Strategy Workshops: Record and Outputs

The Challenge Dialogue System™

Development of a Strategic Plan for Forest Inventory and Monitoring Activities in Mountain Pine Beetle Areas

Forest Analysis Branch
BC Ministry of Forests

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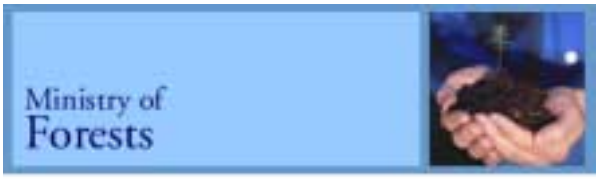

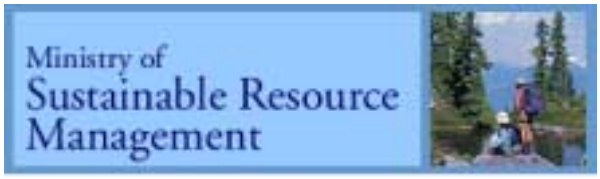

April 13, 2005

The Challenge Dialogue System

We are using the Challenge Dialogue System™ (CDS) developed by the *Innovation Expedition* to guide our Dialogue prior to and during the face-to-face workshop on the Forest Inventory and Monitoring Strategy for the Mountain Pine Beetle Areas.

CDS is an efficient and effective vehicle for engaging diverse stakeholders and assisting them to collaborate and innovate in order to accomplish a complex task. CDS is a structured but flexible methodology for moving a team of people from ideas to action quickly and effectively. More information on CDS is available at the Innovation Expedition's website at: www.innovationexpedition.com.

Don Simpson and Keith Jones, Innovation Expedition

Please e-mail any further comments to

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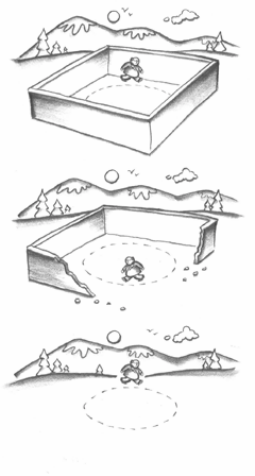

Thinking outside the box —
The constraints we feel are holding us back are often self-imposed.

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Vancouver Workshop Invitation

March 18, 2005

Melanie Boyce
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BC Min of Forests
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PO Box 9512, Stn. Prov. Government
Victoria, BC V8W9C3

Dear Colleague:

Thanks for your interest in the upcoming workshop regarding forest inventory and MPBs in BC. This note confirms you are invited to attend the workshop on March 30 and 31. Please note the agenda is attached below.

Timing: March 30th - arrive at the workshop 12:30 to 1:00 to register, workshop starts at 1:00 March 30. We plan to break for a buffet-style dinner 6:00 - 7:00 (provided) and carry on with the meeting until about 8:30.

Workshop ends at 12:00 March 31.

Location: Best Western Richmond Hotel & Convention Centre (the old Richmond Inn, web site below) - Room - Minoru D

We have 40 rooms blocked for the workshop attendees. You'll need to make your own travel and room arrangements. When calling the hotel to make your reservation, make reference to the "Forest Inventory Workshop" in order to get the $80 room rate. Reservations can be made at 1-800-663-0299, 604-273-7878, or at reservations@richmond-hotel.ca The hotel is located at 7551 Westminster Highway in Richmond. Parking is available for $7/day for registered guests.

RSVP: as soon as possible please RSVP by sending a confirmation to Denise Young denise.young@gems9.gov.bc.ca

We have compiled some material that you may be interested in reading before hand. A summary of input has been posted (unattributed and *as-is*) on the following MoF ftp site: http://www.for.gov.bc.ca/ftp/HTS/external/outgoing/

Please note the file will automatically be deleted after 7 days.

Please note the focus of the workshop will be to build a clear understanding of our provincial business needs. The fuller discussion of exact technical solutions will follow.

Melanie Boyce and Fern Schultz

Vancouver Workshop Agenda

Time	Description	Who
Wednesday March 30		
12:30-1:00	**Assemble / Registration**	
1:00-1:20	**Session 1a: Welcome & Introduction** • Overview and Context	Melanie Boyce Fern Schultz
1:20-2:00	**Session 1b: Approach and Setting the Stage for Collaboration** • The Challenge Dialogue Process • Rules of the Road • Key Challenge • Task 1.1: Expectations of what we will accomplish	Keith Jones
2:00-2:40	**Session 2: Scoping the Strategy** • Task 2.1: Define the High-Level Business Areas	Table Groups
2:40-2:50	**Break**	
2:50-3:50	**Session 2 (continued)** • Task 2.2: Define the Timeframes • Task 2.3: Define the Spatial Extent • Task 2.4: Prioritize the High-Level Business Areas within the Timeframes	Table Groups
3:50-4:00	**Break**	
4:00-5:00	**Session 3: Specific Business Needs** • Task 3.1: Identify the Specific Business Needs • Task 3.2: Prioritize the Specific Business Needs	Table Groups
5:00-6:00	**Open**	
6:00-7:00	**Buffet Supper**	
7:00-8:30	**Session 3 (continued)** • Task 3.3: Transform the Specific Business Needs into Clear Questions	Table Groups

Time	Description	Who
Thursday March 31		
8:15-9:45	**Session 3 (continued)** • Complete Task 3.3	Table Groups
9:45-10:00	**Refreshment Break**	
10:00-11:00	**Session 4: Entities and Attribute Data** • Task 4.1: Identify Entities and Attribute Data Needed to Answer the Questions • Task 4.2: Rank the Entities/Attribute Data	Table Groups
11:00-11:30	**Open (activity depends on progress)**	
11:30-12:00	**Review, Next Steps and Wrap-up**	Melanie Boyce Fern Schultz

