
Okanagan TSA

Silviculture Strategy (Type 1)

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The consultants also wish to thank the participants in the workshop, listed below, whose contributions are the basis of this strategy.

	Name	Role/Position	Organization
1	Bruce Pamplin	Silviculture Forester	MoF – Kamloops
2	Alan Rassmussen	Silviculture Forester	MoF – Penticton
3	Randy Hardy	Forester	Gorman Bros. Lumber Ltd.
4	Mark Leineman	Silviculture Tech.	ML Forestry Services
5	Ray van Ingen	Silviculture Tech.	Gorman Bros. Lumber Ltd.
6	Mic Werstuik	Nat. Resource Tch.	Heartland Economics (WFM – sp?)
7	Ted McRae	Planning	MoF – Vernon
8	Don Purdy	Silviculture Forester	MoF – Vernon
9	Sue Matovich	SBFEP Silv. Forester	MoF – Vernon
10	Kim Young	Silviculture Forester	Tolko – Lavington
11	Rob McAdam	Silviculture	Tolko – Lavington
12	Paul Birzins	Planning	MoF – Salmon Arm
13	Gene Desnoyers	Silviculture	MoF – Penticton
14	Jeff Fukumoto	Silviculture	MoF – Salmon Arm
15	Jim Wright	Silviculture Forester	MoF – Salmon Arm
16	Glenn Noble-Hearte	Silviculture Tech	MoF- Penticton District
17	Jerome Girart	Silviculture	Riverside – Kelowna
18	Bob Johnson	Silviculture Forester	Riverside – Armstrong
19	Bill Coulter	Silviculture Forester	Riverside – Lumby
20	Edward Collen	Silviculture Forester	Weyerhaeuser – Okanagan Falls
21	Steve Jones	Consultant (SIFC) to WeyCan	
22	Brain Harris	Habitat Officer	MELP – Penticton Forest Dist.



Preface

The development of silviculture strategies for TSAs and TFLs is motivated by the desire to clarify the relationship between investments in silviculture and the critical forest-level issues specific to the management unit.

The Type 1 analysis is workshop-based. It draws on the expert knowledge of the participants to identify the critical issues, derive objectives with respect to those issues, specify regimes to meet those issues, and identify the regime activities that can be implemented in the next five years. After consideration of the benefits and costs of each of the activities on each of the forest-level objectives, the participants rank the silviculture activities by priority. The result is a prioritized list of silviculture activities that are explicitly linked to the critical issues of the management unit.

Type 2 analyses are model-based, but the analysis process is fundamentally identical to the Type 1 analysis. A forest-level model is used to evaluate the impacts of regimes on the forest-level objectives, to identify the silviculture activities constituting the “preferred management scenario”, and to rank those activities.

The Type 2 (model-based) analysis will result in a silviculture strategy that is considerably more appropriate and robust than the Type 1 approach, but it is more expensive and demanding of scarce modeling expertise. Hence the Type 1 (workshop-based) approach has been designed to produce an interim silviculture strategy that will serve until a Type 2 analysis can be completed.

In the absence of a silviculture strategy for a management unit, the Ministry of Forests’ provincial level strategy *Incremental Silviculture Strategy For British Columbia (Interim)* has provided interim guidance. A summary of this document is included as Appendix 3 to this report.



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1. Introduction

The Silviculture Strategy (Type 1) workshop draws on the expert knowledge of the participants to: (1) identify the critical issues that should guide silvicultural planning on the TSA, (2) derive objectives with respect to those issues, (3) specify regimes to meet those issues, and (4) identify the regime activities that can be implemented in the next five years. The key idea is that this line of logic from issues to silvicultural activities can be retraced when allocating funds to ensure that activities are funded that address critical TSA issues.

The first step in developing this line of logic is to identify the critical issues that should guide silvicultural planning on the TSA. Next, the participants' objectives with respect to these issues are clearly stated. Strategies for meeting these objectives are identified, together with the silvicultural target (stand types) to which these strategies are to be applied. A plan of action, most often a silvicultural regime, is then developed to implement each strategy. This sequence constitutes the "strategic analysis" part of the workshop and the resulting compilation of issues, objectives, strategies and regimes is the silviculture strategy.

After developing the strategy, the workshop identifies opportunities to implement the regimes in the next five years and develops a program of silvicultural activities that is consistent with the strategy and is feasible with respect to the operational realities of the TSA. The impacts of these silvicultural activities on selected objectives are estimated by the workshop participants, and in a final step, the activities are ranked as to their importance with respect to the TSA issues. Development of the 5-year plan of silvicultural activity and estimating impacts and evaluating ranks of the activities constitutes the "tactical analysis" part of the workshop.

This report documents the results of a workshop to develop a strategy and a 5-year plan for the Okanagan TSA. Following this introduction, section 2 summarizes the results of the strategic analysis and section 3 presents the analysis of the 5-year plan. Issues that influence silviculture planning on the TSA were obtained from a questionnaire sent to the District, the most recent Resource Management Plan, and other documents identified by the District. These issues were compiled prior to the workshop and are described in Appendix 1. Appendix 2 contains a detailed examination of the timber supply situation on the TSA, also prepared prior to the workshop, as some aspect of timber supply is often a guiding issue for silviculture planning. As noted in the Preface, Appendix 3 is a summary of the Ministry of Forests' provincial level strategy *Incremental Silviculture Strategy For British Columbia (Interim)*. The Penticton Forest District's document *Maintaining Biodiversity and Wildlife Habitat in Silviculture Projects* is included with a related letter and flowchart of the referral process in Appendix 5, and Appendix 6 contains the regimes developed in the workshop by participants.



2. Guiding Issues

This section identifies the critical issues that guide silviculture planning in the Okanagan TSA. The issues prepared prior to the workshop (Appendix 1) were reviewed by the participants and modified, refined and ranked (Table 2-1).

Issues that were identified as requiring investigation prior to planning silvicultural action (the "to-do" list) are compiled Table 2-2.

Table 2-1. Issues guiding silviculture planning on the Okanagan TSA

	Issue	Priority ¹		
		P	V	S
1	Operational constraints on timber supply that are not recognized by the aspatial modeling methods used in the TSR reduce the availability of harvestable timber (i.e., reduce harvest flexibility) in the short- and mid-term.	3	H	H
2	Green-up constraints and expected expansion of visually sensitive areas are reducing harvesting flexibility in the short term.	1	H	H
3	Wood quality is expected to decline during the transition from natural to managed stands.	1	M	L
4	Fd sites in IDF stands are under-performing with respect to TSR assumptions, and will result in downward pressure on mid- and long-term harvest levels.	2	L	L
5	Regenerated stands and treated stands may be under-performing expectations, with implications for late mid- and long-term timber supply.	2	H	H
6	The onerous green-up constraints in community watersheds result in lack of harvesting flexibility and downward pressure on timber supply.	2	L	L
7	TSR1 reported 120 thousand hectares of problem forest types (PFT). Rehabilitation of suitable PFT stands could increase the timber harvesting land base and hence the long-term harvest level.	6	H	M
8	Management of grizzly bear and caribou habitat, as well as other habitat issues identified in the LRMP may constrain timber supply.	6	nr	nr
9	Pruning programs have left partially treated stands that should be completed in order to protect past investments.	4	M	M
10	Pruning provides employment and is a component of community partnerships.	4	L	L
11	The productivity of white pine and other pines is reduced by various diseases.	5	M	M
12	Salvage areas are considered as contributing to the AAC but may be understocked	6	M	M
13	Backlog ²			

¹ P, V and S stand for Penticton, Vernon and Salmon Arm

² Backlog was not identified as an issue at the workshop but was listed as an opportunity to increase timber supply in the TSA's 1999 RMP.



Table 2-2. Issues identified as requiring investigation prior to planning silvicultural action

	Issue	Priority ¹		
		P	V	S
1	Undertake a FSSIM exercise to determine timber supply situations in geographic sub units of the TSA (i.e., by districts), and by community watershed. Investigate differences between TSR1 and TSR2; map the changes to the THLB from TSR1 and TSR2 and note north/south impacts. Many TSA issues are contingent on completing this topic.	1	H	H
2	Create a sampling procedure to confirm OGSI shifts using growth intercept surveys coupled with other traditional surveys. This is important but is not critical for other activities	2	H	H
3	Improve inventory information quality. There is a concern that volume of older stands is not what is assumed; general concern about accuracy; important but not critical for other activities.	3	H	H
4	Undertake a problem analysis to determine suitable density management objectives. It is recognized that they may well vary across the TSA and include volume and product mix objectives. These objectives must be defined and timing of treatment specified. End-product objectives should be defined in terms of minimum piece size; taper and wood quality should be derived. This issue is contingent on issue 1 above.	4	M	M
5	Coordinate and undertake review and reconnaissance survey IDF Fdi and Pp IU logged and determine appropriate silvicultural system (reforestation methods and density management). Also identify criteria for PFT, opportunities, and recognize other forest resource objectives. This issue is contingent on topic 1.	5	L	L
6	Undertake a problem analysis to investigate the decline of PI when held past maturity as scheduled in TSR2. Investigate the risks associated with rationing timber as per the TSR2 timber supply forecast.	6	M	M
7	Confirm OAF's for all types for future TSR analyses.	nr ²	H	H

¹ P, V and S stand for Penticton, Vernon and Salmon Arm

² nr: not ranked



3. Strategies and Their Implementation

The participants analyzed issues that could be addressed with silvicultural actions by identifying: objectives with respect to each issue, strategies for meeting the objectives, the target stand types, and a list of activities to implement each strategy. Some of these detailed specifications of regimes are compiled in Appendix 5. The set of strategies and activities are categorized in the following sections as timber quantity, timber quality and habitat strategies.

