

**Detailed Minutes of the
Workshop to Develop Objectives for a
Provincial Level Projection of the Current MPB Outbreak**

*Supported by the
Mountain Pine Beetle Initiative of the Canadian Forest Service
and the BC Forest Service*

Date:

September 17, 2003 – 0900 - 1630

Location

Dilbert Hall, Pacific Forestry Centre, 506 West Burnside Road, Victoria

Participants

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0900 – 0910 Introductions of people and the project Marvin Eng

**0910 – 0930 A Framework and Software Tool for Collaborative
Landscape Analysis with a focus on the MPB projection
project Marvin Eng**

Please see attached presentation.

0930 – 0940 Objectives of the Workshop Marvin Eng

- Current status and strategy of outbreak
- Modelling description and results. Scenario brainstorming.
- Stakeholder questions and how they fit into their respective decision processes.

0940 – 1000 Current Status of the Outbreak Tim Ebata

- Provincial map of outbreak 1999 to 2002 (See attached pdf) 2003 would likely have yellow going to red and more infill in the Chilcotin.
- Spread to Chilcotin – 300 to 400 % increase in Quesnel
- Expanding in Fort St James and Prince George TSA
- Nelson is stable
- Kamloops may be expanding
- 2003 data is in the process of being compiled. Contact Tim Ebata for current information.
- 20 : 1 green to red attack, indicating that the beetles are immigrating into the Chilcotin.
- Beetles are attacking smaller diameter classes.
 - Les S – relationships are the same – diameter size and MPB production rates.
- How will provincial over view flights be resourced.
 - Les S – need to know state of forest to manage.
 - How to inventory – efficacy of satellite
 - Debate - Annual surveys and effort to detect green attack, or Infrequent surveys of what is left post attack.

- How to reflect outbreak – not analogous to hectares impacted, A lot of standing biomass remains, for example pine removed but spruce and fir left and in growing with the stand becoming fully stocked.
- Inventory – dependent upon questions. Shelf life, timber supply require different types of inventory, during outbreak vs post outbreak.

1000 – 1030 Nutrition Break

1030 – 1050 The Mountain Pine Beetle Initiative

Bill Wilson

- Funding objectives:
 1. Mitigate impacts of MPB.
 2. Reduce risk of future impacts.
- Two calls for proposals this year:
 - 03/04 ~5.75 M, with 2M for research, rest for land based programs.
 - September - 60 proposals proposed – 10M request - likely fund 15-20%. 2.5M request for this year. Could endorse 1M more this year, more near term capacity.
 - 5 themes – 2 committees.
- Questions:
 - Remote Sensing, ecology and shelf life status for funding.
 - Remote Sensing: Workshop report on application of Remote Sensing, available on the beetle web site. Two remote sensing projects have been considered.
 - Shelf Life: A needs analysis was done. Strategic decision not to get caught between company vs government perspective on shelf life. A small committee has been formed – looking at merch yeild curves.
 - Ecological: Requests for modelling ecological interactions, not considered a priority.
 - The future – First step was to do a needs analysis with information users, committee process vetted it. Second step strategic look at MPB research objectives, looking at the supply side of the question.
 - Funded projects – listed on web site.
- Relationship to this project:
 - Timing and spatial arrangement of outbreak – need basic information.
 - Timber supply is a critical issue to a lot of areas with respect to MPB.

- Social issues – communities want to know the medium and long term impacts?
- Land based managers making decisions.
- Other projects - G&Y, climate change, ecological, socio-economic – regional economic models.

