KAMLOOPS TSA
TYPE 4 SILVICULTURE STRATEGY

27th November 2013

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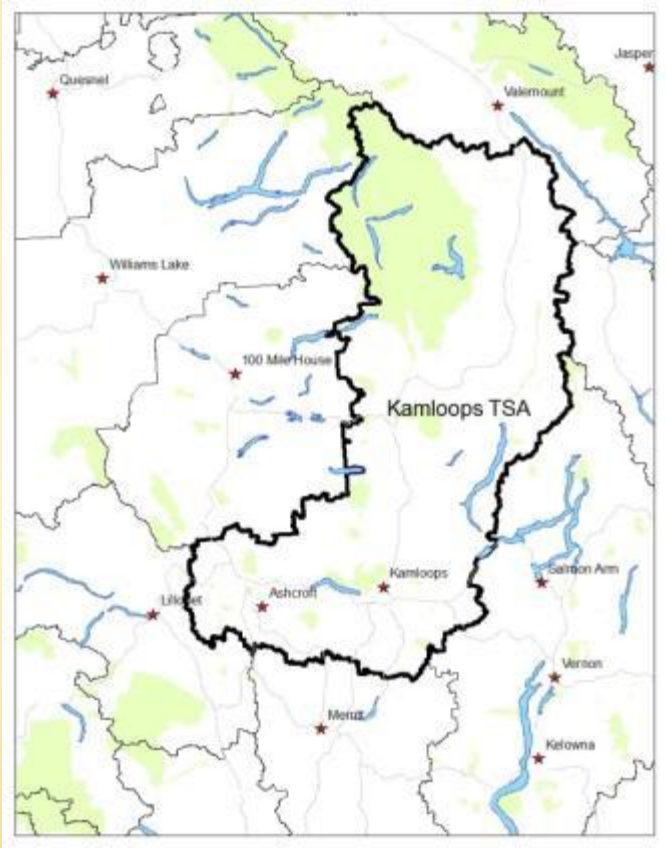
OUTLINE

- 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



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- 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

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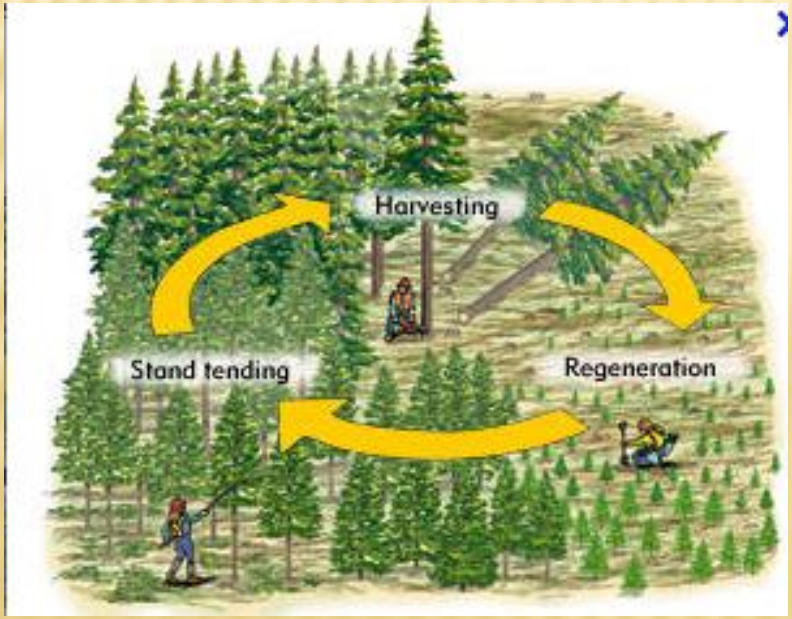
KAMLOOPS SILVICULTURE STRATEGY

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



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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

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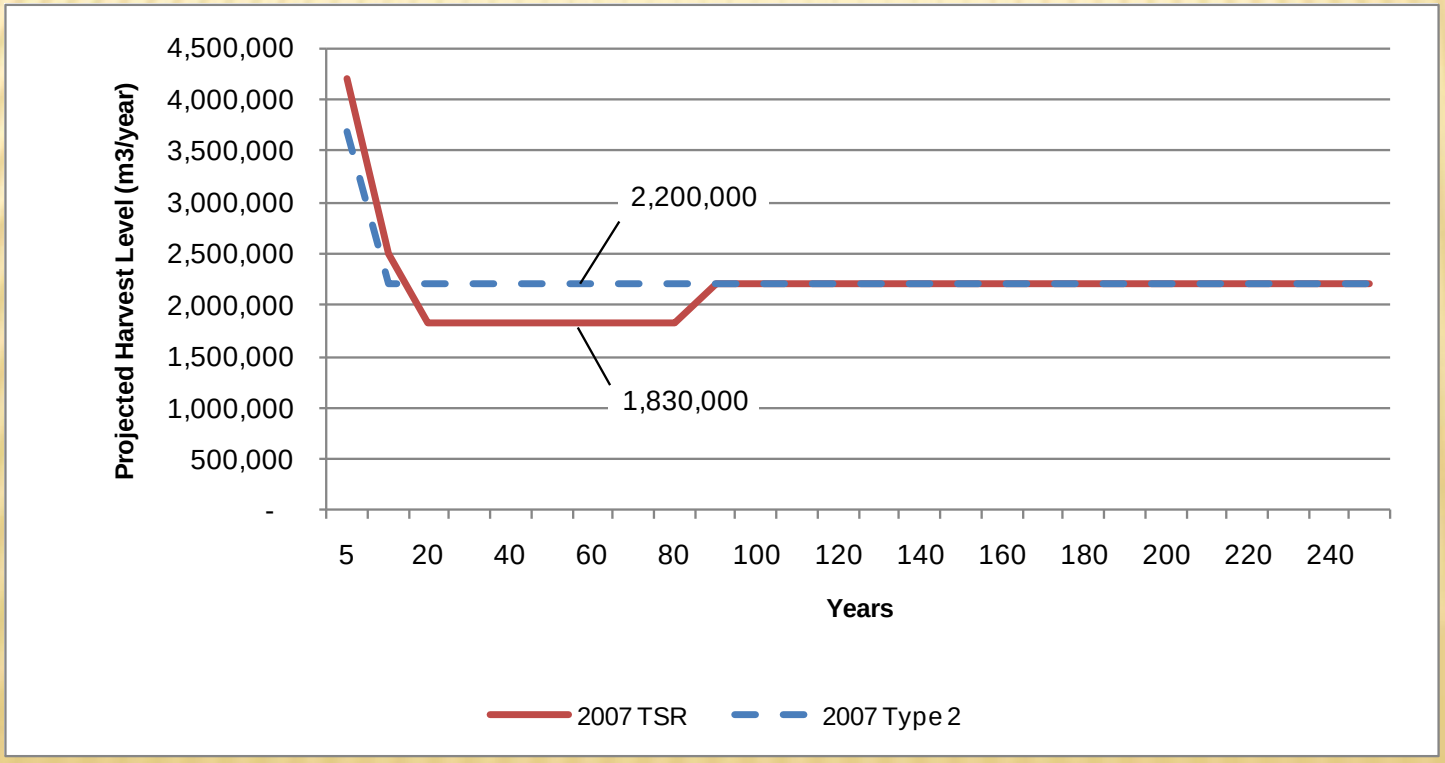
PROJECTED HARVEST LEVELS

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



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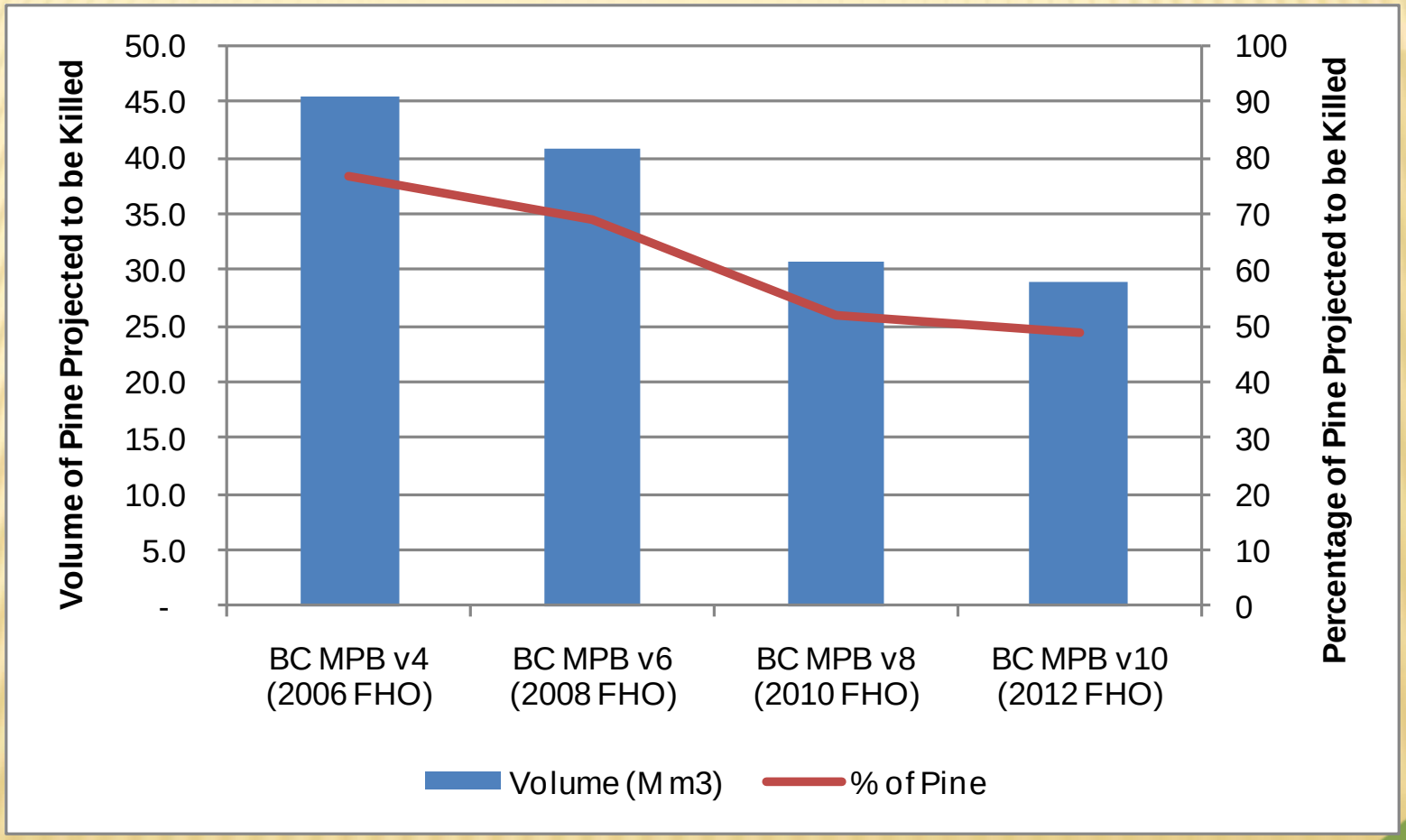
MPB PROJECTIONS IN KAMLOOPS TSA



