
Nass TSA

Silviculture Strategy (Type 1)

March 2001



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FOREST
RENEWAL BC



Nass TSA Silviculture Strategy (Type 1)

Acknowledgements

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	Name	Organization
1	Rocky Chan	Kalum Forest District
2	Doug Davies	Kalum Forest District
3	Kevin Derow	Skeena Cellulose Inc., Terrace
4	Neil Endacott	Prince Rupert Forest Region
5	Ben Haizimsque	Nisga'a Lisims Government
6	Lance Loggin	West Fraser
7	Carolyn Soloducha	Skeena Cellulose Inc.
8	Lou Tromp	Prince Rupert Forest Region
9	Bob Wilson	Kalum Forest District
10	Jordan Tanz	Cortex Consultants Inc.
11	Laird Pittman	Pittman Consulting



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

The issues addressed by this strategy are (in order of importance): fertility of degraded second-growth sites, underestimation of site index, maintaining a supply of sawlog-quality stands, stocking in old burns, basic reforestation difficulties, deciduous stocking on reforested sites, and forest health issues (green-striped forest looper, balsam bark beetle, spruce leader weevil, and *Comandra rust*).

Elements of the Strategy

Issue 1: *Fertility of degraded second-growth*. Identify the location and extent of nutrient deficient areas. Develop a remedial plan for the areas that are deemed to be affected. The plan may include treatment of the sites. Treat by means of fertilization where it is appropriate and after foliar analysis has been carried out.

Issue 2: *Underestimation of site index*. Improve estimates of site index for old-growth stands. Improve estimates of site index for second-growth stands.

Issue 3: *Supply of sawlog-quality stands*. Identify candidate stands that are currently under management that are suitable for treatment to promote a consistent level of quality sawlogs. The most likely stands suitable are overstocked stands with high site productivity. Rank the stands that have been identified as suitable candidates for treatment (to obtain minimum sawlog level). Implement treatments that promote the



growth of sawlog quality stands. In the Nass TSA spacing of overstocked stands is the most likely treatment that will ensure the objective is met.

Issue 4: *Stocking in old burns*. Old burn areas should be surveyed to determine stocking level and then reclassified to the correct inventory label. Determine the need for density control in overstocked sites and implement spacing treatment in candidate stands in old burn areas.

Issue 5: *Basic reforestation difficulties*. Evaluate suitability of planting hemlock and mountain hemlock on difficult sites as alternatives to *Abies lasiocarpa*. Use improved seed to accelerate early growth. Explore vegetation management approaches. Avoid creating habitat for voles as they damage and kill seedlings. Explore opportunities for more effective site preparation treatments (e.g. prescribed burning). Identify damage prevention strategies. Ensure that stocking levels are managed to targets rather than minimum levels. Identify seed production areas to ensure that an adequate supply of seed is available into the future from quality stands.

Issue 6: *Deciduous stocking*. Review the current policies regarding acceptability of deciduous species as contributing to stocking requirements. Redraft the policies where appropriate and where it is agreed that deciduous species should be considered as acceptable crop trees.

Issue 7: *Forest health*. Continue to plant a mixture of species as per the Hazard Rating Guide (spruce leader weevil). Limit the area that is planted to pine (*Comandra* rust). Pursue the development of resistant planting stock (green-striped forest looper and *Comandra* rust).

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. Priorities identified by workshop participants for Nass TSA are to identify and treat second growth stands that are nutrient-deficient and to improve estimates of site index for old-growth. The third-ranked activities were to contribute to the supply of sawlog-quality stands by surveying and treating (as appropriate) overstocked stands. Stocking in old burns was ranked fourth. The remaining issues were not ranked by workshop participants.

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
FERTILITY OF SECOND-GROWTH STANDS		
Foliar analysis	1000 ha (year 1)	1
select sites, prescribe treatment	200 ha/yr	1
fertilize	200 ha/yr	1
SITE INDEX UNDER-ESTIMATION		
OGSI (paired-plot corrections)	n/a	2
Growth intercept studies	n/a	2
SUPPLY OF SAWLOG-QUALITY STANDS		
Survey and analysis	4000 ha total	3
Spacing	200 ha/yr	3
STOCKING IN OLD BURNS (NASS, ROCHESTER, IRVING)		
Reclassify	2000 ha/yr	4
analysis, surveys	2000 ha/yr	4
spacing	200 ha/yr	4



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1. Introduction

The Silviculture Strategy (Type 1) workshop draws on the expert knowledge of the participants to identify the key issues that should guide silvicultural planning on the TSA, 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. The key idea is that this line of logic from issues to silvicultural activities can be retraced when evaluating funding levels, ensuring that activities are funded that address critical TSA issues.

