

# Climate Change Adaptation Workshops

## *Climate Change: Guidance for Tree Species Selection*

### *Coastal BC*

Ministry of Forests, Lands, and  
Natural Resource Operations

2014



**ADAPTING TO  
CLIMATE CHANGE**



# *Climate Change: Guidance for Tree Species Selection*

## **This session's agenda**

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### **A brief history of species selection guidance**

- The basics – feasibility, reliability, productivity

### **Climate Change – what to expect**

- Ecological guidance including fire
- Seed Transfer
- FRPA tests
- Present direction and flexibility
- Questions and wrap up



# *Climate Change: Guidance for Tree Species Selection*

## Learning Objectives for the Session

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1. Understand the importance of bringing climate change into the decision process for selecting species
2. Awareness of where to find ecologically based direction
3. Understand the rules surrounding seed transfer and use





# Species Selection and Climate Change 101 (lite)

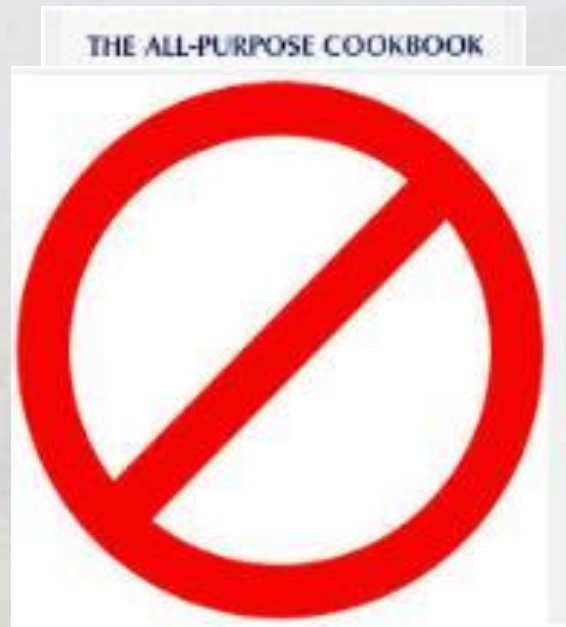
- A correlated set of stocking standards were first created in 1993 – 20 years + ago to guide species use.
- They provided the following direction:  
“Follow not the system as a blind man follows a wall”



## *Climate Change: Guidance for Tree Species Selection*

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Or more specifically - understand your objectives and options - through thoughtful deliberation choose species and mixes that meet the desired outcomes – there is no one cookbook answer.





## *Climate Change: Guidance for Tree Species Selection*

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- Species guidance uses the following 3 key elements:
  - **Feasibility** – this is a critical component of all reforestation decisions and is amplified when Climate Change suggests moving some species into areas where they were not previously found
  - **Reliability** – again critical – what threats are there now and potentially in the future – this is addressed by the long term forest health test
  - **Productivity** – this is again key, the tree improvement branch is fully committed to climate based seed transfer – matching genetics to growing conditions



# ***Climate Change: Guidance for Tree Species Selection***

## ***Standards are to:***

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- Be based on ecologically appropriate species
- Be measurable
- Describe where and when it will apply
- Have clearly defined target conditions
- Maintain or improve forest health
- Maintain stand productivity or minimize the impacts to stand productivity
- Maintain or enhance the commercially valuable timber supply
- Define acceptable levels of variability



### **Species evaluation and categories**

**Primary** – ecologically acceptable with a high rating for F, R, and P - managed as a major component of the stand

**Secondary** – ecologically acceptable but rank lower for one or more of F, R and P – managed as either a major or minor component of the stand

**Tertiary** – ecologically acceptable – usually only suitable as a minor component of the stand



# Climate Change: Guidance for Tree Species Selection

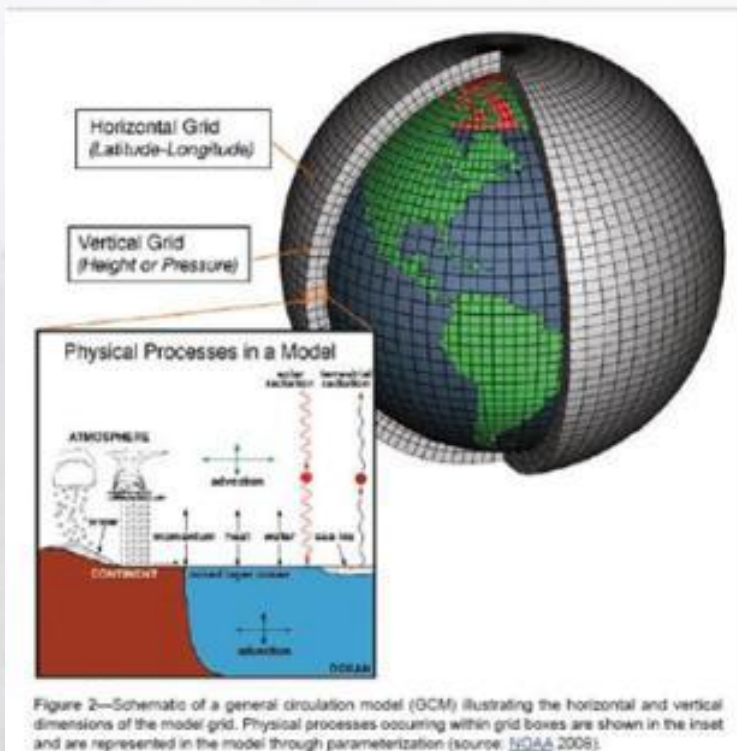
## How to bring in climate change into the thought process?



## What information is out there?

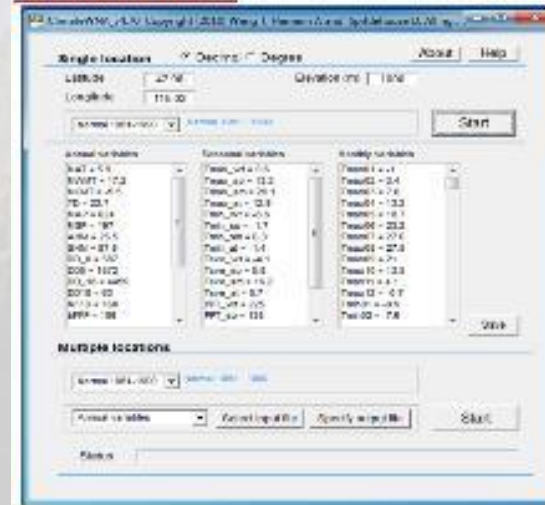
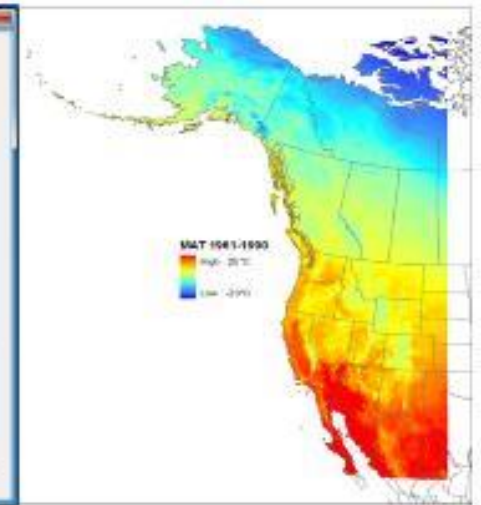
# Climate Change: Guidance for Tree Species Selection

## Global Circulation Models and Downscaling



Mathematical representation of global climate system (the physics) – takes global climate and is downscaled for interpretation – e.g. Climate WNA

### ClimateWNA



# Principles of Climate Change Adaptation

## Climate Trends

### Natural Variation

**Climate the bigger picture**

**Earth's natural climate system varies over time**

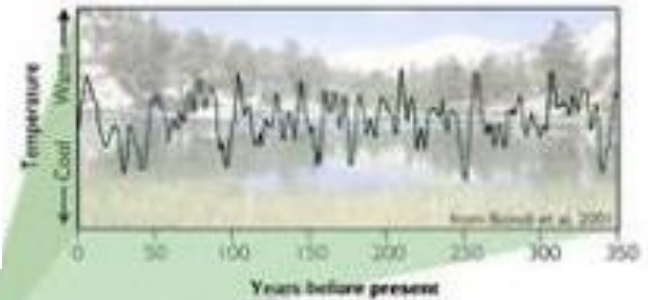
Climate changes over time with different patterns and modes.

Modes are nested in annual, decadal, century and millennial scales

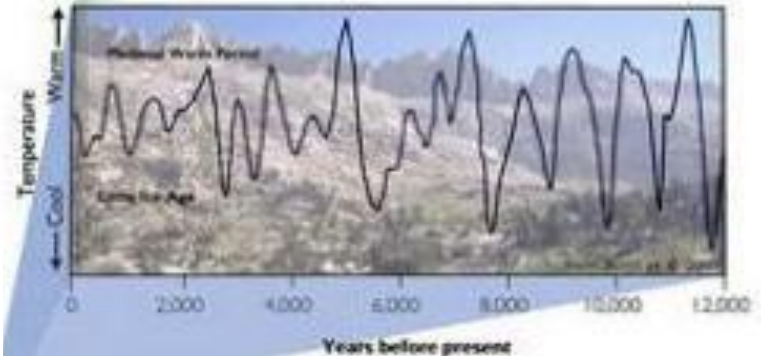
Note: Different mechanisms drive different modes

