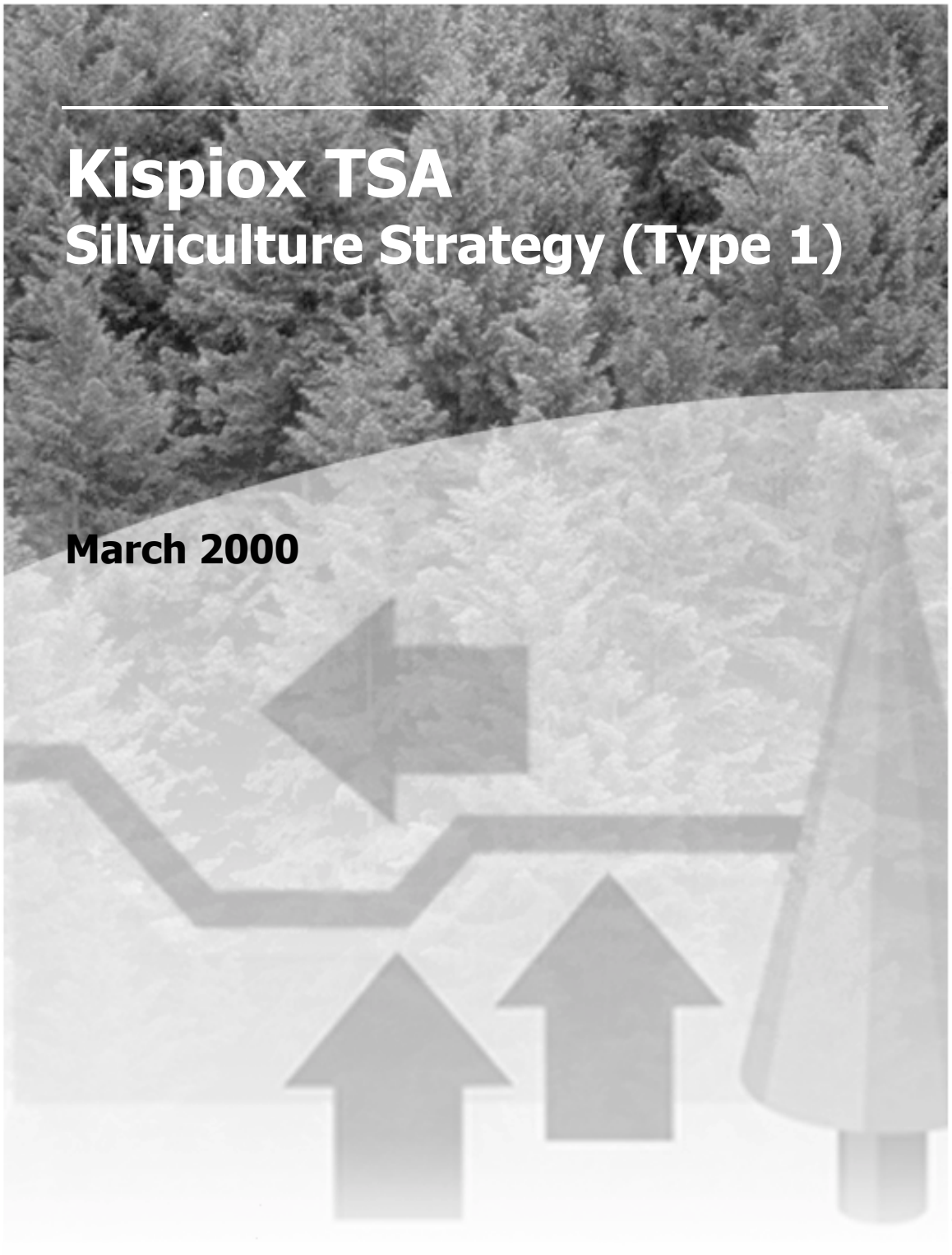
Kispiox TSA
Silviculture Strategy (Type 1)

March 2000



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Acknowledgements

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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.

Strategy Summary

Issues Addressed by the Strategy

While many issues were proposed and discussed in the workshop, the participants developed a silviculture strategy that addressed three key issues: addressing backlog, ensuring continued stand productivity, and increasing the size of the timber harvesting land base (THLB).

Workshop participants ranked the treatment of impeded backlog and backlog NSR as the two highest priority items. A third program, that of investigating and possibly treating old fires was ranked much lower. Most of these areas, regardless of their current recorded stocking status, are believed to be either stocked or over-stocked, primarily with hemlock. Surveying and treating these areas will be expensive. A certain percentage of this area is also likely to be inoperable.

Elements of the Strategy

1. Backlog (backlog NSR, impeded stands, old burns)

There area a total of about 1000 ha of backlog NSR in the district. It should be surveyed and treated as needed promptly.

The strategy for addressing backlog impeded stands involves surveying, preparing prescriptions, and treating. Prescriptions will often involve accepting deciduous stocking where deciduous species enhances non-timber values, or accepting reduced coniferous stocking and projected yields. About 2000 ha/yr of impeded backlog will require treatment involving combinations of

brushing and pre-commercial thinning. Much of the estimated 6800 ha of old burns will be reclassified as SR once surveyed. On the remainder, spacing treatments could be very expensive.

2. Ensuring continued stand productivity

Workshop participants expressed concern that some currently free-growing stands are at risk of becoming impeded by growth of competing vegetation. A monitoring program was recommended to ensure that any need for further treatments is detected.

3. Increasing the size of the timber harvesting land base

Several strategies were identified to increase the size of the timber harvesting land base, but were generally regarded as low priority because of high cost and small available areas. The strategies are: rehabilitation of old roads and landings, conversion of deciduous-leading stands.

4. Timber quality strategies

Workshop participants ranked timber quality strategies as moderate priority. A program of spacing 200 ha/yr of higher density hemlock stands to produce a small component of the harvest profile as premium logs. Participants agreed on pruning about 100 ha/yr of good-site pine to produce clear lumber.

Tactical Priorities

The tactical priorities set by the participants represent a balance between the participants' strategic objectives for the management unit and the silvicultural opportunities available on the TSA in the next 5 years. Treatment of impeded backlog and backlog NSR were ranked highest by the workshop participants. Additional high-ranking activities were aerial reconnaissance of free-growing blocks, and spacing higher density hemlock stands to create larger logs. Table S-1 lists activities identified by the participants and the rank (priority) assigned to each activity.

