create a long term timber supply, which will enable the timber quality profile of future harvests to be the same or better than the current profile.

It is recognized that not every management unit has the same capability to contribute to these interim objectives. Further, it is recognized that these objectives may not be attainable at current funding levels. Their purpose is to provide general guidance to the application of available funds.

Regional Objectives

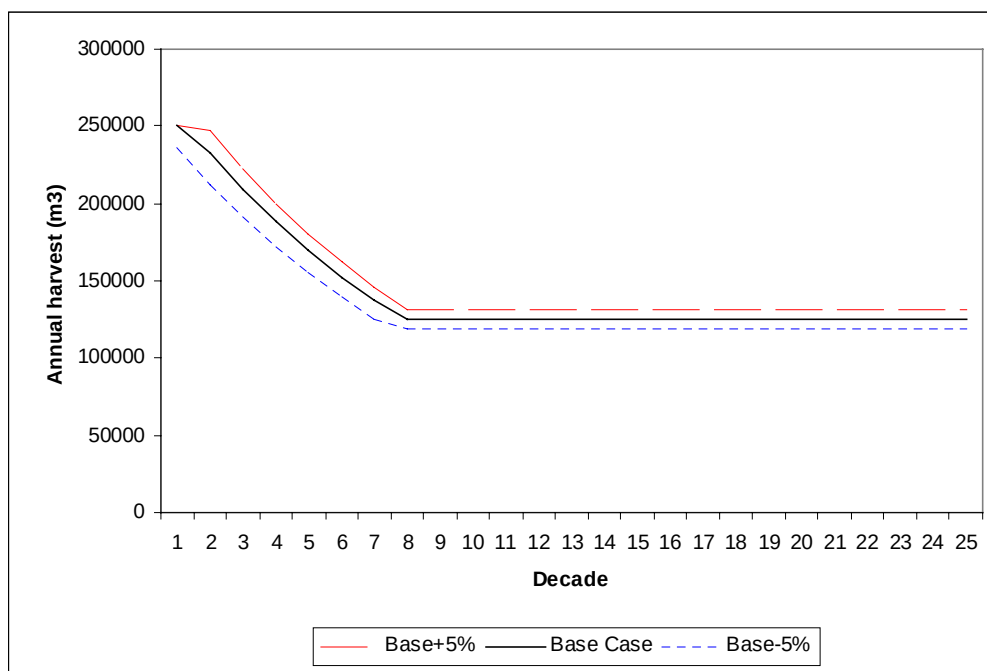
The objectives of the regional incremental silviculture strategy are to:

- Ensure a long term sustainable harvest, which approximates the current harvest value and volume levels and that, produces a diversified mix of products necessary to create and maintain sustainable forest employment.
- Balance treatments that enhance growth and yield such as fertilizing, spacing and forest health activities with those that increase the value of the wood such as pruning.
- Utilize incremental silviculture treatments to contribute to sustainable management of non-timber values at the landscape level. (MoF, 1998b)

