Fort St. John Pilot Project

Mixedwood Management Strategy

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Mixedwood Management Strategy under the Fort St. John Pilot Project SFMP

I. STRATEGY OBJECTIVES

The Fort St. John Timber supply area is covered with a mosaic of mixedwood forests that are complex, dynamic and diverse in composition and structure. Given the complexity of working in mixedwood forests, managers have tended to avoid operating in the true mixedwood stands in the absence of proven and cost effective standards under which to operate. Instead they have targeted mostly pure stands of conifer or deciduous for harvesting. The implementation of the strategy described below will allow participants to move forward with operations into mixedwood areas. The strategy is designed to provide foresters with the direction for choosing and managing reforestation pathways that will produce successful mixedwood stands at the landscape level and meet the commitments made in the Sustainable Forest Management Plan (SFMP). It will also be an evolving document that can incorporate new ideas, science and methodologies, as they become better known.

The objective of this mixedwood management strategy is:

- To describe the method for classifying and tracking forest types for forest management purposes.
- To describe the stocking standards that will be applied in the reforestation of mixedwood stands.
- To describe some possible methods that will be implemented to achieve the desired future forest conditions and forest types described in the SFMP.

II. BACKGROUND

The strategy will be applied to the Fort St. John pilot project area ("defined forest area" or DFA) as described in the SFMP. This area is included within the Fort St. John TSA and covers about 4.1 million hectares.

In the SFMP (section 4 -Landscape level strategies), there is a commitment to produce new forests with similar structural characteristics that naturally occur on the landscape. Section 4.8 (Reforestation) states that the participants must declare to reforest an area within a cutblock as a coniferous area, a deciduous area or a mixed wood area. This declaration may be revised prior to the end of the reforestation period subject to compensating revision elsewhere on the landscape. The prescribing and implementing foresters are responsible to ensure stocking on the site is managed to provide forest establishment sufficient to meet the landscape level targets. This section also says that the short-term mixedwood management will be achieved primarily through reforestation strategies that maintain separate deciduous and coniferous strata. The reforestation strategies will involve approaches that stratify the area to be reforested into discrete deciduous and coniferous strata (i.e. splitting cutblocks or reforesting conifers in clusters or strips). This approach enables the application of the deciduous and coniferous standards to separate strata. For the term of this

SFMP, mixedwood regimes for intimate mixtures of conifer and deciduous will be established on 10% of the harvested mixedwood landbase as operational trials. Over the longer term a strategic approach will be developed to guide the deployment of reforestation strategies that will establish an appropriate desired future forest condition.

Mixedwood forests will be sustained by managing forest type distribution as per Section 6.1. Section 6.1 indicates the percent distribution of forest type (deciduous, deciduous mixedwood, conifer mixedwood, conifer) >20 years old by landscape unit. The target is 100% of the forest type groups by landscape unit will be within the target range as described in Table 1 below:

Table 1: Current, FDP Status and Baseline Target for Forest Types (Note: This table is subject to change with updated Vegetation Resource Inventory that should be completed for the next SFMP period)

Landscape Unit	Forest Type	Current Status		FDP Status		Baseline Target Range	
		ha	%	ha	%	Min	Max
Blueberry	Deciduous	140,289	37.1%	127,642	36.1%	30%	45%
	Deciduous Mixedwood	32,500	8.6%	30,582	8.6%	7%	10%
	Conifer Mixedwood	50,669	13.4%	48,969	13.8%	11%	16%
	Conifer	154,320	40.8%	146,757	41.5%	33%	49%
Blueberry Total		377,778	100.0%	353,951	100.0 %		
Crying Girl	Deciduous	646	1.1%	646	1.1%	0.5%	2%
	Deciduous Mixedwood	706	1.2%	706	1.2%	0.5%	2%
	Conifer Mixedwood	1,205	2.0%	1,205	2.1%	1%	3%
	Conifer	58,390	95.8%	54,544	95.5%	93%	98%
Crying Girl Total		60,947	100.0%	57,101	100.0 %		
Graham	Deciduous	3,061	1.4%	3,061	1.4%	0.5%	2%
	Deciduous Mixedwood	1,724	0.8%	1,721	0.8%	0.5%	2%
	Conifer Mixedwood	3,866	1.8%	3,854	1.8%	1%	3%
	Conifer	205,996	96.0%	205,410	96.0%	93%	98%
Graham Total		214,647	100.0%	214,046	100.0 %		
Halfway	Deciduous	14,845	11.5%	14,523	11.5%	9%	14%
	Deciduous Mixedwood	5,399	4.2%	5,333	4.2%	3%	5%

