



Dunster Community Forest

**Regeneration and Management of Mixedwood Stands in the Dunster  
Community Forest, CFA # K30:**

**Rationale, Goals, and Implementation/Performance Standards**

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## **Introduction and Background**

The Dunster Community Forest (DCF) wishes to actively manage both existing and future deciduous and deciduous-coniferous mixed stands within the DCF area. Current information suggests that the abundance of the existing deciduous component of stands on the DCF tenure area had its origins in past major disturbances (especially fire events). Deciduous tree species are most abundant in earlier seral stages in these ecosystems, and over time, a coniferous component tends to establish itself in the shade of the deciduous forest.

As a management principle and key goal, DCF supports retaining adequate quantities and densities of deciduous tree species in natural and managed stands, as deciduous trees promote stand and landscape-level biodiversity, wildlife habitat and enhanced nutrient recycling. Deciduous stem retention helps ameliorate the spread of root rot diseases <sup>1</sup> and can mitigate the level of spruce leader weevil damage in regenerating stands <sup>2</sup>.

The DCF chooses not to use chemical herbicide treatments in their vegetation management strategies (i.e. for control of competing vegetation impacting regeneration of desired tree species); this therefore requires a clear framework of alternative silvicultural strategies for successfully treating mixed deciduous-coniferous stands.

A key consideration in silvicultural and management planning, and related harvesting strategies for the CFA K30 is the spatial configuration of the Forest Development Units (FDUs) as they relate to meeting specified Visual Quality Objectives (Sec 9.2 FPPR) for these areas, and maintaining social license or acceptance for harvesting in these areas. These two main planning areas follow the steep side slopes of the Rocky Mountain Trench and are very visible from the highway. Because of this, most of the DCF is in a visually sensitive area. Because recent harvesting to address mountain pine beetle (MPB) mortality has created cumulative visual impacts in these visually sensitive areas, future management in these areas will be either constrained or modified for a period of time until MPB salvage areas reach visual green-up heights.

Most of the DCF's Timber Harvesting Land Base (THLB) have Visual Quality Objectives (VQOs) of Partial Retention or Retention. These objectives can potentially significantly constrain the extent and pattern of harvest development if conventional harvesting and stocking standards promote only homogenous and coniferous stand conditions in post-harvest and regenerating stands. The DCF has observed that coniferous stands with a deciduous component tend to have diverse and variable stand structure, both horizontally and vertically. Retaining a mature deciduous component (while harvesting the coniferous component) produces less visual impact ('softening' the visual effects of harvesting) relative to full harvest of all mature trees on the site. Similarly, this effect may contribute to faster apparent "green-up" of regenerating areas when a deciduous component is retained.

Mixedwood forests are diverse and complex and as such protect or buffer the forest landscape from anticipated climate change stresses.

In the past, conventional, Coniferous Stocking Standards tended to not specify a % deciduous allowed or allowed deciduous species as a minor or “tertiary” acceptable but not preferred species. Management approaches are changing, though. Several recent memos from the Chief Forester and the Assistant Deputy Minister of the Ministry of Forests, Lands and Natural Resource Operations, between 2008 and 2012 encourage government staff as well as licensees to develop new standards that can be used to manage risks associated with innovative and/or unproven practices. The Ministry has developed initiatives to benchmark percentages by species to maintain or increase diversity in ecosystems to promote resilient landscapes<sup>3</sup>. Nevertheless, prior to this proposal, we know of no approved Mixedwood Stocking Standards in the Prince George Forest District.

Because the DCF does not *currently* have a robust timber market for deciduous tree species, we do not wish to promote regeneration of purely deciduous or strongly deciduous-leading stands. The DCF’s management objective, therefore, is to regenerate and promote mixed stands of coniferous and deciduous tree species in a manner that will maintain and promote valuable coniferous species, in a mix with deciduous tree species that provide ecological and social benefits.

Therefore, the DCF proposes the Mixedwood Stocking Standards (MSS) for appropriate ecosystems and stand structures within the Community Forest tenure area. These standards are provided in Tables 1 and 2 using the Silviculture Options from Table 3, which define the desired future forest condition outcomes listed. Such mixedwood management standards will promote a viable crop of both deciduous and coniferous trees in a manner that will provide management flexibility across different ecological site types and stand structures.