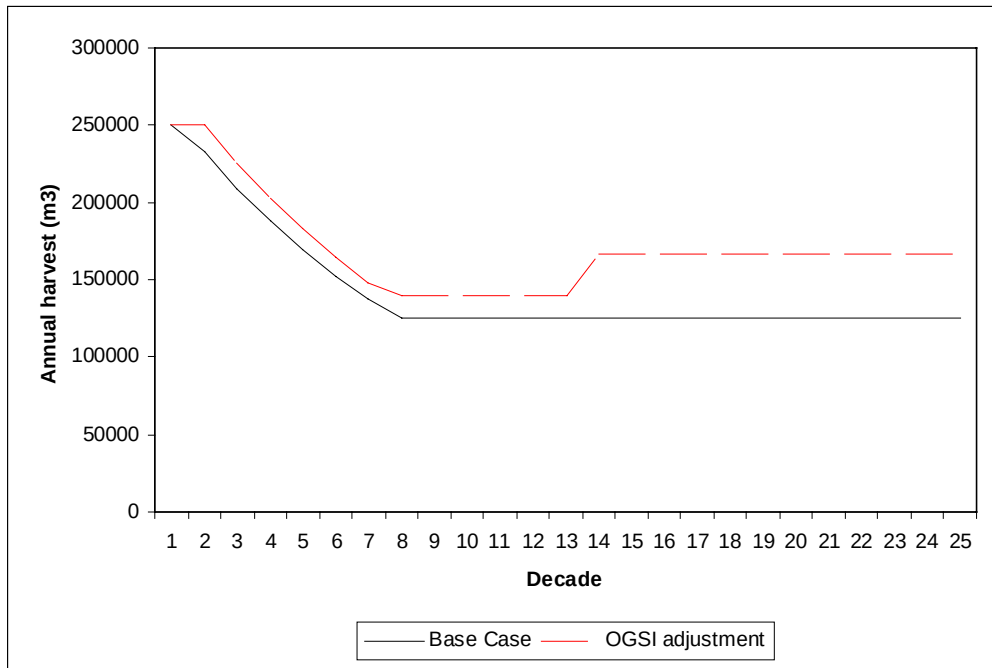
Opportunities to Increase Timber Supply

Opportunities Indicated Through MP #8 Sensitivity Analyses

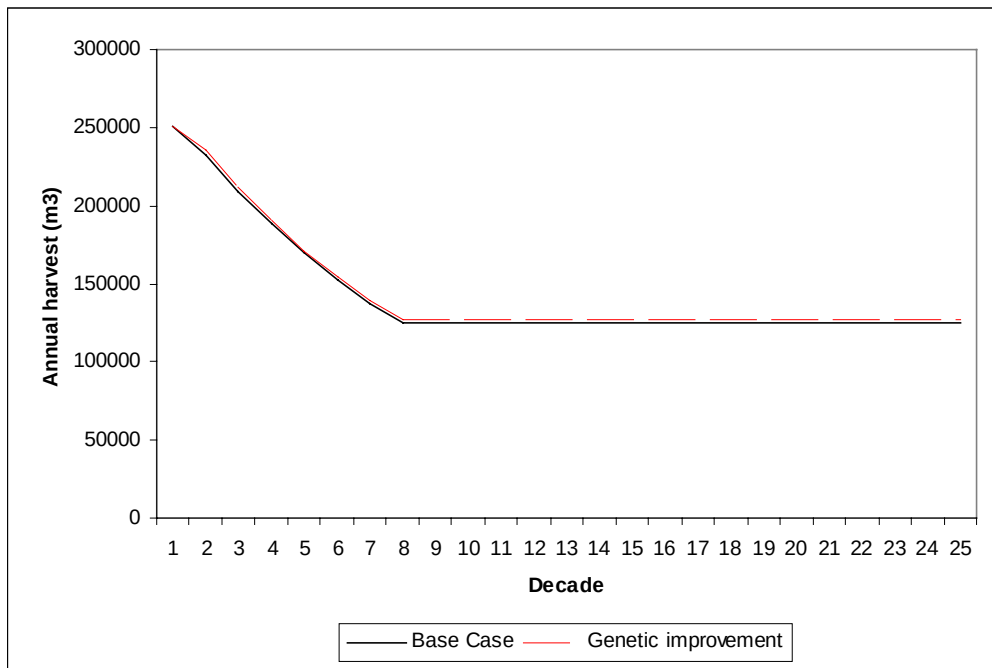
TSA modelling in support of planning incremental silviculture has not yet been undertaken. In its absence, sensitivity analyses from the MP #8 analysis report are the best source of information as to the opportunities for incremental silviculture to increase future timber supply. It should be noted that in TSR II the accepted harvest flow was significantly higher than the base case (see 'Net harvest level-licensee proposal' figure). However, the sensitivities are only applied to the 'basecase.' As a result, this report speculates only on the effect the incremental silviculture will have on the base case. The following are selected sensitivity analysis charts from the MP #8 analysis report.



