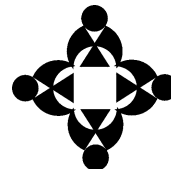




Partial Cutting Information Needs Assessment for the Nelson Forest Region:

“Finding Solutions”: Biological and Technical Issues

FILE REPORT 01-3

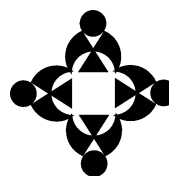


Southern Interior
Forest Extension and
Research Partnership

Partial Cutting Information Needs Assessment for the Nelson Forest Region:

**“Finding Solutions”:
Biological and Technical Issues**

Kathie Swift (editor and compiler)



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ABSTRACT

As the management of other values becomes a more intricate component of our forestry culture, the use of the silvicultural systems “tool kit” increases in importance. With the greater use of different systems, the need for information pertaining to their use is also increasing.

In early January 2000, the B.C. Ministry of Forests in the Nelson Forest Region did an internal review of the partial cutting issue and indicated that a more widespread view of the problem was required. To achieve this wider view, the Ministry worked with the Southern Interior Forest Extension and Research Partnership (the Partnership) to develop a partial cutting information needs strategy.

During initial focus group sessions, over 70 biological or technical issues were identified. This list was further refined to 39, with the majority of issues relating to broad themes, such as growth and yield, forest health, stand structure, landscape-level planning, windthrow, ecosystem restoration, and wood quality.

A working session was set up with the research community (October 10 and 11, 2000) to further review these issues. The researchers then discussed what steps were needed to address the identified issue, looking at possible extension or research mechanisms. This report provides a brief outline of the discussions that took place around these issues.

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QUALIFIER

The intent of this report is to identify key information issues in the area of partial cutting in the Nelson Forest Region. It is important to note that the information needs identified in this survey only reflect the views of practitioners in this forest region and should be treated accordingly. As well, the information generated as a result of the follow-up working sessions with the research and policy communities is far from complete and should be viewed as a limited reflection of what is currently under way.

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1 INTRODUCTION

As the management of other values becomes a more intricate component of our forestry culture, the use of the silvicultural systems tool kit increases in importance. With the greater use of different systems, the need for information pertaining to their use is also increasing. Partial cutting, a term that seems to encompass many of the different silvicultural systems techniques, has been categorized as an area of high information need in a number of surveys. However, before providing information to fill this need, it is important to define the problems surrounding partial cutting, the information needed to help address these problems, the best methods of delivery, and the techniques to evaluate the effectiveness of delivery.

In early January 2000, the B.C. Ministry of Forests in the Nelson Forest Region did an internal review of the partial cutting issue and indicated that a more widespread view of the problem was required. To achieve this wider view, the Ministry requested the aid of the Southern Interior Forest Extension and Research Partnership (the Partnership). Working with the Partnership and a small multi-party working group, a partial cutting information needs strategy was developed and implemented.

1.1 Project Objectives

The objectives developed for the partial cutting information needs project were:

1. to identify information needs that will increase the comfort, confidence, and competence of those who have to develop or approve and implement partial cutting regimes to meet a management objective; and
2. to provide direction and identify priorities for research, extension, and policy specialists and to link these priorities to funding agencies.

2 METHODS

To carry out the objectives of the partial cutting needs assessment project, an audience of field practitioners was chosen as the primary target group. This group included consultants, Ministry of Forests district personnel, licensees, Ministry of Environment, Lands and Parks personnel, and woodlot owners. Administrative personnel were also chosen as a secondary target group.

To assess the needs of the primary target group, a two-phase approach was used. The first phase involved the development of a 4 × 5 matrix with possible issue categories listed across the top of the matrix and potential forest types of interest listed down the side of the matrix. This exercise provided the target group with an opportunity to analyze their issues with a “coarse filter.” They categorized the issues as biological/technical, policy, administrative, and socio-economic, as well as by forest type (Dry Douglas-fir; Wet Belt Douglas-fir; Kootenay Mix – Interior Cedar–Hemlock; lodgepole pine; and Engelmann Spruce–Subalpine Fir). This matrix, along with details about its use, was forwarded to the target audience for completion. Once completed, the matrices were returned and the data summarized by issue and forest type.

In the second phase of the project, all members of the target audience were invited to attend two focus group sessions. One, held in Invermere (June 13, 2000), drew 18 participants, and

the other in Castlegar (June 14, 2000), drew 17 participants. The intent of these focus groups was to:

- review all of the issues generated by the matrix,
- clarify the real issues, and
- identify any additional issues that might have been missed during the first phase of the process.

The focus group participants were to prioritize the issues that were identified; however, because of time limitations, this did not occur. A list of issues was generated that synthesized the information collected from both focus groups. This list was forwarded to the participants for review. At the same time, the participants were also asked to identify their top ten biological or technical issues and their top ten policy or administrative issues based on the perceived severity and extent of the problems. A summary of the biological/technical issues is presented in Appendix 1, with a more detailed account provided in Appendix 2.

To meet the second objective of this project, two working sessions were set up, one with the research community (October 10 and 11, 2000), and one with the Ministry of Forests policy community (October 12 and 13, 2000).

The purpose of the working session with the research community was to review the biological or technical issues initially identified by the project target group. The information generated by the target group was first reviewed, and then each individual issue was assessed to determine:

- what information was currently known about the issue,
- what information was lacking, and
- where uncertainties existed.

The researchers then discussed what steps were needed to address the identified issue, looking at possible extension or research mechanisms.

The remaining sections of this report will focus on the information generated for the biological and technical issues.

3 RESULTS

3.1 Major Issues Identified

During the focus group sessions, the target audience identified over 70 biological or technical issues. This list was further refined to 39, with the majority of issues relating to broad themes such as growth and yield, forest health, stand structure, landscape-level planning, windthrow, ecosystem restoration, and wood quality. The following were the top biological or technical issues identified by the target audience.

- What are the growth and yield implications of partially cut stands?
- What appropriate partial cutting management strategies are available to mitigate forest health concerns, such as root disease, stem cankers, blister rusts, and animal damage?
- At the landscape level, where should partial cutting be used versus clearcutting? Do we have enough information to use it appropriately? What are the trade-offs, consequences, or risks associated with the decision?
- Management constraints are leading to the use of more partial cutting; do we understand the implications of this practice?

3.2 Synopsis of Discussion

A brief outline of the discussions that took place around these issues, and a number of others, follows.