The DCF submits that our proposed approach balances the potential risk in departing from established practices against the potential benefits of new and more appropriate species composition targets for our land base, and future increased knowledge of mixedwood management gained for the DCF and others.

## **Goals and Strategies for DCF Mixedwood Management**

### **Goals**

The goal of the DCF is to be able to manage mixedwood forests, not only to meet prescribed stocking standards, but to also satisfy key principles of the CF including ecological and social benefits.

To achieve these goals, the DCF must have approved Mixedwood Stocking Standards to apply on a small scale within the CFA, to stands with specific compositional and structural classes, on a pilot basis. Mixedwood standards will allow a higher proportion of deciduous in regenerating and free growing

stands. This will help the DCF manage species composition and stand development in mixed deciduous-coniferous stands, using appropriate strategies for harvesting and reforestation. The mixedwood standards will also allow the DCF to maintain some mixedwood stands which promote biodiversity, wildlife habitat, enhanced nutrient recycling and help ameliorate root rot diseases. Deciduous cover also ameliorates frost damage to conifers and helps to reduce damage by spruce leader weevil <sup>4</sup>.

### **Enabling Strategies for Mixedwood Management at the Forest Level**

The DCF is working towards compiling more robust timber inventory data which will present a more accurate picture of the extent, distribution and importance of mixedwood stands and their associated volumes and value within the Community Forest tenure area. The DCF can then work to develop markets for these mixed stands. There is potential that, in the near to mid-term, new markets may emerge, such as a pellet plant proposing to locate in the Robson Valley. However, at time of writing, there is a very limited local market for deciduous species.

Visual Impact Assessments that are underway, will also help the DCF to develop appropriate strategies for harvesting and reforesting using mixedwood management.

Currently, Paper Birch in the Robson Valley is marketable for flooring and cabinetry to local mills and artisans. Outside this region, Trembling Aspen and Black Cottonwood are marketable for Oriented Strand Board, sawlog and other products, but the potential destination markets/mills are at such a distance (Kamloops, 100 Mile House, Williams Lake) that high transportation cost make net returns marginal at best.

The DCF will be able to begin the process of learning to effectively manage this economically marginal component of our CF area by first targeting easily accessible mixedwood stands. Aided by progressively better inventory data and management experience, over time, the DCF will strive to find and develop larger markets that they can economically access.

### **Tools for Implementation of Mixedwood Silviculture Strategies**

The DCF proposes to use a range of alternative silviculture options relating to 6 types of mixedwood stand structures, with the final choice of a specific silvicultural option at the stand level to be dependent on management objective(s).

The 2 types of mixedwood stand compositions are described in detail in Table 3 and are summarized below. Stands where > 80% of merchantable stems-per-hectare are conifer will not be considered as mixedwoods, and in a regeneration context will employ the regular coniferous stocking standards. (With the exception of stands that are affected by root disease, where a transition to mixedwood stocking

would mitigate the effects of the root disease). Where stand structures are > 80% deciduous, deciduous SS will be used.

These compositional classes include:

1. Coniferous leading mixedwood (CLM): where >50% SPH but, <80% SPH is coniferous
2. Deciduous leading mixedwood (DLM): where >50% SPH but, <80% SPH is deciduous

In addition, the mixed designations of CLM and DLM will be differentiated into 3 structural classes which include

- Stratified mixtures: where one component (usually deciduous) makes up the overstory and the other is in the understory
- Intimate mixtures: where both components share dominance on the site and each are within the overstory
- Mosaic mixtures: where each component is a distinct patch

Based on 2 compositional classes and 3 structural classes, 6 distinct types of mixedwood stands are defined:

	CLM	DLM
Stratified mixtures	1	4
Intimate mixtures	2	5
Mosaic (patchy) mixtures	3	6

From stand structures CLM and DLM the DCF will choose appropriate silviculture systems and treatments to use to create the desired outcome, employing the proposed mixedwood stocking standards for at least the first two rotations. In choosing appropriate silvicultural systems the Silviculture Systems Guidebook, April 1995 will be used.

To predict the visual impacts of the various silvicultural systems, the information in the Visual Impacts of Partial Cutting Report <sup>5</sup> will be used.

For assessing the outcomes of these strategies at the free growing survey stage, the DCF will use the Silviculture Survey Procedures Manual - April 1, 2015.

