

Quantifying risks and opportunities from climate change: Interim results for Merritt TSA

Caren Dymond, Sinclair Tedder, Brian Raymer,
Dave Spittlehouse, Kathy Hopkins, Laura Li,
James Sandland

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Scope

Problem: We are interested identifying opportunities to increase ecosystem resilience, reduce risk, and maintain benefits.

Questions:

- **Can different management actions**
 - **maintain or increase the diversity of our forests?**
 - **make a difference to forest health impacts?**
 - **be effective from an economic or social perspective?**

Initial attempt to answer these questions:

Use the mountain pine beetle epidemic in Merritt TSA as a proxy scenario to develop a climate change risk and opportunity assessment model.

What is resiliency?

- The ability to recover from or adjust easily to stress or change.

*The bamboo that bends is
stronger than the oak that
resists.*

- Japanese proverb



What is resiliency?

- The ability to recover from or adjust easily to stress or change.

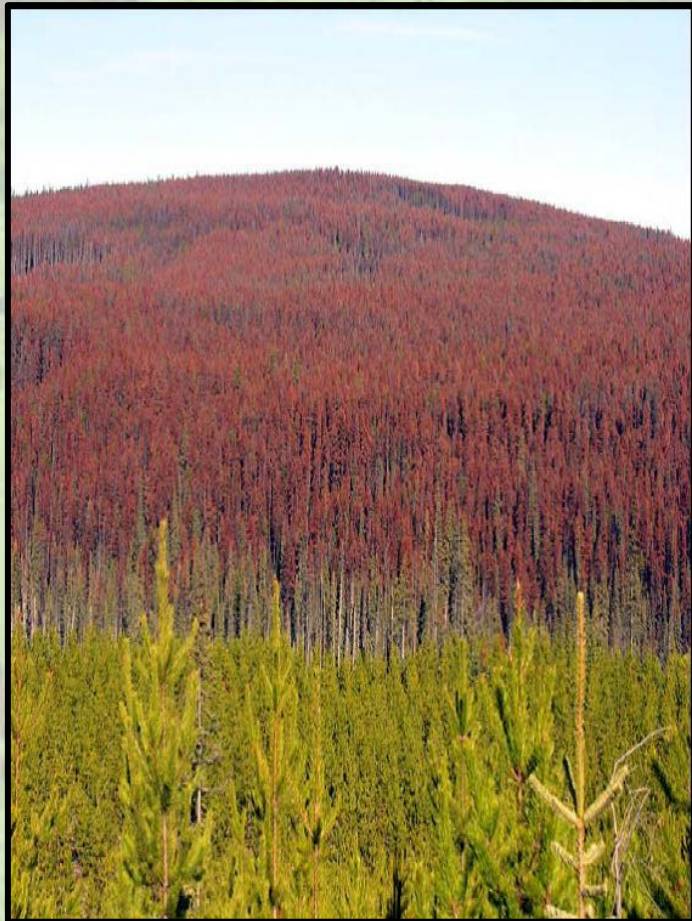


RESILIENCE

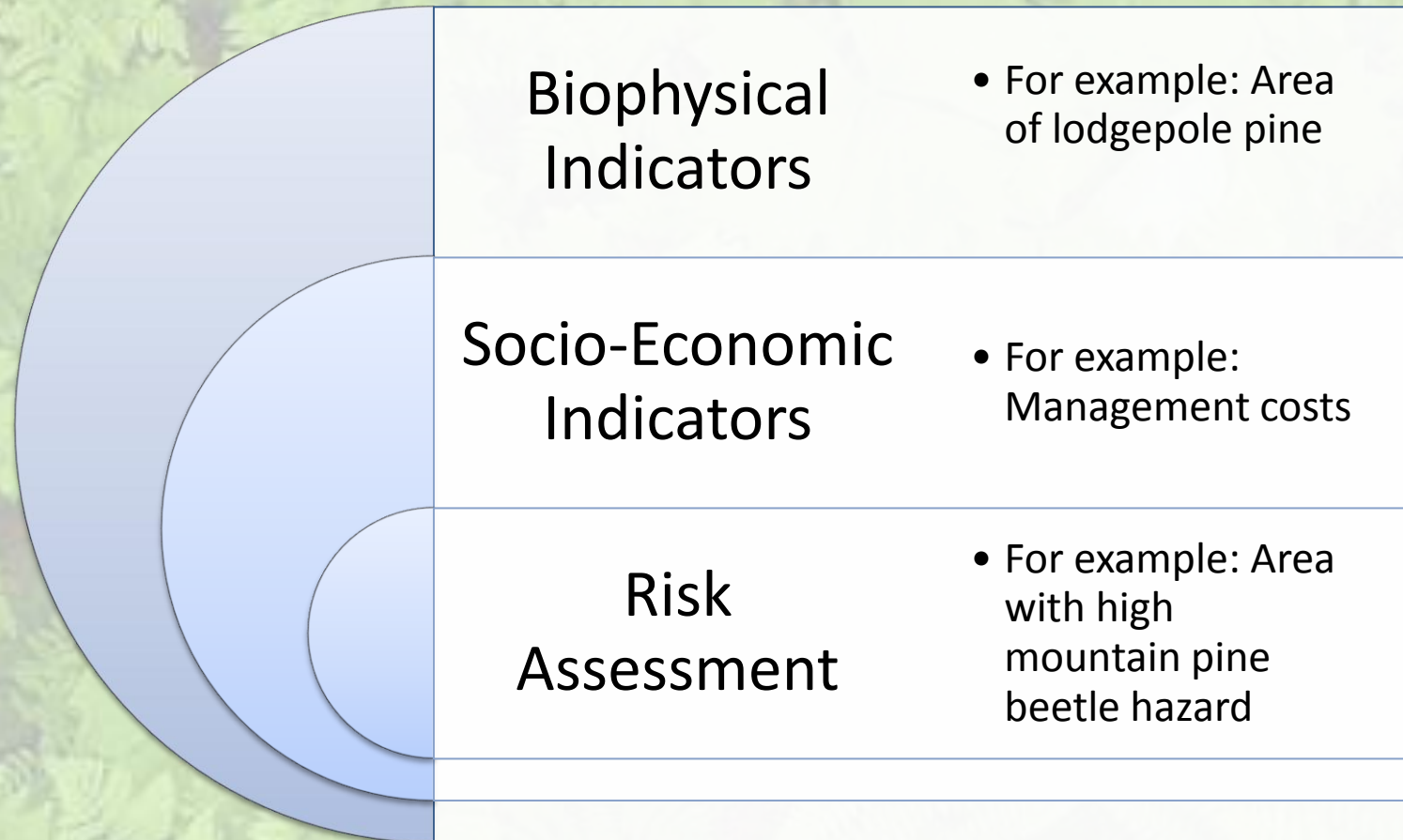
**YOU CAN FALL, BUT YOU CAN RISE ALSO.
MAYBE**

What does species diversity have to do with resilience?

