

**KTS Session Presentation**

*Houston, British Columbia*

# ***Morice IFPA Mountain Pine Beetle Mitigation Scenario - Description & Outcomes***



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# Modeling Disclaimer

*Models are not magical - they are simply sophisticated accounting/forecasting tools designed to provide rapid feedback for large & complex calculations.*

As a result, models are tools to help Decision Makers make better, more informed decisions

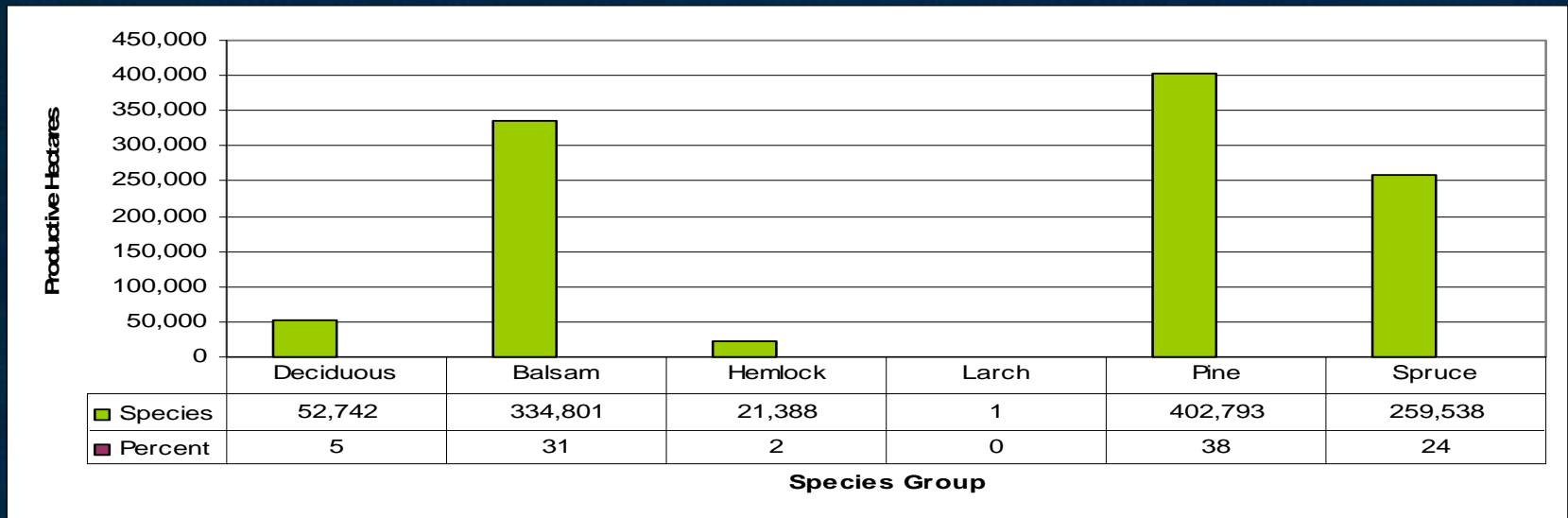
- Human effort and time is required to:
  - *Ensure the right questions are asked;*
  - *Provide the necessary data inputs and assumptions; and*
  - *Interpret the results so that efficient and effective decisions can be made.*
- *Models cannot provide decision makers with good results if they are given bad data and poor assumptions.*

# Presentation Outline

- **Backgrounder**
- **MPB Mitigation Scenario**
- **Concluding Thoughts**
- **Questions/Answers**

## Current Land Base Profile

- Morice TSA Forests are fairly diverse, lodgepole pine is the dominant leading species occupying more than 50% of the land base. The two other major leading species are spruce and subalpine fir (balsam).
- 60% of the forests in the TSA are currently considered mature and old.



- Most of the pine stands are mixed with other species (i.e. they are not pure pine stands).

## *A number of Modeling Scenarios were completed from 1999-2005/2006*

- Base Case (spatial implementation of TSR2)
- Agriculture
- Ecosystem
- Forest Productivity
- Recreation
- Current Status + MPB Mortality
- Current Status with Morice LRMP + MPB Mortality

*“Decision Scenario” = Insights from above scenarios + MPB Mortality*

*SFM Indicators developed based on Modeled Outputs to enable Measurement of values/issues.*

- Base Case (spatial implementation of TSR2)
- Agriculture
- Ecosystem
- Forest Productivity
- Recreation
- Decision Scenario

*SFM Plan version 3.0 is based on the SFM Indicator Reporting from the Decision Scenario.*

*The IFPA member companies also have committed to performing additional SFM Reporting :*

- Periodically (1yr & 5yr depending on the indicator) based on actual activities that consider:
  - Road Construction/Deactivation Activities
  - Harvesting Operations
  - Reforestation Operations

*These annual/periodic indicators become part of the monitoring process for the member companies.*

# MPB Mitigation Scenario

## Refined Growth & Yield assumptions that were in the Decision Scenario

- **Future GI Stock Percentages and Availability**
  - 2002-2012, use 30% availability of genetically improved 1st gen pine stock. Starting in 2012, 100% of the pine stock is available. Spruce genetically improved stock is 100% available from 2002 onwards. GW during 2002-2017 is 10.4 for Pine and 17.5 for Spruce.
  - 2018+ - assume 100% availability of 2nd gen genetically improved stock with percentages based on FGC species plan. Spruce GW = 24; Pine GW = 17.