Source: Millar 2003

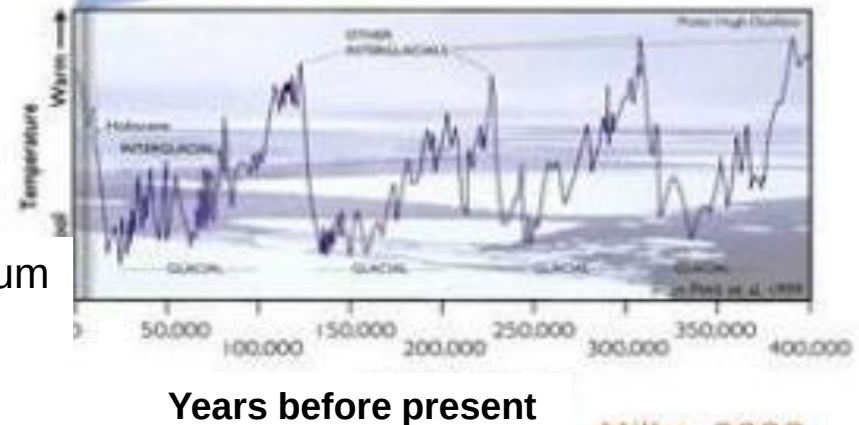
Decade scale



Century scale



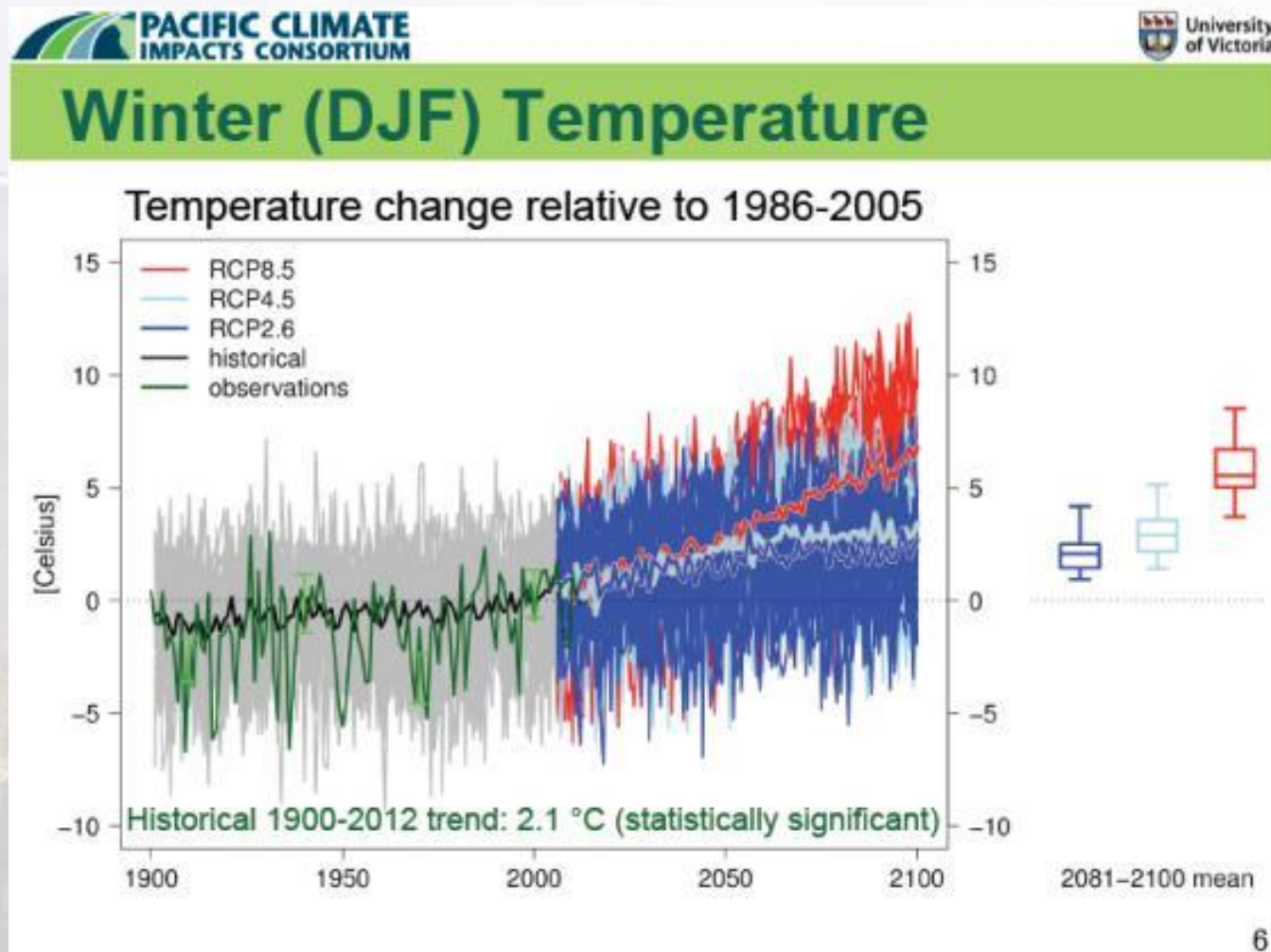
Millennium scale



Millar 2003

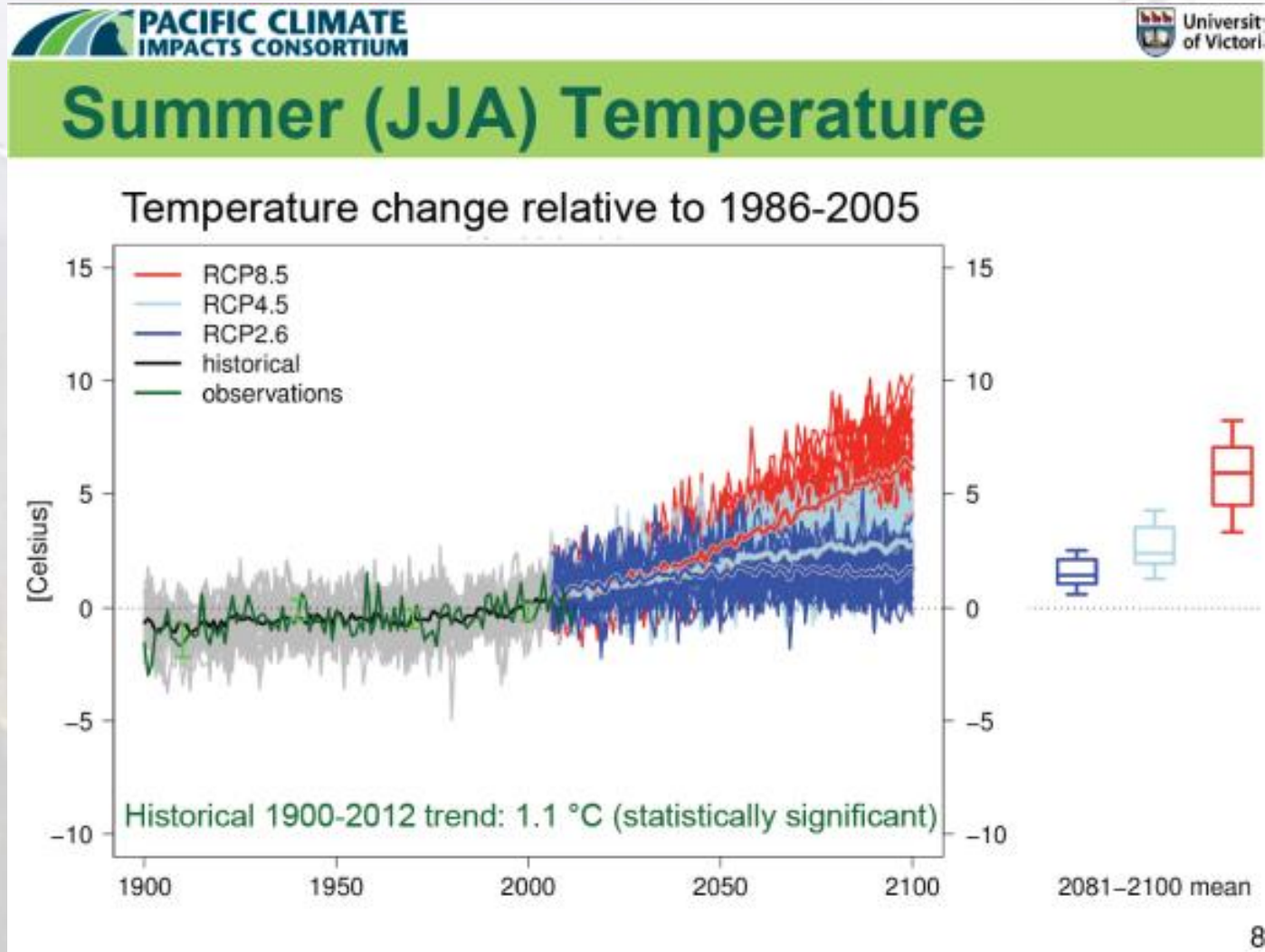
# Climate Change: Guidance for Tree Species Selection

## Natural Variation



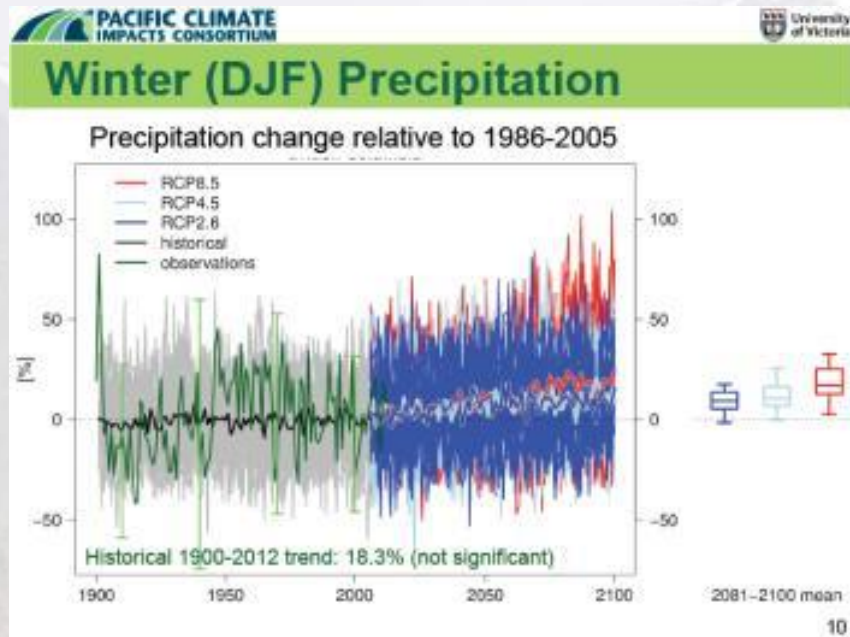
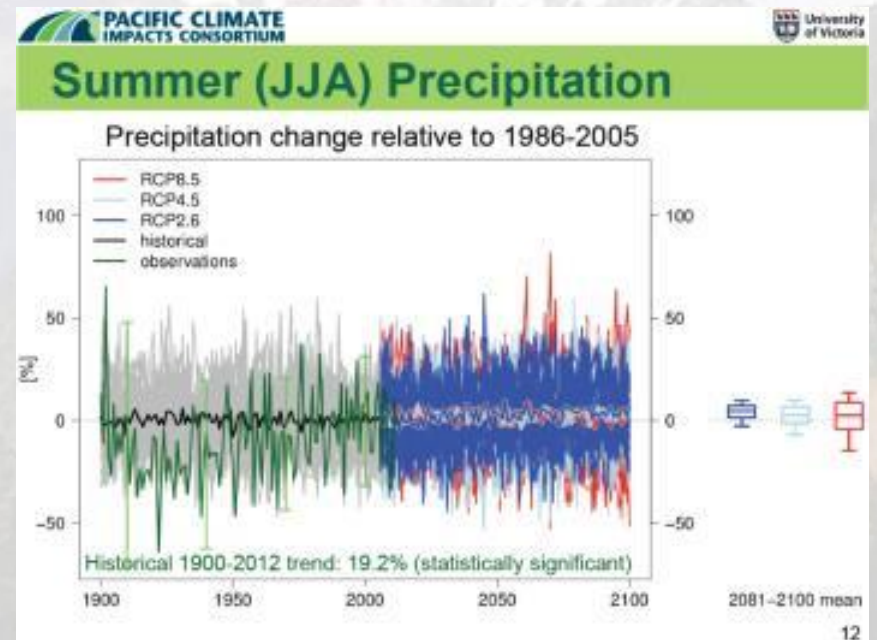
# Climate Change: Guidance for Tree Species Selection