Albert Nussbaum at the Workshop in Richmond on the Mountain Pine Beetle Inventory and Monitoring Strategy getting checked over carefully for the infamous Richmond Hotel Ticks saying — *Suffering Ticks in the woods is one thing, but you'd think these workshops could be free of them. Such is life for the dedicated forester I guess.*

Record of Table Group and Plenary — Workshop Dialogue

Approach and Setting the Stage for Collaboration
Session 1b — Task 1.1: Expectations of What We Will Accomplish, Key Challenge

Christine Fletcher – Table Group

Key Challenge — Reactions

- Different time frames aspect for different needs and different users is very important — short-, mid- and long-term (bullet #4).
- Money is not mentioned explicitly – rather "appropriate resources and timeframes" (bullet #5); we assume this includes institutional capacity as well.
- First Nations are not mentioned explicitly, should they be included – implied in bullet #3; recognize that their interests may be more with resource allocation than information per se.
- Forest health vectors other than just MPB may cause problems in forests, especially forests we may be counting on to serve mid-term harvest needs 30 years from now (e.g., spruce forest pathogens and the Douglas fir beetle such as what is occurring in the Chilcotin.
- This Strategy will have application elsewhere in non-MPB areas; don't want to focus only on pine.

Expectations

- Focus-in on a few priority, concrete actions/tasks with the strategy development covering various time frames.
- Support the need to define business needs (set priorities; how much/what quality of information needed).
- Defining needs in areas with different types/quantities of pine at different stages of attack.

Rick Baker – Table Group

Key Challenge — Reactions

- It is a fairly BC-centric view of things – what about our national and international obligations such as those with climate change and Kyoto?
- Rather than stating "considering the information requirements of forest managers" we might say "what information is missing that the forest managers need?"
- It should imply that where possible and useful we will be utilizing existing information services. It is not clear here if we were going to throw the baby out with the bathwater or build on what we have got. We don't want to ignore the past data sets that we have; we want to, wherever possible, build upon this existing information.
- Regarding bullet #5, we preferred the previous version of this (in bullet #3) which said: be "achievable and sustainable in appropriate time frames under existing and foreseeable technology"

Expectations

- An acceptable outcome of this workshop should be that we are able to articulate at the end what are the business drivers and what strategic and operational investment decision-making processes (grouped by business drivers) need resource information. From this, we need to identify what the gaps are from what we are currently doing and, articulate how to fill these gaps. In other words, what tools, processes and so forth are needed? Some of these maybe further down the road.
- We also need to be able to capture the changes and dynamics across the landscape better. There are existing processes in place but we don't have the full suite of tools, especially that deal with the magnitude of changes taking place on the landscape right now. We have been doing well at capturing harvesting related changes. We are struggling with fire-related changes because we don't have a suite of tools. With the magnitude of the insect infestations — I [Rick Baker] don't know how to deal with that. If you take the whole suite of changes that are occurring across the vegetation land base right now, we need a whole new suite of tools. It is so big and so dynamic, the current suite of tools don't fit. Some of them will help, but that is what this workshop is about.

Warren Eng – Table Group C

Key Challenge — Reactions

- How do we mitigate AAC reduction 15 years from now, [with the right strategies and actions] today? Note, some younger stands are being attacked now.
- How do we define immediate/short term: (a) from activities we do now for G&Y data that have benefits 10 years from now; and (b) activities for operational activities we do six months from now.
- There are three components that the Strategy should consider: (1) areas already attacked (post-attack); (2) areas likely to be attacked – which have monitoring requirements (pre-attack); (3) monitoring of management options (regeneration and G&Y).
- There was also the idea that maybe a timber inventory is not required to answer the question of where to harvest right now. The idea was that if the infestation rates are at 100 percent over the next 5 years, it may be does not matter so much about where you cut but more about proximity to roads and other logistics than the timber inventory per se.
- Comment – The real issue or question here is — are we logging over *here* when this stuff over *there* is going to fall down within seven years and won't be there when we need it. Or should we log *this* and because that stand over *there* is still going to be here for 10 years. These are not timber volume driven questions but more questions based on the ecology of the sites (shelf life related but that is more tied to a forest product).
- The Strategy must consider areas outside the MPB area to support B.D. and mid-term harvest flow

Ideas

- Need to include economic considerations.
- Challenge with current inventory in terms of time frame and attributes – different for working forest and for parks and protected areas.
- What resolution of information are we looking for?

Expectations of Workshop

- Understand what questions we are trying to answer for Forest Analysis Branch (AAC).
- Comment – Timber/tree inventory not required to answer *where* to harvest – at infestations rates of 100% over next 4 years it doesn't matter where you cut. Decision may be based on proximity to road, logistics and other reasons not related to forest inventory.
- Will the Strategy meet the business objectives?
- Strategy must consider if this is a pre- (monitoring) or post- (inventory) attack inventory. Geographical considerations depend on stage of attack.

Jon Vivian – Table Group

Key Challenge — Reactions

- It is broad and expansive, may be complete.
- We need to know where industry is in this process. There is a need to fully engage industry. This statement is written more from a government, not industry, perspective.
- Change "consider" to "address (points #1, #2, #3).
- Make point #6 first.
- Issue of duplicate data collection – what government needs vs. what industry requires.
- What structure or forum is needed to engage industry (e.g., Business Information Management Group – BIMB); and what is industry's role.

Dave Waddell takes a welcome break from the intense dialogue sessions, while Ann and Xiaoping continue to focus and to beetle ahead with the task assignment.