- Species diversity influenced by the number of species and the relative abundance of different species found in a community.



Framework



Methods

Simulation model of forest ecosystem

- 1980 – 2080
- Management scenarios
 1. **Business as usual** – historical clear cut & planting from records, plus plans in timber supply analysis and silviculture strategy.
 2. **Mixed Planting** - Increase diversity of plantings following BAU harvesting.
 3. **Accelerated Pine Clear cut with Mixed Planting** - simulate more pine harvested but mostly clearcut. Increase diversity of plantings.
 4. **Increase Partial Pine Harvest and Natural Regeneration** - simulate more pine harvested and leave non-pine to the extent possible. Increase diversity of plantings and simulate diversity from natural regeneration.
- Ecora consultants did the biophysical modelling.

Merritt

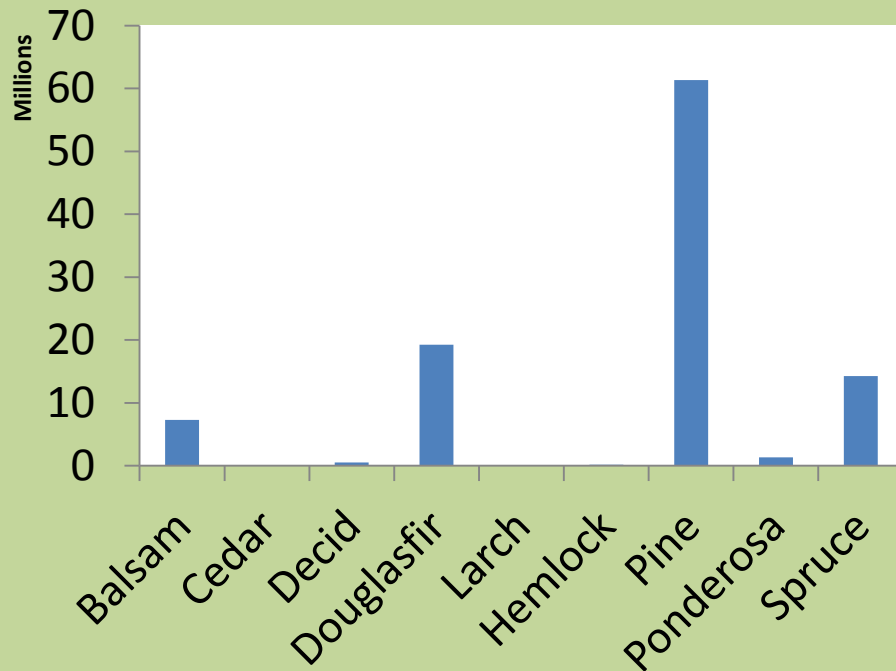
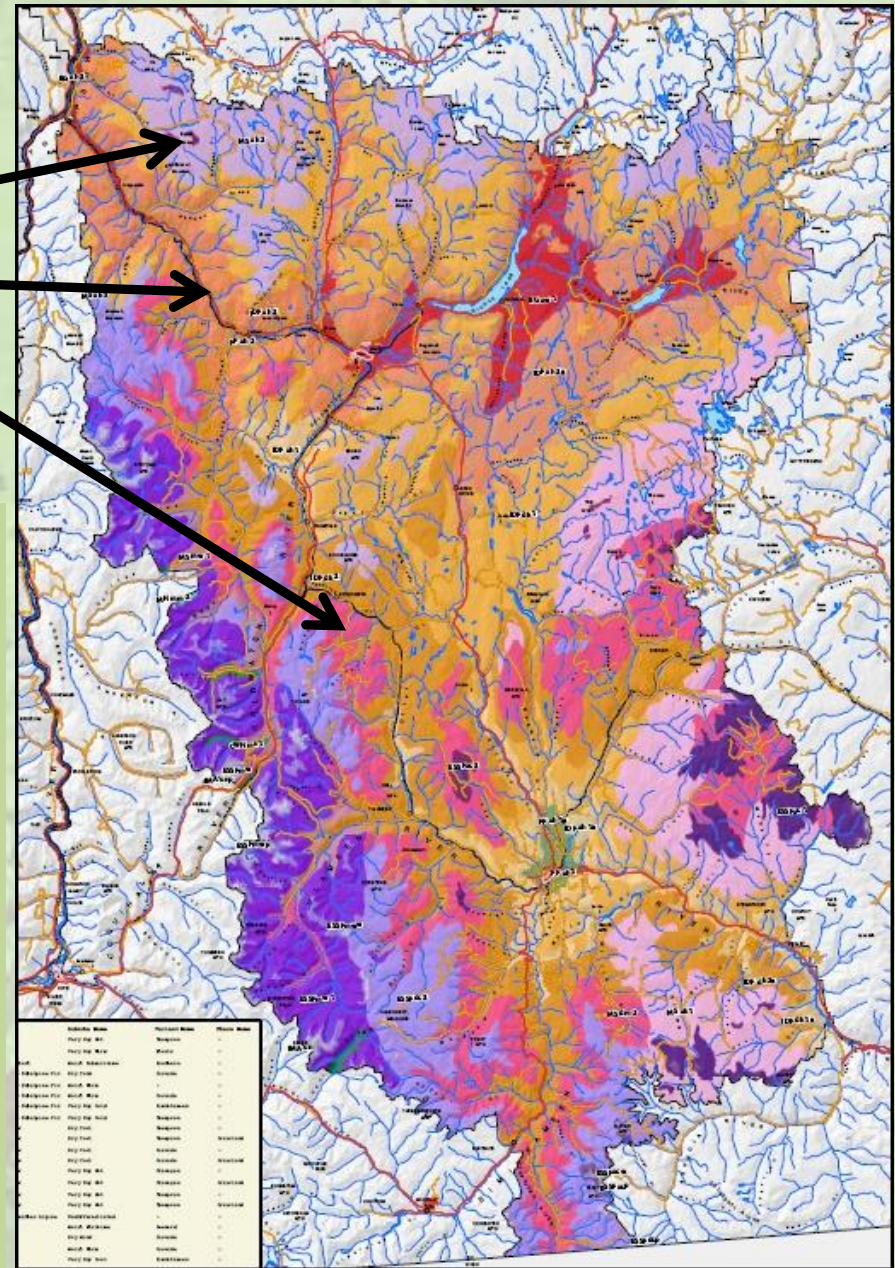
- Dry and cold climate
- Great place for pine