3.1 Reduce Minimum Harvest Age - Enhanced Regeneration

Reducing minimum harvesting age across the timber harvesting land base will mitigate the effects of operational constraints on timber supply that reduce the availability of harvestable timber (i.e., reduce harvest flexibility) in the short- and mid-term (issue 1 in Table 2.1). This strategy will be implemented by:

- prompt and enhanced reforestation using improved seed where available,
- shortened regeneration delay by planting as soon as possible
- use vegetation control where needed
- use density control where natural regeneration ingress is excessive

Class A seed is expected to produce between 4% and 26% greater volume. Reduced regeneration delay, utilization of appropriate microsites, brushing and density control will promote early full establishment.

See also the regime description “Minimum Harvest Age” in Appendix 5.

3.2 Reduce Minimum Harvest Age - Fertilization.

Fertilization of suitable PI stands (40-70 years, medium to good site classes) will reduce the time to minimum harvest criteria (reduce minimum harvest age) by 10 to 20 years (issue 1 in Table 2.1). Suitable PI stands must be identified or PCT or CT treatments utilized to create suitable densities. A fertilization strategy for the TSA should be developed to identify candidate stands, initiate a fertilization program and quantify fertilization effects.

See also the regime descriptions “Wood Quality” and “Quality and Taper” in Appendix 5.

3.3 Accelerated Regeneration in Visually Sensitive Areas

Accelerated regeneration in Visually Sensitive Areas (VSAs), Penticton District Montane Spruce areas, and community watersheds will reduce the impact of green-up constraints and mitigate the timber supply implications of increases in VSAs (issue 2 in Table 2.1). This strategy will be implemented by:

- use improved seed for reforestation when available.
- site preparation where appropriate.
- planting larger stock
- fertilizing early (field trials)
- shortening regeneration delay by planting as soon as possible, using vegetation control where needed, and using density control where natural regeneration ingress is excessive



Class A seed is expected to produce between 4 and 26% greater volume with attendant increases in height growth and reduction in time to green-up. Reduced regeneration delay, utilization of appropriate microsites, brushing and density control will promote early full establishment. Planting larger stock and early fertilization will promote reaching green-up target height criteria earlier.

See also the regime description “Enhanced Regeneration and Development Regime” in Appendix 5.

3.4 Space Juvenile Stands

Space juvenile space stands (mostly fire origin PI) greater than 10,000 sph in order to produce larger and more uniform piece size, reduce time to merchantability, and provide increased treatment options such as commercial thinning. This strategy addresses issue 3 (declining wood quality) and issue 1 in Table 2.1 (operational constraints on timber supply). This strategy will be implemented by spacing PI stands to 3000 sph or another density specified to meet product and timing objectives.

See also the regime description “Quality and Taper” in Appendix 5.

3.5 Prune Thinned Stands

Prune stands that have been pre-commercially thinned to < 1600 sph in order to reduce the amount of juvenile wood and increase value through knot free wood (issue 3 in Table 2.1). A second target is stands with a high level of white pine. Candidate stands will be identified with the ISIS database and pruned stands will be tracked to ensure that maximum value is obtained from the stand at harvest. While log quality is the traditional objective of pruning, a major benefit of this strategy is the generation of employment benefits and the maintenance of partnership arrangements with First Nations (issue 10 in Table 2.1). The anticipated benefit of pruning white pine is the reduction of the infection rate for White Pine Blister Rust.

3.6 Complete Partially Pruned Stands

Complete treatments (finish the first lift or prune second lift) of all stands that have had a partial lift or where a second lift is prescribed (issue 9). Completing these treatments protects previous investment as well as increasing the value of the stands.

3.7 Influence Tree Improvement Program

Utilize desired genetic traits to maximize future timber value and options. The objective of this strategy is to plant stock on all harvested stands with superior provenance selected for small knots, good height growth and high density (addresses issue 3 in Table 2.1). This will likely require additional selection criteria for class A seed.

3.8 Improve Management of IDF

Use the recently produced IDF protocol (source required) and follow-up inventory to identify current conditions and provide treatment options for under performing Fd sites (addresses issue 4 in Table 2.1; also see the regime “Under performing Fd” in Appendix 5). Develop treatment



options based on stand structure, forest health and forest level objectives. Site and stand conditions along with the desired forest condition will be used to create site specific prescriptions that may include all phases of harvesting and post harvest silvicultural treatments including under-burning. Anticipated benefits of this strategy include better definition of current conditions, refinement of the estimate of manageable forest landbase, and potential gains in under performing IDF.

3.9 Review Criteria for Problem Forest Types

The criteria for problem forest types should be reviewed to identify treatable stands. Treatment of PFTs will increase the timber harvesting landbase and long-term timber supply.

3.10 Treat Under-performing Regenerated Stands

Identify, prescribe and rehabilitate stands that are performing much below the expected level due to forest health, poorly adapted growing stock or other causes (issue 5 in Table 2.1). Target both artificial and naturally reforested areas where regeneration is under performing including PI in the wetbelt, drybelt Fd and Sx in lower elevation sites which are susceptible to weevil attack. The general approach will be to conduct surveys to identify problems sites, determine the probable limiting factor or factors, and assess treatment options. In many cases treatment will include regimes similar to those used in reforesting backlog NSR.

See also the regime description “Plantation Performance Monitoring” in Appendix 5.

The anticipated benefit from this strategy is that under-performing stands will be brought back into the yield trajectory assumed in TSR timber harvest forecasts. Without treatment of these stands, the timber supply forecasts are overly optimistic and volume shortfalls will occur in the mid- and long-term.

3.11 Rehabilitation of Problem Forest Types

Rehabilitate problem forest types (PFTs) as defined in TSR II to increase the timber harvesting land base. This strategy will be implemented by defining PFT's in the field, mapping and ground truthing areas potentially suited to treatment. Prescriptions to treat suitable sites will be developed and ranked by economic opportunity. Areas presently satisfying other resource values, such as old seral contributions to LU planning or other critical habitat needs, will not be considered as candidates for treatment.

The anticipated benefits from this treatment are increases in mid- and long-term timber supply (issue 1) but there is also a risk of investing in stands that will not become part of the timber harvesting land base.

3.12 Implement MOF/MoELP Strategy for Maintaining Biodiversity and Wildlife Habitat in Silvicultural Projects

All backlog and incremental treated areas will be managed according to the operating procedures and referral flowchart described in the MOF/MoELP Strategy for Maintaining Biodiversity and Wildlife Habitat in Silvicultural Projects. This document is included in Appendix 4, together with a related policy letter and spreadsheet. The intended benefit of the strategy is to ensure that the design of all silvicultural treatments consider structural requirements for the maintenance of



biodiversity and the reduction of associated administrative bottlenecks. This strategy addresses issue 8 in Table 2.1.

3.13 Implement the Okanagan LRMP Resource Management Zone Habitat Strategies

The Okanagan LRMP will provide management guidelines for RMZs with specific habitat objectives (e.g., grizzly, caribou; issue 8 in Table 2.1).

3.14 Survey and Treat Salvage Areas

Survey all harvested areas not covered by an SP and all areas under salvage permits to determine if these areas are understocked with respect to TSR assumptions (issue 12 in Table 2.1). Understocked stands will be treated with regimes similar to those used in reforesting backlog NSR.

The intent of this strategy is to bring sites up to their productive capability and be consistent with TSR modelling assumptions.

See also the regime description “Salvage Regime ” in Appendix 5.

3.14 Treat Backlog

Backlog reforestation enhances timber supply by putting NSR area back into reforestation. Treating backlog addresses issues 1, 2 and 5 in Table 2.1.



4. Silviculture Impacts and Priorities

The silviculture activities required to implement the strategies identified in Table 2.1 are summarized below in Table 4.1, together with their impacts on selected TSA objectives.

The workshop participants declined to participate in the development of Table 4.1 and subsequent Type 1 workshop activities, and referred the Consultants to the 1999 Resource Management Plan (RMP), the Salmon Arm Forest District Silviculture Strategic Plan, and other materials supplied to the Consultants prior to the workshop. Using these sources, the Consultants estimated for each treatment the opportunity area (i.e., the area available for treatment for the next 5 years), the impacts on timber supply quantity and quality, and habitat effects.