## Refined Growth & Yield assumptions that were in the Decision Scenario

- **Regeneration Delay was adjusted:**
  - **1 year Regen Delay within the THLB; and**
  - **Variable Regen Delay on the Non-THLB portion of the land base, based on BEC Zones (info provided by licensees).**

## Better Site Productivity Estimates

- **Adjusted OAF 1 Values (stocking gaps, endemic losses and other random risk factors such as snow press, animal damage, etc):**
  - TSA Analysis typically use 15%
  - IFPA Studies have shown values of:

BEC Zone	Morice IFPA OAF1 Value (%)	THLB Area, (ha)	Percentage of THLB Area (%)
SBSdk 01/05/06	5	53,877.8	8
SBSmc2 01/01c/05/06/09/10	5	484,964.6	69
ESSFmc 01/04/05/06	5	90,875.9	13
ESSFwv 01	5	N/A	N/A
SBSdk 07	10	4,324.0	1
ESSFmc 09/10	10	2,888.5	0
All others	15	69,764.5	10

## Better Site Productivity Estimates

- However, the IFA study was compiled after the curves for the mitigation analysis were completed.
- The actual % used in the Mitigation Analysis were conservative at:
  - 12% for pine
  - 7% for other species
- Same % as indicated through the Babine EFMPP work.

## Better Site Productivity Estimates

- The site index adjustments from the IFPA PEM/SIBEC/OGSI work better represents the productive capability of the forest resource.
- A number of sensitivities were performed to validate the timber supply impact of using the IPFA adjusted Site Indices.
- IFPA site indices resulted in and increase of growing stock (i.e. timber) available for harvest.

**Harvest strategy was further refined from the Decision Scenario to provide an enhanced targeting of MPB attacked stands.**

- Targeted available pine-leading stands while also focusing on mixed species pine stands by targeting stands based on the highest percentage of pine volume.
- **How?** Prioritized Inventory Type Group 28 or 30, then ranked into seven different classes according to the amount of pine volume

# Mitigation Scenario

Pine Volume Ranking	Amount of Pine Volume/Hectare
1	$\geq 400\text{m}^3/\text{ha}$
2	$\geq 300\text{m}^3/\text{ha}$ and $< 400\text{m}^3/\text{ha}$
3	$\geq 200\text{m}^3/\text{ha}$ and $< 300\text{m}^3/\text{ha}$
4	$\geq 100\text{m}^3/\text{ha}$ and $< 200\text{m}^3/\text{ha}$
5	$\geq 50\text{m}^3/\text{ha}$ and $< 100\text{m}^3/\text{ha}$
6	$> 0\text{m}^3/\text{ha}$ and $< 50\text{m}^3/\text{ha}$
7	All other stands

- After 15yrs the harvest rule switched to an MPB susceptibility based harvest rule.

# Mitigation Scenario

<b>Mountain Pine Beetle</b>						
<b>Hazard Rating</b>	<b>Leading Species</b>	<b>Secondary Species</b>	<b>Age</b>	<b>Site Index</b>	<b>Harvest Priority</b>	
Extreme	PL	Any	>120 yrs	>=16	1	
High	PL	Any	>120 yrs	<16	2	
Moderate	Any	PL 20 - 50%	>120 yrs	Any	4	
Low	PL	Any	> 80 and <=120	Any	None	
<b>Spruce Bark Beetle</b>						
Extreme	S	Any	>120 yrs	>=15	1	
High	S	Any	>120 yrs	<15	2	
Moderate	Any	S 20 - 50%	>120 yrs	Any	4	
Low	S	Any	> 80 and <=120	Any	None	
<b>Balsam Bark Beetle</b>						
Extreme	BL	Any	>120 yrs	>=15	3	
High	BL	Any	>120 yrs	<15	5	
Moderate	Any	BL 20 - 50%	>120 yrs	Any	6	
Low	BL	Any	> 80 and <=120	Any	None	