## Natural Variation



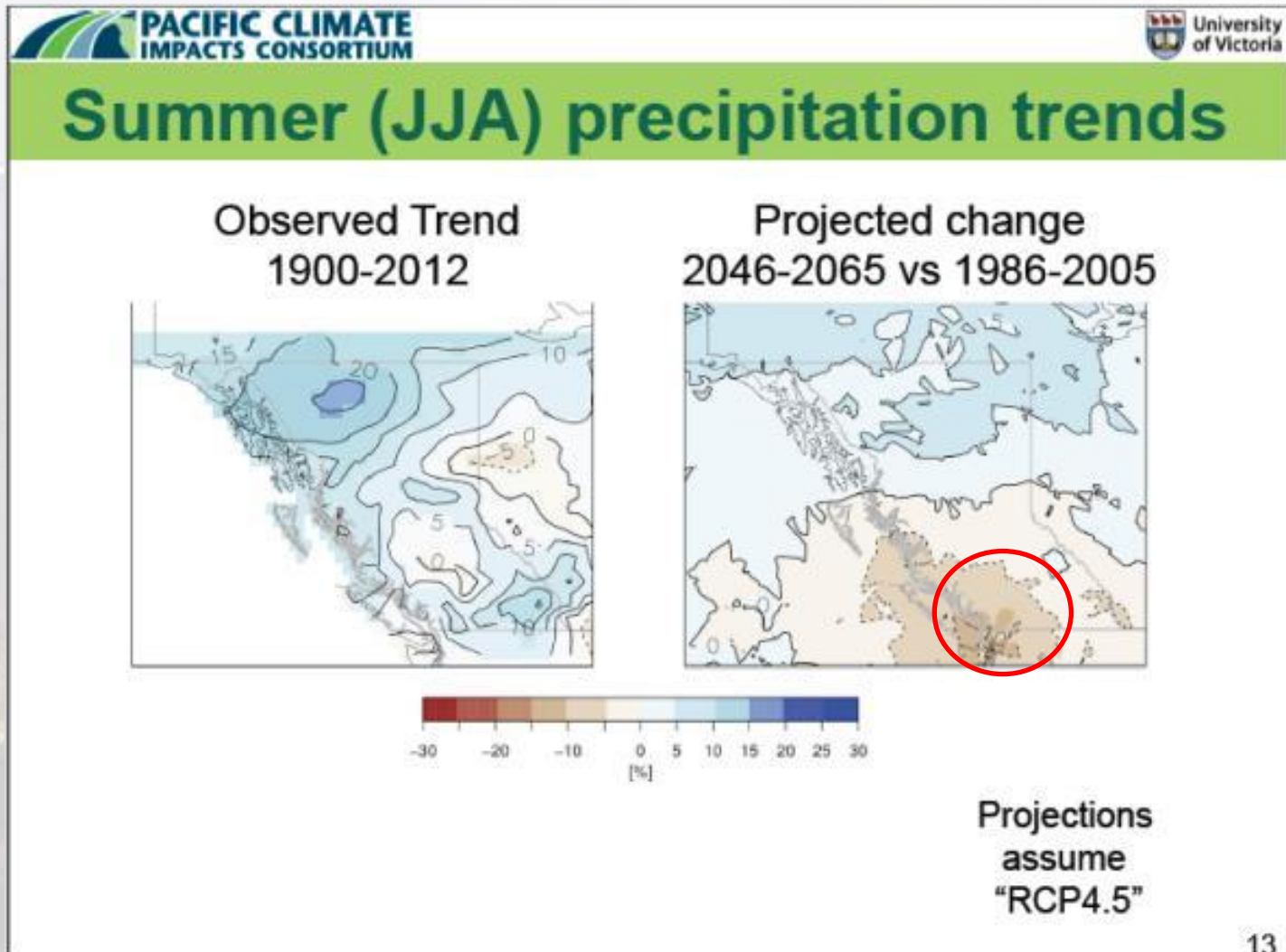
# Climate Change: Guidance for Tree Species Selection

## Natural Variation



# Climate Change: Guidance for Tree Species Selection

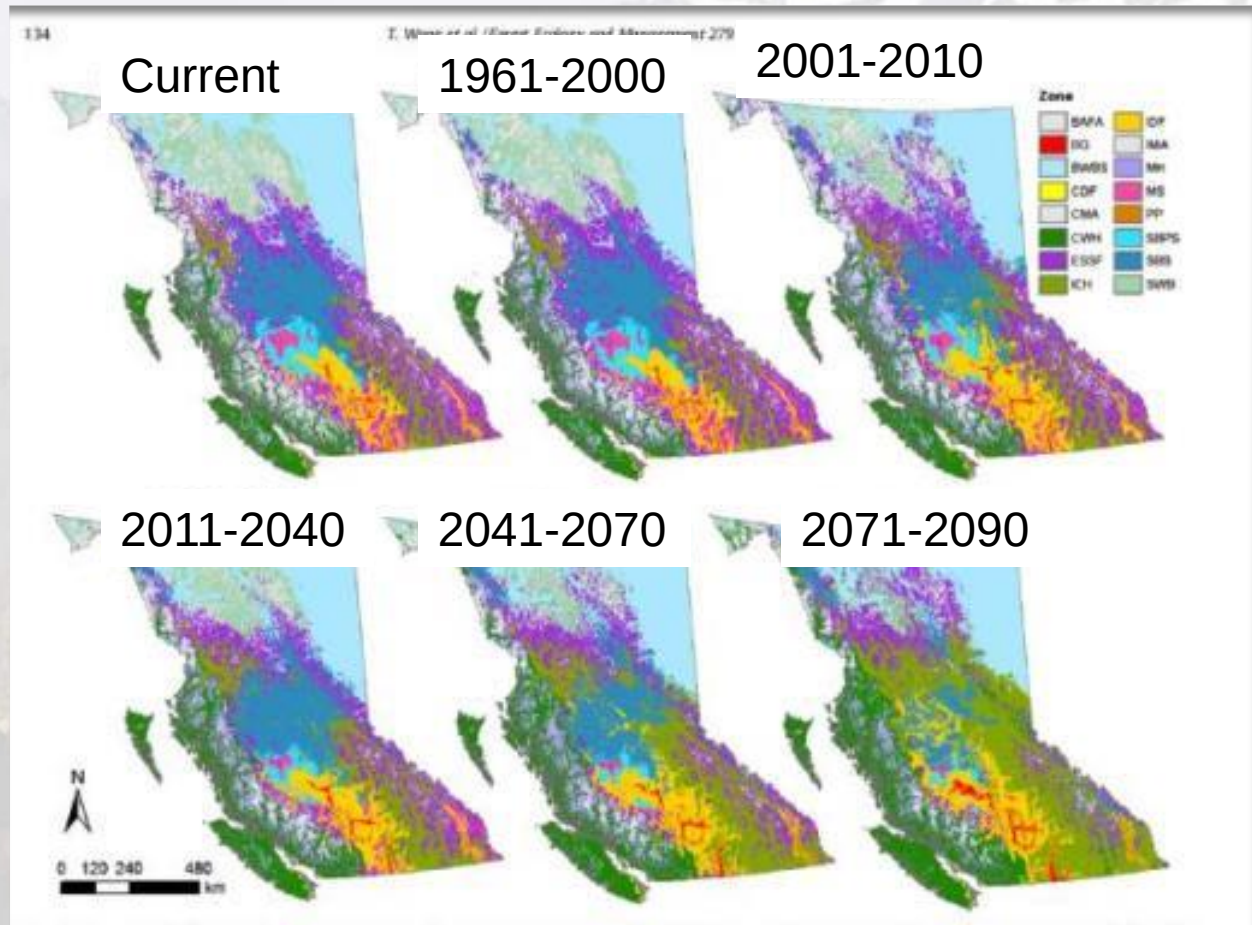
## Natural Variation



# Climate Change: Guidance for Tree Species Selection

## Shifts of climate envelopes – a visualization tool

Note: This is one representation at the zonal level using BC analogues

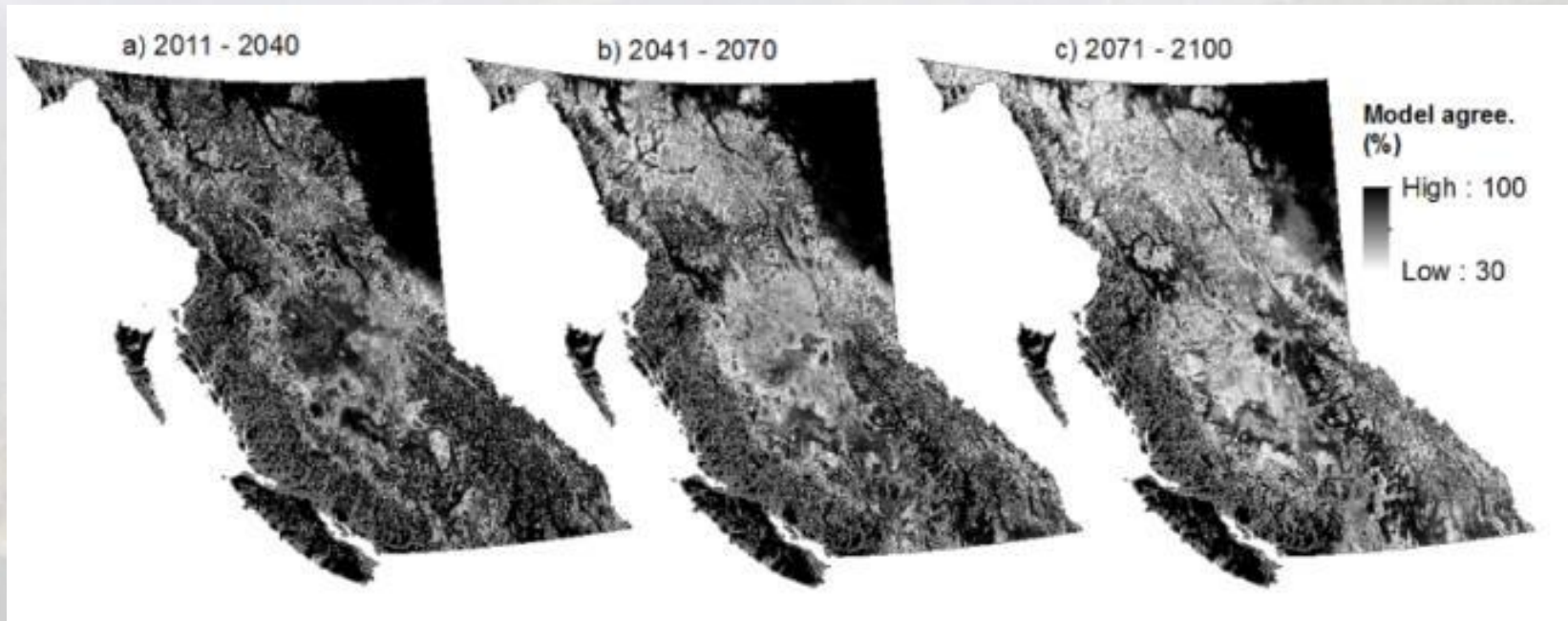


# *Climate Change: Guidance for Tree Species Selection*

## Shifts of climate envelopes

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Model agreement (black) diminishes over time – (e.g., Future is more uncertain).