Don Reimer – Table Group

Key Challenge — Reactions

- Was a little vague in that it didn't explicitly mention consideration of other resource values; that the overall objectives at the land management scale is to achieve a balance between environmental, social and economic-business objectives
- Regarding bullet #3, there is a temporal lens aspect to this that is not mentioned as explicitly as it might be (although this may be too much detail). Keeping in mind the need to get the balance right, you cannot do everything for everyone in all places. So

there are some temporal aspects that might suggest different data for different purposes in different places and at different scales.

- There is a need for some statement in there regarding the dynamic aspects of this; the rate of change in terms of business and social needs in addition to the resource itself. Our forecasting models need to be able to handle these dynamics and the temporal scales.
- In sum, generally no disagreement with the key challenge but it could be more explicit in terms of two factors: need to address multiple resources and the temporal and geographic dimensions of this, which are quite varied.

Fire Hazard Comment

One of the items that we have not discussed is fire hazard with MPB. It is a big issue with rural occupants on the land. We have people in Quesnel who can't get house mortgage insurance because of the MPB. It therefore might be helpful if we could quantify the fire hazard a bit better rather than saying it is "dead pine" all with the same hazard rating. The ratings are different on different parts of the landscape. The communities are interested not only in "life after the beetle" but also what the fire hazard is. This question is being addressed in different districts, with Forest Protection Branch involvement, in another forum, and the issue goes beyond just inventory. These other discussions may raise some resource information needs which we should make sure we link into.

Scoping the Strategy: Define the High-Level Business Areas Session 2 — Task 2.1

The Table Group sessions were asked to identify and list a set of business drivers that they felt the Strategy needed to address. The following composite list was prepared in a plenary session. Each participant then voted (3 votes each to be allocated to 3 business areas) on what business drivers were of highest priority). The highest priority business areas are shown shaded along with the other business areas that were identified.

Table 1. Initial Composite List of High Level Business Drivers and Priority Ratings

Ranking	High Level Business Area	# Votes
1	**Timber Supply (AAC)**	20
2	**Timber Harvest Scheduling (Allocation); Salvage (Shelf Life)**	18
3	**Silviculture, Regeneration, Succession/Stand Dynamics, Silviculture Policy**	12
4	**Forest Health**	11
5	**Declining Asset Value**	9
6	Socio-Economics / Health, Community Planning / Stability (House Insurance, Particulates)	5
7	Fish / Wildlife Habitat (Land Use Planning?)	3
8	Water – Hydrology, Quantity, Quality	2
9	Forest Protection, Fire Risk (Fuel Management)	2
10	Product / Mill Capacity & Planning (Economic)	1

11	Leading Edge Management	1
12	Biodiversity	1
13	Infrastructure – Roads	1
14	Landscape Analysis (& Visual)	1
15	Agriculture/Forage, Dominant Range	0
16	Non-Timber Forest Products (Botanicals), Other Forest Uses (Guiding, Trapping)	0
17	Climate Change (National/International Obligations – Kyoto), Species Migration	0
18	Treaties/First Nations Interests	0
19	Recreation, Tourism, Eco-tourism	0
20	Broad-Level Reporting (State of…)	0
21	Certification	0

Scoping the Strategy: Define the High-Level Business Areas
Session 2 — Task 2.2 – Define the Time Frames and 2.3 Define the Spatial Extent)
Session 3 — Task 3.1 and 3.2 – Identify & Prioritize the Specific Business Needs and Task 3.3 Transform the Specific Business Needs into Clear Questions

With reference to the Workshop Road Map, it was decided that the time frame and spatial extent considerations (Task 2.2) were addressed largely during Task 2.1. It was also felt that there was no need to further specify the Business Needs from Task 2.1 into any further detail — i.e., Task 3.2 and 3.2. Rather, the participants were asked to jump immediately to Task 3.3 to identify a set of inventory/monitoring questions for each Business Area.

Harvest Scheduling Table Group

Table 2. Business need/question, entities, time frame and spatial extent.

Business Need / Question	Entity	Time Frame	Spatial Extent
1. What is the current inventory of merchantable timber by species *and* what is the level of pine mortality in the stand?	Stand By Management unit	Annual*	district
2. What is the year of main mortality in merchantable stands? (When does the "clock start ticking" and when will the stand be unmerchantable and where is the mortality occurring?)	Stand By Management unit	annual	district
3. What is the rate at which the stand will deteriorate?	TBD By Management unit	once	district

Business Need / Question	Entity	Time Frame	Spatial Extent
4. What stands should be retained for midterm wood supply or for other values? (given a certain stand structures, what should be harvested and what if should be left?)	Stand By Management unit	Annual*	landscape
5. What is the presence and condition of the commercial understorey? (another stand structure consideration)	Stand By Management unit	Annual*	
6. What is the stand age and condition at time of mortality? (What characteristics of stands dictate they will fall apart faster than other stands?)	Stand By Management unit	annual	district
		* stands of interest (impacted by MPB)	

Comments:

Our group was interested in very short-term information needs about where we want to log; what timber should be taken and what timber should be left. Our resource information needs essentially boil down to the question of *where* the kill is and *how long we have to access* this affected (dead) timber. Most of this information needs to be updated annually so we can update are harvesting plans annually. We are targeting those stands of timber that have been most impacted by the MPB.

Is important to note that we need more information on this topic particularly regarding the level of precision required for the information. So we need to bring other people into the discussion to refine these initial specifications.

Silviculture–Regeneration Table Group

Our group was focused on looking for silviculture investment opportunities in non-harvested MPB killed stands for: (1) mitigating allowable annual cut fall down and, (2) future wildlife requirements. We identified four possible silviculture opportunity conditions.