Landscape Unit	Forest Type	Current Status		FDP Status		Baseline Target Range	
		ha	%	ha	%	Min	Max
	Conifer Mixedwood	8,936	6.9%	8,801	7.0%	6%	8%
	Conifer	100,239	77.5%	97,391	77.3%	73%	82%
Halfway Total		129,419	100.0%	126,048	100.0 %		
Kahntah	Deciduous	64,727	40.1%	64,689	40.8%	32%	48%
	Deciduous Mixedwood	21,274	13.2%	21,153	13.3%	11%	16%
	Conifer Mixedwood	25,395	15.7%	24,673	15.6%	13%	19%
	Conifer	49,940	31.0%	48,004	30.3%	25%	37%
Kahntah Total		161,335	100.0%	158,519	100.0 %		
Kobes	Deciduous	34,392	37.0%	32,031	36.3%	30%	44%
	Deciduous Mixedwood	8,578	9.2%	8,097	9.2%	7%	11%
	Conifer Mixedwood	13,560	14.6%	12,993	14.7%	12%	18%
	Conifer	36,442	39.2%	35,227	39.9%	31%	47%
Kobes Total		92,971	100.0%	88,349	100.0 %		
Lower Beatton	Deciduous	58,825	68.6%	55,326	68.0%	55%	82%
	Deciduous Mixedwood	5,372	6.3%	5,053	6.2%	5%	8%
	Conifer Mixedwood	7,624	8.9%	7,353	9.0%	7%	11%
	Conifer	13,976	16.3%	13,631	16.8%	13%	20%
Lower Beatton Total		85,797	100.0%	81,364	100.0 %		
Milligan	Deciduous	28,677	26.1%	27,737	25.7%	21%	31%
	Deciduous Mixedwood	22,493	20.4%	21,993	20.4%	16%	25%
	Conifer Mixedwood	25,259	23.0%	24,902	23.1%	18%	28%
	Conifer	33,570	30.5%	33,141	30.8%	24%	37%
Milligan Total		109,999	100.0%	107,773	100.0 %		
Sikanni	Deciduous	4,608	3.3%	4,608	3.3%	2%	4%
	Deciduous Mixedwood	2,662	1.9%	2,662	1.9%	1.5%	3%
	Conifer	4,746	3.4%	4,746	3.4%	2%	4%

Landscape Unit	Forest Type	Current Status		FDP Status		Baseline Target Range	
		ha	%	ha	%	Min	Max
	Mixedwood						
	Conifer	129,392	91.5%	129,392	91.5%	89%	95%
Sikanni Total		141,408	100.0%	141,408	100.0 %		
Tommy Lakes	Deciduous	64,676	24.0%	63,150	24.6%	19%	29%
	Deciduous Mixedwood	19,517	7.2%	18,844	7.3%	6%	9%
	Conifer Mixedwood	31,864	11.8%	30,664	11.9%	9%	14%
	Conifer	153,325	56.9%	144,470	56.2%	46%	68%
Tommy Lakes Total		269,383	100.0%	257,129	100.0 %		
Trutch	Deciduous	45,003	23.0%	44,949	23.1%	18%	28%
	Deciduous Mixedwood	10,628	5.4%	10,602	5.4%	4%	7%
	Conifer Mixedwood	18,072	9.2%	17,963	9.2%	7%	11%
	Conifer	122,373	62.4%	121,180	62.2%	50%	75%
Trutch Total		196,076	100.0%	194,694	100.0 %		
Grand Total		1,839,761	100.0%	1,780,381	100.0 %		

III. CLASSIFYING AND TRACKING FOREST TYPES

In accordance with the Fort St. John Pilot Project Regulation (FSJPPR) and SFMP, the participants must declare to reforest the cutblock as a coniferous area, a deciduous area, or a mixedwood area in the FDP or FOS and in the Site Level Plan. The mixedwood forest type area will be further defined into deciduous leading or coniferous leading mixedwoods.