5. Silviculture Program

5.1 Tactical Priorities

The highest ranked activities in Table 4.1 are enhanced regeneration activities (planting larger stock, fertilization at planting), backlog brushing and fertilization of appropriate older stands.

Rehabilitation and salvage activities (site prep, planting and brushing) and completing second lift pruning were ranked medium priority, while spacing and pruning for employment were ranked low.

5.2 Program Costs and Benefits

Table 5-1 contains the area treated by activity and year.

Table 5-2 contains the expenditure by activity and year, based on the unit costs recorded in the treatment table (Table 4.1).

Table 5-3 contains the silviculture employment benefits associated with the program.

The employment effects and costs used to develop the program tables (Table 5.1-5.3) were drawn from a variety of Regional and Provincial sources. The rank (priority) of each treatment was determined through consideration of ranks assigned by the participants to the issues (Table 2-1) and rankings assigned in the RMP and Salmon Arm Forest District Silviculture Strategic Plan.

Table 4-1a. Issues, silviculture activities, their impacts and ranks.

Issues		Activities	Opportunity Area (Ha/Yr)	----- Timber Supply Effects -----			Qual	Habitat Effects	Workshop Ranks		
				Short	Mid	Long			P	V	S
				0-20	21-100	100+					
Survey			34550								
	1	general - 3X program	7350								
4	2	Fdi	5000								
5	3	poor performance	2000								
5	4	treatment response pre 87	10000								
5	5	treatment response post 87	7000								
7	6	rehab opportunities	3000								
12	7	salvage areas	200								
Regen to FG			2100								
1,2	8	site prep	na								
1,2	9	plant larger stock	na								
1,2	10	fert at planting	200	+	+	+		-	H	H	H
6	11	site prep - CW	na								
6	12	plant larger stock - CW	na								
6	13	fert at planting - CW	100	+	+	+		-	H	H	H
7,13	14	site prep - Rehab	500		+	+		n	L	H	M
7,13	15	plant larger stock - rehab	500		+	+		n	L	H	M
7,13	16	brushing legal plus impeded	550		+	+		n	H	H	H
12	17	site prep - salvage	100		m	m		n	L	M	M
12	18	plant larger stock - salvage	100		m	m		n	L	M	M
12	19	brushing	50		m	m		n	L	M	M
Spacing			1250								
3	20	PI	1000		+	+		+/-	H	L	L
3	21	Fd (dry)	250		+	+		+/-	H	M	L
Pruning			500								
9	22	existing partial	300				+	+	M	M	M
10	23	new-employment	200				+	+	M	L	L
Fertilization			1500								
1	24	appropriate older stands	1500	+	+	+		+/-	H	H	H
Habitat			2000								
8	25	Habitat	2000					+	H	NR	NR
Forest Health											
11	26	prune Pw, other pines	na								

Notes:

+, - indicates, respectively, a positive or negative impact on the indicated objective.

+/- indicates that the activity could have a positive or negative effect, depending on its circumstances of application

m - assumed in current TSR and required to maintain the harvest forecast

na - not available

Ranks: (H,M,L) high, medium, low

NR - not ranked

(P,V,S) Penticton, Vernon and Salmon Arm Forest Districts

Unit Cost and Employment Assumptions (Regional and Provincial sources)

Year	Surveys* All	Site Prep Rehab	Backlog Brushing	Plant Larger Stock	Juvenile Spacing	Pruning Value	Fertilization At Planting	Fertilization
\$/ha	15	2,000	400	233	450	1,200	150	175
PDs/ha	0.04	?	2.0	0.5	3.0	8.0	0.50	0.10

* Includes prescription and layout

Table 5-1. Area (ha) treated by activity and year.

Year	Surveys* All	Site Prep Rehab	Backlog Brushing	Plant Larger Stock	Juvenile Spacing	Pruning Value	Fertilization At Planting	Fertilization	Total
1	34,550	600	600	600	1,250	500	300	1,500	45,661
2	34,550	600	600	600	1,250	500	300	1,500	46,293
3	34,550	600	600	600	1,250	500	300	1,500	45,610
4	34,550	600	600	600	1,250	500	300	1,500	45,610
5	34,550	600	600	600	1,250	500	300	1,500	45,610
Subtot Yr 1 - 5	172,750	3,000	3,000	3,000	6,250	2,500	1,500	7,500	228,783
6 - 10	34,550	3,000	3,000	3,000	6,250	2,500	1,500	500	62,955
Total Yr 1 - 10	207,300	6,000	6,000	6,000	12,500	5,000	3,000	8,000	291,738

* Includes prescription and layout

Table 5-2. Expenditure ('000 \$) by activity and year.

Year	Surveys* All	Site Prep Rehab	Backlog Brushing	Plant Larger Stock	Juvenile Spacing	Pruning Value	Fertilization At Planting	Fertilization	Total
1	518	1,200	240	140	563	600	45	263	4,141
2	518	1,200	240	140	563	600	45	263	4,559
3	518	1,200	240	140	563	600	45	263	4,108
4	518	1,200	240	140	563	600	45	263	4,108
5	518	1,200	240	140	563	600	45	263	4,108
Subtot Yr 1 - 5	2,591	6,000	1,200	699	2,813	3,000	225	1,313	21,024
6 - 10	518	6,000	1,200	699	2,813	3,000	225	88	17,918
Total Yr 1 - 10	3,110	12,000	2,400	1,398	5,625	6,000	450	1,400	38,942

Table 5-3. Short term employment benefits (person-years) of the silviculture program, by year and activity.

Year	Surveys* All	Site Prep Rehab	Backlog Brushing	Plant Larger Stock	Juvenile Spacing	Pruning Value	Fertilization At Planting	Fertilization	Total
1	6.9	?	6.0	1.5	18.8	20.0	0.8	0.8	58
2	6.9	?	6.0	1.5	18.8	20.0	0.8	0.8	65
3	6.9	?	6.0	1.5	18.8	20.0	0.8	0.8	58
4	6.9	?	6.0	1.5	18.8	20.0	0.8	0.8	58
5	6.9	?	6.0	1.5	18.8	20.0	0.8	0.8	58
Subtot Yr 1 - 5	34.6	?	30.0	7.5	93.8	100.0	3.8	3.8	296
6 - 10	6.9	?	30.0	7.5	93.8	100.0	3.8	0.3	255
Total Yr 1 - 10	41.5	?	60.0	15.0	187.5	200.0	7.5	4.0	551

Note: Assumes 200 days of silviculture work = 1 job



Appendix 1

Issues Reviewed in the Okanagan TSA Workshop

The objective of this section is to identify aspects of the timber harvesting land base and its management that govern the supply of timber from the TSA. This information provides the basis for identifying the constraining mechanisms that shape the timber supply forecast for the unit and for specifying possible silvicultural remedies. Unless otherwise indicated, the data in section is drawn from the Okanagan TSA Timber Supply Analysis (1993) .

Issues that can be addressed through silviculture were obtained from the District (District Enquiry), the most recent Resource Management Plan, and other documents identified by the District. These issues will be reviewed and expanded during the workshop.

In discussions with District staff it was pointed out that there are major silvicultural differences between the north and south portions of the TSA.

A1.1 Timber Supply Issues - Quantity

Treatment of IDF stands(all) – IDF stands selectively harvested in 50's and 60's require a strategy to re-enter these areas to recover volume that is considered contributing to the AAC.

Green-up and VQO(all) – Meeting the green-up assumptions of the TSR is crucial to maintaining the AAC. Earlier achievement of green-up may be possible.

Density management (all) - Density management regimes across the TSA will vary according to, species, site, legal obligations and end products objectives.

Pre-FG Opportunities (all) – “Incremental” silvicultural opportunities exist pre-free growing (e.g., brushing for growth).

Poor plantation performance (north) – Requires more information on performance and development of appropriate treatments. Conversion of these types might conflict with OGMA and habitat objectives.

Community watersheds (south) – Areas of the timber harvesting land base that lie within community watersheds require special silvicultural consideration.

PFT, NCB, NCC types - Evaluate the opportunity and potential of rehabilitating non timber producing sites adding forest land base back into the TSA

Backlog Reforestation – TSR1 recorded 22 458 ha of backlog which was assumed to be restocked over 10 years.

A1.2 Timber Supply Issues – Quality

(none submitted prior to the workshop)

A1.3 Forest Health Issues

In general, incorporate Forest Health into all silviculture treatments, recognising a multitude of FH agents across the TSA and different FH agents being prevalent in different areas. Forest health management strategies should be consistent with timber end-products objectives.