# Mitigation Scenario – Initial Modeling

**Question: How much harvesting is necessary in the short-term to reduce future NRLs due to MPB**

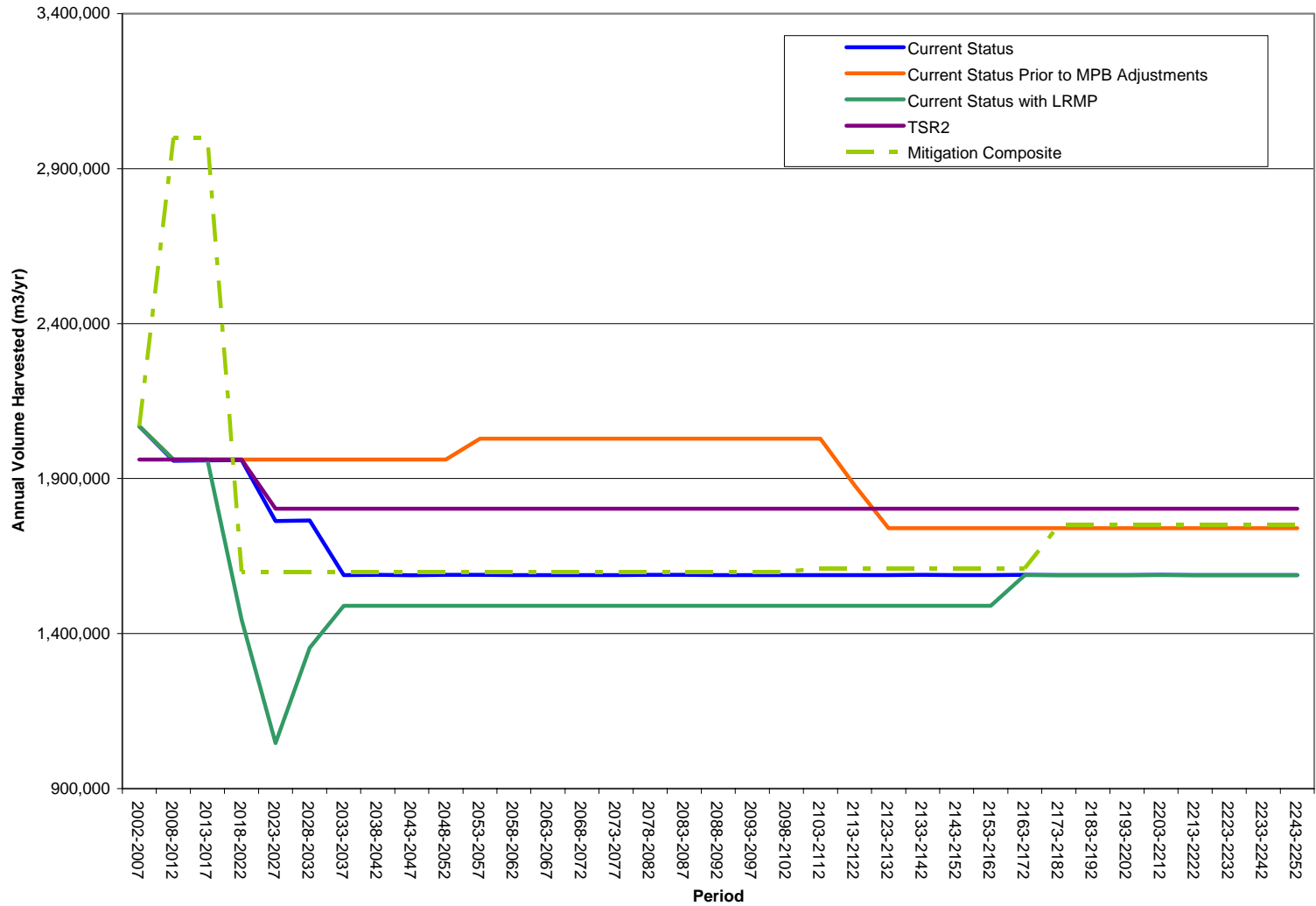
- Modeled variations of harvest levels 2.5-4.0 million for different lengths of time, 5-20 years.
- Projected NRLs = 30-40 million range during the period of the epidemic.
- Harvest flow of 3 million m<sup>3</sup>/yr for a duration of 10 years should be able to alleviate the MPB impacts in the short/mid and long-term. Current AAC is 1.961 million.