Table S-1. Silviculture activities and areas selected by the workshop participants

Activities/Treatments	Opportunity (ha)	Workshop Rank
Surveys		
impeded backlog	6000 ha/yr	1
backlog NSR	500 ha/yr (for two years)	2
aerial recce of FG blocks (five-years post-FG)	27000 ha (in 2003) 5000 ha/yr (after2003)	3
survey old wildfire-burned areas classed SR, NSR	6800 total ha	8, 9
Brushing & Spacing		
impeded backlog > 3000 sph	2000 ha/yr	1
Enhanced Spacing		
higher density, usually hemlock-leading	200 ha/yr	4
Pruning		
good site pine	100 ha/yr	5
Other treatments and activities		
incorporate growth intercept method in FG surveys		1
OGSI paired-plot study		6
OAF 1 study		7
road rehabilitation	100 ha/yr	10

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1. Issues and Strategies

This section identifies the critical issues that guide silviculture planning on the TSA and strategies developed in the workshop for addressing those issues. These strategies were assessed by the workshop participants as to their appropriateness and efficacy. Some of these strategies were selected by the participants as feasible and desirable for the TSA and are listed in Table 1-1. This set of strategies constitutes the silviculture strategy for the Kispiox TSA, as determined by the workshop participants.

1.1 Timber Quantity Strategies

Timber quantity strategies for maintaining or increasing future timber supply were proposed and evaluated by the workshop. The strategies addressed three key issues as listed below:

1.1.1 Strategies to address backlog stands

Treatment of backlog stands is viewed as a mandatory program, and assumptions for completion have already been included in TSR. For the most part there will be no timber supply gains per se; the benefits will be in maintaining the conditions that are already assumed. To a small degree, however, there may be some timber supply benefits in accelerating the backlog program over the TSR assumptions; earlier treatment will result in earlier availability for harvest. There may also be small gains through improvement of stocking conditions beyond those assumed.

Workshop participants ranked the treatment of impeded backlog and backlog NSR as the two highest priority items. A third program, that of investigating and possibly treating old fires was ranked much lower. Most of these areas, regardless of their current recorded stocking status, are believed to be either stocked or over-stocked, primarily with hemlock. Surveying and treating these areas will be expensive. A certain percentage of this area is also likely to be inoperable.

1.1.1.1 Impeded Backlog

Impeded Backlog Surveys

A program of 6000 ha per year will facilitate planning of the needed treatments.

Impeded Backlog Prescriptions

Depending on survey results, approximately 2400 ha per year (60%) will require prescription development. It is expected that prescriptions will fall into three categories:

- accept reduced stocking of conifers (limited area; older stands only) – while this will result in reduced yields, the productivity will be no worse than the alternative of starting over
- accept deciduous stocking (birch and cottonwood only) in limited areas where their presence enhances non-timber resources
- treat

Impeded Backlog Treatment

Depending on survey results, approximately 2000 ha per year will require treatment. Treatments will consist of varying combinations of brushing and pre-commercial thinning; thinning will be

targeted on stands with greater than 3000 trees/ha. Target post-treatment densities will be in the range of 1600 trees/ha to create opportunities for future commercial thinning treatments.

1.1.1.2 Backlog NSR

There is a total of about 1000 ha of backlog NSR in Kispiox TSA. It should be treated promptly.

Backlog NSR Surveys

A program of 500 ha per year will facilitate planning the needed treatments. Most of this area is expected to either be found to have acceptable stocking or to be unfeasible to treat (site sensitivity; resources values other than timber assessed as paramount). In such cases, re-classification will be appropriate.

Backlog NSR Prescriptions

Depending on survey results, approximately 200 will require prescription development

Backlog NSR Treatment

Depending on survey results, approximately 200 ha will require treatment , including site preparation, planting, successive surveys and likely brushing.

1.1.1.2 Old burns

Surveys

A total program of 6800 ha (5000 ha classed SR, 1800 classed NSR) will facilitate planning of the needed treatments. Re-classification of most of the NSR area to SR is one of the expected benefits. Surveys will also help to determine which portions of the burns are on operable ground.

Prescriptions and Treatments

Depending on survey results, a program of prescriptions and treatment will be proposed. Treatments will be primarily spacing in over-dense hemlock stands. Due to extremes of density, many of these treatments will be very expensive.

1.1.2 Strategies to ensure continued stand productivity

Concern was expressed in the workshop regarding continued free-growing status of stands classed as free-growing. There is some indication that an unspecified portion of these stands were at risk of again being overtaken by deleterious competing vegetation. A monitoring program was recommended, and ranked relatively high, to keep track of future development patterns in these stands. Such a program would serve two purposes: to ensure that any need for further treatments is detected, and to evaluate current application of free-growing policy. Monitoring would occur for all blocks 5 years after free-growing status is declared. A program of 27,000 ha in 2003 was suggested, with successive annual programs of approximately 5000 ha/yr. This monitoring program could easily be accomplished with visual estimates from a helicopter, making assessments of large areas fast and relatively cheap.

1.1.3 Strategies to address the Timber Harvesting Landbase

Several strategies for increasing the size of the timber harvesting landbase were identified in the workshop. In general, these were ranked as low priorities due to high cost of treatment and the small areas available for treatment.

Rehab old roads and landings

A recent evaluation of old roads and landings has indicated only a small percentage are suitable for rehabilitation, and these occur in small dispersed pieces. A total area of 1600 ha may be available; it was estimated that a maximum of 100 ha could be treated in any given year.

Stand conversion

Stands dominated by deciduous species have not been included in the THLB. While birch and cottonwood are expected to have future commercial value, aspen is not - generally due to poor quality. The main target stands for conversion would be those dominated by aspen. Only approximately 500 ha total would be available for treatment. Many deciduous leading stands exist within areas of high habitat sensitivity along major riparian corridors, and will not be available for conversion. The high cost of conversion in the absence of herbicide use makes these treatments unattractive.

1.2 Timber Quality Strategies

Strategies to address timber quality were considered by the workshop, and given moderate priority. It was recognized that density management treatments in other strategies listed above would have impacts on timber quality, particularly on piece size and fibre quality.

1.2.1 Spacing for piece size

A modest program of enhanced (intensive) spacing was recommended by the workshop, focussing on higher density hemlock stands. The objective is to produce a small component of the harvest profile in premium size logs. A program of 200 ha/yr was believed feasible. Depending on post-thinning densities selected (to maximize piece size) there may be a small loss of volume production associated with this treatment (5-20%, varying with choice of density).

1.2.2 Prune to produce clear lumber

Clear lumber is commonly valued 3-4 times greater than similar wood containing knots. Trees pruned to produce clear lumber have the potential to yield higher stumpage values than non-pruned trees (although regimes to prune trees in interior BC stands are typically financially non-viable or highly risky). Expected benefits from a conservative pruning program include short term employment and future product diversification. A program of 100 ha/yr was suggested by the workshop, focusing on good-site pine.

2. Silviculture Impacts and Priorities

The following worksheet, defining the elements of the interim strategy, was produced in the workshop in the Kispiox Forest District offices.