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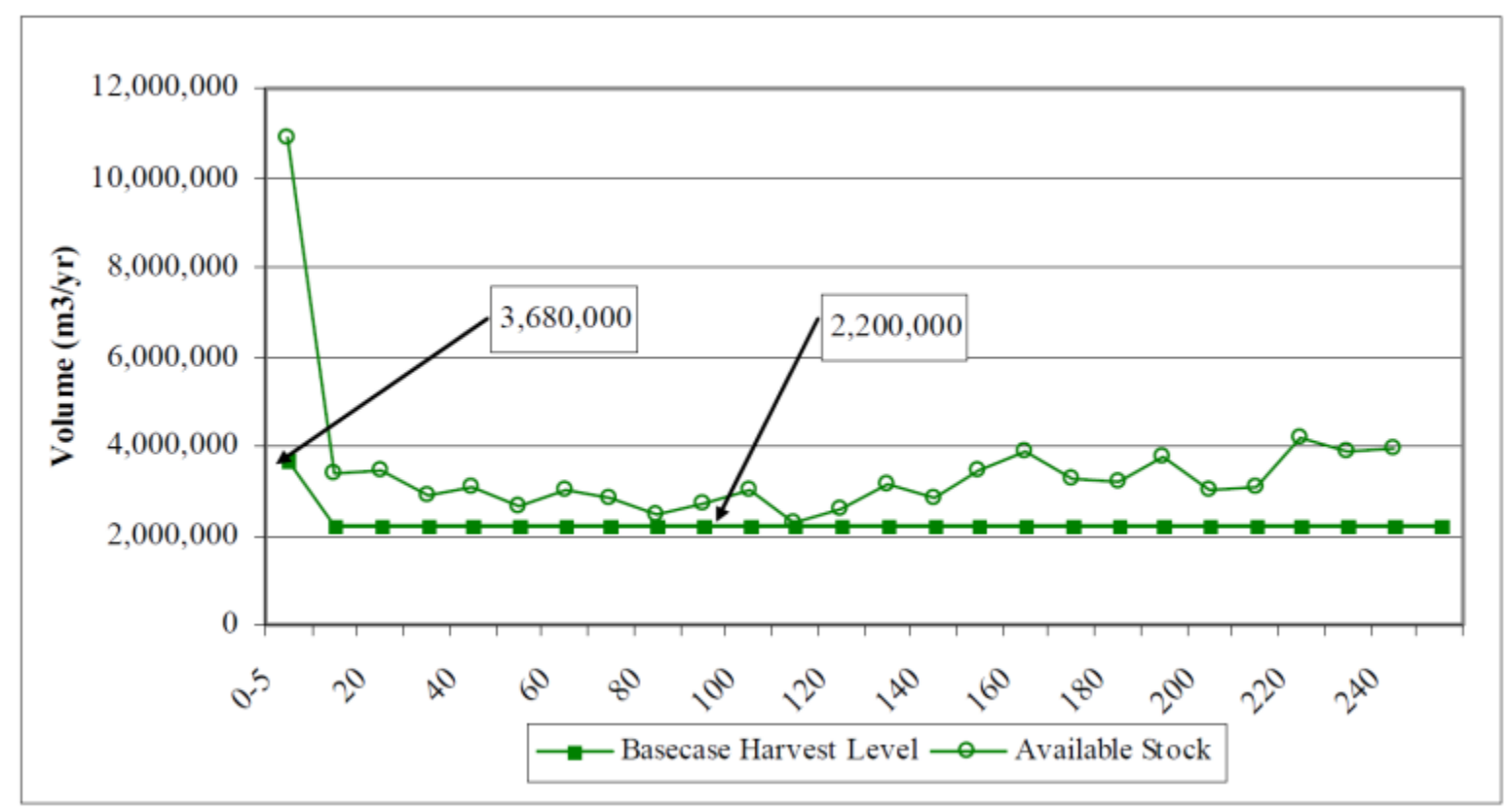
TIMBER AVAILABILITY – TYPE 2

- Limiting pinch point immediately after MPB salvage



SELECTED ANALYSIS ASSUMPTIONS

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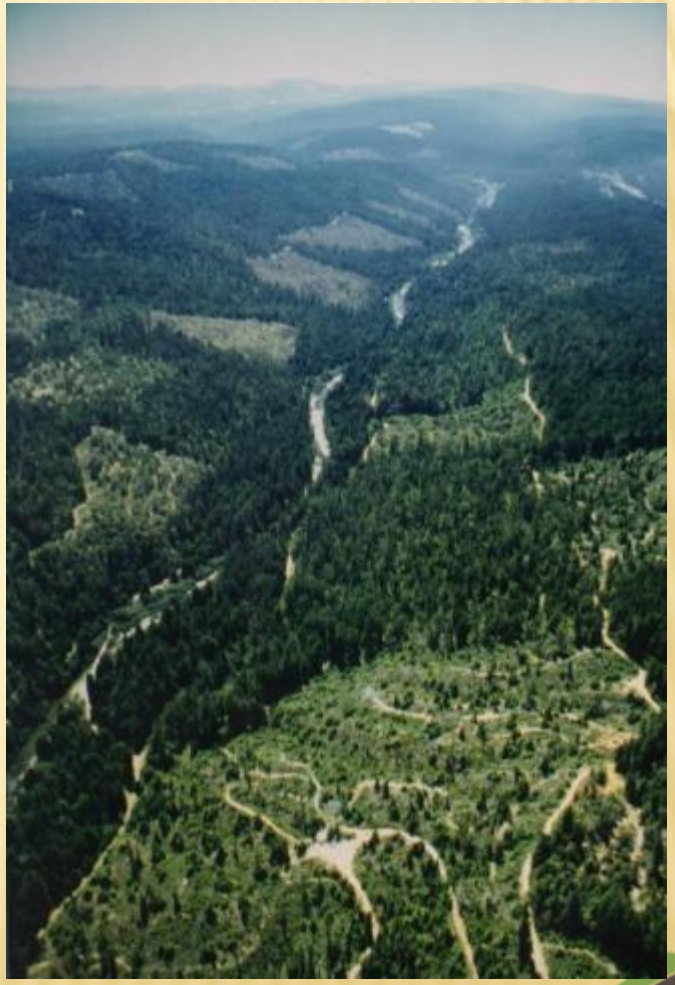
LANDBASE CLASSIFICATION (TSR NETDOWN)

Land Classification	TSR 4 / Type 2
Total Area	**2,770,266**
Wells Gray Provincial Park	539,102
Total Area Without Wells Gray Park	**2,231,164**
Non-crown	367,187
Non-productive, non-forest	356,420
Existing Roads	28,553
Non-productive Reductions	**752,159**
Productive Forest	**1,479,005**
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
Long Term THLB	**1,009,305**