The first step in developing this line of logic is to identify the key 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 Nass TSA. Following this introduction, section 2 summarizes the results of the strategic analysis and sections 3 and 4 present the plan. Issues that influence silviculture planning on the TSA were obtained in interviews with District staff and various documents identified by the District. Appendix A contains a detailed examination of the timber supply situation on the TSA, based on the most recent TSR timber supply analysis report, as some aspect of timber supply is often a guiding issue for silviculture planning. Appendix B includes the executive summary of the Interim Provincial Incremental Silviculture Strategy. Appendix C is the workshop evaluation summary.

2. 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 Nass TSA, as determined by the workshop participants.

The main issues in the Nass TSA are, under estimation of site index, fertility of degraded second-growth sites, maintaining supply of sawlog quality stands, stocking in old burns, basic reforestation difficulties, deciduous stocking and forest health issues including green-striped forest looper, balsam bark beetle, spruce leader weevil, and *Comandra* rust.



Issue 1: Fertility of Degraded Second-Growth Sites

A number of backlog sites exist where the application of broadcast burning as a site preparation tool has caused site productivity problems due to the severity of the burn. The areas have been planted and the seedling growth appears to be inhibited by the fertility of the site.

Strategies:

1. Identify the location and extent of nutrient deficient areas.
2. Develop a remedial plan for the areas that are deemed to be affected. The plan may include treatment of the sites.
3. Treat by fertilizing where appropriate and after foliar analysis has been carried out.

Issue 2: Site Index Under-estimated

The productivity of a site largely depends on how quickly trees will grow. It therefore affects the timber volumes in regenerated stands, the time to reach green-up height, and the age at which stands will reach merchantable or minimum harvestable size.

The results of recent province-wide research suggest that site productivity, which is measured by site index, may be significantly underestimated. Forest managers in the Nass TSA believe that site index is most likely underestimated in that area. Increases in site index in the Nass TSA would have large impacts on timber supply and timber flow.

Strategies:

1. Improve estimates of site index for old-growth stands.
2. Improve estimates of site index for second-growth stands.

Issue 3: Maintaining supply of Sawlog Quality Stands

Operators in the Nass TSA want to ensure that a consistent minimum level of high quality sawlogs are available in the future.

Strategies:

1. Identify candidate stands currently under management that are suitable for treatment to promote this objective. The most likely candidates are high-productivity overstocked stands.
2. Rank the stands that have been identified as suitable candidates for treatment.
3. Implement treatments that promote the growth of sawlog quality stands. In the Nass TSA spacing of overstocked stands is the treatment most likely to ensure that the objective is met.

Issue 4: Stocking in Old Burns

There is some uncertainty about stocking levels in an area of old burns of up to 12 000 hectares. Some of these areas are currently classified as NSR and others thought to be significantly overstocked. These overstocked stands may be classified as low sites in the TSR timber supply analysis where a silviculture treatment could move them towards a higher level of productivity. NSR sites that are actually SR may also be re-classified and included as part of the timber harvesting land base.



Strategies:

1. These areas should be surveyed to determine stocking level and then reclassified to the correct inventory label.
2. Determine the need for density control in overstocked sites and implement spacing treatment in candidate stands.

Issue 5: Basic Reforestation Difficulties

Achieving free growing status can be difficult in certain operating areas and biogeoclimatic zone variants in the Nass TSA. This challenge in part is due to climate, vegetation competition, availability and opportunity of alternative preferred tree species, and damage from pathogens and animals.

Strategies:

1. Evaluate suitability of planting hemlock and mountain hemlock on difficult sites as alternatives to *Abies lasiocarpa*. *Abies* is currently being planted because it is indigenous but there is some question of quality and value as a crop tree.
2. Use genetically improved seed to accelerate early growth.
3. Explore vegetation management approaches. There is some question as to the effectiveness of different post-establishment brushing treatments. A review of different methods available may determine a better approach
4. Avoid creating habitat for voles as they damage and kill seedlings. Alternative harvesting systems and site preparation methods may help alleviate this problem.
5. Explore opportunities for more effective site preparation treatments (e.g. prescribed burning).
6. Identify damage prevention strategies.
7. Ensure that stocking levels are managed to targets rather than minimum levels.
8. Identify seed production areas to ensure that an adequate supply of seed is available into the future from quality stands.