Table 1. Showing the workshop issues, objectives, strategies, activities, targets, and impacts, Kispiox TSA

				Opportunity	--- Timber Supply Effects---				Habitat	Jobs	Cost	
	Issues	Strategies/Activities	Target	Area (ha)	Short	Mid	Long	Qual	Effects	Days/ha	$/ha	Rank
1a	backlog NSR	surveys	total backlog NSR	1000 ha/yr	0	0	0			0.01	20	2
1b	backlog NSR	prescriptions	depends on survey results	200 ha/yr	0	0	0				10	2
1c	backlog NSR	treatments as prescribed	depends on survey results	200 ha/yr	0	0	0				2000	2
1d	burned areas classed NSR	survey; prescription; treat as prescribed	old wildfire burned areas	1800 total ha	0	0	0	++	+/-		20	8
1e	burned areas that are SR, over-stocked	surveys, prescriptions	old wildfire burned areas	5000 total ha	0	0	0	++	+/-		20	9
2a	impeded backlog	surveys prescriptions treatments as prescribed		total 35000 ha (survey 6000 /yr)	0	0	0		+		20	1
2b	impeded backlog	a) accept reduced stocking of conifers in some cases	impeded backlog, primarily conifer, with insufficient stocking but older age	subset of 6000	0	0	0		+			1
2c	impeded backlog	b) accept deciduous (cottonwood, birch) stocking in some cases	impeded backlog, mixed conifer and cottonwood and/or birch, with insufficient stocking but older age	subset of 6000	0	0	0		+		20	1
2d	impeded backlog	c) brush and space to 1600 sph, trying to create CT opportunities - use this in most of the 60% of the 35000 ha	impeded backlog, pure and/or mixed, density >3000 conifer sph	major subset of 6000	0	0	0	+	+		720	1
4a	THLB size	rehab to bring area into THLB	roads & landings; only a small % of total roads and landings could be treated	1600 total ha		0	+		-/+		2000	10
4b	THLB size	convert deciduous leading stands to conifer	deciduous leading	500 ha total		0	+		-		3000	10
4c	THLB size	rehab to bring area into THLB	NCBr	1000 total ha		0	+		-		5000	10
5a	regenerated yield tables	incorporate growth intercept method in surveys	all FG surveys	(all surveys)		+++	+++				0	1
5b	regenerated yield tables	OGSI paired-plot study	all A.U.	TSA		+++	+++				20000	6
5c	regenerated yield tables	OAF 1 study	all A.U.	TSA		+++	+++				20000	7
6	tracking performance of free-growing stands	aerial recce of FG blocks five years post-FG - part of the outcome of the recce will be an evaluation of whether this is a problem that needs continued effort, and whether application of FG rules needs to be revisited	all blocks declared FG	27000 ha in 2003 5000 ha/yr thereafter	0	0	0		0		10000/yr; 6000/yr	3
7a	log quality, stand value—regenerating stands	spacing (enhanced)	higher density, usually hemlock leading	200 ha/yr	0	0	0	++	+		700	4
7b	log quality, stand value—regenerating stands	pruning	good site pine	100 ha/yr	0	0	0	++	+		700	5
8a	Pine pathogens: pine needle cast, root collar weevil											
8b	spruce leader weevil											

Table 2. Summary of silvicultural activities, Kispiox TSA

	Strategies	Activities	Target	Opportunity Area	Rank
	Timber quantity				
1	treat Impeded backlog	surveys	impeded backlog	6000 ha/yr	1
		brushing and spacing	impeded backlog >3000 sph	2000 ha/yr	1
2	treat backlog NSR	surveys	backlog NSR	1000 ha total	2
		site preparation, planting		200 ha total	2
		brushing		200 ha total	2
3	reclassify old burns	survey	old burns classed SR (total 5000 ha)	5000 ha	8
		survey	old burns classed NSR (total 1800 ha)	1800 ha	9
		spacing	overstocked hemlock	?	9
4	ensure continued stand productivity	aerial reconnaissance of FG blocks	FG blocks (5 yr after FG declared)	27000 ha (in 2003)	3
				5000 ha/yr (2004+)	3
5	increase the timber harvesting land base	road rehabilitation	old roads and landings (total 1600 ha)	100 ha/yr	10
		stand conversion	aspen-dominated stands (total 500 ha)	100 ha/yr	10
	Timber Quality				
6	increase piece size to produce premium logs	spacing	higher density hemlock stands	200 ha/yr	4
7	produce clear lumber	pruning	good site pine	100 ha/yr	5

3. Silviculture Program

3.1 Tactical Priorities

Tactical priorities for Kispiox TSA were defined in the workshop by having participants ranking strategies and activities for implementation in the next five years. Priorities were assigned through discussion and consensus among the participants, and produced a clear sense of the most important activities from the participants' perspectives. In Kispiox TSA, workshop participants felt that the most important tasks are to retire impeded backlog stands and backlog NSR. Activities related to these objectives–surveys, brushing, spacing–were ranked highest. Providing assurance that free-growing stands are not overtaken by competing vegetation ranked third in importance. This will be done with aerial reconnaissance of free-growing blocks five years after free-growing status is declared.

Activities to provide premium logs and clear lumber ranked fourth and fifth at the workshop. These included spacing 200 ha of higher density hemlock and pruning 100 ha of good site pine annually.

3.2 Program Costs and Benefits

The costs and benefits of the program developed in the workshop are summarized in Tables 3-6, below.

Table 3 shows the assumed unit costs and employment associated with each activity. Employment multipliers were estimated by the consultant and should be verified by the District.

Table 4 shows the area treated by activity and program year.

Table 5 shows expenditures in thousands of dollars by activity and program year.

Table 6 shows the person-days of employment generated by undertaking the activities listed in the preceding tables.

Table 3. Unit Cost and Employment Assumptions

	Impeded backlog		Backlog NSR					Reclassify old burns		Aerial recon of FG blocks[2]	Increase the THLB		Timber quality	
	Survey	Brush & space	Survey	Prescrip-tion	Site prep	Plant[1]	Brush	Survey SR	Survey NSR		Road rehab	Stand conversion	Spacing (piece size)	Pruning (clear lumber)
$/ha average	20	720	20	10	400	700	900	20	20	6500	2000	4000	700	700
PDs/ha[3]	0.05	3.00	0.05	0.05	1.90	1.00	2.00	0.05	0.05	0.01	3.00	3.00	2.00	6.00

[1] Planting includes the cost of seedlings

[2] Cost for aerial reconnaissance was estimated at $10000/yr in 2003, and $6000/yr in 2004-2010. Average cost = $6500/yr.