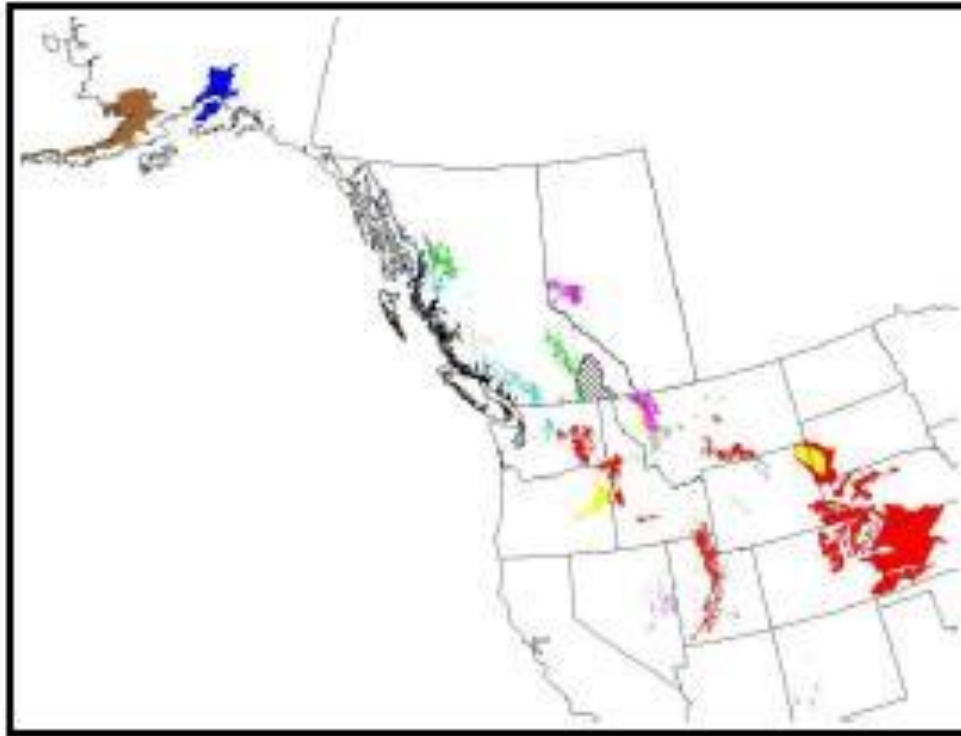


# ***Climate Change: Guidance for Tree Species Selection***

## **Shifts of climate envelopes**

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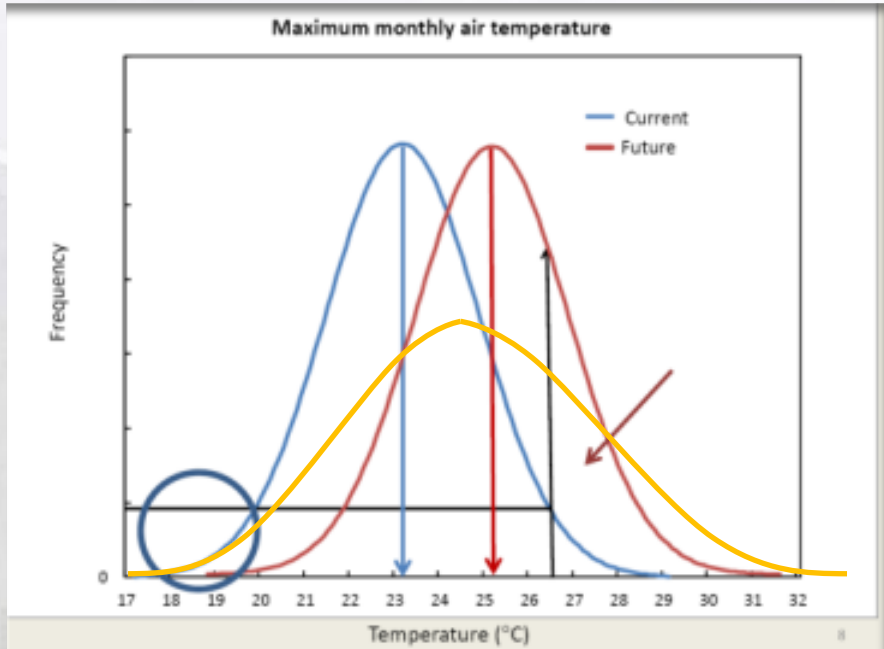
West Kootenay 2080 output - possible climate from outside BC



# Climate Change: Guidance for Tree Species Selection

## Regional plausible futures

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E.g., Shift of the mean and extremes

(Spittlehouse 2012)

It is *virtually certain* that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase. It is *very likely* that heat waves will occur with a higher frequency and duration. Occasional cold winter extremes will continue to occur (see Table SPM.1). {12.4} <http://www.ipcc.ch/report/ar5/wg1/#.UkXFTzJrbGg>

# Climate Change: Guidance for Tree Species Selection

## Use of Plan2Adapt



PLAN2ADAPT

[PCIC Home](#) | [Contact Us](#)

Summary

Region & Time

Temperature

Precipitation

Snowfall

Growing DD

Heating DD

Frost-Free Days

Impacts

Notes

References

### Summary of Climate Change for South Coast in the 2050s

| Climate Variable                   | Season | Projected Change from 1961-1990 Baseline |                                 |
|------------------------------------|--------|------------------------------------------|---------------------------------|
|                                    |        | Ensemble Median                          | Range (10th to 90th percentile) |
| Mean Temperature (°C)              | Annual | +1.7 °C                                  | +1.0 °C to +2.5 °C              |
| Precipitation (%)                  | Annual | +6%                                      | -2% to +11%                     |
|                                    | Summer | -14%                                     | -23% to +3%                     |
|                                    | Winter | +6%                                      | -4% to +15%                     |
| Snowfall* (%)                      | Winter | -24%                                     | -40% to -10%                    |
|                                    | Spring | -52%                                     | -73% to -13%                    |
| Growing Degree Days* (degree days) | Annual | +336 degree days                         | +205 to +519 degree days        |
| Heating Degree Days* (degree days) | Annual | -593 degree days                         | -902 to -362 degree days        |
| Frost-Free Days* (days)            | Annual | +24 days                                 | +13 to +36 days                 |

The table above shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the **2050s** for the **South Coast** region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections (see the 'Notes' tab for more information). The range values represent the lowest and highest results within the set. Please note that this summary table does not reflect the 'Season' choice made under the 'Region & Time' tab. However, this setting does affect results obtained under each variable tab.

\* These values are derived from temperature and precipitation. Please select the appropriate variable tab for more information.

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### Settings

#### Region

South Coast

#### Time Period

- ☐ 2020s (2010-2039)  
☒ 2050s (2040-2069)  
☐ 2080s (2070-2099)

#### Season

- ☐ Winter (DJF)  
☐ Spring (JAM)  
☒ Summer (JJA)  
☐ Fall (SON)  
☐ Annual

Continue

<http://www.pacificclimate.org/tools-and-data/plan2adapt>

# ***Climate Change: Guidance for Tree Species Selection***

## ***Climate Trends***

### **Output from Plan2Adapt – list of impacts**

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#### **Shorter access season where winter access requires frozen road**

- Winter logging season will likely decrease
- More logs may need to be stockpiled for break-up



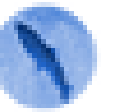
#### **Opportunities for facilitated migration of tree species**

- Increased growing season and changing frost dates
- Southerly species may be more suitable



#### **Warmer and shorter cold season**

- Increased growing season for some commodities
- Heating costs in cold season may decline



#### **Earlier spring lake ice melt.**

- Lake productivity may decline
- Inland fisheries, sport fisheries and related tourism affected
- Salmon smolt migration timing may be affected



# Climate Change: Guidance for Tree Species Selection

## Climate BC map

2010 vs 2050



BEC\_subz\_VI\_2050s:



# Climate Change: Guidance for Tree Species Selection

## A General Perspective on Risk

**Big risks may be a sufficiently compelling to apply treatments in spite of the uncertainties.**

Appropriately weigh these risks and uncertainties:

- Treatments and timing
- Direction from higher level planning
  - realistic description of the current condition and direction
- Realistic expectation of treatment effect over time.
- Phase in
  - Learn by starting small, ramp up to have an effect

| Likelihood     | Consequences  |       |          |       |        |
|----------------|---------------|-------|----------|-------|--------|
|                | Insignificant | Minor | Moderate | Major | Severe |
| Almost certain | M             | H     | H        | E     | E      |
| Likely         | M             | M     | H        | H     | E      |
| Possible       | L             | M     | M        | H     | E      |
| Unlikely       | L             | M     | M        | M     | H      |
| Rare           | L             | L     | M        | M     | H      |

# Climate Change: Guidance for Tree Species Selection

## Managing Risk – information sources

Ministry of Forests, Lands and  
Natural Resource Operations

### Tools

This page provides links to tools useful for:

- understanding changes underway in your area and
- adapting forest management so that BC forests remain resilient to climate change, variability and other stressors.

Credit for each of the tools belongs with each developer noted on the linked web pages.

- **New link!** (June 2013) **Stand Establishment Decision Aids (SEDAs)**: These [SEDAs](#) show *current* forest health risk and point to silvicultural tools and practices to deal with environmentally limiting factors within the context of BEC.
- **New link!** (June 2013) **Forest health change detection risk (hazard/severity) maps** in two formats:
  - Mapped [incidence of pests by TSA and cutblock from the RESULTS database](#) and,
  - [Regional maps of pest distribution](#) using the SEDA information.
- February 2013. FORREX [Checklist for adapting BC's landscapes to a changing environment](#). This checklist summarizes the key considerations for buffering your managed forests against the impact of climate change during planning, harvesting, and reforestation. (3 pages).