ESSF

IDF

MS

1980 Volume by species



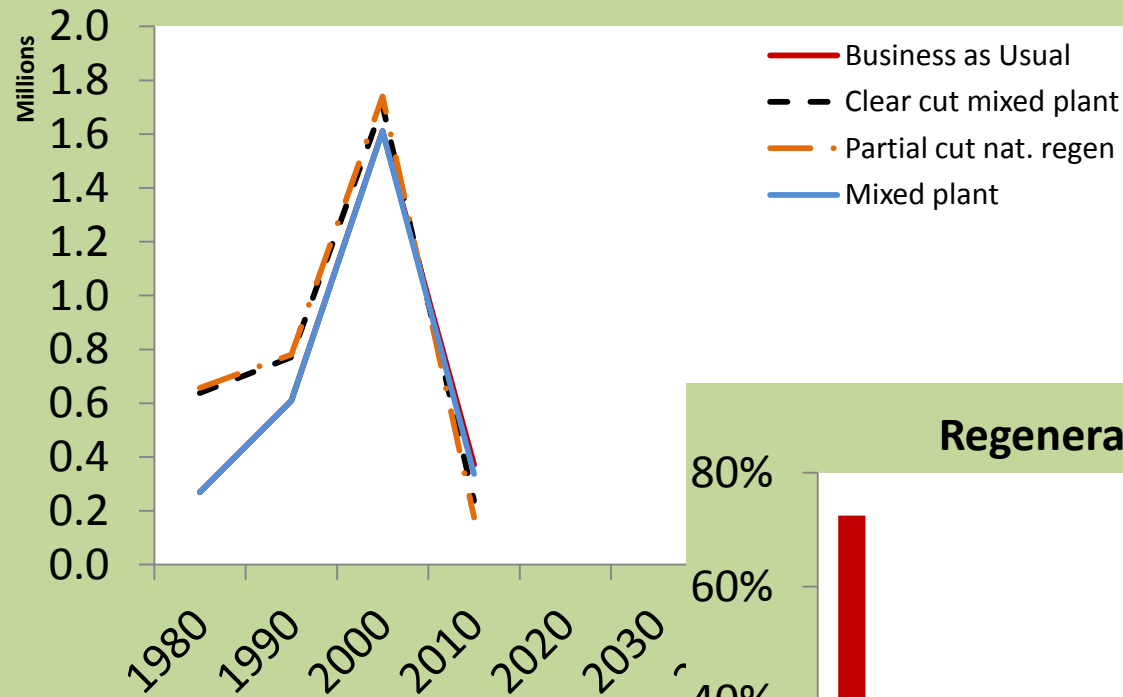
Methods

Socio-economic analyses

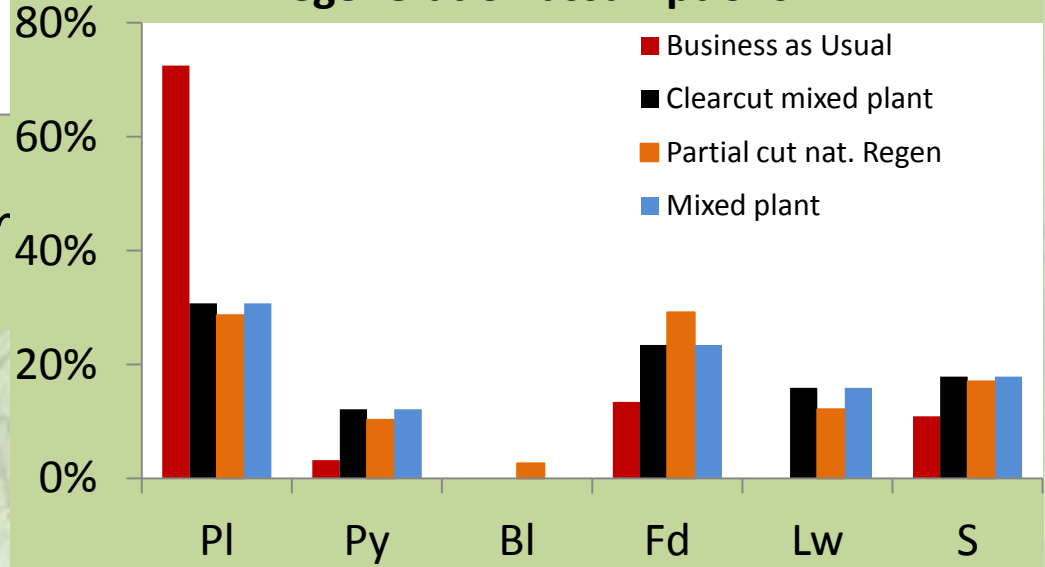
- The socio-economic analysis assesses the scenarios from two perspectives:
 1. Evaluation analysis examines net present value and/or social expectation values of each scenario;
 2. Impact analysis examines macro economic impact indicators such as jobs and gross domestic product.
- This information will provide a more social-relevant perspective of policy options facing government having to balance the potential trade-offs between social welfare creation and job/GDP creation.
- Non-monetary benefits associated with lower risk and greater diversity can be added to the scenario outcomes by introducing risk factors associated with higher or lower diversity.