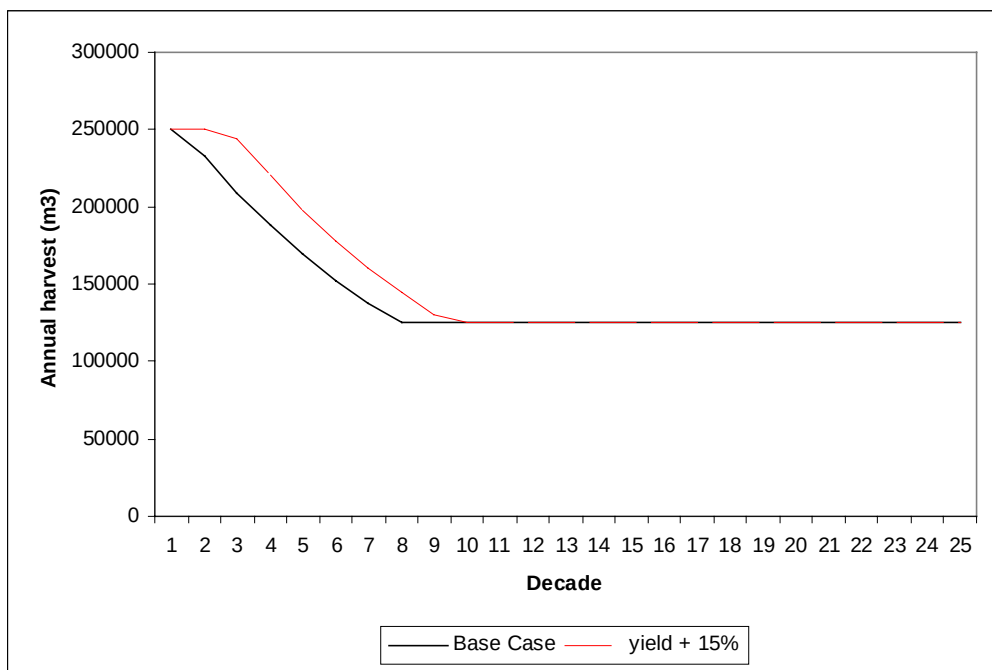
Impact of adjusting operability +/- 5%



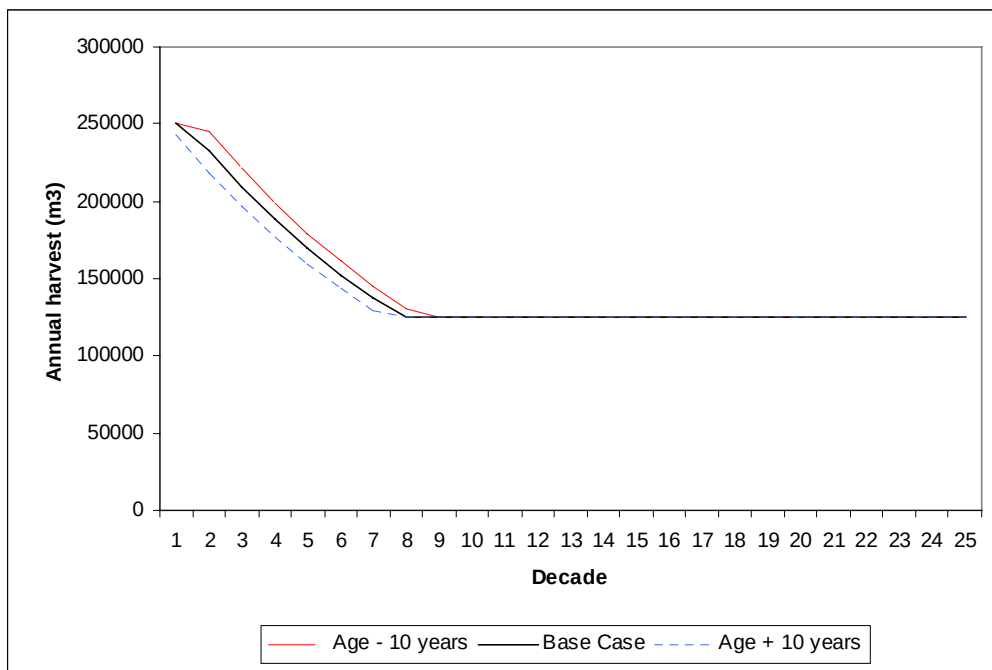
Impact of applying OGSi adjustments



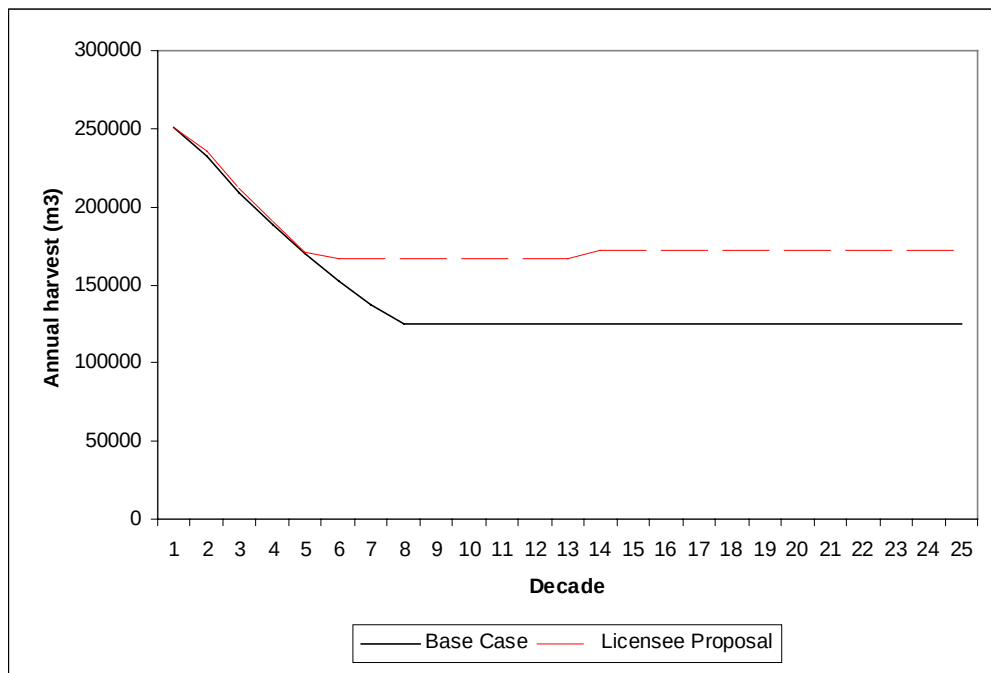
Impact of applying genetic gain adjustments



Impact of adjusting existing stand yields by +/- 10%



Impact of adjusting minimum harvest age by +/- 10 years



Net harvest level-licensee proposal

Identification of Silviculture Opportunities

During the district working session, information in the previous sections was used to identify a number of silvicultural strategies as having potential to increase future timber supply at the TFL level. The list presented under “Major Silviculture Strategies (page ii)” was meant only to initiate discussion. During the working session, each of these was addressed in more detail, as well as other strategies.