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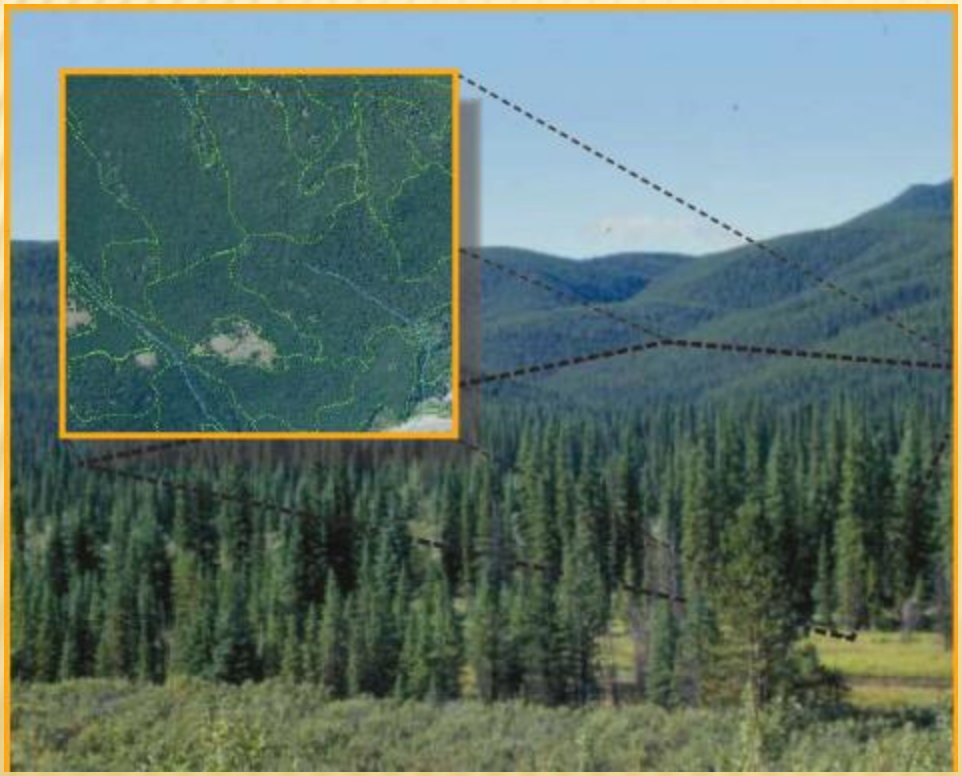
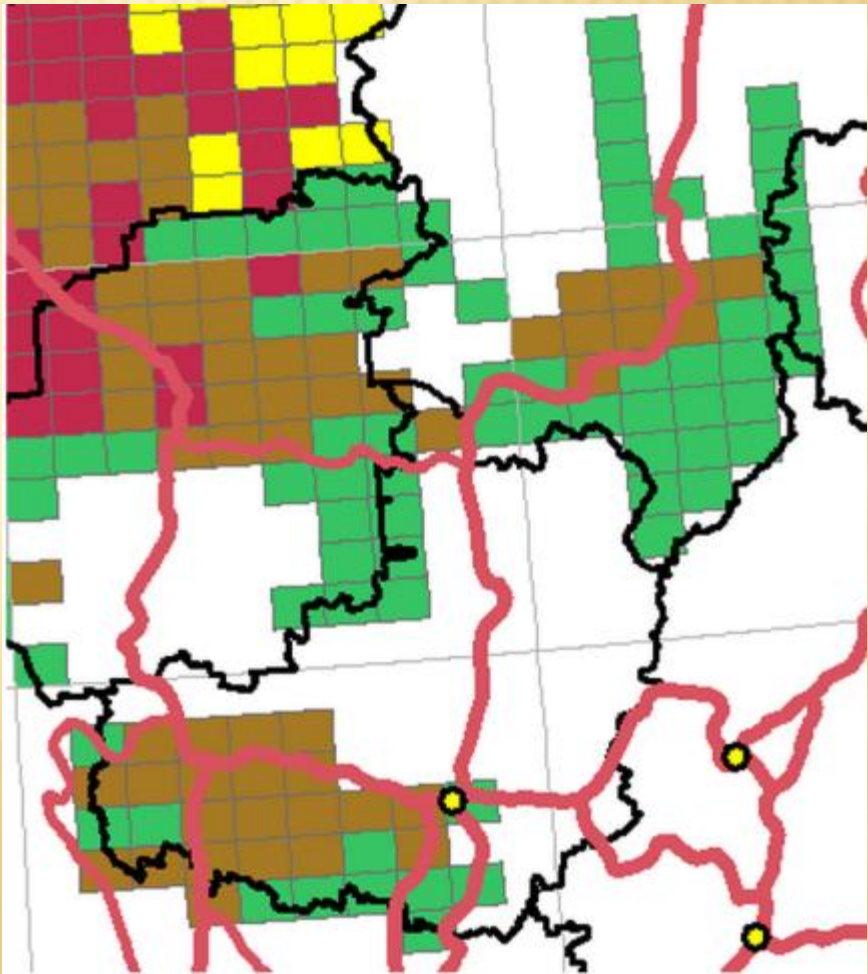
KAMLOOPS VRI

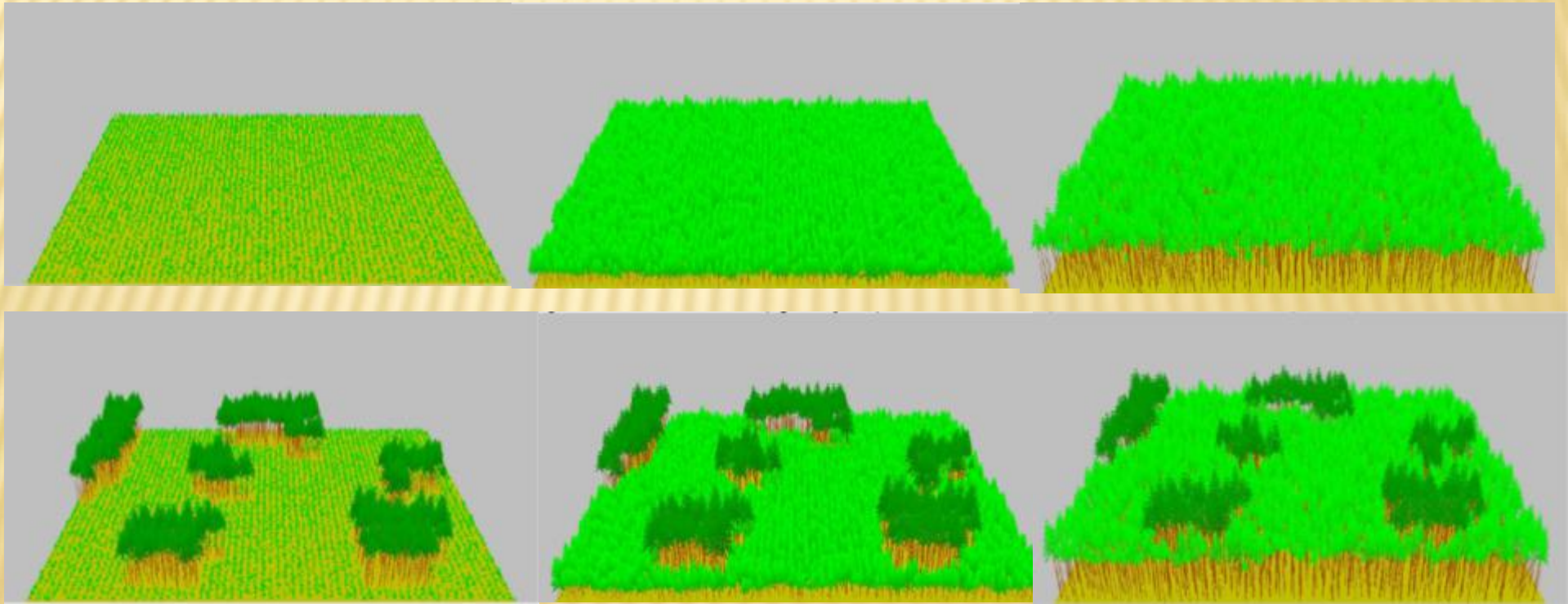
- Impacts netdown, analysis units, G&Y (initial volume and productivity)





GROWTH AND YIELD

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



ANALYSIS UNITS

- 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

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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

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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	70	1200
						Pl	30	1200
3	Fir / wet	G/M < 141	2	Plant	100	Fd	60	1400
						Pl	25	1600
						Sx	15	1400
4	Fir / wet	G/M ≥ 141	2	Plant	100	Fd	60	1400
						Pl	25	1600
						Sx	15	1400
5	Fir / wet	P/L <141	2	Plant	100	Fd	25	1300
						Pl	65	1500
						Sx	10	1300
6	Fir / wet	P/L ≥ 141	2	Plant	100	Fd	25	1300
						Pl	65	1500
						Sx	10	1300
7	Cedar	G/M < 141	2	Plant	100	Fd	15	1400
						Pl	10	1600
						Sx	45	1400
						Cw	20	1300
						Hw	10	1300
8	Cedar	P/L < 141	2	Plant	100	Fd	30	1300
						Pl	10	1500
						Sx	30	1300
						Cw	20	1300
						Hw	10	1300

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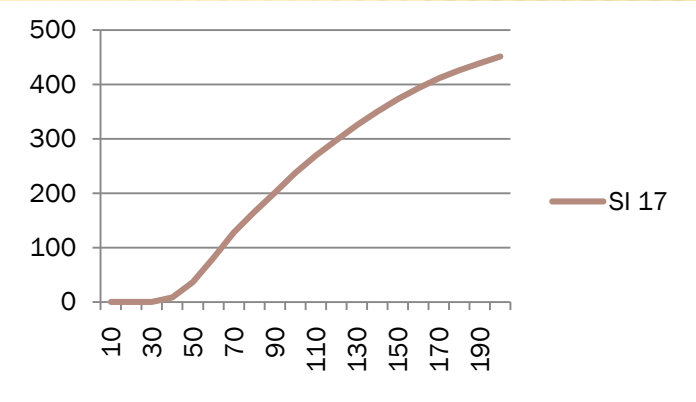
G&Y MODELS

- 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?