Root diseases (north)- Root disease in the ICH and wetter IDF subzones has an impact on the management of forest and non-forest resources

Budworm and rusts (south) -

A1.4 Habitat Issues

(none submitted prior to the workshop)

A1.5 Employment Issues

(none submitted prior to the workshop)

A1.6 First Nations Issues

(none submitted prior to the workshop)

A1.7 Policy and information Issues

Delivery costs(all) - There is concern that partnership delivery costs exceed delivery costs obtained through competitive bids, and that the increased cost of completing work through partnerships impacts the achievements of the programs.

Inventory information (all) - Inventory information quality should be improved and gaps be filled

LRMP Impacts - The LRMP (not yet completed) will impact timber supply, modify silvicultural opportunities, and constrain treatments.

Inconsistent Funding - There are difficulties in implementing long-term silviculture regimse with a short- term and inconsistent funding. Inconsistent annual funding has impacts on the workforce and the efficiency and continuity of delivery. For example, the benefits of aggressive planting of backlog blocks may be lost in later years if funding is insufficient to brush these same blocks.

Monitoring treatments - Monitoring and follow-up of treatments to determine effectiveness and deficiencies is insufficient.

Confirmation of OGSI - Preliminary estimates of timber supply benefits from OGSI are substantial. These estimates should be confirmed through local studies.



Appendix 2

The Timber Supply Context of Silviculture in the Okanagan TSA

The objective of this section is to further define timber supply issues and identify the constraining mechanisms that shape the timber supply forecast for the unit.

Timber supply is the rate at which timber is made available for harvesting, and it is “made available” through natural, administrative, and economic processes. The forest economy draws timber from the land base in response to consumer demand, and this flow of timber is limited by the rate at which the forest can physically grow trees, and by a variety of administrative constraints. The combined effect of these three processes is considered in the determination of the Annual Allowable Cut (AAC). Silviculture can modify directly or adjust the effect of each of the three underlying processes.

The base case of the timber supply review (TSR) forecasts future timber supply subject to current management practices, administrative constraints and market conditions. The purpose of this section is to identify the “pinch points” and constraining mechanisms that shape the timber supply forecast for the unit. Observations drawn from the TSR base case and selected sensitivity analyses are used to describe the timber supply dynamics of the management unit and to suggest how silviculture treatments might enhance timber supply.

The TSR2 analysis was not yet published at the time of writing. Consequently, this section relies on TSR1 analysis data, augmented with some TSR2 information that has been released. Furthermore, an LRMP is also in preparation, which will also lead to changes in the timber supply dynamics of the TSA.

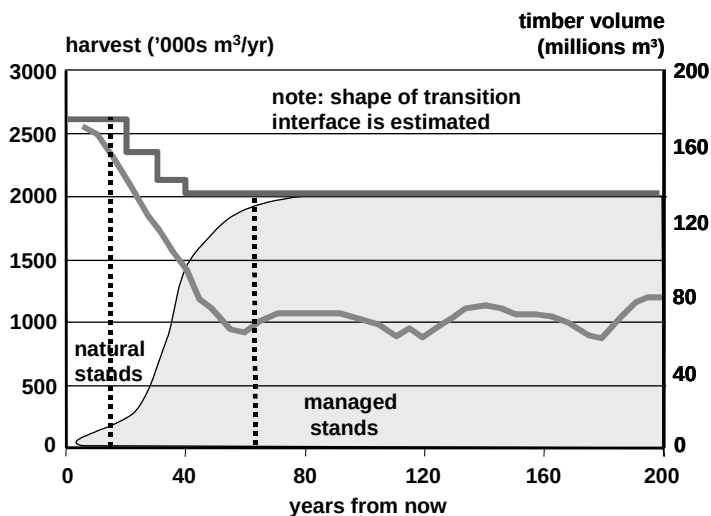
A2.1 Timber Supply and the AAC

The 1993 Timber Supply Analysis of the Okanagan TSA, upon which the current AAC determination was based, forecast that the allowable annual cut would be maintained for 20 years without causing a reduction in future harvest levels (Figure A2-1). After 20 years the harvest declines at 10% each decade until the long term is reached in the eighth decade. The long-term harvest level, the potential maximum that can be harvested in perpetuity, is about 2 022 000 cubic metres per year, a 23% decline from the initial harvest level.

The steep decline from current harvest levels to a lower long-term harvest level is characteristic of a management unit that is in transition from a timber surplus condition to condition of timber scarcity. Figure A2-1 also overlays the forecast levels of harvestable growing stock on the base case, demonstrating that the timing of the reduction of the stock coincides with the fall down in harvest. Note the increasing scarcity of merchantable timber. The pinch point in supply corresponds to the point of maximum scarcity of merchantable stock.



Figure A2-1. TSR1 Base harvest forecast, Okanagan TSA, 1993



A2.2 Transition from Managed to Natural Stands

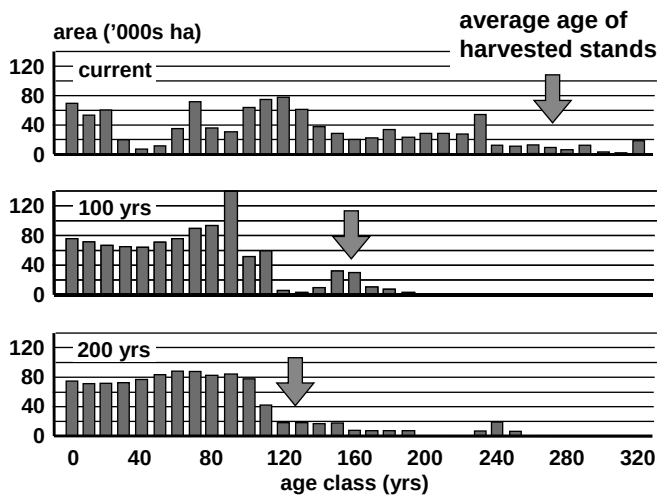
The transition of the harvest from old growth to predominantly second growth is also plotted on Figure A2-1. Note that this transition line is an estimate – this information was not reported from the TSR1 analysis. The transition curve helps identify the response framework for Type 1 and Type 2 Silviculture Analyses – the end of the mid term and beginning of the long term is the point at which the harvest is predominantly dependent on managed stands. We have identified 65 years as the end of the mid-term for Okanagan TSA. The short term is arbitrarily defined as the first 20 years. Current mature timber must be rationed to support the harvest schedule until managed stands come on stream.

Figure A2-1 further demonstrates the need to ration current mature timber until the transition from natural to managed stands occurs in the near future. Figure A2-2 displays the age distribution of the timber harvesting land base currently, and in 100 and 200 years time. Harvesting is currently concentrated in the stands aged 240+. The current harvest forecast will eliminate older age classes for the next 100 years. After this time the harvest forecast will be supported by younger age classes. In 100 years time the harvest will be concentrated in stands 120+. After this time harvesting will occur in stands which have just met or exceeded merchantable limits.

So far, our examination of the TSR graphics indicates that the timber supply curve for the Okanagan TSA is shaped by the rationing of surplus growing stock until managed stands come on-line to support the harvest. The relative scarcity of harvestable growing stock 5-7 decades in the future coupled with harvest flow constraints are also factors that shape the timber supply forecast.



Figure A2-2. Current and future age class distribution, Okanagan TSA 1993



A2.3 TSR2 Timber Supply

At the time of preparation of this report, a draft of the Okanagan TSR2 Timber Supply Analysis Report was not yet published. Figure A2-3 compares the base harvest forecast of the TSR1 to TSR2.

The predicted TSR2 base case harvest forecast will support the current AAC of 2 615 000 m³ per year. This level will be maintained until decade 14 when the harvest forecast will decline to the LTHL. The increase in the timber supply forecast can be attributed to increases in the THLB and decreases in selection management zones (Figure A2-4).

Changes to the timber supply forecast indicates that there are changes to the underlying timber supply dynamics. The drawdown of current mature growing stock will be lengthened (Figure A2-4). This will allow the pinch point, currently at decade 6 (TSR1), to be moved out 15 decades. The lengthened availability of mature growing stock will increase the time period in the harvest forecast when the transition from natural to managed stands occurs (Figure A2-4).

There has been recent study in the Okanagan TSA concerning old-growth site index adjustments (OGSI). If current site indices are underestimated, not only will the falldown in the timber supply forecast be delayed, it may be eliminated by OGSI adjustments (Figure A2-5).



Figure A2-3. Predicted TSR2 harvest forecast, Okanagan TSA, 2000.