To Do List:

Lobby for the Forest Genetic Council to re-visit ranking of the Nass TSA seed planning units, with the goal of moving it higher in the decision matrix.

Track free growing stocking levels achieved to determine if levels are managed to targets rather than minimums.

Issue 6: Deciduous Stocking

A component of deciduous stocking exists on certain sites. If deemed acceptable, birch, cottonwood and aspen could be counted toward satisfying regeneration delay and free growing requirements.



Strategies:

1. Review the current policies regarding acceptability of deciduous species as contributing to stocking requirements.
2. Redraft the policies where appropriate and where it is agreed that deciduous species should be considered as acceptable crop trees.

Issue 7: Forest Health Issues

There are a number of forest health concerns in the Nass TSA. Those that are most prominent and pose the greatest threat to seedling establishment or tree growth are the green-striped forest looper, balsam bark beetle, spruce leader weevil, and *Comandra* rust.

Strategies for Spruce Leader Weevil:

1. Continue to plant a mixture of species as per the Hazard Rating Guide.
2. Pursue the development of resistant planting stock.

Strategies for Comandra Rust:

1. Limit the area that is planted to pine (*Comandra* rust).
2. Pursue development of resistant planting stock (*Comandra* rust).

3. Silviculture Impacts and Priorities

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

Table 1. Workshop issues, objectives, strategies, activities, targets, and impacts, Nass TSA

Issues	Objectives	Strategies	Target	Activities	Opportunity Area (ha)	----- Timber Supply Effects -----				Habitat Effects	Jobs (pdays)	Cost	Rank
						Short	Mid	Long	Qual				
1 site index under-estimated	improve estimates of site index for old-growth and existing stands	improve estimates for old-growth stands	TSA	OGSI, paired plot corrections		0-20	21-130	131+		+	100 pd	\$100,000	2
		improve estimates for second-growth stands	TSA	growth intercept studies			+	+		+			2
2 fertility of degraded second-growth sites	increase site productivity by alleviating nutrient deficiencies <div>Backlog sites</div> <div>This should be mentioned for completeness, but the group felt that there is no action to be taken other than harvesting. Possible PA? However, there may be a potential for future outbreaks.</div>	identify location and extent of nutrient-deficient areas, species develop plan for remedial treatment	areas logged and prescribe-burned (Bowser L., etc.) ~2500 ha	foliar analysis on suspect sites (some sites already known); areas north of km 140 hwy 37	1000 ha in first year						0.015 pd/ha	\$15 000	1
				develop plan for remedial treatment; select sites; prescribe treatment treat sites	200 ha/yr								1
					200 ha/yr	+		1500 ha already done by SCI	+		0.1 pd/ha	\$400/ha	1
3 FOREST HEALTH green-striped forest looper balsam bark beetle spruce leader weevil commandra rust	reduce susceptibility of reforested hectares no access	plant mixture of species as per hazard rating (already being done)	spruce stands	already being done									
		pursue development of resistant planting stock (improved seed)		work with FGC to examine opportunities or options for producing improved seed	"to do"								
		limit area planted to pine	pine stands	work with FGC to examine opportunities or options for producing improved seed	"to do"								
4 basic reforestation difficulties (achieving FG status)	more effectively meet basic reforestation obligations/targets minimize losses to voles achieve target stocking standards (full stocking, full site occupancy) seed sources for <i>A. lasiocarpa</i> , <i>A. amabilis</i>	evaluate suitability of hemlock and mountain hemlock on difficult sites as alternatives to <i>A. lasiocarpa</i>	TSA north of Meziadin Junction (ICHvc)	operational trials	"to do"								
		explore vegetation management approaches	brush-prone sites	continue veg mgmt trial	"to do"								
		avoid creating habitat for voles (they damage seedlings)	TSA	- develop guidelines	underway								
		find more effective site preparation methods	TSA		"to do"								
		identify damage prevention strategies	TSA		"to do"								
		ensure that target stocking standards are specified	TSA		"to do"								
		identify seed production areas	A. lasiocarpa, A. amabilis	review and identify candidate areas (underway)	"to do"								
5 stocking in old burns	improve stocking information for old burns <div>Issues: 1. impact on reaching FTG 2. projecting volume yields</div>	reclassify to determine correct stocking/inventory	12000 to 8000 ha (Nass, Rochester, Irving burns)	surveys	2000 ha/yr						.04 pd/ha	\$15/ha	4
		determine need for density control in overstocked stands		analysis, surveys	2000 ha/yr						.04 pd/ha	\$15/ha	4
				spacing	200 ha/yr		+		+		5 pd/ha	\$1500/ha	4
6 deciduous stocking (birch, aspen, cottonwood) on reforested sites	determine tolerance for deciduous species in meeting basic silviculture objectives	review current policy; change as appropriate/needed	TSA	underway; "to do"									
7 maintaining supply of sawlog quality stands	density control to increase average diameter	identify candidate stands; rank candidates for treatment	overstocked stands	survey, analysis							.04 pd/ha	\$25/ha	3
		implement treatments		spacing					++		5 pd/ha	\$1500/ha	3



