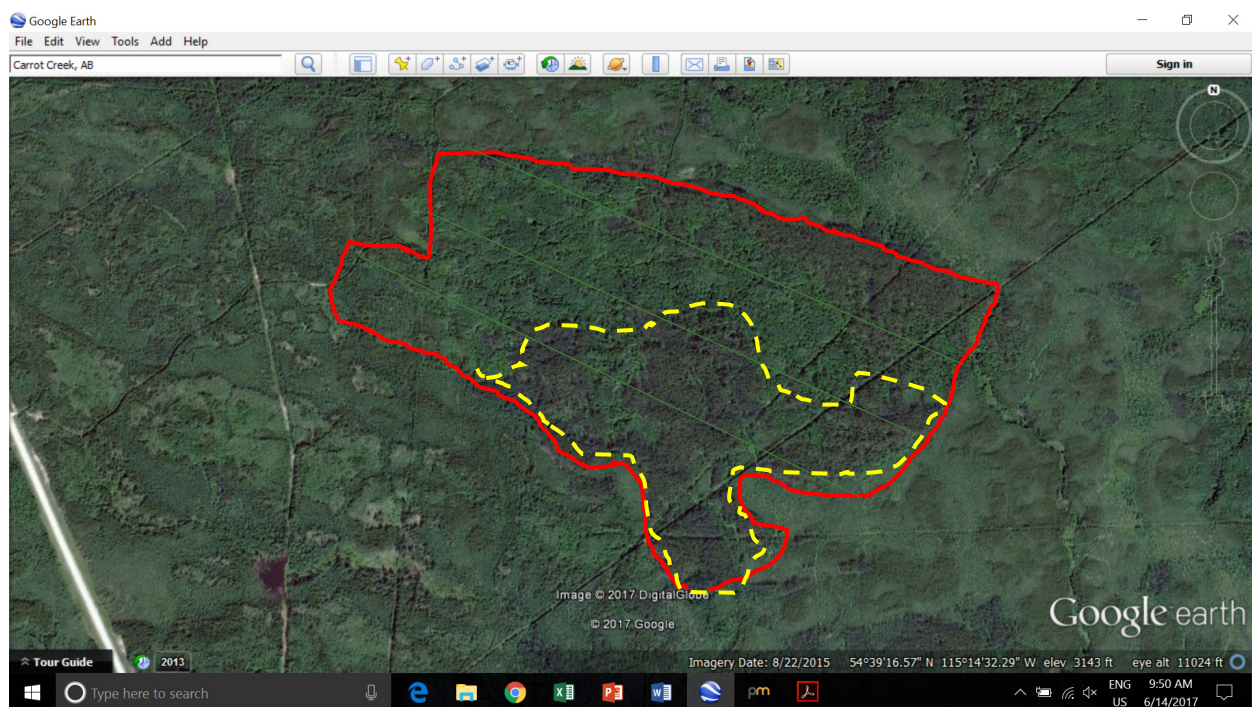


## APPENDIX: CASE STUDY – USING THE MIXEDWOOD SILVICULTURE GUIDE TO MAKE A REFORESTATION PRESCRIPTION

### PRE-HARVEST SITE DESCRIPTION

A planned cutblock consists of two stands: approximately 35 ha of a 105-year-old deciduous leading mixedwood stand carrying approximately 75 m<sup>3</sup>/ha of deciduous volume and 55 m<sup>3</sup>/ha coniferous volume (leading species are aspen and white spruce); and approximately 20 ha of a 135-year-old coniferous leading mixedwood stand carrying approximately 90 m<sup>3</sup>/ha of coniferous volume and 35 m<sup>3</sup>/ha of deciduous volume. In Figure 1 the opening boundary is traced in red, the coniferous leading stand is traced in yellow (with dashes) and the lines on which assessment points were placed are shown in blue. Assessment points were located along the lines at the same spacing as the between-line spacing.