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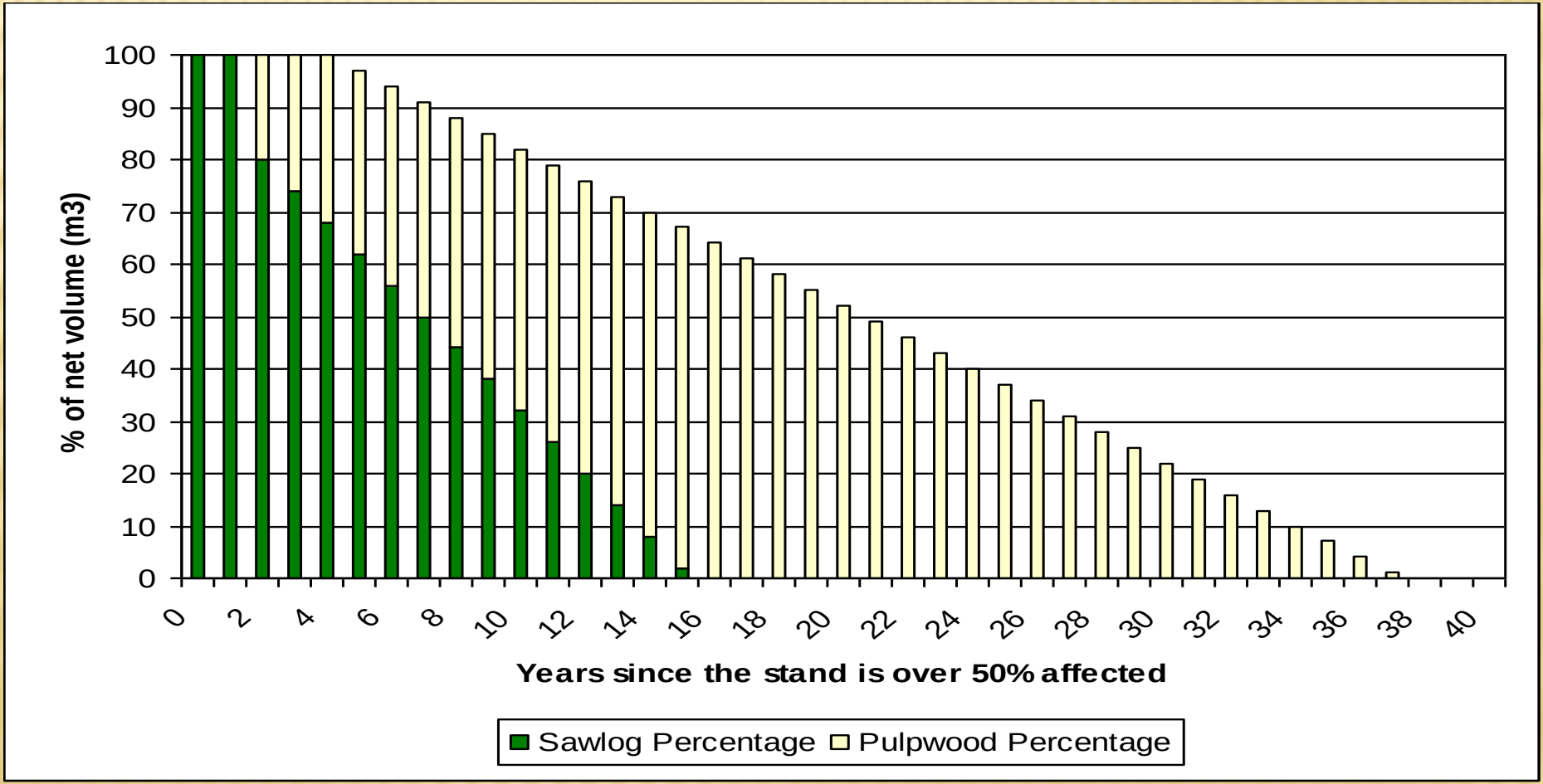
MPB ASSUMPTIONS

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



MPB ASSUMPTIONS

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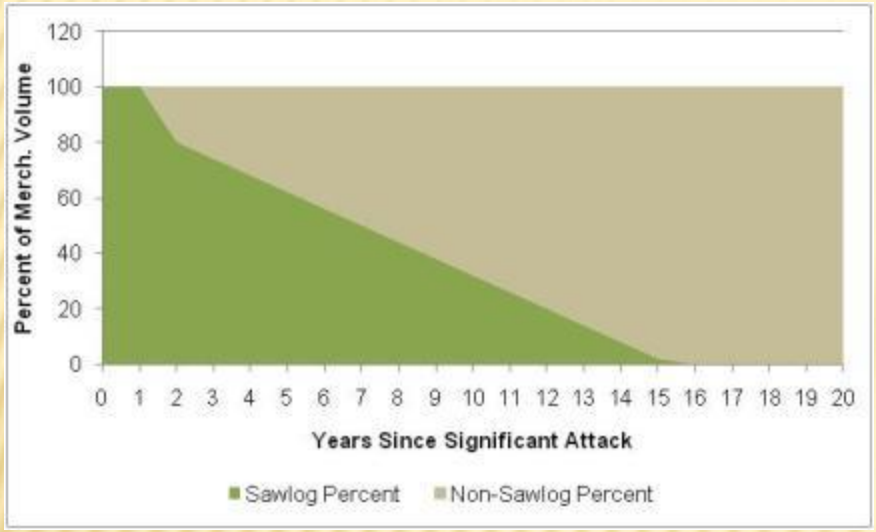

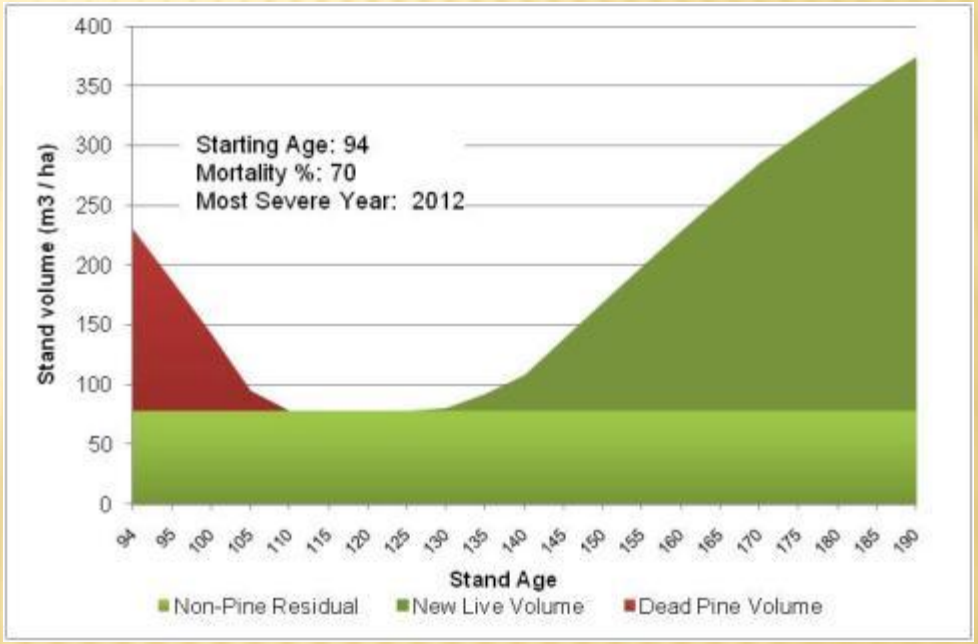

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LANDBASE VALUES AND GOAL SETTING

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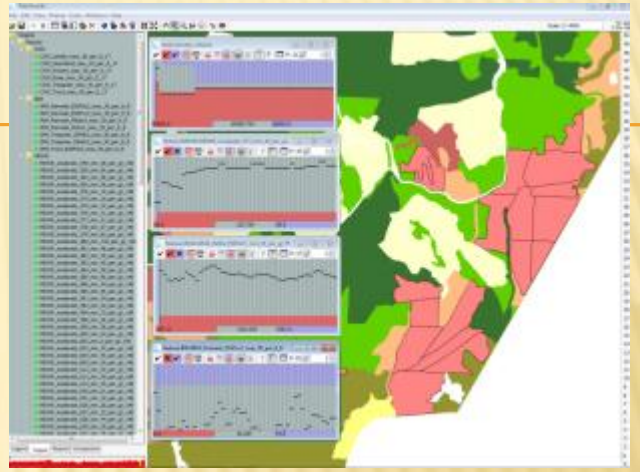
PATCHWORKS



- 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).

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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)