# Mitigation Scenario – Initial Modeling

## Question: How effective is the Harvest Rule Targeting?

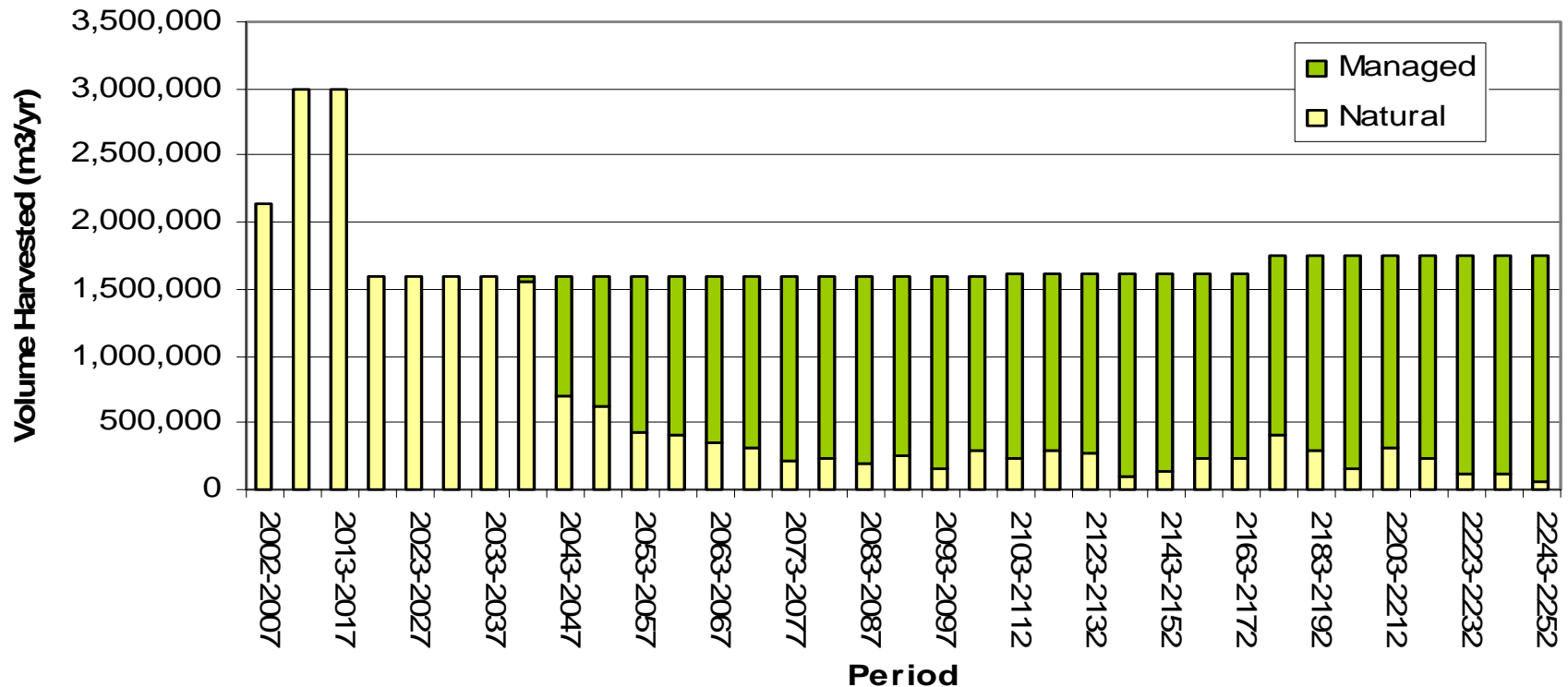
- If harvesting was based solely on oldest first, then very little of the Pine stands were targeted.
  - Period 2 (2007-2011), only 45% of the harvest; Period 3 (2008-2012) 25% of the harvest was pine
- Using the targeted approach, pine harvest in periods 2 and 3 ranges from 62-75%.
- Based on the actual species compositions of stands, if characterized by leading species the harvest would be in the order of 85%.

