



Tree Species Selection and Climate Change

An Overview of Available Tools and Information

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To: Distribution List

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

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

- ▶ A diversity of well adapted, healthy, resilient, stands across the landscape
- ▶ Tree species diversity at multiple scales
- ▶ No single “right” answer
- ▶ Use the best science available



How can we manage for species diversity?

- ▶ **Ecological Resilience and Complexity Tech Report 055 - examples:**
 - ▶ Facilitate tree species (and population) migration and range shifts
 - ▶ Forest harvest, regeneration, and stand-tending activities that maintain or enhance ecosystem complexity and response diversity to environmental change, such as forest structures generated by past disturbance regimes
 - ▶ Plant broader mixes of tree species across landscapes to help reset successional trajectories
 - ▶ Promote landscape connectivity
 - ▶ Retain or restore areas that may be buffered against climate change
- ▶ **Species diversification and assisted migration**
 - ▶ Implementation will depend on ecosystem type and need to evolve
 - ▶ 3 as more information on the impacts of climate change on ecosystems become available

Available Tools for supporting species diversity – Site level

Establishment to Free Growing Guidebook: Cariboo Forest Region

SBSmc1 — Cariboo					Tree Species Selection		
Site series	Conifer species			Broadleaf species ¹	Stocking standards (well-spaced/ha)+		
	Primary	Secondary	Tertiary		TSSpa	MSSpa	MSSp
01	Sxw – Huckleberry	Fd ^{15,32} PI Sx ²⁸	BI ²⁸	Act ^b	1200	700	600
02*	PI – Cladonia – Haircap moss	PI	BI ²⁸ Sx ²⁸		1000	500	400
03	Fd – Pinegrass – Aster	Fd PI		At ^b	1200	700	600
04	Sxw – Huckleberry – Labrador tea	PI Sx ³²	BI ³²		1200	700	600
05	Sxw – Spirea – Glow moss	PI Sx ³²	BI ³²		1200	700	600
06	Sxw – Oak fern	Fd ^{15,32} PI Sx	BI	Act ^a	1200	700	600
07	Sxw – Devil's club – Step moss	Fd ^{15,32} PI Sx	BI	Act ^a	1200	700	600
08	Sxw – Horsetail – Glow moss	Sx ^{1,32}	BI ^{1,32} PI ¹	Act ^b	1000	500	400

* avoid logging
1 elevated micro
15 restricted to n
28 limited by mo
32 limited by gro



A Guide to Site Identification and Interpretation for the Kamloops Forest Region

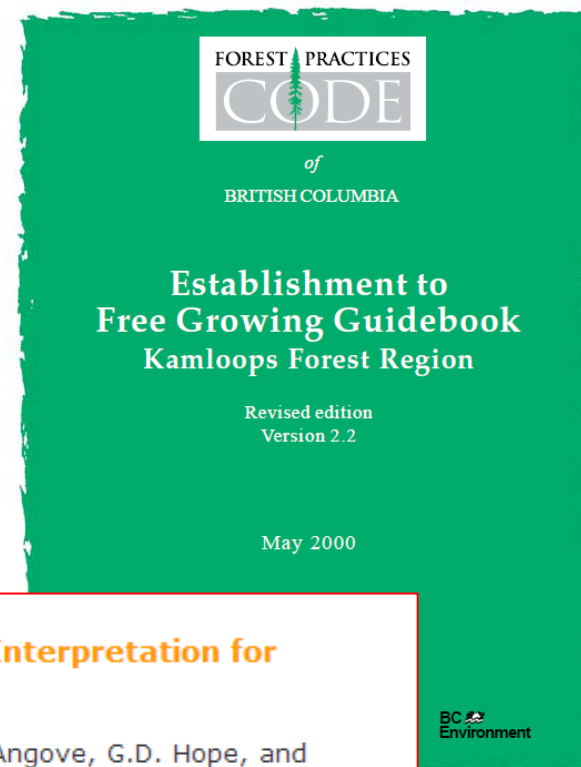
Author(s) or contact(s): D.A. Lloyd, K. Angove, G.D. Hope, and C. Thompson

Source: Research Branch

Subject: Ecosystems

Series: Land Management Handbook

Other details: Published 1990. [Hardcopy is available.](#)



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UPDATES TO THE REFERENCE GUIDE FOR FDP STOCKING STANDARDS (2014): CLIMATE-CHANGE RELATED STOCKING STANDARDS