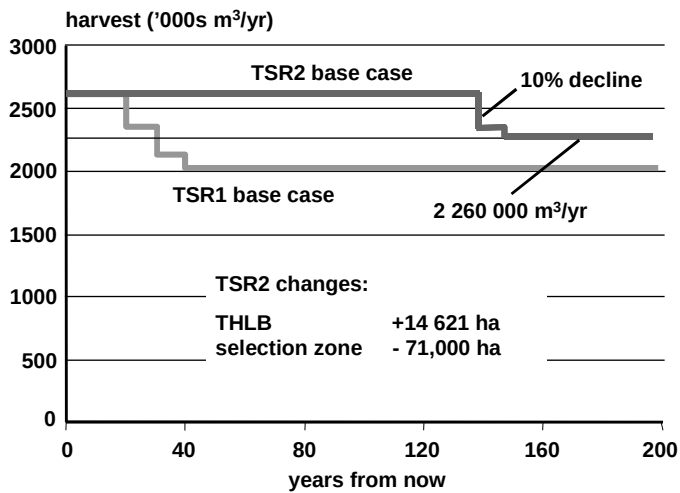


Figure A2-4. TSR2 harvest forecast and underlying timber supply dynamics, Okanagan TSA 2000.

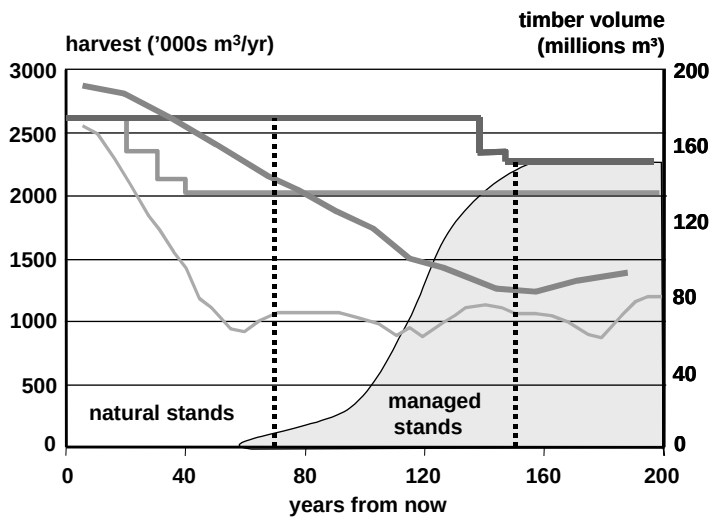
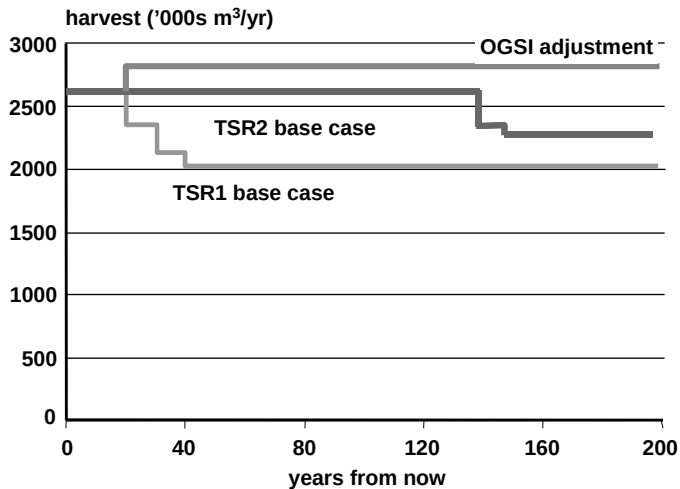


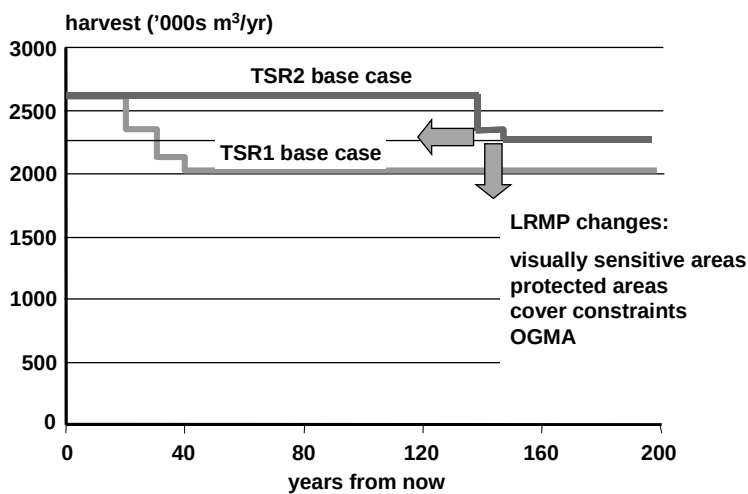


Figure A2-5. TSR2 base case harvest forecast with OGSi adjustments, Okanagan TSA, 2000



As stated previously, the Okanagan LRMP has not yet been released, but early indications from the report predict a changing harvest forecast (Figure A2-6). Increased forest cover constraints will suppress timber availability.

Figure A2-6. Base case harvest forecast and the impact of the LRMP, Okanagan TSA, 2000



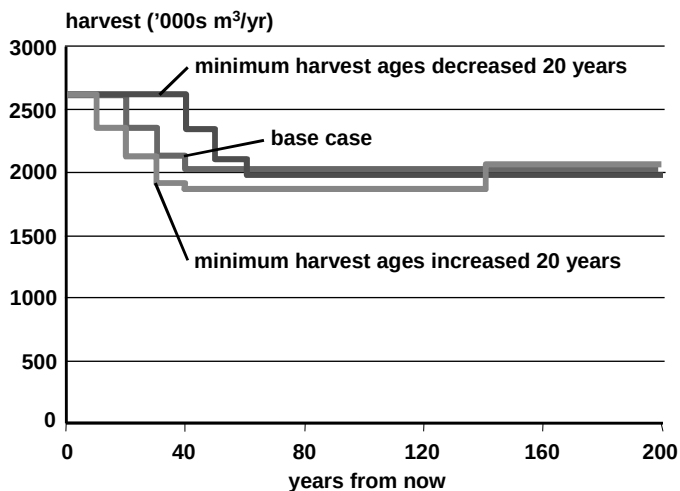
At this time, there is much uncertainty concerning the Okanagan timber supply. For purposes of discussion, this report will assume that the basic structure and dynamics of the timber supply as determined in TSR1 and explained in the TSR1 documents remain valid, but it is noted that future timber supply dynamics will be changing (TSR2 and LRMP).



A2.4 Sensitivity to Minimum Harvestable Ages

Minimum harvest ages might be reduced through silviculture and the TSR sensitivity analysis (Figure A2-7), gives us some idea of how much of a timber supply benefit is possible and when it might occur. In the short and early mid term, reducing minimum harvest ages has significant improvement in timber supply. This seems odd as Figures A2-1 and A2-2 indicate that the harvest in the short and mid term was supported mainly by stands age >200 years. However, it is likely that sometime after decade 10, during the period of maximum scarcity before sufficient managed stands were available to support the cut, the model is harvesting stands at their mha. The increase in available stands at this critical point, that results from reducing mha by 20 years, is substituted forward in harvest queue, up the fall-down staircase, drawn by the modeler's desire to maintain the initial harvest level for as long as possible and yet still decline at a maximum rate of 10% per decade.

Figure A2-7. Sensitivity to changes in minimum harvestable ages, Okanagan TSA, 1993

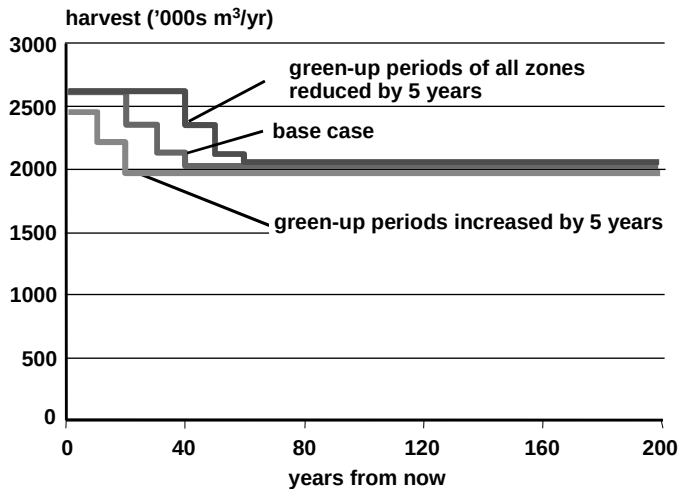


Note that in the TSR sensitivity analysis, the change in harvest ages is applied to all stands across the 250 year modeling horizon, while silviculture treatments would be applied to specific inventory targets and should result in larger benefits.