3.2.1 Growth and Yield

MODELS

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– District people do not use models.– Is modelling the way to go?– What models are available and what are their strengths, weaknesses, and range of use?
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Ministry of Forests has a number of growth and yield models available for use – PROGNOSIS, TIPSYP, TASS, just to name a few.– Individual regions also have specific growth and yield models that they are using (ATLAS-SIMFOR, FORECAST, etc.).– There appears to be some (limited) information to calibrate root rot effects within the current model.
NEXT STEPS	<ul style="list-style-type: none">– More extension and training around the current growth and yield modelling tools.– Models to date estimate root disease effects based on guesswork, rather than on well-replicated science. This needs to be changed, given the frequent occurrence of <i>Armillaria ostoyae</i> in the Interior Cedar–Hemlock (ICH), and the need to estimate accurately future stand yields.

DATA COLLECTION

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Do we have sufficient growth and yield information in the Interior ICH zone to calibrate and validate PROGNOSIS?– Do we have the raw data to drive the existing knowledge?– Insufficient funds are available to install permanent sample plots.– Insufficient commitment to install permanent sample plots.– If responsibility for the permanent sample plots falls to the licensees, how do we deal with proprietary interests?
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Biogeoclimatic zone (BEC) matrix exists for PROGNOSIS, but it contains gaps.– Canadian Forest Service (CFS) is working to collect data to help calibrate the effects of root rot.– Slocan and Tembec are putting in permanent sample plots.

KNOWLEDGE GAPS	<ul style="list-style-type: none"> – There is a lack of permanent sample plots in the ICH, therefore, limited data is available. – Is the data that currently exists sufficient or not?
AREAS OF UNCERTAINTY	<ul style="list-style-type: none"> – Is the calibration of PROGNOSIS based on treated or natural stands? The knowledge is based mainly on old-growth and naturally regenerated second-growth stands. – The calibration of models will have some effect of root disease built in because of the difficulty in seeing symptoms above ground.
NEXT STEPS	<ul style="list-style-type: none"> – Establish more permanent sample plots to provide more data for the existing models. – Fill in the matrix that currently exists for PROGNOSIS to help calibrate it for the ICH. – Maintain existing, applicable, long-term permanent sample plots. – Collect data to calibrate the root disease effects of below-ground infections.

BASAL AREA RETENTION

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none"> – What is the maximum level of removal before you affect the site's productivity? – Do the existing guidelines reflect current research knowledge, and how do we get new research incorporated into the guidelines?
EXISTING KNOWLEDGE	<ul style="list-style-type: none"> – Models available to simulate productivity implications. – In 1996–97, Cranbrook and Invermere forest districts did a study using a number of basal area retention simulations; similar simulations can be redone using PROGNOSIS. – Knowledge of the ecologists is vital.
KNOWLEDGE GAPS	<ul style="list-style-type: none"> – We need data on the regeneration stage for existing data.
NEXT STEPS	<ul style="list-style-type: none"> – Table issue of standards with the Nelson Free Growing working group to deal with policy/guidelines. – More extension and training on existing models (e.g., PROGNOSIS). – Need a policy endorsement for the models to be used: there are a lot of models available, which one is the best? – What models are available and what are their uses; this is an extension issue.

3.2.2 Forest Health

GENERAL

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– For root rot diseases, do we understand the biology of the disease species and how it will respond to partial cutting?
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Multiple entries will increase inoculum, but effect will depend on the size of trees cut and their distribution within the stand.– If a high level of inoculum exists in a stand, mortality will occur.– Many more trees are infected below ground than can be seen above ground by symptoms.– Larger trees are more likely to be infected and therefore effects are most concentrated here.– Trees in partially cut stands are more likely to be infected and have a higher risk of mortality.– A draft hazard rating system developed by the CFS is available.– Hazard rating system exists in the root rot guidebook.– Mitigation course available from Don Norris.– Detailed information on growth loss threat may be added to PROGNOSIS (modelling decline in Douglas-fir).– Duncan Morrison’s retrospective work.– Nelson Region EP1186.– A belief from the research community that partial cutting in the ICH is risky.– Pop-up treatment tool.– Literature available on a number of trials from the northwest needs synthesis.– Two posters available from CFS (FTP://FTP.PFC.Forestry.ca), then click on Mike Cruickshank (need Adobe Acrobat 4.0): Poster 1 is on growth and yield, and Poster 2 is on a general overview of root diseases.– SIFERP information needs root rot survey: results of which will be published as a SIFERP file report in the near future.
KNOWLEDGE GAPS	<ul style="list-style-type: none">– Do we know what happens to a tree that is infected versus uninfected?– What are the impacts of other silvicultural treatments (e.g., brushing, Class A seed)?– How are forest management operations affecting the timing and frequency of below-ground infections?– Just how productive is the ICH, if the root disease effect is taken into account?

AREAS OF UNCERTAINTY

- Do we know what happens with multiple entries?
- Lots of inoculum: effects/thresholds?
- Do we know that pop-up treatments really work in practice? It should work based on first principles, but does it?
- How do practitioners like pop-up treatments?

NEXT STEPS

- Determine the effects of below-ground infections on growth and yield and incorporate these into models.
 - Determine the economics of treatments, which includes all effects of the disease.
 - Extension on possible mitigation opportunities.
 - Risk assessment matrix (guidebook) could have an attachment providing harvesting/cutting options that could mitigate some of the problems associated with root rot: explanation of treatment options.
 - Increase the use or awareness of birch as a mitigator for forest health concerns, but also remind people that it can be used to mitigate effects of root rot only when it is alive and standing; it can become a source of inoculum after it is cut down.
 - Symposium or conference on Armillaria to take place in Nelson (fall 2001–2002); will include field sessions. Could possibly piggyback on the Armillaria and Douglas-fir beetle meeting at the Western International Forest Disease Work Conference?
 - Need to use SIFERP root rot survey to determine the most appropriate format for extension opportunities.
 - Brainstorming session on extension and best mechanisms to use to get the messages out.
 - Need to determine which information the operational community wants (SIFERP survey could help).
 - Conduct small focus groups to determine best extension opportunities.
-

MECHANICAL SCARRING

COMPONENTS OF THE ISSUE

- What is the amount of decay that is acceptable and what are the impacts?
- What techniques need to be avoided?