Resources Practices Branch:
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DRAFT V 3.3

IDFdk1/ 01 (KAMLOOPS)

Trends and Comments

- IDFdk1 encompasses 526,856 ha.
- Approximately 326,651 ha are expected to change in the IDFxh by 2020
- This is one of the largest changes (by area) for a BGC unit in the Thompson Okanagan Region.
- Over half of the IDFdk1 is proposed to be IDFxh subzone by 2020. This lower drier unit lacks PI (too hot and dry) and has more Py. If the scenarios occur as predicted, PI will become an unsuitable species throughout the lower half of the IDFdk1 in a few years and 3/4 of the BGC unit by 2050.
- Focus on planting PI at higher elevations and on cool aspects and planting Py at lower elevations on warm aspect over the next few years.
- Should also consider shifting from clearcut to partial cutting silvicultural systems, e.g., shelterwoods, particularly on south aspects (if so, www becomes the major form of regeneration). This may create a problem for planting PI and Py due to shade intolerance.
- Do not include Lw - it is too dry for this unit (even more so in future).
- Avoid species conversion to PI throughout the variant.



Available tools – landscape guidance for species diversity

▶ Tree Species Selection Project

- ▶ Working group – multi-disciplinary specialists and practitioners from government and industry
- ▶ The goal of the Tree Species Selection Tool is to provide practitioners and planners with the best available information to inform tree species selection decision-making at the stand- and landscape-level in a changing climate
- ▶ The goal of the Landscape Species Strategy Project is to develop the knowledge and tools to aid the development of landscape-level species strategies to guide stand-level reforestation decisions that maintain or increase ecosystem resilience.

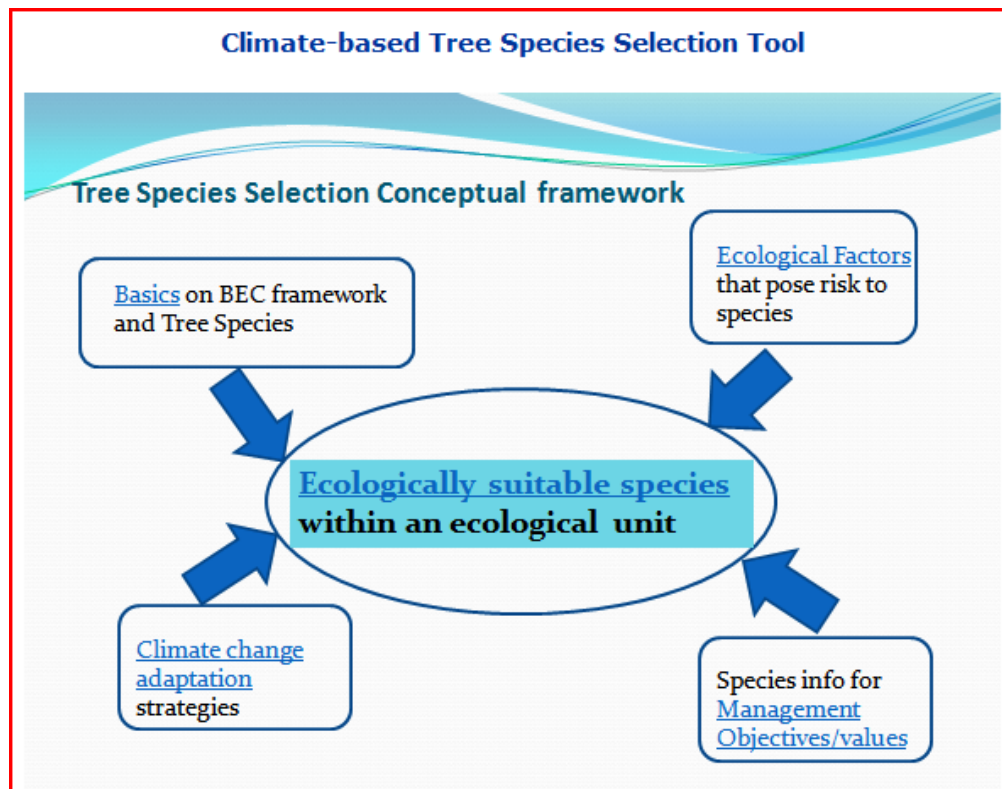


Tree Species Selection Tool – Goal and Objectives

- ▶ Hub for tree species selection related information
- ▶ Conceptual framework for species selection decision-making
- ▶ Dynamic - Identify and fill gaps
- ▶ User friendly