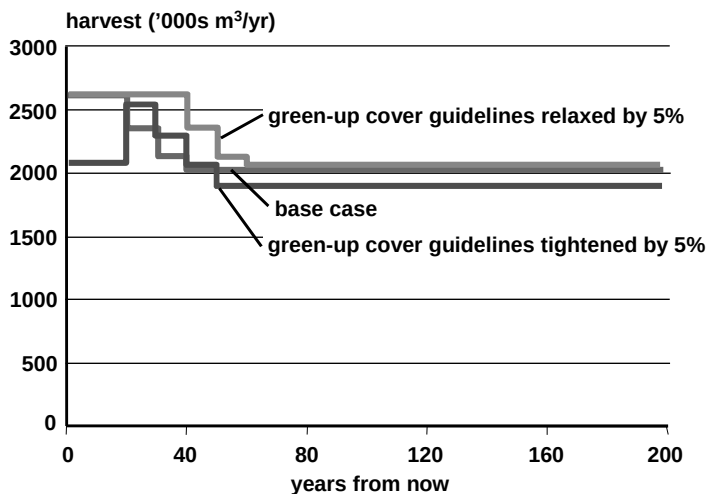
A2.5 Sensitivity to Green-up Constraints

Another way of affecting managed stand volumes is increasing or decreasing green-up age (Figure A2-8). Green-up age can be defined as the age in which a stand reaches a required height. If this time is increased or decreased changes in the harvest forecast are imminent.

Silvicultural regimes can be employed to reduce the number of years to reach the desired green-up age. Pre-free growing regimes such as improved planting stock, site preparation, herbicide and fertilization are just a few examples of regimes which could lessen the number of years required to reach desired green-up requirements.

**Figure A2-8. Sensitivity to changes in green-up age, Okanagan TSA, 1993**

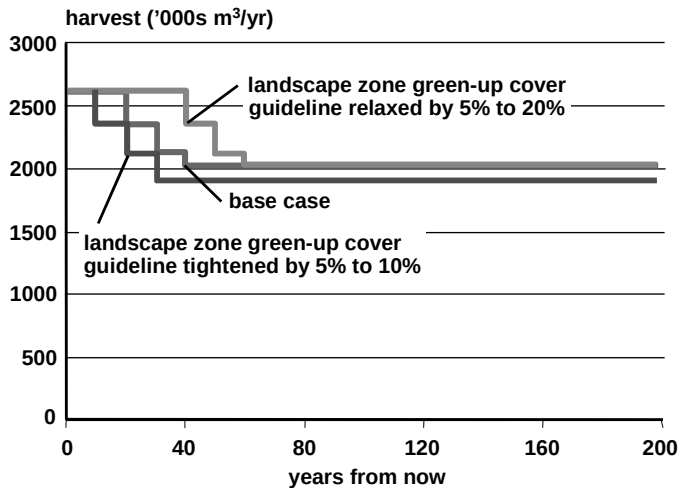
FigureA2-9 illustrates the effects of changing the amount of area required to meet green-up cover guidelines. When green-up requirement guidelines are relaxed we see a comparable positive effect to that of changing green-up age. When green-up cover guidelines are tightened these is a drastic decrease in the timber supply forecast.

Figure 2-9. Sensitivity to uncertainty in forest cover guidelines–green-up area, Okanagan TSA, 1993

When the maximum area below green-up ages within landscape management zones is increased or decreased the harvest forecast will fluctuate (Figure A2-10). Relaxing landscape zone green-up cover guidelines allows increasing areas of the timber harvesting land base to be eligible for harvest because there is less area tied up in landscape zone adjacency constraints. Tightening landscape zone green-up cover guidelines will have the opposite affect.



Figure A2-10. Maximum area below green-up ages–landscape management zone, Okanagan TSA, 1993



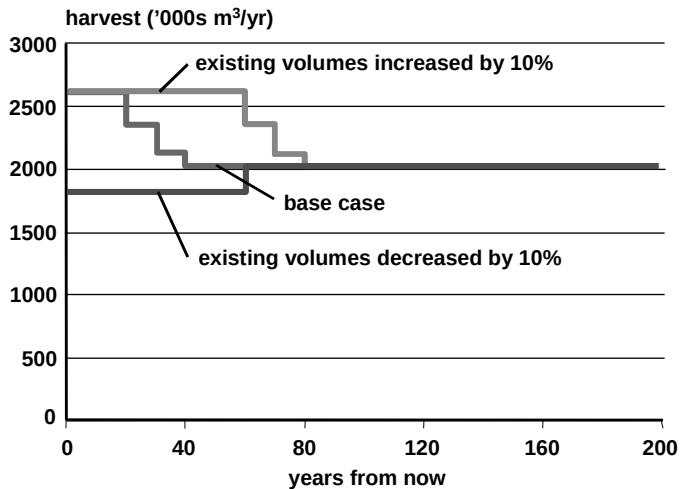
Employing alternative silvicultural treatments aids in alleviating certain forest cover constraints. Several harvesting techniques and equipment could be used to retain the stand structure found in merchantable older stands certain areas, therefore lessening the number of green-up forest cover constraints being met. This allows the harvest forecast to capture additional volume from the surplus available.

It should be noted that green-up is sensitive only when timber supply is tight. If additional area is added to the timber harvesting land base, as predicted for the TSR2 analysis, sensitivity to green-up age will not be an issue.

A2.6 Sensitivity to Stand Yields

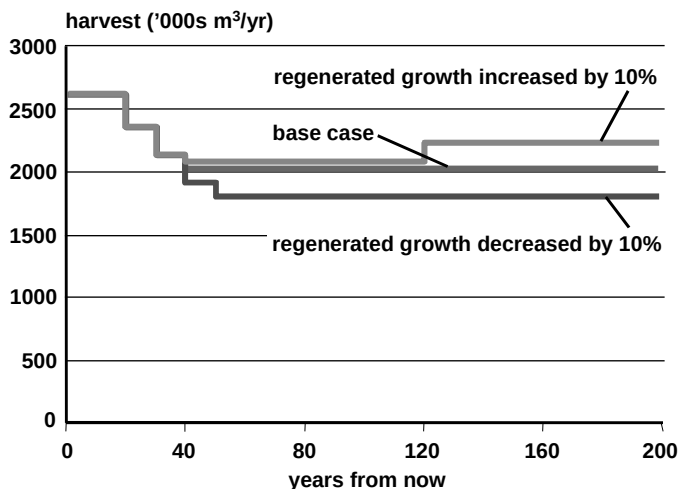
Increasing existing stand yields has a significant effect on the short to mid-term harvest levels (Figure 2-11). Since there is a majority of stands over the minimum harvestable age, increasing yield estimates will mean that increased volume will be obtained from these stands. The current harvest level can be maintained an extra 4 decades. As the older stands are used up, there will be a decline in the harvest, as seen with the base case. The effects of increasing existing stand volumes emphasize the opportunity for silviculture to increase the volume of standing timber.

Decreasing existing stand yields causes a drastic decline in the harvest level. The current harvest level can only be maintained for 1 decade. This can be attributed to the fact that the potential volume from the mature stands is lessened due to the decreased yield estimates. As these mature stands are harvested there is a steady decline in the harvest level. Decreasing stand volumes indicates the risk of loss in inventory or overestimation of merchantability.

**Figure A2-11. Sensitivity to uncertainty in existing stand volumes, Okanagan TSA, 1993**

Enhancing regenerated stand volumes by 10% creates an increased LTHL (Figure A2-12). The increase can be attributed to the surplus of stands nearing merchantable limits 100 years from now (Figure A2-2). When the future harvest forecast reaches decade 12, those stand will have reached merchantable limits. If silviculture targeted these stand, the increase in harvest may be brought forward.

Decreasing regenerated volumes increases the number of decades in the decline from the current harvest level to the LTHL (Figure A2-12). The LTHL will be approximately 11% lower than the base case harvest forecast LTHL. Reductions in the regenerated stand volumes can be attributed to overestimations in site productivity and increased pest infestations.

Figure A2-12. Sensitivity to uncertainty in regenerated stand volumes, Okanagan TSA, 1993



Timber Supply Dynamics - Summary

The main constraint on timber supply in the Okanagan TSA is the physical scarcity of harvestable timber near the end of the transition from a harvest dependent on natural stands to a harvest predominately comprised of managed stands. This scarcity requires that the substantial volumes of existing mature timber from unmanaged stands be rationed until managed stands are ready for harvest.

However, it is uncertain when this pinch point in supply will actually occur. TSR1 places it about 4-5 decades into the future while TSR2 moves it out to decade 15. The impending LRMP will probably move it back closer to the present.

Assuming that the basic structure and dynamics of the timber supply as determined in TSR1 and explained in the TSR1 documents remain valid, silviculture and harvesting opportunities can be designed and targeted on sensitive timber supply parameters governing minimum harvest ages, green-up, and existing and regenerating stand volumes.



