

# **KAMLOOPS TSA TYPE 4 SILVICULTURE STRATEGY**

27<sup>th</sup> November 2013



# OUTLINE

- ✖ Introduction
- ✖ Project overview
- ✖ Analysis background and selected assumptions
- ✖ Mid and long-term vision
- ✖ Critical local landbase values
- ✖ Activities to consider
  - + How to model
  - + Interaction with landbase values



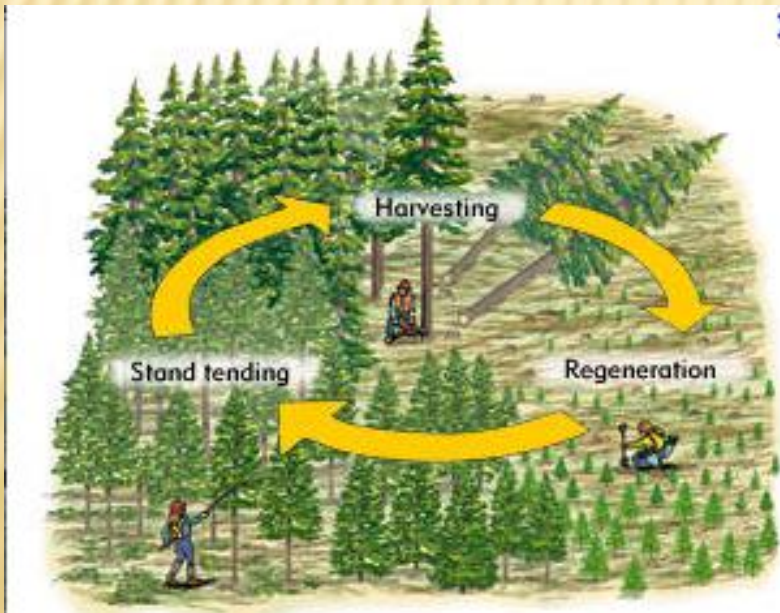




- ✕ Ecora is a natural resource and engineering consulting firm that specializes in:
  - + Resource inventories and analysis
  - + Terrestrial ecology
  - + Forest carbon project development and modelling
  - + Geomatics
  - + Civil and structural engineering

# KAMLOOPS SILVICULTURE STRATEGY

MFLNRO's Resource Practices Branch has recognized the value in strategically investing in the landbase at this pivotal point in the outbreak cycle in effort to mitigate the mid-term reduction in timber supply





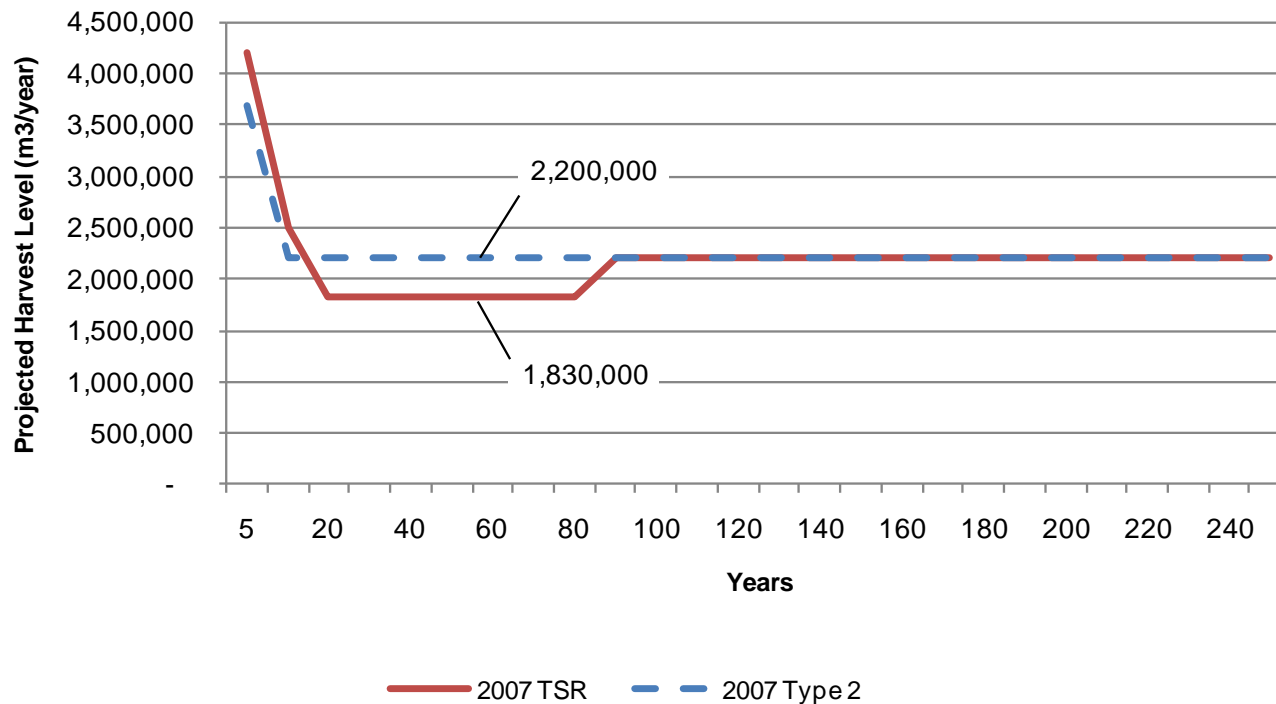
# PROJECT GAME PLAN

1. Plan for plan (complete)
2. Select landbase (complete)
3. Identify present and emerging issues
4. Identify objectives and create targets
5. Create vision for mid and long-term timber and habitat supply
6. Translate vision into operational reality
7. Monitoring and iterative updates

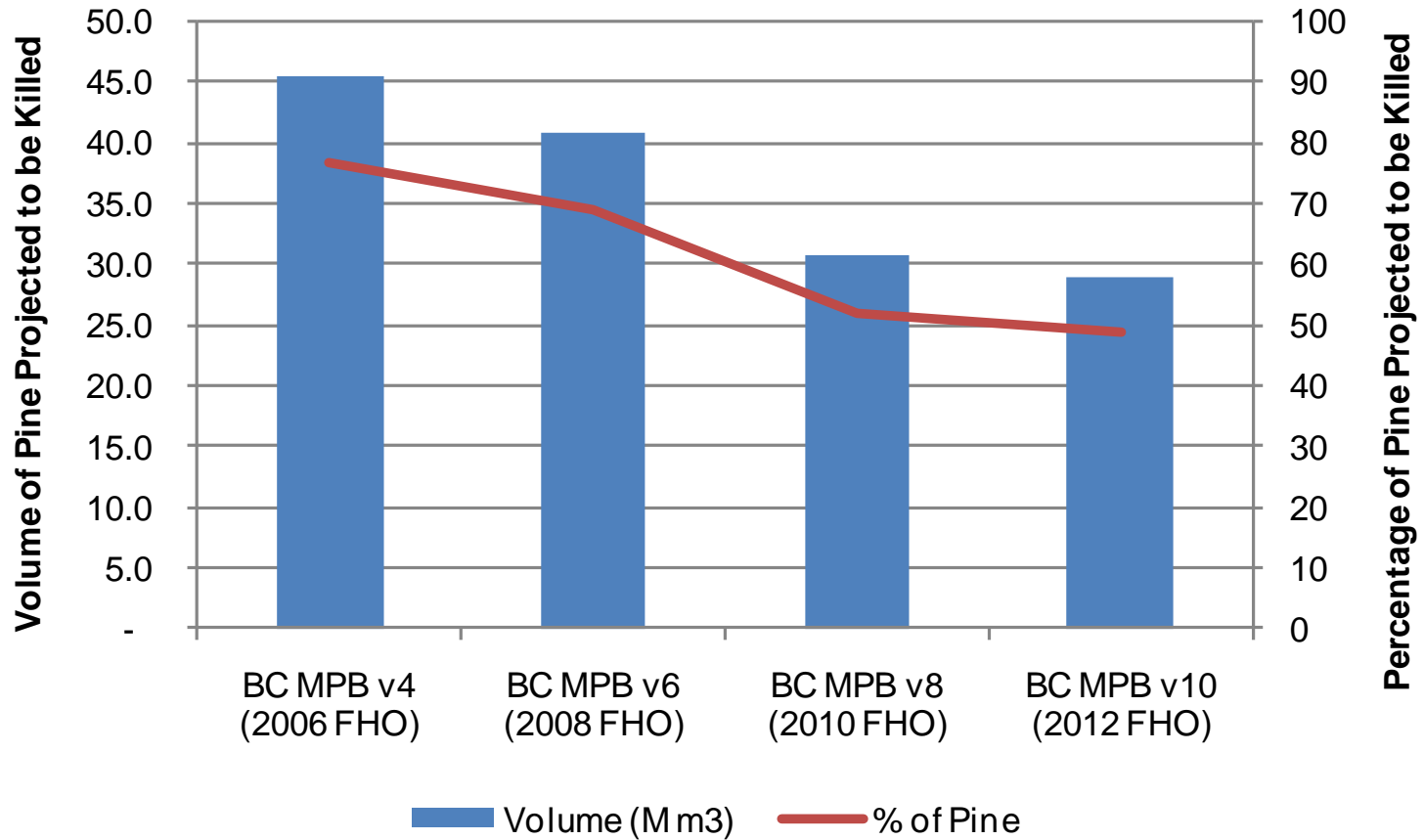


# PROJECTED HARVEST LEVELS

- ✗ 2007 FFT MPB horizontal initiatives project (Type 2) & TSR
- ✗ June 2008 the Kamloops AAC was set at 4.0M m<sup>3</sup>/year
- ✗ Mid-term forecasts range between 1.8 – 2.2M m<sup>3</sup>/year