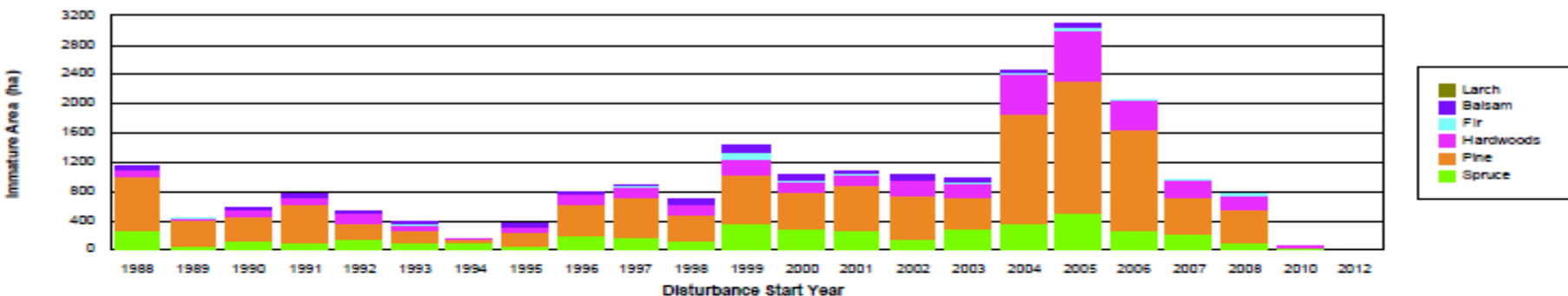
Tree species selection tool



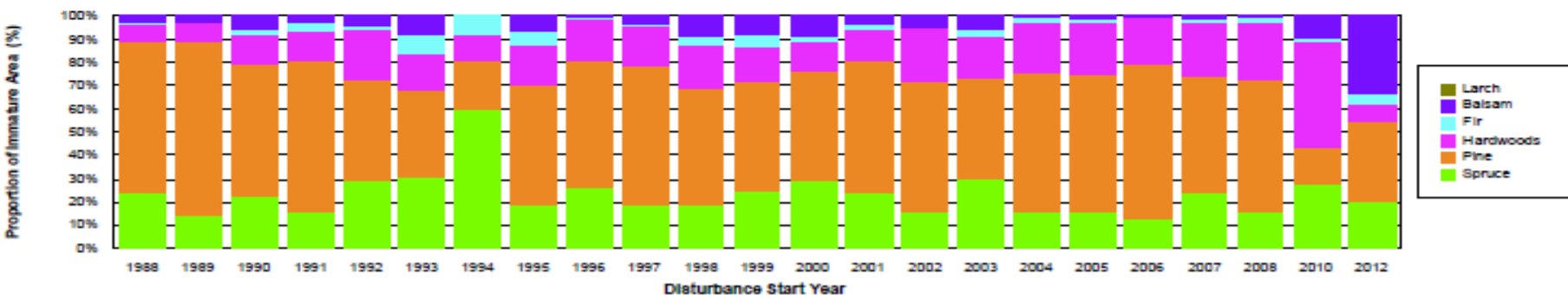
- ▶ Landscape-level species descriptions by BEC subzone/variant
- ▶ Updated ecologically suitable tree species lists
- ▶ Basic tree species and ecosystems info
- ▶ Available info for environmental factors that pose risk to ecologically suitable species
- ▶ Species-related info for managing different values
- ▶ Climate change info for developing adaptation strategies

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Regenerated Forest Cover for RESULTS by Disturbance Start Year by Species for Fort St. James Natural Resource District



Proportion of Regenerated Forest Cover for RESULTS by Disturbance Start Year by Species for Fort St. James Natural Resource District



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Available sources of ecologically suitable species info:

1. Reference guide for developing stocking standards + climate change-related s.s.
2. Tree Species Selection Tool – ecologically suitable species lists without a management filter

