TFL 10
Tree Farm License

Incremental Silviculture Strategy (Interim)

-- Version 1.0 --

Contents

British Columbia

Ministry of Forests

Funded By

Forest Renewal BC

March 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 10 MP#8 and the knowledge of forestry professionals (through their input in a district working section). Unfortunately, TFL 10 has significant uncertainty because the Klahoose First Nation has denied passage through their reserve, which has rendered two thirds of the timber harvesting landbase inaccessible. It is anticipated that forest management strategies and objectives will have to change considerably before the Klahoose First Nation allow Interfor access to the inaccessible area of the TFL. This Silviculture Strategy report does not intend to make any assumptions regarding the outcome of the access issue and therefore is based on the entire TFL being accessible and managed under the current management regime. The proposed silviculture strategy is a recommendation to commence throughout the TFL in 2002. It is recognized that this is not realistic, however current available information has limited our options.

Timber supply on TFL 10 is constrained at three points over the 250 year time horizon of the analysis. The first constraint point occurs at decade 5, and limits timber harvest in the short term. The second constraint point occurs at decade 11, affecting short and mid-term timber availability. A third point at decade 16 primarily affects long-term supply. Generally, silviculture activities that increase the timber availability at these points will prove to have the strongest impact on the potential harvest flow. The potential treatments on TFL 10 are:

Available Information Regarding Potential Treatments and Treatable Area

	Treatment	Comment	Location	Treatable Area
MT1:	Spacing	Spacing, to 800-1000 sph.	Throughout	60 ha/year
MT1:	Spacing backlog	Spacing~20% of the 1300 ha logged between 1986 and 1991.	Accessible area	50 ha/year for 5 years
MT2:	Late rotation fertilization	Target Fd dominating sites with SI>25, 40 –70 years old.	Throughout	400 ha every 5 years starting in 2030
Q1:	Pruning	Target Fd dominated sites with SI>30, 2 entries 15 years old and 20 years old	Throughout	20 ha/year
H1	Variable Retention Harvesting*	Target areas already have visual, riparian and/or wildlife constraints	Throughout (accessible area since 1989)	96 ha currently, 120 ha/year by 2002
H2	Spacing-RMA	Target dysfunctional RRZ area for long term habitat benefits	Throughout	10 ha/year

Note: there is no pre-1988 backlog program on TFL 10

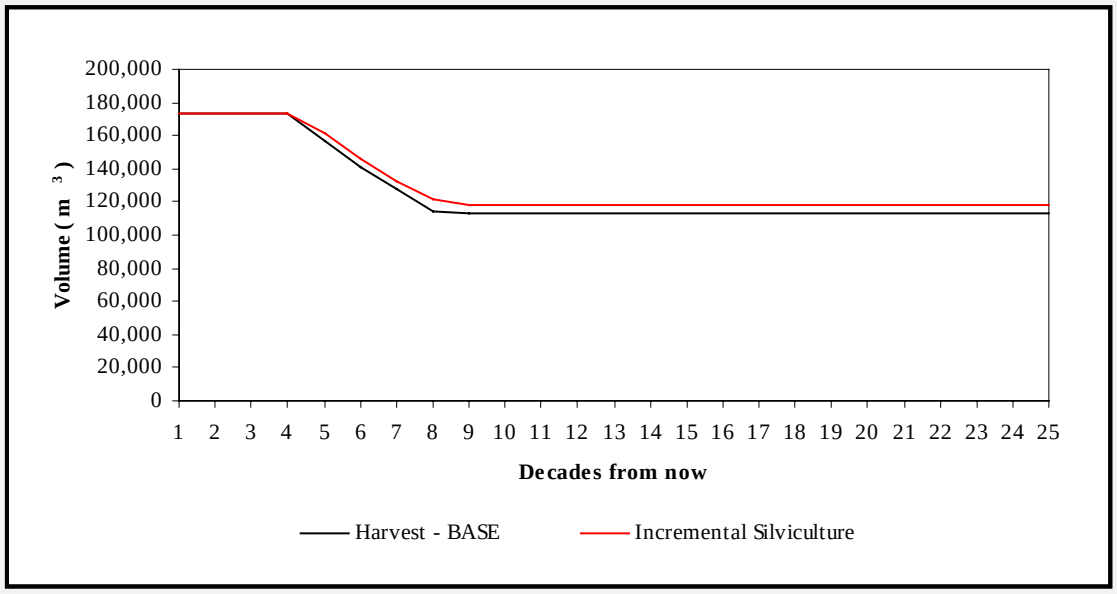
* variable retention harvesting is not eligible for FRBC funding

Potential Harvest Forecast

The potential harvest level that may be attained through implementation of the silvicultural strategies in the preceding tables was developed, assuming the following additive impacts:

- 1.9% long term improvement from 21% of the THLB having a 9% increase in timber availability from late rotation fertilization (based on increasing managed stand yields sensitivity).
- 3% midterm improvement in timber flow from spacing thrifty stands (based on reducing minimum harvest age sensitivity).

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 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.

Strategic Issues

General Strategy

There is significant uncertainty around the future of International Forest Product's (Interfor) TFL 10. Interfor's ability to manage the TFL has been encumbered since 1989, because the Klahoose First Nation has denied passage through their reserve, which has rendered two thirds of the timber harvesting landbase inaccessible. Since 1989 Interfor's harvesting and forest management activities have been restricted to the accessible portion of the TFL. The information available for development of this report is the TSR II analysis report. The TSR II basecase and sensitivity analysis evaluate the entire landbase. A partition was modelled which assessed the harvest potential of the accessible area, but no sensitivities were performed on the partition. This report uses the available information and does not attempt to interpolate the TSR II results for the accessible area only.

Furthermore, it is anticipated that forest management strategies and objectives will have to change considerably before the Klahoose First Nation allow Interfor access to the inaccessible area of the TFL. This report is based on a silviculture strategy under current management regimes. This report does not intend to make any assumptions regarding the outcome of the access issue and therefore is based on the entire TFL being accessible and managed under the current management regime. Given the available information and uncertainty around the future of the TFL it was agreed in the workshop that this report would reflect the TFL as a whole. This approach is validated by the fact that the access restriction is a short term issue and none of the silviculture strategies recommended have an effect on the short term availability.

Irrespective of the access issue 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: wildlife, biodiversity, recreation and market demands.

Working Targets

Quantity:

In Management Plan #8, the proposed AAC is 171,000 cubic metres. This is projected to be sustainable for four decades, after which the harvest level decreases by 10%/decade, reaching a steady long-term level of 112,300 cubic metres in decade 8.

Quality:

Management 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, the stability of 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 ±15 cm average dbh for final harvest and 30 cm ±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;

Major Silvicultural Strategies

Currently Identified

The following points represent the major silviculture strategic objectives, which have been identified for TFL 10 in the proposed 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. Utilize genetically improved seed
2. Optimize species selection
3. Space natural stands
4. Increase utilization/minimize losses
5. Commercial thinning
6. Fertilize
7. Shorten regen delay
8. Accelerate early height growth
9. Others?