EXISTING KNOWLEDGE

- How to manage scarring to mitigate decay: some work done in Kamloops Region.
 - Eric Allen (CFS)—Mt. Seven work—looking at incidences by growth and yield.
 - CFS has some technology transfer notes regarding implication of scarring and growth and yield.
-

KNOWLEDGE GAPS	<ul style="list-style-type: none"> – Mitigation of stem damage: we don't know the impacts. – Butt rot and stem decays caused by scarring can be a double hit in terms of growth loss: no work done on this in North America, some work done in Scandinavia.
NEXT STEPS	<ul style="list-style-type: none"> – Extension on how to manage mechanical scarring.

DWARF MISTLETOE

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none"> – Mistletoe: it may not be a problem at present, but what about the future? The level of the problem may not be understood now, but another contraindication for partial cutting in susceptible stands.
EXISTING KNOWLEDGE	<ul style="list-style-type: none"> – Some work taking place on larch seed-tree pruning for mistletoe: Lw–Dwarf Mistletoe trial at Howser being re-measured this year (2001).
KNOWLEDGE GAPS	<ul style="list-style-type: none"> – What options are available to deal with mistletoe other than pruning? Spacing to favour on-site, non-host species? – What are the growth and yield implications?
NEXT STEPS	<ul style="list-style-type: none"> – Determine the growth and yield and economic implications of infections.

BEETLE-PROOFING

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none"> – Beetle-proofing: what does it mean? – There is a difference between beetle-proofing for Mountain Pine Beetle and beetle-proofing for Douglas-fir beetle.
EXISTING KNOWLEDGE	<ul style="list-style-type: none"> – CFS has done a lot of work on beetle proofing for Mountain Pine Beetle under certain practices. – CFS has also done some work on the Douglas-fir beetle showing that the beetles are attracted to and breed well in stumps (long butts) and fresh course woody debris, especially in the shade. Stressed trees are ideal habitat for the expansion Douglas-fir beetle populations. Partial cutting leaves stumps and damaged trees; therefore, they recommend that during outbreaks of this beetle, partial cutting should be limited. – Trap trees work well to concentrate Douglas-fir beetle attacks. However, trap trees left in the woods (i.e., not retrieved before flight) lead to a rapid expansion of the population. It is suggested that trap trees should not be used without a good mapping and follow-up policy. – Terry Shore is working with Kootenay Lake District in the West Arm Demonstration Forest on a susceptibility rating for the Douglas-fir beetle.

3.2.3 Regeneration

ADVANCED REGENERATION

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Response of advanced regeneration to release.– The information on release of advanced regeneration is not making it into the free growing guidebook.– Losing shade-tolerant species.– Soil disturbance, or lack of, is causing the loss of some species.
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Deb DeLong is doing work on the response of advanced regeneration to release (Ice Road Study).– We have knowledge of specific physical ground conditions for seedlings: John Pollack’s Partial Cutting Analysis, conducted a number of years ago (is it on paper?).
KNOWLEDGE GAPS	<ul style="list-style-type: none">– The impact of a range of canopy openings, soil compaction, and range of species.
NEXT STEPS	<ul style="list-style-type: none">– We need a synthesis of existing information.– Problem analysis on regeneration under partially cut stands to determine gaps in the knowledge level.

SNOW PRESS

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Impact of snow press in the Engelmann Spruce–Subalpine Fir zone (ESSF).
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– There are guidelines that are already available regarding the impact of blowdown and snow press effects on residual stems and growth and yield.– These items do not usually affect a mature stand all at once, but usually one stem at a time.– Steve Mitchell has done work on windfirmness and growth and yield implications. A guide and risk assessments have also been done.
KNOWLEDGE GAPS	<ul style="list-style-type: none">– Do models take into account mortality and growth and yield losses due to windthrow and snowpress?
NEXT STEPS	<ul style="list-style-type: none">– Extension of existing guidelines.

3.2.4 Stand Structure

GENETICS

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Genetic loss/diversity.– Is there a potential for creating disgenetic species pools?– Will partial cutting potentially lead to genetic degradation?
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– We know that partial cutting will lead to genetic degradation.– Biodiversity issues may be encouraging this.– It is important to know what contribution to the next stand these remaining trees are providing because a lot of information is known about effects.
AREAS OF UNCERTAINTY	<ul style="list-style-type: none">– Assessment of the degree of species conversion and possible macro-implications (landscape).
NEXT STEPS	<ul style="list-style-type: none">– Need to extend knowledge on considerations related to removing trees.– Initiate a project that evaluates disgenetic processes through current partial cutting regimes.

GROWTH AND YIELD

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Species conversion: what did the stand look like in the past.– What is the impact on growth and yield?
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Management issue: at high elevations, spruce is removed, and balsam will regenerate in.
KNOWLEDGE GAPS	<ul style="list-style-type: none">– NDT 1, 2, 3 research?– Some work done by Harry Quesnel, but limited.
AREAS OF UNCERTAINTY	<ul style="list-style-type: none">– Future stand structure is not being thought about: what is the impact of this?– Importance of what we are leaving behind.
NEXT STEPS	<ul style="list-style-type: none">– Extension on legacy of natural disturbance.

FUTURE STRUCTURE

COMPONENTS OF ISSUE	<ul style="list-style-type: none">– What range of tree species do we leave behind?– How do we determine which trees will survive pre- and post-treatment?
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Age may not be a factor.– Look at small trees as the future component of the stand.

UNEVEN-AGED MANAGEMENT

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Uneven-aged management of dry belt Douglas-fir.– Define single-tree selection or group selection systems within the ungulate winter range.
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Some work in progress about defining winter range for ungulates.– Some work done on caribou.– Have enough knowledge about uneven-aged stand management for dry Douglas-fir.
KNOWLEDGE GAPS	<ul style="list-style-type: none">– Some controversy on how much thermal cover is required; more research?– What attributes are being managed for?– Low-risk approach right now; because we don't know how much a stand can be opened up and still meet the objectives.– Nothing done on moose.
AREAS OF UNCERTAINTY	<ul style="list-style-type: none">– How much can you open the stand up for use as winter range (i.e., forage and thermal cover)?
NEXT STEPS	<ul style="list-style-type: none">– Information about managing for habitat attributes for wildlife (amount of forest cover, etc).– A problem analysis should be conducted.– Components should be developed for the existing models.– Extension is needed on the information obtained so far.