**1050 – 1115 A Provincial Perspective on the outbreak Marvin Eng
& Peter Hall**

- Bob Clark – Beetle Boss provided a few notes to Marvin to pass on:
 - The NGOs have not been actively engaged in the provincial strategy. They have produced a document called Salvaging solutions – Sierra legal defence report
 - The government has been working with the forest industry to develop a provincial bark beetle strategy. That document is now in its third draft and is expected to be public soon (Peter Hall will provide a summary of the strategy in his presentation)
 - 2000 – 48 million cubic meter of pine in the THLB was killed, 2001 – 71 million, 2002 – 108 million, 2003 – 150 to 160M Marvin's estimate based on growth.
 - 15% of provincial pine has been impacted.
 - Marvin provided some results of work he has done summarizing the actual & projected infestations based on the provincial aerial overview surveys – see attached graph. The overview is:
 - Flights 1:100,000 maps draw polygons and attribute with Light(L), Medium(M), Severe(S) and Very Severe impact.
 - Spot data of infestation.
 - Polygons have relatively poor spatial accuracy. Therefore:
 - Drew a provincial grid 1200 metres on a side, 144ha in size and populated with the values of the underlying polygons. Average size of polygon.
 - Example of impact - Light infestation – 5% translate into area given an average stocking of 750 stems/ha.
 - Made a time series of outbreak 1999 to 2002.
 - Map shows a lot of filling in.
 - Shows lots of outbreaks – not all coming from the park!

- Application of a Markovian model to generate future patterns. Need pine density of grids. Nature of host – intensity, neighbour's state, history of cell, effect of long range dispersers.
 - A transition probability estimate of error based on 99-2001 data, knowing 2002 and applying it to a 2003 estimate.
- Peter Hall:
 - See attached presentation
 - Context of outbreak, with historical outbreaks.
 - Infestation characteristics – how aggregated is the outbreak. Older outbreaks are more aggregated than younger.
 - Where to allocate resources through the strategy – earlier better than later.
 - Strategy needs
 - Expanding infestations
 - Some areas no longer appropriate for mitigation
 - Limited resources
 - Need for consistency across province.
 - Need co-ordinated response
 - Overall Approach
 - Dynamic event integrating with a complex land base
 - Collaboration between MoF and Industry.
 - General guidance
 - Local implementation
 - BB strategy – tech guidelines and DFAM level strategies – specific projects.
 - Technical objectives:
 - Beetle management units (BMUs)
 - Aggressive management
 - Containment
 - Salvage/Limited Action
 - BMU strategies
 - Suppression/Prevention – default strategy
 - Holding

- Salvage
- Monitor – management activities are no longer applied – eg. Tweedsmuir park
- Map of zones and strategies
- Expectation that the event can be slowed, but not stopped, requires a weather event.

1140-1200 MPB-SIM MPB/SELES description and results - Bill Riel & Andrew Fall

- TSA Landscape Model of MPB – see attached slides
- Thresholds of changing beetle strategy based on level of infestation
- The model – scaling stand level to landscape level.
- TSR calibration – Forest modelling is consistent with TSR projection
- MPB spread calibration – MPB model of spread is consistent with actual spread.
- Scenarios:
 - Lakes - no effect of any management action
 - Kamloops – MPB management is effective given level of outbreak. Fine scale treatments requires high success.
 - Morice – District has been proactive. MPB management is effective. Tweedsmuir has only a moderate effect compared with weather and the primary driver is control by management.
- Questions-
 - Effect of model temporal and spatial grain?
 - Model verification helps to evaluate how appropriate the model scale is at capturing the processes and dynamics.
 - Modelling at the boundary of the study area:
 - Tested the effect of immigration vs local outbreak.
 - The larger the landscape the less the boundary is a problem.
- Model only captures MPB, not spruce bark beetle or fire, and other forest health issues.

Issues Raised during the Morning:

- What's left? Timber implications.

- How do the stands recover, how does the recovery fit into the timber supply projections?
 - Post processing task since forest growth not covered in this project.
- What are proper management objectives – is suppression effective – Kamloops, Lakes and Morice analysis – see MPB-SIM results above.
- What's out there – how much is gone, quantification required.
 - See scenarios.
- Unmanaged vs managed landscapes – parks as the canary in the coal mine of what may happen in the managed landscape.
 - See scenarios.

1200 – 1300 Lunch

1300 – 1615 Stakeholder views: A general discussion of questions and specification of objectives, indicators and scenarios.

The group was asked to provide the following information for each client:

1. What decisions are affected, at a provincial scale?
2. What comments need to be recorded to understand the context of the decision?
3. What are the specific questions involved?
4. What indicators need to be reported?
5. What scenarios need to be examined?
6. Who is an appropriate domain expert to specify the conceptual models and evaluate the results?