[3] These values were estimated by the consultant, and should be reviewed carefully by the District

Table 4. Area (ha) treated by activity and year

	Impeded backlog		Backlog NSR					Reclassify old burns			Increase the THLB		Timber quality		
Year	Survey	Brush & space	Survey	Prescrip-tion	Site prep	Plant	Brush	Survey SR	Survey NSR	Aerial recon of FG blocks	Road rehab	Stand conversion	Spacing (piece size)	Pruning (clear lumber)	Total
1	6,000	2,000	500	0	0	0	0	2,500	900	0	160	100	200	100	12,460
2	6,000	2,000	500	200	200	200	200	2,500	900	0	160	100	200	100	13,260
3	6,000	2,000	0	0	0	0	0	0	0	27,000	160	100	200	100	35,560
4	6,000	2,000	0	0	0	0	0	0	0	5,000	160	100	200	100	13,560
5	6,000	2,000	0	0	0	0	0	0	0	5,000	160	100	200	100	13,560
Subtotal Yr 1-5	30,000	10,000	1,000	200	200	200	200	5,000	1,800	37,000	800	500	1,000	500	88,400
6-10	30,000	10,000	0	0	0	0	0	0	0	25,000	800	1,000	1,000	500	68,300
Total Yr 1-10	60,000	20,000	1,000	200	200	200	200	5,000	1,800	62,000	1,600	1,500	2,000	1,000	156,700

Table 5. Expenditure ($ x 1000) by activity and year

	Impeded backlog		Backlog NSR					Reclassify old burns			Increase the THLB		Timber quality		
Year	Survey	Brush & space	Survey	Prescrip-tion	Site prep	Plant	Brush	Survey SR	Survey NSR	Aerial recon of FG blocks	Road rehab	Stand conversion	Spacing (piece size)	Pruning (clear lumber)	Total
1	120	1,440	10	-	-	-	-	50	18	-	320	400	140	70	2,568
2	120	1,440	10	2	80	140	180	50	18	-	320	400	140	70	2,970
3	120	1,440	-	-	-	-	-	-	-	270,000	320	400	140	70	272,490
4	120	1,440	-	-	-	-	-	-	-	30,000	320	400	140	70	32,490
5	120	1,440	-	-	-	-	-	-	-	30,000	320	400	140	70	32,490
Subtotal Yr 1-5	600	7,200	20	2	80	140	180	100	36	330,000	1,600	2,000	700	350	343,008
6-10	600	7,200	-	-	-	-	-	-	-	150,000	1,600	4,000	700	350	164,450
Total Yr 1-10	1,200	14,400	20	2	80	140	180	100	36	480,000	3,200	6,000	1,400	700	507,458

Table 6. Short term employment benefits (person-years[4]), by activity and year

	Impeded backlog		Backlog NSR					Reclassify old burns			Increase the THLB		Timber quality		
Year	Survey	Brush & space	Survey	Prescrip-tion	Site prep	Plant	Brush	Survey SR	Survey NSR	Aerial recon of FG blocks	Road rehab	Stand conversion	Spacing (piece size)	Pruning (clear lumber)	Total
1	1.50	30.00	0.13	-	-	-	-	0.63	0.23	-	2.40	1.50	2.00	3.00	41.38
2	1.50	30.00	0.13	0.05	1.90	1.00	2.00	0.63	0.23	-	2.40	1.50	2.00	3.00	46.33
3	1.50	30.00	-	-	-	-	-	-	-	1.35	2.40	1.50	2.00	3.00	41.75
4	1.50	30.00	-	-	-	-	-	-	-	0.25	2.40	1.50	2.00	3.00	40.65
5	1.50	30.00	-	-	-	-	-	-	-	0.25	2.40	1.50	2.00	3.00	40.65
Subtotal Yr 1-5	7.50	150.00	0.25	0.05	1.90	1.00	2.00	1.25	0.45	1.85	12.00	7.50	10.00	15.00	210.75
6-10	7.50	150.00	-	-	-	-	-	-	-	1.25	12.00	15.00	10.00	15.00	210.75
Total Yr 1-10	15.00	300.00	0.25	0.05	1.90	1.00	2.00	1.25	0.45	3.10	24.00	22.50	20.00	30.00	421.50

[4] one person-year is equivalent to 200 person-days of employment

4. Issues Requiring Investigation ("To Do List")

As various issues, objectives and strategies were discussed in the workshop, there were inevitably some that were clouded by lack of information. Either the lack of information itself was the issue (e.g., uncertainty about site index estimates for existing regenerated stands), or the issue could not be resolved until further investigation provided some clarification (e.g., the impact of silvicultural systems on wildlife habitat). These items were added to a running "To Do List" throughout the workshop. At the end of the workshop participants ranked these items by urgency (Table 7).

Later (post-workshop) these items were described in more detail. Items ranked with the addition of a decimal place were not originally on the "To Do List", but were listed as silvicultural strategies. Post-workshop they seemed more appropriate to be listed here, as they are intended to collect better information about stands and their yields rather than implementing treatments which will alter stands and their yields. The rank assigned each was estimated by the workshop silviculturist/facilitator, and is subject to re-evaluation based on comments from the workshop participants. The expanded list of issues requiring further investigation follows.

Table 7. Issues identified in the workshop that require investigation, Kispiox TSA

Rank	Issue
1	minimum stocking *vs* targets—identify portions of land base at minimum stocking levels and targets; relevant to density values for TIPSY projections, and for District staff comfort about trends in the District
2	yield projections for pre-'87 ???? openings—uncertainty about yields (VDYP *vs* TIPSY) — district say they will use "VDYP" yield tables for pre-87 openings
3	economic cutoff for backlog NSR treatment — decision criteria?
4	investigate opportunities for partial cutting
5	botanical resources--morel mushrooms (need fire), pine mushrooms (no fire),.. re partial cutting prescriptions (impact of silviculture system; predict occurrence of mushrooms—current study in Region)
6	investigate habitat effects of silvicultural systems/treatments—identifying structural attributes that are desirable for various habitats
7	silviculture investment risk re: alienations—evaluate risk of treating land that may be alienated at a later time

4.1 Revised (post-workshop) To Do List

1. Stocking levels for yield projections

Concern was expressed that TSR assumptions regarding stocking levels for regenerated stands do not match with achieved values on the landbase. *A study is required to correlate known conditions with appropriate input values for TIPSY*. The most prevalent concern focused on portions of the landbase at minimum stocking as opposed to target stocking, but areas with high levels of hemlock ingress were also a concern.

1.5 Estimates of SI for existing regenerated stands

Concern was expressed that there is a need to have the best possible estimates of SI available for existing regenerated stands to facilitate yield projection and silviculture planning. *The Growth Intercept method of estimating SI needs to be incorporated into all Free Growing surveys.* This process has already been initiated.