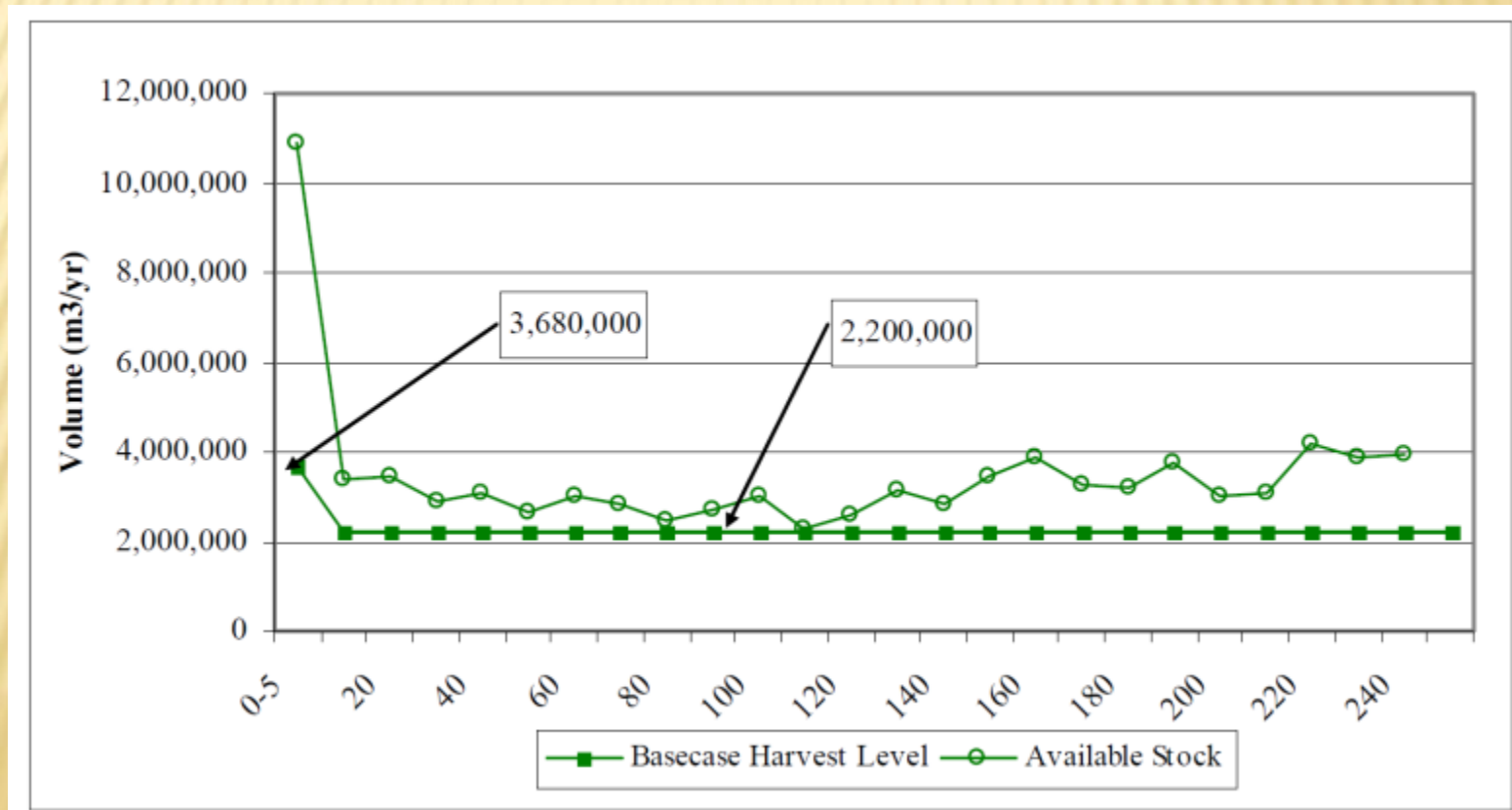


# MPB PROJECTIONS IN KAMLOOPS TSA



# TIMBER AVAILABILITY – TYPE 2

- ✖ Limiting pinch point immediately after MPB salvage





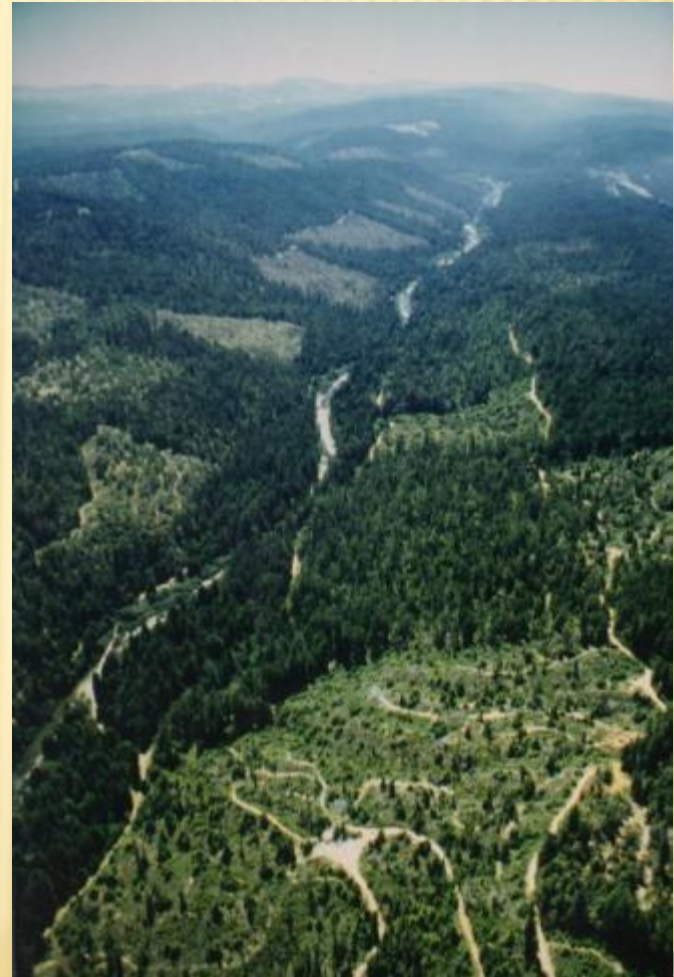
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# **SELECTED ANALYSIS ASSUMPTIONS**



# LANDBASE CLASSIFICATION (TSR NETDOWN)

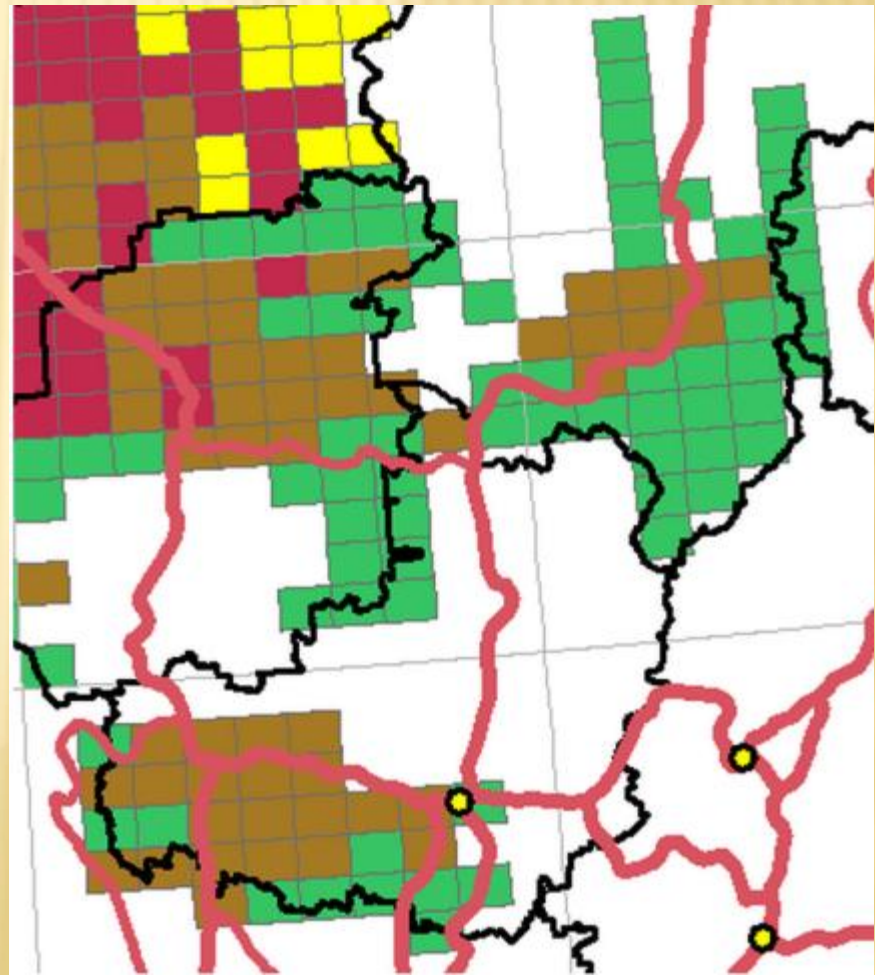
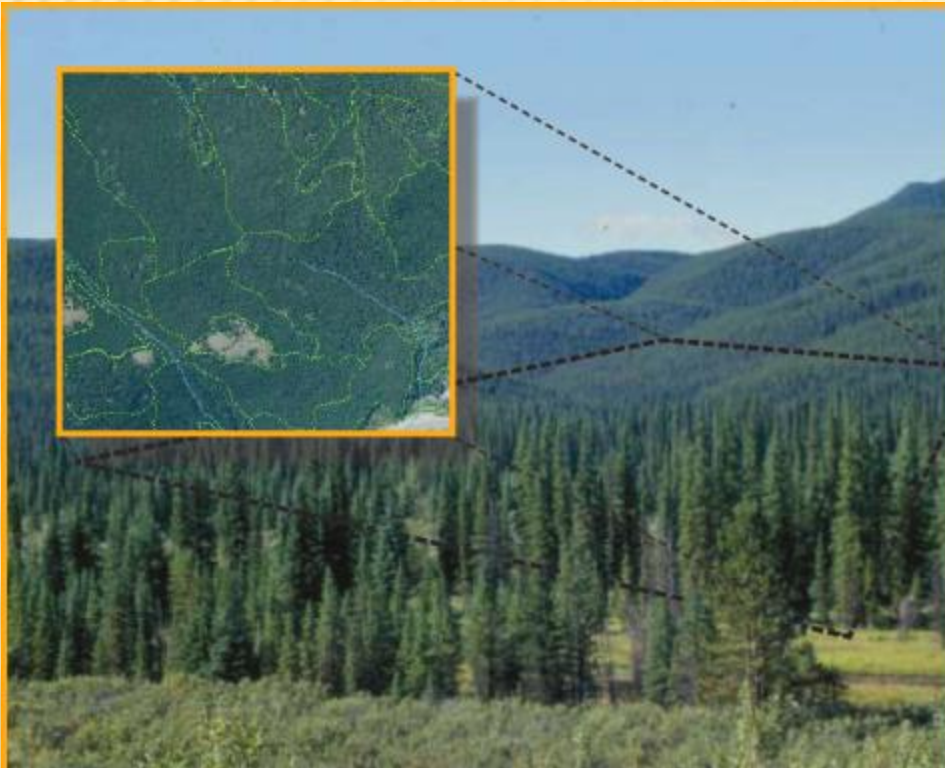
Land Classification	TSR 4 / Type 2
<b>Total Area</b>	<b>2,770,266</b>
Wells Gray Provincial Park	539,102
<b>Total Area Without Wells Gray Park</b>	<b>2,231,164</b>
Non-crown	367,187
Non-productive, non-forest	356,420
Existing Roads	28,553
<b>Non-productive Reductions</b>	<b>752,159</b>
<b>Productive Forest</b>	<b>1,479,005</b>
Parks	68,021
Non-commercial brush	1,650
Inoperable	96,471
Environmentally Sensitive	66,656
Deciduous	0
Low Site Growing Potential	30,138
Non-merchantable stands	79,435
Riparian	21,527
Hudson's Bay Trail	342
Tod Mountain (Sun Peaks)	2,148
Community Watershed Intakes	4
Wells Gray Community Forest	11,128
Old Growth Management Areas	92,177
Total Productive Reductions	469,700
<b>Long Term THLB</b>	<b>1,009,305</b>