Appendix 3

Executive Summary of The Incremental Silviculture Strategy For British Columbia (Interim)

STRATEGY AT A GLANCE

Purpose	This strategy provides guidance to the application of available funds for incremental silviculture activities. It is not tied to a specified funding level.
Government's Goals	<ul style="list-style-type: none">• Sustainable Use• Community Stability• A Strong Forest Sector
Key Principles	<ol style="list-style-type: none">1. Because the distant future cannot be foretold, the best and only course of action in managing the timber resource is that which minimizes risk and maintains options.2. British Columbia's forests are important locally, provincially, nationally and globally and should be managed in this context.3. Each generation of British Columbians becomes the steward of the province's forest resources and has a moral obligation to preserve this heritage for future generations.
Working Targets	<p>Within the context of the guiding principles:</p> <p>WT 1: Minimize the anticipated interim reduction in timber supply so that provincial annual harvests of at least 65 million m³ can be achieved during this period.</p> <p>WT 2: Create a long term timber supply capable of supporting a steady long term provincial harvest level of at least 75 million m³.</p> <p>WT 3: Over the long term, maintain the production of premium quality logs at or above 10% of total harvest.</p>
Major Silvicultural Strategies	<ul style="list-style-type: none">• Increase the use of alternative silvicultural systems and commercial thinning.• Achieve earlier green-up of harvested areas.• Increase regenerated stand volumes 20%.• Eliminate all pre-1982 good and medium site backlog NSR and all 1982 to 1987 backlog NSR.• Initiate a long rotation quality management program for stands where harvesting must be delayed. <p>Other silvicultural and non-silvicultural strategies must also be implemented to achieve the working targets.</p>
Strategy Implementation	Regional and management unit strategies must be developed, followed by programs and plans to implement them.



Appendix 4

Maintaining Biodiversity and Wildlife Habitat in Silviculture Projects

- A4-1.** Letter, re: Penticton Forest District Policy on Referral's for SMP, TP, and B/LSP
- A4-2.** Penticton Forest District Silviculture Agreement - Maintaining Biodiversity and Wildlife Habitat in Silviculture Projects
- A4-3** Flowchart – Referral Process



A4-1. Letter, re: Penticton Forest District Policy on Referral's for SMP, TP, and B/LSP

Penticton Forest District
102 Industrial Place,
Penticton, B.C.,
V2A-7C8

Attention: Penticton Forest District Major Licencees
Small Business Program
Woodlot Licencees
Penticton Forest District Programs

RE: Penticton Forest District Policy on Referral's for SMP, TP, and B/LSP

Dear sir,

The Penticton Forest District has developed a referral agreement with Ministry of Environment, Lands, and Parks (MELP), that streamlines prescription development, and the associated approval process, while ensuring that MELP needs are not compromised.

The Penticton Forest District policy will be to use the "Ministry of Forests//Ministry of Environment Lands & Parks SMP, TP, and B/LSP Referral Agreement" flow chart, dated May 20, 1999, as the decision tool to determine which activities being considered for prescription will require a referral to MELP. This policy is not applicable to activities completed under a Silviculture Prescription.

There are three areas that require clarification in the utilization of the flow chart;

1. Activities such as spacing and brushing are carried out simultaneously on some openings. Where this occurs both activities should be checked on the flow chart. A referral will be required if indicated for either activity. Where a secondary activity involving minor works are undertaken, in conjunction with the main activity, the appropriate comments in the F/WSOP should be consulted as part of the prescription development.
2. Where F/WSOP (Fish and Wildlife Standard Operating Procedures) is indicated this will refer to MELP's "Maintaining Biodiversity and Wildlife Habitat in Silviculture Projects" dated January 20, 1999.
3. The FW/MAP for Manual treatment of Willow has been included with this letter. The Moose Winter Range areas indicated by the horizontal hatching represent the areas of concern.

If you have any questions please contact Gene Desnoyers, Silviculture Officer or Brian Harris Habitat Protection Officer.

Yours truly,

John Wenger
District Manager



A4-2. Penticton Forest District Silviculture Agreement - Maintaining Biodiversity and Wildlife Habitat in Silviculture Projects

Penticton Forest District Silviculture Agreement Maintaining Biodiversity and Wildlife Habitat in Silviculture Projects

The following silviculture guidance was developed by MELP with consultation with MOF and licensees. The guidance provides direction for developing backlog silviculture prescriptions, stand management prescriptions and treatment prescriptions to address environment and habitat requirements. When this guidance is followed, the individual prescriptions need not be referred to MELP. Where alternate strategies are prescribed, refer the prescription to MELP.

The objectives of this document ensure that some of the attributes of a natural, mature forest are retained in a managed stand (i.e. maintain forest biodiversity), and to protect some specific wildlife habitat features.

The document has two sections, the first describes forest habitat features that may be impacted by silviculture activities. The second section describes concerns and recommendations for specific silviculture activities.

Forest habitat features potentially at risk from silviculture activities

1. Residual stems

Habitat Value - Any residual stems remaining after forest harvesting have some wildlife habitat value - bird perches, nesting, cover, feeding, or future woody debris. As a general statement, the more remnants of the original forest that are retained, the more forest wildlife species that benefit.

Silviculture Considerations - Most residual stems, particularly the larger stems, that survive harvesting should also survive silviculture treatment (with consideration for forest health concerns). Snags and defective vets should be assessed by a Danger Tree Assessor and appropriate steps taken to preserve these features.

2. Coarse Woody Debris

Habitat Value - Cover for small mammals, reptiles and amphibians as well as substrate for fungi and insects which, in turn are the food source for these animals as well as for ground foraging birds.

Silviculture Considerations - To date there is no systematic tally of the preharvest volume of CWD, so it is difficult to set targets for retention. For most wildlife, coarse woody debris is better left scattered on the block than piled, particularly the larger pieces. If there is such an abundance



of woody debris on the block following harvesting that silviculture objectives are impeded, see the following regarding site preparation piles.

3. Slash piles (site preparation piles, not landing piles)

Habitat Value - Foraging and denning habitat for marten and weasels and, to a lesser extent, hares and woodpeckers. Some of the wood should stick up out of the snow to allow marten easy access to the piles.

Silviculture Considerations - Where it is necessary to pile the woody debris, the material should be sorted, leaving the coarser pieces scattered on the block and piling only the fines. Where there is an excessive amount of woody debris, or if sorting before piling is impractical, retain (i.e. don't burn) some the piles. The most suitable piles for wildlife are those within 150m of the block edge or 50m of a riparian area.

NOTE: Meadow voles are the species most likely to damage regenerating conifers, and this species does not benefit from the retention of slash piles.

4. Variety in site characteristics

Habitat Value - Forest wildlife use many different components of a forest, but the requirements are difficult to quantify. Generally, wildlife diversity in a regenerating forest benefits from a variety of tree species, tree spacing (thickets and "voids"), tree sizes and tree ages.

Silviculture Considerations - In the regenerating forest, some of the habitat variety will be maintained by:

- advanced regen of all conifer species (with consideration for forest health concerns).
- as many tree species as were present in the harvested stand.
- "voids" and thickets.

Implications to Specific Silviculture Activities

1. Mechanical Site Preparation

Concern - Removal of residual stems.

Recommendation - Retain all residual stems that do not interfere with operations and maintain thickets (where they occur) over 10% of the net area of the treatment block.

Concern - Removal of coarse woody debris.



Recommendation - Avoid piling the woody debris, however, if piling is necessary, avoid including the larger (>7.5cm diameter) pieces in piles as much as possible. If the number of piles is excessive, retain (i.e. do not burn) 4 piles per ha, (assuming 6m diameter piles, 2m high).

NOTE: Loose piles with pieces jutting up benefit marten and weasels by assisting access under the snow. The most suitable piles for wildlife are those within 150m of the block edge or 50m of a riparian area.

2. Planting (NSR areas)

Concern - "Homogenization" of the regenerating forest, i.e. a reduction in diversity of tree species and spatial heterogeneity.

Recommendation - On projects greater than 25ha, or contiguous with another project where the aggregated area is greater than 25 ha, maintain "voids" or areas of very low stocking, over 10% of the treatment area. Rocky areas, deciduous patches, riparian areas, and no work zones around wildlife trees, all contribute.

NOTE: Planting prescriptions should include as many conifer species as were present in the harvested stand.

3. Chemical brush control

Concern - Loss of deciduous species that provide forage for some wildlife and cover for others. In general, the projects that cause concern are 1. those on ungulate winter range, 2. those where the target species are considered very valuable to wildlife (red osier dogwood, willows, Douglas maple, ceanothus sp., and in certain sites, cottonwood and aspen) 3. those that propose to treat a significant amount of a watershed in one year, 4. those areas of identified grizzly bear habitat.

Recommendation - Refer to BCE for comment, projects:

- on deer or moose winter range
- in identified grizzly bear habitat areas
- that would treat more than 50% of the early seral stands in a watershed in one year
- specifically target the deciduous species mentioned.