DECIDUOUS STANDS

COMPONENTS OF THE ISSUE	<ul style="list-style-type: none">– Deciduous crop planning.
EXISTING KNOWLEDGE	<ul style="list-style-type: none">– Rick Krebs in Prince George and Keith Thomas at the Branch in Victoria are working on the topic.– A lot of research has been done on aspen.– Some information is available on birch.– SIFERP conducted a hybrid poplar survey regarding information needs.
KNOWLEDGE GAPS	<ul style="list-style-type: none">– We have no (or very limited) management experience with broadleaves.– Densities or threshold levels of competition on conifers.– The implications at the landscape level of managing for broadleaves are unknown.– How would you manage for them?

3.2.5 Landscape-level Planning

OLD GROWTH

COMPONENTS OF THE ISSUE	– Management strategies to maintain old growth.
EXISTING KNOWLEDGE	– Harry Quesnel has done work on old-growth attributes for some BEC zones, with no implications for management. – Report available on old-growth attributes. – Some work on actual attributes; however, need some consensus on what some attributes are (other than age). – Some work taking place on identifying actual stands.
KNOWLEDGE GAPS	– Can partial cutting be used to provide for old-growth attributes? – How do we use partial cutting to enhance old-growth attributes?
NEXT STEPS	– Time and space strategy for old growth. – Work is under way, but how much? How long do we have to wait?

STRATEGIC LOCATION OF PARTIAL CUTTING AREAS

COMPONENTS OF THE ISSUE	– Strategically, where should partial cutting be done?
EXISTING KNOWLEDGE	– John Pollack’s wood flow analysis for the Arrow TSA using partial cutting (report available). This report showed where to apply partial cutting strategically. – Some work also done on commercial thinning on highly constrained areas. – Pop-up commercial thinning is feasible (Rosebud Lake) to control a range of root diseases.
NEXT STEPS	– Some extension of reports and options.

TIMBER SUPPLY REVIEW

COMPONENTS OF THE ISSUE	– Timber Supply Review purposes and partial cutting: do we understand the implications?
KNOWLEDGE GAPS	– Modelling at TSR level and partial cutting needs work. – Do the best that we can at the stand level. – Need better information at the stand level (growth and yield) – How do you incorporate into the TSR the data to develop the curves for partial cutting? – Do we need more data?

NEXT STEPS	<ul style="list-style-type: none"> – Some more gaming needed and extension on results. – Harry Drake (?) needs to continue on with extension surrounding certification.
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3.2.6 Wood Quality

COMPONENTS OF THE ISSUE	– Do partial cutting issues influence timber quality?
EXISTING KNOWLEDGE	<ul style="list-style-type: none"> – Large information gap: FORINTEK has done a few studies on spaced stands. – Weyerhaeuser is also doing some work.
KNOWLEDGE GAPS	– Wood quality in the next cut?
AREAS OF UNCERTAINTY	<ul style="list-style-type: none"> – There is some information out there about the effects of commercial thinning on wood quality: is this applicable to partial cut stands? – What is the wood quality of the regeneration coming off partially cut stands?
NEXT STEPS	– Follow-up with FORINTEK.

4 CONCLUSIONS AND RECOMMENDATIONS

- From the results generated, it appears that a lot of information about the biological and technical components of partial cutting exists; however, extension and training mechanisms are lacking to get this information into the hands of the operational community.
- A lot of time and energy has been put into partial cutting: perhaps it is time to evaluate what we have accomplished and learn from it.
- Some form of research and monitoring appears to be needed to eliminate the uncertainty around objectives and to measure whether those objectives have been met.

APPENDIX 1 Top Ten Biological or Technical Issues

THEME/CATEGORY	IDENTIFIED ISSUE	FOREST TYPE AFFECTED	PRIORITY IDENTIFICATION	PAGE REFERENCE
Forest Health	What partial cutting management strategies are available to mitigate forest health concerns, such as root disease, stem cankers, blister rusts, and animal damage, since the ones for clearcutting don't seem to mesh?	All	4	17
	What are some tactics/options to reduce a stand's susceptibility to beetle, and what is the role of beetle-proofing?	Dry Df, Wet Df, Pl	1	18
	What is the impact of partial cutting adjacent to parks or private lands infested with pests?	Kmix	1	18
	Is root damage caused by machinery when using partial cutting?	All	0	18
	What are the impacts of decay and waste breakage factors (and commercial thinning) on the younger stands?	Kmix	2	18
	Are we overplanting lodgepole pine, and if so, what are the effects in terms of forest health issues?	All	1	18
Growth and Yield	What are the implications of partial cutting on soil disturbance and permanent access structures?	All	0	19
	What are the growth and yield implications of partially cut stands?	All	7	19
	In stands with mixed species with different MAIs, how do you know when is the best time for harvest?	All	2	20
	What are the growth and yield implications of using advanced regeneration as part of the regeneration strategy on these sites?	Wet Df, Kmix	2	20
	At what BA retention level does it cease to be mature forest cover (intermediate cut): implications of timber availability?	All	3	20
	What is the productivity and acceptability of the understorey in the wet belt?	Kmix	2	21

APPENDIX 1 *Top Ten Biological or Technical Issues (Continued)*

THEME/CATEGORY	IDENTIFIED ISSUE	FOREST TYPE AFFECTED	PRIORITY IDENTIFICATION	PAGE REFERENCE
Growth and Yield <i>(continued)</i>	What are the impacts of scarring?	All	0	21
	What is the impact of snow press and damage throughout the growth period?	ESSF	0	21
	Is there a lack of growth and yield models for operational planning?	All	1	21
Stand Structure	What is the role of CWD and what is the fuel density and distribution?	All	0	22
	Third-rotation stands: how should we be managing them?	Dry Df, Wet Df, Kmix	0	22
	Will the relative shade intolerance of Df, Pw, and spruce lead to the eventual conversion of hemlock and cedar if single tree and small group selection are used? If so, what are the ecological implications?	Wet Df, Kmix	1	22
	Could partial cutting potentially genetically degrade or produce a species conversion on these sites, and if so what are the ecological implications?	Kmix, ESSF	2	22
	Stands tend to have a range of tree sizes present, although they are approximately the same age; what do you do in terms of removing BA: do you leave a few large trees or a lot of small ones or any combination in between? Is BA the best way to describe these stands? How do you go back and measure to verify that you have achieved the level specified?	Kmix	3	23
	Can we model BA retention and regeneration success, particularly in stands of mixed species and diameters?	All	2	23
	Are we using the application of classic uneven-aged management in areas where stand structure is not suitable? Is it appropriate for stands assigned as ungulate winter range?	All	1	24
	What is the role of deciduous trees in terms of crop planning, forest health, and products?	Kmix	1	25