		Regeneration Guide											
BGC		Species								Stocking(i)			
Classification										Broadleaf	Target	MIN pa	MIN p
Zone/SZ	Series	Primary	Preferred (p)		Secondary	Acceptable (a)		Tertiary			(well-spaced/ha)		
SBSdk	01	PI Sx	PI Sx		Fd ^{9,18}	Fd ^{9,18}				At ^a Ep ^a	1200	700	600
	02*	PI	PI		Sx ²⁸	Sx ²⁸				At ^a Ep ^b	1000	500	400
	03*	PI	PI		Sb ²⁸ Sx ²⁸	Sx ²⁸ Sb ²⁸				At ^b	1200	700	600
	04	Fd PI	Fd PI Sx ²⁸		Sx ²⁸					At ^b Ep ^a	1200	700	600
	05	PI Sx ²⁸	PI Sx ²⁸		Fd ^{9,18}	Fd ^{9,18}				At ^a Ep ^a	1200	700	600
SiteUnit	Source	ots or Reg	Act	At	Ep	Fd	PI	Sb	Sx	Act ^a At ^a Ep ^a	1200	700	600
SBSdk/01	Guide	Pr George	X	X	X	X	X		X	Act ^b At ^b Ep ^b	1000	500	400
SBSdk/02	Guide	Pr George		X	X		X		X	Act ^a At ^a Ep ^a	1200	700	600
SBSdk/03	Guide	Pr George		X	X		X	X	X				
SBSdk/04	Guide	Pr George		X	X	X	X		X				
SBSdk/05	Guide	Pr George		X	X	X	X		X				
SBSdk/06	Guide	Pr George	X	X	X	X	X		X				
SBSdk/07	Guide	Pr George	X	X	X		X		X				
SBSdk/08	Guide	Pr George	X	X	X		X	X	X				
SBSdk/09	Guide	Pr George					X	X					
SBSdk/10	Guide	Pr George					X	X	X				



Forest health considerations and information

Pine Stem rusts

High priority

Commandra Blister Rust - *Cronartium comandrae*

Stalactiform Blister Rust - *Cronartium coleosporioides*

Western Gall Rust - *Endocronartium harknessii*

Management Objective

To reduce losses of volume and time in young stands impacted by rusts which cause mortality, unacceptable stem damage and plantation failure.

Ranking rationale

TSA scale maps have been created from RESULTS submissions, in-house sampling and FIA funded FH surveys and are located in **Appendix 1 and 2** to provide a visual aid to gauge the scope of rust occurrence. From the best information available, it has been determined that the leading rust type across the Nadina District is Western Gall Rust, followed by Commandra blister rust and then Stalactiform blister rust.

Management Tactic

- Increase planting densities
- Plant non-host species such as Douglas fir;
- No spacing in high risk areas
- Conduct silviculture surveys
- Continue to report survey results

Currently, the most effective management tactic is to plant non-host species, often through planting in high hazard rust areas suggests that areas that are too dry to plant non-host species should be established at higher densities of pine should be established in high hazard rust areas suggests

for a stand to become free growing and remain productive into the future. This suggestion is backed by the Northern Interior Regional Pathologist and recorded in FREP report #13 "Are Free-Growing Stands Meeting Timber Productivity Expectations in the Lakes Timber Supply Area?" Consideration should also be given to planting non-host species, as these species could provide increased diversity and stand resiliency in high hazard rust areas.