**This website is constantly being updated – note New! links**

# *Climate Change: Guidance for Tree Species Selection*

## *Ecological guidance*

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### Coastal BC – Background and Recommended Guidance

Thanks to the ecologists for their input:

Vancouver Region - Sari Saunders, Heather Klassen, and Andy MacKinnon

Prince Rupert Region – Phil LePage, Sari Saunders, Heather Klassen and Andy MacKinnon



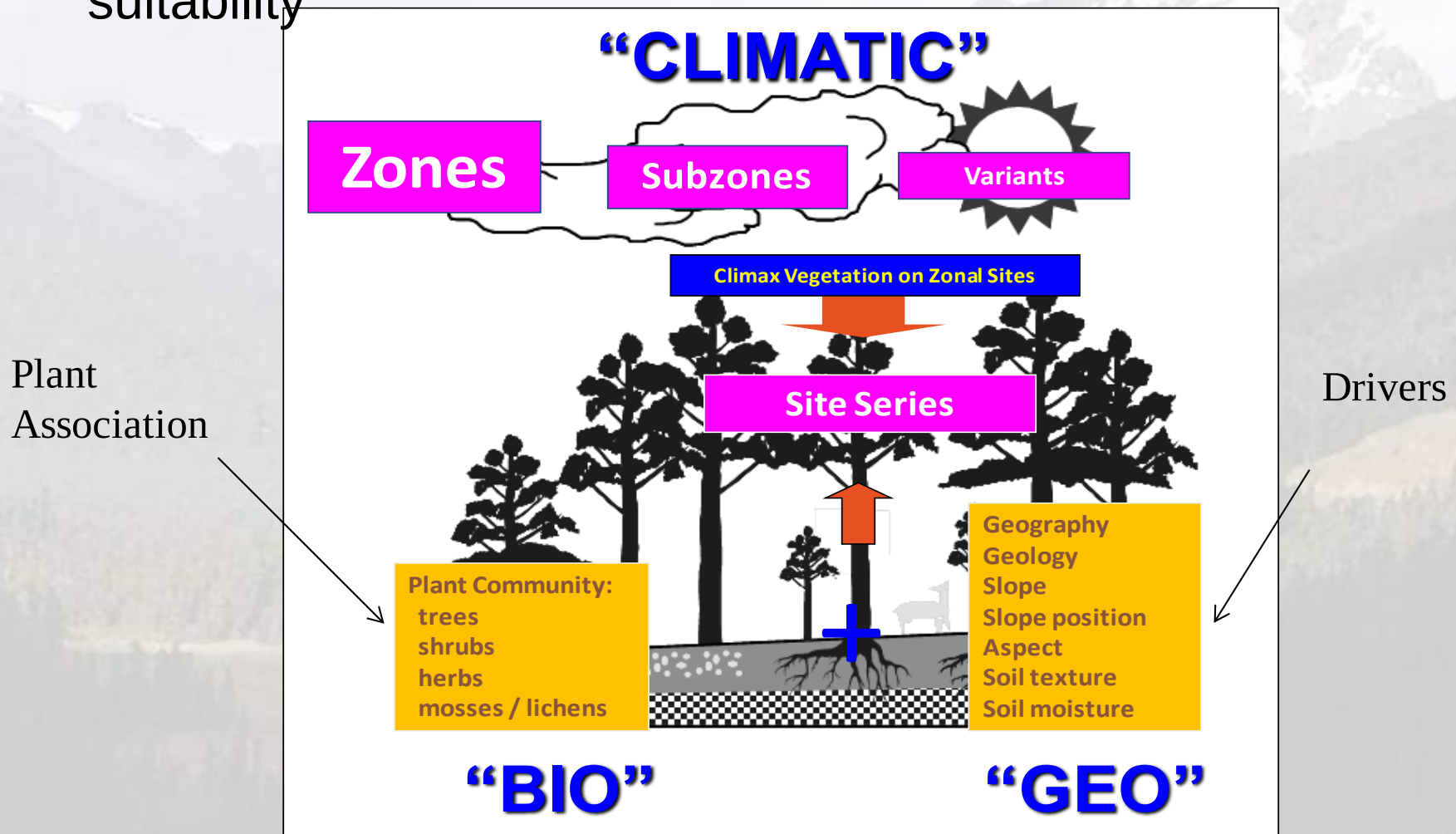
|                |        |              | Regeneration Guide |               |                    |                    |          |                                 |                  |             |        |           | Free Growing Guide |            |        |                 |    |
|----------------|--------|--------------|--------------------|---------------|--------------------|--------------------|----------|---------------------------------|------------------|-------------|--------|-----------|--------------------|------------|--------|-----------------|----|
| BGC            |        |              | Species            |               |                    |                    |          |                                 |                  | Stocking(i) |        |           | Regen              | Assessment |        | Min. Height(ii) |    |
| Classification |        |              |                    |               |                    |                    |          |                                 | Broadleaf        | Target      | MIN pa | MIN p     | Delay              | Earliest   | Latest | Species         | Ht |
| Zone/SZ        | Series | Standards ID | Primary            | Preferred (p) | Secondary          | Acceptable (a)     | Tertiary |                                 | (well-spaced/ha) |             |        | (Max yrs) | (yrs)              | (yrs)      |        | (m)             |    |
| SBSdk          | 01     | 85193        | PI Sx              | PI Sx         | Fd <sup>8,18</sup> | Fd <sup>8,18</sup> |          | At <sup>3</sup> Ep <sup>3</sup> | 1200             | 700         | 600    | 7         | 12                 | 15         | PI     | 2.00            |    |
|                |        |              |                    |               |                    |                    |          |                                 |                  |             |        |           |                    |            | Fd     | 1.40            |    |
|                |        |              |                    |               |                    |                    |          |                                 |                  |             |        |           |                    |            | Others | 1.00            |    |

- 1990 - BEC classification incorporated into the Correlated Guidelines for Free Growing Stocking Standards for Ecosystems of BC

- The current Chief foresters Reference Guide Stocking Standards uses BEC site series as the foundation for preferred and acceptable and/or 1°,2°,3° tree species selection

- BEC site series classification: site level units or ecosystems defined at the plant association level that reflect site capacity

Strong climate level to site level relationship makes BEC site series an ideal unit of measure and platform for predicting future bio-climate conditions and species suitability



In 2012 Resource Practice's Branch (RPB) (Winter and Astridge, 2012) initiated a climate change based species guidance project

BEC Ecologists asked to participate in Phase 1 of the project using available tools to develop Reference Guide promotion/demotion rankings for species at the site series level (only the zonal 01 site series was used to start with).

Projections for future BEC bio-climate envelope niches were produced by Wang et al. (2010 - UBC Dept of Forest Sciences) using the Climate – Western North America (WNA) model and run with 20 scenarios to generate a projection consensus map for 2020, 2050 and 2080

Some tools ecologists used in the RPB project used were:

- 1) BEC Database Tool (Bio-climate envelope/reference guide queries)
- 2) Species Drought Risk Tool (FFESC)
- 3) ClimateWNA Model

# BEC Database Tool Output

## Current Reference Guide species status

| Zone  | Site Series | Act | At | Ba | Bl | Cw | Dr | Ep | Fd | Hm | Hw | Lw | Mb | Pl | Pw | Py | Sx | Sxs |
|-------|-------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| SBSdk | 01          |     | 4  |    |    |    |    | 4  | 2  |    |    |    |    | 1  |    |    | 1  |     |

## 2080 projected % area changed and new species status

| 2080   | Site Series | Act | At | Ba | Bl | Cw | Dr | Ep | Fd | Hm | Hw | Lw | Mb | Pl | Pw | Py | Sx | Sxs | % Area Changed |
|--------|-------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----------------|
| IDFmw2 | 01          |     | 4  |    |    | 3  |    | 4  | 1  |    |    | 3  |    | 1  |    |    |    |     | 37.70%         |
| IDFxh2 | 01          |     | 4  |    |    |    |    |    | 1  |    |    |    |    |    |    | 1  |    |     | 18.98%         |
| SBSdk  | 01          |     | 4  |    |    |    |    | 4  | 2  |    |    |    |    | 1  |    |    | 1  |     | 28.92%         |
| Other  | 01          |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     | 14.40%         |
|        |             |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     | 100.00%        |

|   |                |
|---|----------------|
|   | Stays the same |
|   | Was added      |
|   | Promoted       |
|   | Demoted        |
|   | Was removed    |
| 1 | primary        |
| 2 | secondary      |
| 3 | tertiary       |
| 4 | deciduous      |

Based on output from available tools ecologists were asked to recommend promotion, demotion, addition or deletion of species in a few subzone variants (zonal sites). Then create a logic matrix:

1. Ran the VPRo database tool for zonal 01 sites and picked the dominant unit changes
2. Look at the ClimateWNA projected variables and see if the logic agreed
3. Formulated draft rational for promotion/demotion based on the assumptions of whether we could establish species now on site and/or whether species would be maladapted or not at rotation

In the RPB draft document “**Suggested changes to the Reference Guide for FDP stocking standards**” an example of a conservative species promotion is Fd and Lw on SBSdk/03-05 sites

Current reference and updated guide

|                     |        |              | <b>Regeneration Guide</b> |                                              |                                        |                              |          |
|---------------------|--------|--------------|---------------------------|----------------------------------------------|----------------------------------------|------------------------------|----------|
| BGC                 |        |              | Species                   |                                              |                                        |                              |          |
| Classification      |        |              |                           |                                              |                                        |                              |          |
| Zone/SZ             | Series | Standards ID | Primary                   | Preferred (p)                                | Secondary                              | Acceptable (a)               | Tertiary |
| SBSdk               | 01     | 85193        | PI Sx                     | PI Sx                                        | Fd <sup>9,18</sup>                     | Fd <sup>9,18</sup>           |          |
| Climate Change 2013 | 01     |              | PI Sx                     | PI Sx Fd <sup>9,18,32</sup> Lw <sup>32</sup> | Fd <sup>9,18,32</sup> Lw <sup>32</sup> | <del>Fd<sup>9,18</sup></del> |          |

## Suggested promotion in draft

SBSdk/ 03, 05 (Prince Rupert)

| Species | Present Category | Suggested Category | Preferred/ Acceptable Recommendation | Promotion or Demotion | Rationale/Footnotes                                                                                                       |
|---------|------------------|--------------------|--------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------|
| Fd      | 0                | 3                  | Acceptable                           | Promotion             | Well drained somewhat drier soils. Avoid areas where there is potential of cold air/frost ponding.                        |
| Lw      | 0                | 3                  | Acceptable                           | Promotion             | Southerly aspects and moist well drained soils preferred. Avoid areas where there is potential of cold air/frost ponding. |

# Autecology of Lw and Fd

Primary ecological amplitudes for Lw and Fd are the same

But still need to recognize the differences (strengths/weaknesses) between the species

Figure 2 – Lw ASMR

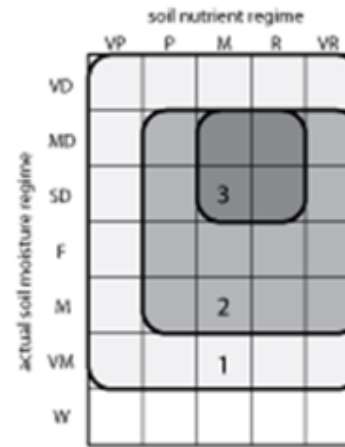
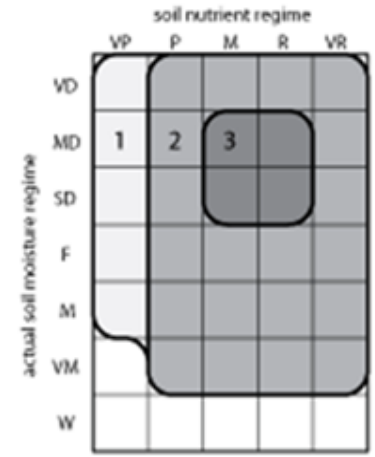