APPENDIX 1 *Top Ten Biological or Technical Issues (Continued)*

THEME/CATEGORY	IDENTIFIED ISSUE	FOREST TYPE AFFECTED	PRIORITY IDENTIFICATION	PAGE REFERENCE
Stand Structure <i>(continued)</i>	What is the applicability and suitability of 40% BA retention with regards to natural regeneration?	All	2	25
Landscape Level	What are the management strategies for maintaining old-growth stands?	All	3	25
	Strategically, at a landscape level, where should partial cutting be used versus clearcutting? Do we have enough information to apply it appropriately? What are the trade-offs/consequences/risks associated with that decision?	All	3	26
	With the advent of fire suppression we are growing more Douglas-fir: where do we want to go with this in the long term?	Kmix	0	26
	Is residual yield quantified for TSR purposes?	Kmix	1	27
	What are the implications of certification on how we manage partial cutting?	All	0	27
	Management constraints are requiring more partial cutting to be practised: do we understand the implications of this?	All	3	27
	What are the impacts of caribou management?	ESSF	0	27
Regeneration	How do you deal with the seedbed/site preparation requirements and regeneration problems associated with partial cutting?	All	2	28
	Does the use of heli-logging for partial cutting reduce our options for site preparation?	ESSF	0	29
Windfirmness	Do we really understand the issues surrounding windfirmness and blowdown hazards? What strategies/tactics are available to deal with them?	All	1	29
	What is the effect of snow damage on windthrow? Does snow damage further exacerbate windthrow?	ESSF	1	30

APPENDIX 1 *Top Ten Biological or Technical Issues (Concluded)*

THEME/CATEGORY	IDENTIFIED ISSUE	FOREST TYPE AFFECTED	PRIORITY IDENTIFICATION	PAGE REFERENCE
Restoration Practices	NDT4 restoration entries: what is the target stem density and stand architecture, species selection (discourage Fd and Pl, encourage Py and Lw)?	Dry Df	1	30
	Fire-maintained ecosystem restoration: what are we getting for our investment?	Dry Df	1	30
Wood Quality	When conducting partial cutting activities, are we also considering timber quality?	All	1	30
	What is the effect of different partial cutting practices (on tree density) on the latewood production of those trees left behind?	All	0	30

APPENDIX 2 Details of the Top Ten Biological or Technical Issues

Forest Health Theme

1. *What management strategies are available to mitigate forest health concerns such as root disease, stem rusts, insects, and animal damage since the ones for clearcutting don't seem to mesh?*

Concerns:

- Management strategies dealing with diseases and insects don't mesh with partial cutting: main strategy has been to eliminate the inoculum (clearcut). How can partial cutting fit in?
- What level of disease is acceptable?
- Are OAF factors over-capturing the problem (i.e., too much area has been netted out)? Are OAF factors realistic in the Timber Supply Review, and if not, what is the effect on the TSR values?
- The dry Df sites are overstocked because of fire suppression: what role did forest health play before fire suppression and what role is it playing now? What does this mean in terms of affecting the present stand?
- What models are available to predict the effects of root rot and treatment options?
- Is there a relationship between bark beetles and root rot?
- Green illusion: leaving infected trees because of the need for retention knowing that they will die before the next entry.
- Conflicting information about the effect of disease (root rot) on future stands. We also know that impacts could vary because of a variety of factors.

Specific to the Kootenay Mix:

- It is believed that stumps created by partial cutting will increase the amount of Armillaria in the stand.
- What species should be retained on a site because of forest health conditions?
- Some people are trying group selection on these sites to get their SP approved. Does it work? What about the cost of this treatment? By leaving stumps in the ground, what is the impact on the root rot?
- Hypheloma: what is the efficacy of this treatment? Does it work?
- What is the compatibility of root removal treatments with partial cutting?

In terms of the Douglas-fir bark beetle and beetles in general:

- What options are available to manage bark beetle when faced with conflicting management objectives; for example, the amount of slash that should be left behind to deal with bark beetle seems to conflict with the MDWR guidelines?
- What is the effect on density management for the species?
- What is the effect of windthrow on beetles?

2. *What are some tactics/options to reduce a stand's susceptibility to beetles, and what is the role of beetle-proofing? (lodgepole pine type)?*

Concerns:

- What is the efficacy of beetle-proofing in these forest stands?
- What happens next over time?
- How do these stands get regenerated?
- Do these stands get converted into something else? What is the implication of this biologically?

3. *What is the impact of partial cutting adjacent to parks or private land infested with pests?*

Concerns:

- What is the effect on the managed forest of pests leaving parks and infesting adjacent working forests?
- What options are available?

4. *Is root damage caused by machinery when using partial cutting?*

Concerns:

- How do you avoid it?
- What is the effect of this root damage on current and future growth potential?
- What is the significance of this damage? Is it a problem? Does it weaken the trees?

5. *What are the impacts of decay and waste breakage factors (and commercial thinning) on the younger stands?*

Concerns:

- What is the effect on young stands of forest health factors?
- What is the effect of commercial thinning on decay?
- What is the effect on TSR?
- Are there studies to link decay in waste breakage to TSR?

6. *Are we overplanting lodgepole pine, and if so, what are the effects in terms of forest health issues?*

Concerns:

- In some situations, lodgepole pine is being planted in too pure a situation. What implications will this have in terms of forest health?

Growth and Yield Theme

1. *What are the implications of partial cutting on soil disturbance and permanent access?*

Concerns with regards to soil disturbance:

- Does partial cutting increase or decrease soil disturbance/site degradation?
- Is it quantifiable in terms of effects on site/soil productivity?
- What is the effect of lack of soil disturbance on species such as Pi and Lw?
- Larger number of SPs appear to be required to deal with the potential of higher site degradation: is this the answer? Is this an interpretation problem between districts? Is this more of an issue on flatter terrain?

Concerns with regards to permanent access structures:

- Are you re-using your skid trails?
- Should you be re-using them? What can be left? What do you rehabilitate? How much of the land base is affected? How much actual ground is lost because of permanent access structures? A plan is needed to deal with these.
- And if you are re-using them, what is the effect on site/soil productivity and root rot? Can these effects be quantified?
- A conflict is apparent: the amount of money spent on road building does not get returned because of the reduced amount of volume being removed. If this is true, what can be done about it?
- How much is productivity increased because of stand management versus the amount being lost to roads?
- It may not be an issue for this pass: how about the next one?
- Is enough training or information available on how to deal with trails and how to get them declared?
- How much monitoring is going on in terms of reviewing what has happened in the past?