# KAMLOOPS VRI

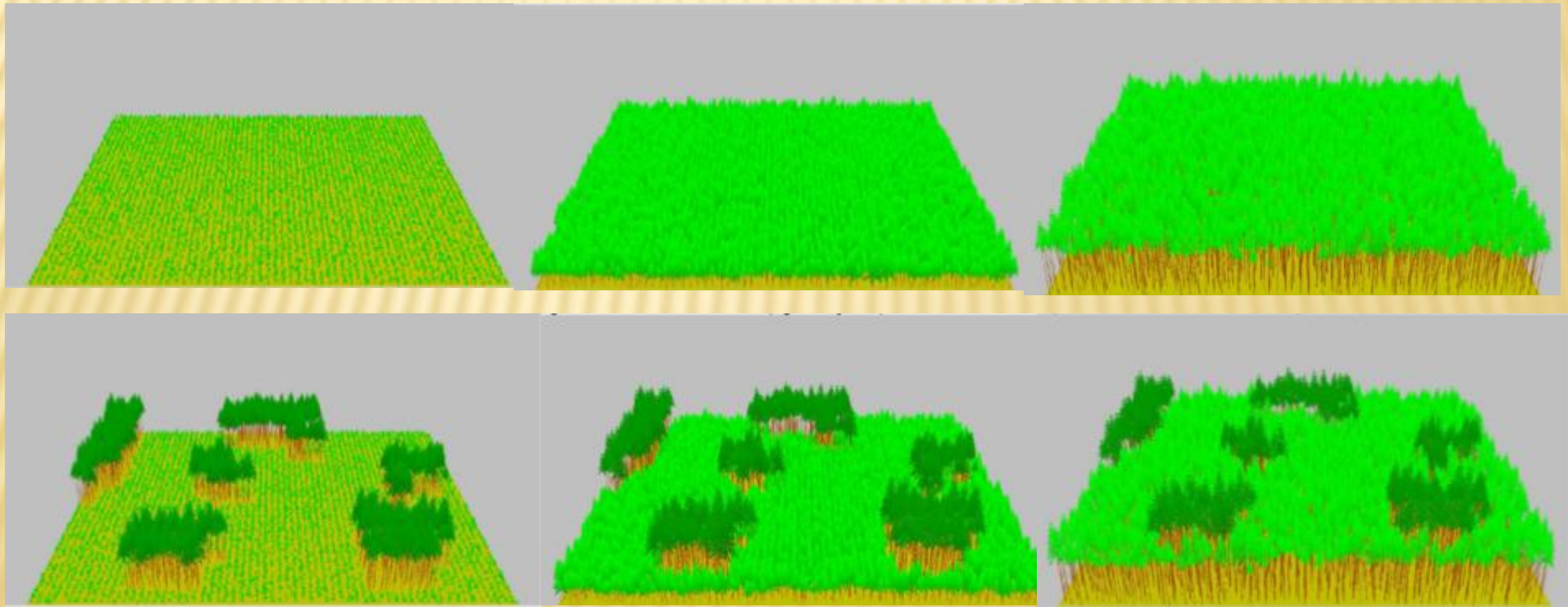
- ✖ Impacts netdown, analysis units, G&Y (initial volume and productivity)





# GROWTH AND YIELD

- ✗ Analysis units
- ✗ Natural stands, Managed stands
- ✗ Minimum harvest age



# ANALYSIS UNITS

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- ✖ AUs are aggregations of stands with similar species composition, site productivity and treatment regime
- ✖ TSR analysis units classify stands according to:
  - + Species, dry/wet belt, PA16, productivity and age
- ✖ This analysis will employ more detailed AUs to capture MPB, increased treatment options, wildfire modelling

# ANALYSIS UNITS

## ✕ Factors may include:

- + Harvest method (clear-cut or partial cut);
- + MPB characteristics: the mortality percentage and year affected;
- + Leading species;
- + Age of stand (rounded to the nearest 20 years);
- + Inventory site index (rounded to the nearest 3m);
- + BGC zone; and
- + Crown closure class (dense/open/sparse).

Harvest method	BGC Zone	Leading Species	Site Index	Age	Crown closure class	MPB Characteristics	
						Mortality %	Year Affected
Clear-cut	IDFdk2	Spruce	21	150	dense	0	n/a
Clear-cut	IDFdk2	Spruce	21	150	open	40	2008
Clear-cut	IDFdk2	Pine	12	80	sparse	0	n/a
Clear-cut	IDFdk2	Pine	12	80	dense	40	2008
Clear-cut	IDFdk2	Pine	12	80	dense	60	2008
Clear-cut	IDFdk2	Pine	15	130	open	80	2012
Clear-cut	IDFdk2	Pine	15	130	open	70	2012
Partial-cut	IDFdk2	Douglas-fir	15	90	sparse	0	n/a
Clear-cut	IDFdk2	Douglas-fir	15	180	sparse	50	2012
Clear-cut	IDFdk2	Douglas-fir	15	90	open	0	n/a



# MANAGED STAND ASSUMPTIONS

## ✕ TSR regeneration assumptions

Table A-17. Regeneration assumptions by analysis unit

Analysis unit	Leading species	Site class / age	Regen delay (years)	Method		Density		
				Type	%	Species	Spp. %	Stems / hectare
1	Fir / dry	N/A	N/A	Selection – natural	All	N/A	N/A	N/A
2	Fir / dry	N/A	2	Plant	100	Fd PI	70 30	1200 1200
3	Fir / wet	G/M < 141	2	Plant	100	Fd PI Sx	60 25 15	1400 1600 1400
4	Fir / wet	G/M ≥ 141	2	Plant	100	Fd PI Sx	60 25 15	1400 1600 1400
5	Fir / wet	P/L < 141	2	Plant	100	Fd PI Sx	25 65 10	1300 1500 1300
6	Fir / wet	P/L ≥ 141	2	Plant	100	Fd PI Sx	25 65 10	1300 1500 1300
7	Cedar	G/M < 141	2	Plant	100	Fd PI Sx Cw Hw	15 10 45 20 10	1400 1600 1400 1300 1300
8	Cedar	P/L < 141	2	Plant	100	Fd PI Sx Cw Hw	30 10 30 20 10	1300 1500 1300 1300 1300

# G&Y MODELS

- ✗ Natural stands:

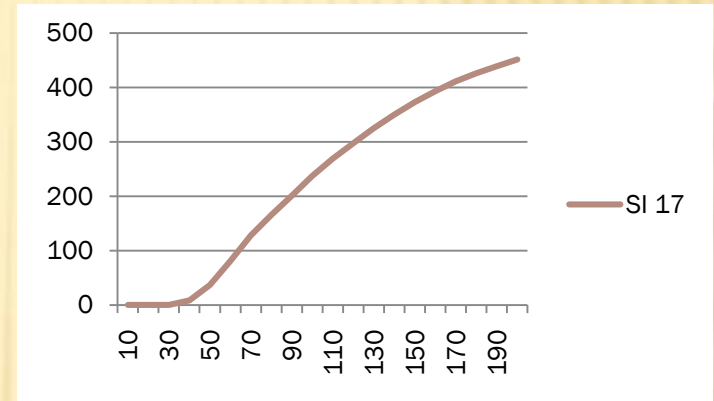
- + VDYP7
- + Inventory site index

- ✗ Managed stands:

- + TIPSy
- + Site index tile

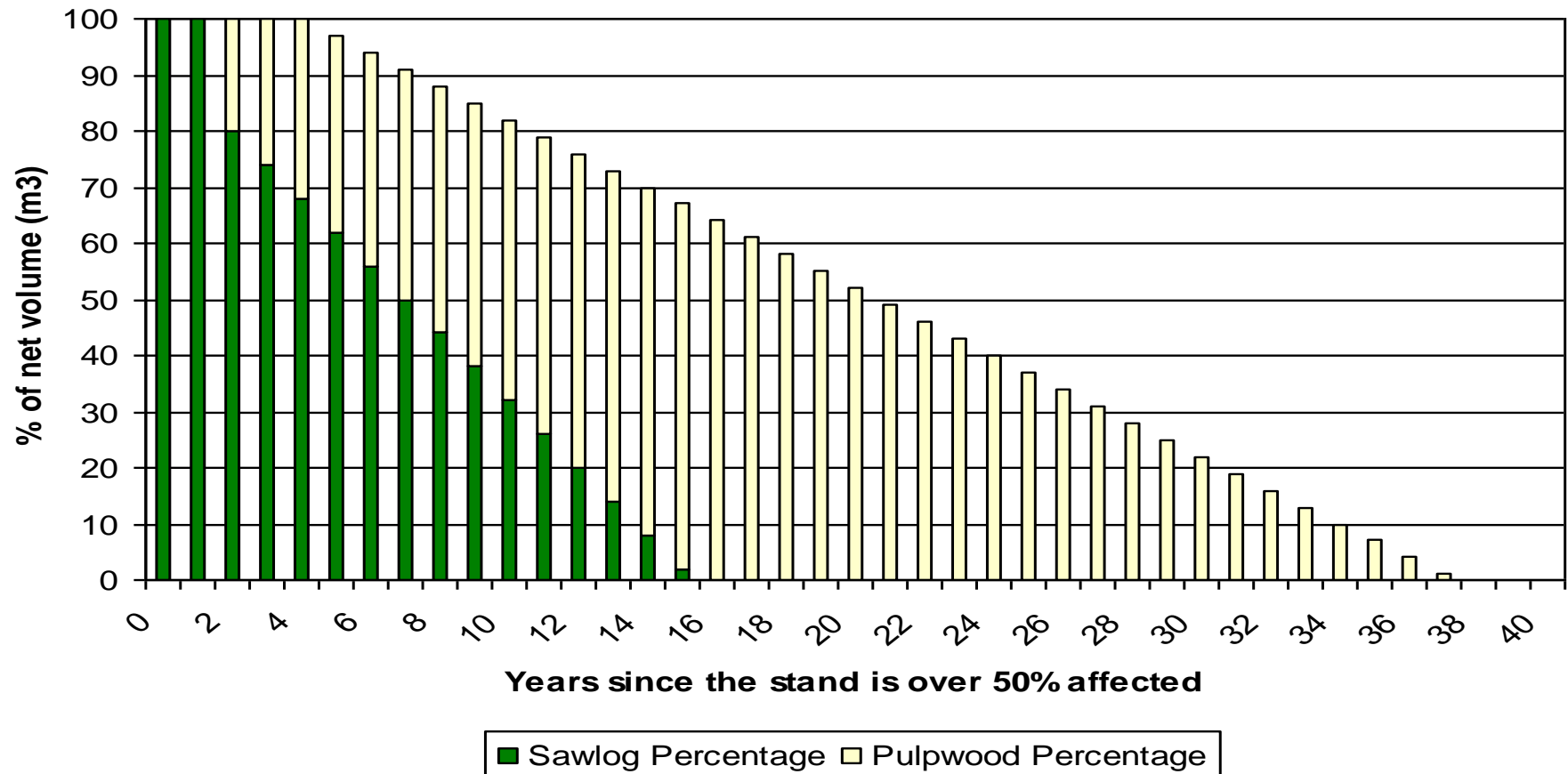
- ✗ G&Y models for consideration:

- + Prognosis for partial harvest?
- + TASS for MPB natural regen considering FFT surveys?