Figure 3 – Fd ASMR



| Feature                        | Western Larch                            | Douglas-fir                           |
|--------------------------------|------------------------------------------|---------------------------------------|
|                                | <b>Tolerance Class</b>                   |                                       |
| northern extent                | Currently south of 51 deg lat            | Currently just north of 55 deg lat    |
| Edaphic amplitudes             | mod-dry to slightly-dry: medium-rich nut | mod-dry to slightly-dry: medium nut   |
| low light                      | L                                        | L - H                                 |
| frost                          | M                                        | L - M                                 |
| heat                           | M                                        | M - H                                 |
| water deficit                  | M                                        | M                                     |
| water surplus                  | L                                        | L                                     |
| nutrient (mainly N) deficiency | M                                        | M                                     |
| snow                           | H                                        | L - M                                 |
| wind                           | H                                        | H                                     |
|                                | <b>Risk Class</b>                        |                                       |
| fire                           | M (resist ground fire when mature)       | M (resist ground fire when mature)    |
| insects                        | *M (Lw case earer, sx budworm)           | H (Fd beetle, bud worm, tussock moth) |
| fungi                          | L                                        | *H (rootrot, butt rot, needle cast)   |
| other agents                   | M (dwarf mistletoe)                      | L (browse, hair, rohdent...)          |
|                                | <b>Interperative Class</b>               |                                       |
| Reproduction capacity          | H                                        | H                                     |
| Seed disemintation capacity    | M                                        | H                                     |
| Low light nat reg potential    | L                                        | L-H                                   |

## Keep in Mind:

- Climate change is occurring and we need to use the tools we have to make educated BEST GUESSES
- Climate projections are based on a range of scenarios. Managing for the future should be based on a range of potential outcomes (not all eggs in one basket)
- Field data for Fd and Lw plantations, some up to 50 years old, indicate both species show excellent potential within parts of the ICHmc2, SBSdk, dw3, mc2 and CWHws1 (LePage, P and L. McCulloch 2010)
- Bioclimate models for Lw can be used in conjunction with modeled geographic patterns of genetic variation to develop and map for the contemporary climate the seed zones and seed transfer guidelines needed for reforestation (Rehfeldt G. E. And Jaquish, B.C, 2010).
- Need to be proactive but be aware of the assumptions of tools and models e.g:
  - 1) strengths and weaknesses in tree species responses (mixed vs single spp planting)
  - 2) site level changes
  - 3) need to maintain and initiate monitoring and more long term trials to answer some of these questions

Not sure what to plant here guys.  
Maybe a beer or two would help?





# References and Links

The paper entitled Stand level Tool Paper\_Nov\_DeLong\_etal.pdf is a draft manuscript so not published yet and, no link exists and I can't circulate widely so don't use the FTP link for that one but the other less detailed report is available on the Future Forest Ecosystem Scientific Council website at [http://www.for.gov.bc.ca/hfp/future\\_forests/council/#completed-projects](http://www.for.gov.bc.ca/hfp/future_forests/council/#completed-projects) entitled "Risk analysis and Decision Support Tool" which covers the central concepts behind the work so just use this one and if they have more detailed questions they can get a hold me. Also, I have changed the footnotes below so that links to publications work. I have also included links to the associated models so that folks can play with these them selves

Resource Practices Branch - Tree Species Selection Tool -

<http://www.for.gov.bc.ca/hfp/silviculture/TSS/tss.htm>

[<sup>1</sup>] DeLong, S.C, H. Griesbauer<sup>2</sup>, and C. R. Nitschke, 2012 (accessed December 4, 2013). Risk Analysis and Decision Support Tool, Future Forest Ecosystem Scientific Council, Final Report, [http://www.for.gov.bc.ca/hfp/future\\_forests/council/#completed-projects](http://www.for.gov.bc.ca/hfp/future_forests/council/#completed-projects) . (To download or run Stand Level Drought Risk Assessment tool see [http://www.for.gov.bc.ca/hfp/silviculture/TSS/Drought\\_Risk.html](http://www.for.gov.bc.ca/hfp/silviculture/TSS/Drought_Risk.html) on the Tree Species Selection Tool website <http://www.for.gov.bc.ca/hfp/silviculture/TSS/tss.htm> )

[<sup>2</sup>]Wang, T., E.M. Campbell, G.A. O'Neill, S.N. Aitken (2012). Projecting future distributions of ecosystem climate niches: Uncertainties and management applications. For. Ecol. Manage. 279:128-140. <http://www.sciencedirect.com/science/article/pii/S0378112712003118> (For further information on ClimateWNA (Western North America) Prism downscaling model see <http://cfcg.forestry.ubc.ca/projects/climate-data/climatebcwna/> ; to run the web version of ClimateWNA see <http://climatemodels.forestry.ubc.ca/climatewna/>

# Climate Change: Guidance for Tree Species Selection

## What about climate effects on species use?

### What is being done?

Type 4 Silviculture Strategies have species direction at the Subzone level as desired trends and or targets, e.g., for SBSdw in the Quesnel TSA

#### SBSdw

| Pl      |                                                                                   |         | Sx      |                                                                                    |         | Fd      |                                                                                     |         |
|---------|-----------------------------------------------------------------------------------|---------|---------|------------------------------------------------------------------------------------|---------|---------|-------------------------------------------------------------------------------------|---------|
| Current | Trend                                                                             | Target  | Current | Trend                                                                              | Target  | Current | Trend                                                                               | Target  |
| 68 / 80 |  | 20 - 30 | 25 / 11 |  | 15 - 20 | 5 / 5   |  | 30 - 40 |

Promote Fd where possible; maintain reduced dependence on Pl, increased use of Sx over harvest.

- Current—proportions planted / logged
- Trend—whether it is desired to
  - increase 
  - decrease or 
  - maintain the proportion planted / logged 
- Target— a biological target for the unit to trend towards where feasible

## What about climate and wildfire – our options?

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### Fire Management Stocking Standards



Ed Korpela  
Fire Management Specialist  
Wildfire Management Branch

## What about climate and wildfire – our options?

### Fire Management Stocking Standards

- Ability to provide win/win scenarios
  - Ecosystem restoration
  - Hardwood production
  - Fire hazard reduction
- Consistent with Chief Forester Guidance on:
  - Incorporating mixedwood and broadleaves
  - Tree species composition at stand and landscape scales
  - Maintaining/recruiting habitat
  - Use of western larch
  - Immediate and long-term forest health issues



## **What about climate and wildfire – our options?**

### **Fire Management Stocking Standards - Key Questions**

- Why – Protection of life and property and enhancement of the delivery of ecosystem goods and services from forests within BC
- Where – where should fire management stocking standards apply?
- When – at what point(s) in the life of a stand should stocking standards apply?



## *Climate Change: Guidance for Tree Species Selection*

### **What about climate and wildfire – our options?**

#### **Fire Management Stocking Standards - Where**

- Relative to values negatively impacted by fire on the landbase
  - Within approx 2 km of interface
    - Provincial strategic threat analysis (PSTA) map
  - Within approx 2 km of other high value infrastructure on the landbase
    - Fire Management Plan Values Maps
    - Additional defined by Designated Decision Maker
  - Where identified by fuels management plan within the fire management plan
    - Based on landscape scale fire management objectives



## **What about climate and wildfire – our options?**

### **Fire Management Stocking Standards - Where cont.**

- Does not necessarily have to be applied to entire harvest blocks
  - Usually adjacent to value to be protected
  - On other appropriate standard units
  - More than one fire management standard could be developed
    - May be desirable to create a diversity of fuel types
    - Spatial arrangement of fuel types is important – locally and landscape



## What about climate and wildfire – our options?

### Fire Management Stocking Standards - When

- At different forest successional stages
  - Regeneration/ Free growing
  - Partial harvest with regeneration objectives
  - Intermediate Cut
- When identified by fuels management plan within a fire management plan
  - Based on landscape scale fire management objectives
  - May apply to any/all phases of forest production



## **What about climate and wildfire – our options?**

### **Fire Management Objectives**

- May be Landscape or Local
  - Landscape
    - Reduce fire size
    - Reduce fire behaviour
  - Local
    - Reduce fire behaviour
    - Reduce likelihood of crown fire
    - Reduce fire intensities
    - Reduce rate of spread
- In both cases – typically include enhanced suppression effectiveness and success as an objective



# *Climate Change: Guidance for Tree Species Selection*

## **What about climate and wildfire – our options?**

### **Stand Structure Considerations**

- Include:
  - Species
    - Species fire characteristics
    - Species fire resistance
  - Inter-tree distance
    - Density and canopy bulk density
  - Canopy base height
  - Ecological suitability
  - Genetics
  - Tree/competition height ratios
  - Climate change considerations
  - Forest succession and in-growth including understory

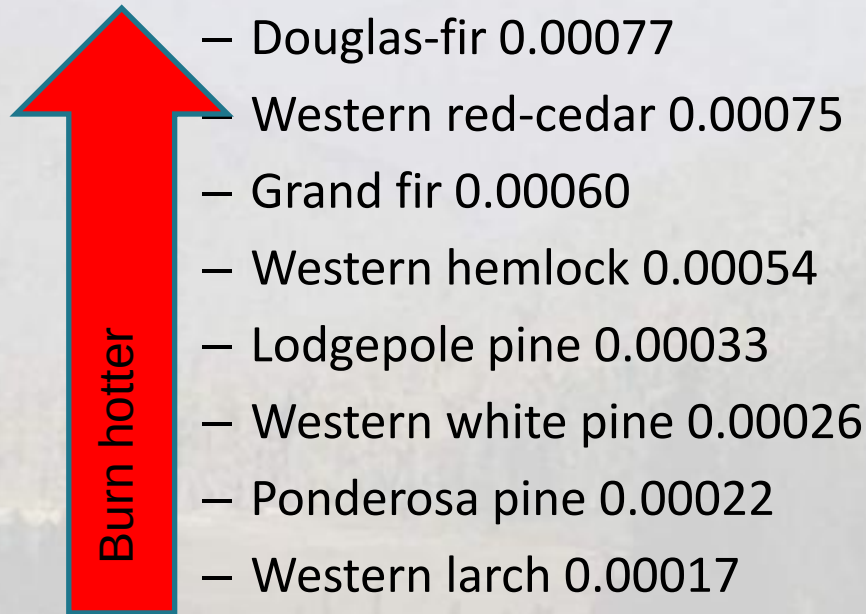


# *Climate Change: Guidance for Tree Species Selection*

## **What about climate and wildfire – our options?**

### Species Considerations

- Representative Canopy Bulk Densities (kg/cubic meter) for a single tree of the same size (approx 30cm dbh and 20 m tall)  
In order of decreasing bulk density – higher means hotter



# *Climate Change: Guidance for Tree Species Selection*

## What about climate and wildfire – our options?

### Species Considerations

- **Fire Resistance**

- **High** - western larch, ponderosa pine, Douglas-fir
- **Moderate** - western white pine, lodgepole pine, western red-cedar
- **Low** - western hemlock, grand fir, Pacific silver fir
- Notes - Highly dependent on bark thickness (thicker is better), rooting habit (deep is better), branching habit (self pruning is better), foliage density (less is better) and associated species. Relationships and categorization vary with age and opinion.