While an attempt was made to categorize opportunities according to response time frame it should be noted that most of the strategies will have significant impact on short-term timber supply. This is due to the timing of the timber constraint (decade 14). Any effort, which improves timber availability within the first 140 years, can significantly impact on short-term supplies. This “Allowable Cut Effect” offers a significant investment opportunity, as economic returns from these activities will be almost immediate.

In addition, several treatment opportunities are not expected to have significant impacts on timber quantity, but are associated with changes in timber quality and/or wildlife habitat availability.

A ‘Summary of combinations of silviculture treatment’ table was included to help clarify the operational realities associated with the selection of various silviculture treatments.

Immediate impact on quantity (required to sustain current timber flow forecast)

IM 1: Planting all harvested stands and use genetic stock when available

IM 2: Early fertilization (plant with fertilizer)

Short Term (1 - 20 yrs) impact on quantity

ST 1: Late rotation fertilization

ST 2: Spacing w/o CT

Mid Term (21 - 110 yrs) impact on quantity

MT 1: Spacing good sites

MT 2: Spacing and/or pruning backlog

MT 3: Brushing and/of planting backlog

Long Term (111+ yrs) impact on quantity

LT 1: No treatment is exclusively long term

Impact on timber quality

Q 1: Prune

Q2: Commercial thin

Impact on wildlife quantity/quality

H1: Ungulate Winter Range(UWR) (space-600sph & prune)

H2: Non-specific forage (plant in clusters)

H3: Plant and space in clusters in areas adjacent to eagle roost

Summary of combinations of silviculture treatments

	Plant	Space	Prune	Commercial Thin	**Area (ha/year)
Discussion					
Best sites with easy access	Y	Y	Y	Y	100
Best sites without easy access	Y	Y	Y	N	55
Best sites without easy access	Y	Y	N	N	55
High elevation, high risk	Y	N	N	N	150
Good sites with dominance naturally established	Y	N	Y	?	20

**this table does not include the silviculture treatments primarily for habitat.

Available Information Regarding Potential Treatments and Treatable Area

This section summarizes available information directly relevant to the potential treatments for the TFL.

	Treatment	Comment	Location	Treatable Area
IM 1	Planting	Planting 100% of the area harvested and using genetically improved stock where available.	Throughout	405 ha/year
IM 2	Early fertilization	Common practice. It provides more root growth and often removes the need for brushing	mostly poor sites	
ST 1	Late rotation fertilization	Not currently practiced	Fd medium sites	40 ha/year (400 ha decade)
ST 2	Spacing w/o CT	~800-1000sph high density for natural HwBa site	Not easily accessible (Heli)	55 ha/year
MT 1	Spacing good sites	~800sph for good Fd sites	Fd good	100 ha/year
MT 2	Spacing and/or pruning backlog	~800-1000 sph spacing and ~300-500 Fd sph pruning	Good sites	500 ha total
MT 3	Planting and/or brushing backlog			25 ha/year for 5 years
Q 1	Pruning	Fairly common practice	Fd good	180 ha/year
Q 2	Commercial thin	Not currently practiced	Fd good	100 ha/year
H 1	UWR		UWR	5 ha/year
H 2	Non-specific forage	Plant in clusters and use large seedling protectors		15 ha/year
H 3	Adjacent to Eagle Roost	May move eagle roost making them available for harvest		5 ha/year

As suggested by Brian Broznitsky, there is also potential to manage the MoF Dewdney Fd orchard as a breeding orchard. Brian anticipates a 10-12% volume gain.

Potential Timber Quantity Strategies by Response Time Frame

Explanatory notes with respect to the following tables.

Column Number	Note
1	The response time frame is the period in which the anticipated result is expected, <u>not</u> the period in which actions must necessarily commence.
2	Description of treatment
3	Information was largely obtained from the March 7, 8 workshop, combined with information presented earlier in this document.
4	Anticipated results will be calculated using the timber supply responses indicated by MP #8 sensitivity analyses.
5	The harvest forecasts will use the current AAC as the starting level. Mid and long term harvest forecasts will employ the base case levels from MP #8 as the starting levels.

In the AAC rationale, the Chief Forester identified several downward influences on timber supply, dealing primarily with additional requirements for biodiversity, and other aspects of the Forest Practices Code. For the purposes of this strategy, however, a status quo is assumed with respect to these. Should any arise, the strategies would serve to mitigate their effects rather than increase timber supply.