Table 2. Summary of silvicultural activities, Nass TSA

Issue (by rank)	Strategy	Activity	Target	Opportunity Area (ha)
1. fertility of second-growth sites	identify location and extent of nutrient-deficient areas, species	foliar analysis	areas logged and prescribe-burned; suspect sites (some already known); areas north of km 140 Hwy 37	1000 in first year
	develop plan for remedial treatment	select sites, prescribe treatment		200 ha
		treat sites		200 ha
2. site index under-estimation	improve site index estimates for old-growth stands	OGSI; paired-plot corrections	whole TSA	n/a
	improve site index estimates for second-growth stands	growth intercept studies	whole TSA	n/a
3. maintaining supply of sawlog-quality stands	identify and rank candidates for spacing	survey and analysis	overstocked stands	4000 ha
	space stands to increase average diameter	spacing	overstocked stands	200 ha/yr
4. stocking in old burns	reclassify	surveys	8 000 to 12 000 ha in the Nass, Rochester, and Irving burns	2000 ha/yr
	determine need for spacing in overstocked stands	analysis, surveys		2000 ha/yr
		spacing		200 ha/yr



4. Silviculture Program

4.1 Tactical Priorities

Tactical priorities for Nass 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 Nass TSA, workshop participants felt that the most important tasks are to identify and treat second growth stands that are nutrient-deficient and to improve estimates of site index for old-growth. The third-ranked activities were to contribute to the supply of sawlog-quality stands by surveying and treating (as appropriate) overstocked stands.

4.2 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 (\$/ha) and employment (person-days/ha) assumptions

Issue	fertility of degraded second-growth			site index	supply of sawlogs		stocking in old burns		
Year	foliar ¹ analysis	plan treatment	fertilize	OGSI ² paired-plot studies	survey overstocked stands	space overstocked stands	survey (old burns)	analysis (old burns)	space (old burns)
\$/ha average	15		400	100000	25	1500	15	15	1500
PDs/ha	0.015		0.10	100	0.04	5.0	0.04	0.04	5.0

¹ \$15000 ÷ 1000 ha

² total \$ and PD

Table 4 Area (ha) treated by activity and year

Year	foliar analysis	plan treatment	fertilize	OGSI paired-plot studies	survey overstocked stands	space overstocked stands	survey (old burns)	analysis (old burns)	space (old burns)	Total
1	1 000	200	200	TSA	4000	200	2 000	2 000	200	9 800
2	0	200	200	0	0	200	2 000	2 000	200	4 800
3	0	200	200	0	0	200	2 000	2 000	200	4 800
4	0	200	200	0	0	200	2 000	2 000	200	4 800
5	0	200	200	0	0	200	2 000	2 000	200	4 800
Subtotal Yr 1 - 5	1 000	1 000	1 000	TSA	4000	1 000	10 000	10 000	1 000	29 000
Subtotal Yr 6 - 10	0	0	0	0	0	1 000	10 000	10 000	1 000	22 000
Total Yr 1 - 10	1 000	1 000	1 000	TSA	4000	2 000	20 000	20 000	2 000	51 000