The tactics listed here were used to initiate discussion during the working session.

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 potential 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. In the case of TFL 10, MP #8 has recently been prepared and submitted to MoF for approval. Therefore, this interim strategy will be useful in providing background for the implementation of the management plan.

Methodology

This strategy was prepared through the following process:

1. Prior to a district working session, Timberline Forest Inventory Consultants prepared a preliminary draft of this report, 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 January 30 and 31, 2002 in Campbell River, attended by representatives of the MoF, MoELP and Interfor staff. Erik Wang of Timberline and Jamie Killackey of Interfor le the session. The objective of the session was to review potential opportunities identified in this draft document along with others that arose during discussion. The outcome of the session included a silviculture regime table, complete with priorities.
3. The results of the working session have been incorporated into this document along with attendant forecasts of future harvest quantity and quality and of job outcomes.
4. The 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	Representative
MoF-Vancouver Region	Larry Sigurdson
MoF-Sunshine Coast District	Mark Scott
MoELP	Steve Gordon (submitted comments)
Intefor	Gerry Sommers, Lazlo Kardos, Jamie Killackey, Nigel Ross, Jamie Kantor

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

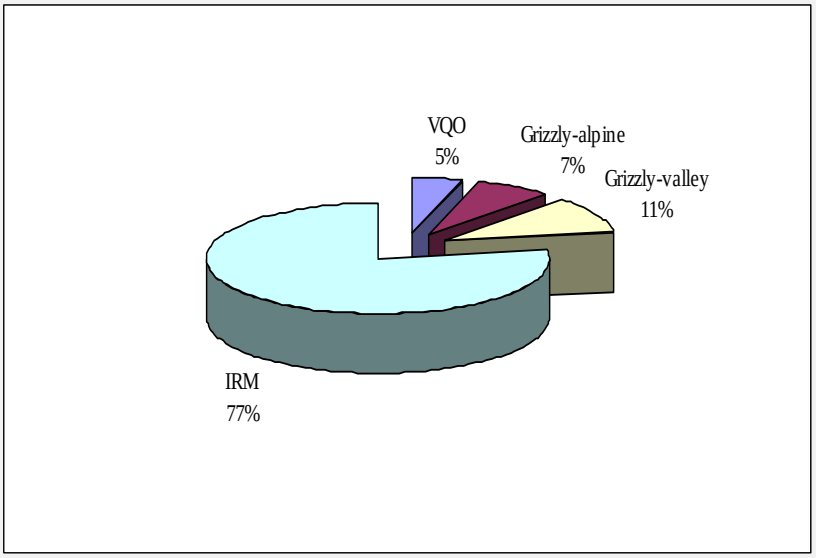
Land Area

Description	Area (ha)	Area %
Total Area of TSA	229,667	100
Total Productive Crown Forest	53,722	23.4
Current NTH Land Base	24,259	10.6
Long-term NTH Landbase	23,582	10.3

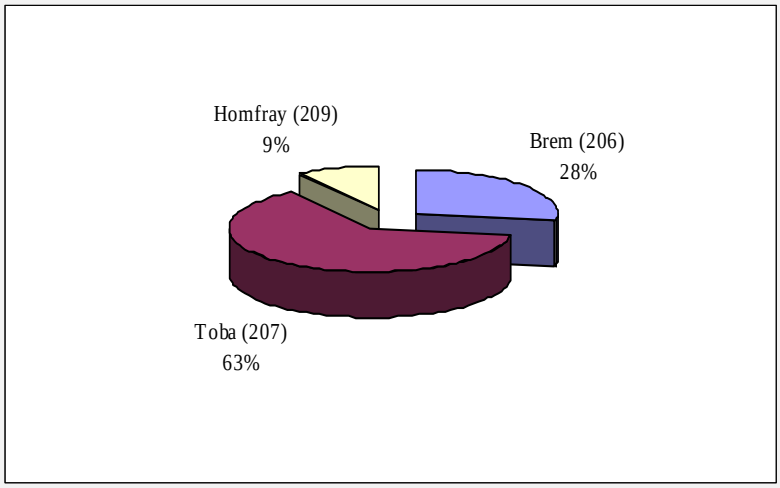
Source: MP #8 report.

AAC (existing and proposed in MP#8)

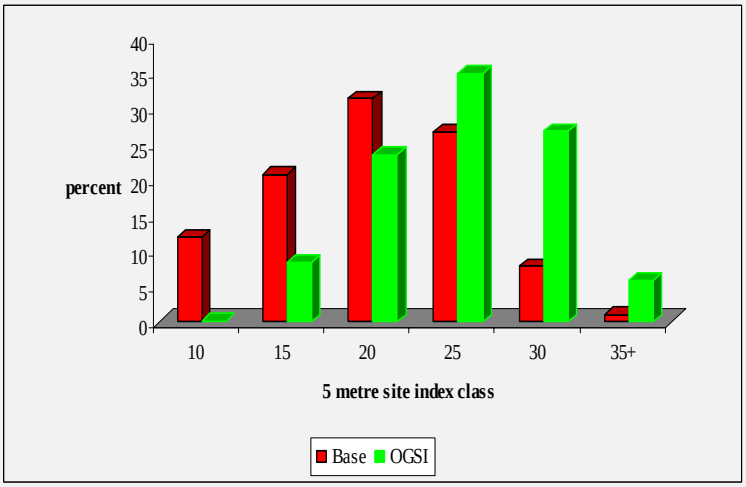
	Licensee	SBFEP	Total
TFL(non-Toba)	103,097	12,853	115,950
TFL(Toba)	48,903	6,097	55,000
Total	152,000	18,950	170,950



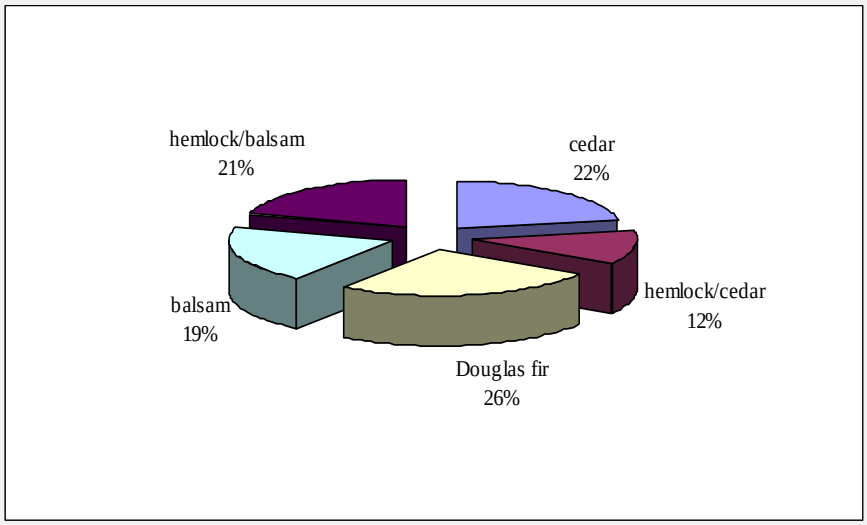
Distribution of Productive area by Resource Emphasis Area



