MPB Decision Support Tool (DST) Prototype Development

April 25, 2012

Willi Fast
Yanguo Qin, Cosmin Tansanu
Brian Maier, Kerry Nice, Spiros Sioutis
Dick Dempster
Shongming Huang
Ellen MacDonald

MPB Ecology Program Workshop

4 topics to be Addressed:

MPB Ecology Program Workshop

4 topics to be Addressed:

- ***Context for MPB DST***

MPB Ecology Program Workshop

4 topics to be Addressed:

- ***Context for MPB DST***
- ***Objectives for MPB DST***

MPB Ecology Program Workshop

4 topics to be Addressed:

- ***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***

MPB Ecology Program Workshop

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***

MPB Ecology Program Workshop

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

- ***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)***

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)***

MPB DST

DST Development

DST Objective is to:

" …… project stand conditions under a range of MPB-induced mortality, secondary stand structure and regeneration scenarios …….. "

MPB Ecology Program Workshop

DST Success necessitates an Understanding of:

- ***Mortality patterns***

MPB Ecology Program Workshop

DST Success necessitates an Understanding of:

- ***Mortality patterns***
  - ***How does MPB-kill progress through a stand over time ?***

MPB Ecology Program Workshop

Success necessitates an Understanding of:

- ***Secondary Stand Structure***

MPB Ecology Program Workshop

Success necessitates an Understanding of:

- ***Secondary Stand Structure***
  - ***What secondary stand structures exist in stands being attacked by MPB ?***

MPB Ecology Program Workshop

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 ?***

MPB Ecology Program Workshop

Success necessitates an Understanding of:

- ***Regeneration***

MPB Ecology Program Workshop

Success necessitates an Understanding of:

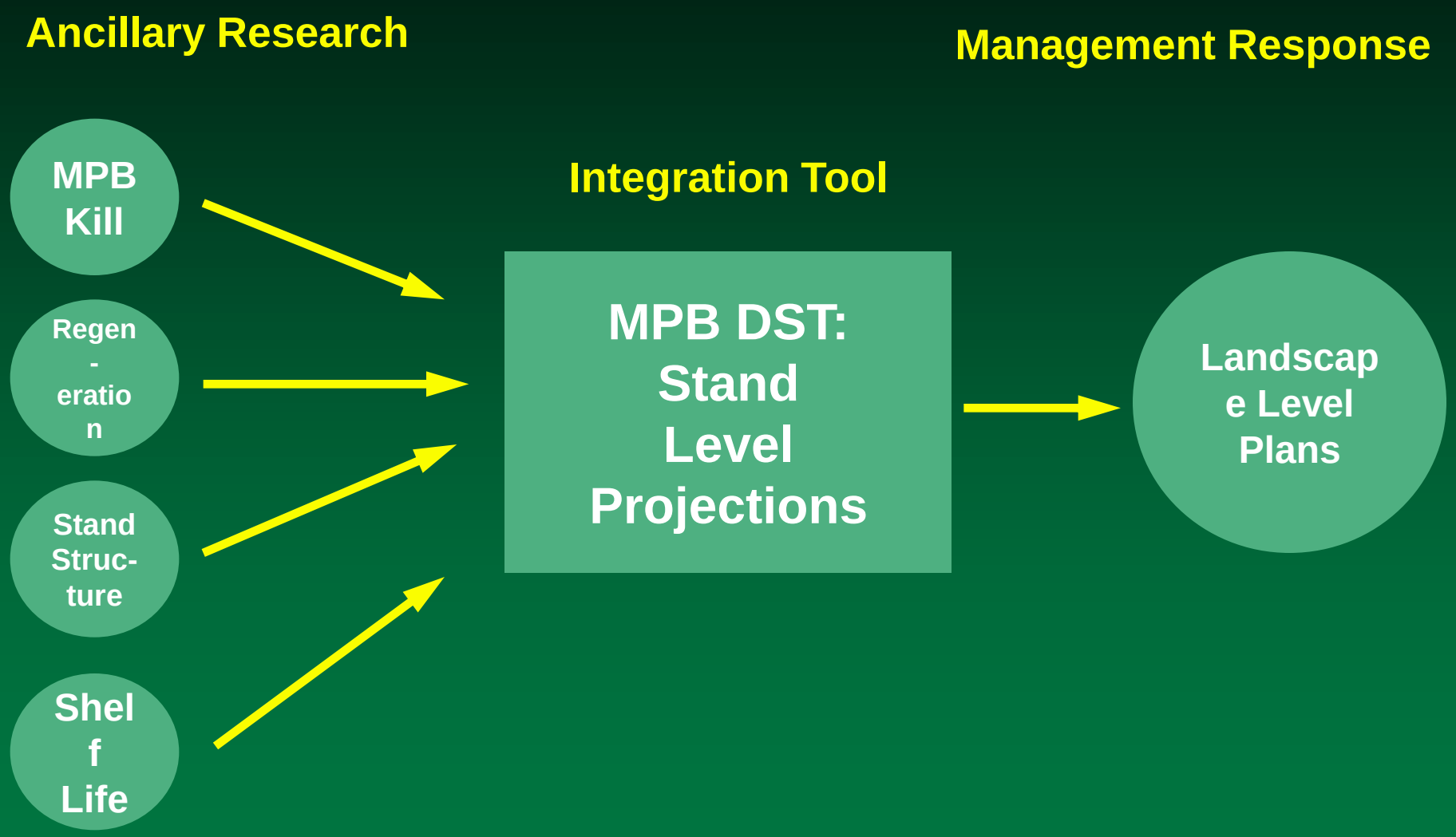
- ***Regeneration***
  - ***What level of regeneration (Pl, other ?) can be expected after MPB attack?***