Issues: What is still outstanding in terms of information needs?

- Extension and communication needs to take place between SP writers, survey people, and researchers: part of an ongoing process to learn to speak the same language.
- Monitoring needs to take place to look at what has been done and what is currently going on.
- Interaction between and within industry/MOF/FELP: relationship-building.

2. *What are the growth and yield and timber supply implications of partially cut stands?*

Concerns:

- Will we suffer volume losses on partially cut blocks when compared to traditional silvicultural systems of clearcut, clearcut with reserves (group), seed tree, or light overstorey retention shelterwood?

- What retention levels (stems per hectare BA) minimize the volume loss when compared to non-partial cut systems?
- What growth and yield models exist to track this over a long period of time? Do we have accurate stand response information to put into this model?

3. *In stands with mixed species with different MAIs, how do you know when is the best time for harvest? (differences in CMAI between species)*

Concerns:

- What is the true age at which you should be harvesting the different species?
- Need some hard numbers in terms of specific site information; for example, Douglas-fir is a longer-living species (over 110 years) and in mixed stands some species are being held past their maximum MAI in order to manage for the Douglas-fir component. This results in lost volume for those species while waiting for the fir to become available.
- Is the inventory accurate in terms of species composition and site index?
- What is the minimum harvest age for a partial cut versus a clearcut, as it relates to CMAI?
- What is our understanding of stand dynamics: what can we (or cannot) get away with in terms of holding stands over time?
- There is pressure on older stands in the KBLUP; therefore, younger stands are being considered for harvest. What are the landscape-level implications of harvesting these younger stands (i.e., in terms of biodiversity constraints)?
- Are there opportunities for alleviating some of these biodiversity constraints with the use of partial cutting, and if so, what are the implications for the future?
- This issue tends to be management-unit specific with trade-offs: do we have a good handle on the trade-offs?

4. *What are the growth and yield implications of using advanced regeneration as part of the regeneration strategy?*

No concerns, issues, or options identified.

5. *At what basal area retention level does it cease to be mature forest cover (intermediate cut: implications of timber availability)?*

Concerns:

- For some partial cutting activities, we are knowingly making a decision to reduce stocking levels when managing for specific values. However, at what level are implications for growth and yield serious?
- Is there a tool available (like a stocking table with B-level stocking) to help with evaluating possible removal options?

6. What is the productivity and acceptability of the understorey in wet belt?

Concerns:

- Work has been done on developing advanced regeneration damage criteria; it is available but needs to be distributed.

Science: What we already know is available, or here is how we are answering this question (options)

- Damage criteria available.

Issues: What is still outstanding in terms of information needs?

- Extension issues

7. What are the impacts of scarring?

Concerns:

- What is the amount of decay that is acceptable and what are the impacts?
- What techniques need to be avoided?
- What is the best timing for operations (season) to reduce damage to residuals?
- What are the cost implications?
- How can we reduce the damage in terms of cost recognition and training?
- If species are retained that may be resistant to damage, will it mesh with the management objective or will it conflict? Should these species be targeted, and if so, what are the implications to the future forest?

8. What is the impact of snowpress and damage throughout the growth period?

Concerns:

- Is there information available to show how snowpress-damaged trees respond over time? How do they respond to this damage?
- The amount of residual cover carries a large amount of snow that has a profound negative effect on regeneration, especially at higher elevations.
- What is the impact of snow press and damage on the growth potential of the seedlings, and how can the damage be mitigated?
- What about steep slopes and avalanche tracts: are guidelines now available?
- Are straight trees natural in clearcuts at this elevation?

9. Is there a lack of growth and yield models for operational planning?

Concerns:

- Forest-level models need more work.
- PROGNOSIS is not spatially specific (retention stands are a problem), and therefore, it may cause problems with mixed species stands and islands.
- What is the application of SORTI (Dave Coate's model?)

- Growth and yield in terms of operational planning: what is the future stand growth? What is the future stand growth potential? What will we end up with?
- Inventory labels are not accurate: may not go into any area that has “low” productivity, when in fact it may not be low at all, just mislabelled.

Stand Structure Theme

1. What is the role of coarse woody debris and what is the fuel density and distribution?

Concerns:

- Don't know what the targets are.
- Don't know what we are managing for and why.
- Utilization standards take precedence.
- How do we manage CWD over time?
- What do we need to do?
- What is the impact of CWD on site productivity?

2. Third-rotation stands: how should we be managing them?

Concerns:

- Should these stands be managed on an uneven-aged management basis?
- What are the implications on the biology of the stand if it is managed on an uneven-aged basis?
- What other options are available?

3. Will the relative shade intolerance of Df, Pw, and spruce lead to the eventual conversion to hemlock and cedar if single tree and small group selection are used? If so, what are the ecological implications?

No concerns, issues, or options identified.

4. Could partial cutting potentially genetically degrade or produce a species conversion on some sites, and if so what are the ecological implications? (Biological implications with 5+ species: genetic degradation and stand species conversions, as well as at higher elevations)

Concerns:

- When selecting out specific species, what is the biological impact on the site?
- Leaving trees for other reasons may conflict with the biology of the site: what is the impact of this?
- There is a real danger of stands being converted; for example, we may be seeing the reduction of shade-tolerant species (Cw) and a shift towards Pl and Df. What are the implications of keeping cedar or of totally removing it?

- Is this a true species shift, and if so, at what level of retention does it occur?
- Lw and Py trends in the United States indicate possible loss of these species because of the reduction of burning and site preparation. What is the impact in British Columbia?
- What are the genetic implications of degeneration selection (for other values)?

In the ESSF:

- Is a species shift to Bl taking place, and if so, to what extent? What are the implications?
- Do we have an understanding of the ecology and stand dynamics of these systems?
- Does partial cutting in the ESSF emulate natural disturbance patterns?

Issues: What is still outstanding in terms of information needs?

- What evidence (quantifiable data) is there to this possible species shift?
- If this shift is happening to a great extent, what is the impact to the ecosystem?