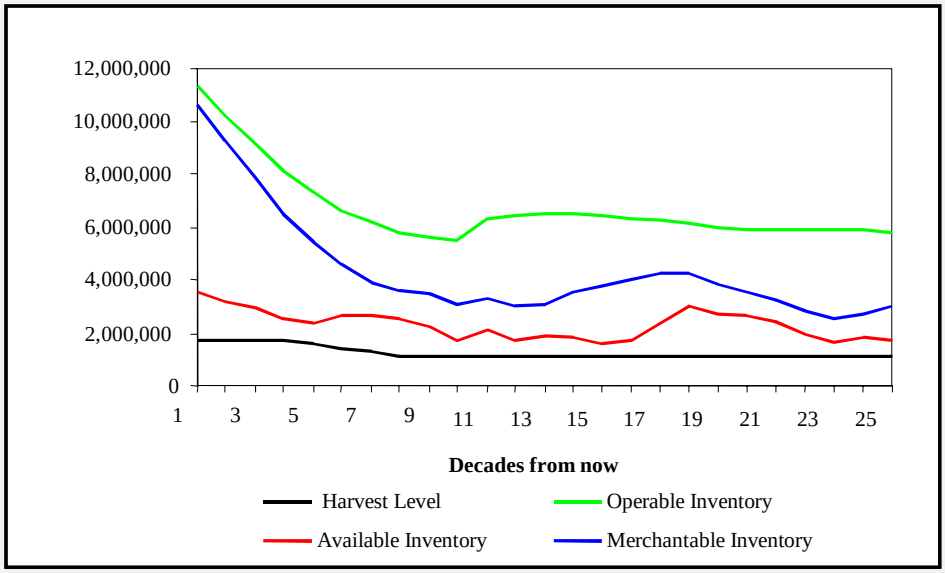
Distribution of productive area by landscape unit



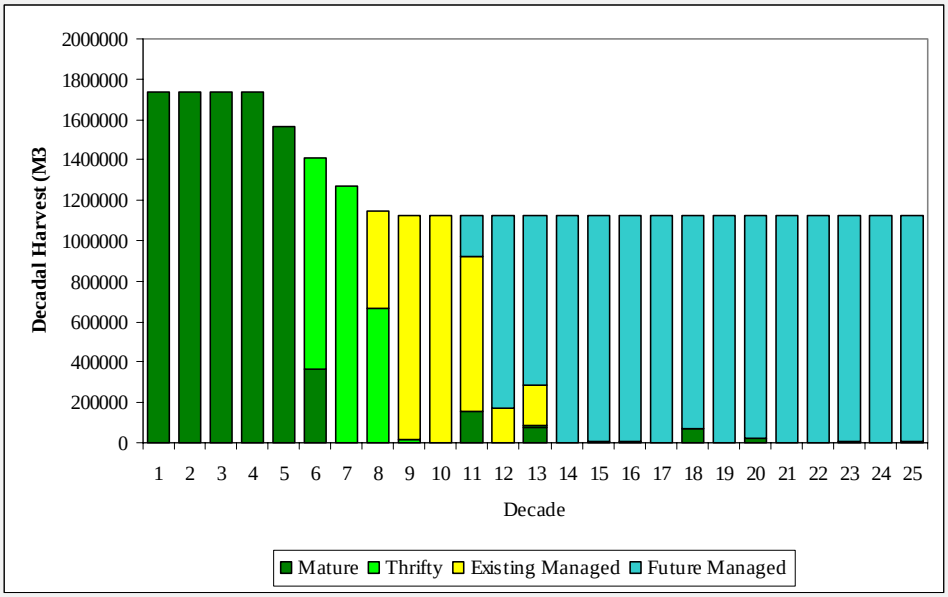
Distribution of net area by 5-metre site index class



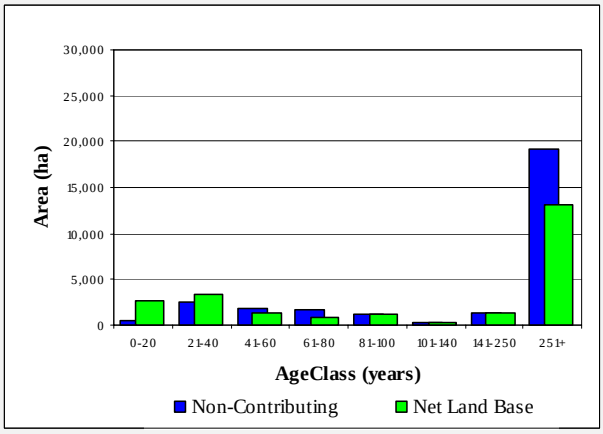
Distribution of net area by leading tree species (inventory type grouping)



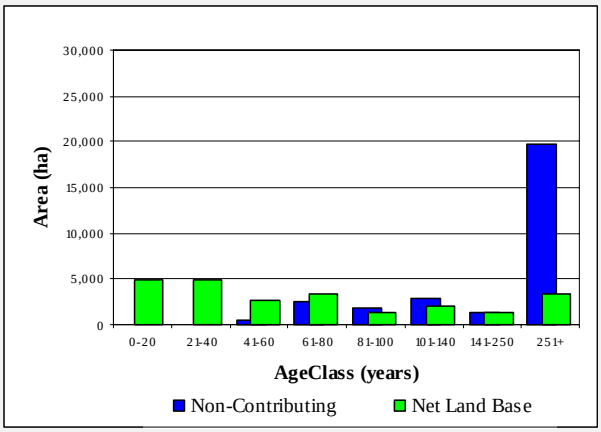
Base case harvest and growing stock profile



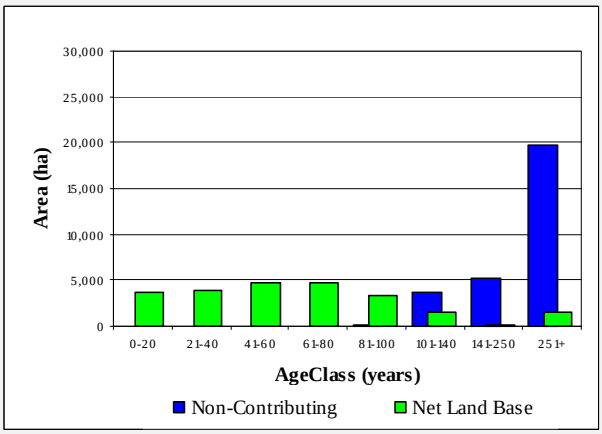
Gross harvest by maturity



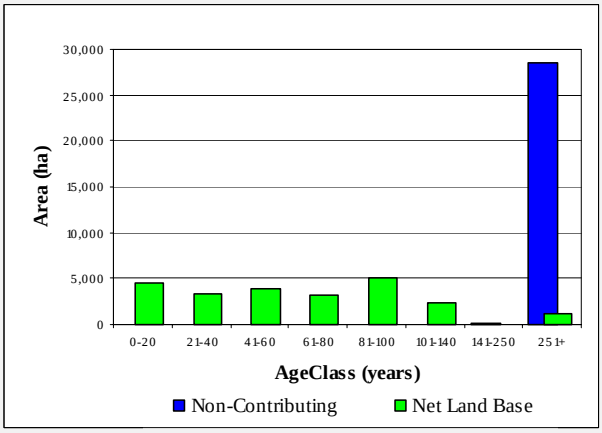
Age class distribution – Decade 1



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 the last timber supply analysis. Key statements are bolded.