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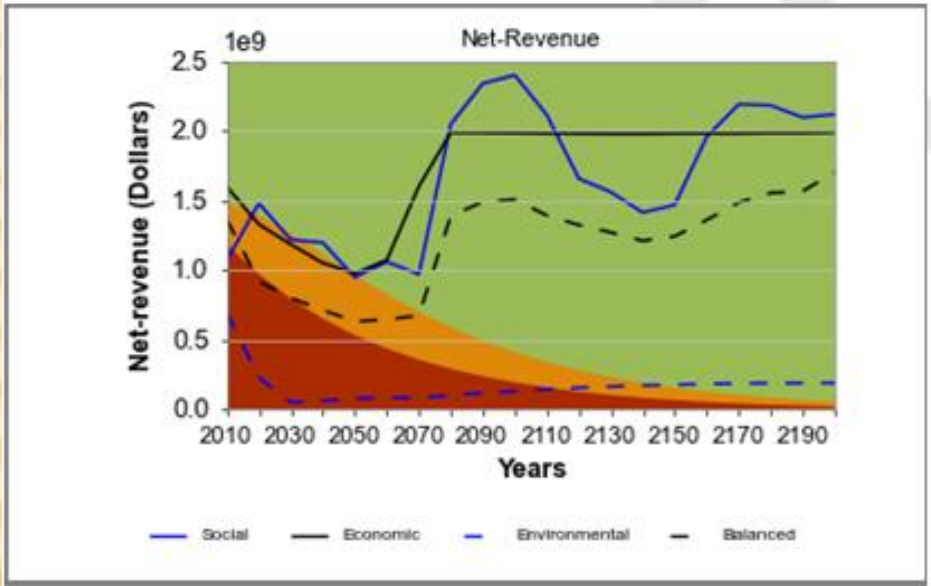
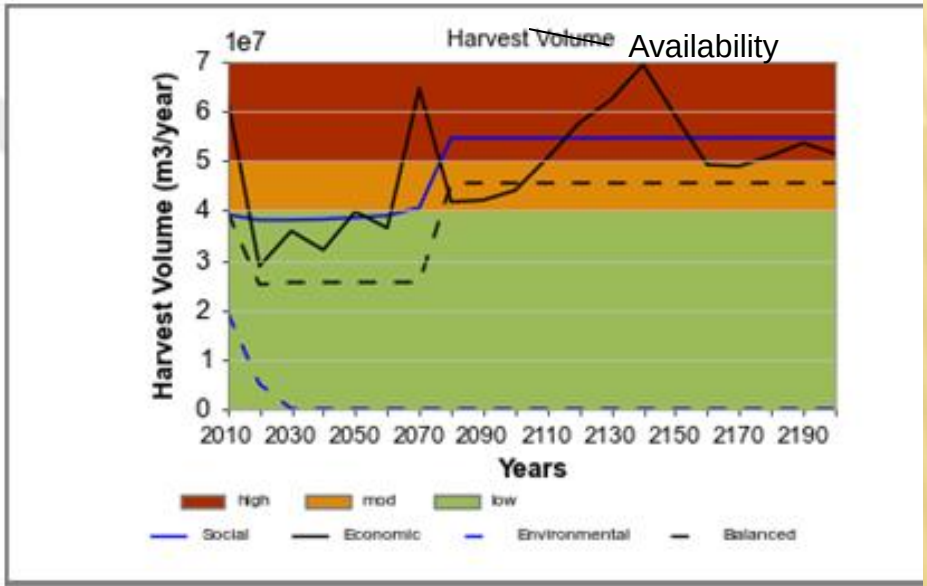
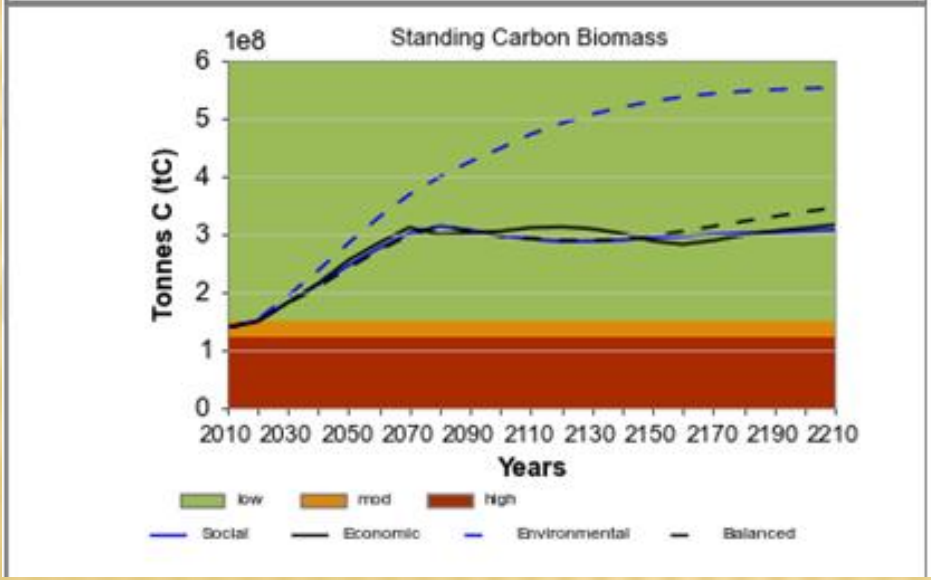
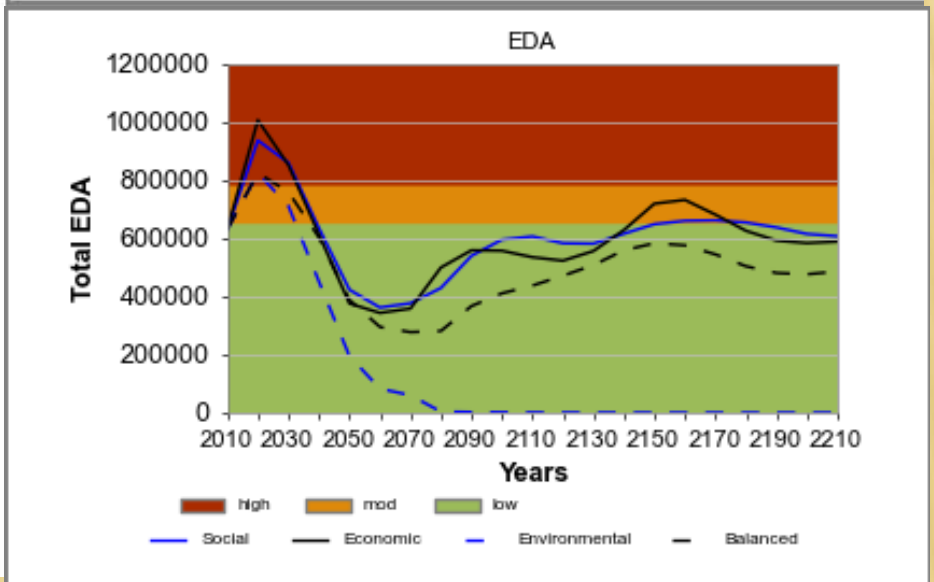
INDICATORS WITH RISK BASED BACK-DROP





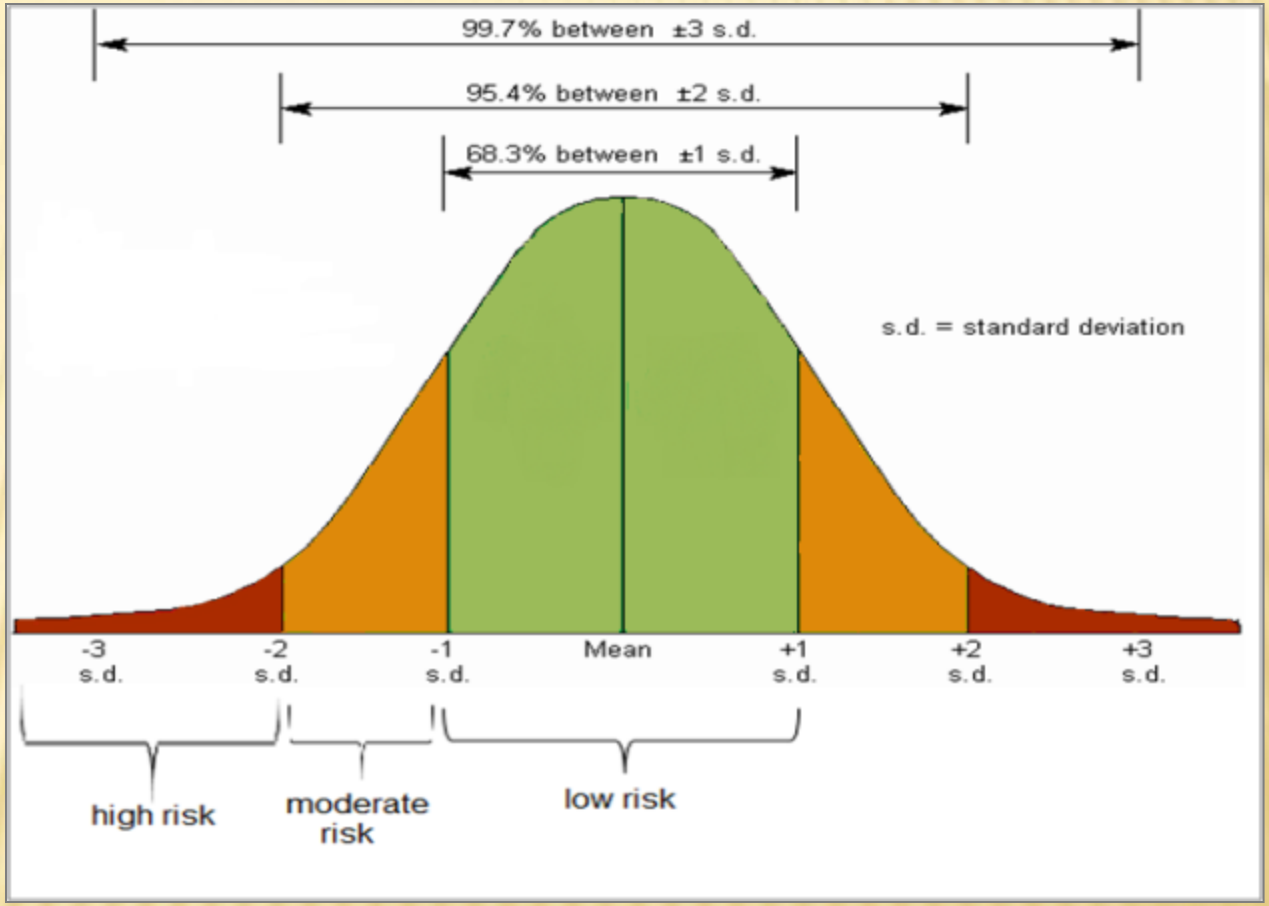




RISK RATINGS- SD APPROACH

Close to ‘ideal’ is low risk

Risk increases as difference from ‘ideal’ increases



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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

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TIMBER VALUE

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TIMBER – HARVEST AND LANDBASE

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

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TSR/KLRMP RMZS

- 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).