- **Flammability**

- Deciduous species are generally far less flammable than coniferous species.
- Western red-cedar may be considered the most flammable of the coniferous species considered due to tendency to retain foliage and oil.



## **What about climate and wildfire – our options?**

### **A Fire Management Stocking Standard**

- Then becomes the combination of:
  - Fire management objectives
  - Stand structure considerations
  - And other compatible objectives (e.g. Timber production, ecosystem restoration, hardwood production, etc)



## **What about climate and wildfire – our options?**

### **Fire Management Stocking Standard Development Approaches**

- Development of new stocking standards
- Approved variance(s) on existing standards
- Planning to develop guidance for approved variances – option 2.



# ***Climate Change: Guidance for Tree Species Selection Managing Risk and Exploring Options***

## ***LOTS OF THOUGHT ON THIS ONE***

### ***The BC Wildland Fire Management Strategy 2010***

Framework for achieving fire resilient landscapes.

### ***Forest Sector Strategy for BC 2012***

...Province will implement landscape fire management planning...

### ***The BC Forest Stewardship Action Plan for Climate Change***

...Manage risks and capture opportunities for fire resilience

- ***Need to bring this into some thoughtful operational strategic planning***



# Climate Change: Guidance for Tree Species Selection

What can be done now?

## Available guidance

### UPDATES TO THE REFERENCE GUIDE FOR FDP STOCKING STANDARDS (2013): CLIMATE-CHANGE RELATED STOCKING STANDARDS



Resources Practices Branch:

Ministry of Forests, Lands and Natural Resources Operations

DRAFT V 3.2

January 16, 2014

## Ecological Guidance An example

KAMLOOPS – THOMPSON OKANAGAN

ESSFwc2/01 (Kamloops)

#### Trends and Comments

- ESSFwc2 encompasses 617,608 ha.
- About 50% of the ESSFwc2 is proposed to shift to ICH by 2020 and 75% by 2050.
- This is one of the largest changes by area for BGC units in the Thompson Okanagan Region
- Consider use of lower-elevation genetic stock of spruce (Sx)

| Species | Present Category         | Suggested Category          | Preferred/ Acceptable Recommendation | Promotion or Demotion | Rationale/Footnotes                                                                             |
|---------|--------------------------|-----------------------------|--------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------|
| BI      | 1                        | 1                           | Preferred                            | No change             |                                                                                                 |
| PI      | 3 PI <sup>(27, 24)</sup> | 0                           | Not suitable                         | Demotion              | Not a suitable species.                                                                         |
| Fd      | 0                        | 3 Fd <sup>(9, 14, 32)</sup> | Acceptable                           | Promotion             | May consider use on warm aspects at low elevations where growing-season frosts are not expected |
| Cw      | 0                        | 3 Cw <sup>(14, 32)</sup>    | Acceptable                           | Promotion             | Consider using Cw at lowest elevations                                                          |
| Hw      | 0                        | 3 Hw <sup>(14, 32)</sup>    | Acceptable                           | Promotion             | Consider using Hw at lowest elevations                                                          |
| Pw      | 0                        | 3 Pw <sup>(32, 9, 14)</sup> | Acceptable                           | Promotion             | Use blister-resistant stock on warm aspects at low elevations                                   |

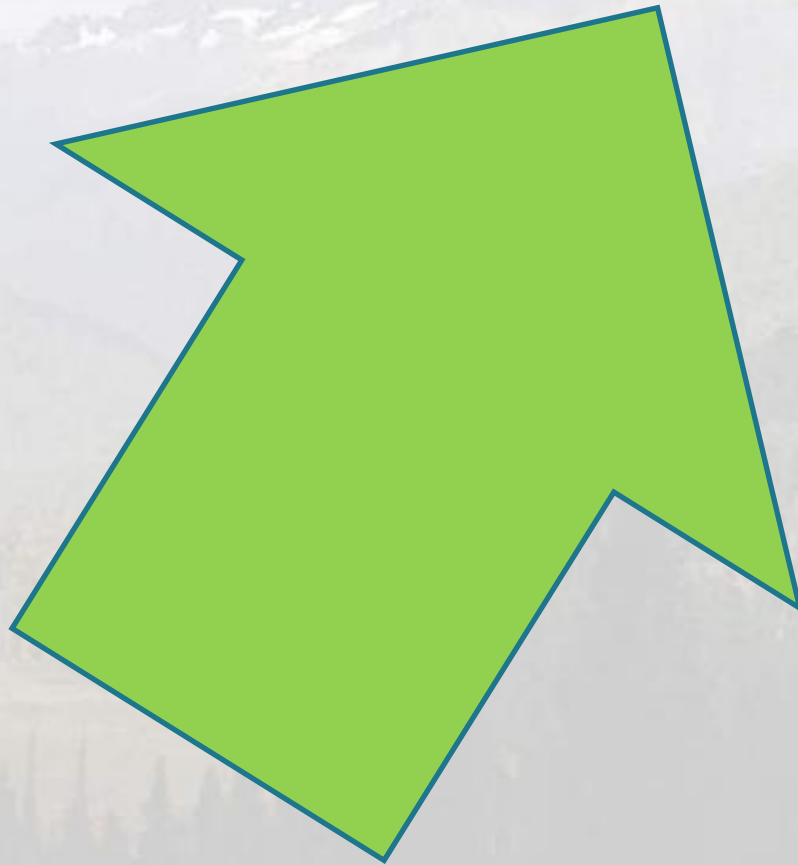
# ***Climate Change: Guidance for Tree Species Selection***

*What can be done now?*

## **Available guidance**

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Link to guidance document to show specific examples – query participants

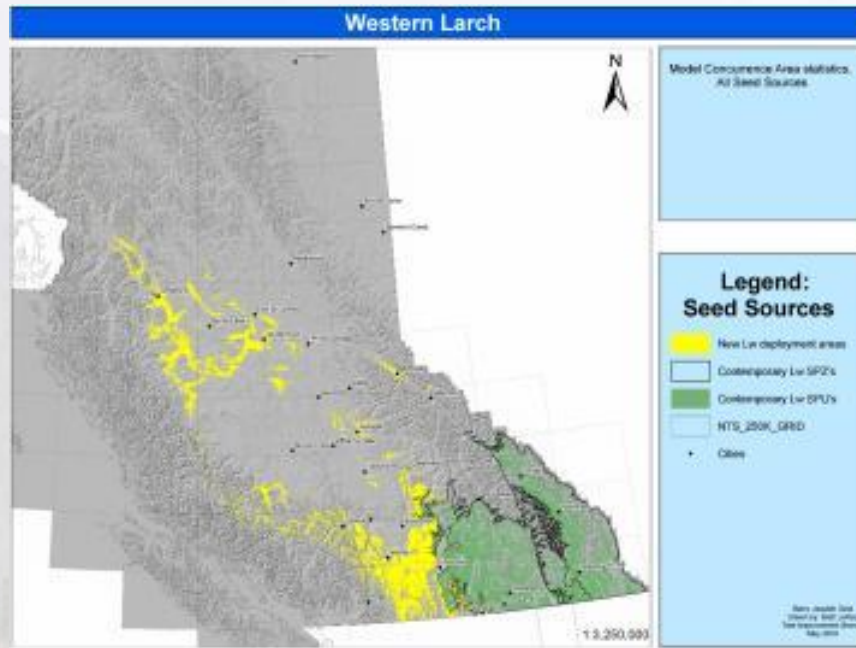
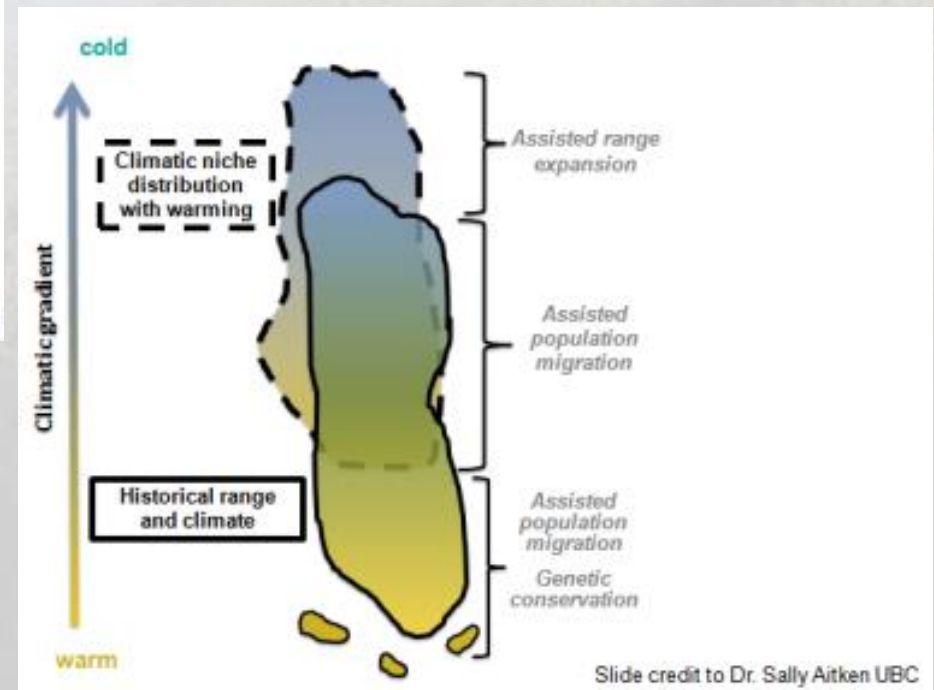