## **Implementation and Monitoring Strategy**

The practices and assessments which the society has identified to minimize risk and to achieve the goals of responsible mixed-wood management are:

1. Identify sites to be used on a trial basis for the next 20 years which mirrors the Free Growing window of FRPA. To minimize risk, use no more than 20% of the AAC and limit trial to 1,000 ha (5% of CF area). Determine the BEC zone/subzone/site series present. These sites have the VQO of Partial Retention (PR) or Retention (R), and these objectives must be carefully considered when designing the blocks for harvest.
2. Initiate implementation by identifying sites that match one of the 6 types of mixedwood stands. Apply the appropriate harvest method, silvicultural system, and mixedwood stocking standard at the site plan phase to these stands.
3. Plant greater densities than usual (1800-2000sph) to achieve TSS of 1200 coniferous stems per hectare (sph) on sites that are transitional to coniferous stocking standards.
4. Do a stocking surveys at 3 years post-harvest to determine % species and stocking densities
5. Assess areas treated by brushing with another survey 2 years after treatment to determine the effectiveness of treatments by measuring % stems by species and stocking densities. Brush again, if and where required
6. Monitor stands with walkthroughs every 3 years after the survey until free growing (FG) status is achieved
7. Do a FG survey at or before the latest FG date to determine final stand structures

## **Evaluate and Adjust**

Assess the survey results to determine which of the treatments were most successful in aligning with targeted mixedwood stocking standards, (achieving acceptable mixes of deciduous and coniferous stems) at an acceptable cost. Project results from the free growing date through to the next rotation. Implement alternative treatments or ways to modify existing treatments. Plan the next harvest using this new information to produce better results.

## **References**

1. Establishment to Free Growing Guidebook: Prince George Forest Region
2. Planting White Spruce under Trembling Aspen -7 year Results of Seedling Condition and Performance, Craig deLong, Ministry of Forests, Forest Resources, Prince George, BC, 2000

3. Mah, S and K. Astridge, 2014. Landscape-level ecological tree species benchmarks pilot project: first approximation benchmarks in five British Columbia Timber Supply Areas, Prov. BC, Victoria, BC Tech Rep.082  
<https://www.for.gov.bc.ca/hfd/pubs/docs/tr/tr082.pdf>

4. Mixedwood management-Ecological and economic benefits and costs in the sub boreal forest, Chris Hawkins FRBC Slocan Mixedwood Chair, UNBC, Prince George, BC, Mar 19, 2004

5. Visual Impacts of Partial Cutting Summary Report, A Technical Analysis and Public Perception Study by B.C. Ministry of Forests, Forest Development Section, Forest Practices Branch, Aug 1997

<b>Appendix 3 Table 1. ICHmm Stocking Standards for Mixedwood Stands</b>										
Site series SS ID	Pref Conifer	Accep Conifer	Pref Decid	TSS Pref and Acc	Min Pref and Acc	Regen Delay max yrs	FG latest yrs	Species	Min ht at FG	Max % decid allowed
01	Fd PI Sx Cw	Bl <sub>29</sub> Hw,Lw	At <sup>a</sup> Ep <sup>a</sup>	1200	700	4	20	PI,At,Ep	2.00	40
								Fd	1.40	
								Others	1.00	
02	Fd PI Ep	Hw Cw Sx Lw	At <sup>b</sup> Ep <sup>b</sup>	1000	500	4	20	PI, At,Ep,Fd	1.40	40
								Others	0.80	
03	Fd Hw PI Sx	Bl <sub>29</sub> Cw,Lw	At <sup>a</sup> Ep <sup>a</sup>	1200	700	4	20	PI, At,Ep	2.00	40
								Fd	1.40	
								Others	1.00	
04	Cw Hw Sx Fd	Bl <sub>29</sub> PI Pw	Act <sup>b</sup> At <sup>a</sup> Ep <sup>a</sup>	1200	700	4	20	PI, Pw,Act,At,Ep	2.00	40
								Fd	1.40	
								Others	1.00	
05	Cw <sub>1</sub> Hw <sub>1</sub> Fd <sub>1</sub> Sx <sub>1</sub>	Bl <sub>29</sub> PI <sub>1</sub>	Act <sup>a</sup> At <sup>a</sup> Ep <sup>a</sup>	1200	700	4	20	PI,Act,At,Ep	2.00	40
								Fd	1.40	
								Others	1.00	
06	Cw <sub>1</sub> Hw <sub>1</sub> PI <sub>1</sub> Sx <sub>1</sub>	Bl <sub>1,29</sub>	Act <sup>a</sup>	1000	500	4	20	PI,Act	1.40	40
								Others	0.80	
*consideration will be given to the shade tolerance of each species prior to selection for management; Lw <= 10% of stand										
<b>Broadleaf Management Constraints:</b> a) productive, reliable and feasible option and b) limited in productivity, reliability and/or feasibility										