1. Stands that are not harvested that have no regeneration.
2. Stands that are not harvested that have natural regeneration.
3. Mixed stands that are not harvested with or without a pine component.
4. Young managed and unmanaged stands that are killed.

We asked — what are the silviculture investment decisions that inventory information can assist? For example this information can be used for site preparation and rehabilitation, planting and advanced regeneration; stand tending, including brushing; spacing and fertilization; or silviculture planning.

We assumed that logged and treated areas would be covered by the timber harvest business area. We also didn't address any forest health issues assuming that this would be covered by the forest health Table Group.

Regarding modelling — there is a need for retrospective data to model when regeneration will come in. In MPB killed stands, we can use existing permanent sample plot information. We could also establish temporary sample plots or use old temporary plot information. Perhaps audit information could be used? We have an immediate need for regeneration delay models. And, we have an immediate need for succession and birth mortality models. Note that the model data is not a part of the inventory data.

Table 3. Business need/question, entities, time frame and spatial extent.

Business Need / Question	Entity	Time Frame	Spatial Extent
• Where are the areas that have been killed by the MPB? What is the location and extent of the non-harvested MPB killed stands?		With in 5 years of the kill	MPB affected areas
• What is the presence and condition of the understorey; of the young stand? Is their regeneration present? And if so how much is present? (Presence/condition of understory/young stand)	Stand and tree level information	Within 5 years of the kill	MPB affected areas
• What is the residual volume? What is the site productivity potential; is it worth treating? (Residual volumes / site productivity)		With in 5 years of the kill	MPB affected areas
• What is the growth potential of existing regeneration and of residuals? What is the regeneration delay; when will we get regeneration (artificial vs. natural)? What are the characteristics (species) of the future regeneration?[1] And do we have adequate models? Do we have data for modeling? What model building data is required?		Start now	Wherever they are Pl, Py stands (EBBMA)

Discussion

Question – did you consider the spatial distribution of the silvicultural activities at the landscape level? In other words, how to create a condition that is more resilient to a large outbreak? Answer – No. This was followed by a discussion as to whether this was an inventory question or really more of a policy question.

[1] Does not include forced health issues

Comments

The trees that matter right now are the trees that are in the ground right now. The trees that will be present 50 to 60 years from now already exist and these are the trees that we are going to be logging. And, if you look at the past 10 or so years there has been a heavy reliance on lodgepole pine regeneration. So the real inventory question here is how much young pine stands are out there in different age classes and from these data can we anticipate if there's going to be another one of these outbreaks and what we do about it in order to mitigate it, by breaking up the age class? We've relied heavily on pine reforestation because it happens to get free growing very quickly. There is a lot of pine out there (this was to get the regeneration liability of the books). In some areas it is almost like we have a pine climax, you don't see a lot of spruce out there. Some are 300 years old because there's nothing to replace it.

So there is an inventory question buried in there that has got to do with the regeneration that has happened over the past 15 to 20 years. Earlier there was a question about young stands that have been killed. So we might want to look at the status of stands that have been killed. What is the status of the species in the stands? We've had a lot of reforestation in the last 15 to 20 years that is going to come on stream in 50 to 60 years and we need to ask what is the composition of those stands.

Timber Supply Table Group

This discussion had a temporal dimension to it. First there is the AAC uplift work which is over the next five years, but which needs information this year. And then there is the regular timber supply review which is 2010 and on, but could really do with information two years from now.

AAC Uplift

(these need to converted into questions)

- Where is the MPB and where has the MPB been?
- Depletion information (salvage).
- Severity rating.
- Shelf life (milling capacity and deterioration rates).
- Context = Management Unit level; Start time = less than 5 years.
- Depletion update – database completion, backlog for Forest Service, backlog for industry, MPB.

Mid-term (next year)

Same questions just finer detail.

- Regeneration based on severity of attack for all business areas.
- Scenario forest planning on MPB Zone (a very large area modelled all at once) required .at polygon level – need for new and updated inventory information *starting in 2006*
- Verify the live trees for this large area analysis.
- Constraints on remaining forest for other values; 20% retention requirement.
- Spatially representative.
- More detail, a finer level of inventory, on the non-pine types as these will be the future AAC; what is left will presumably increase in value. There are three broad types (1)

stands with 80% of Pl; (2) mixed Pl stands; and (3) those with no Pl. Both types '2' and '3' will need more detailed information to support future AAC analyses – *start 2006*

- Need to Track where/when severity of Pl mortality – *now*
- How do we model the growth of the mixed stands and the partially killed stands? – *2006*
- Factor-in habitat supply linkages in short-, medium- and long-term – now
- Growth and yield models in response to new management practices
- Do we need ecosystem mapping to inform decay modelling aspect of MPB area management – BEC, TEM/PEM?
- Do we need to consider analysing past data for both G&Y and inventory information in areas where the MPB was active in the past? A large infestation in 1975 was noted that might be used for this? We need to see how the MPB has affected the nature of the inventory over time.
- We need more ground truthing of live stands, particular of the young pine. There is a gap in ground truth information from free-growing to 30 years of age. There is no ground sampling with VRI in the younger stands; we just don't do it. – *Delay to 2007*
- Do we need all of this provincially coordinated? Will we use the FIA model or will there be some provincial strategy to help coordinate these efforts – *governance and coordination now*?
- Shelf Life — Do we need shelf life models to predict how long the dead trees will have value as different products;from logs to chips to some carbon product?