# Climate Change: Guidance for Tree Species Selection

*What can be done now?*

## Available guidance – added range for Lw

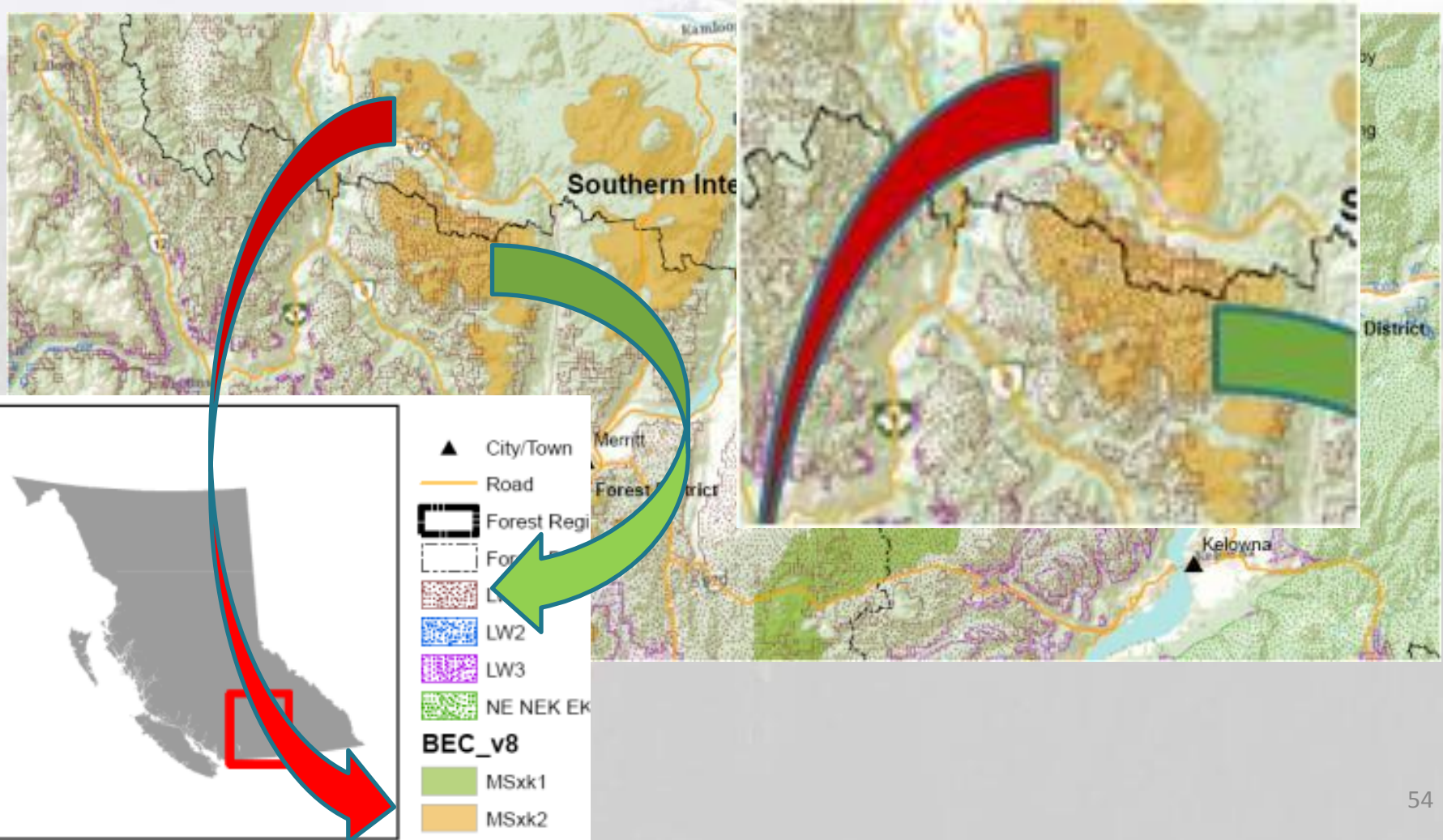
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# Climate Change: Guidance for Tree Species Selection

*What can be done now?*

**Not all area is available within the present transfer rules**



# Climate Change: Guidance for Tree Species Selection

*What can be done now?*

**Available guidance – you have 5% or if you desire more**

## What to do now if you wish to transfer outside of the defined seed zones

Ministry of Forests, Lands and Natural Resource Operations

Tree Improvement Branch - Welcome

Featured Sites

- Operational Tree Improvement Program Call for Proposals 2014/15
- Whiteback Pine - Tree Seed Centre Activities
- Climate Based Seed Transfer
- Summary Data and Graphs
- MPR Seed Planning Process and Opportunity Mapings
- New Jurisdiction Seed Prices and the Core and Seed Fee Schedule (effective April 1, 2011)
- Amendments to Chief Forester's Standards for Seed Use
- Operational Seed Planning Reference
- Map Gallery
- Receive the latest MPR announcements and updates by e-mail

Changes and Amendments

- Amendment to the Standards - June 2010
- Amendment to the Standards - November 2008
- Amendment to the Standards - June 2008
- Amendment to the Standards - November 2006
- Changes to Seed Transfer Limits - April 2005
- Notice from Jim Swenson, Chief Forester - November 25, 2004
- Seed Standards to Help Protect BC Tree Gene Resources - September 24, 2004

Policies & Procedures

| Title                                    | Download                                 |
|------------------------------------------|------------------------------------------|
| Chief Forester's Standards for Seed Use  | <a href="#">HTML</a> <a href="#">PDF</a> |
| Updating Parent Tree and Lot Information | <a href="#">HTML</a> <a href="#">PDF</a> |
| Alternatives Policy                      | <a href="#">HTML</a> <a href="#">PDF</a> |
| Amendment Policy                         | <a href="#">HTML</a> <a href="#">PDF</a> |
| Parent Tree Information Policy           | <a href="#">HTML</a> <a href="#">PDF</a> |

Call Lee – she will help guide you through the process

Lee Charleson  
[Lee.Charleson@gov.bc.ca](mailto:Lee.Charleson@gov.bc.ca)  
1 250 387-4839

Ministry Home Government of British Columbia  
Ministry of Forests and Range

The Minister News Search Reports & Publications Contacts

**Alternatives Policy**  
**Chief Forester's Standards for Seed Use.**

Effective Date: June 1, 2005

**Scope**

In accordance with the section 169 of the Forest and Range Practices Act (FRPA), section 43 of the Forest Planning and Practice Regulation, and section 32 of the Woodlot Licence Planning and Practices Regulation, I established the Chief Forester's Standards for Seed Use. These standards, which came into effect on April 1, 2005.

Under the aforementioned regulations, a person who uses seed to establish a tree growing stand may submit for approval an alternative to any standard established by the chief forester. Furthermore, these regulations require that I only approve an alternative if I consider it to be consistent with achieving the intent of the standard. If I approve the alternative, the person who submitted it must subsequently comply with the approved alternative.

**Purpose**

This policy provides an account of the guiding principles, procedures, information and factors that I will use when considering an alternative to any standard in the Chief Forester's Standards for Seed Use.

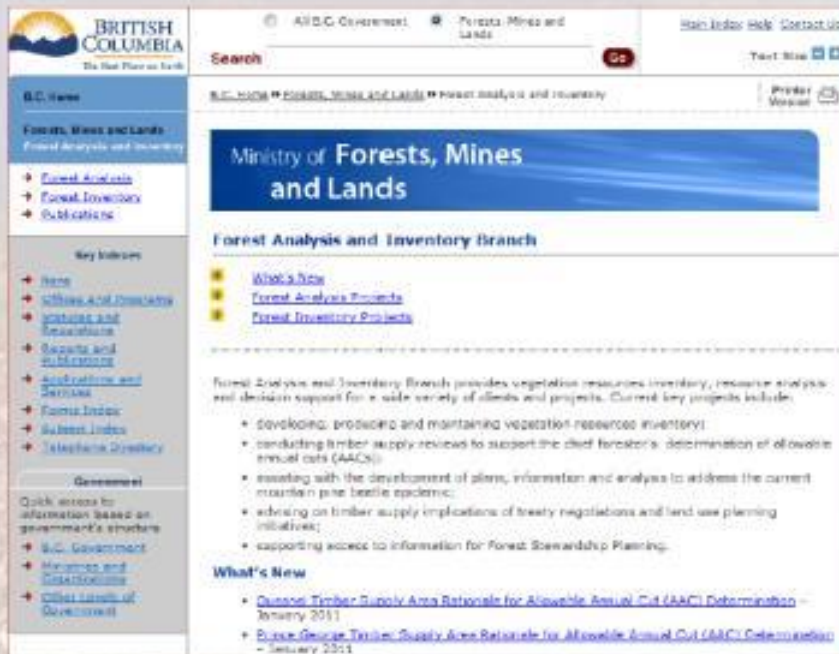
# Climate Change: Guidance for Tree Species Selection

## What can be done now? - FRPA tests

### Stocking Standards The Tests

After the overview need to be confident that the other tests have been met

FPPR s.26 / FRPA s.16



### The Tests

1. Addresses established objectives. Meets content requirements.
2. Includes ecologically suitable species
3. Poses no immediate or long-term forest health risks.
4. Maintains or enhances an economically valuable supply of commercial timber.
5. **Is consistent with TSR analysis and assumptions.**

# ***Climate Change: Guidance for Tree Species Selection***

## ***What can be done now? FRPA tests***

---

### ***Stocking Standards***

### **Consistent with TSR analysis and assumptions**



#### **What if it is not consistent?**

#### **DDM MAY confer with licensee and:**

- Consider for discretionary approval
- Must be deemed reasonable according to criteria

#### **The Tests**

1. Addresses established objectives. Meets content requirements.
2. Includes ecologically suitable species
3. Poses no immediate or long-term forest health risks.
4. Maintains or enhances economically valuable commercial timber supply.
5. **Is consistent with TSR analysis and assumptions.**

# Climate Change: Guidance for Tree Species Selection

What can be done now? FRPA tests

## Stocking Standards

**Consistent with TSR analysis and assumptions**

### *Discretionary Approval*

#### Test 5

- **Sec 26 (5)**

#### **PURPOSE:**

- New situations, priorities etc
- Allows for innovation
- Situations where appropriate standards are not currently consistent with TSR.

*Discretionary Approval – where the standards are reasonable having regard for the future timber supply for the area.*



# Climate Change: Guidance for Tree Species Selection

What can be done now? FRPA tests

## Stocking Standards

**Consistent with TSR analysis and assumptions**

### Discretionary Approval



Section 26 (5) The minister may approve the stocking standards...even though they do not conform to subsection (3) or (4) of this section, if the minister is satisfied that the regeneration date and stocking standards are reasonable, having regard to the future timber supply for the area

#### **Must Approve if it:** *FPPR s.26(1,3,4)*

- 1. Addresses established objectives. Meets content requirements.**
- 2. Includes ecologically suitable species**
- 3. Poses no immediate or long-term forest health risks.**
- 4. Maintains or enhances economically valuable commercial timber supply.**
5. Is consistent with TSR analysis and assumptions. *FPPR s.26(3)(ii)*

# ***Climate Change: Guidance for Tree Species Selection***

*What can be done now? FRPA tests*

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## ***Stocking Standards***

**Consistent with TSR analysis and assumptions**

## ***Discretionary Approval***



1. Has it been successfully used on similar sites?, or,
  - Is it suitable for a trial on a limited area, with monitoring plan.
2. Rationale shows neutral or positive TSR impact
  - Or negative impact is offset by other positive benefits

# ***Climate Change: Guidance for Tree Species Selection***

*What can be done now?*

**Guidance** [http://www.for.gov.bc.ca/hfp/silviculture/stocking\\_std.htm](http://www.for.gov.bc.ca/hfp/silviculture/stocking_std.htm)

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**From:** Tom Ethier  
Assistant Deputy Minister  
Resource Stewardship Division

**Re:** Consideration of Climate Change When Addressing Long-Term  
Forest Health in Stocking Standards

This memo builds on the Chief Forester's "Guidance on Tree Species Composition at the Stand and Landscape Level" released on September 24, 2009, and highlights mechanisms within the existing legislative framework that can be used to manage risks associated with innovative and/or unproven practices.



Ministry of Forests  
and Range

Forest Stewardship Division

MEMORANDUM

File: 280-30/TREESP  
Ref. 119378

SEP 24 2009

To: Distribution List

From: Jim Snetsinger, R.P.F.  
Chief Forester

**Re:** Guidance on Tree Species Composition at the Stand and Landscape Level

## *Lessons Learned*

**What are you going to do differently based on what you learned today?**

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Change is here  
Think, Learn,  
Act, Think again

Thanks