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result	Harvest Forecast Impact (%)
♦ Immediate				
IM 1	Planting	Planting 100% of the area harvested and using genetically improved stock where available	maintain base case	
IM 2	Early fertilization	Currently carried out in trail basis. Concentrating in the harsher/brush/rocky or dry sites. It may provide more root growth and reduce the need for large scale broadcast brushing	maintain base case	0.2%
♦ Short Term (1 – 20 yrs)				
ST 1	Late rotation fertilization	not currently practiced (Has been done but in very limited amounts).	Anticipated results are based on the sensitivity for increasing managed stand yields10%.	+1%
ST 2	Spacing w/o CT	Increased timber availability is from reducing the minimum harvest age		
♦ Mid Term (21–110 yrs)				
MT 1	Spacing good sites	Increased timber availability is from reducing the minimum harvest age		+1%
MT 2	Spacing and/or pruning backlog			
MT 3	Planting and/or brushing backlog			
Q 1	Pruning			
Q 2	Commercial thin			
H 1	UWR			
H 2	Non-specific forage			

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result	Harvest Forecast Impact (%)
H 3	Adjacent to Eagle Roost			
♦ Long Term (111+ yrs)	Nothing proposed in addition to mid term			

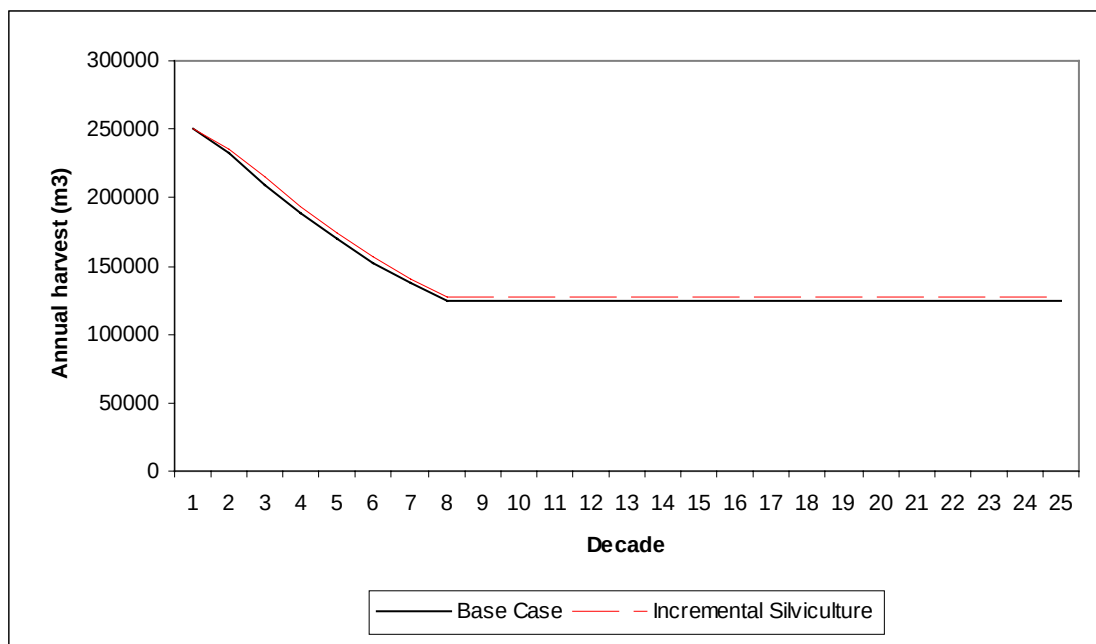
Potential Harvest Forecast

Based on a completion of the above table, a graphical representation of the potential harvest level that may be attained through implementation of the silvicultural strategies in the preceding tables will be developed, assuming additive impacts.

These increases will be applied to the base case to represent the potential harvest forecast. The increases include:

- 1% improvement in timber flow throughout the planning horizon from late rotation fertilization assuming that there is a 10% increase in stand yield of 10% of the landbase (based on increasing managed stand yields sensitivity).
- 1% short-term increase in timber availability from spacing (based on decreasing the minimum harvest age sensitivity).
- 0.2% increase in timber flow throughout the planning horizon from a 2% increase in yields on 12% of the landbase (used genetic sensitivity to represent early rotation fertilization).

This forecast will be at best highly speculative, requiring confirmation through timber supply analysis. Modeling may indicate more precise timing, targeting and program levels associated with incremental silviculture activities than could be developed in this interim strategy.



Potential harvest increase

Opportunities to Improve Timber Quality

The effects of incremental silviculture on the future quality of the timber resource were not analyzed in the MP #8 Timber Supply Analysis. However this issue was discussed during the working session.

Product Objectives

During the working session, the topic of product objectives was discussed. In addition to the objectives stated on page i Interfor has no specific product objectives, or at least are driving silviculture strategies for the TFL. Uncertainty surrounding future markets is cited as a key reason for this. Nevertheless, it is clear that many of the silviculture opportunities identified will impact on log quality. As part of the characterization of these opportunities, each treatment will be assessed with respect to its probable impact on log quality. These assessments will be summarized in the following table.