Abbreviations: AAC - allowable annual cut; THLB - timber harvesting land base; IHL - initial harvest level; MTHL mid-term harvest level, LTHL - long term harvest level; CF - chief forester.

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	**"Current AAC" is 170,950 m^3**, after a 2,700 m^3 deduction for non-recoverable losses. Initial harvest level is maintained for 4 decades and declines 10%/ decade through decades 5-8 to a long term level of 112 300 m^3 (**34% below current AAC).** **Harvest levels must decline to avoid serious timber supply shortfalls in the future**.
♦ Age Class	55% 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 for harvest.
♦ Productivity	**Existing productivity estimates are deemed to be significantly understated, due to the bias in estimation of old growth site indices.** Sensitivity: Increased site indices for regenerated types by 2-11 metres, depending upon species. **Impact: Significant impact on short term supply as decade 15 timber availability constraint is relaxed.**
♦ Forest Cover (disturbance)	*Non-VQO Zones*: 95% of THLB. Base case requirement of at most 25% of THLB permitted to be < 3 m tall (4 pass system). *Visual Quality Zones*: 5% of THLB. Base case requirement of at most 10% (partial retention VQO) and 20% (modification VQO) to be < 5 m tall. Sensitivity test: varied by zone Relaxation**: Insensitive** Increasing the maximum disturbance percentages in the non-VQO and VQO zones permitted the MTHL to be increased by about 7% in decades 5-8. Relaxing VQO disturbance levels by approximately 5% had no impact on harvest levels Increase: **Highly sensitive in the short and mid-term**. Reducing the non-VQO maximum by 5% forced a reduction of the IHL from 4 decades to 2. In addition, there was a 14% reduction in MTHL.
♦ Minimum harvest age	**Highly Sensitive** IHL and MTHL levels are highly sensitive to any delays in timber availability associated with changes in minimum harvest age**. Specifically, setting a minimum DBH of 35 cm reduces the first rotation harvest by about 15%.**
♦ Unmerch types	• 1672 ha were deducted from the THLB for deciduous species. Low productivity accounted for an additional 144 ha. Unmerchantable types were deducted through the operability classification.

♦ Older Forests	The base case analysis included old-growth seral stage requirements as specified in the Biodiversity Handbook. Sensitivity test: +/- 5% Relaxation **Insensitive**. Reducing the old-growth target by 5% had no impact on timber supply. Increase **Moderately sensitive**. Increasing the old-growth target by 5% had an 8% impact on MTHL.
♦ Wildlife forest cover	Base case includes a requirement to maintain at least 75% of the forest cover in alpine grizzly habitat above age 250. In addition, 36% of the forest cover in valley bottom grizzly habitat must be maintained above age 80.. Sensitivity test: +/-5% **Insensitive**. Timber supply was insensitive to changes in the forest cover requirements for grizzly bear.
♦ Silvicultural Systems	Most of the THLB is currently managed under a clearcut harvesting system
♦ Regeneration	Base case assumes regen delays of 4-6 years. Sensitivity test: +/- 1 year Relaxation**: Insensitive**. Increase: **Insensitive**. Stands are regenerated to the same leading species in most cases, with the same site class. 80% of the future managed stands are assumed to be planted at 1,000 stems per hectare. The remaining 20% regenerated naturally at an initial density of 4,000 stems per hectare, spaced to 800 stems per hectare.
♦ Estimates of Timber Volumes	VDYP used for existing stand volumes for all stands greater than age 30. Sensitivity test +/- 10% Increase: **Moderately sensitive**. The MTHL could be increased by approximately 10%. Decrease: **Highly sensitive**. IHL reduced to 2 decades. In addition, the MTHL was reduced by 14%. TIPSY used for existing stands less than age 31, and all future regenerated stands. OAF1 – 15%. OAF-2 of 5% was used for Douglas-fir, while 15% was used for remaining species. In the last determination the same approach was used. **The CF considered these yield estimates to be conservative, in light of the high OAF 2 values employed, and the site index issue discussed earlier**. Sensitivity test +/- 10% Increase: **Moderately sensitive**. The LTHL could be increased by approximately 12%. Decrease: **Moderately sensitive**. The LTHL was reduced by 8%.

Summary of TFL-level Issues by Period

Overall, timber supply is constrained at three points over the 250 year time horizon of the analysis. The first constraint point occurs at decade 5, and limits timber harvest in the short term. The second constraint point occurs at decade 11, affecting short and mid-term timber availability. A third point at decade 16 primarily affects long-term supply.

Short Term (1 - 40 years)

In the base case, the IHL can only be maintained for 4 decades. Any factors, which affect timber availability over the first 11 decades, can therefore be expected to impact on short-term harvest levels.

Mid Term (41 - 80 years)

As was the case in the short-term, any factors, which affect timber availability over the first 11 decades, can therefore also be expected to impact on mid-term harvest levels.

Long Term (81 + years)

The major impacts on long-term harvest levels were, not surprisingly, caused by changes in regenerated stand performance. Increases (or decreases) in long-term timber harvest are directly related to changes in these factors.

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	If seed stock is available
♦ Optimize species selection	None
♦ Space natural stands	60 ha
♦ Increase utilization/minimize losses	None
♦ Commercial thinning	None
♦ Fertilize	None
♦ Shorten regen delay	None
♦ Accelerate early height growth	None
♦ Other	None

Higher Level Goals and Objectives

This section documents higher level goals and objectives relevant to an incremental silviculture strategy for TFL 10.