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

Year	foliar analysis	plan treatment	fertilize	OGSI paired-plot studies	survey overstocked stands	space overstocked stands	survey (old burns)	analysis (old burns)	space (old burns)	Total
1	15	0	80	100	100	300	30	30	300	955
2	0	0	80	0	0	300	30	30	300	740
3	0	0	80	0	0	300	30	30	300	740
4	0	0	80	0	0	300	30	30	300	740
5	0	0	80	0	0	300	30	30	300	740
Subtotal Yr 1 - 5	15	0	400	100	100	1 500	150	150	1 500	3 915
Subtotal Yr 6 - 10	0	0	0	0	0	1 500	150	150	1 500	3 300
Total Yr 1 - 10	15	0	400	100	100	3 000	300	300	3 000	7 215

Table 6 Short-term employment benefits (person-years³) by activity and year

Year	foliar analysis	plan treatment	fertilize	OGSI paired-plot studies	survey overstocked stands	space overstocked stands	survey (old burns)	analysis (old burns)	space (old burns)	Total
1	0.08	0.0	0.1	0.5	0.8	5.0	0.4	0.4	5.0	12
2	0.00	0.0	0.1	0.0	0.0	5.0	0.4	0.4	5.0	11
3	0.00	0.0	0.1	0.0	0.0	5.0	0.4	0.4	5.0	11
4	0.00	0.0	0.1	0.0	0.0	5.0	0.4	0.4	5.0	11
5	0.00	0.0	0.1	0.0	0.0	5.0	0.4	0.4	5.0	11
Subtotal Yr 1 - 5	0.1	0.0	0.5	0.5	0.8	25.0	2.0	2.0	25.0	55.9
Subtotal Yr 6 - 10	0.0	0.0	0.0	0.0	0.8	25.0	2.0	2.0	25.0	54.0
Total Yr 1 - 10	0.1	0.0	0.5	0.5	0.0	50.0	4.0	4.0	50.0	109.9

³ one person-year of employment is equivalent to 200 person-days of employment



5. 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), or the issue could not be resolved until further investigation provided some clarification (e.g., the suitability of planting hemlock on difficult sites). 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).

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

Rank	Issue
1	Identify strategies for reducing damage by voles through harvesting and post-treatment practices. Reduction of slash accumulations may assist in reducing loss.
1	Determine tolerance for deciduous species in meeting basic silviculture objectives; review current policy; change as needed and appropriate.
2	The potential for managing to minimum stocking standards rather than targets will result in reduced yields. Monitoring is needed to verify whether this is a concern in the Nass TSA. Track FTG stocking achieved (minimums vs targets).
2	Evaluate suitability of planting hemlock, mountain hemlock and spruce on difficult sites as alternatives to <i>A. lasiocarpa</i> .
2	Lobby for FGC to re-visit ranking of Nass TSA seed planning units, with goal of moving it higher in decision matrix.
2	Review site preparation methods to improve effectiveness of different methods (e.g., prescribed burning trials).



Appendix A—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 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

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 m³ 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 m³.
- 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 B—Summary of Workshop Evaluations

Total and average scores are shown in parentheses

1 Length of session (Average: 3.0)	5 too long	4	3 just right (8)	2	1 too short
2 Level of detail of content (Average: 3.0)	5 too much	4	3 just right (8)	2	1 not enough
3 Instructional method) (Average: 4.5)	5 excellent (4)	4 (4)	3 adequate	2	1 poor
4 Relevance to your interests/needs (Average: 3.9)	5 extremely (3)	4 (5)	3 average	2	1 not at all
5 Extent to which your needs were met (Average: 3.4)	5 entirely (1)	4 (5)	3 average (2)	2	1 not at all
6 Usefulness of the handouts (Average: 4.0)	5 very (2)	4 (3)	3 adequate (2)	2	1 useless

What were the strengths of this workshop?

- Knowledge and skills to facilitate workshop.
- I thought it was well-presented, good discussion;
- Simple and clear.
- Got all/everyone involved.
- Having the right/key people present to contribute to the knowledge based seminar.
- Presenters well versed in topic(s). Opportunity for input from stakeholders across the TSA.
- Knowledge of subject by Jordy and Laird.
- Jordan did a great job presenting a potentially difficult subject.

What were the weaknesses of this workshop?

- None noted!
- It would have been nice to have had some pre-reading.
- Some pre-reading. Preparatory info.

How could this workshop be improved?

- Good as is.
- Couldn't.
- It would be nice to have the material prior to the workshop.

Other comments?

- Was one of the most interesting workshops been to in the last 12 mo. or so.