A. Initial Cutblock Classification

The following process will be used to categorize a cutblock into a forest type class:

Prescribing foresters will review the merchantable volume for a grouping of blocks such as in a Timber Sales Licence or Timbermark grouping. This grouping of blocks may be larger if more blocks are ready to be submitted for declaration and are in close vicinity (for example, blocks managed by the same participant but being harvested under different licenses). The source of the volume statistics

shall be the timber cruise block-method compilation summary. Forest Types shall be classified according to the percentage of net merchantable volume by species type. The species types are **coniferous** and **deciduous**. The tree species included in each species group, and the corresponding cruising codes, are listed in the following table.

SPECIES TYPE	TREE SPECIES	CRUISE COMPILATION CODE
Coniferous	White spruce (*Picea glauca*) Black spruce (*Picea mariana*) Lodgepole pine (*Pinus contorta*) Subalpine fir (*Abies lasiocarpa*) Tamarack (*Larix laricina*)	S S PL B L
Deciduous	Trembling aspen (*Populus tremuloides*) Balsam poplar (*Populus balsamifera*) Paper birch (*Betula papyrifera*)	AT AC E

If the leading species type in the block contains greater than 80% of the net merchantable volume, it shall be considered 'pure' Forest type – either 'pure' deciduous or 'pure' coniferous. If the species types are between 20% and 80% of the net merchantable volume, the block shall be classified as a 'mixedwood' Forest type – either deciduous-leading or conifer-leading mixedwood.

B. Defining Initial Area targets

The process for defining area targets is designed to give prescribing foresters a method for assigning the original declarations on a Standard Unit (SU). The areas determined in this original forest type declaration will form the baseline proportions in each ledger population described in section C below for future balancing. This process for defining the area targets is described below:

- If the block is considered pure coniferous, then 100% of the NAR will be tallied as conifer reforestation.

- If the block is considered pure deciduous, then 100% of the NAR will be tallied as deciduous reforestation.

- If the block is considered a conifer leading mixedwood (50 to 79.9% coniferous), then 35% of the NAR is tallied as deciduous reforestation and 65% of the NAR is tallied as conifer reforestation.

- If the block is considered a deciduous leading mixedwood (50 to 79.9% deciduous), then 35% of the NAR is tallied as conifer reforestation and 65% of the NAR is tallied as deciduous reforestation.

- Once the areas have all been accounted within the grouping of blocks, the prescribing foresters will stratify standard units (SU), assign the appropriate SU forest types, assign stocking standards and develop silviculture regimes for each cutblock designed to achieve the required area targets determined above. There is a +/- 5% variance from the calculated area targets over the specific grouping of blocks to allow for some operational flexibility during silviculture implementation (E.g. if the final area weighting results in 60% of the area designated as deciduous and 40% of the area designated as conifer, the prescribing Forester will be allowed to adjust these area proportions +/- 5% to maximize the use of well-defined boundaries such as roads, wtp's, streams, etc. The final area declaration may be between 55%-65% deciduous and 35%-45% conifer).

C. Ledger System for Balancing Forest Types Over Time

In accordance with the Fort St. John pilot project SFMP landscape level reforestation strategy, the process for tracking the declaration of the forest type areas determined above needs to be flexible enough to allow Professional Foresters to exercise their professional judgment at the cutblock level to vary regimes and/or make corrective actions as required to achieve the landscape level targets. As stated in the SFMP, the declaration of a forest type "may be revised prior to the end of the reforestation period subject to compensating revision elsewhere on the landscape".