# Mitigation Scenario – Harvest Flow



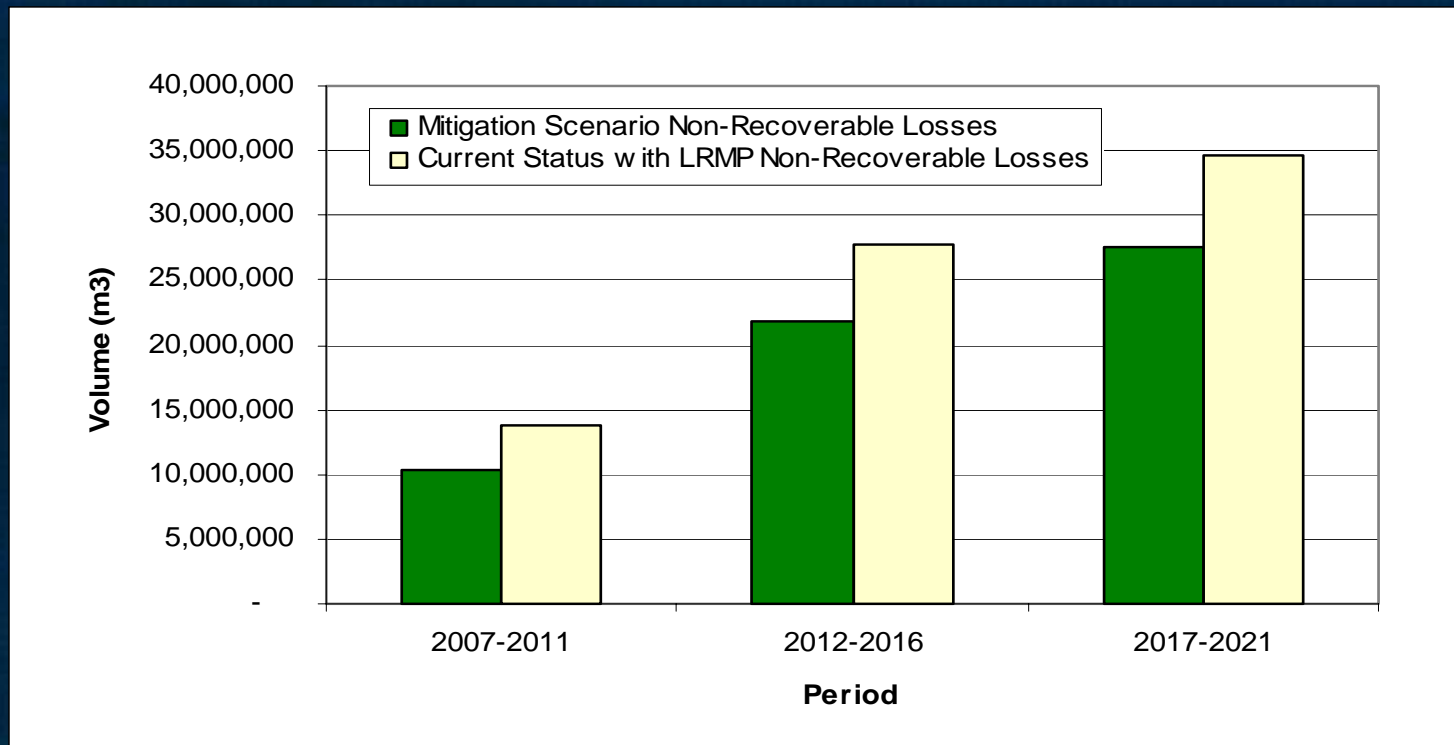
# Mitigation Scenario – Natural vs Managed

- First 50 yrs – average harvest age ranges from 140-240
- Long-term – average harvest age ranges from 80-90



# Mitigation Scenario – NRLs

- Substantially reduced THLB NRLs during 2007-2011 and 2012-2016 through enhanced targeting of MPB susceptible stands.
- The 16.6 million reduction in NRLs = 8.5 years of cut at the current AAC of 1.9861 million m<sup>3</sup>/yr.