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

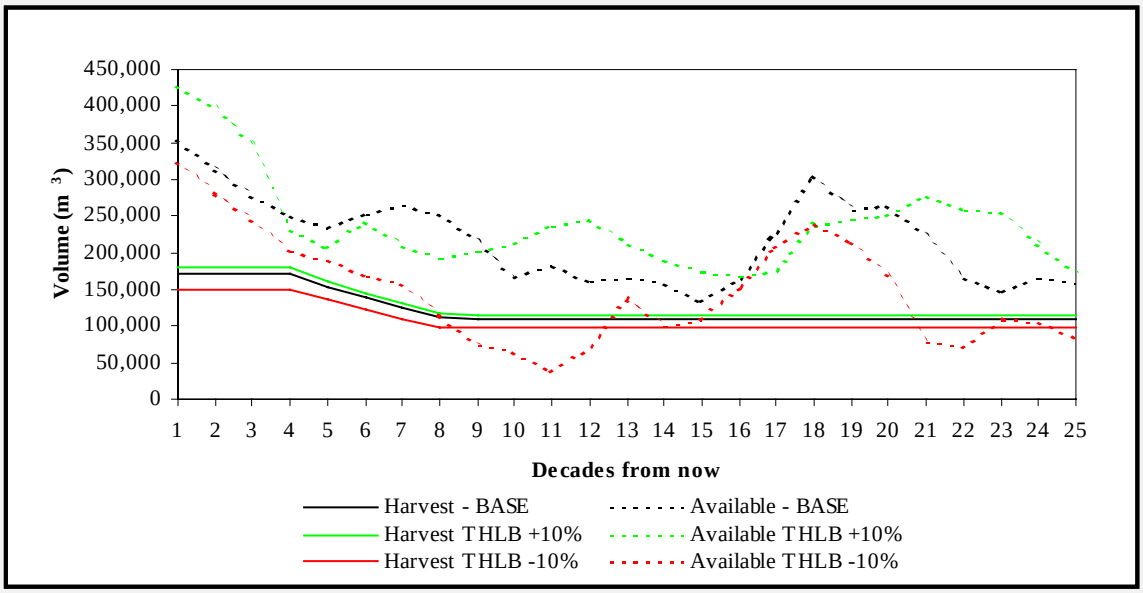
The objectives of the regional incremental silviculture strategy are to:

- 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)

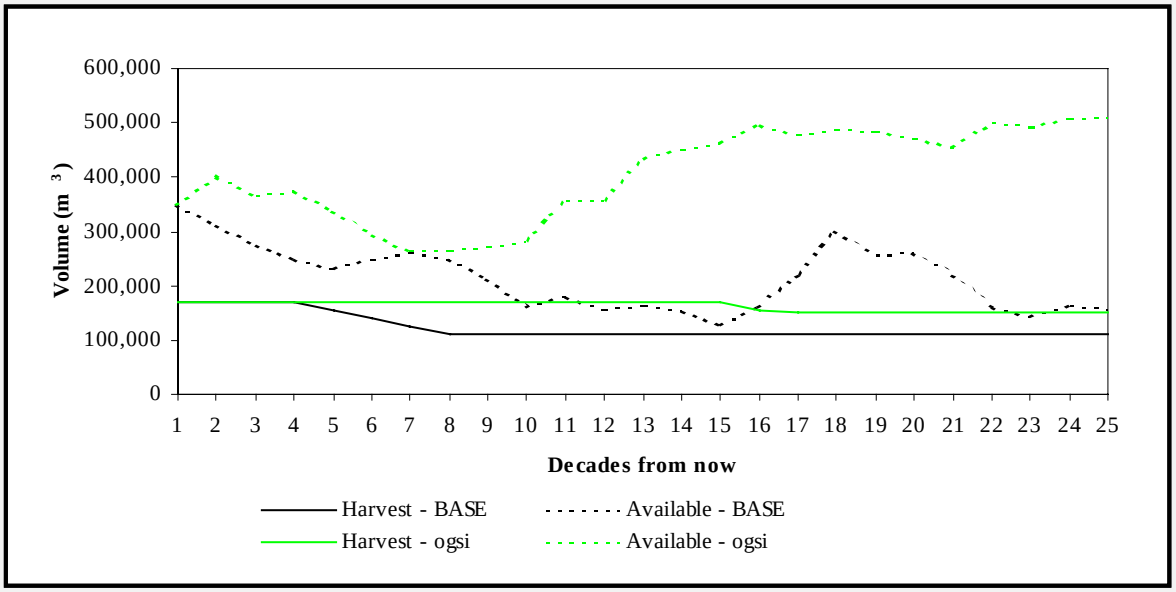
Opportunities to Increase Timber Supply

Opportunities Indicated Through MP #8 Sensitivity Analyses

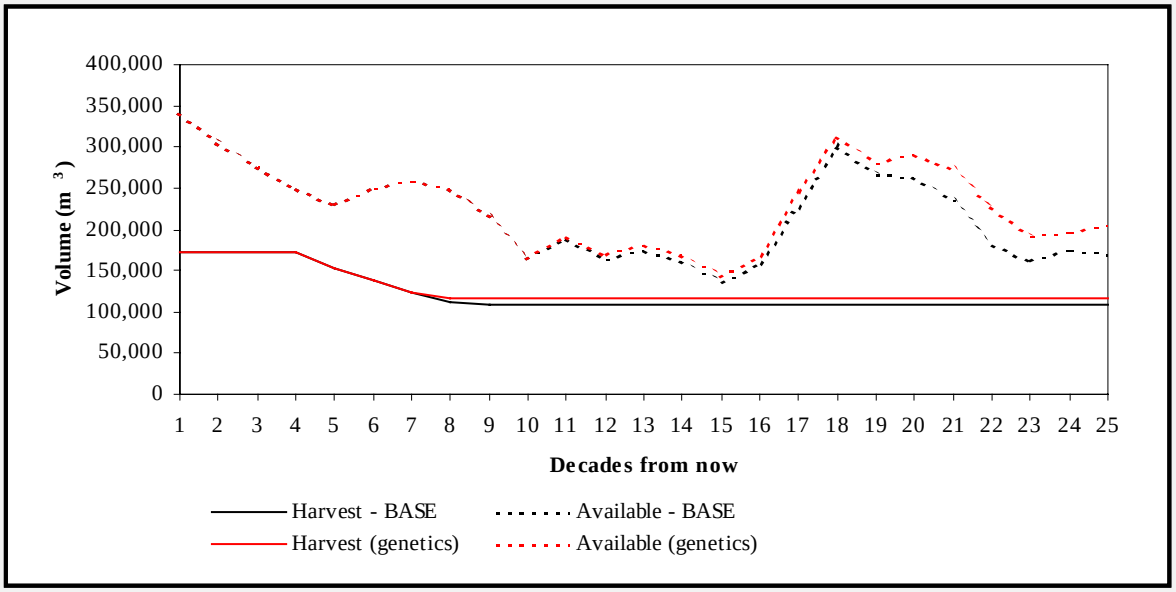
TSA modelling in support of planning incremental silviculture has not yet been undertaken. In its absence, sensitivity analyses from the MP #8 analysis report are the best source of information as to the opportunities for incremental silviculture to increase future timber supply. The following are selected sensitivity analsysis charts from the MP #8 analysis report.