MPB Ecology Program Workshop

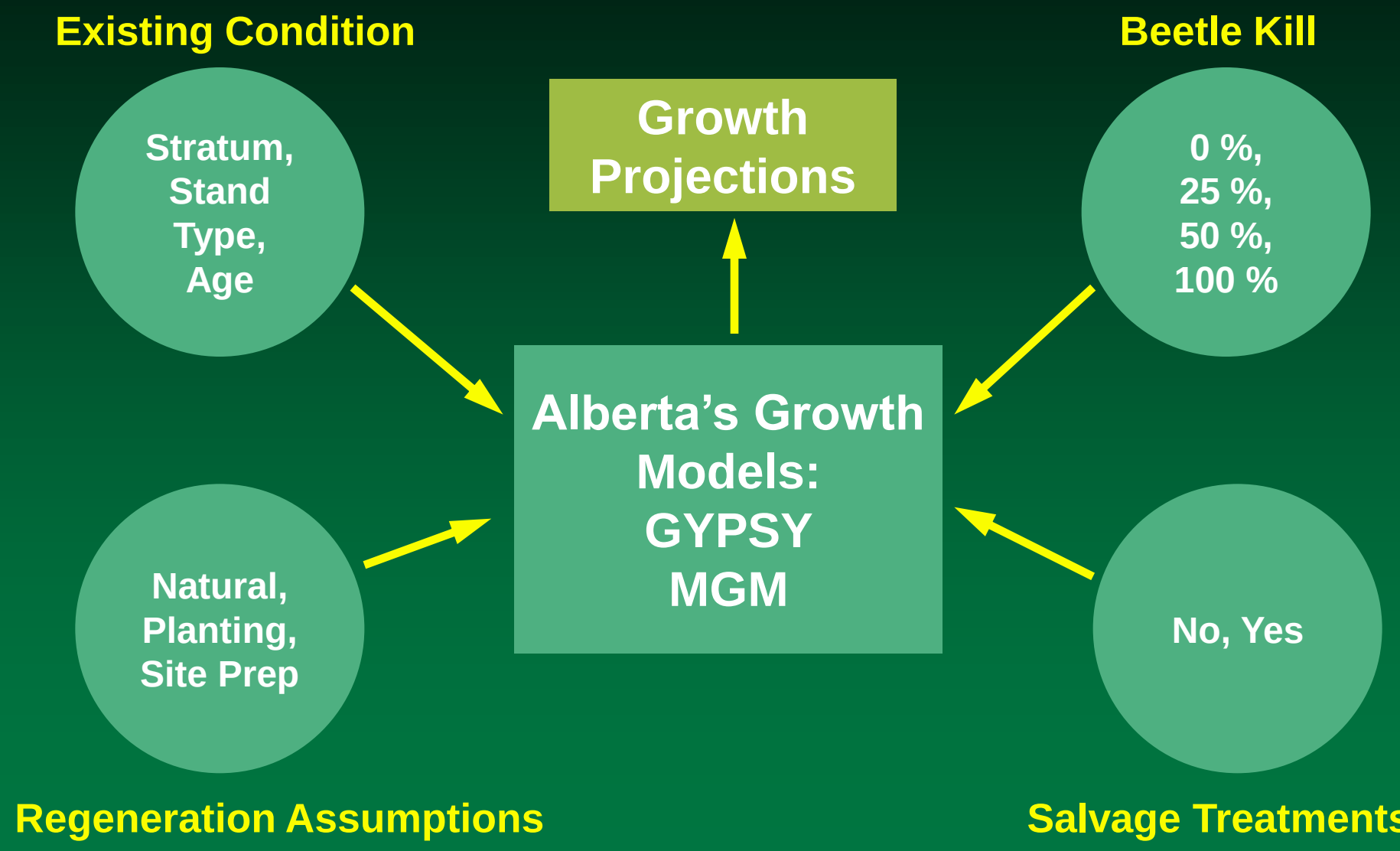
Success necessitates an Understanding of:

- ***Regeneration***
  - ***What level of regeneration (Pl, other ?) can be expected after MPB attack?***
  - ***How will new regeneration behave (mortality, ingress, growth) after MPB attack?***

MPB Ecology Workshop

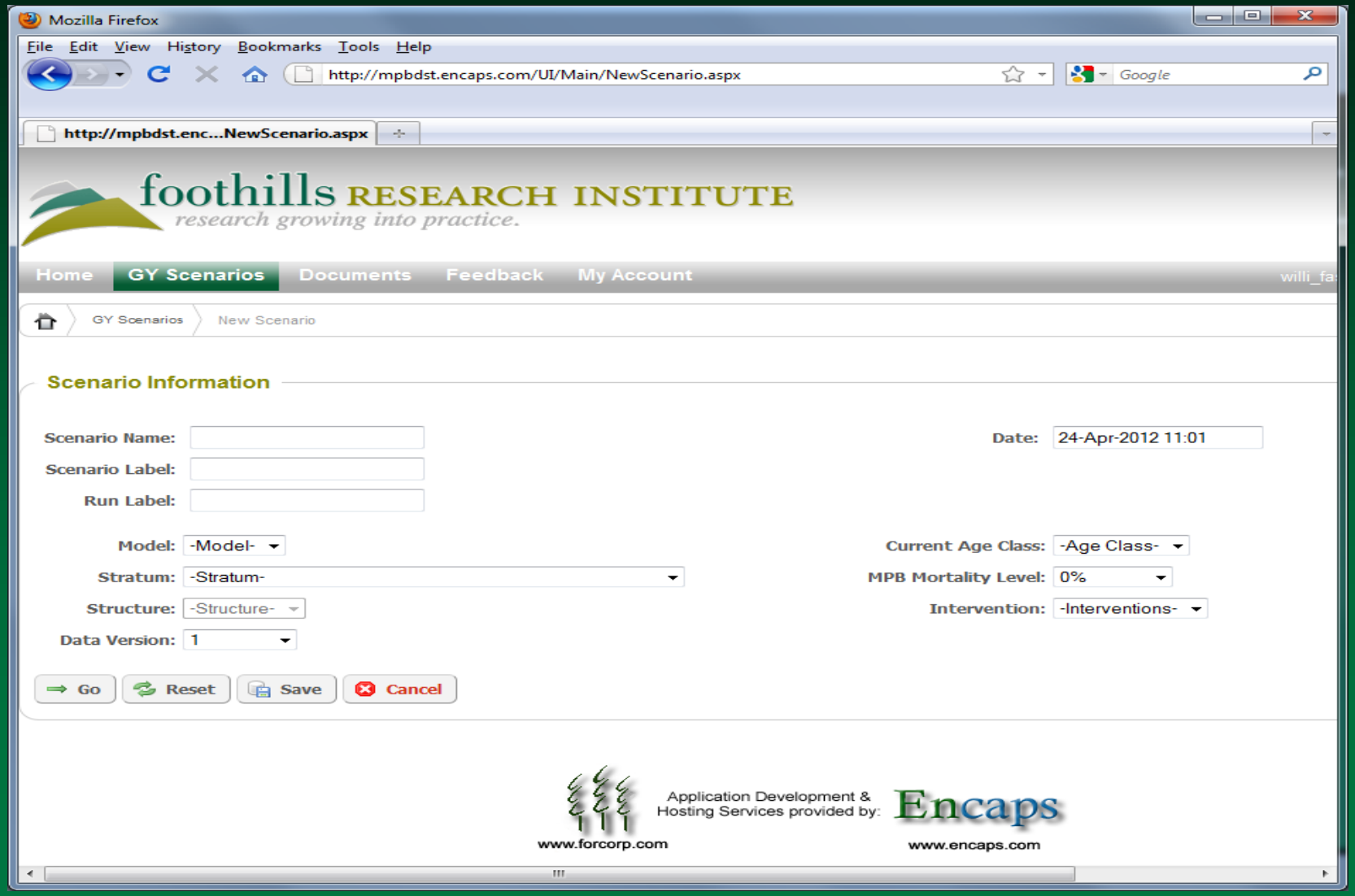


What does the DST do ?