<b>Appendix 3 Table 2. SBSdh1 Stocking Standards for Mixedwood Stands</b>										
Site series SS ID	Pref conifer	Accep conifer	Pref Decid	TSS Pref and Acc	Min Pref and Acc	Regen Delay max yrs	FG latest yrs	Species	Min ht at FG	Max % decid allowed
01	PI Sx Fd	Bl <sub>29</sub> Lw	At <sup>3</sup> Ep <sup>a</sup>	1200	700	7	20	PI,At,Ep,Lw	2.0	40
								Fd	1.4	
								Others	1.0	
05	PI	Sb Sx Lw	At <sup>b</sup>	1200	700	7	20	PI,At	2.0	40
								Others	1.0	
06	Fd Sx	Bl <sub>29</sub> PI Lw	At <sup>a</sup> Ep <sup>a</sup>	1200	700	7	20	PI,At,Ep	2.0	40
								Fd	1.4	
								Others	1.0	
07	Fd <sub>1</sub> , PI <sub>1</sub> Sx <sub>1</sub>	Bl <sub>1,29</sub>	Act <sup>a</sup> At <sup>a</sup> Ep <sup>a</sup>	1000	500	4	20	PI,Act,At,Ep	1.4	40
								Fd	1.0	
								Others	0.8	
*Consideration will be given to the shade tolerance of each conifer species prior to selection for management; Lw <= 10% of stand										
<b><u>Coniferous Footnotes</u></b>										
1. elevated microsites are preferred										
29. risk of heavy browsing by moose										
footnotes 32 (frost hazards) and 35 (spruce leader weevil damage) will be mitigated with higher levels of deciduous stems to protect conifers										

**Appendix 3 Table 3. Silviculture Options for Mixedwood Stands**

Current Composition	Stand Structure	Silviculture System*	Treatments	Stand Level Target Outcome
1. CLM  Coniferous leading mixedwood  50% - 80% conifer sph	Stands are stratified mixture of conifers and deciduous where one makes up the overstory (usually deciduous) and the other is the understory	Partial cut or  Clearcut* with reserves	Plant 1800-2000sph conifer  Manually brush as required  Survey and Monitor	1. Transition to coniferous leading stand
	Stands are intimate mixtures where both components share dominance on the site and each are within the overstory	Partial cut or  Clearcut* with reserves	Plant 1600sph conifer  Manually brush as required  Survey and Monitor	2. Maintain as a coniferous leading mixedwood stand
	Stands are mosaic mixtures where each component is a distinct patch	Partial cut or  Clearcut* with reserves	Plant 1600sph conifer  Manually brush as required  Survey and Monitor	3. Maintain as a coniferous leading mixedwood stand

2. DLM  Deciduous leading mixedwood  50-80%  Deciduous sph	Stands are stratified mixture of conifers and deciduous where one component makes up the overstory (usually deciduous) and the other is the understory	Partial cut removing deciduous with protection of understory if present or  Clearcut with group reserves	Plant 1600 sph conifer  Manually brush as required  Survey and Monitor	4. Transition to coniferous stand and coniferous SS after 2 rotations
	Stands are intimate mixtures where both components share dominance on the site and each are within the overstory	Partial Cut both components		5. Retain mixedwood structure using mixedwood SS
	Stands are mosaic mixtures where each component is a distinct patch	Partial Cut removing selected deciduous or coniferous component		6. Retain individual coniferous or deciduous structure in each patch and apply appropriate SS

\*using the Silvicultural Systems Guidebook, April 1995

\*Where Site Index is greater than 15, Root Rots are not usually present and Partial cuts can be prescribed. Where root rots are present, Clear cuts are preferred. Sites with higher index are better suited to transitioning to coniferous leading

\*Partial cuts are the preferred option where the VQO is Retention and Clear Cuts with reserves are preferred where the VQO is Partial Retention