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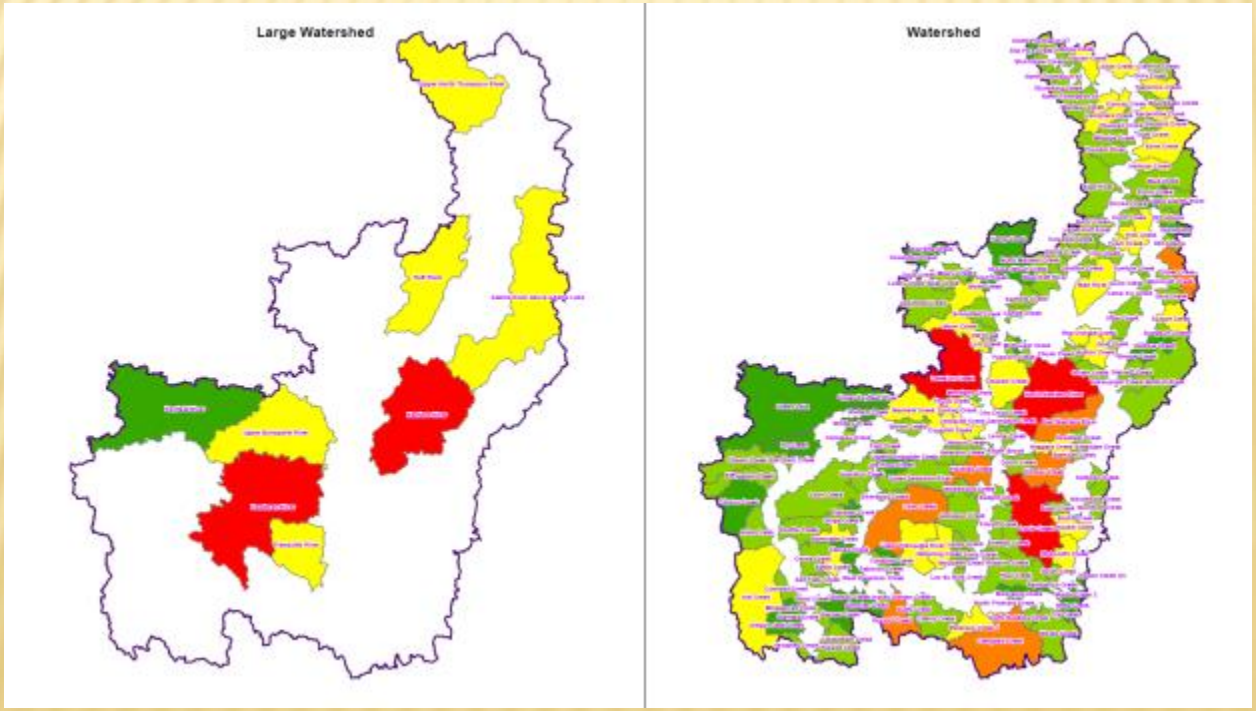
HYDROLOGY

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



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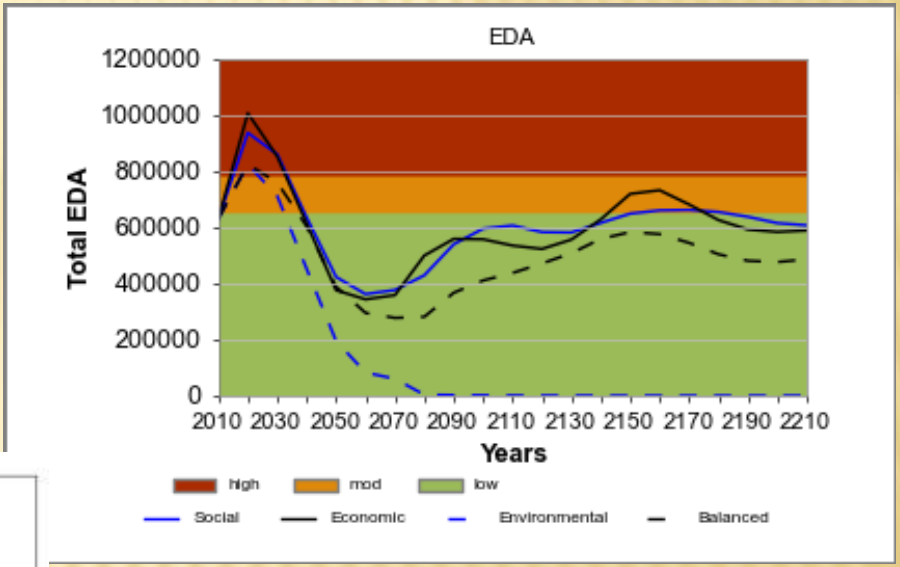
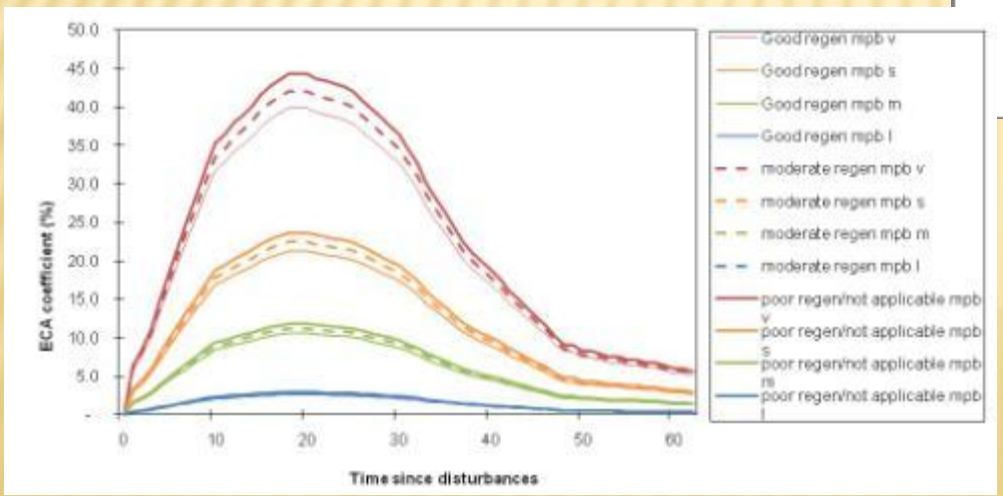
HYDROLOGY

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





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FOREST HEALTH

- Hazard/risk ratings:
  - Mountain pine beetle
    - Hazard rating = Pine per * Age F * Density F * Location F
  - Douglas-fir beetle
    - Hazard Rating = Fd per * Age F* Diam F * Growth F
  - Spruce beetle
    - Hazard Rating = 10 * ((Spruce per * Quality F * Age F * Location F * Stand density equation) ^ 0.5

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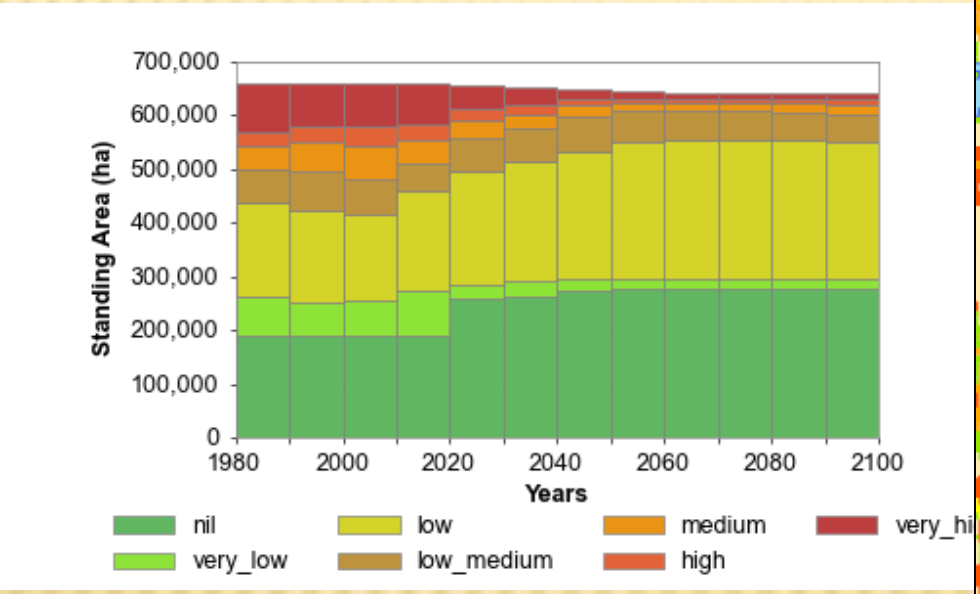
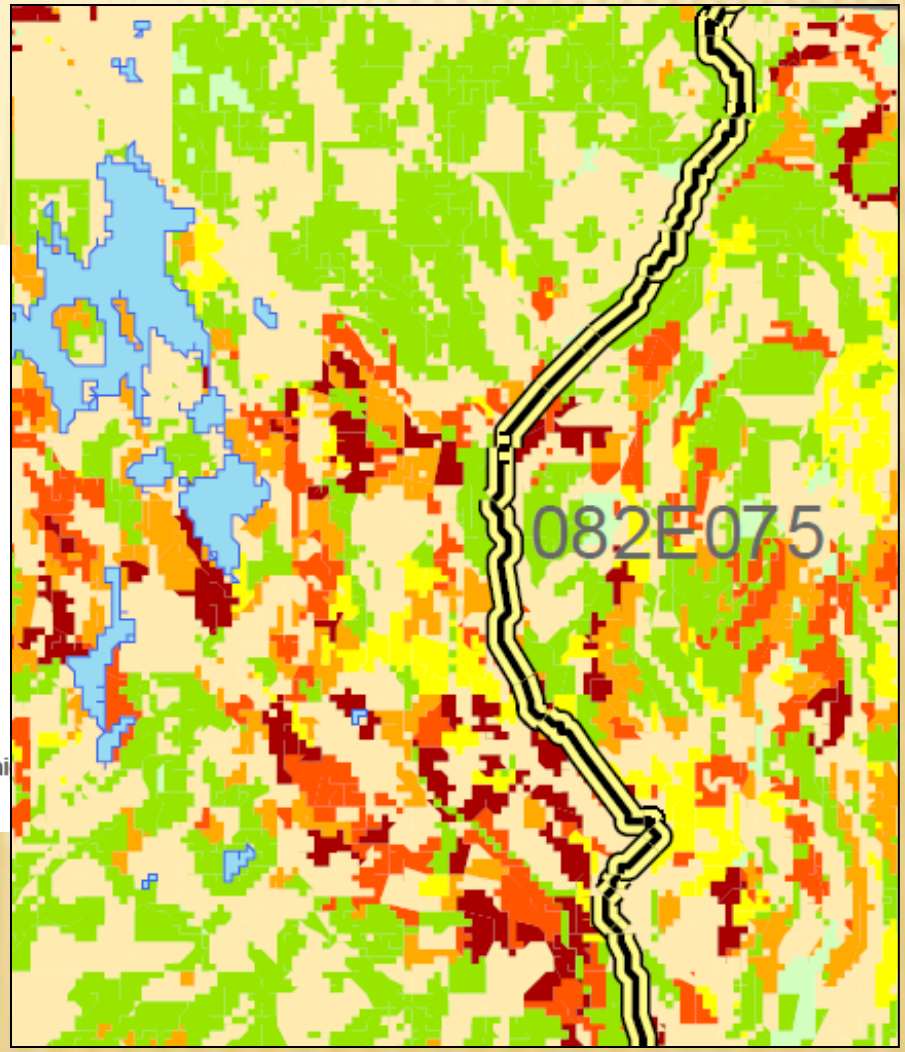
FOREST HEALTH