# MPB ASSUMPTIONS

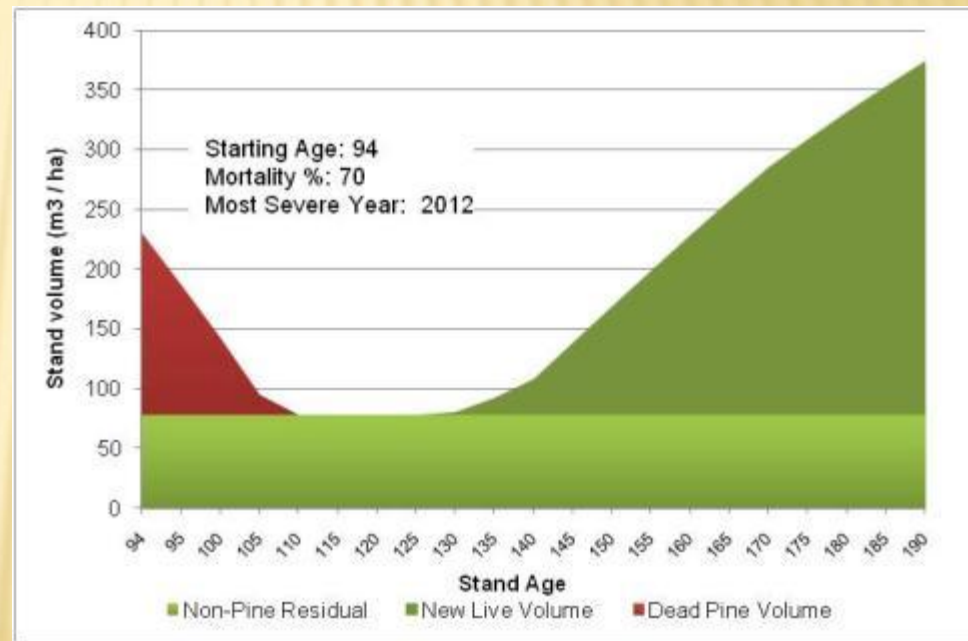
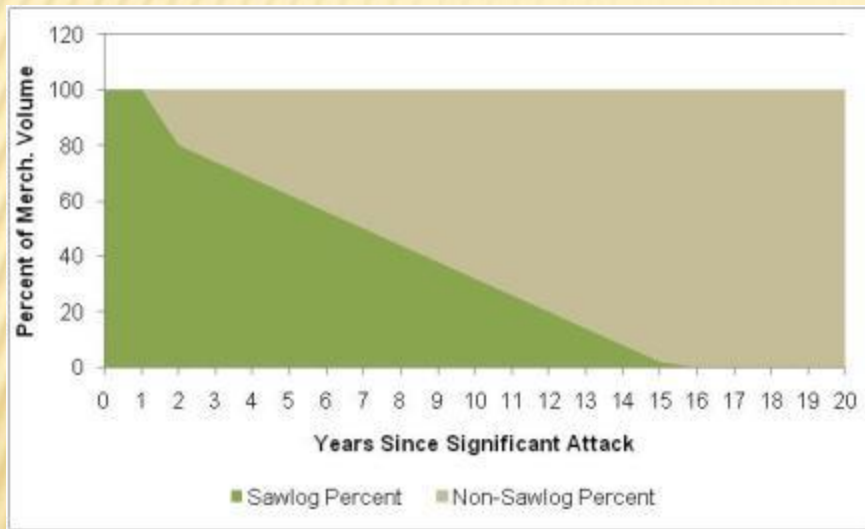
- ✗ Shelf-life decay curve incorporated into yield curves
- ✗ Implemented from the age affected





# MPB ASSUMPTIONS

- ✗ Shelf-life decay curve incorporated into yield curves



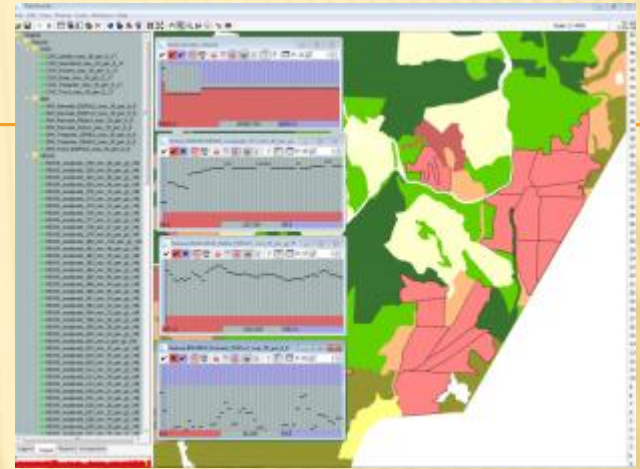
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# **LANDBASE VALUES AND GOAL SETTING**



# PATCHWORKS

- + Spatially Explicit Optimization Model
- + Ideal for balancing multiple objectives across extended time horizons
- + Spatial capability creates a link between strategic objectives and operational reality
- + Well-suited for examining trade-offs between multiple competing objectives (i.e. pine salvage versus retention).





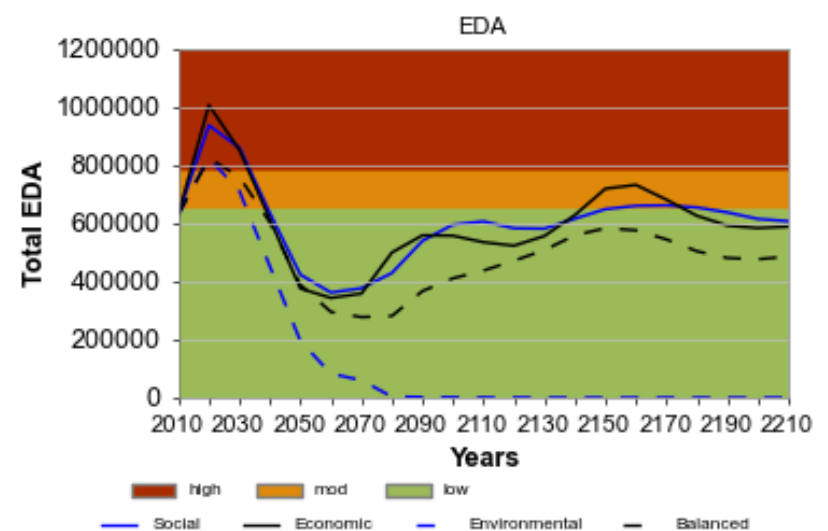
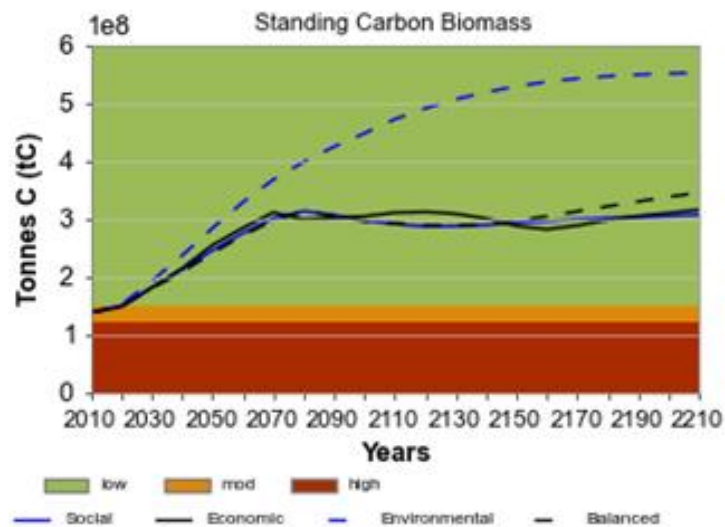
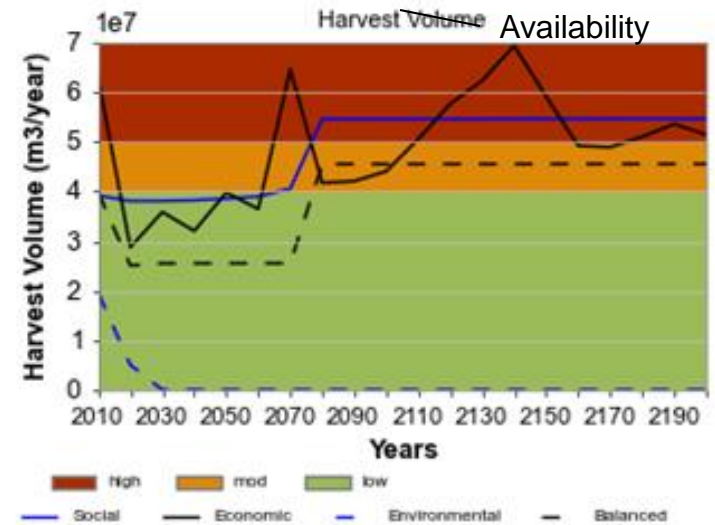
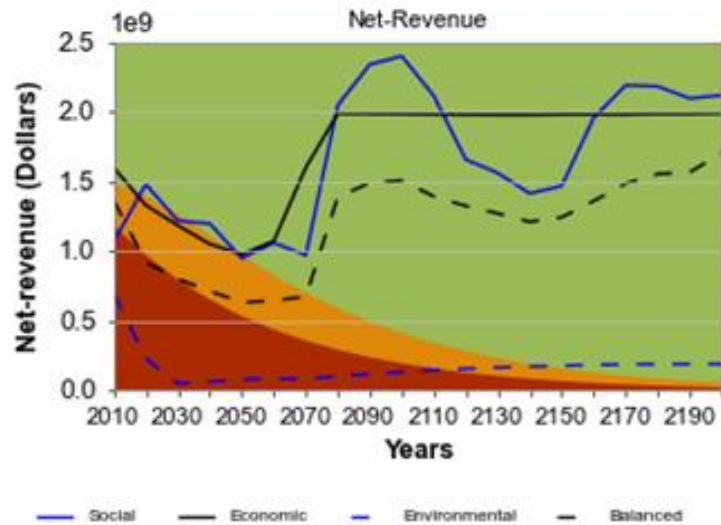
# STRATEGIC FOREST MANAGEMENT PLANNING

- ✖ Identify objectives
- ✖ Create targets



*“If you don’t know where you are going any road will get you there” Lewis Carroll (born 1832)*