What does the DST look like ?

What does the DST look like ?



DST Output

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://mpbdst.encaps.com/UI/Main/Report.aspx?ScenarioID=251

http://mpbdst.enc...x?ScenarioID=251

Answers

	Pre-Existing Overstorey			
	Lodgepole Pine			
Year	PL Height (m)	PL Basal Area (sq m/ha)	PL Merch Volume (cu.m./ha)	PL Density (Stems/ha)
2012	19.9	35.2	304.0	946.0
2022	20.4	35.2	318.0	830.0
2032	20.9	35.2	329.0	735.0
2042	21.3	35.2	337.0	654.0
2052	21.6	35.1	343.0	587.0
2062	21.9	35.0	348.0	529.0
2072	22.2	35.0	352.0	480.0
2082	22.4	34.9	356.0	437.0
2092	22.7	34.8	359.0	400.0
2102	22.9	34.7	361.0	367.0
2112	23.1	34.6	363.0	339.0

	Pre-Existing Understorey			
	Black Spruce			
Year	SB Height (m)	SB Basal Area (sq m/ha)	SB Merch Volume (cu.m./ha)	SB Density (Stems/ha)
2012	10.5	2.9	4.0	265.0
2022	12.5	3.9	10.0	251.0
2032	14.3	4.7	18.0	234.0
2042	15.7	5.3	25.0	215.0
2052	16.9	5.8	32.0	195.0
2062	18.0	6.1	37.0	174.0
2072	18.9	6.3	42.0	155.0
2082	19.6	6.5	45.0	136.0
2092	20.3	6.5	48.0	120.0
2102	20.9	6.6	50.0	105.0
2112	21.4	6.6	52.0	92.0

	Pre-Existing Regeneration			
	Black Spruce			
Year	SB Height (m)	SB Basal Area (sq m/ha)	SB Merch Volume (cu.m./ha)	SB Density (Stems/ha)
2012	1.4	0.0	0.0	4000.0
2022	4.1	1.6	0.0	3938.0
2032	6.9	5.5	0.0	3801.0
2042	9.5	10.1	1.0	3583.0
2052	11.7	14.4	4.0	3294.0
2062	13.6	17.9	12.0	2958.0
2072	15.2	20.6	27.0	2604.0
2082	16.5	22.5	49.0	2258.0
2092	17.6	23.9	75.0	1939.0
2102	18.5	24.9	102.0	1655.0
2112	19.3	25.5	127.0	1410.0

DST Output


Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://mpbdst.encaps.com/UI/Main/Report.aspx?ScenarioID=254
Google
http://mpbdst.enc...x?ScenarioID=254
Charts
Height (m)
Height
Year
Basal Area (sq.m/ha)
Basal Area
Merchantable Volume (cu.m/ha)
Merch Volume
Density (stems/ha)
Density
OS PL
US SB
PR SB

DST Output


Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://mpbdst.encaps.com/UI/Main/Report.aspx?ScenarioID=254
Google
http://mpbdst.enc...x?ScenarioID=254
Number of Trees with Checks
Number of Trees
Year (0 -> 10)
Checks
Standing Dead
Number of Trees with Saprot
Number of Trees
Year (0 -> 10)
Saprot
Standing Dead
Number of Trees with Woodborer Damage
Number of Trees
Year (0 -> 10)
Borer Damage
Standing Dead
Export to PDF
Close

Ongoing Development

- User group given opportunity to use DST

Ongoing Development

- User group given opportunity to use DST
- 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

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

Ongoing Development

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

Ongoing Development

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 Pl after MPB attack in the absence of Salvage**

Ongoing Development

Regeneration response in Unsalvaged Stands

- **Currently, no natural regeneration of Pl after MPB attack in the absence of Salvage**

- **Based largely on BC published literature**

Ongoing Development

Regeneration response in Unsalvaged Stands

- **Currently, no natural regeneration of Pl 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**

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**

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

Ongoing Development

Non-tree vegetation responses in MPB Stands

Ongoing Development

Non-tree vegetation responses in MPB Stands

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

Ongoing Development

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**

Ongoing Development

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

Ongoing Development

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

Ongoing Development

Validation of GYPSY 3 Layers

- DST projections required a 3-layer version of GYPSY

Ongoing Development

Validation of GYPSY 3 Layers

- DST projections required a 3-layer version of GYPSY
- Developed by Huang in response to DST request

Ongoing Development

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

Summary

The MPB DST is:

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

Summary

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**

Summary

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**

Summary

The MPB DST is:

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