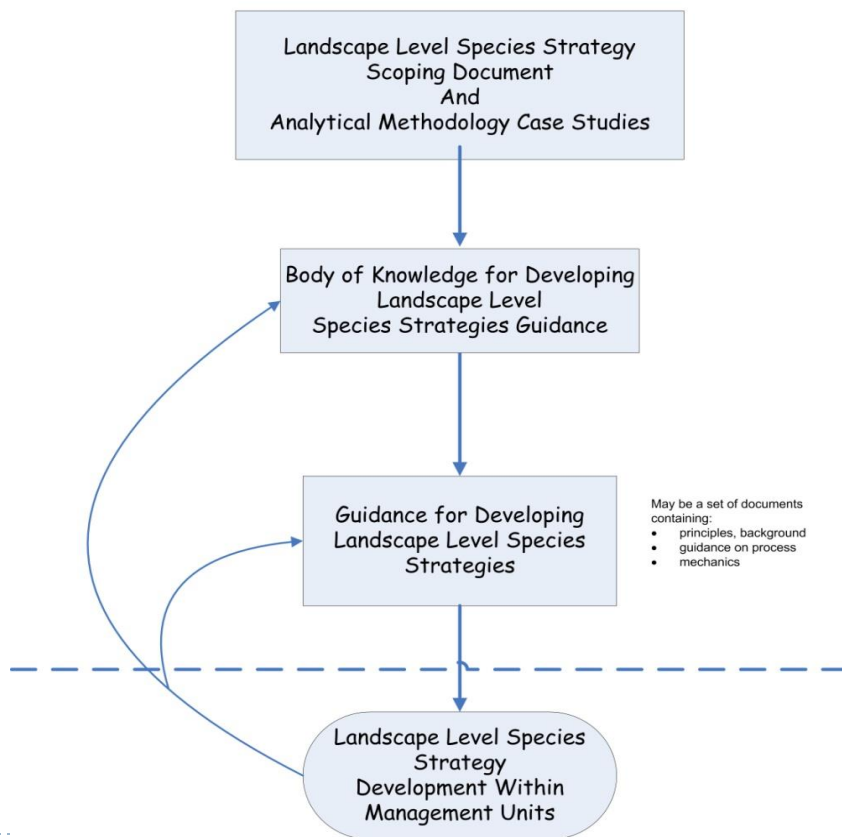
Tool Status

- ▶ Current available info for the following regions:
 - ▶ Omineca, Skeena, Coast (northern and Haida Gwaii), and Cariboo regions
- ▶ In development
 - ▶ Southern Coast, Kootenay-Boundary, and Thompson-Okanagan regions



Landscape species strategy project

Roadmap for Development of Landscape
Level Species Strategies
(Draft, Mar 27, 2009)



Work Completed:

- ▶ Phase 1 – A Landscape-level Species Strategy for Forest Management in British Columbia: Exploration of Development and Implementation Issues (Tech Report 067)
- ▶ Phase 2 – Landscape-level Ecological Tree Species Benchmarks Pilot Project: First Approximation Benchmarks in Five British Columbia TSAs (Tech Report 082)

In Development:

- ▶ Phase 3 – Initiate an Implementation pilot



Table 8 *Guidance for tree species deployment on harvested areas*

Biogeoclimatic variant	Desired Trend			Comments
	Sx	Pl	Fd	
SBSdm	↓	-	↑	
SBSmc	↓	-	-	Manage Bl as naturals
SBSwk	-	-	↑	
SBPSdc	-	-	-	Manage At as naturals
MSxv	-	-	-	
ESSFwk	-	-	-	Manage Bl as naturals



What can we do now?

In the context of a changing climate and associated uncertainty for ecosystems consider:

- ▶ Species regeneration and retention
 - ▶ Diversification and assisted migration
- ▶ Connecting site-level decisions with the landscape context of a BEC subzone/variant
 - ▶ Silviculture strategies
- ▶ Adaptive management – experiment and monitor, LEARN and SHARE
- ▶ “In the interim I expect that we will utilize the diversity of desirable tree species that are currently recognized as ecologically suitable” (Chief Forester 2009)



What's old is new?

- ▶ “Where feasible establish mixed species plantations”
- ▶ “If exotics are chosen for reforestation, they should be established in mixes with native species”
- ▶ “Maximizing diversity on every site may result in stands that are difficult to manage...planning for biological diversity is often best done at the landscape level”
- ▶ “The determination of an appropriate species mix, however, will be unique to each site and should include consideration, at the landscape level, of what percentage of cutblocks should have a species mix, and the species distribution within each cutblock”
- ▶ “Reasons for promoting a species mix include.....improving stand resilience to damaging agents.....enhancing biodiversity”
- ▶ “The choice between establishing a single species or a mixture depends on management objectives, site characteristics, and species compatibility”

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B.C. Home > Business > Natural Resource Industries > Forestry

- Bio-economy
- BC Timber Sales
- Information & Research
- Resource Roads
- Responsible Forestry
- Tenures
- Timber Pricing
- Worker Health & Safety
- Log Exports
- Tree Seed
- ▼ [Silviculture](#)
 - Tree Species Selection
 - Land Based Investment

Silviculture

Silviculture is about growing and managing trees to meet B.C.'s resource management objectives.

Reporting Silviculture Updates and Land Status Tracking System (RESULTS)

RESULTS is a web-based application that provides clients and government staff direct online access to Provincial spatially enabled silviculture information.

- Access the [RESULTS application](#)
- Review supporting information about [the RESULTS application](#)

Tree Species Selection Project