<u>Code</u>	<u>Impact</u>
+	Positive
0	Neutral
-	Negative

Available Information Regarding Potential Treatments and Impact on Quality

Treatment		Impact on quality
IM 1	Planting	O
IM 2	Early fertilization	O
ST 1	Late rotation fertilization	O
ST 2	Spacing w/o CT	+
MT 1	Spacing good sites	+
MT 2	Spacing and/or pruning backlog	+
MT 3	Planting and/or brushing backlog	O
Q 1	Pruning	+
Q 2	Commercial thin	+
H 1	UWR	O
H 2	Non-specific forage	-
H 3	Adjacent to eagle roost	O

Potential Timber Quality Strategies by Response Time Frame

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result
♦ Immediate			
IM 1	Planting		No effect
IM 2	Early fertilization		No effect
♦ Short Term (1–20 yrs)			
ST 1	Late rotation fertilization	Wood quality will depend on the time of harvest	Potentially increased quality
ST 2	Spacing w/o CT		Will increase wood quality
♦ Mid Term (21–110 yrs)			
MT 1	Spacing good sites		Will increase wood quality
MT 2	Spacing and/or pruning backlog		Will increase wood quality
MT 3	Planting and/or brushing backlog		No effect
Q 1	Pruning		Will definitely increase wood quality
Q 2	Commercial thin		High quality wood will be distributed over longer timeframe
H 1	UWR	Effect on wood quality will depend on whether the stand is pruned.	may increase wood quality
H 2	Non-specific forage		Will likely decrease wood quality

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result
H 3	Adjacent to Eagle Roost		No effect

Opportunities to Improve Habitat Quality/Quantity

The effects of incremental silviculture on the future quality/quantity of wildlife habitat were not analyzed explicitly in the MP #8 Timber Supply Analysis. The issue was discussed during the working session. As with timber quantity/quality, it is clear that many of the silviculture opportunities identified will impact on habitat availability. As part of the characterization of these opportunities, each treatment will be assessed with respect to its probable impact on habitat. These assessments are summarized in the following table.

<u>Code</u>	<u>Impact</u>
+	positive
0	neutral
-	negative

Available Information Regarding Potential Treatments and Impact on Habitat

Treatment		Impact on old growth	Impact on riparian zones	Impact on wildlife habitat
IM 1	Planting	O	O	O
IM 2	Early fertilization	O	O	O
ST 1	Late Rotation fertilization	O	O	O
ST 2	Spacing w/o CT	+	+	+
MT 1	Spacing good sites	+	+	+
MT 2	Spacing and/or pruning backlog	+	+	+
MT 3	Brushing and/or planting backlog	O	O	O
Q 1	Prune	O	O	+
Q 2	Commercial thin	+	+	+
H 1	UWR	+	O	+
H 2	Non-specific forage	+	O	+
H 3	Adjacent to eagle roost	+	O	+

Potential Habitat A Strategies by Response Time Frame

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result
♦ Immediate			
IM 1	Planting		
IM 2	Early fertilization		
♦ Short Term (1–20 yrs)			
ST 1	Late rotation fertilization		No affect on habitat aside from potentially more lush vegetation. May have slight negative impact form due to earlier canopy closure.
ST 2	Spacing w/o CT		Speeds up the development of second growth stands to old growth characteristics and promotes understory
♦ Mid Term (21–110 yrs)			
MT 1	Spacing good sites		Spacing speeds up the development of second growth stands to old growth characteristics and promotes understory
MT 2	Spacing and/or pruning backlog		
MT 3	Planting and/or brushing backlog		
Q 1	Pruning		Provides better visibility
Q 2	Commercial thin		Maintains structural complexity
H 1	UWR	Could potentially provide for UWR without having negative effect on timber supply through reducing minimum harvest age	Provides UWR

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result
H 2	Non-specific forage	Plant in clusters	Makes more forage available
H 3	Adjacent to Eagle Roost	May allow the eagle roost area to be moved which would make more timber available for harvest (further research required in order to mimic eagle roosts through silviculture activity).	Maintains eagle roost area

Incremental Silviculture Strategy

This section synthesizes the preceding background information and analysis into an incremental silviculture strategy for the TFL.

General Strategy

As stated earlier, short and medium term timber flow on TFL 38 is constrained by timber availability at decade 14. Because of the timing of this constraint, considerable opportunity exists to enhance timber supply prior to this point. Generally, any strategy which increases timber availability prior to decade 14 will have a positive impact on short and medium term timber flow. Tactics, which accelerate the development of managed stands, are particularly important in this regard. These tactics impact on timber availability in three positive fashions:

- reduced time to greenup;
- Reduced minimum harvest ages; and
- Increased yields at rotation.