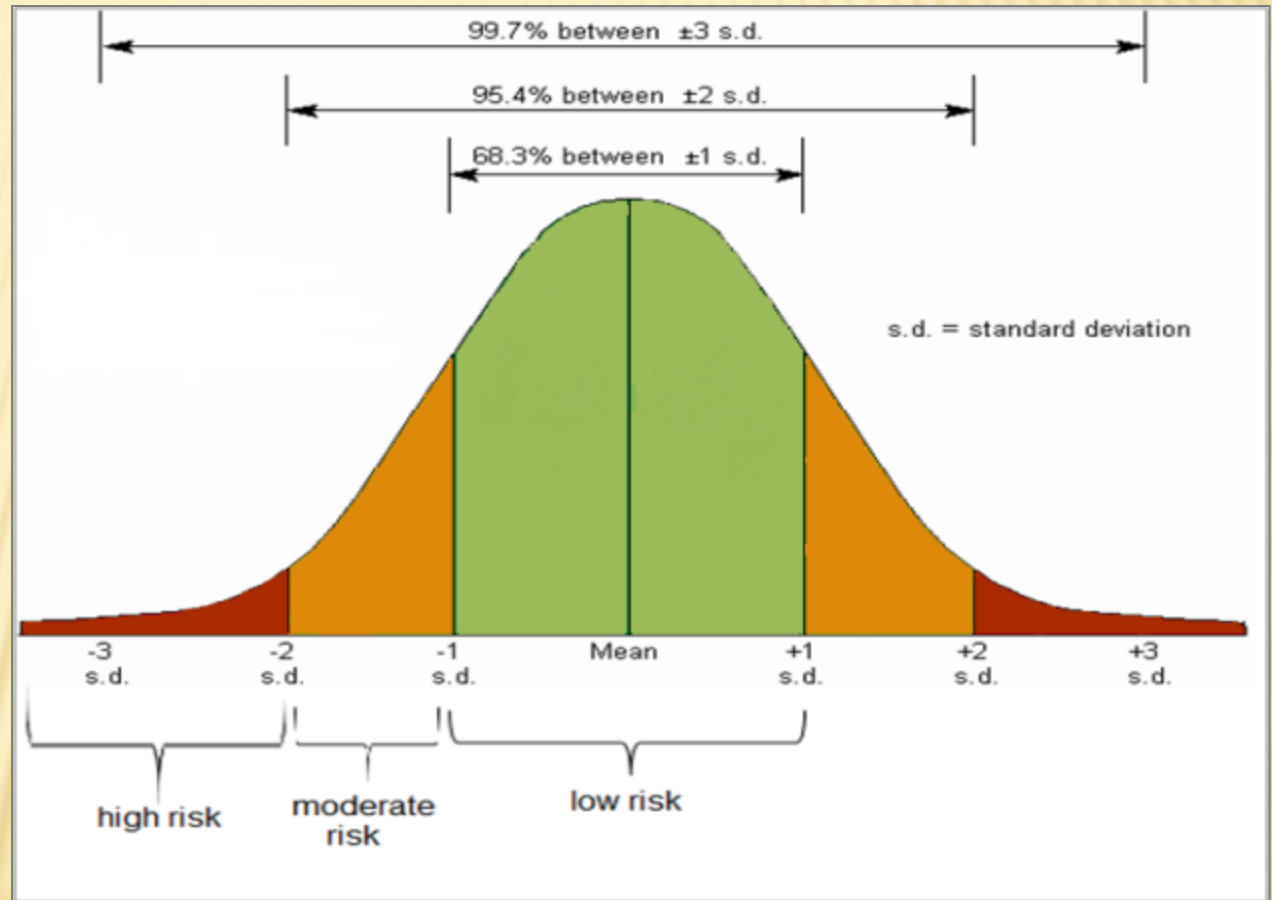
# INDICATORS WITH RISK BASED BACK-DROP



# RISK RATINGS- SD APPROACH

Close to 'ideal'  
is low risk

Risk increases  
as difference  
from 'ideal'  
increases





# POSSIBLE INDICATORS

- ✗ Timber- volume and product objectives
- ✗ TSR RMZs (CWS, deer, lakeshore management, caribou, visuals, WHAs etc)
- ✗ Economics
- ✗ Hydrology- EDA, H50
- ✗ Wildfire hazard
- ✗ Forest health hazard (MPB, Douglas-fir beetle, Spruce beetle)
- ✗ Range supply
- ✗ Tree species diversity
- ✗ Harvesting the profile (terrain, economics, visuals?)
- ✗ Road density
- ✗ First Nations values

# TIMBER VALUE



# TIMBER – HARVEST AND LANDBASE

- ✕ Timber volume – targets?
- ✕ Species diversity – targets?
- ✕ Value – piece size
- ✕ Cost
- ✕ Harvest profile:
  - + Terrain
  - + Economics
  - + Visuals
- ✕ Premium logs?



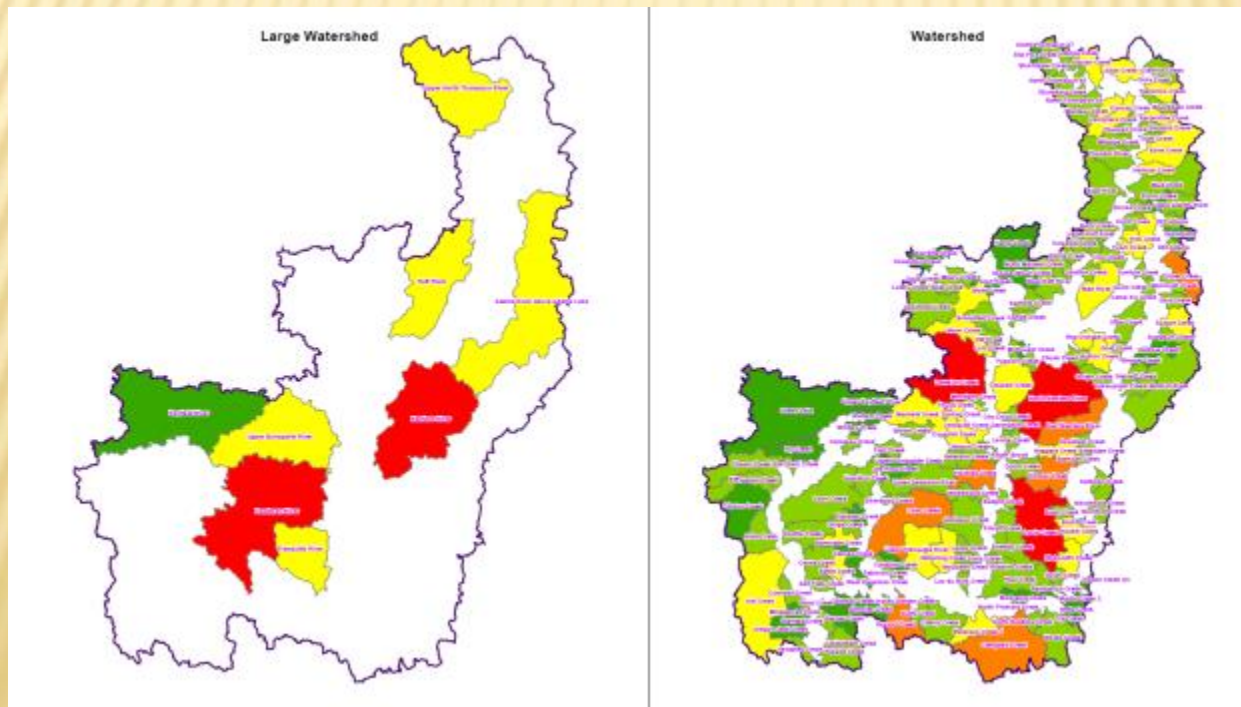
# TSR/KLRMP RMZS

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- ✖ Community watersheds (CWS);
- ✖ Integrated resource management zones (IRM);
- ✖ KLRMP critical deer winter range
- ✖ KLRMP critical moose winter range (MWR);
- ✖ Lakeshore management zones (LMZs);
- ✖ Mountain Caribou approved ungulate winter ranges;
- ✖ Old growth management areas (OGMAs);
- ✖ Visual quality objectives (VQOs); and
- ✖ Wildlife habitat areas (WHAs).

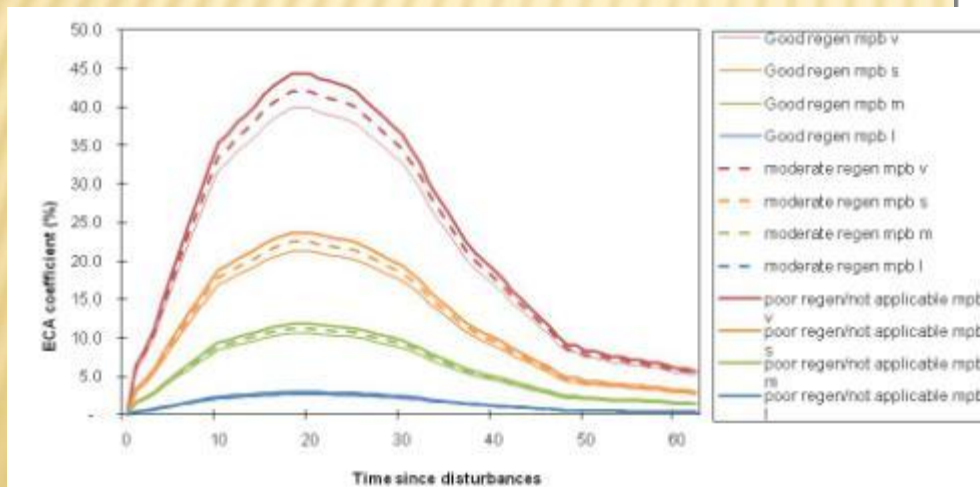
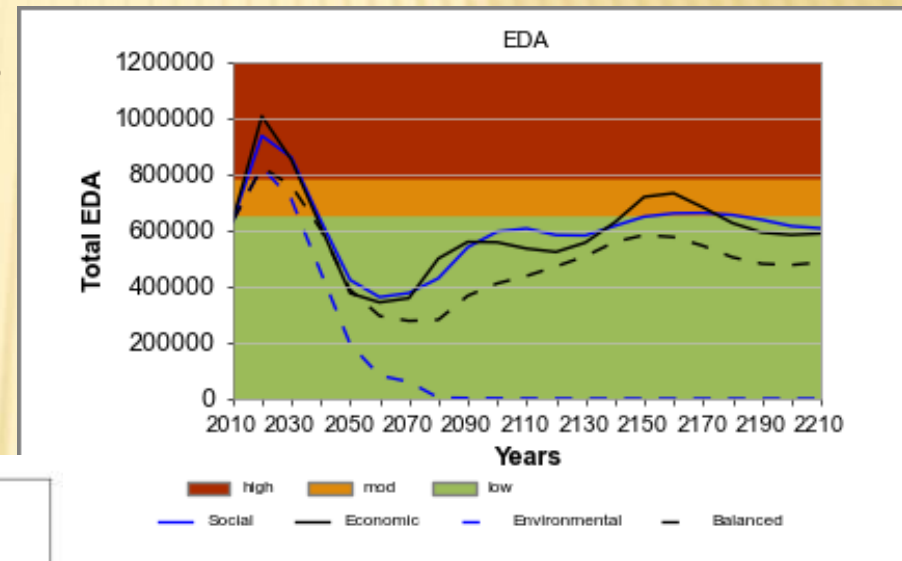
# HYDROLOGY