- Model hazard over time
- Spatially located





WILDFIRE HAZARD

- 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

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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
Coniferous	
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
Deciduous	
D-1	Leafless aspen
Mixedwood	
M-1	Boreal mixedwood–leafless
M-2	Boreal mixedwood–green
M-3	Dead balsam fir mixedwood–leafless
M-4	Dead balsam fir mixedwood–green
Slash	
S-1	Jack or lodgepole pine slash
S-2	White spruce–balsam slash
S-3	Coastal cedar–hemlock–Douglas-fir slash
Open	
O-1	Grass

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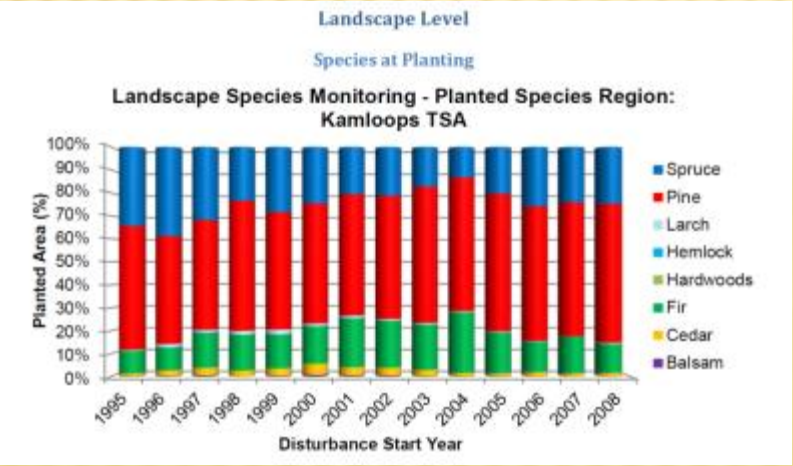
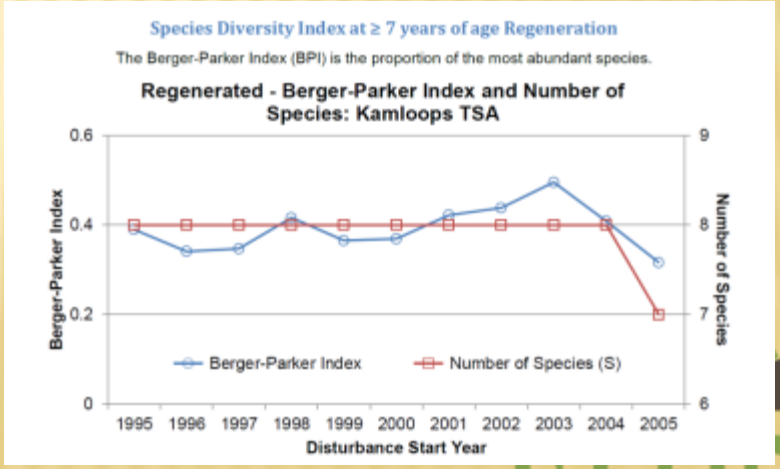
TREE SPECIES INDICATORS

- 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

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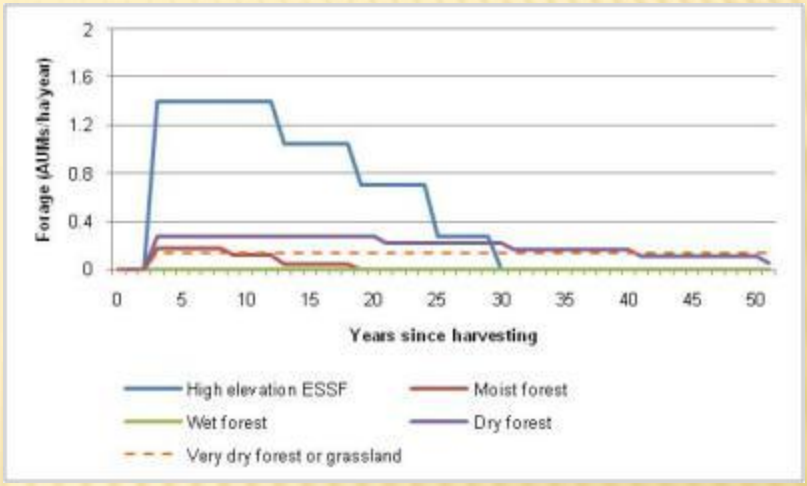
RANGE SUPPLY

- Forage growth is modelled post harvest (by BGC)



- Alternative management by cut-block type:

Forestry focus

Range focus

- **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

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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

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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

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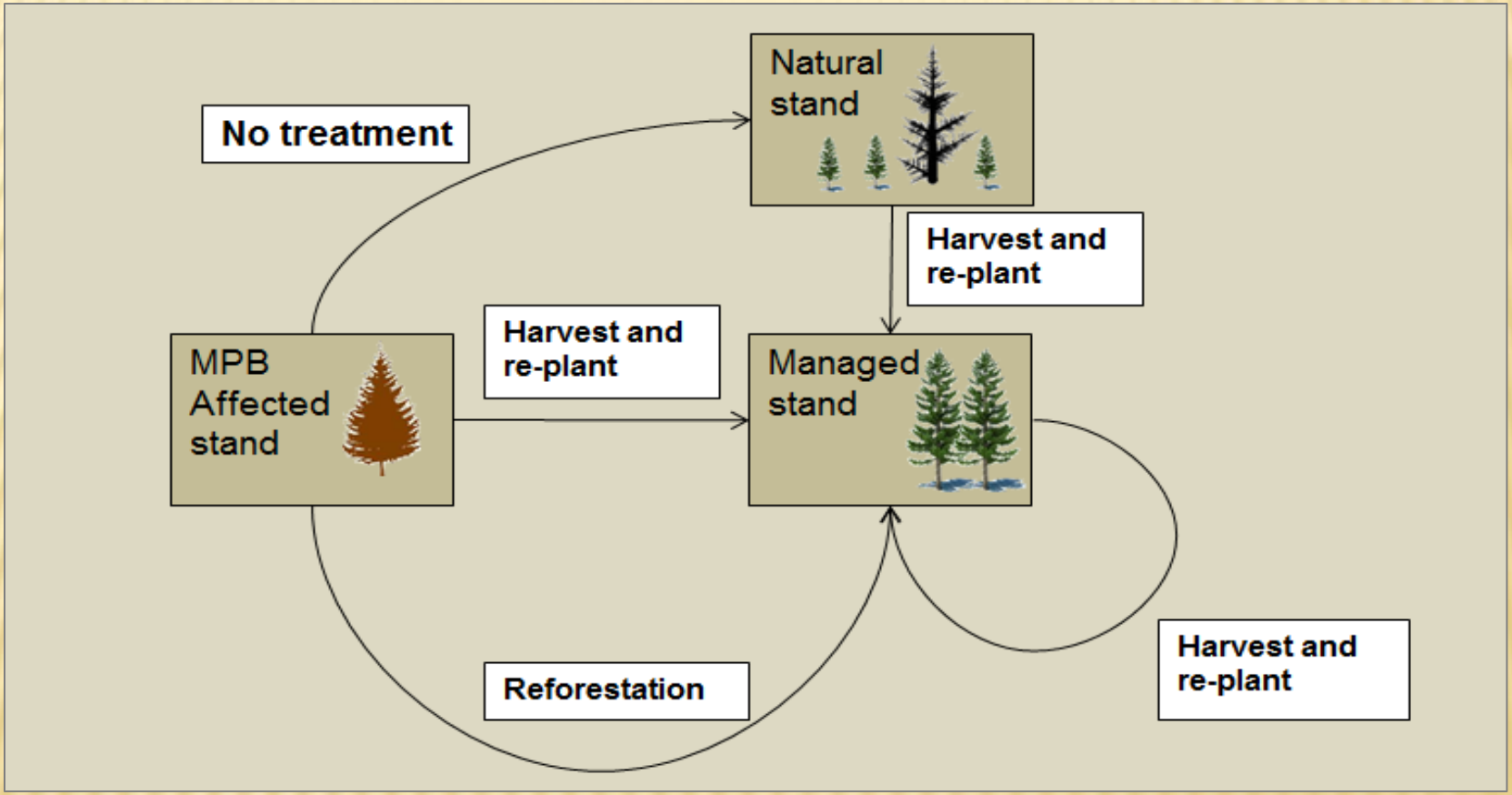
SAMPLE ACTIVITIES ON MPB STAND