2. Yield projections for pre-'87 openings

There was uncertainty about the appropriate use of VDYP vs. TIPSY for projecting yields on backlog openings. In particular, many of these sites have a high percentage of naturally regenerated trees established over a number of years, in many cases with a significant component of hardwoods. These conditions deviate considerably from the regeneration assumptions in TIPSY, which was used to project yields for these stands in the first TSR. *An evaluation is required to assess whether regeneration patterns and stocking conditions for these stands dictate a move away from using TIPSY for yield projections.*

3. Economic thresholds for backlog NSR treatment

Concern was expressed that significant portions of the documented backlog NSR lands are on sites that are either very difficult (and thus expensive) to treat, are located in very small dispersed patches, and/or have high non-timber values which will be adversely affected by treatment. *A set of decision criteria and evaluation methods are required with which to make economic judgements on treating backlog NSR areas*. The objective is to prioritize treatment where it is best suited, and reclassify other lands which should not be treated.

4. Opportunities for partial cutting

Increasing interest in partial cutting in the District has raised the issue of appropriate silvicultural systems and stand types. This has particularly been a concern for the Small Business program. *A District strategy is required which matches application of different silviculture systems to landscape level management objectives.* Such a strategy must be done in conjunction with TSA-level planning processes, and be sensitive to overall TSA management objectives.

5. Sustainability of "botanical resources"

Concern exists within the District over the effects of different forest practices on the long term harvest potential of "botanical resources", specifically morel mushrooms (which need a history of fire) and pine mushrooms (no fire). Several Regional studies on mushroom habitat have recently been completed, in particular related to partial cutting prescriptions. *A consistent decision making framework is needed to minimize impact of tree harvesting on high value mushroom habitats.*

6. Silviculture Systems impacts on habitat

Concern was expressed over the need to identify habitat objectives for different silvicultural systems. *There is a need to investigate habitat effects resulting from the application of different silvicultural systems/treatments, and to identify structural attributes that are desirable for various habitats.*

7. Silviculture investment risk relative to land alienations

Concern was expressed that future land alienations may put current silvicultural investments at risk, particularly those associated with intensive silviculture treatments. *There is a need to identify*

portions of the TSA that at are low risk for alienation. This will facilitate concentration of investment where the probability of capturing the benefits of the investment is the highest.

7.5a Estimates of SI for future regenerated stands

Concern was expressed that there is uncertainty around SI values for all stands in the inventory where the existing cover consists of old stands (old growth). Improved estimates of SI are needed to estimate yields for regenerated stands once these areas are harvested. *There is a need for a localized OGSI study to improve estimates of SI for future regenerated stands.* This item has a relatively low priority as the impacts of any adjustments will not show up in the timber supply projection for several decades.

7.5b Estimates of site occupancy relative to yield

Concern was expressed that provincial default values for Operational Adjustment Factors (OAFs) used to adjust TIPSY yield projections in timber supply analysis may be inappropriate for the Kispiox TSA. *There is a need to implement a sampling strategy to localize estimates of OAF 1 (unstocked gaps).* This item has a relatively low priority as the impacts of any adjustments will not show up in the timber supply projection for several decades.

Appendix A. Timber Supply Context

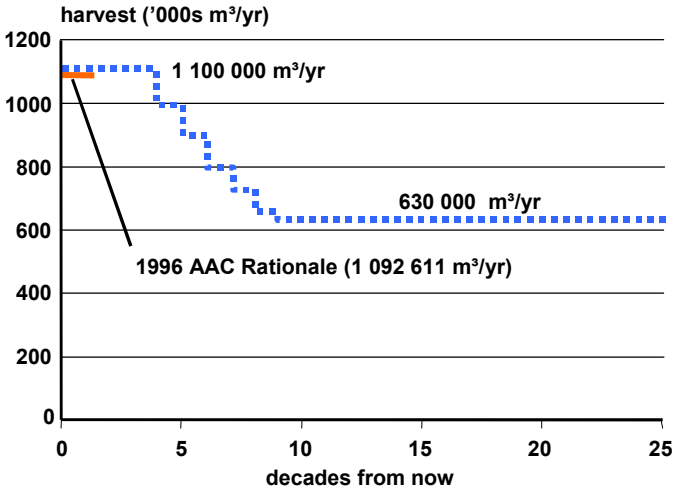
Timber supply is the rate at which timber is made available for harvesting, and it is "made available" through natural, administrative, and economic processes. The forest economy draws timber from the land base in response to consumer demand, and this flow of timber is limited by the rate at which the forest can physically grow trees, and by a variety of administrative constraints. The combined effect of these administrative constraints is incorporated in the Allowable Annual Cut (AAC).

The base case of the timber supply review (TSR) forecasts future timber supply subject to current administrative constraints and assuming present 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.

A 1 Timber Supply and the AAC

The 1996 TSR, upon which the current AAC determination was based, forecasts a harvest level of 1 100 000 m³/yr maintained for the first 4 decades (Figure A1-1). In the fifth decade the harvest level declines 10% per decade until the long term harvest level of 630 000 m³ is reached.