This concept will require participants to develop a ledger or tracking system to ensure the changes made to declarations after harvesting are balanced elsewhere on the landscape. The ledger system should maintain a history of the original declarations as determined above. The original declarations will form the baseline proportions for balancing future area exchanges of conifer and deciduous strata. The ledger must also track future reclassifications to ensure the original baseline proportions, as determined at the Standard Unit level (original forest type declaration), are being maintained. The annual review and reporting of progress to landscape unit objectives and targets as required in the SFMP (Table 1) will be used to evaluate the landscape unit forest types relative to the target ranges. In the event any of the landscape unit forest types are found to be outside the target ranges, the original baseline proportions for the current dataset population or a future dataset population will have to be adjusted to bring the landscape unit forest type proportions in-line with the target levels defined in the SFMP. This change will be summarized in the annual report for future reference. The population of standard units to be balanced should be within a defined period of time, using the harvesting commencement dates, and preferably within the same landscape unit. However, if there are not suitable areas within the

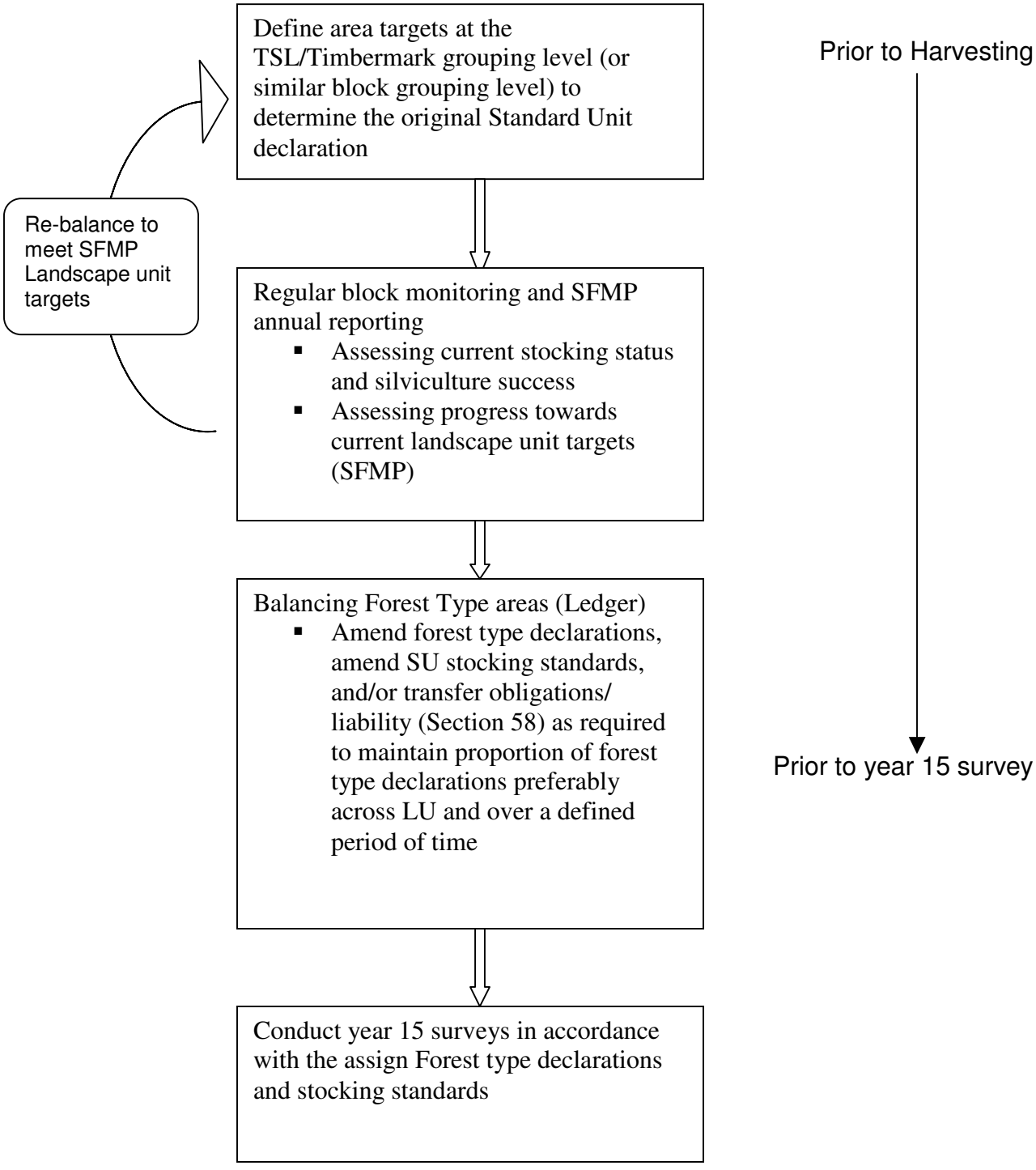
landscape unit to exchange, the balancing of forest types may occur within adjacent landscape units or across the TSA provided the exchanges will not result in a landscape unit exceeding the target ranges described in the SFMP. The following general principles will be used to evaluate suitable areas for conducting a reforestation declaration exchange:

- Areas considered for exchange should have a similar site index.
- Areas considered for exchange should be verified in the field to ensure they are ecologically suitable for species changes.
- Exchanges between blocks in as close proximity as operationally feasible should be considered first prior to balancing areas across the TSA.
- Areas to be exchanged should consider the operational logistics and economics associated with establishing a different crop tree species on site.
- Area exchanges must occur between areas of similar ages as described below.

The first population of blocks will include all blocks harvested since November 15, 2001 (start of the FSJPPR) to March 31, 2010 (end of current SFMP). The second population of blocks will include blocks where harvesting starts during the next 6-year period after March 31, 2010 and subsequent populations will include blocks harvested at 6-year increments thereafter. It is preferable that the balance be maintained across each managing participant's population of blocks and areas of liability. If managing participants would like to exchange blocks and liability for the purpose of balancing forest type areas, this exchange must be done in writing in accordance with Section 58 (Assignability) of the Fort St. John Pilot Regulation. The reclassification of forest type areas, whether done through balancing individual participant's blocks or through exchange of blocks, must be completed prior to the year-15 MSQ survey for those blocks. See figure 1 below for a summary of the overall process.

The SFMP requires participants to establish intimate mixtures as operational trails on 10% of the harvested mixedwood landbase. Participants will be responsible for meeting this commitment within their population of blocks. The participants should report on their progress towards this target in each annual report.

Figure 1: **Forest Type Declaration and Balancing Process**



IV. PROPOSED METHODS OF REFORESTATION

1) "Large scale" un-mix the mix (each block will be managed for pure conifer or pure deciduous),
2) "Small scale" un-mix the mix (divide blocks into discrete strata of pure conifer and pure deciduous),
3) "Micro-scale" un-mix the mix (intermixing patches or strips within the blocks)
4) Intimate mixtures
    - Deciduous and conifer are co-dominants in the canopy, or
    - Conifer (usually white spruce) is under a taller canopy of deciduous

The methods for 1, 2 and 3 can be accommodated using the process of defining area targets for discrete strata of conifer and deciduous as described above. The various levels of patch size that result from the “large scale”, “small scale” and “micro-scale” methods will produce a mixedwood stand at a landscape level. Methods 1 and 2 will result in distinct patches of conifer and deciduous areas that will produce landscape level mixedwoods. Method 3 should result in a stand that more closely represents an intimate mixture of conifer and deciduous but will still be managed as discrete strata. Methods 1, 2 and 3 can be applied using current harvesting practices and stocking standards for conifer and deciduous, outlined in the SFMP (Appendix 6).

The commitment for the term of the current SFMP regarding intimate mixtures of conifer and deciduous is to establish intimate mixtures on 10% of the harvested mixedwood landbase as operational trials. Current policies, practices and information bases in BC do not effectively support mixedwood management using intimate mixtures. Successful policy will require accountability, but should also be flexible enough for managers to adjust stand-level plans in response to variation in early stand development (e.g., poor survival of plantations, poor establishment of aspen, etc.) (Comeau *et al*. 2005). The complexity in stand development and wide variety of possible stand conditions requires greater understanding of the natural and managed stand dynamics as well as better models for forecasting growth and yield projections. For the term of this SFMP the participants should be very clear in their prescriptions that areas managed as intimate mixtures are operational trials. Stocking standards and assumptions may be amended or incorporated as better information becomes available.