Shelf Life Discussion

There is quite a bit of anecdotal information; there is the work of UNBC with some spring sampling that will perhaps provide more information on this in a few months. Canfor has done quite a bit of work on this with FIA support. This information is now quite politically sensitive so people are holding this information close to their chest as new licenses are being issued. Paprican's work was looking at pulping qualities. CFS is funding $1M worth of research in this area. There are market issues that are also closely associated with this question in terms of what might happen with all this wood, for example, how it might impact the softwood lumber issue. Is it really an issue, since there will be so much dead wood? Won't we be going after the most recently killed wood anyway? Right now what is happening is that they are logging the material closest to the road. We are crossing between *leading edge* strategies and *salvage* strategies right now. This information is important for developing different timber supply strategies which is a different use of the information than operational interests. So there are a number of different interests and uses of this shelf life information – for planning, for operations and from the perspective of different wood products. So these different information interests (stakes) raise the question of what level of energy do we need to placing on obtaining this information and knowledge? And this cannot be a highly scientific exercise either because of the time frame here. It is hard to talk about (anticipate) product drivers here because of the kinds of changes that occur in the industry with wood use. They are logging material that would have been left in the bush 10 years ago. So we need to talk about what the attributes of the log are and not get hung up on what the product is because the industry and the market will figure that out. We need to be able to describe what the trees look like, for example, 5 years after they have died — what kind of cracks do they have. One hypothesis is the relationship of shelf life to the site moisture regime or some climatic (BEC) factors.

Rather than shelf life, our group asked — *what the rate of stand deterioration is*. So from a forest information viewpoint, it is really the rate of deterioration feature we are interested in knowing and how that condition may be influenced by other correlated (site, stand, history/impact) factors. And, we need to understand what the relationship is between the rate of deterioration and log/wood quality conditions. This is a parallel to the need to understand log quality relationships for biodiversity values.

From a timber supply viewpoint, at some point we need to canvas the people that use this wood and ask, in the continuum of deterioration, at what point does this wood become useless to you. When we are canvassing for a new licence, we have to decide how long we are going to metre-out this "dead" wood. So there is an issue of time. So if it does only have a two year value for a product because it deteriorates so fast – a shelf life – then that's a different situation than if it has value for, say, 10 years. New licensees tend to want to have a long term to their license, they don't want to come in for two years. So the product consideration does come in here, for example, if the wood is for pellets, we need to know the state of deterioration.

Declining Asset Value Table Group

Initial Characterization of the Topic

- Ability to attract financing (licensees) — affects the book value of tenure.
- Ability to finance the provincial debt – affect on Moody's debt rating.
- Implications to timber price (to the 4.2 billion in revenue) in terms of changes in the quality of the wood and in terms of the large supply of wood; both will affect the value of the asset to the people of BC.
- Reduction in timber supply/capital affects in government revenue (reduce value to public in terms of stumpage revenue).
- There is a question about the long-term productivity of the land base in terms of how these stands will respond (we are assuming they will go back to the way they grew before, but it could be more susceptible to disease, and what about the shade affect of the dead trees). These factors could affect the ability to provide revenue and to support economic activity.
- Potentially large public silviculture liability/cost.
- "Over" supply leads to price reduction (resource allocation strategy; balance immediate use against impact on government revenue and markets).

Table4. Business requirement and time frame.

Business Requirement	Timeframe
How do we determine the pre-MPB forest asset value?	immediate
How do we determined and described the dynamics of the value decline?	immediate
How we determine the post MPB forest asset value?	
	immediate
The knowledge elements to support these questions are: • attack/mortality dynamics — temporal pattern of degradation — how stands are going to die, what stands are going to die? When stands are going to die? Where will stands die? In other words attributes regarding the timing of death and time since mortality • the ability to model stand death and by ecosystem — site conditions (moisture of site and trees) – BEC, terrain, slope	**Entity/Attributes** • stand structure (diameter, species, site class, age, stocking, etc.) • ecosystem and terrain – BEC, slope, aspect, moisture • **spatial** resolution within stands • **temporal** resolution (see temporal pattern of degrade" below)

Christine Fletcher, Policy Develop with MOF, poses another zinger question for her Table Group to have to ponder.

Discussion

Long-Term Productivity and a hidden cost — While we may be selling wood at 25 cents per cubic metre we are off-loading a $5 regeneration liability. So if a stand does not get logged, the crown holds this rehabilitation liability which is a huge cost to the province; to get these stands back into a managed condition.

There are two factors here from a silvicultural point of view — if a stand is logged, what happens and if a stand is not logged, what happens if the whole area around is dead? Are there issues that we are not paying attention to?

Some people at the Prince George sessions were talking about situations with changes in moisture regime, higher water tables, which may pose a problem for pine regeneration. There may be a need for an interim species (e.g., poplar). Summer logging is becoming a problem and is extensive enough that companies are squawking about it. There is a pilot project on this going in in Van der Hoof to put some science into this question. Reference to recent Parks Canada RFP to look at old MPB killed areas in the parks, which is trying to set up some baseline information on this sort of thing.

Forest Health Table Group

Note, we had no forest health experts in out group. For those with this knowledge, we assumed they are interested in trying to control the leading edge of the infestation. And, if you want to control the leading edge then you need forest health inventory information about the leading edge condition. And this requirement leads to a whole set of MPB biology-related questions (as opposed to harvesting) regarding green attack, red attack, etc.

If you can't control / manage it then you want the information to serve more as "knowledge" and this moves us into the area of monitoring and the need for monitoring forest health trends. You need this information particularly in the non-beetle areas because that is the remaining forest. We talked about different methods and there was a strong vote for plot-based methods and these data also can feed into G&Y models to help make the appropriate forest health related adjustments.