Merritt management scenarios

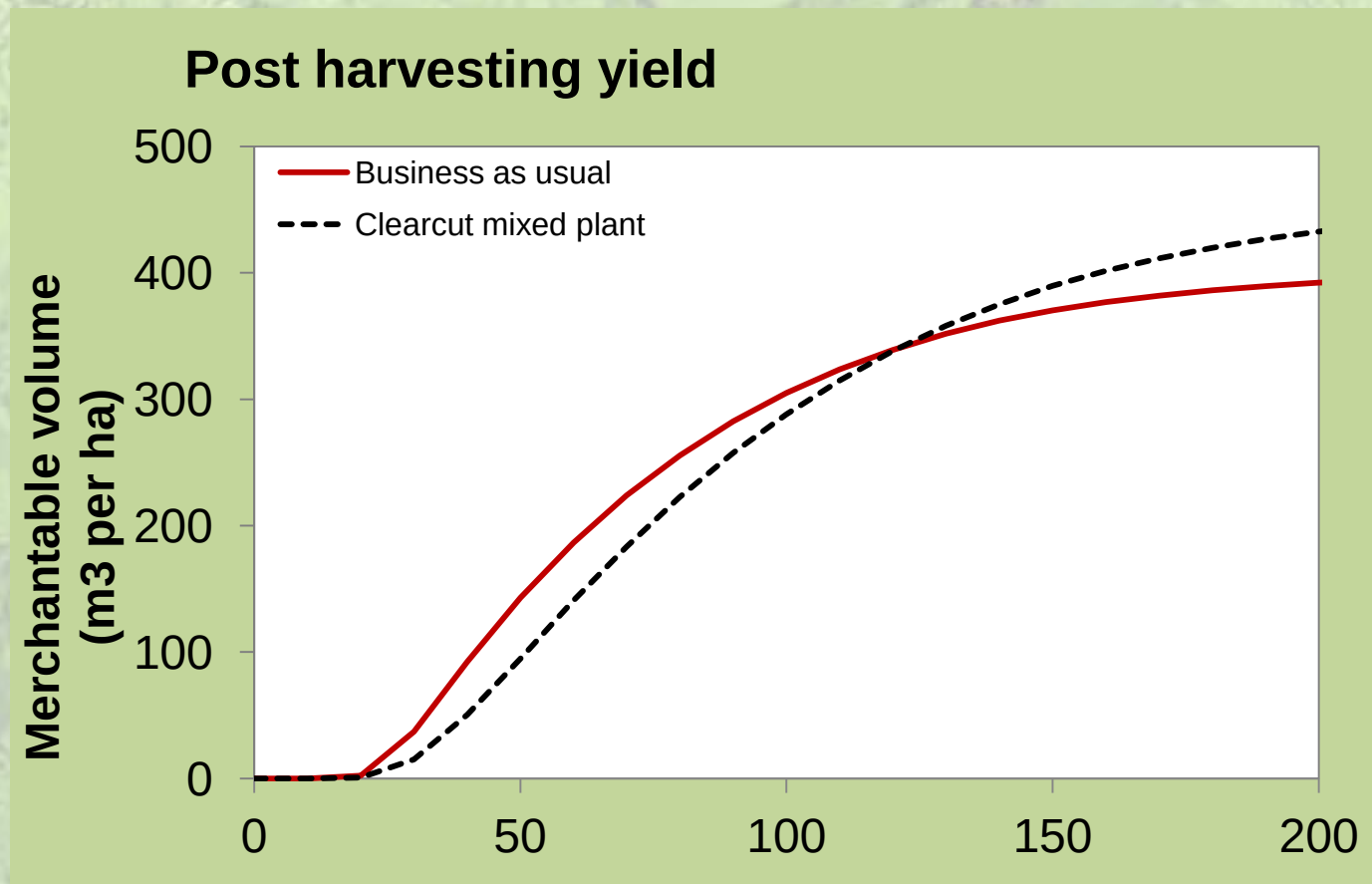
Pine harvest volumes



Regeneration assumptions



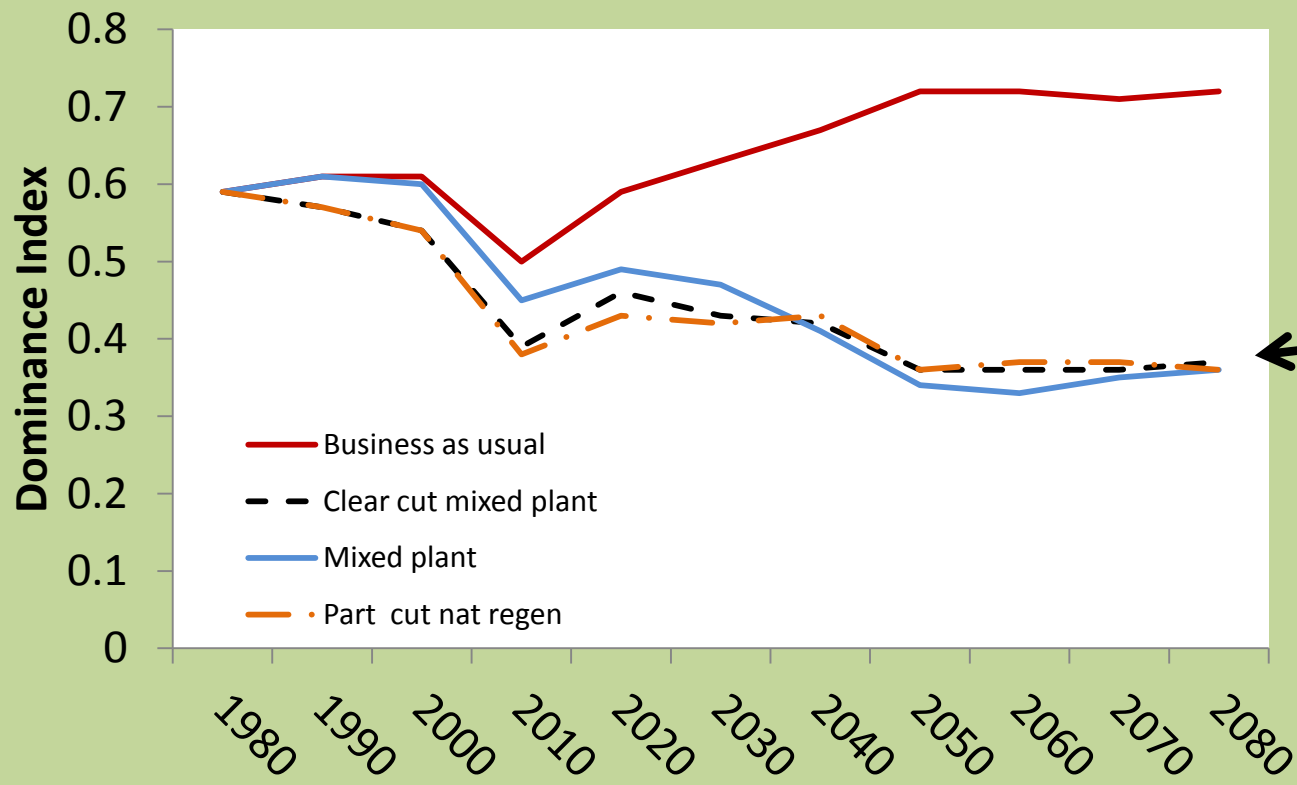
Merritt management scenarios



Note: VDYP adjustment factors suggest increasing pine volume by 55% therefore, when incorporated there was a larger difference between BAU and the others.