- ✗ Currently- only community watershed rules modeled in TSR
- ✗ Could build on May 2012 Kamloops TSA Watershed Risk Analysis



# HYDROLOGY

- ✖ Lots of community watersheds in the TSA
- ✖ Third order watersheds
- ✖ ECA/EDA modelling
- ✖ H50





# FOREST HEALTH

## ✕ Hazard/risk ratings:

### + Mountain pine beetle

$$\text{✕ Hazard rating} = \text{Pine per} * \text{Age F} * \text{Density F} * \text{Location F}$$

### + Douglas-fir beetle

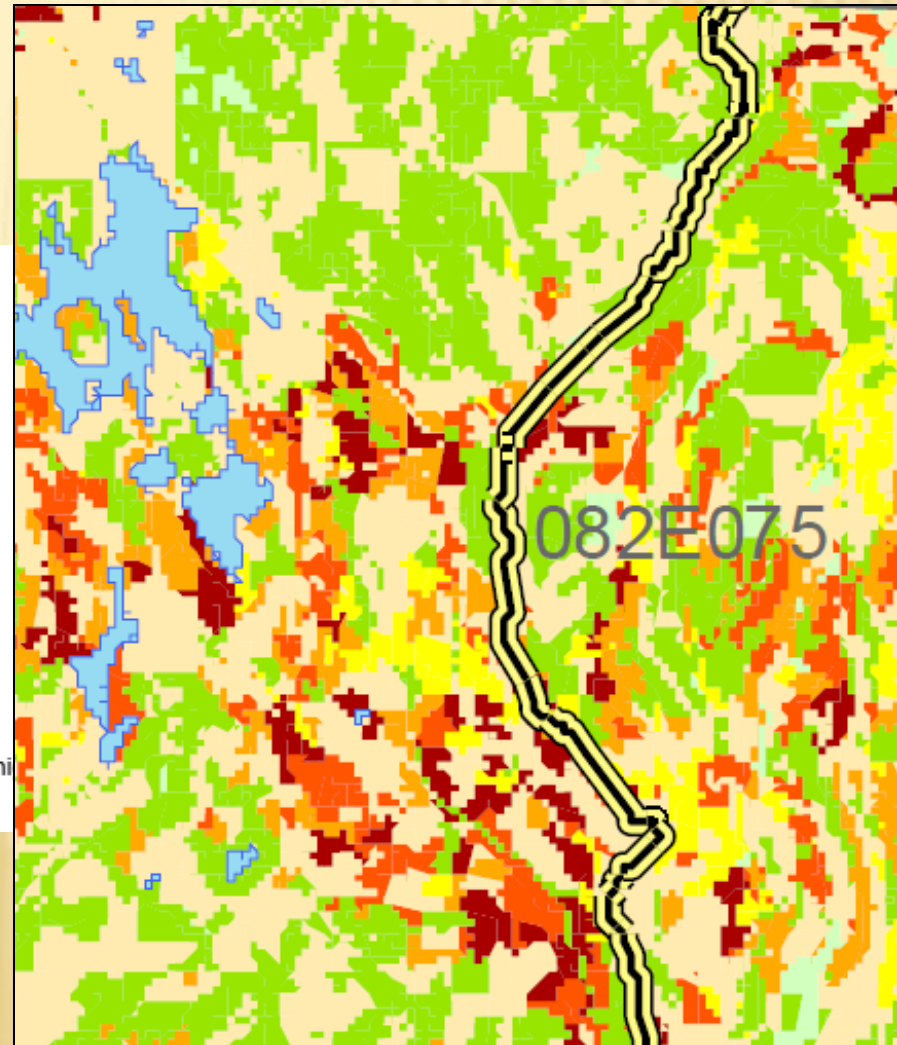
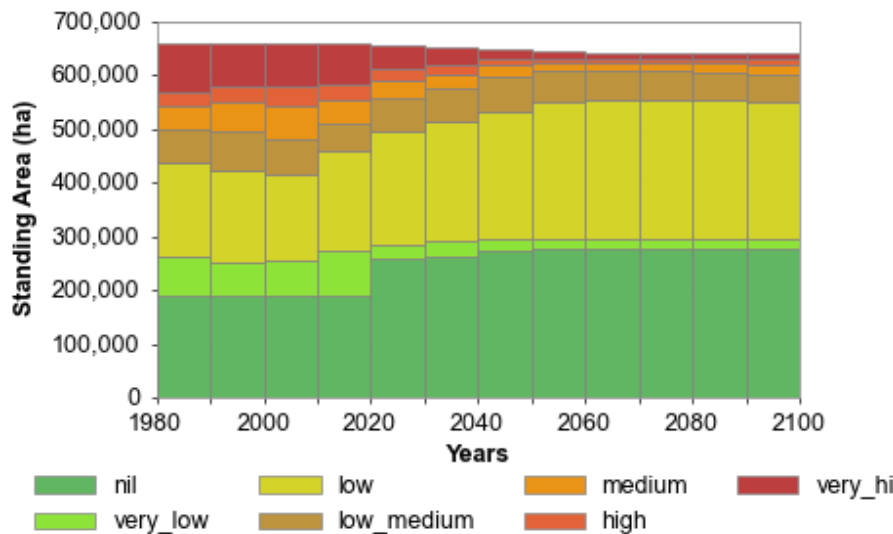
$$\text{✕ Hazard Rating} = \text{Fd per} * \text{Age F} * \text{Diam F} * \text{Growth F}$$

### + Spruce beetle

$$\text{✕ Hazard Rating} = 10 * ((\text{Spruce per} * \text{Quality F} * \text{Age F} * \text{Location F} * \text{Stand density equation})^{0.5})$$

# FOREST HEALTH

- ✗ Model hazard over time
- ✗ Spatially located



# WILDFIRE HAZARD

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- ✗ Wildfire hazard
- ✗ Interaction with ecosystem restoration
- ✗ Community wildfire interface
- ✗ Try to include wildfire hazard in the forest estate modelling so it is able to be used for decision support



# WILDFIRE

## ✖ Last time:

- + Simplified modelling
- + Assign FBP system fuel types
- + Summarized fuel types

## ✖ This time:

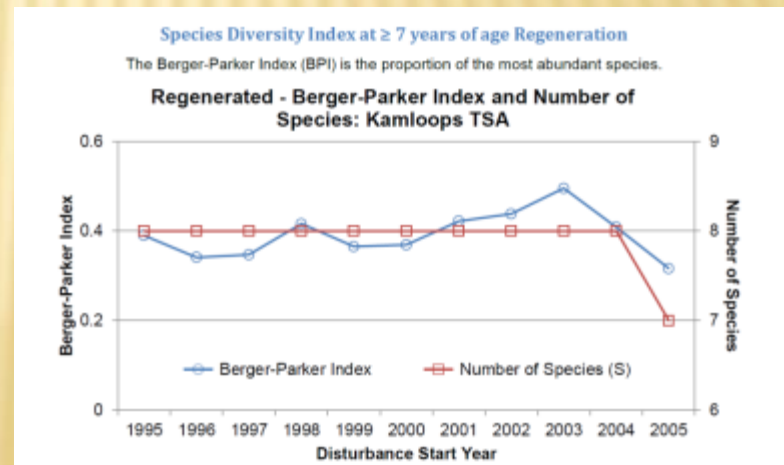
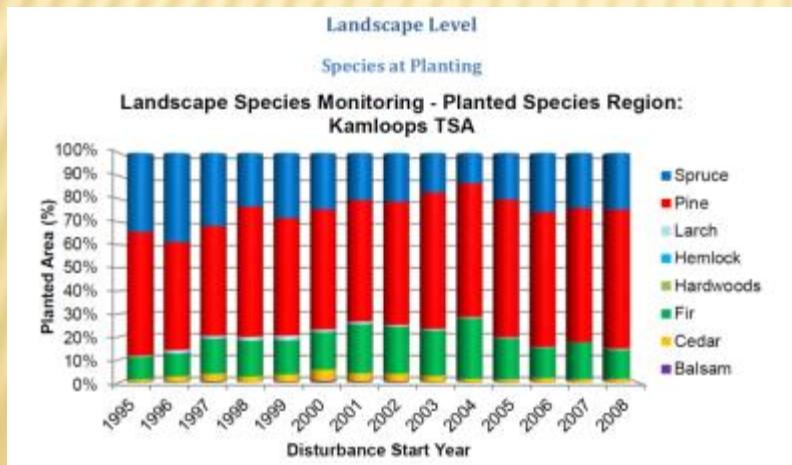
- + Do better- build upon this
- + Assign hazard associated with each fuel type

**Table 2.** FBP System fuel types.

Group / Identifier	Descriptive name
<b>Coniferous</b>	
C-1	Spruce-lichen woodland
C-2	Boreal spruce
C-3	Mature jack or lodgepole pine
C-4	Immature jack or lodgepole pine
C-5	Red and white pine
C-6	Conifer plantation
C-7	Ponderosa pine-Douglas-fir
<b>Deciduous</b>	
D-1	Leafless aspen
<b>Mixedwood</b>	
M-1	Boreal mixedwood-leafless
M-2	Boreal mixedwood-green
M-3	Dead balsam fir mixedwood-leafless
M-4	Dead balsam fir mixedwood-green
<b>Slash</b>	
S-1	Jack or lodgepole pine slash
S-2	White spruce-balsam slash
S-3	Coastal cedar-hemlock-Douglas-fir slash
<b>Open</b>	
O-1	Grass

# TREE SPECIES INDICATORS

- ✗ species targets by BEC subzone level
- ✗ monitor species diversity
- ✗ pre-/post harvest species mixes
- ✗ Berger-parker index
- ✗ Reporting could follow “Species Monitoring Report May 2012”



# RANGE SUPPLY

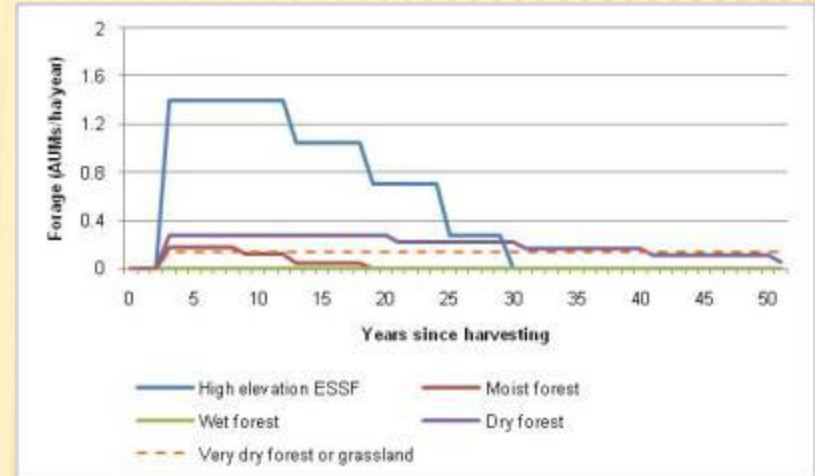
- ✘ Range agreements have a target forage by pasture
- ✘ Measured in animal unit months (AUMs)
- ✘ Forestry significantly impacts forage supply
- ✘ Provide foundation to reasonably incorporate range into the planning process