We also recognized that the forest health questions may change but felt that if the monitoring approach is robust enough, then hopefully the system can answer these new questions. So we are thinking here of an ideal monitoring system. A link to the National Forest Inventory (grid) and system was seen as possible national network that could be taken advantage of.

A minor point was in using the forest health pathogens as indicators of climate change as opposed to the focus being on the consequences of the MPB.

The links between forest health and inventory are very important and maybe this MPB challenge is an opportunity to break down some of those barriers and link them together.

Lastly was a discussion of "non-forestry" forest health opportunities — urban environments, golf courses, and power lines (BC Hydro) and related security concerns with these dead trees.

Table 5. Forest Health — Questions, When and Where.

Questions	When	Where
Which pathogen?		
Which species is the pathogen affecting?		
What is the severity of the infestation?		
Where is the infestation?		
When did the infestation occur?		
What is the rate of spread of the infestation?		
What are the characteristics of infestation / spread?		
For "control"	Annual	Tactical leading edge
For "knowledge" (monitoring)		Regional (plots?)

- Is other information available to answer our question – e.g., other databases?
- Different needs/users for forest health information at different administrative levels and with different timeframes for the information
- Issue – attribute consistency
- Time – immediate post attack

Monitoring

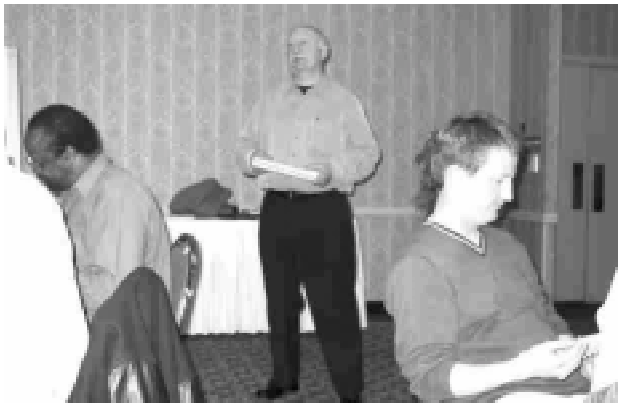
- To understand the dynamics of the landscape
- To capture change – continuous
- To capture "disturbance" – discontinuous
- MPB as an indicator of climate change; affects the geographic area that would be monitored
- The forest health question may change therefore you need a robust monitoring system
- Plot-based, georeferenced monitoring; would provide data for modelling. Measured in the field / remote
- Link this monitoring need to a hierarchy of monitoring needs

Urban Forest Health

- High resolution for infested trees
- Drivers are liability, visual quality and other amenities

"Non-Forestry" Forest Health

- Parks – trail safety, ecology
- Utilities – BC Hydro (Lydar)
- Golf courses
- Watershed issues



Lawrence Bowdige — *There he goes using those big words again and they're not even in the Workbook!*
Sam Otukol — *Ya, and besides only Biometricians should be allowed to use those words anyway!*

Entities and Attribute Data
Session 4 — Task 4.1 – Identify Entities and Attributes Needed to Answer the Questions

Harvest Scheduling Table Group

Table 6. Harvest Scheduling — Entities and Attributes.

Entity	Attribute	Standards	Update Frequency	Temporal - Immediate
1. Stand • **Overstory** • **Understory**	• **Species %** • **Age** • **Volume** • **Height** • **Mortality Level**	• Yes • Yes • Yes • Yes • No	• Yearly for all standards (establish in year 1, monitor thereafter)	• Yes
2. Stand Mortality	• **Mortality Date and Percent**	• Yes	• As above	• Yes
3. Stand	• **Primary and Secondary Checking** • **Presence of Rot**	• Yes	• As above	• Yes
4. Stand	• **Location relative to spatially identified patches**	• Yes	• Yearly, then monitor	• Yes
5. Stand	• **Structure** • **Presence and Condition of Snags** • **Crown Closure** • **Forest Health – Primary and Secondary Pathogens**	• Yes	• Immediate, once	• Yes

Entity	2-5 Years	5-15 Years	15-200+	Poly-gon	Land-scape	Manage ment Unit	Accu racy	Preci sion	Monit or
1. Stand • **Overstory** • **Understory**	• **No**	•	• No	• Yes	• No	•	• H i g h	• M e d	• Y e s
2. Stand Mortality	• **No**	•	• No	• Yes	• No	•	• H i g h	• H i g h	• Y e s
3. Stand	• **No**	•	• No	• Yes	• Ye s	•	• H i g h	• H i g h	• Y e s
4. Stand	• **Ye s**	•	• No	• Yes	• No	• Yes	• M e d	• M e d	• Y e s
5. Stand	• **No**	•	• No	• Yes	• No	• Yes	• H i g h	• M e d	• Y e s

Silviculture Table Group

Table7. Silviculture — Entities and Attributes.

Entity	Attribute	Standards	Frequency (subject to MPB activity)	Temporal – Scale (Now / Later – subject to MPB activity – intense now; less intense later)
1. Stand	**a. Spatial features** **b. Species commercial %** **c. Age (ave)** **d. Height** **e. Density – live, Density – dead**	• 'a' through 'd' and ''h' through 'm' already have standards • 'e' exist but need revision Do we have new standards and are they portable?	• Policy / management decision – e.g., if not, treating all MPB killed stands	
1. Stand	**f. Year of mortality**	• Already exist		• Mortality
1. Stand	**g. Site index – derived or field estimated**	• Already exist		
1. Stand	**h. Volume – derived**	• Already exist		
1. Stand	**i. Site Series – BEC**	• Already exist	• "constant" – sp	
1. Stand	**j. Competitive vegetation (brush)**	• Already exist	• When other attributes change • When management requires it	

Entity	Attribute	Standards	Frequency (subject to MPB activity)	Temporal – Scale (Now / Later – subject to MPB activity – intense now; less intense later)
1. Stand	**k. Diameter distribution** **l. History**	• Already exist	• On-going	• Current • History
2. Tree	• **Vertical complexity – stand structure** • **Above: a,b,c,d** • **Uniformed or clumped** • **Tree condition (wildlife tree, wood quality, MPB…)**	• Already exist		
3. Site Series – Soil, Site Condition				

Please see previous tables and flip chart notes for other Table Groups.