Figure A1-1. Base case harvest forecast, Kispiox TSA, 1996

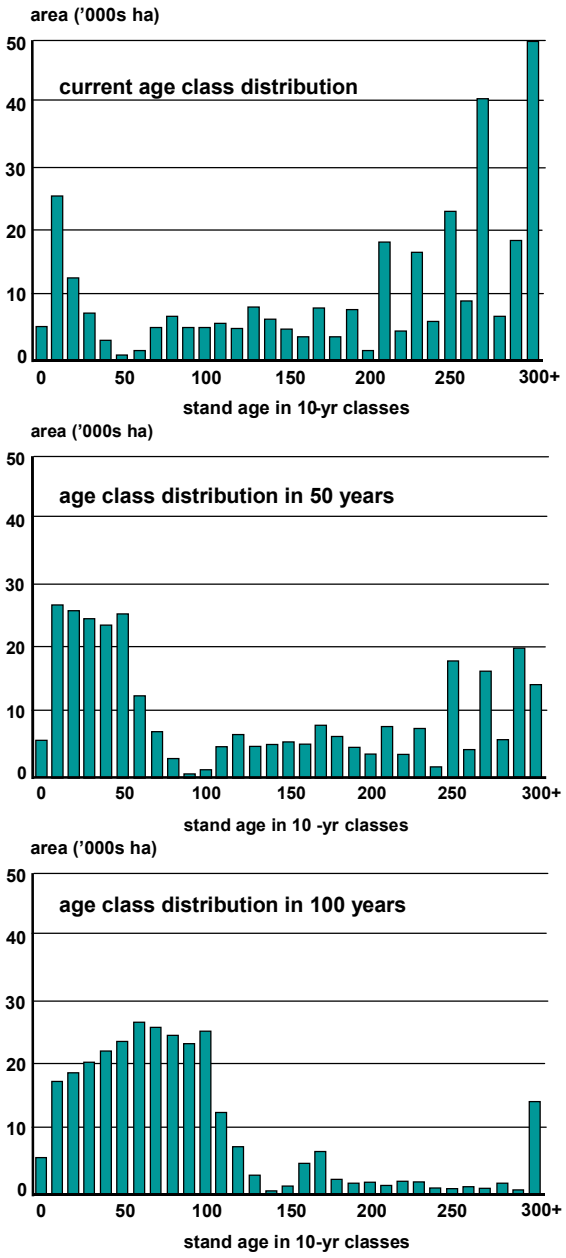


A 2 Rationing Mature Timber

This current harvest level can be maintained due to the age class structure of the timber harvesting land base (Figure A2-1). There is an abundance of mature timber, which allows the harvest level to be maintained for 4 decades. The harvest flow then steps down steadily as seen with the base case harvest forecast. The reason for this decline is the depletion of mature harvestable stands before regenerating stands have reached the minimum harvestable age. The harvest level evens out with the transition to managed stands.

The lack of harvestable timber in decades 4-6 has been "filled in" by rationing the current available mature–timber that is currently age 200+ years. Timber rationing is the main objective of constraints on the rate of change of harvest levels.

Figure A2-1. Age class distribution-timber harvesting land base, Kispiox TSA 1996

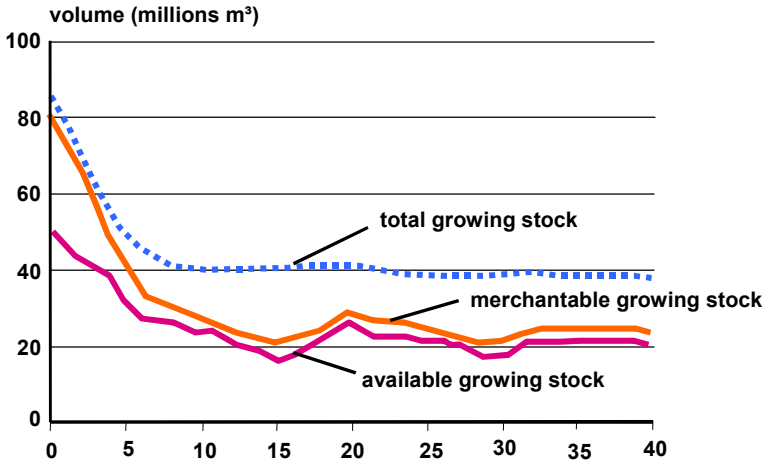


So this mechanism shaping timber supply–constraints on the rate of change of the harvest level–also provides a means of capturing silvicultural benefits in the short term. Note that the efficacy

of this effect is determined by the shape of the timber supply curve and hence is specific to a management unit.

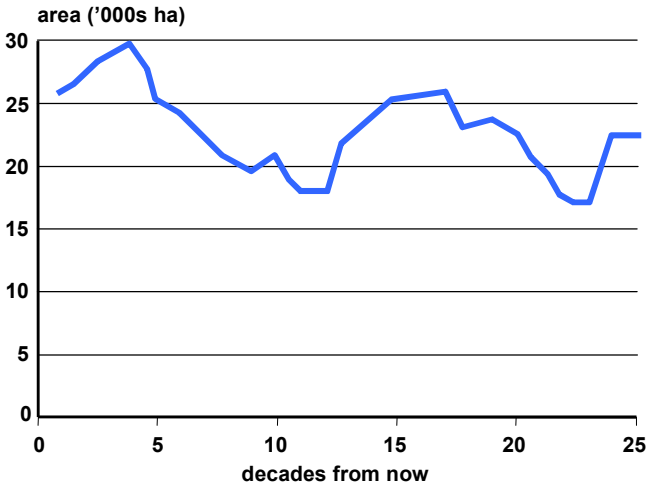
After 40 years there is a drawing down of the mature stock. Figure A2-2 forecasts a steady decline in total and harvestable growing stock for the first 70 years. After this time, both measures of stock reach a steady long-term level.

Figure A2-2. Total, merchantable and available growing stock, Kispiox TSA, 1996



The area harvested over time increases while the harvest level is maintained for the first 4 decades (Figure A2-3). The level rises while the oldest stands are eliminated from the timber harvesting land base. As the mature stands become depleted, timber rationing begins and the area harvested drops until the managed stands reach merchantable limits.

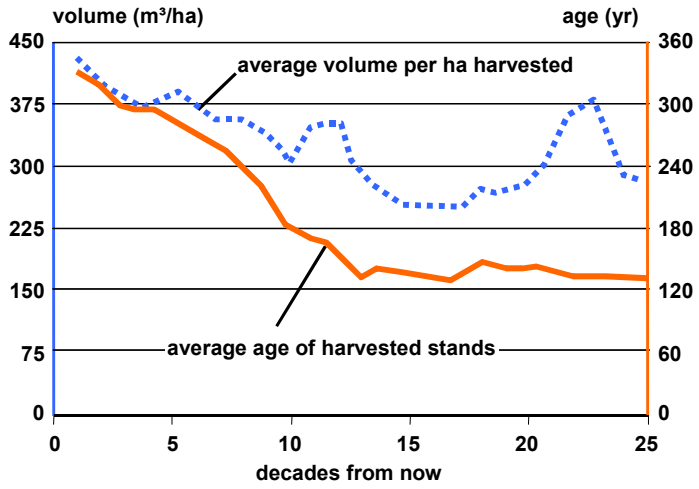
Figure A2-3. Average area harvested, Kispiox TSA, 1996



The average volume per hectare of timber harvested over time will decline until harvesting occurs on managed stands with good to medium site productivity (Figure A2-4). A cyclic pattern will develop as the good to medium sites are depleted and replenished at a constant rate.

The average age of harvested stands (Figure A2-4) declines quickly over the first 130 decades of the planning period. This decline can be attributed to older stands ranging in ages 120-300+ years being harvested for the first 70 years. Once these stands are harvested, the average age declines as the heavy concentration of regenerating stands with lower minimum harvestable ages become merchantable.