Merritt Results THLB - Dominance

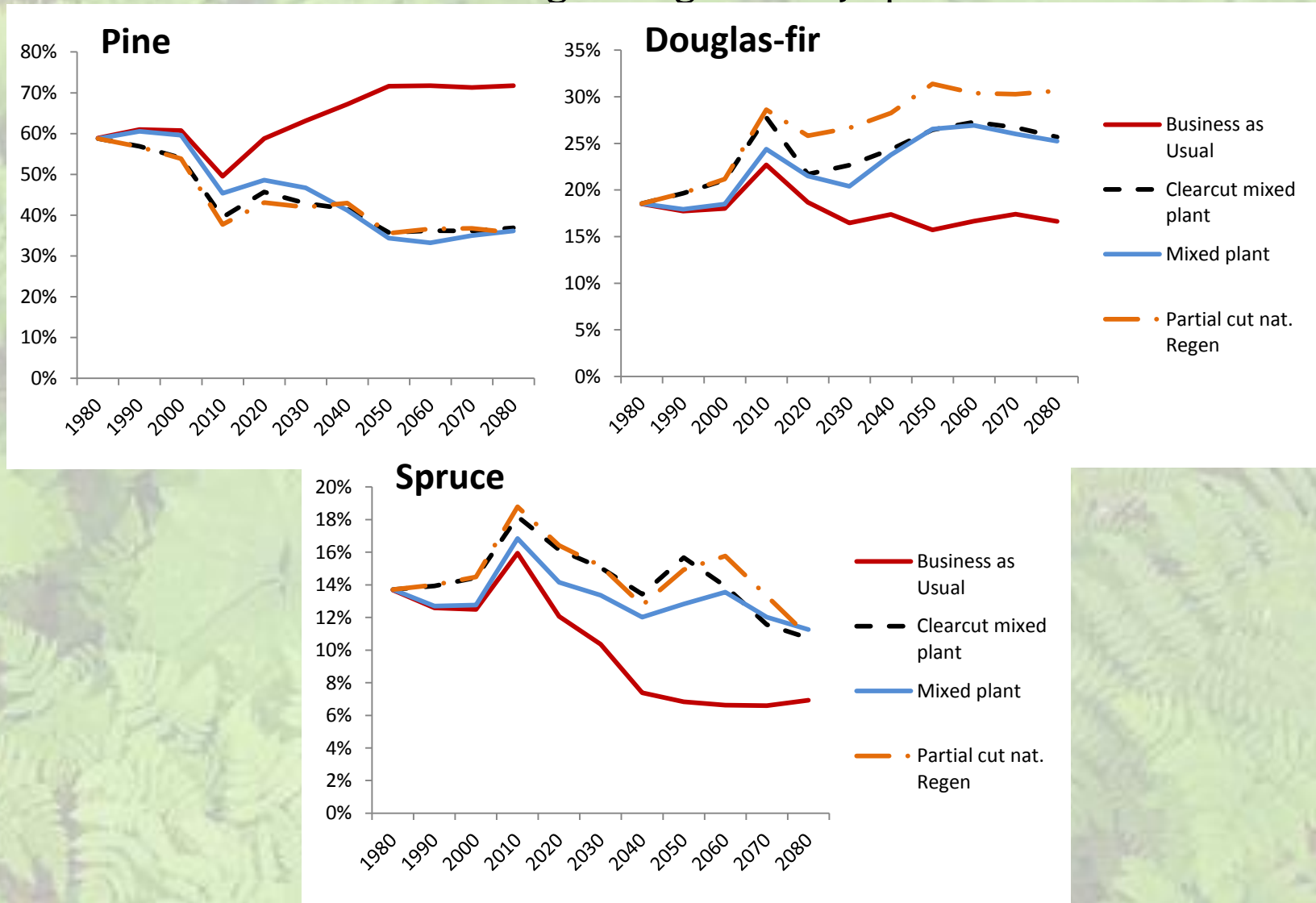
Decreasing the dominance of a single species is like diversifying an investment portfolio – growth continues despite unexpected shocks in the future.