# RANGE SUPPLY

- ✗ Forage growth is modelled post harvest (by BGC)
- ✗ Alternative management by cut-block type:



- + **Type 0:** current management - no forage enhancement & standard tree stocking
- + **Type 1 and 2:** forage cut-block – moderately increase forage activities with standard tree stocking
- + **Type 3:** silvo-pasture cut-block – high forage production with reduced timber production (~75% fewer trees)
- + **Type 4:** forage cut-block - conversion to permanent forage production

# ROAD DENSITY

- ✗ Patchworks can incorporate road networks
- ✗ Apply costs associated with roads dynamically
  - + construction
  - + maintenance
  - + hauling costs
- ✗ Send volume to explicit mills
- ✗ Calculate and control road density e.g. by watershed or in grizzly bear habitat



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**GO TO BRYCE'S PPT  
ACTIVITIES TO CONSIDER**

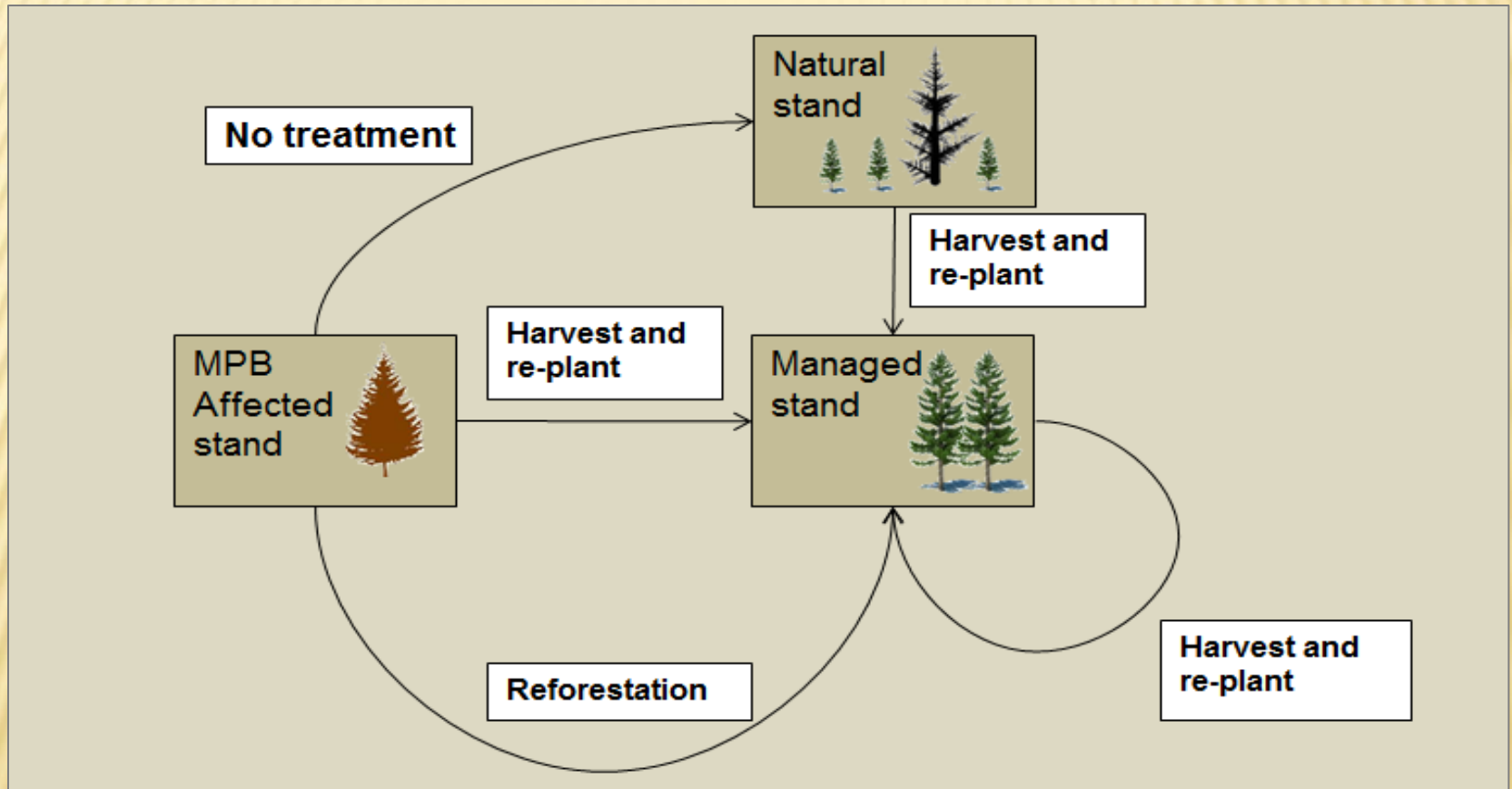




# ACTIVITIES FOR CONSIDERATION

- ✗ Clear-cut harvesting
- ✗ Selection harvesting
- ✗ MPB salvage harvesting
- ✗ Rehab (planting non-harvested MPB stands)
- ✗ Fertilization
- ✗ Ecosystem restoration
- ✗ Brushing impeded stands
- ✗ Defoliator spraying program

# SAMPLE ACTIVITIES ON MPB STAND



# MPB AFFECTED STAND

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A MPB affected stand can be harvested if it is:

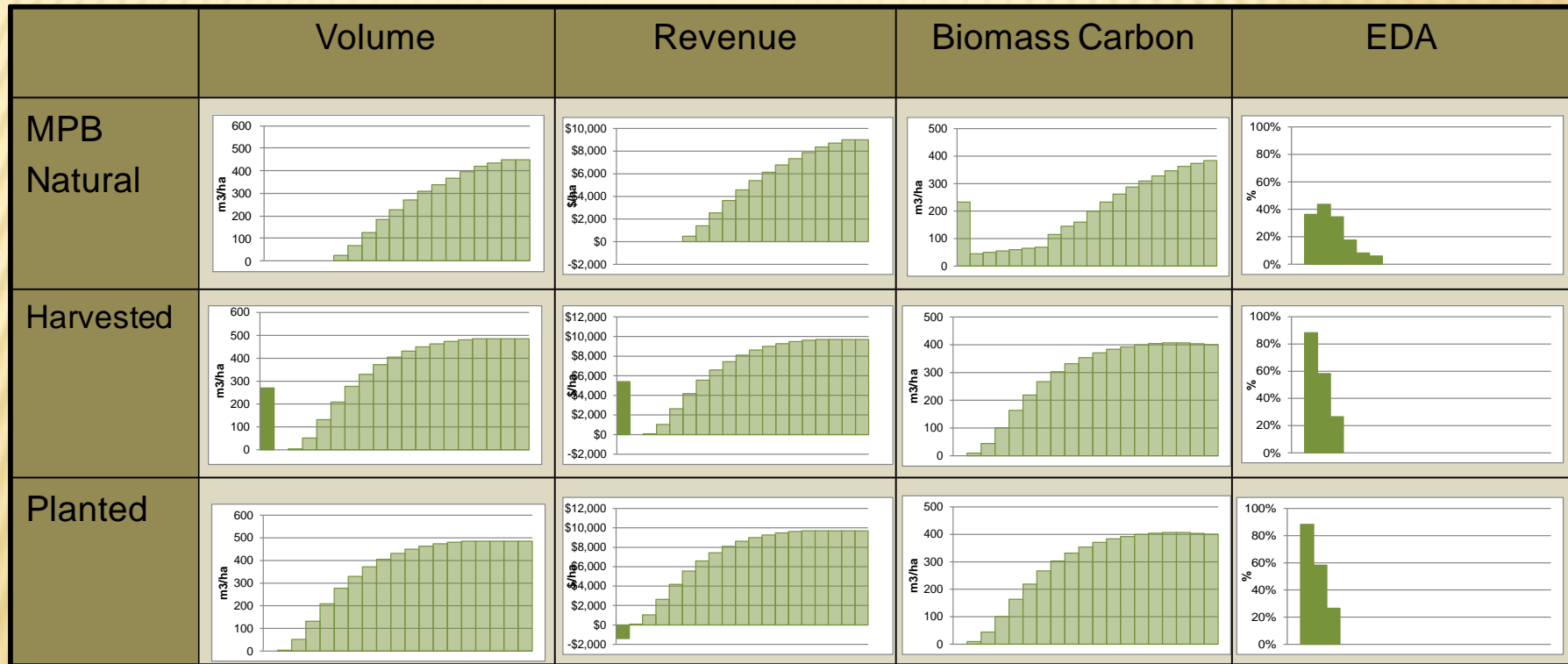
- ✗ on the THLB; and
- ✗ > minimum harvest volume.

A MPB affected stand can be planted if it is:

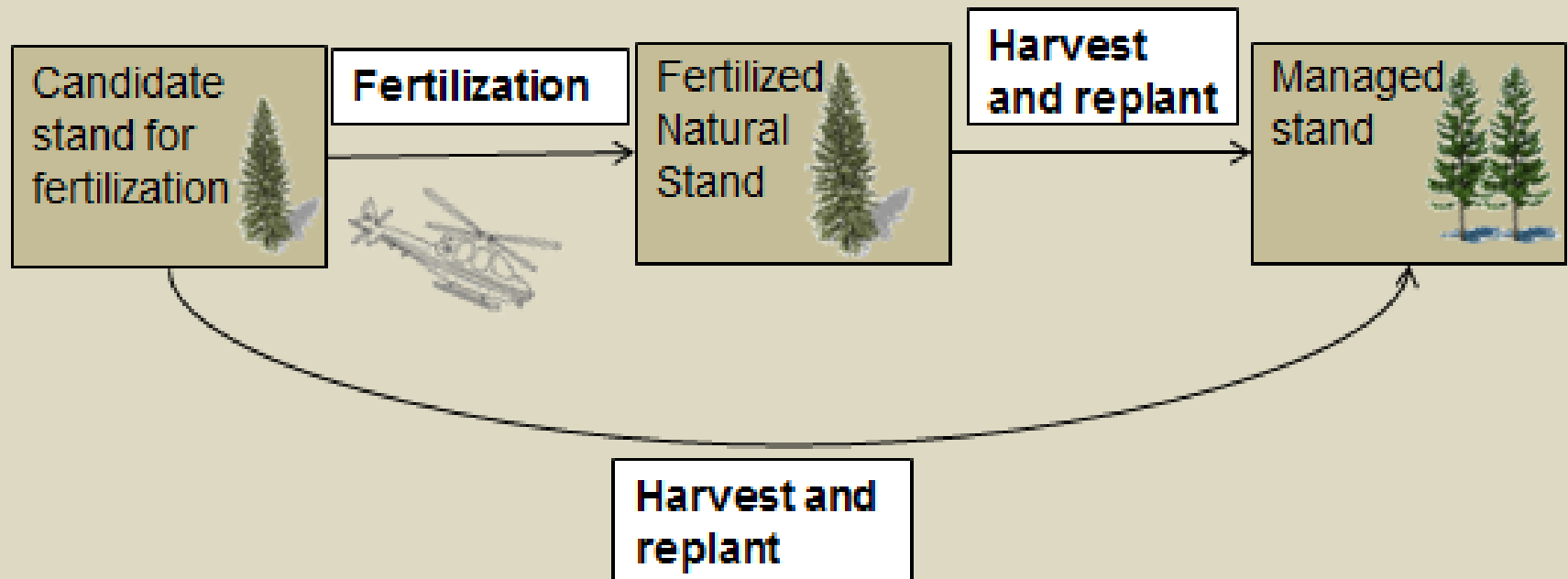
- ✗ on the THLB; and
  - ✗ not harvested.
- 
- ✗ cost of planting is applied (e.g. \$2,681/ha);
  - ✗ the value and cost of harvesting is calculated;