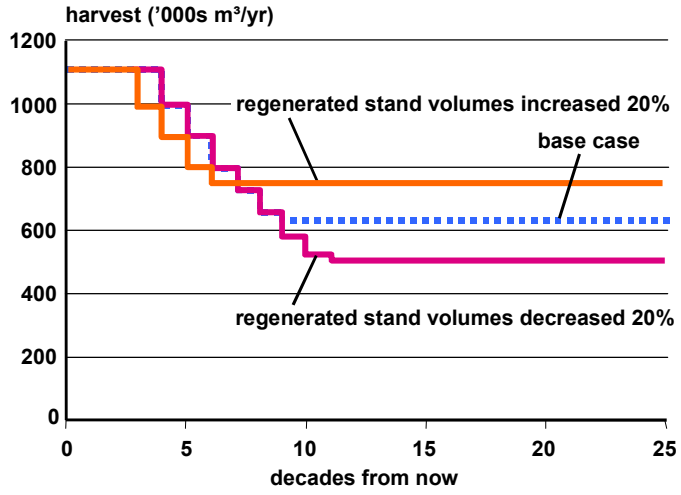
Figure A2-4. Average age and volume per hectare of harvested stands, Kispiox TSA, 1996



A 3 Uncertainty in Regenerated Stand Volume Estimates

Figure A3-1 demonstrates the sensitivity to volume estimates for regenerated stands. When regenerated volumes are increased the long-term harvest level can be increased to 19% above the base case forecast. Decreasing regenerated volumes causes the long-term harvest level to fall 18% below the base case forecast.

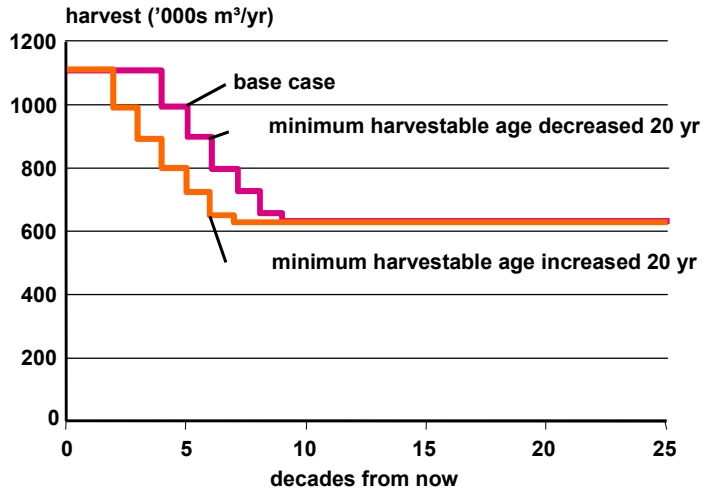
Figure A3-1. Sensitivity to volume estimates for regenerated stands, Kispiox TSA, 1996



A 4. Minimum Harvestable Ages

A 20 year decrease in the minimum harvestable age does not affect the timber supply because a majority of stands have reached or surpassed minimum harvestable age (Figure A4-1). Increasing the minimum harvestable age by 20 years will affect existing and regenerated stands. Although a large number of stands are above the minimum harvestable age, increasing the age of harvest will cause enough stands to fall below merchantability limits, therefore causing a decrease in the long-term harvest level.

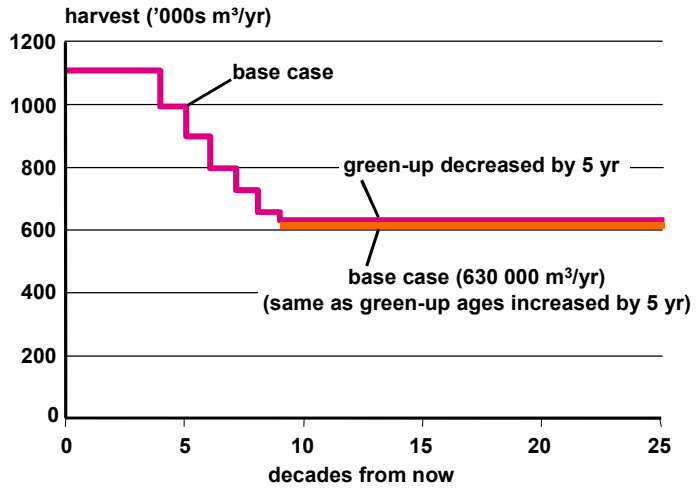
Figure A4-1. Sensitivity to minimum harvestable ages, Kispiox TSA, 1996



A 5 Green-up and Cutblock Adjacency

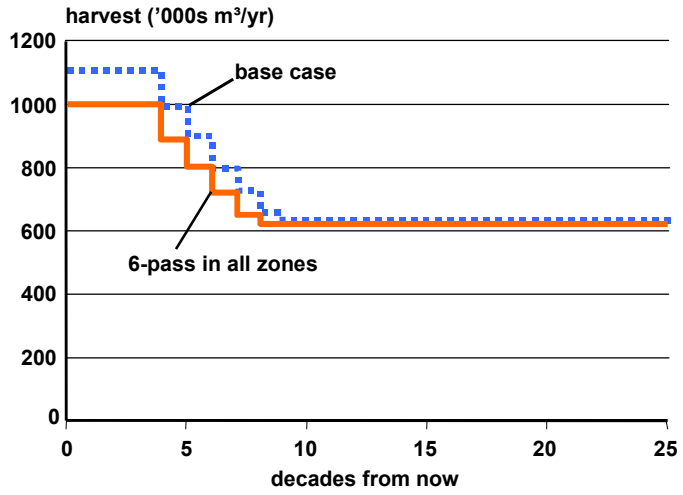
The current green-up height in Kispiox is 6 metres in VQO zones and 3 metres elsewhere in the TSA. Increasing green-up ages does not constrain the timber supply because of the short harvesting history (40 years) in the Kispiox TSA (Figure A5-1). The Kispiox TSA does not have a large number of areas tied up in green-up requirements due to previous harvesting. Decreasing the green-up ages increases the long-term harvest level by 10 000 m³ per year. When green-up ages are decreased, stands reach height requirements earlier, therefore allowing unharvested adjacent areas to become eligible for harvest.

Figure A5-1. Harvest forecast with variable green-up ages, Kispiox TSA, 1996



In the base case forecast the forest cover requirement used to model cutblock adjacency is based on the assumption that a maximum of 33% of the area can be less than 3 metres tall at any given time, representing a 3-pass harvesting system. Increasing the constraint to a 6-pass system causes a 9% decline in the initial harvest level. The long-term harvest level will be 10 000 m³ below the base case forecast. Figure A5-2 illustrates the effects of using a 6-pass system. The reason for the decrease is that the 6-pass system allows only 16.7% of the area to be below green-up height, while the base case allows 33% of the timber harvesting land base to be above green-up height.