5. Stands tend to have a range of tree sizes present, although they are approximately the same age: what do you do in terms of removing basal area? Do you leave a few large trees, or a lot of small ones, or any combination in between? Is basal area the best way to describe these stands? How do you go back and measure to verify that you have achieved the level specified?

Concerns:

- Biologically, is basal area the best way to describe these stands?
- Is there a more effective way to describe or characterize what you are trying to leave out there? What about species composition?
- Remeasurement concerns after harvesting: it is almost impossible to evaluate or compare pre- and post-harvest stands because of the removal of the survey plots. It appears that the only way to truly evaluate pre- and post-harvest conditions is to re-establish the pre-harvest plots, which is very expensive. Is there any other way?
- The basal area varies across these stands as do the species: it is inherent in the variability of these stands. How can we go back in to say that you have achieved your range (as described in the SP) because of this variability?
- Do we know how the different sizes or species respond to different levels of basal area removal?

6. Can we model basal area retention and regeneration success, particularly in stand of mixed species and diameter?

Concerns:

- A problem seems to exist in modelling middle retention zones of basal area (14–24 m² of BA). How do you deal with them?
- These stands are not a regenerating stand, but not enough volume to do anything with: what is the required future action?
- At what level of basal area retention should regeneration options be considered?
- There are timber supply implications regarding partial cutting, but the current landscape-level models cannot handle partial cutting in terms of basal area. What potential implications may this have for the future (2–3 rotations).

- Stand-level information can be handled by PROGNOSIS, but some concerns exist on the availability of the program and issues around training.
- How can we extend the use and range of PROGNOSIS? Are training sessions required on how to use it and how to interpret the results?

Science: What we already know is available, or here is how we are answering this question (options)

- PROGNOSIS training sessions are taking place (fall 2000)

Issues: What is still outstanding in terms of information needs?

- Options to meet management objectives and implications (growth and yield) at the stand and landscape level are still missing. Is this partly because of the lack of basic silvics knowledge?
- How do root rot infestations affect the taper of individual trees? What is the long-term growth implication and how can this be modelled?

7. Are we using the application of classic uneven-aged management in areas where stand structure is not suitable? Is it appropriate for stands assigned as ungulate winter range?

Concerns:

- Transition zone issues.
- There is public pressure to do partial cutting, but what does this mean?
- This uneven-aged management system should be species- and disturbance-dependent: so is it currently being applied correctly?
- A number of issues surround the practice of creating uneven-aged stands: does it make sense to do it here?

For Ungulate Winter Range:

- What are the different options within the land-use plan and what are the habitat requirements for ungulates? What are the limiting factors of concern? Is it forage? Is it overwintering? These need to be defined.
- Where is the science behind the blanket prescription (guidelines) for ungulate winter range: do we have the stand structure that can incorporate an uneven-aged management option?
- Do we have the correct ecosystem management strategies for the animals that exist in this area?
- Better correlation between the goal and the prescription (guidelines/plan) will lead to better results on the ground.
- Tree biology may not be the main priority (superseded by the Higher Level Plans and objectives) when managing for other values. What is the impact of this on biological processes?

8. *What is the role of deciduous trees in crop planning, forest health, and products?*

Concerns:

- How do you manage for birch at the regeneration stage?
- How do you manage birch and aspen as a crop: tending options?

9. *What is the applicability and suitability of 40% basal area retention with regards to natural regeneration?*

Concerns:

- What species are you going to regenerate underneath?
- Does it make sense in all cases?

Landscape Level Theme

1. *What are the management strategies for maintaining old-growth stands?*

Concerns:

- Tying stand-level activities to the big picture is hard when so much uncertainty exists at that level.
- How does partial cutting fit into the seral stage analysis for Landscape Units?
- How do we use partial cutting as a tactic to manage seral stage distribution in terms of mature old and mature and old growth? For example, can we use partial cutting to maintain caribou attributes and to access timber at the same time?
- Can partial cutting be used to increase the amount of old attributes of old growth in order to access timber when the whole land base is tied up? And if so, what are the implications?
- What stand structure are you working towards?
- What species and basal area options are available to meet wildlife habitat or forage needs that exist at the seral stage or are suitable for the species?
- Can the intermediate cut be used without compromising the status or seral stage of the area (i.e., can you remove some selected trees carefully so that it will still remain within the old category in the seral stage classification)?
- Incorporating TEM and PEM for wildlife needs will help, but will also need to correlate the vegetation interpretations for all seven seral stages.
- A model needs to be developed to account for partial cutting in seral stage distribution numbers (areas).

Science: *What we already know is available, or here is how we are answering this question (options)*

- Score card being developed by Tom B.: needs to get out.

2. Strategically (at a landscape level), where should partial cutting be used versus clearcutting? Do we have enough information to apply it appropriately and what are the trade-offs/consequences/risks associated with that decision?

Concerns:

- What options do you have to work with in terms of silvicultural systems and basal area retention?
- Where are they appropriate (biologically, economically, socially)?
- What are the constraining factors for the area (visual quality objectives, ungulate winter range, wildlife trees/patches, water, adjacency, ECA, riparian management areas, etc)?
- Will the constraining factors be alleviated by the stand structure (BA retention) associated with the silvicultural systems option?
- What will be the impact of the cutting option on what gets removed now and in the future (growth and yield impacts)?
- Are we monitoring what we have done in the past: what has worked and what could we have done differently?
- Is there dialogue and information-sharing taking place between planners and operations linked to partial-cutting activities?

Science: What we already know is available, or here is how we are answering this question (options)

- Case study paper exercise.

Issues: What is still outstanding in terms of information needs?

- Better inventory information in terms of what is really out there.
- Is the information that is being collected the correct information?
- What are we linking our information to?
- Can the information be tracked?
- Once we have the correct inventory information at the pre-harvest stage, what do we do with it?
- Is the expertise available to interpret the information and develop a proper prescription? Is training needed?
- Are we monitoring to see if we have achieved our objective? What is the best monitoring system? What is the role of adaptive management?

3. With the advent of fire suppression, we are growing more Douglas-fir: where do we want to go with this in the long-term?

Concerns:

- Douglas-fir is starting to dominate the ecosystem because of fire suppression, which in turn appears to be creating forest health concerns, etc. What are the impacts of this?

4. *Is residual yield quantified for Timber Supply Review purposes?*

Concerns:

- Models for TSR do not have the correct architectures.
- More pools are needed (e.g., stands available for partial cutting and clearcutting).
- The model does not deal with our population constraints.
- Complexity of partial cutting in the model has to be tackled by analysis unit because of the large number of iterations currently required.
- Need changes in net downs for roads in partial cutting areas (requires some adjustments).