For the purpose of the final reforestation assessment, discrete stratums of conifer would fall in the applicable 15-year population for the conifer MSQ surveys. Preferably, discrete deciduous areas would be surveyed at the same 15-year period. Assessment procedures for discrete deciduous strata will be conducted using the current free growing survey procedures until such time as yield curves are available to have a deciduous MSQ type survey. Growth model trial runs are currently being completed on deciduous species so a MSQ type assessment for deciduous should be available in the near future. Assessment procedures and

standards will be documented as operational trials for strata with intimate mixtures and will be described on a site-specific basis in site level plans.

Table 2 details some silviculture options for boreal mixedwoods forests. The practices followed depend on the current state of the stand and the desired future forest (stand) condition.

Table 2: From Kabzems, R. 2002. Silviculture options for boreal mixedwoods. [Modified from Figure 2 in Lieffers et al. (1996)]

Current State	**First Treatment**	**Secondary Treatment**	**Outcome**
1. Deciduous or Deciduous Coniferous (vigorous)	A) Clearcut (suckering)		Deciduous or Deciduous-Coniferous
	B) Late understory plant	Understory protection	Stands are horizontal mixes of coniferous patches and these are of different age.
	C) Early understory plant with wind protection	Understory protection	Stands are horizontal mixes of coniferous patches and deciduous patches and these are of different age.
2. Deciduous or Deciduous Coniferous (breaking up)	A) Clearcut (suckering)		Deciduous
	B) Understory site preparation and plant	Understory protection	Stands are horizontal mixes of coniferous patches and deciduous patches and these are of different age.
	C) Clearcut, site preparation, plant	Vegetation management	Coniferous or Coniferous-Deciduous (Mixture)

3. Coniferous or Coniferous-Deciduous	A) Clearcut (suckering) B) Clearcut, site preparation, plant C) Clearcut, site preparation, plant D) Shelterwood E) Leave seed clusters ▪ leave for natural ▪ site preparation F) Group selection	 Vegetation management Removal cut	Deciduous or Deciduous/Coniferous Deciduous/Coniferous (Mixture) Coniferous or Coniferous-Deciduous Coniferous or Coniferous-Deciduous Deciduous-Coniferous (Mixture) Deciduous-Coniferous (Mixture) Stands are small patches of intermixed deciduous and coniferous but the patches are of different ages.
4. Overstory Deciduous or Deciduous Coniferous Understory Coniferous (short even-aged)	A) Understory protection		Stands are horizontal mixes of coniferous patches and deciduous patches and these are of different age.
5. Overstory Deciduous or Deciduous Coniferous Understory Coniferous (tall even-aged)	A) Understory protection with wind protection		Stands are horizontal mixes of coniferous patches and deciduous patches and these are of different age.
6. Overstory Deciduous or Coniferous Understory Coniferous (uneven-aged)	A) Understory protection with wind protection ▪ Tall understory cut		Stands are horizontal areas of young deciduous between patches of all-aged coniferous, leading to selection system. Stands are horizontal mixes of coniferous patches and deciduous patches and these are of different age.

7. Overstory Coniferous Deciduous or Coniferous Understory (uneven-aged)	A) Understory protection with wind protection ▪ Tall understory cut B) Single tree selection		Stands are horizontal areas of young deciduous between patches of all-aged coniferous. Stands are horizontal mixes of coniferous patches and deciduous patches and these are of different age. Coniferous (all-aged)
8. Overstory Coniferous Deciduous or Coniferous (partly uneven-aged) Understory Coniferous (scattered pockets of advance growth)	A) Irregular shelterwood removal cuts		Coniferous or Coniferous Deciduous

Reference:

Philip G. Comeau, Richard Kabzems, John McClarnon, and Jean L. Heineman 2005. Implications of Selected approaches for regenerating and managing western boreal mixedwoods. For. Chron. 81(4): 559-574

Lieffers, VJ, RB Macmillan, D MacPherson, K Branter, and JD Stewart. 1996 Semi-natural and intensive silviculture systems for the Boreal mixedwood forests. For. Chron. 72: 286-292.