MPB Decision Support Tool (DST)
Prototype Development

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4 topics to be Addressed:
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- **Context for MPB DST**
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• *Context for MPB DST*

• *Objectives for MPB DST*
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- *Context for MPB DST*
- *Objectives for MPB DST*
- *DST Overview*
MPB Ecology Program Workshop

4 topics to be Addressed:

- *Context for MPB DST*
- *Objectives for MPB DST*
- *DST Overview*
- *Ongoing Development*
Context for MPB DST

• Problem of Scale:

• Tree vs Stand vs Landscape
Context for MPB DST

• Problem of Scale:

• MPB’s effects are most dramatically seen at the Landscape Level
Context for MPB DST

- Problem of Scale:
  - MPB’s effects are most dramatically seen at the Landscape Level
  - MPB management response most meaningfully implemented at Landscape Level
MPB Ecology Program Workshop
Context for MPB DST

• **Problem of Scale:**

• *In absence of major in-fights, MPB works mainly at Tree- and Stand-Level*

• *Tree-to-Tree, and Stand-to-Stand spread*
Context for MPB DST

• Problem of Scale:

• For Landscape-level projection and planning to be meaningful, need Stand-Level understanding of dynamics:
Context for MPB DST

• **Problem of Scale:**

• *For Landscape-level projection and planning to be meaningful, need Stand-level understanding of dynamics:*
  – MPB infestation and spread
Context for MPB DST

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  – Stand vegetation development (growth)
Context for MPB DST

• **Problem of Scale:**

• **For Landscape-level projection and planning to be meaningful, need Stand-level understanding of dynamics:**
  – MPB infestation and spread
  – Stand vegetation development (growth)
DST Objective is to:

“ .......... project stand conditions under a range of MPB-induced mortality, secondary stand structure and regeneration scenarios ........ “
DST Success necessitates an Understanding of:

- *Mortality patterns*
DST Success necessitates an Understanding of:

• Mortality patterns

  – How does MPB-kill progress through a stand over time?
Success necessitates an Understanding of:

• Secondary Stand Structure
Success necessitates an Understanding of:

- **Secondary Stand Structure**
  
  What secondary stand structures exist in stands being attacked by MPB?
Success necessitates an Understanding of:

- **Secondary Stand Structure**
  
  - What secondary stand structures exist in stands being attacked by MPB?
  
  - How will remaining secondary structure behave (mortality, ingress, growth) after MPB attack?
Success necessitates an Understanding of:

- *Regeneration*
Success necessitates an Understanding of:

- **Regeneration**

  - *What level of regeneration (PI, other ?) can be expected after MPB attack?*
Success necessitates an Understanding of:

• **Regeneration**
  
  – *What level of regeneration (PI, other ?) can be expected after MPB attack?*
  
  – *How will new regeneration behave (mortality, ingress, growth) after MPB attack?*
MPB Ecology Workshop

Ancillary Research

- MPB Kill
- Regeneration
- Stand Structure
- Shelf Life

Integration Tool

MPB DST: Stand Level Projections

Management Response

- Landscape Level Plans
What does the DST do?

Existing Condition
- Stratum, Stand Type, Age

Beetle Kill
- 0 %, 25 %, 50 %, 100 %

Regeneration Assumptions
- Natural, Planting, Site Prep

Salvage Treatments
- No, Yes

Growth Projections

Alberta’s Growth Models:
- GYPSY
- MGM
What does the DST look like?
What does the DST look like?
### Pre-Existing Overstorey

**Lodgepole Pine**

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<th>PL Height (m)</th>
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### Pre-Existing Understorey

**Black Spruce**

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<th>Year</th>
<th>SB Height (m)</th>
<th>SB Basal Area (sq m/ha)</th>
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### Pre-Existing Regeneration

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DST Output
Ongoing Development

• User group given opportunity to use DST
Ongoing Development

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• User feedback solicited with on-line Response Facility
Ongoing Development

- User group given opportunity to use DST
- User feedback solicited with on-line Response Facility
- User Feedback Workshop
Ongoing Development

1. User group given opportunity to use DST
2. User feedback solicited with online Response Facility
3. User Feedback Workshop
4. Enhancement Plan developed to address User Feedback issues
Ongoing Development
Ongoing Development