Figure A5-2. Harvest forecast with a more stringent cutblock adjacency requirement, Kispiox TSA, 1996



A 6 Future Land Base Access Complications

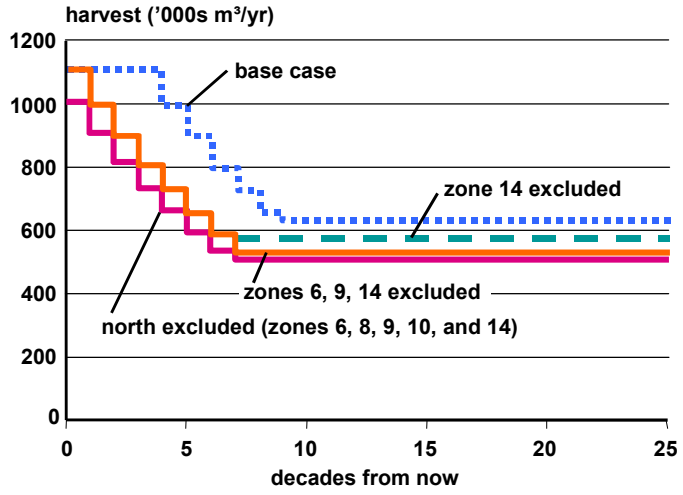
There is uncertainty about access to portions of the Kispiox TSA. A sensitivity analysis was carried out with several zones removed from the timber harvesting land base (Figure A6-1).

If zone 14 (IRM east) is excluded from the timber harvesting land base the initial harvest level declines after the first decade, and the long-term harvest level is 10% lower than the base case. When zones 6, 9 and 14 (the area north of the Babine River and east of the Skeena River) are removed from the timber harvesting base the initial harvest level declines after the first decade, and the long term harvest level is 19% lower than the base case.

Figure A6-1 illustrates the effects of removing zones 6, 8, 9, 10 and 14 (northern portion of the Kispiox TSA). The initial harvest level will be reduced to 1 000 000 m³ per year for the first decade, and the long term harvest level will be 21% below the long term harvest level.

The analysis shows that areas east of the Skeena River, as well as the northern portion of the TSA, are critical to both the short and long term timber supply.

Figure A6-1. Harvest forecast with multiple access restrictions, Kispiox TSA, 1996

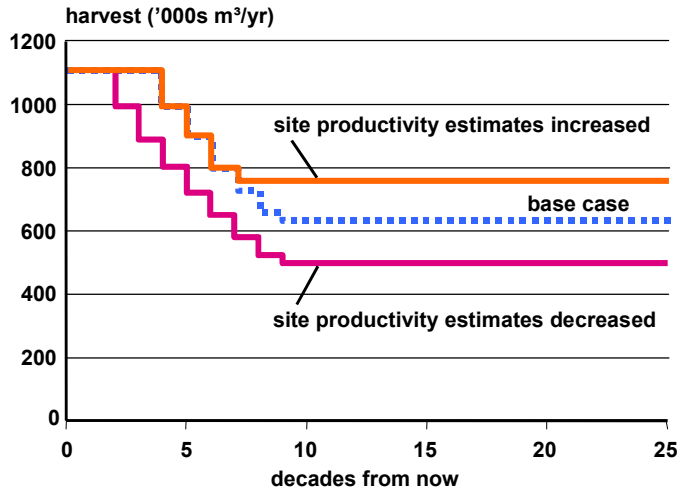


A 7 Uncertainty in Site Productivity

There is a high level of uncertainty concerning site productivity in the Kispiox TSA. Sensitivity analysis illustrates the vulnerability of the harvest level to fluctuations in site productivity estimates (Figure A7-1)

If regenerating stands are found on higher productive sites the long-term harvest level will increase by 21%. If current site productivity is overestimated, existing and regenerated volumes will be much lower, therefore causing the current harvest level to be maintained for only 2 decades, and the long term harvest level will be 20% below the base case harvest forecast.

Figure A7-1. Harvest forecast with sensitivity estimates of site productivity, Kispiox TSA, 1996



A 8 Timber Supply Dynamics–Summary

The base case harvest forecast could be maintained for 4 decades because of the age class structure, which is heavily weighted to mature timber.

As the mature stands are depleted, harvest and growing stock levels decline until managed stands allow for a stabilization of levels. Once the managed stands are established certain levels will enter a cyclic pattern as higher productive sites enter and exit the operability window.

This timber supply forecast is robust with respect to management modeling parameters such as green-up age and adjacency. Changes to regenerated stand yields and site productivity estimates result in significant increases or decreases in mid-term and long-term timber supply.

Administrative constraints such as access restrictions to certain areas of the timber harvesting land base could cause far-reaching decreases to the timber harvest forecast.

Appendix B. Executive Summary, Incremental Silviculture Strategy for BC

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

- Sustainable Use
- Community Stability
- A Strong Forest Sector

Key Principles

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 import 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

Within the context of the guiding principles:

1 Minimize the anticipated interim reduction in timber supply so that provincial annual harvests of at least 65 million m^3 can be achieved.

2 Create a long-term timber supply capable of supporting a steady long-term provincial harvest level of at least 75 million m^3.

3 Over the long term, maintain the production of premium quality logs at or above 10% of total harvest.

Major Silvicultural Strategies

- 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.

Other silvicultural and non-silvicultural strategies must also be implemented to achieve the working targets.

Strategy Implementation

Regional and management unit strategies must be developed, followed by programs and plans to implement them

Appendix C. Summary of Workshop Evaluations
Kispiox TSA (January 24-25, 2000)

	Please circle the number that best represents your view.				
1 Length of session	5 too long (**1**)	4	3 just right (**6**)	2	1 too short
2 Level of detail of content	5 too much	4 (**2**)	3 just right (**5**)	2	1 not enough
3 Instructional method (style, interaction, clarity)	5 excellent (**3**)	4 (**3**)	3 adequate (**1**)	2	1 poor
4 Relevance to your interests/needs	5 extremely	4 (**4**)	3 average (**3**)	2	1 not at all
5 Extent to which your needs were met	5 entirely (**1**)	4 (**3**)	3 average (**3**)	2	1 not at all
6 Usefulness of the handout graphics and texts	5 very (**1**)	4 (**4**)	3 adequate (**2**)	2	1 useless

What were the strengths of this workshop?

- Knowledge of facilitators. Small group – effective.
- Group discussion
- Stimulated and interesting issues/relevant to Kispiox. Good brainstorming session.
- Good interaction with participants.
- Very good instructional method – made to feel comfortable – made easy to interact.

What were the weaknesses of this workshop?

- None – good workshop
- Lack of licensee involvement
- Rough estimates of regime opportunities are limiting. Lack of imagination/creation of Rx regimes – esp. spacing opportunities, w.r.t. spp., SI, stocks….
- Sometimes conversation diverged, taking us away form the main focus of the discussion.
- Would have been nice to have more licensee participation.

How could this workshop be improved?

- None – good as is.

- No, very well organized. I like the "workshop document" – it will be a good reference.
- Good as is.
- Decrease length to one day.

Other comments? (use back if necessary)

- Good job.
- Thanks for the opportunity to participate.
- Too bad no M/L folks showed up!
- Good job, you guys are expert facilitators! Thanks, and good to meet you.