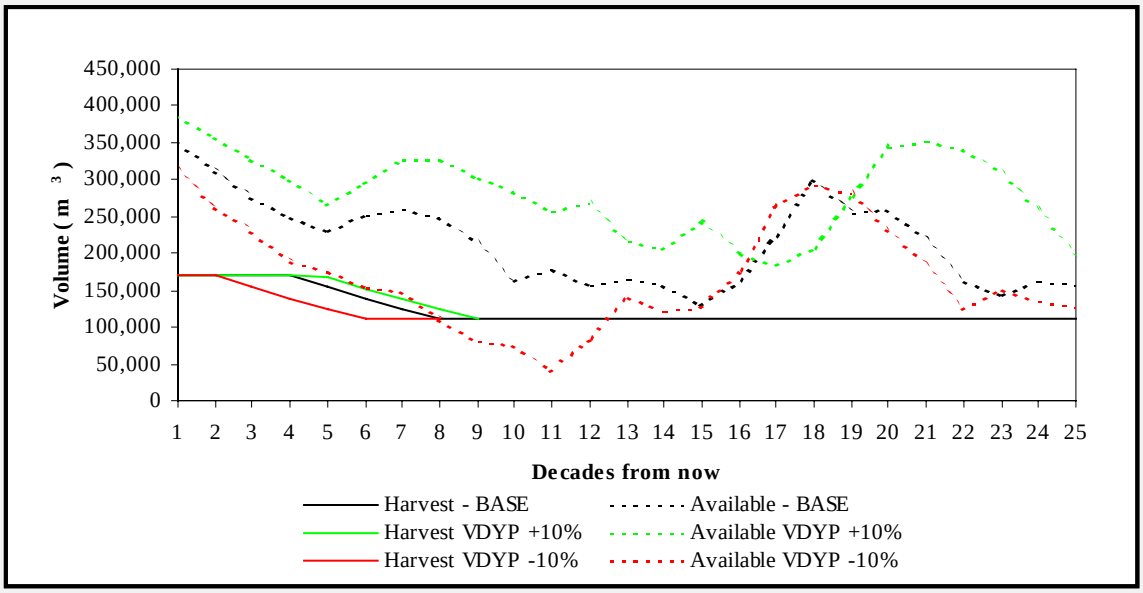
Impact of adjusting the THLB by +/- 10%



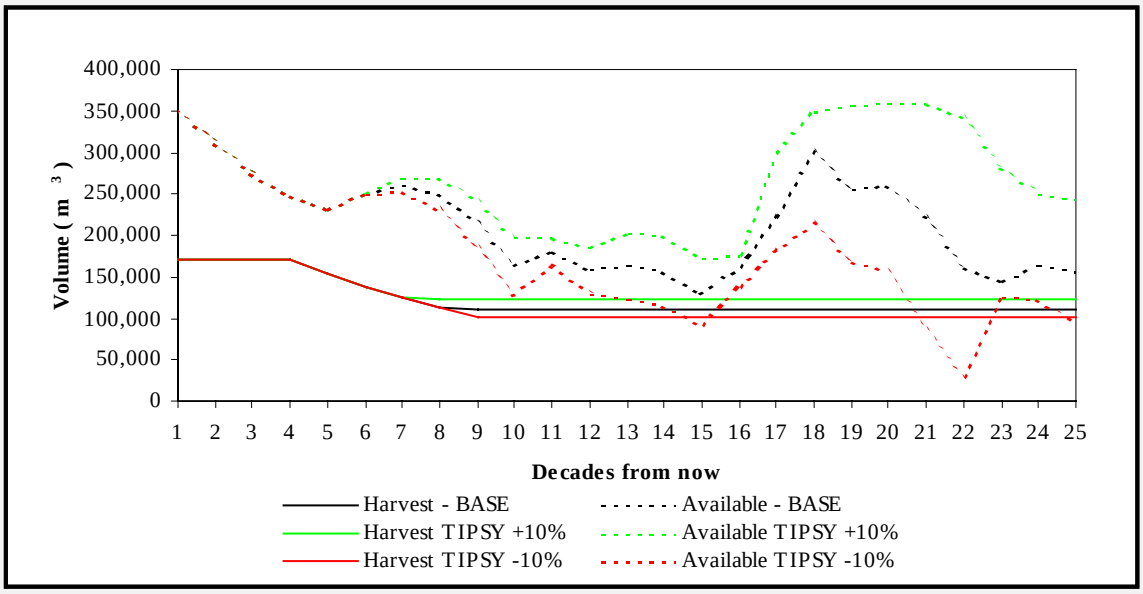
Impact of applying OGSI adjustments



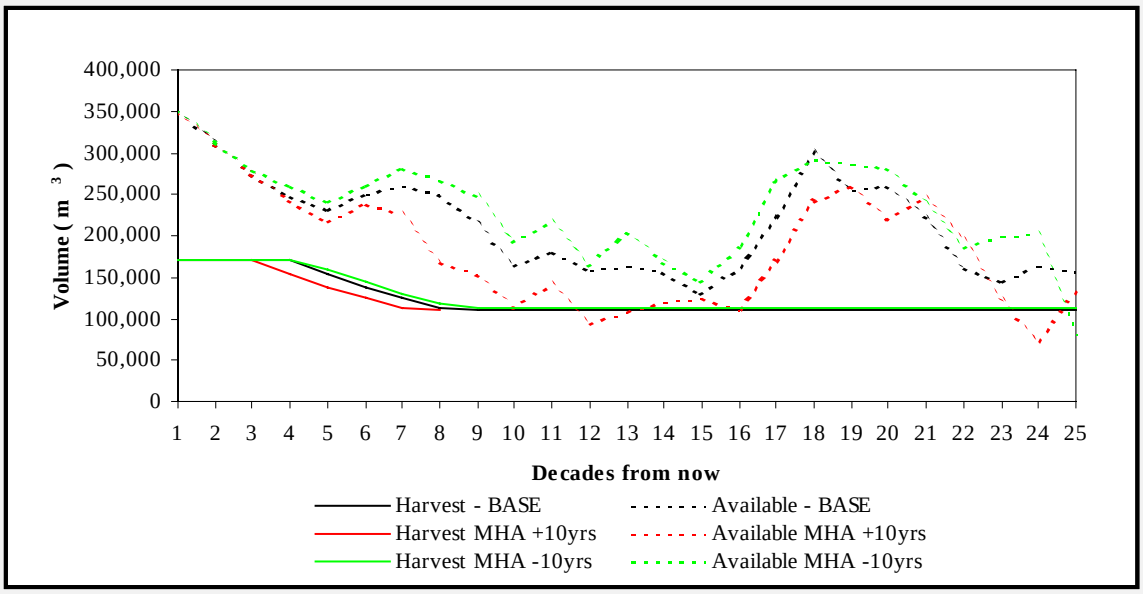
Impact of applying genetic gain adjustments



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



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



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

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 iv) was meant only to initiate discussion. During the working session, each of these was addressed in more detail, along with any other strategies deemed applicable.

While an attempt was made to categorize opportunities according to response time fame, it should be noted that most of the strategies identified impact on mid and long-term timber supply. This is due to the hesitancy to invest given the uncertainty around forest management issues in the near future. Since 1989 harvesting has only occurred in the Toba Inlet, which comprises one-third of the THLB. Essentially the social issues on the TFL overshadow concerns with silviculture strategies that would have a short term effect on timber supply.

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. Neither variable retention harvesting or spacing in the riparian reserve zones are part of the incremental silviculture financing. For completeness however, these practices are included in the report.

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

Nothing proposed

Short Term (1 - 20 yrs) impact on quantity

Nothing proposed

Mid Term (21 - 110 yrs) impact on quantity

MT 1: Increase mid-term volume availability through spacing thrifty stands.