# HOW ACTIVITIES ARE MODELLED



# FERTILIZATION



# FERTILIZATION

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A stand is suitable to be a candidate for fertilization if it is:

- ✗ Douglas-fir or spruce leading;
  - ✗ Non-MPB affected;
  - ✗ Site index  $\geq 15$ ; and
  - ✗ On the THLB.
- 
- ✗ cost of fertilization is \$450 /ha;
  - ✗ no harvesting for 10 years after treatment;
  - ✗ growth response realised from fertilization implemented (10 m<sup>3</sup>/ha for spruce and 12 m<sup>3</sup>/ha for Douglas-fir)



# SELECTION HARVESTING

## TSR assumptions:

### ✘ Fir dry selection

- + Douglas-fir leading
- + BGC: PPxh, IDFxh, IDFxw, IDFdK1, IDFdK3, BG

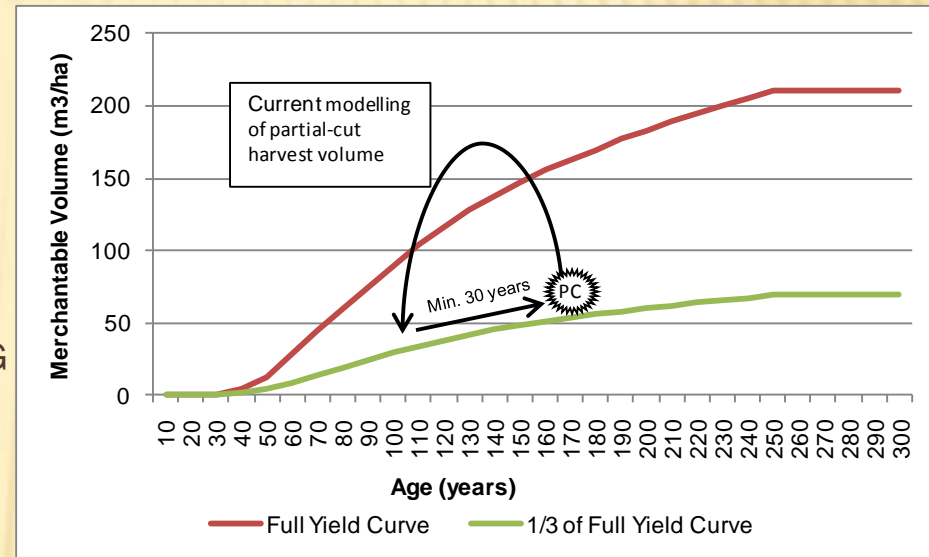
### ✘ Fir dry small patch

- + Douglas-fir leading
- + BGC: IDFdK2 & MSxk
- + excluding Sx, Hw, Cw, BI & PI 2nd species

### ✘ 40/30% removed on the first/second past

### ✘ 30year return interval

### ✘ Approx 100,000ha / 1M ha THLB (10% of THLB)



# BRUSHING IMPEDED STANDS

- ✗ Impeded stand are: “*satisfactorily restocked stands on areas harvested pre-October 1, 1987 that are not currently under a silviculture prescription and require treatment to reduce brush competition.*”
- ✗ Can we identify these stands?
- ✗ What is the volume gain from treatment?



Source: <http://www.for.gov.bc.ca/hcp/fia/landbase/fft/activities/impeDED-stands.htm>

Source: <http://www.for.gov.bc.ca/hfp/publications/00183/>

# OTHER ACTIVITIES

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- ✘ What other activities should be considered in the modelling environment?
- ✘ Spacing / thinning?
- ✘ Defoliator spray program?



# CARBON NEWS FROM CHINA - CARBON?

## Shanghai Daily

Cloudy 5/11°C

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Tuesday 27 November 2012

### Focus of Doha climate talks

US and other countries should stop evading responsibilities in emissions control, funds and technology transfer

The 18th Conference of the Parties to the United Nations Framework Convention on Climate Change is under way in Doha, Qatar. This is the first time that the UN climate change conference has been held in a Gulf country. The state of Qatar is rich in gas and oil. In particular, it has the world's third largest reserves of natural gas resources, accounting for about 13.5 percent of the world's total. The urban and suburban areas of Doha are a desert oasis, demonstrating once again the ability of humans to transform nature.

But the various pipelines visible are a reminder of how important the supply of water is for Qatar and Doha city. Climate change will inevitably aggravate the pressures on the water and food resources in regions, such as desert areas, with extreme ecological vulnerability. A huge crisis is hidden under the surface prosperity. Gulf countries are aware of this serious problem.

These countries have rich oil and gas resources, but since these resources are exhausted, how can the desert support them? Therefore, the Gulf oil countries are inclined

to compensate for the abundant and insufficient development of the energy industry.

In 1997, the Kyoto Protocol was signed in Kyoto, Japan, and in 2007 the Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention was one of the two workstreams agreed as part of the Bali Roadmap. By convention, the UN climate change conference has returned to the Asia Pacific and come to Doha. At Doha, the double-track negotiating process of the Kyoto Protocol and the Long-Term Cooperative Action is coming to the end.

The key is whether the second commitment period of the Kyoto Protocol can be launched on time. Canada and New Zealand have withdrawn from the accord, followed by the United States, which never ratified the Kyoto Protocol. Other countries of the Umbrella Group, a loose coalition of non-EU developed countries, have also said they will not join the second commitment period of the Kyoto Protocol.

Only the European Union countries and Australia have pledged to join the second commitment period. For their commitment has no great significance, as their goals are not commensurate. The EU has reduced



Only the European Union countries and Australia have pledged to join the second commitment period. Yet their commitment has no great significance, as their goals are not encouraging.

the second commitment period of the Kyoto Protocol, they cannot enjoy the benefits of market mechanisms in the Kyoto Protocol, such as the clean development mechanism. These countries not agreeing to the second commitment period of the Kyoto Protocol are happy not to make any reduction and set emissions limits. "A deal one from an unwilling source"

with more important issues, so as to reach a consensus among contracting parties. The US and other countries of the Umbrella Group don't like to discuss high emissions reduction goals, financial support and technology transfer, and these will cost a lot of negotiating time.

Developing countries have asked developed countries to come out with a roadmap to show how the Green Climate Fund will be distributed between 2013 and 2020, and the fund should reach \$100 billion by 2020. However, developed countries do not want to discuss the loss and damage that their accumulated carbon emissions have done to developing countries over the years. And they are reluctant to transfer technology to developing countries using intellectual property rights as the excuse. Developing countries also hold that developed countries should have emissions reductions in areas such as aviation and navigation to international organizations instead of taking unilateral actions.

The Long-Term Cooperative Action deals with long-term issues such as the pledges of emissions reductions various countries have made and implementation of the goals that should be included in new climate change treaties after 2012. These areas

### US, EU resist Doha pleas for more emission cuts

Chinese delegate urges rich to do more

### Potential huge for China to go 'green'

Yet China already the leader in hydro and solar energy

By WANG ZHONGTONG, ZHANG YONGQIAN and SHI HUI

Indonesia capacity reached 130 million MW, the top in the world. The nation's installed wind power capacity of 47 million MW was also the highest globally. The country has achieved progress in the application of solar and geothermal energy.

Challenges ahead

Although the momentum is strong, the development of China's renewable energy resources is still at an early stage.

Asking the natural challenges is the cost of renewable energy, which remains much higher than the conventional sources. Wind power costs 30 to 40 percent more than coal-fired power, and solar energy is 10 times higher yet, some two to three times the cost.

Support for renewable energy industries will put more burden on the government and require more government subsidies.

Also, China's low-carbon energy technologies lag far



Wang Zhongtong

behind developed countries, except in the case of solar heated water and methane. The technological disadvantage must be overcome and low-carbon acceptance.

Even less are lost, China's geothermal studies is hard to develop new designs. Wind and solar power resources are rich in the west, yet the absence of these regions means that long-distance transmission is the highly industrialized and populated east where resources are scarce.

#### Huge potential

China government has set a target of 15.4 percent of total energy from clean energy by 2015 and 15 percent by 2020. It also pledges to boost

the carbon dioxide emission per unit of GDP by 17 percent from 2005 to 2015, and to further reduce it by 40 to 45 percent by 2020.

The potential for renewable energy is huge. Currently, less than 30 percent of the water resources are used for generating electricity. Installed capacity of hydropower in China is estimated to be 200 million kW to 300 million kW.

Like hydropower, wind power is one of the most renewable energy that has the best potential for large-scale use currently. By 2015, installed wind power capacity will surpass 100 million kW, among which 5 million kW will be connected to the grid.

The 2013 target for solar power is to have installed capacity of about 21 million kW. The country plans to build large-scale photovoltaic power stations on the sparsely populated areas in the middle and eastern regions. It plans to have 300 demonstration centers for green energy and 1,000 demonstration villages for solar power.

Through vigorous development of new energy and renewable energy resources,



A worker installs a solar-powered street lamp in Lianxi county of Anhui province. The county is developing mass wind and solar energy.

the country is expected to increase its total usage of renewable energy equivalent to 470 million tons of standard coal by 2015. This means the reduction of 1 billion tons of carbon dioxide emissions, a great contribution to environmental protection and sustainable development of the country's economy.

The experts are Wang Zhongtong, deputy director general of the Energy Research Institute of the National Development and Reform Commission, and director of the China National Renewable Energy Center. Zhu Fengming, director-general of the center and vice director of the center.

# COLLABORATION AND RESULTS

- ✖ A project website will be set-up
- ✖ It is a communication tool for project updates, assumptions and results



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# Thank you

Kelly Sherman, RPF

Krysta Giles-Hansen, RPF