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MPB AFFECTED STAND

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;

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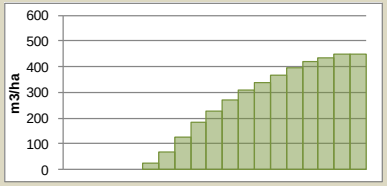
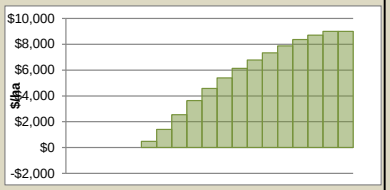
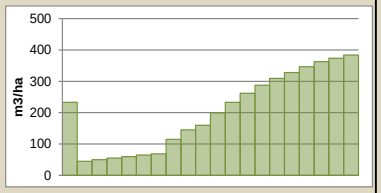
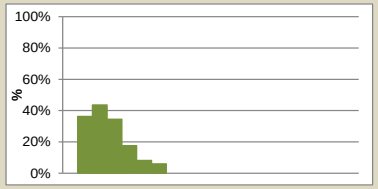
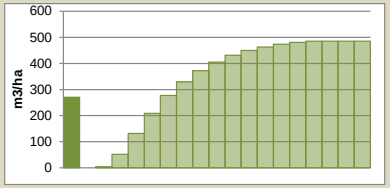
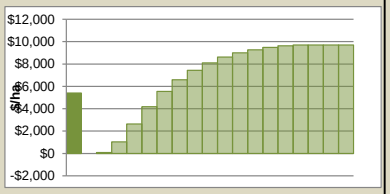
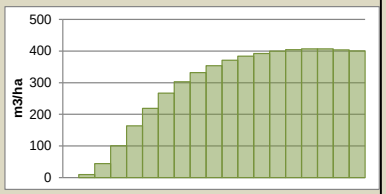
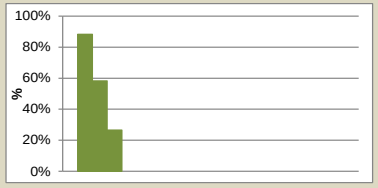
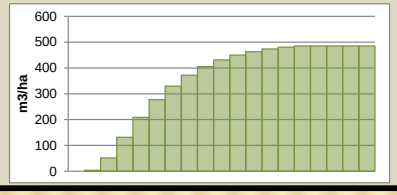
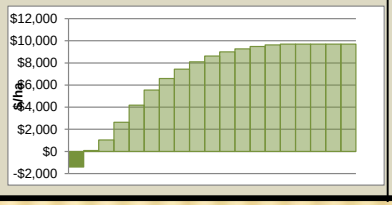
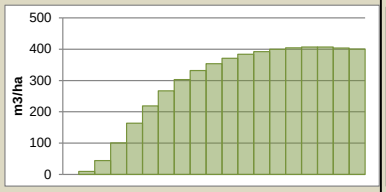
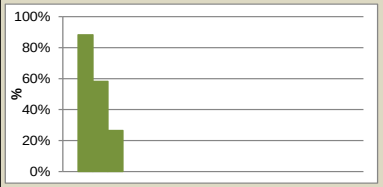
HOW ACTIVITIES ARE MODELLED

	Volume	Revenue	Biomass Carbon	EDA
MPB Natural				
Harvested				
Planted				

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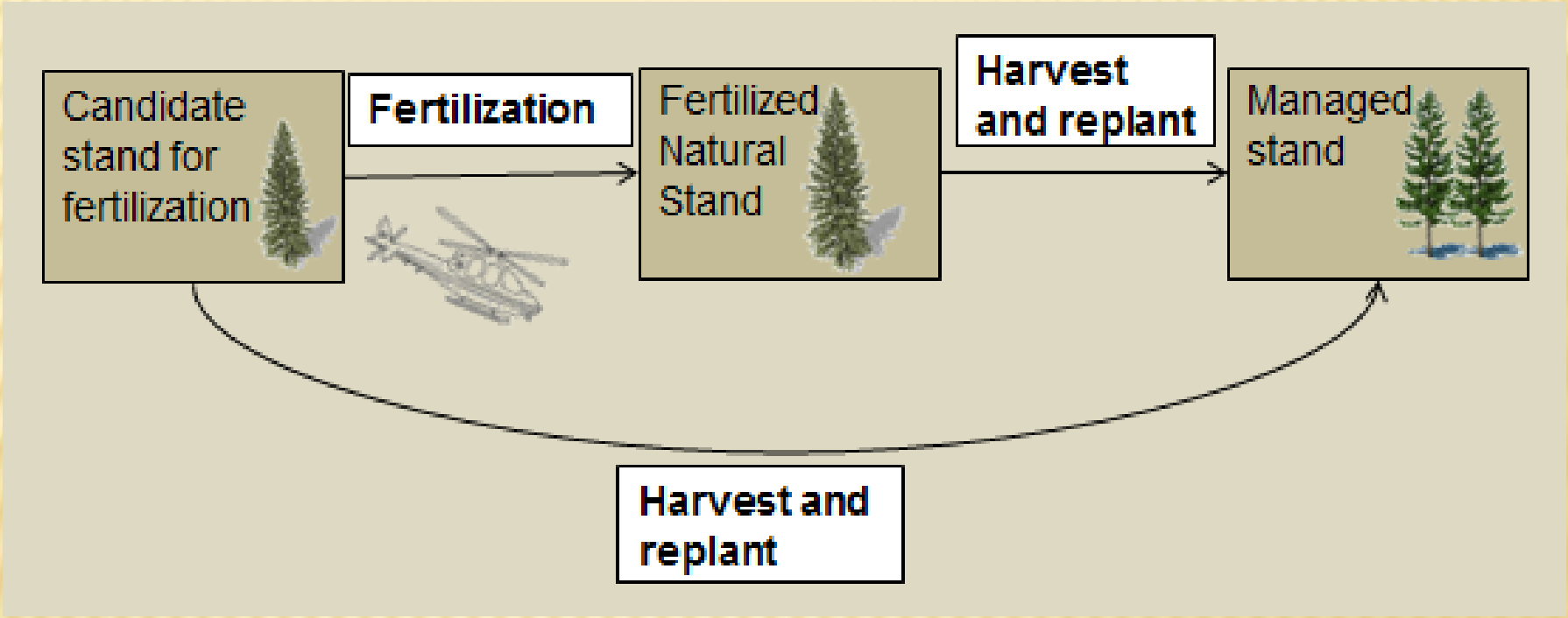
FERTILIZATION



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FERTILIZATION

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

- Douglas-fir or spruce leading;
- Non-MPB affected;
- Site index >= 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^3/ha for spruce and 12 m^3/ha for Douglas-fir)

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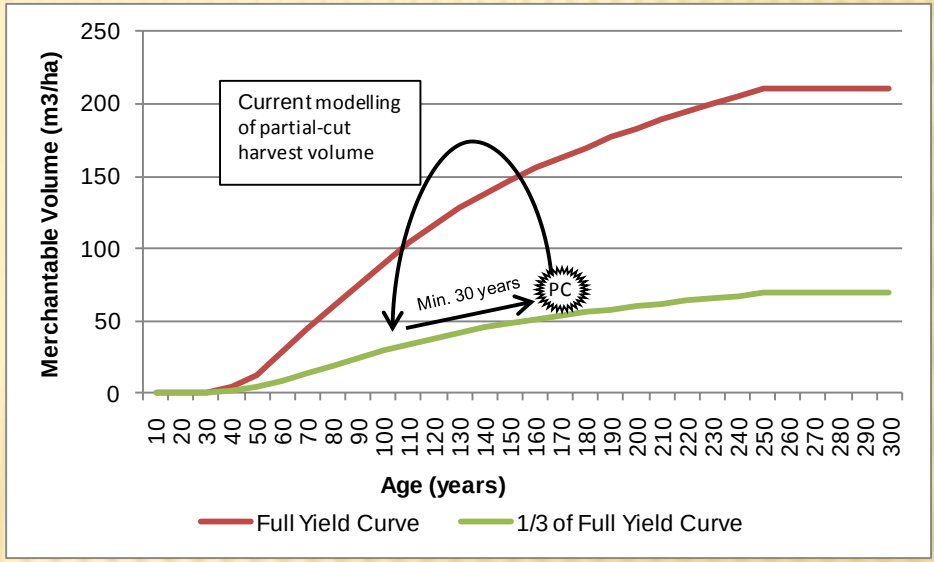
SELECTION HARVESTING

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, Bl & Pl 2nd species
- 40/30% removed on the first/second past
- 30year return interval
- Approx 100,000ha / 1M ha THLB (10% of THLB)



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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/

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OTHER ACTIVITIES

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

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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

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.

US, EU resist Doha pleas for more emission cuts

- Chinese delegate urges rich to do more

TOP NEWS/A2

Potential huge for China to go 'green'

Yet China already the leader in hydro and solar energy

Wang Zhongying

Challenges ahead

Huge potential

COLLABORATION AND RESULTS

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

Thank you

Kelly Sherman, RPF
Krysta Giles-Hansen, RPF

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