MT 2: Late rotation fertilization of very productive Douglas Fir leading/dominating stands.

Long Term (111+ yrs) impact on quantity

LT 1: Nothing proposed

Impact on timber quality

Q 1: Increase mid-long term quality through pruning.

Impact on wildlife quantity/quality

H1: Maintain structural complexity through variable retention harvesting

H2: Improve wildlife habitat characteristics through spacing.

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
MT1:	Spacing	Spacing, to 800-1000 sph.	Throughout	60 ha/year
MT1:	Spacing backlog	Spacing~20% of the 1300 ha logged between 1986 and 1991.	Accessible area	50 ha/year for 5 years
MT2:	Late rotation fertilization	Target Fd dominating sites with SI>25, 40 –70 years old.	Throughout	400 ha every 5 years starting in 2030
Q1:	Pruning	Target Fd dominated sites with SI>30, 2 entries 15 years old and 20 years old	Throughout	20 ha/year
H1	Variable Retention Harvesting*	Target areas already have visual, riparian and/or wildlife constraints	Throughout (accessable area since 1989)	96 ha currently, 120 ha/year by 2002
H2	Spacing-RMA	Target dysfunctional RRZ area for long term habitat benefits	Throughout	10 ha/year

Note: there is no pre-1988 backlog program on TFL 10

* variable retention harvesting is not eligible for FRBC funding

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, not the period in which actions must necessarily commence.
2	Description of treatment
3	Information was largely obtained from the January 30, 31 workshop, combined with information presented earlier in this document.
4	Anticipated results were calculated using the timber supply responses indicated by MP #8 sensitivity analyses, along with subjective information collected during the workshop.
5	The harvest forecasts use the current AAC as the starting level. Mid and long term harvest forecasts 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	**Harv Forecast Impact (%)
♦ Immediate				
	Nothing proposed			
♦ Short Term (1 – 20 yrs)				
	Nothing proposed			
♦ Mid Term (21–110 yrs)				
MT1	Spacing	Currently required to provide density control assumptions in MP 8.	If not implemented the basecase may not be achievable. However, if full implementation results in reductions in minimum harvest age, a positive impact is possible.	+3%
MT2	Late rotation Fertilization	Not part of current practice on the TFL	Higher volume and piece size. As this treatment is implemented late in rotation, it will be applied to thrifty stands in 2030 to increase the volume available in the mid term.	+1.9%
♦ Long Term (111+ yrs)				
	Noting proposed in addition to mid term			

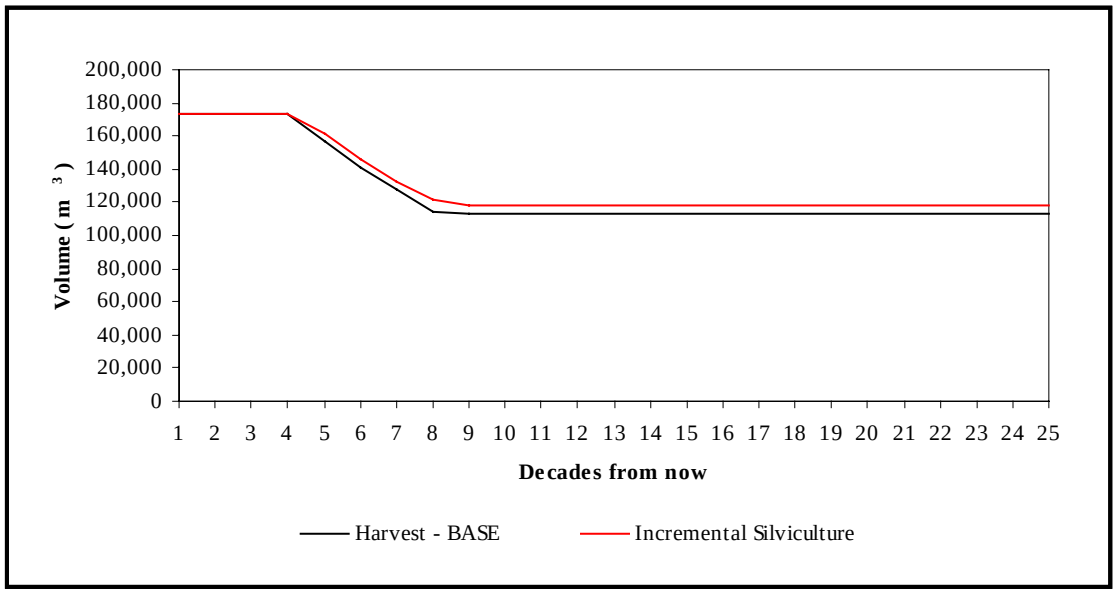
**the harvest flow impacts are based on the sensitivity information from the TSR II. The 3% increase in harvest impact from spacing is based on the 'reducing minimum harvest age' sensitivity. The 1.9% increase in harvest impact from fertilization is based on the 25% of the landbase having a 9% increase as per the managed stand yields sensitivity.

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 was developed, assuming the following additive impacts:

- 1.9% long term improvement in timber flow from 21% of the THLB having a 9% increase in timber availability from late rotation fertilization (based on increasing managed stand yields sensitivity).
- 3% midterm improvement in timber flow from spacing thrifty stands (based on reducing minimum harvest age sensitivity).

These increases are applied to the base case as shown in the Potential harvest increase figure.



Potential harvest increase

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

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. This issue was howver discussed during the working session.

Product Objectives

Beyond what is stated on page iv, no specific product objectives exist, 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 were assessed with respect to its probable impact on log quality. These assessments are summarized in the following table.

Code	Impact
+	positive
0	neutral
-	negative

Available Information Regarding Potential Treatments and Impact on Quality

Treatment		Impact on quality
MT1	Spacing Thrifty stands	+
MT2	Late rotation fertilization	+
Q1	Pruning	+
H1	Variable retention harvesting	+
H2	Spacing RMA	0

Potential Timber Quality Strategies by Response Time Frame

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result
♦ Immediate	Nothing identified		
♦ Short Term (1–20 yrs)	Nothing identified		
♦ Mid Term (21–110 yrs)			
MT1	Spacing	Currently used for density control	Would increase the stand quality
MT2	Late rotation Fertilization	Not currently practiced	Average piece size would increase, increasing quality
♦ Long Term (111+ yrs)			
Q1	Pruning	Being done on a limited basis	Will definitely increase wood quality
H1	Variable retention harvesting	Currently 40% of Harvest, 50% by 2002	High quality wood distributed over longer timeframe
H2	Spacing RMAs	Not currently practiced	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 will be 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 will be summarized in the following table.