Suite of Stand Types Available
Ongoing Development

Suite of Stand Types Available

• Sw and Fb understories not currently in DST
Ongoing Development

Suite of Stand Types Available

• Sw and Fb understories not currently in DST

• ‘No Salvage’ may become an important management prescription if Sw and Fb can be shown as important in supporting medium-term timber supplies
Ongoing Development

Applicability of Starting Conditions
Applicability of Starting Conditions

- Starting densities, ages, heights did not always reflect the kinds of stands that users need to address
Ongoing Development

Applicability of Starting Conditions

• Starting densities, ages, heights did not always reflect the kinds of stands that users need to address

• Currently no ability to enter ‘custom’ starting conditions to reflect local conditions
Applicability of Starting Conditions

• Expanded scope of data to define starting conditions (operational PSP’s, not just those in the MPB monitoring program)

• Currently developing a new suite of starting conditions to address missing stand types
Ongoing Development

Regeneration response in Unsalvaged Stands
Ongoing Development

Regeneration response in Unsalvaged Stands

• Currently, no natural regeneration of PI after MPB attack in the absence of Salvage
Regeneration response in Unsalvaged Stands

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• Based largely on BC published literature
Ongoing Development

Regeneration response in Unsalvaged Stands

• Currently, no natural regeneration of PI after MPB attack in the absence of Salvage

• Based largely on BC published literature

• Current assumptions are conservative and likely an under-estimate of natural regeneration expected after MPB
Ongoing Development

Regeneration response in Unsalvaged Stands

- DST revisions will await data from research describing post-MPB regeneration responses
Ongoing Development

Shelf-Life of MPB killed timber
Ongoing Development

Shelf-Life of MPB killed timber

• Currently, post-MPB Wood Quality parameters are based on published observations in BC
Shelf-Life of MPB killed timber

- Currently, post-MPB Wood Quality parameters are based on published observations in BC
- Anecdotal evidence that Alberta responses are different
Ongoing Development

Shelf-Life of MPB killed timber

- Currently, post-MPB Wood Quality parameters are based on published observations in BC

- Anecdotal evidence that Alberta responses are different

- More severe Checking, faster Fall Down
Ongoing Development

Shelf-Life of MPB killed timber

• DST revisions will await data and results from MPB Ecology Program research with Kathy Lewis
Non-tree vegetation responses in MPB Stands
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• DST does not currently report any non-tree vegetation responses after MPB
Non-tree vegetation responses in MPB Stands

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• 2010 field measurement provide first opportunity to describe non-tree vegetation response after MPB
Non-tree vegetation responses in MPB Stands

• DST does not currently report any non-tree vegetation responses after MPB

• 2010 field measurement provide first opportunity to describe non-tree vegetation response after MPB

• Use/application of non-tree vegetation trends have not been defined
Ongoing Development

MPB attack and mortality assumptions
MPB attack and mortality assumptions

• DST currently only addresses 4 discrete levels of MPB attack (0, 25, 50, 100%)
Ongoing Development

MPB attack and mortality assumptions

• DST currently only addresses 4 discrete levels of MPB attack (0, 25, 50, 100%)

• An intermediate level of 75 – 80% is currently being integrated into the DST – anecdotally, this is a `typical` level of MPB infestation being observed
Ongoing Development

Validation of GYPSY 3 Layers
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• DST projections required a 3-layer version of GYPSY
Validation of GYPSY 3 Layers

- DST projections required a 3-layer version of GYPSY

- Developed by Huang in response to DST request
Validation of GYPSY 3 Layers

- DST projections required a 3-layer version of GYPSY

- Developed by Huang in response to DST request

- GYPSY 3-Layers continues to be un-validated, and is not considered ‘approved’ by Alberta SRD
The MPB DST is:

- A Stand-level projection tool for simulating post-MPB stand development
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- Currently under going revision to address shortfalls in projection capability and stand type suitability
The MPB DST is:

• A Stand-level projection tool for simulating post-MPB stand development

• Currently under going revision to address shortfalls in projection capability and stand type suitability

• An integrative tool that can provide stand-level forecasts, that are required by Landscape-level plans
Summary

The MPB DST is:

• Easily modified to incorporate new research and knowledge
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- Easily modified to incorporate new research and knowledge
- A logical integrative tool for applying research findings to management planning and response