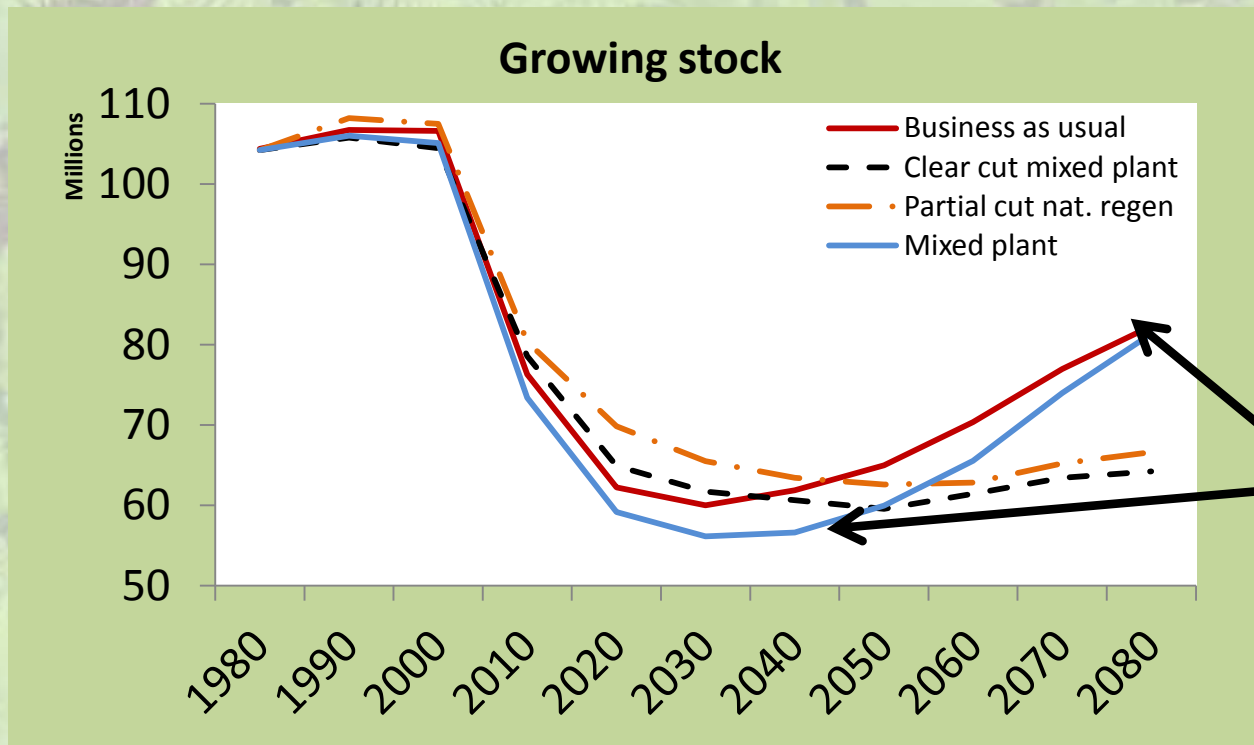
More resilient

Merritt Results THLB

Percent of growing stock by species

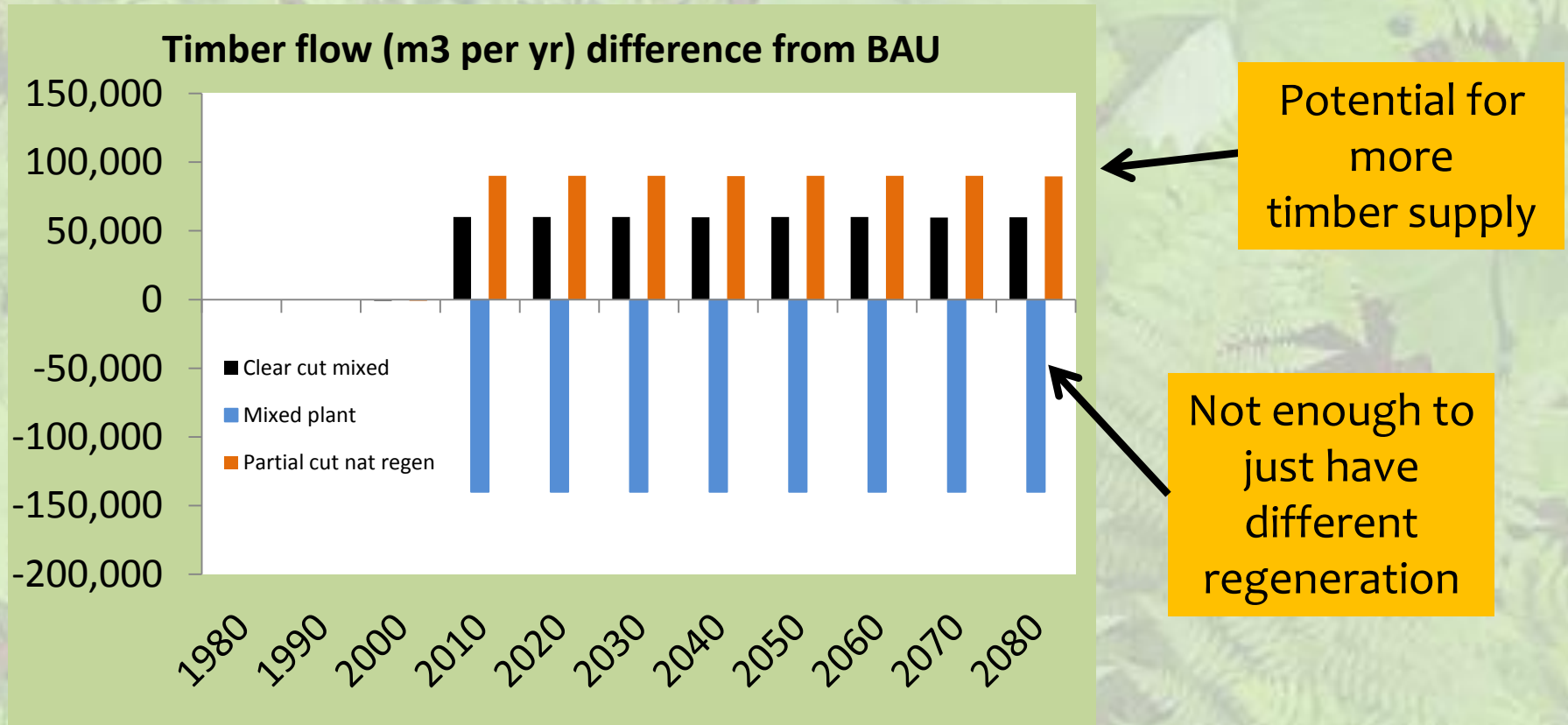


Merritt Results – risks & opportunities