Quality targets have not been explicitly established for TFL 38. An extensive pruning program is currently underway with the intent of maximizing the value of the timber. Several of the silviculture tactics identified for improvement of quantity are also expected to have a positive impact on quality.

Working Targets

The preceding analysis indicates the following working target is attainable:

- Maintain the existing AAC (250,500 m³) for a period of 40 years
- Step down to a mid and long term level of 140,000 m³.

Log Product Objectives

In addition to the objectives stated on page i, log product objectives have not been explicitly developed for TFL 38. The following are product objectives at the log level, which have been developed for another TSA on the coast (Strathcona). During the workshop it was agreed that these quality objectives would be appropriate targets for the TFL 38 incremental silviculture strategy.

<u>Quality Class</u>	<u>Species</u>	<u>Characteristics</u>
Premium Log:	Douglas-fir, clear, pruned	55+ cm min DBH, pruned, min 5 m log.
	Douglas-fir, large timber	55+ cm min DBH, unpruned.
	Douglas-fir, clear, unpruned	long rotation.
	Hemlock, large timber.....	55+ cm min DBH, unpruned.
	Hemlock, clear, unpruned	long rotation.
	Cedar, large timber.....	55+ cm min DBH, unpruned.
	Cedar, clear, unpruned.....	2 rotations in stand.
Sawlog:	Minimum average stand DBH of 45 cm and min. stand vol. of 350 m ³ /ha.	

Summary of Information and Research Needs

No specific information/research needs were identified during the course of the workshop, however the following uncertainties are recognized:

1. Expected response to late rotation fertilization;
2. Ability to mimic eagle roost through silviculture activity; and
3. Yield and stand structure responses to variable retention harvesting systems.
4. Financial analysis of juvenile spacing – pruning.

Silviculture Regimes and Investment Priorities

The following table indicates incremental silviculture regimes which are suitable for attaining the above working targets and strategies.

Regime Table: TFL 38, January, 2001

Treatment	Location	Ha/y r	Timber supply			Quality	Habitat			Direct Jobs Days/ha	Direct Cost \$/ha	Priority
			Sh	Me	Lo		OG	Ri	W			
	Surveys	Throughout	640							0.07	25	1
IM 1	Planting	Throughout	405	O	O	O	O	O	O	1.3	1100	1
IM 2	Early fertilization	mostly poor sites		O	O	O	O	O	O	0	150	3
ST 1	Late Rotation fertilization	Fd medium sites	40	+	+	+	O	O	O	0.1	300	1
ST 2	Spacing w/o CT	Not easily accessible (Heli)	55	+	+	+	+	+	+	4	1600	2
MT 1	Spacing good sites	Fd good	100	O	+	+	+	+	+	4	1600	3
MT 2	Spacing and/or pruning backlog	Good sites	500 ha total	O	+	O	+	+	+	14	4600	2
MT 3	Brushing and/or planting backlog		25 for 5 years	O	+	O	O	O	O	1.3	1100	1
Q 1	Prune	Fd good	180	O	O	O	+	O	O	10	3000	3
Q 2	Commercial thin	Fd good	100	O	+	+	+	+	+	0.5	4000	3
H 1	UWR	UWR	5	O	O	O	O	+	O	14	4600	5
H 2	Non-specific forage		15	O	O	O	O	+	O	3	4000	5
H 3	Adjacent to eagle roost		5	0	+	+	O	+	O	5	2000	6

Priority: 1-high 6 low

Incremental Silviculture Program

The following annualized program will contribute to achieving the above goals and strategies.

Program Table – Hectares treated: TFL 38, January, 2001

Treatment		Location	Years 1-5					Totals		
			1	2	3	4	5	1-5	6-10	1-10
	Surveys	Throughout	640	640	640	640	640	3200	3200	6400
IM 1	Planting	Throughout	405	405	405	405	405	2025	2025	4050
IM 2	Early fertilization	mostly poor sites	50	50	50	50	50	250	250	500
ST 1	Late Rotation fertilization	Fd medium sites					400			400
ST 2	Spacing w/o CT	Not easily accessible (Heli)	55	55	55	55	55	275	275	550
MT 1	Spacing good sites	Fd good	100	100	100	100	100	500	500	1000
MT 2	Spacing and/or pruning backlog	Good sites	100	100	100	100	100	500	0	500
MT 3	Brushing and/or planting backlog		25	25	25	25	25	125	0	125
Q 1	Prune	Fd good	180	180	180	180	180	900	900	1800
Q 2	Commercial thin	Fd good	100	100	100	100	100	500	500	1000
H 1	UWR	UWR	5	5	5	5	5	25	25	50
H 2	Non-specific forage		15	15	15	15	15	75	75	150
H 3	Adjacent to eagle roost		5	5	5	5	5	25	25	50