Note that the following discussion is presented in the order in which it occurred. Many participants later in the afternoon felt that some of their comments and questions and scenarios had already been included by other clients. All participants agreed that most of the indicators might be useful to more than one client. A “domain expert” was identified for each client so the core team could follow up the discussion.

A summary list of indicators and scenarios along with data issues was prepared as each client was discussed. These, along with a discussion of modeling issues and other comments, is presented at the end of the minutes.

Clients

Federal government – National Forest Sinks Committee

- Decision
 - Should forest management be included in the net carbon balance calculations for Canada?
- Comments
 - How to feed pine beetle knowledge into other models that require information of extent of MPB impact.
 - Federal decision that can use data from this project to assist with their evaluation.
- Questions
 - How do Mountain Pine Beetle affect the net provincial carbon balance?
 - What proportion of the pine will be killed in the first “commitment window” for the Kyoto protocol (2008 to 2012)?
- Indicators:
 - Area and volume affected/year by reporting strata such as– BEC zone, “analysis unit”
- Scenarios:
 - Probability of fires, insects, etc. over a reporting period.
 - Can there be a series of MPB scenarios that give a probability distribution of impact.
 - Low, medium, high effect based on weather and outbreak cycle and available host.
 - How does beetle management shift the curve, high and low.
- *Domain Expert – Werner Kurz*

Forest Investment Council

- Decisions
 - Where should the planning for forest health rehabilitation budget be allocated
- Comments
 - This issue could feed into merchantability and other shelf life issues in a secondary model used to assess provincial rehabilitation allocations.
- Questions:

- TSA's directing forest health rehab budget.
- How much is needed where?
- How is allocation decision made provincially?
- Where is the damage, how much can be salvaged provincially. This could assist on TSA rehabilitation investment allocation.
- Indicators:
 - Anticipated level of salvage,
 - How much would be natural and how much would require silvicultural intervention by timber type.
- Scenarios
 - High medium low infestation
- *Domain Expert - John McClaron*

Forest Practices Branch –Forest Health Program

- Decision
 - Refinement of the bark beetle strategy.
- Questions:
 - Rate of change of outbreak.
 - Relative impact resulting from different management strategies
 - How does weather events effect outbreak.
- Indicators
 -
- Scenarios
 - Good/bad winter
 - good/bad flight period.
- *Domain Expert – Peter Hall*

Ministry of Sustainable Resource Management Terrestrial Information Branch

- Decision:
 - Planning workload for Forest Cover/Inventory update.
- Questions:

- Where will the infestation spread to at various levels of intensity over the time frame
- Indicators
 - Map of spread through time at various levels of intensity
- Scenarios
 - Uncertainty in inventory
- *Domain Expert – Ann Morrison*

Ministry of Water Land and Air Protection - Environmental Stewardship Division

- Decision
 - How is habitat going to be managed?
- Comments
 - Implication for UWR, WHA's.
 - Impact of MPB management on provincial populations
 - Roads, etc
 - Grizzly Bear, Caribou, etc.
 - Issues include:
 - Changes in the amount and placement of access
 - Increased forest fragmentation resulting from beetle management
 - Changes in opening size and placement resulting from beetle management
- Questions:
 - How is habitat going to be changed
 - By the MPB outbreak itself?
 - By forest management designed to deal with the MPB outbreak?
- Indicators
 - Effect on species range.
 - Anticipated levels of salvage – location and timing.
- Scenarios
 - No harvest in certain areas with risk assessment.
- *Domain Expert: Lyle Gawalko*

Ministry of Sustainable Resource Management Planning Division

- Decision
 - Should land use / management zones be altered in the face of the MPB outbreak?
- Comments
 - MSRM – meeting landscape level objectives?
 - Zones are static in a dynamic system.
 - Zone changes require stakeholder participation and are slow to respond to landscape change. Require public consultation.
 - Direction to accommodate First Nations in setting land use objectives.
 - To what extent do disturbed stands meet old growth targets?
 - What are the harvesting rules for beetle areas – block size and approval, following zonal rules, VQO, special management.
- Questions:
 - What effect will the MPB outbreak have on the nature of management zones?
 - What effect will forest management under the Bark Beetle Regulation have on the nature of management zones?
 - Given extent of outbreak what are the implications for not harvesting in zones with high old growth requirements that would be compromised by roading and harvesting of impacted stands?
- Indicators
 - Land use designation violation.
- Scenarios
 - What will happen to the zones and to the beetles, under relaxing zonal rules vs following zonal rules.