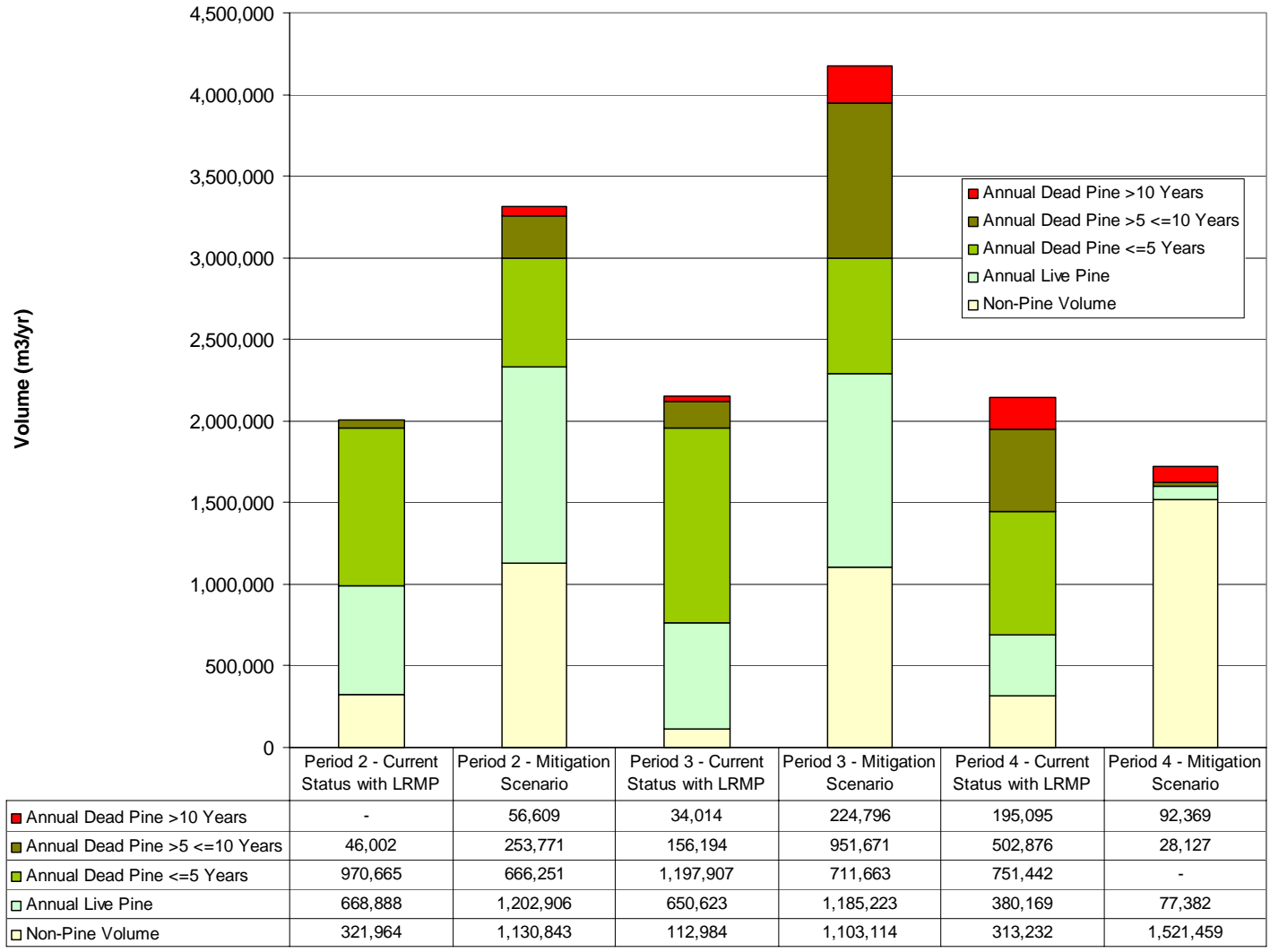


# Mitigation Scenario – NRLs

Period	Current Status with Morice LRMP (m3)			Mitigation Scenario (m3)			Difference
	Volume Lost due to stands being under the economic rotation age and impacted by MPB	Volume Lost due to Pine becoming Unmerchantable (i.e. moving beyond the 5-year shelf life)	Total NRLs	Volume Lost due to stands being under the economic rotation age and impacted by MPB	Volume Lost due to Pine becoming Unmerchantable (i.e. moving beyond the 5-year shelf life)	Total NRLs	
2007-2011	8,365,604	5,329,106	13,694,710	5,426,325	4,857,210	10,283,535	3,411,175
2012-2016	12,920,323	14,870,493	27,790,816	8,998,499	12,755,297	21,753,796	6,037,020
2017-2021	15,685,392	18,994,094	34,679,486	9,673,576	17,819,577	27,493,153	7,186,333
<b>Totals</b>	<b>36,971,319</b>	<b>39,193,693</b>	<b>76,165,011</b>	<b>24,098,400</b>	<b>35,432,084</b>	<b>59,530,484</b>	<b>16,634,528</b>

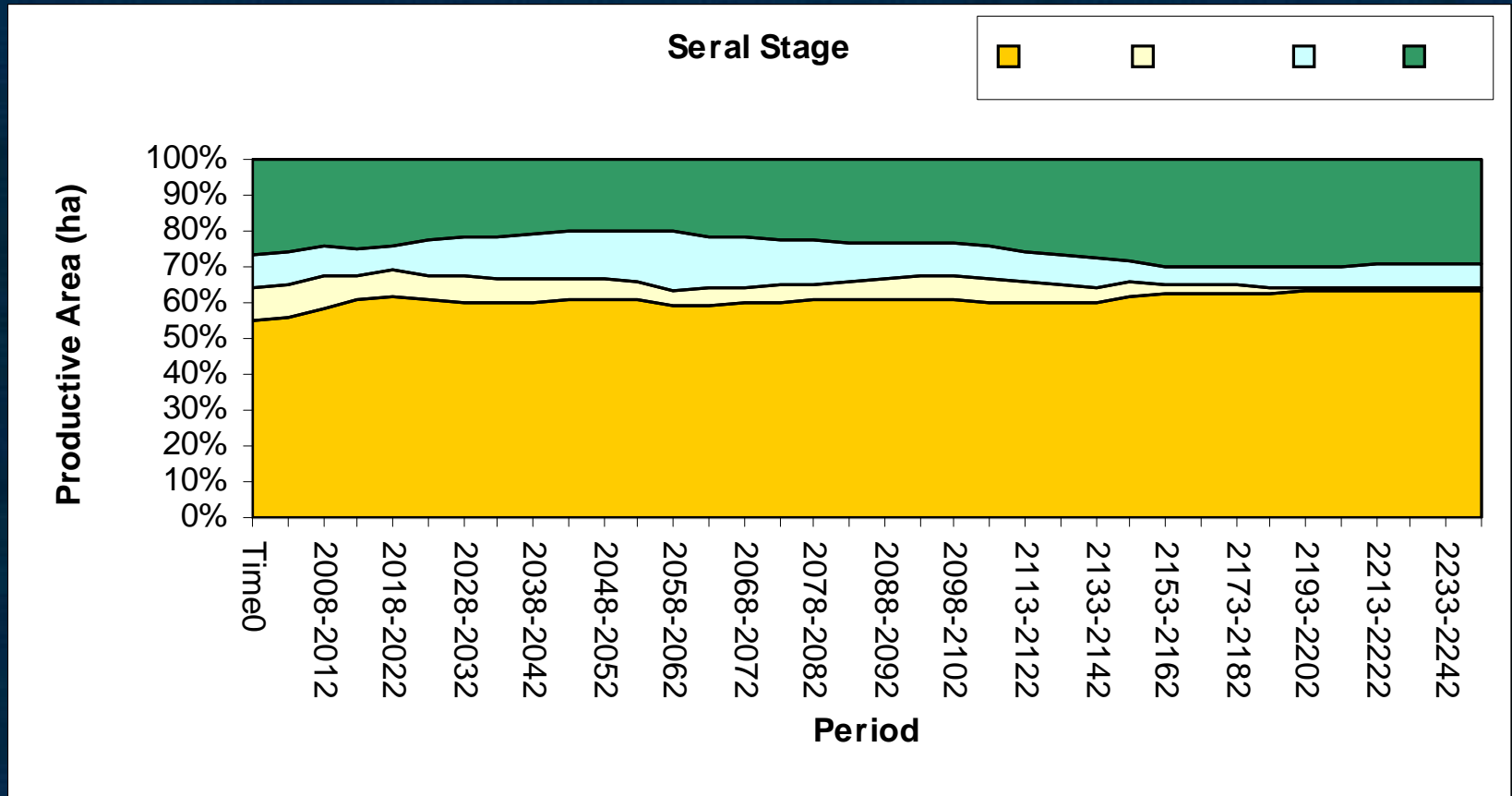
Note: Depending on the site productivity and the amount of pine lost (i.e. dead for longer than 5 years) due to MPB, it may take from 5-300 years for the stand to recover to Minimum Economic Criteria.