Science: *What we already know is available, or here is how we are answering this question (options)*

- Actual adjusted runs already done by consultants for Golden and Revelstoke: the data is available, it just needs to be extended.

5. *What are the impacts of certification on how we manage partial cutting?*

Concerns:

- Where do we think certification is pushing us?
- Are there opportunities to lead certification standards with partial cutting?
- Can we use partial cutting to get in front of the certification curve rather than always dealing with it from behind?

Science: *What we already know is available, or here is how we are answering this question (options)*

- Perry Ridge has a number of examples of implementing various cutting regimes.

6. *Management constraints (visual quality objectives, ungulate winter range, etc) are requiring more partial cutting to be practised: do we understand the implications of this?*

Concerns:

- The practice is being required more, but do we really understand the implications of what this means?

7. *What are the impacts of caribou management?*

Concerns:

- What options are available and what are the impacts?
- What attributes do you want to manage for versus no harvesting at all?
- Do caribou actually like partial cuts?

Science: What we already know is available, or here is how we are answering this question (options)

- Pope and Talbot: Cam Leitch and Dennis Hamilton are doing work on this right now: need to get the information out.

Regeneration Theme

1. How do you deal with the seedbed/site preparation requirements and regeneration problems associated with partial cutting?

Kootenay Mix, Wet Belt Df concerns:

- What is the effect of site preparation (e.g., burning) on residuals? What are the ways to minimize the damages that can occur?
- What is the impact on Lw and Py with the reduction in site preparation activities: are we losing these species because of our lack of site preparation?
- What regeneration options are available when the objective is not to regenerate the stand, but for other values?
- If burning is used, should it be in the spring or fall? What is the impact on residuals in terms of damage?
- We get brush before trees on some sites: what do you do?
- How good is our understanding of the silvics of species without disturbance?
- What are the impacts of our species selection and densities over time? What is the impact on site productivity and the future forest condition?

Dry Df concerns:

- What are you leaving (in terms of natural regeneration or advanced growth) and how well is it growing? How well will underplanted stock do?
- How do you quantify and assess how it is growing?
- What is the effect/implication on the Timber Supply Review?
- If poor crop trees are being selected to fulfil a management objective, then what are the future productivity implications?
- Should we be meeting goals over time for restocking?
- Are trade-offs taken into account in the Timber Supply Review?
- What are the land base management priorities in terms of acceptable and preferred species?
- Different levels of crown closure: at what point do you start thinking about regeneration? How will snow and wind effect the mechanical stability of the stand?
- Need a long-term prescription (post-harvest treatment plan) for the stand so that we are able to follow through on our plans. Is policy, tenure, lack of models, or information stopping this from happening?
- What do we do with fir thickets? How big an area will have an influence on what you do?
- Drought and wildlife damage: how do you deal with them?
- Season of harvest: winter logging does not appear to create enough disturbance (seedbed) for some species to regenerate; therefore, you may not be getting back some species you may want (Lw).

- If natural regeneration is the goal, then do some management objectives leave too much basal area behind, which then discourages natural regeneration from taking place? If so, what options are available?

2. *Are we reducing our options for site preparation by using partial cutting?*

Concerns:

- With the reduction in burning and the amount of residuals remaining, what options are available for site preparation?
- In some situations, areas are being helicopter-logged and therefore access is limited. What are the implications for stand management with this limited access? Does it pose some future risk of extensive failures because of the lack of site preparation or burning? Where is the research?
- In terms of regeneration, is it actually better to partial cut at high elevations: we assume it is, but is there research on this?

Windfirmness Theme

1. *Do we really understand the issues surrounding windfirmness and blowdown hazards, and what strategies/tactics are available to deal with it?*

Concerns:

- What is an acceptable level of windfirmness?
- Blowdown beside reserves, wildlife tree patches, visuals, CWD, beetles, water resources; what is an acceptable amount of blowdown in terms of other values; what is the minimal amount?
- What is the minimal amount of cleanup required: currently being pulled by two different concerns/values. For example, leave CWD behind for water, versus remove CWD because of forest health concerns.
- Lack of tools, training, and an understanding of the issues surrounding windthrow.
- What is the influence of local conditions on the assessment procedures?
- Do the current assessment procedures reflect reality?
- Availability of training for contractors.

Science: *What we already know is available, or here is how we are answering this question (options).*

- Steve Mitchel's risk hazard rating system.

Issues: *What is still outstanding in terms of information needs?*

- Basic hazard risk mapping is needed. Quantification losses: is the loss warranted to change the practice (impact analysis matrix)
- Results from pilot project in WADF need to get out.
- Retrospective studies of older PC stands and effect of windthrow maybe needed to help clarify impacts.

- What literature is coming out of Europe with their windthrow problems: literature synthesis needed.

2. *What is the effect of snow damage on windthrow? Does snow damage further exacerbate windthrow?*

No concerns, issues, or options identified.

Ecosystem Restoration Theme

1. *Natural Disturbance Type 4 restoration entries: what is the target stem density and stand architecture, species selection (discourage Fd and Pl, encourage Py and Lw)?*

Concerns:

- Don't think that there is an issue here.
- Timber is not the main objective for these areas, rather it is to enhance range with the option of getting some pulp from it.
- It is actually one of the region's main success stories.
- Low impact on volume supply in the trench.
- Silviculture allowance used to offset harvest costs, as there is no, or minimal, silviculture done on these areas. Shouldn't have to play this game: should be direct harvesting cost compensation.

2. *Fire-maintained ecosystem restoration: what are we getting for our investment?*

Concerns:

- Impact of restoration entries on understorey and economics of treatment.
- FMER forage versus timber responses to various treatments.
- FMER other vegetation responses to various treatments.
- Activities are more complicated and expensive: for what result in the long term?

Wood Quality Theme

1. *When conducting partial cutting activities, are we also considering timber quality?*

Concerns:

- Are we thinking far enough ahead in partial cutting activities?
- What are the implications in terms of timber quality of the current partial cutting prescriptions and standards?
- Are we managing for a variety of timber products?

2. *What are the effects of different partial cutting practices (in terms of tree densities) on the specific gravity (latewood production) of those trees left behind?*

Concerns:

- What is the effect of density, species, and climate on those residual trees remaining in partial-cut stands?