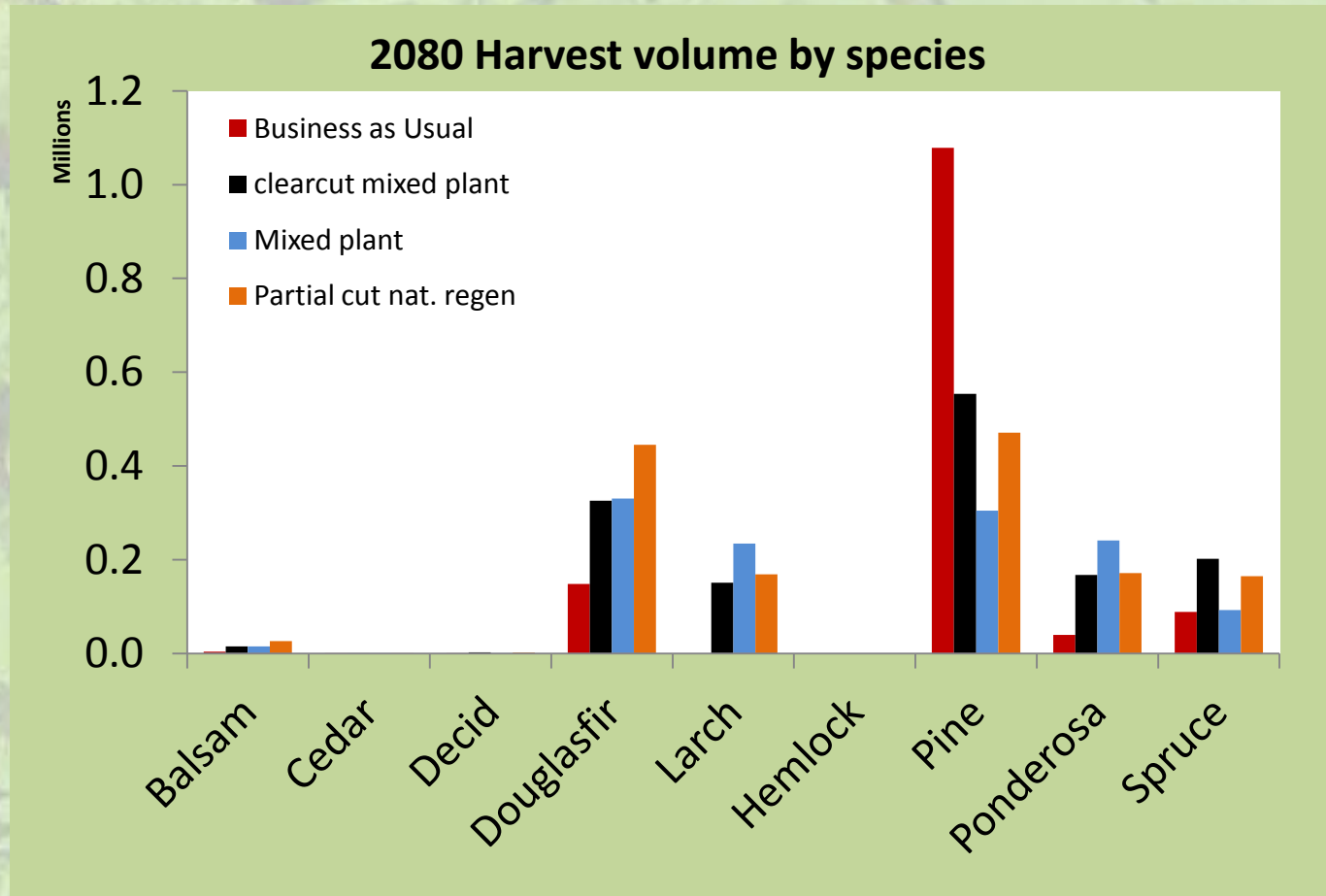


We reduced the amount of modelling artefacts caused by vaporization of surviving host and non-host in beetle-affected stands.