Program Table – \$ 000s: TFL 38, January, 2001

Treatment		Location	Years 1-5					Totals		
			1	2	3	4	5	1-5	6-10	1-10
	Surveys	Throughout	16	16	16	16	16	80	80	160
IM 1	Planting	Throughout	446	446	446	446	446	2230	2230	4460
IM 2	Early fertilization	mostly poor sites	7.5	7.5	7.5	7.5	7.5	37.5	37.5	75
ST 1	Late Rotation fertilization	Fd medium sites	0	0	0	0	120	120	0	120
ST 2	Spacing w/o CT	Not easily accessible (Heli)	88	88	88	88	88	440	440	880
MT 1	Spacing good sites	Fd good	160	160	160	160	160	800	800	1600
MT 2	Spacing and/or pruning backlog	Good sites	230	230	230	230	230	1150	0	1150
MT 3	Brushing and/or planting backlog		27.5	27.5	27.5	27.5	27.5	137.5	0	137.5
Q 1	Prune	Fd good	540	540	540	540	540	2700	2700	5400
Q 2	Commercial thin	Fd good	400	400	400	400	400	2000	2000	2000 0
H 1	UWR	UWR	23	23	23	23	23	115	115	230
H 2	Non-specific forage		60	60	60	60	60	300	300	600
H 3	Adjacent to eagle roost		10	10	10	10	10	50	50	100

Job Outcomes

The following are the anticipated job outcomes associated with the preceding program, assuming the program is maintained into the future as necessary to achieve the working targets.

Program Table – Short-term job outcomes: TFL 38, January, 2001

Treatment		Location	Years 1-5					Totals		
			1	2	3	4	5	1-5	6-10	1-10
	Surveys	Throughout	0.25	0.25	0.25	0.25	0.25	1.25	1.25	2.5
IM 1	Planting	Throughout	2.9	2.9	2.9	2.9	2.9	14.5	14.5	29
IM 2	Early fertilization	mostly poor sites	0	0	0	0	0	0	0	0
ST 1	Late Rotation fertilization	Fd medium sites	0	0	0	0	0.22	0.22	0	0.22
ST 2	Spacing w/o CT	Not easily accessible (Heli)	1.2	1.2	1.2	1.2	1.2	6	6	12
MT 1	Spacing good sites	Fd good	2.2	2.2	2.2	2.2	2.2	11	11	22
MT 2	Spacing and/or pruning backlog	Good sites	3.9	3.9	3.9	3.9	3.9	19.5	0	19.5
MT 3	Brushing and/or planting backlog		0.2	0.2	0.2	0.2	0.2	1	0	1
Q 1	Prune	Fd good	10	10	10	10	10	50	50	100
Q 2	Commercial thin	Fd good	2.8	2.8	2.8	2.8	2.8	140	140	280
H 1	UWR	UWR	0.4	0.4	0.4	0.4	0.4	2	2	4
H 2	Non-specific forage		0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.1
H 3	Adjacent to eagle roost		0.1	0.1	0.1	0.1	0.1	0.5	0.5	1

Note: -assumes 180 days of silviculture work = 1 job
 -early fertilization does not create any jobs because it is done at the same time as planting.

Program Table – Long-term employment: TFL 38, January, 2001

Decade	Harvest Increment (‘000m ³)	Incremental Jobs			
		Per year by decade		Total by decade	
		TFL ⁽¹⁾	Prov ⁽²⁾	TFL	Prov
1	0.0	0.0	0.0	0.0	0.0
2	5.4	2.8	7.0	28.4	70.2
3	6.8	3.6	8.9	35.9	88.7
4	6.1	3.2	8.0	32.2	79.6
5	5.5	2.9	7.1	28.9	71.4
6	4.9	2.6	6.5	26.1	64.6
7	4.4	2.3	5.8	23.4	57.9
8	3.6	1.9	4.7	19.2	47.4
9	1.8	1.0	2.4	9.5	23.6
10	1.8	1.0	2.4	9.5	23.6
11	1.8	1.0	2.4	9.5	23.6
12	1.8	1.0	2.4	9.5	23.6
13	1.8	1.0	2.4	9.5	23.6
14	1.8	1.0	2.4	9.5	23.6
15	1.8	1.0	2.4	9.5	23.6
16	1.8	1.0	2.4	9.5	23.6
17	1.8	1.0	2.4	9.5	23.6
18	1.8	1.0	2.4	9.5	23.6
19	1.8	1.0	2.4	9.5	23.6
20	1.8	1.0	2.4	9.5	23.6
21	1.8	1.0	2.4	9.5	23.6
22	1.8	1.0	2.4	9.5	23.6
23	1.8	1.0	2.4	9.5	23.6
24	1.8	1.0	2.4	9.5	23.6
25	1.8	1.0	2.4	9.5	23.6
Total				356.3	880.7

⁽¹⁾ 1000 m³ of harvest=0.53 incremental jobs on the TFL⁽²⁾ 1000 m³ of harvest=1.31 incremental jobs in the province

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