# Species Harvested in the Uplift Period



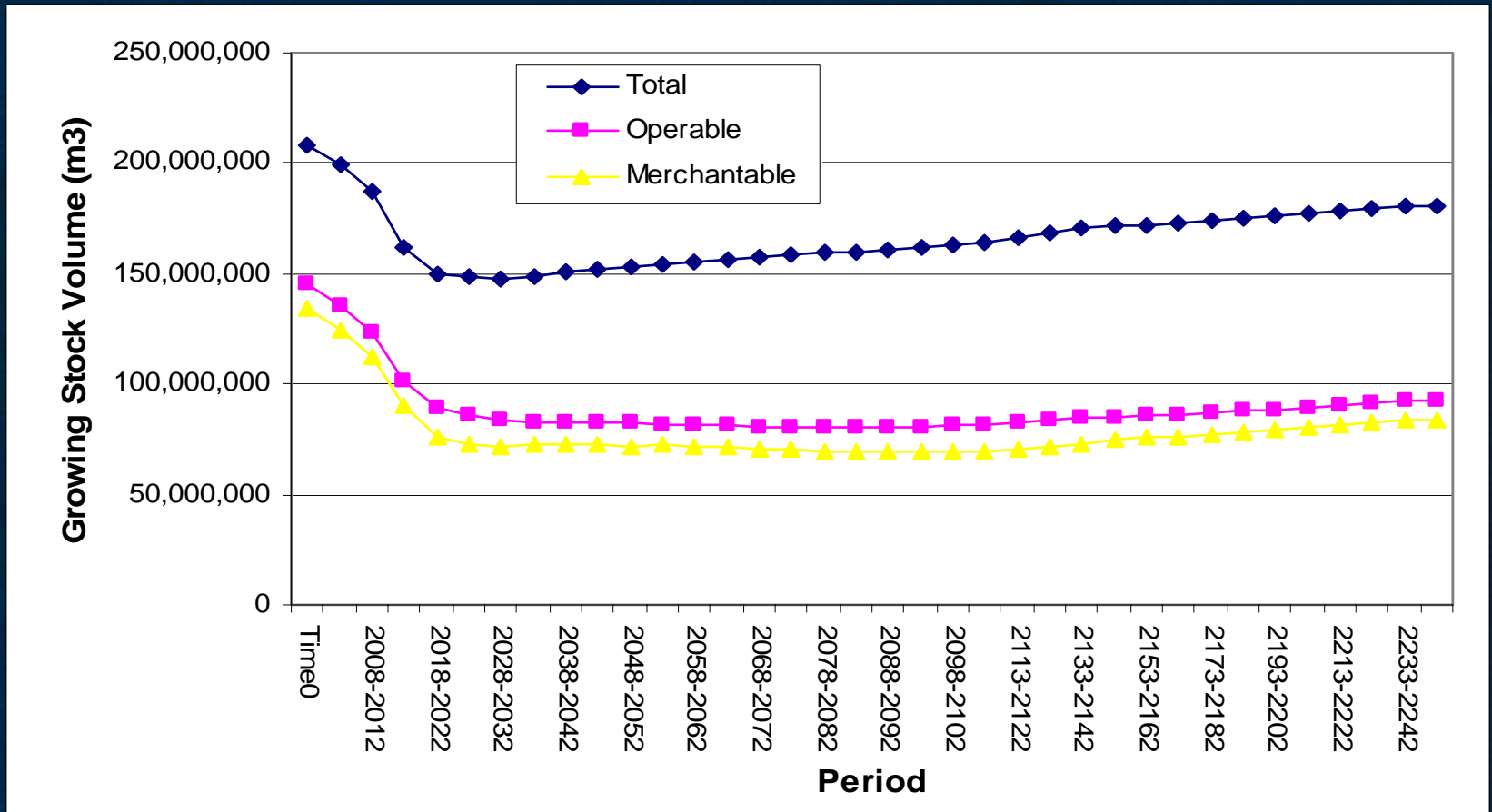
# Mitigation - Seral Structure Over Time