Entities and Attribute Data — Plenary Session
Session 4 — Task 4.1 – Identify Entities and Attributes Needed to Answer the Questions

Following the individual Table Group discussions and the development of the preceding entity/attribute tables the plenary session was focused on developing a master list of entities and attributes. The following tables summarize these outputs.

Master List of Attributes

Table 8. Master List — Stand Entities and Attributes.

STAND - Average	
Species percent*	
Crown closure	
Basal area	
Age*	
Height*	
LOREY height	
Site Index (derived / direct)	
Density	
Diameter*	
Volume (derived)*	
Mortality level	• Area attacked (# dead trees) • Date of preliminary mortality
"Free-to-grow" status	
Presence of primary pathogen agent*	
Rot amount – secondary pathogen agent*	
Colour (red, green, grey)*	
Snags – presence or absence and condition	e.g., Wildlife trees
Cracks – primary and secondary*	
Site Series	
Inventory history / status	
Silviculture history	
Stand spatial features	

Table 9. Stand List — Stand Entities and Attributes.

STAND - Structure	
Layers (in complex stands)	
Spatial distribution	(e.g., clumped, even, etc.)
Rot amount	Stand average
Competing vegetation	• Height • Distribution
Diameter distribution	
? Non-timber forest products	

Table 10. Master List — Tree Entities and Attributes.

TREE	
All items with * in STAND table	
Rate of deterioration	Derived and as it changes over time
Crown ratio	
Snag condition	
Moisture content	

Table 11. Master List — Landscape Entities and Attributes.

LANDSCAPE	
Adjacency / "relationships"	
Existing infrastructure	e.g., Roads
Natural disturbance type	GIS layers
BEC	GIS layers
Ecosystem	GIS layers
Seral stage distribution	
? Non-timber forest products	
Stand dynamics	Temporal changes

Table 12. Master List — Site Entities and Attributes.

SITE	
Soil material – texture, nutrient regime	
Soil moisture regime	
Slope	
Elevation	
Aspect	
Site position – macro, meso, micro	

Warren Eng — *Boy, the guy who designed these tables should be shot!*

Vancouver Workshop Attendees

Affleck	Peter	VP Forestry		Council of Forest Industries
Albricht	Rob	Consultant		Earthimaging Technology
Baker	Rick	Manager Forest Cover Update	Vegetation Resource Inventory	Ministry of Sustainable Resource Management
Bowdige	Laurence	VRI Monitoring Program Coordinator	Vegetation Resource Inventory	Ministry of Sustainable Resource Management
Boyce	Melanie	A/Director Forest Analysis Branch	Forest Analysis Branch	Ministry of Forests
Eng	Warren	Forest Inventory Specialist	Atticus Spatial Information Management Ltd.	Vancouver
Fletcher	Christine	Manager, Policy and Development	Forest Analysis Branch	Ministry of Forests
Grace	Jim	Regional Inventory Forester	Kamloops Service Contact Centre	Ministry of Sustainable Resource Management
Harrison	Dave	Chief Implementation Officer, Mountain Pine Beetle Initiative		NRCan
Heath	Jamie	Consultant	Terrasaurus	Vancouver / Williams Lake
Iles	Kim	Consultant - Forest Inventory Specialist		Kim Isles & Associates
Johansen	Gary	VRI Audit Coordinator	Vegetation Resource Inventory	Ministry of Sustainable Resource Management
Jones	Keith	Principal	R. Keith Jones & Associates	Victoria
Lodin	Michal	Remote Sensing Specialist	GeoSpatial International Inc.	Victoria
MacDonald	Bob	Growth & Yield Forester	Kamloops Service Contact Centre	Ministry of Sustainable Resource Management
MacMillan	Bob	Consultant	LandMapper Environmental Solutions Inc.	Edmonton
Mainer	Dave	Field Operations Supervisor	Vanderhoof	Ministry of Forests
Makar	Matt	Resource Information Specialist-Forestry	Kamloops Service Contact Centre	Ministry of Sustainable Resource Management
Morrison	Ann	Senior Vegetation Update Forester	Forest Cover Update	Ministry of Sustainable Resource Management
Mueller	Helmuth	Operations Manager	Alexis Creek	Ministry of Forests
Nakatsu	Dick	Resource Information Forestry Growth and Yeild (Prince George)	Prince George Contact Centre	Ministry of Sustainable Resource Management
Niemann	Olaf	Professor	Geography Department	University of Victoria
Nussbaum	Albert	Senior Analysis Forester-TSA	Forest Analysis Branch	Ministry of Forests
Omule		Biometrician - NFI	Canadian Forest Service	Natural Resources Canada
Otukol	Sam	Biometrician	Vegetation Resource Inventory	Ministry of Sustainable Resource Management
Pelcat	Mike	Stewardship Officer	Quesnel	Ministry of Forests
Ramsay	James	Forest Resource Management Specialist	AeroLight Imaging Inc.	Victoria
Reimer	Don	President	D.R.systems inc.	Nanaimo
Schultz	Fern	Director	Resource Information Branch	Ministry of Sustainable Resource Management
Sharma	Rajeev	Remote Sensing Scientist	Canadian Forest Service, PFC	NRCan
Spring	Al	Head, Airborne Remote Sensing	Base Mapping and Geomatic Services	Ministry of Sustainable Resource Management
Stearns-Smith	Steve	General Manager	Southern Interior Growth and Yield Co-op	