Code	**Impact**
+	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
MT1	Spacing	+	+	+
MT2	Late rotation fertilization	0	0	0
Q1	Pruning	0	0	+
H1	Variable retention harvesting	+	+	+
H2	Spacing RMA	+	+	+

Potential Habitat A Strategies by Response Time Frame

Response Time Frame	Potential Strategy/Action	Discussion / Current Status	Anticipated Result
♦ Immediate			
	Nothing identified		
♦ Short Term (1 – 20 yrs)			
	Nothing identified		
♦ Mid Term (21–110 yrs)			
MT1	Spacing-timber		Speeds up the development of second growth stands to old growth characteristics and promotes understory.
MT2	Late rotation fertilization		No affect on habitat aside from potentially more lush vegetation.
♦ Long Term (111+ yrs)			
Q1	Pruning		Provides better visibility
H1	Variable retention harvesting		Maintain structural complexity
H2	Spacing-RMAs		Rehab dysfunctional habitat

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 10 is constrained by timber availability at decade 15. Because of the timing of this constraint, opportunity exists to enhance timber supply prior to this point. Generally, any strategy, which increases timber availability prior to decade 15, will have a positive impact on mid 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 10. Several of the silviculture tactics identified for improvement of quantity are also expected to have a positive impact on quality. In addition, pruning could be implemented specifically to improve the supply of premium log grades. However, the cost of such a program is substantial, and more explicit definition of quality objectives should be completed prior to undertaking a pruning program.

Working Targets

The preceding analysis indicates the following working target is attainable:

- Maintain the existing AAC (171,000m^3) for a period of 40 years;
- Improve mid-term level by approximately 5000 m^3 over the base case and
- Achieve a long-term level of 123,400 m^3 (13,400 m^3 over the base case).

Log Product Objectives

As stated, log product quality objectives have not been explicitly developed for TFL 10.

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 10, January, 2002.

Treatment		Location	Ha/yr	Timber supply			Quality	Habitat			Direct Jobs Days/ha	Direct Cost $/ha	Priority
				Sh	Me	Lo		OG	Ri	W			
	Surveys	Throughout	380								0.1	55	1
IM 1	Nothing Identified												
ST 1	Nothing Identified												
MT 1	Spacing-timber(1)	Throughout	60	0	+	0	+	+	+	+	4	2000	1
MT 2	Fertilization-late rotation	Throughout	80	0	+	+	+	0	0	0	.1	300	2
Q 1	Pruning	Throughout	20	0	0	0	+	0	0	+	12	4500	4
H1	Variable retention harvesting*	Throughout	120	-	-	-	+	+	+	+	3	3000	1
H2	Spacing-rma	Throughout	10	0	0	0	0	+	+	+	4	2000	3

*Variable retention harvesting is not eligible for FRBC funding

(1) Juvenile Spacing Regimes

Analysis Unit/Site	Elevation	Initial Density	Well-spaced stems	Space	Relative Rank
FHC/good	Low	>2000	>700	700-800	2
FHC/medium	Low-mid	>3200	>800	700-900	1
CH/good/medium	Low	>2500	>600	500-700	2
CH/medium	Mid	>3500	>800	800-1200	3
HCB/good	Low-mid	>3000	>800	800-1000	2
HCB/medium	Mid-upper	>5000	>850	1000-1200	4

Treatment of poor sites will be done in conjunction with productive sites when the treatment benefits wildlife or habitat objectives.

General Ranking: H =1 & 2; M =3; L =4 & 5

Incremental Silviculture Program

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

Program Table – Hectares treated: TFL 10, January, 2002

Treatment		Location	Years 1-5					Totals		
			1	2	3	4	5	1-5	6-10	1-10
	Surveys	Throughout	380	380	380	380	380	1900	600	2500
IM1	Nothing identified									
ST1	Nothing identified									
MT1	Spacing	Throughout	60	60	60	60	60	300	300	600
MT1	Spacing backlogged	Toba	50	50	50	50	50	250	0	250
MT2	Late rotation fertilization	Throughout	0	0	0	0	0	0	0	0
Q1	Pruning	Throughout	20	20	20	20	20	100	100	200
H1	Variable retention harvesting*	Throughout	90	90	120	120	120	540	600	1140
H2	Spacing RMA	Throughout	10	10	0	0	0	20	20	40

*Variable retention harvesting is not eligible for FRBC funding

Program Table – $ 000s: TFL 10, January, 2002

Treatment		Location	Years 1-5					Totals		
			1	2	3	4	5	1-5	6-10	1-10
	Surveys	Throughout	21	21	21	21	21	105	33	138
IM1	Nothing identified									
ST1	Nothing identified									
MT1	Spacing	Throughout	120	120	120	120	120	600	600	1200
MT1	Spacing backlogged	Toba	100	100	100	100	100	500	0	500
MT2	Late rotation fertilization	Throughout	0	0	0	0	0	0	0	0
Q1	Pruning	Throughout	90	90	90	90	90	450	450	900
H1	Variable retention harvesting	Throughout	270	270	360	360	360	1620	1800	3420
H2	Spacing RMA	Throughout	20	20	0	0	0	40	40	80

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 10, January, 2002

Treatment		Location	Years 1-5					Totals		
			1	2	3	4	5	1-5	6-10	1-10
	Surveys	Throughout	0.21	0.21	0.21	0.21	0.21	1.06	0.33	1.39
IM1	Nothing identified									
ST1	Nothing identified									
MT1	Spacing	Throughout	1.33	1.33	1.33	1.33	1.33	6.67	6.67	13.33
MT1	Spacing backlogged	Toba	1.11	1.11	1.11	1.11	1.11	5.56	0	5.56
MT2	Late rotation fertilization	Throughout	0	0	0	0	0	0	0	0
Q1	Pruning	Throughout	1.33	1.33	1.33	1.33	1.33	6.67	6.67	13.33
H1	Variable retention harvesting	Throughout	1.5	1.5	2	2	2	9	10	19
H2	Spacing RMA	Throughout	0.22	0.22	0	0	0	0.22	0.22	0.44

Note: assumes 180 days of silviculture work = 1 job

Program Table – Long-term employment: TFL 10, January, 2002

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	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0
5	5.0	2.7	6.6	26.5	65.5
6	5.0	2.7	6.6	26.5	65.5
7	5.0	2.7	6.6	26.5	65.5
8	7.4	3.9	9.6	39.0	96.3
9	5.8	3.1	7.6	30.8	76.2
10	5.8	3.1	7.6	30.8	76.2
11	5.8	3.1	7.6	30.8	76.2
12	5.8	3.1	7.6	30.8	76.2
13	5.8	3.1	7.6	30.8	76.2
14	5.8	3.1	7.6	30.8	76.2
15	5.8	3.1	7.6	30.8	76.2
16	5.8	3.1	7.6	30.8	76.2
17	5.8	3.1	7.6	30.8	76.2
18	5.8	3.1	7.6	30.8	76.2
19	5.8	3.1	7.6	30.8	76.2
20	5.8	3.1	7.6	30.8	76.2
21	5.8	3.1	7.6	30.8	76.2
22	5.8	3.1	7.6	30.8	76.2
23	5.8	3.1	7.6	30.8	76.2
24	5.8	3.1	7.6	30.8	76.2
25	5.8	3.1	7.6	30.8	76.2
Total				642	1588

[(1)] 1000 m^3 of harvest = 0.53 incremental jobs on the TFL
[(2)] 1000 m^3 of harvest = 1.31 incremental jobs in the province

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