- With the increased harvest, Old seral (stands older than 140 yrs) will still be retained on the land base.



# Mitigation - Timber Growing Stock

- **Timber Supply is Sustainable, with a bit of an upward trend.**





# Mitigation – Sensitivities

- A number of elements/factors were considered in sensitivity analyses.
- These sensitivities are important to determine the impact of removing/changing one factor in the analysis on Timber Supply.

# Mitigation – Sensitivities

Element	Planning Horizon		
	Harvest for Periods 2 & 3 (2007-2016)	Harvest for Periods 4-20 (2017-2101)	Harvest for Periods 21-35 (2102-2252)
1. Reduced Operational Adjustment Factor (OAF) 1	0%	0.48% 648,090 m <sup>3</sup> 7,625 m <sup>3</sup> /yr	0.31% 793,644 m <sup>3</sup> 5,291 m <sup>3</sup> /yr
2. Volumes based on Site Index generated from PEM/SIBEC/OGSI data rather than the Forest Inventory Site Index.	0%	4.82% 6,558,763 m <sup>3</sup> 77,162 m <sup>3</sup> /yr	8.81% 22,268,723 m <sup>3</sup> 148,458 m <sup>3</sup> /yr
3. Increased Utilization	2% 600,000 m <sup>3</sup> 60,000 m <sup>3</sup> /yr	2% 2,720,000 m <sup>3</sup> 32,000 m <sup>3</sup> /yr	2% 5,054,000 m <sup>3</sup> 33,693 m <sup>3</sup> /yr
4. Increase the percentage of spruce planted in future plantations	0%	0%	5.25% 13,262,804 m <sup>3</sup> 88,418 m <sup>3</sup> /yr
5. Use genetically selected stock as per BC Forest Genetics Council species plans	0%	6.25% 8,500,000 m <sup>3</sup> 100,000 m <sup>3</sup> /yr	9.55% 24,128,571 m <sup>3</sup> 160,857 m <sup>3</sup> /yr
6. Implement MPB Mitigation Harvest Rule	34.6% 10,338,830 m <sup>3</sup> 1,038,883 m <sup>3</sup> /yr	0%	0%

# Concluding Thoughts

Element	Planning Horizon		
	Harvest for Periods 2 & 3 (2007-2016)	Harvest for Periods 4-20 (2017-2101)	Harvest for Periods 21-35 (2102-2252)
Mitigation Scenario	Supports 1,098,883 m <sup>3</sup> /yr	Supports 216,787 m <sup>3</sup> /yr	Supports 436,717 m <sup>3</sup> /yr

- **Mitigation scenario has shown that a harvest uplift in the order of 1 million m<sup>3</sup>/yr can largely mitigate the effects of the MPB epidemic, through:**
  - **Using the best known information and modeling techniques available (i.e. high spatial resolution).**
  - **Harvest MPB susceptible pine stands prior to or shortly after attack as forest level constraints allow to reduce NRLs;**

# Concluding Thoughts

- Target stands of varying degrees of MPB attack to enable cost-efficient rehabilitation (i.e. difficult to reforest and access stands with criss-cross stems, danger trees, etc.)
- Reforest MPB stands ASAP to get stands back into production using “Plus” tree seed stock thereby increasing the future timber supply.

- **Additional Work that the IFPA may want to consider:**
  - **Reforestation Prioritization Strategy (i.e. which stands in light of the MPB epidemic should be prioritized based on limited funding ... best bang for the buck.**
  - **Research on Regeneration under MPB Epidemic (i.e. dead pine) stands.**

For More Information on this project:

**Morice & Lakes**



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