Merritt Results - opportunities



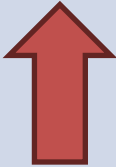
Merritt Results - opportunities



Opportunity
for more
valuable
timber supply

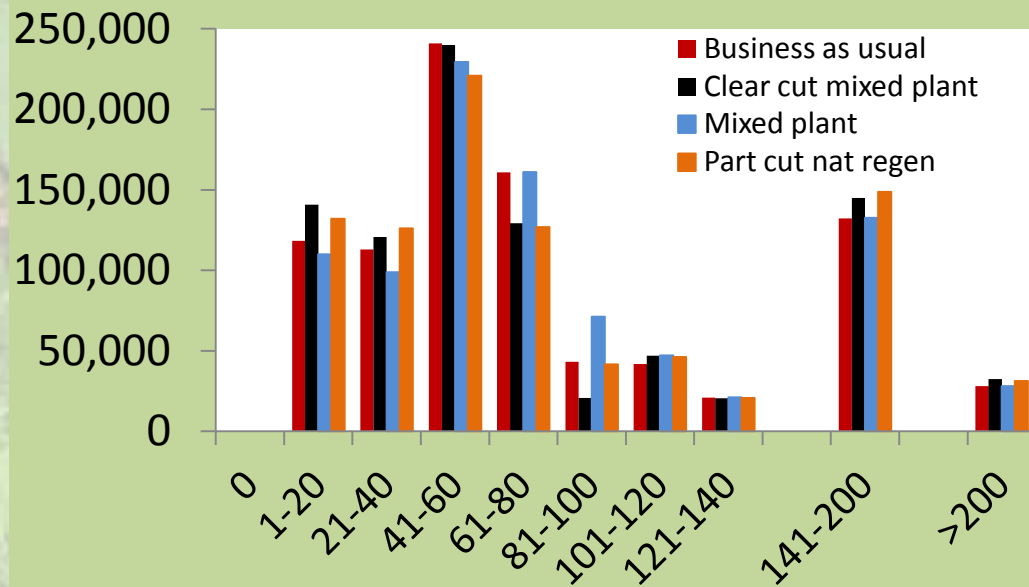
Merritt Results – forest health risks

Trends over time

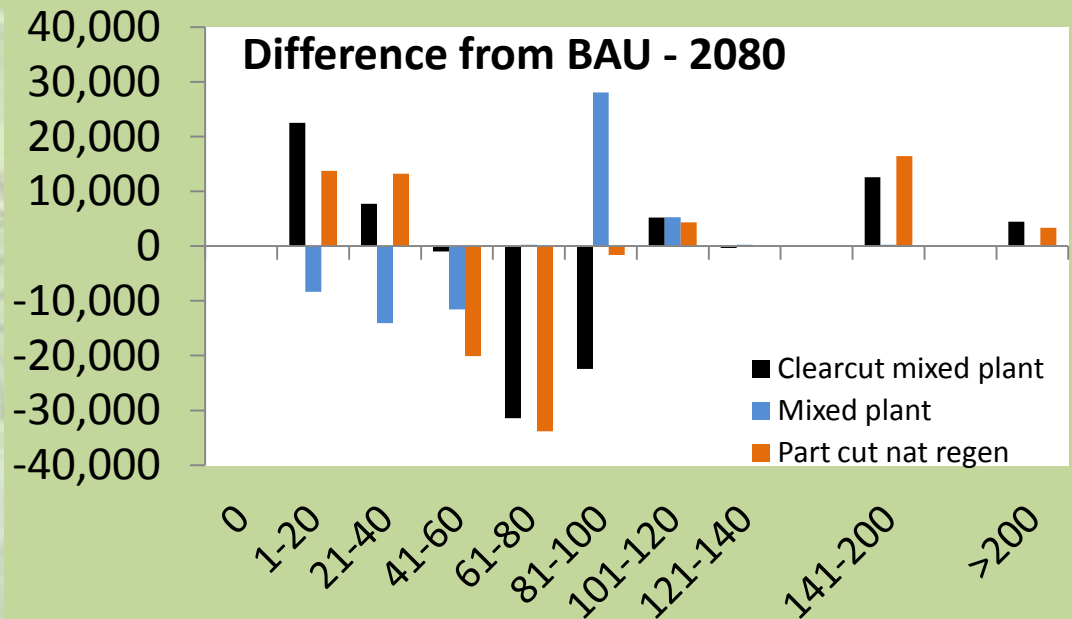
	Mountain pine beetle hazard	Spruce beetle hazard	Douglas-fir beetle hazard	Western spruce budworm
Business as usual				
Clear cut mixed plant				
Partial cut and natural regeneration				Fd in partial cuts at risk in the IDF

Everybody is someone else's dinner

Age class distribution

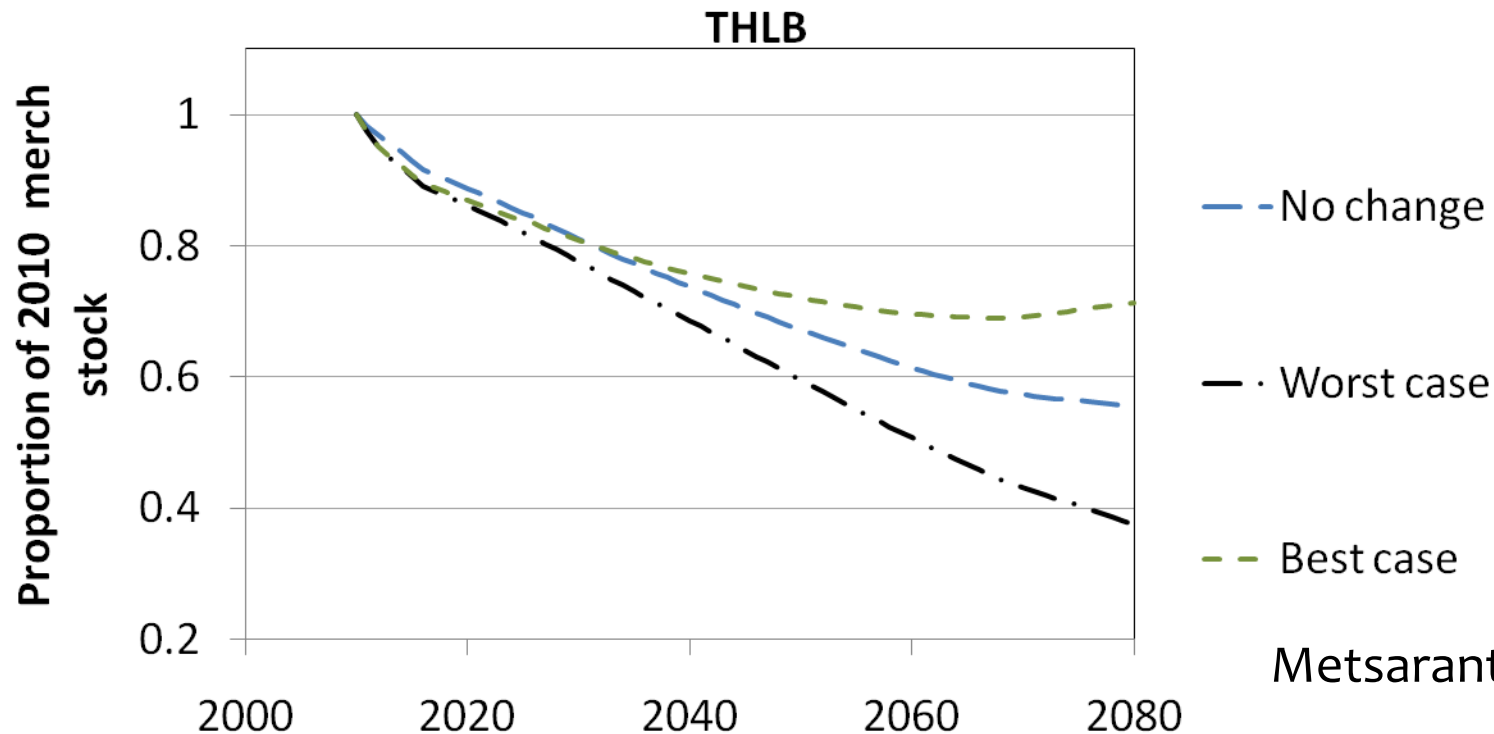


- Another indicator of resilience
- THLB + Non-THLB
- 2080



Not included - Other climate change impacts

- Different study results - All of BC
- Climate change may improve growth rates, cause growth to decrease or increase fire area.
- Decline to 37% to 72% of current stocks



Metsaranta et al 2011

How can we capitalizing upon opportunities to increase ecosystem resilience, reduce risk, and maintain benefits?

Conclusions

- Our current plans will produce high risk to the future timber supply:
 - species will be harvested based on value rather than availability
 - one species will be planted predominantly.
- It's not just about pine – management plans need to maintain or increase species diversity since all trees can host to one pathogen or another.



Conclusions

- Lower risk management strategies do exist.
- The people of BC can benefit from adapting our forest management strategies to increase resilience.

*It is not the strongest of the species
that survive, nor the most
intelligent, but the one most
responsive to change.*

Darwin

Next steps

- Kamloops – biophysical modelling done, needs understanding
- Socio-economic analysis –Sinclair Tedder lead
- Wildlife habitat supply – Don Morgan & Doug Lewis lead
- Thanks to Ecora for modelling support
- Thanks to MFLNRO Research Funding Program

Contact info:
Caren.Dymond@gov.bc.ca
250-387-0140