Tautz	Art	Manager, Research & Development	Biodiversity Branch	Ministry of Water, Land and Air Protection
Vivian	Jon	Manager, Vegetation Resource Invenotry	Resource Information Branch	Ministry of Sustainable Resource Management
Waddell	Dave	Systems Forester	Dev & Policy Section	Ministry of Forests
Wakelin	John	Mountain Pine Beetle "File"		Ministry of Sustainable Resource Management
Wood	Colene	Biodiversity Forester	Ecosystem Planning Section	Ministry of Water, Land and Air Protection
Wulder	Mike	Research Scientist	Canadian Forest Service	NRCan
Yuan	Xiaoping	Forest Statistics Officer	Resource Information Branch	Ministry of Sustainable Resource Management

Prince George Workshop Invitation

March 04, 2005

Re: **Forest Inventory and Monitoring Strategy for the Mountain Pine Beetle Areas**

Dear Colleague:

The Ministry of Forests has initiated the development of a **Forest Inventory and Monitoring Strategy for the Mountain Pine Beetle Areas,** which is an important component of the broader strategy required to address the current mountain pine beetle infestation. We have retained D.R. Systems Inc.[1] to undertake the development of this strategy. D.R. Systems and their consulting team are utilizing a Challenge Dialogue process as a tool to gather information necessary for the strategy.

The process will include a workshop in the Lower Mainland area on or about March 30. Since some participants may not have a chance to attend this workshop, we have scheduled an additional meeting in Prince George for March 11. At this time, I would like to invite you to participate in this informal meeting, which is aimed at informing the development of the inventory strategy.

I appreciate that you may already have reviewed the Challenge Paper circulated earlier. Nevertheless, the March 11 meeting provides an opportunity to meet some of the strategy development team face to face and to provide direct feedback and input.

Staff are championing the development of an inventory and monitoring strategy because data and information about the infestation is critical to making knowledgeable decisions about the infestation and its impact on the provincial forest and associated ecosystems.

At this formative stage of the Challenge Dialogue, staff envision the inventory and monitoring strategy to focus on the following -

> **The development of a strategic plan for forest inventory and monitoring activities in mountain pine beetle areas that meets the short and long term business needs of government agencies, the forest industry and other key stakeholders. The plan must:**
>
> 1. **consider information requirements of forest managers and of the chief forester for AAC determinations;**
> 2. **address, to the extent feasible, the information requirements for management for other forest and resource values by government, industry and communities;**
> 3. **be achievable and sustainable in appropriate timeframes under existing and foreseeable technology, institutional and resourcing conditions.**

You have been invited to participate in the Prince George workshop because the Organizing Team[2]:

- believes you have a clear interest and possibly a direct stake in the outcomes.
- respects your opinion and believe you have many relevant and good ideas to contribute.
- believes you are open to exploring new ideas and engaging in some out-of-the-box thinking that will be beneficial for addressing this rather large and daunting challenge.

This is your chance to provide input and future direction regarding inventory activities in the areas affected by the mountain pine beetles.

In advance, thank you for your contribution!

Yours truly,

Melanie Boyce, Director
Forest Analysis Branch
Ministry of Forests

Attachment(s): (3)

- *March 11 Meeting Agenda*
- *Challenge Paper (Adobe PDF format)*
- *Challenge Paper appendices (Adobe PDF format)*

[2] Note: some 30 stakeholders representing both the business need and technical side of this challenge have been invited to participate.

Prince George Workshop Agenda

Location:
Ministry of Forests Regional Office
1011-4th Avenue,, Plaza 400
5th Floor – Heritage Room
PRINCE GEORGE, BC
11:00 am – 4:30 pm
Friday, March 11th 2005

10:30 am – 11:00 am Registration and coffee

11:00 am Introduction to the Strategy Development Process

11:20 am Outline of Business Requirements, Technical Options

12:00 pm Report on Shelf-Life Workshop

12:15 pm Lunch (courtesy of MoF)

1:00 pm Break out sessions:

A. Discussion of Business Requirements

- List of business requirements and associated parameters
- Precision levels and update frequency requirements for parameters
- Ranking of business requirements/parameters relative to sensitivity/importance of business decisions (levels of risk) made based upon those requirements and parameters

B. Discussion of Technical Options

- List of applicable alternative technical approaches to a solution(s)
- Methodologies associated with an approach and parameters measured or suitable values supplied
- Estimated relative costs and resource requirements for each alternative approach
- Estimated risk levels associated with each alternative approach

2:25 pm Coffee

2:45 pm Discussion of Strategy Options –

- Presentation of Results of Discussions A & B by Discussion Group leaders
- Combine results of Discussions A & B into Draft Strategy Options

3:45 pm Plenary Reports, Summary and Wrap-up

4:30 pm Session Ends

Introduction to the Strategy Development Process

Text goes in here.

Outline of Business Requirements, Technical Options

Text goes in here.

Report on Shelf-Life Workshop

Text goes in here.

Discussion of Business Requirements

Text goes in here.

Discussion of Technical Options

Text goes in here.

Discussion of Strategy Options

Text goes in here.

Plenary Reports

Text goes in here.

Summary and Wrap-Up

Text goes in here.

Prince George Workshop Attendees