4. Spacing and pruning

Concern - reduction of habitat variety

Recommendations -

a) in all projects:



- where they exist, retain at least 6-10 of the residual stems per ha as wildlife trees (the largest diameter stems left on the site). Establish no work zones around those assessed as dangerous.
- retain all stumps less than 5m tall and greater than 25cm dbh
- identify and exclude from treatment all riparian reserve zones around swamps and lakes and along streams (trees in a reserve zone will not normally be harvested thus should not receive a silviculture investment)
- accept cottonwood and aspen as crop trees in the riparian management zone (up to a maximum of 50% of the crop stems as cottonwood and 25% as aspen).
- consider some of the residual conifer stems as “ghost” trees for survey purposes.

b) On projects greater than 25ha or contiguous with another project where the aggregated area is greater than 25ha, maintain thickets (i.e. unspaced) over 10% of the gross treatment area. Patches of residuals, deciduous patches, riparian areas, and no work zones around wildlife trees all contribute.

NOTE: The preferred layout of unspaced areas is 100m wide strips across the contours, preferably following ridges, gullies or riparian areas. Where such opportunities are not present, unspaced patches are acceptable, centered on features such as wildlife trees. In a totally uniform and featureless landscape, randomly locate no treatment strips or patches inside the project boundary.

NOTE: Leaving the lowest live whorl on some of the stumps of the spaced lodgepole pine will maintain an important winter forage for snowshoe hares (which are the primary prey for lynx), particularly in the drier subzones of the MS and ESSF.

5. Brushing

Concern - Loss of forage for ungulates, nesting for birds and cover for small mammals.

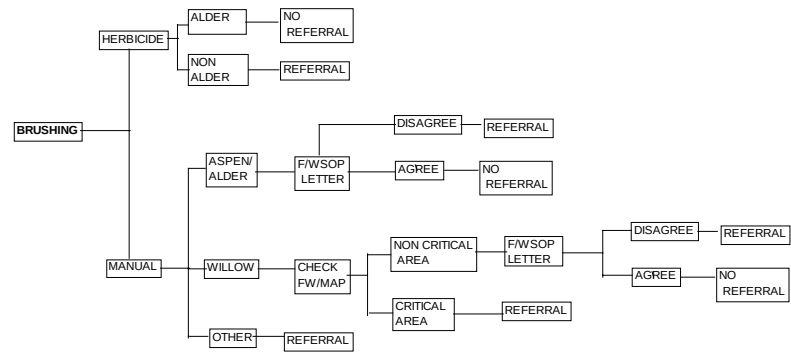
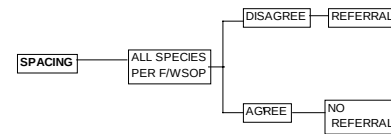
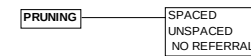
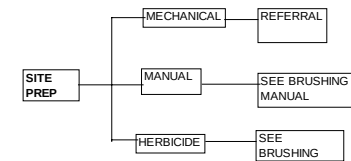
Recommendation - Retain all non commercial stems that are not in competition with crop trees and cut most willows, dogwood and Douglas maple at 30cm above the ground to promote coppicing.

If the guidance in this document is followed, no referral of any BSP, SMP or TP to MELP is required except in those instances noted. However, project areas will be periodically monitored to ensure that habitat objectives are being achieved.

January 20, 1999



A4-3 Ministry of Forests/Ministry of Lands and Parks SMTP, TP and B/LSP Referral Agreement





Appendix 5

Regimes Developed By Workshop Participants

Regimes:

- Minimum Harvest Age**
- Wood Quality**
- Quality and Taper – Dry-belt PI)**
- Enhanced Regeneration and Development**
- Under-performing FD**
- Plantation Performance Monitoring**
- Salvage**



Regime: Minimum Harvest Age

Issue addressed by this regime

To increase harvesting flexibility, eliminate harvest shortfall in the long term. To increase future LTHL.

Strategy

To reach merchantability sized stems sooner (lower minimum harvest age)

Target

All managed stands

Regime Description

1. Enhanced rapid reforestation – reduce MHA, increase volume in reforested stands.
2. Reduce MHA through fertilization of existing stands.

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
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Regime 1

Tree improvement, Use class A PI seed Stand establishment – utilize microsites Shorten regen delay, vegetation management, density control	High and medium sites All	15% + for MAI 2%	L+, M+ M+, L+	S+ E+, H+/-
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Regime 2

Stands currently age 40: PCT or CT fert x 3 harvest	50 ha/year estimate	Reduce mha by 20 years	M++	L+, E+, H+/-
Stands currently age 50: CT fert x 2 harvest	50 ha/year estimate	Reduce mha by 20 years	M++	L+, E+, H+/-
Stands currently aged 60: fert x 2, harvest	50 ha/year estimate	Reduce mha by 10 years	M++	L+, H-
Stands currently aged 70: fert and harvest in 10 years	50 ha/year estimate	Reduce mha by 10 years	M++	L+, H-

Note: By reducing minimum harvest ages, flexibility is increased over the landbase including the short term as adjacency is met sooner.



Regime: Wood Quality

Issue addressed by this regime

To mitigate potential reduction in wood quality during the transition from 'natural' to 'managed' stands.

Strategy

To improve wood quality in managed stands.

Target

1. Pl – post-harvest regenerated stands > 10,000 sph
2. Pl – spaced stands < 1600 sph

Regime Description

Juvenile space
Prune

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
1. Juvenile space 10 to 20 year old stands > 10,000 sph to 3,000 sph	+/- 4000 ha	Reduced time to merchantability	M, L	E
2. Prune		Increase value	M, L	E



Regime: Quality and Taper – Dry-belt PI

Issue addressed by this regime

Creation of high value wood products, that would not be available within the proposed harvest queue time frames.

Strategy

Define end product objectives with a minimum piece size, taper and wood quality attributes.

Target

Mainly PI stands of natural origin with high densities.

Regime Description

Survey and juvenile space when warranted.

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
Survey free growing aged stands for stands over 10,000 sph – reduce density to 3000 sph where encountered	Undefined	Reduce time to merchantable harvest	ML +++	E
Low density stands, add to stocking (increase sph) – not a high investment option	Undefined	As above	ML +	E
Plant superior provenance for small knots, high density and low taper.	Harvested area	Better quality timber products	Q+++ L+	H -



Regime: Enhanced Regeneration and Development

Issue addressed by this regime

Access to timber in community watersheds to increase operator flexibility.

Strategy

Reduce the time to reach administrative height criteria to allow adjacent harvesting.

Target

Openings in watersheds that are 0 to 20 years old.

Regime Description

Accelerated height growth

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
Vegetation management, density control	10,000 ha – 10%/yr	Employment increased growth	S M L	Reduced small mammal habitat
Fertilization	3000 ha total	Increase growth	S M L	Water?
Surveys	20,000 ha total	Monitor and determine treatments	E	
Planted with enhanced stock (site prep)	Harvested area	Increased growth	S L	Reduced habitat (fewer openings)



Regime Name – Under-performing Fd

Issue addressed by this regime

Mitigate downward pressure on mid and long term harvest levels caused by underachieving Fd stands.

Strategy

Enhance productivity of the landbase.

Target

IDF stands – previously harvested (IU logging) often with other resource objectives.

Regime Description

Determine appropriate silvicultural systems including reforestation methods and density management options to meet desired stand structural objectives.

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
IDF protocol and follow-up inventory	100,000 ha ?	Defines current conditions and refines estimate of manageable forest landbase	S, M, L +/-	E
Determine criteria for defining Problem Forest Type and netdown landbase	100,000 ha ?	As above	S, M, L +/-	E
Define other resource constraints and determine appropriate silvi systems	<100,000 ha		+/-	
Target stands for recruitment into structural stages to meet other resource demands (planting spacing, harvesting, pruning, underburning)	<100,000 ha		M++	H+ E +/-



Regime: Plantation Performance Monitoring

Issue addressed by this regime

Confirmation that assumptions being used in the timber supply are being realized on the ground in 2nd growth stands (e.g., site index, forest health – OAFs).

Strategy

Identify any problems in second growth stands that are outside the range of the assumptions used for timber supply.

Target

Post free-growing stands.

Regime Description

Survey and compare results with assumptions

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
Survey for SI and forest health	4000 ha per year	Confirm TSR assumptions	Mid to long term	E+ better database
SMP to detail treatments where needed	?	Maintain harvest at assumed level	Mid to long term	E+

Prioritize by risk – PI 34% of landbase, dry sites – i.e., drought, ESSF – frost, growth rates, quality. (Check with Bob MacDonald or Pat Martin to see if this is being done.)



Regime: Salvage

Issue addressed by this regime

Salvage areas – SP exempt areas (landbase not producing at its potential but is assumed to be in the TSR.)

Strategy

Bring areas back into full productivity

Target

Salvage areas with not reforestation obligations, netted down of areas that are scheduled for harvest

Regime Description

Assess for need for treatment – if treatment warranted develop a suitable regime – realizing the size and scope of these areas.

Regime activities over 10 yrs	Area of Op	Intended benefit	Timing/Wt of benefit	Side Effects
Assess the magnitude	Unknown except all SP exempt			
Site prep, plant, brush if need be	% of the area above that is below MSS	Maintain projected productivity	M+, L+	Poor economy of scale