Domain Expert: Allan Lidstone

MOF - Forest Analysis Branch

- Decision
 - What is the cumulative impacts of AAC uplifts.
 - Economics of forest industry resource reallocation. –

- Regional Strategy in the face of MPB.
- Questions:
 - What is at risk provincially
 - To the “end” of the outbreak
 - After 5 years.
 - What is the effect of cutting pine preferentially.
 - Risk assessment of regeneration delay NSR.
 - What is the most likely outcome? Given different weather events.
- Indicators
 - Volume affected in the timber harvesting landbase and the non-contributing landbase by year
- Scenarios
 - Assume different “stopping” points for the outbreak.

Domain Expert: Chris Fletcher

Indicator Summary

Output as text files and maps.

1. Area affected / year
2. Level of effect for each “analysis unit”
3. Anticipated levels, location and timing (by year) of salvage
4. Effect on “Timber Types” that vary in the need for and ability to rehabilitate.
5. Rate of change in level of infestation spread intensity.

Strata – BGC subzone variants, BMUs, Species ranges management zones
THLB/NCLB.

Scenario Summary

1. Low, moderate, high effect based on weather and outbreak cycle and available host.
2. Beetle management high/low impact on outbreak.
 - Good/bad winter, good/bad flight period.
 - AAC uplift.
3. Salvage high/low efficiency.
4. Increase./decrease harvesting by zones.

5. Harvesting by risk – reflects a preference for pure pine vs pine as a component.

Data Issues

- Year 1:
 - No TFL forest cover or management data will be included in the model this year. We will assume the TFLs are “average” with respect to host susceptibility. This data will be included in year 2 if it is made available
 - No growth and yield data will be included in the model this year.
 - Weather data: need variability wind.
 - Climate normals (1961-90) – monthly min/max temperature and precipitation are available.
 - Need species range maps
 - Need land use zones.

Discussion of Modeling components and information required to answer the questions

- Detailed in project overview – see attached.
 - Mountain Pine Beetle sub-model
 - Will operate at a 1200 meter pixel size
 - The general approach will be to construct a complex Markov Chain (cellular automata) model that includes:
 - First order transitions
 - History of infestation in the cell
 - History of infestation of the eight neighbouring cells
 - Nature of the (pine) host in the cell.
 - Forest harvesting sub-model
 - Will operate at a 400 meter pixel size. The smallest “cutblock” will therefore be 16 hectares. Single tree treatments will be modeled as aspatial events within a cell.
 - The model will be an area based, spatial timber supply model constrained primarily by THLB/NCLB, forest age (standing volume), access and constraints and visual quality objectives
 - Significant uncertainty exists among the workshop participants about the way in which forest management is responding to the MPB

outbreak. Of particular interest is the relative effort that is actually being expended on salvage versus green attack. Suggestions were made to engage Peter Jacobson – Economic and Trade Branch.

Other comments

- Another client is the scientific community that is interested in MPB outbreaks and their effect on the environment. Generally they would use the results to modify other models and “indicators”.
- Workload planning is a decision that cuts across numerous clients
- Domain experts would work with model output files and do the interpretation, either directly or through some post simulation modelling process.
- The model will project possible outcomes, not predict the actual outcome, for any indicator and scenario. Therefore it is important to run the model in a “monte carlo” fashion and present the results as means and variance as appropriate.

1615 – 1630 Next steps in the project

- September: Provide workshop summary to participants
- October and November: Engage domain experts as required in conceptual model development; compilation and formatting of data
- December: Model implementation and testing
- January: Engage domain experts in model verification; model modifications as required
- January and February: run scenarios
- March: report back to stakeholder group.

1630 Adjourn