**Figure 1. Aerial image of planned opening.**

The first stand is located on a mesic to sub-hygic, rich edatope (M 4-5 on the edatope diagram) while the second stand is located on a mesic, medium edatope (M 1-2 on the edatope diagram). For the deciduous-leading stand this is confirmed by a diagnosis identifying the following site factors: Ah soil horizon, medium soil texture, seepage present, flat topography, moderately well drained deep soils (Section 10.3 describes site factors in detail). Therefore, this site is unlikely to have abiotic limiting factors; this infers it is likely to be a high competition site as other plants will be as unconstrained as the trees. The conifer leading site has lack of nutrients as its only abiotic limiting factor; this diagnosis is confirmed by the identification of the following site factors: Ae soil horizon, Mor humus form, medium

soil texture, lack of seepage. Thus, the second site is less likely to be a high competition site. Note that both sites contain small areas where seasonal flooding occurs on an irregular basis.

The first stand has a northerly aspect and is located on the gentle toe of a small slope; the second stand has an easterly aspect on another face of the same gentle slope.

Bluejoint reedgrass is prominent in the understory of the deciduous-leading (first) stand along with raspberry, lowbush cranberry and wild sarsaparilla. The understory of the second stand is composed largely of twinflower and wild rose.

## DECIDUOUS PROPAGULE POTENTIAL

The following table shows how the Deciduous Propagule Potential (DPP) Tool was used to assess the deciduous regeneration potential of each stand.

**Table 1. Using the DPP to assess deciduous reforestation chance.**

**Step One - Determine thrift of deciduous trees in each stand.**

Stand #	Composition	Aspen Condition	Moisture Regime	Site		Elevation	Presence of Disease	Thrift <sup>1</sup>
				Nutrient Regime	Aspect			
1	Deciduous leading	B. Minor defects	B. Mesic	C. Medium to rich	A. Northerly	980-m	B. Single generation	<b>Low</b>
2	Coniferous leading	C. Defects common	B. Mesic	B. Medium	C. East	980-m	B. Single generation	<b>Moderate</b>

**Step Two - Determine deciduous propagule potential**

Stand #	Composition	Deciduous Species	Thrift (see above)	Distribution	Density	Hazards	Propagule Potential <sup>2</sup>
1	Deciduous leading	Aspen	Low	Even	350/ha	Low - winter logging	<b>Fair</b>
2	Coniferous leading	Aspen	Moderate	Even	135/ha	Low - winter logging	<b>Good</b>

Footnotes

1. Result first page of Deciduous Propagule Potential Tool
2. Result of the second page of the Deciduous Propagule Potential Tool

While the two stands have differing deciduous reforestation chance both have sufficient potential to support regeneration to a mixedwood objective. The first stand will require more attention later in the stand development cycle as the patchy nature of deciduous regeneration is more susceptible to stocking of the stand being compromised by tending treatments that reduce deciduous regeneration success. The first stand would not be a good candidate for regenerating to a pure deciduous composition.

## GENERIC PRESCRIPTIONS

Stand replacement, i.e. replacing the harvested stand composition, is generally the most common approach used in Alberta, so that approach is used in this case study. Given that, the first stand will be reforested to a deciduous leading objective, while the second stand will be reforested to coniferous

leading objective. In both cases the species objectives will be deciduous = aspen and coniferous = white spruce.

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#### STAND ONE – DECIDUOUS-LEADING MIXEDWOOD OBJECTIVE

Refer to the generic prescription flowchart for a DC stand on edatope M 3-4. Notice first that the flowchart supports pursuing a deciduous-leading objective but suggests an aggregated stand structure due to the DPP rating of “FAIR”.

Moving further down the flowchart, a site adjustment that creates small to moderate raised microsites is recommended in the presence of bluejoint reedgrass. Microsite creation should likely be focused on areas selected for conifer dominance as part of the aggregated mixedwood objective. Likewise, these areas will likely be targeted with broadcast patch application of glyphosate to control reedgrass within two or three years of planting.

The winter injury assessment process indicates little likelihood of winter injury, thus medium sized white spruce seedlings can be planted.

***Note that the following discussion of mortality uses example data; in using the Guide practitioners will use data based on survival of their own reforested cutblocks. Preferably survival data will be edatope based.*** Previous experience in planting deciduous-leading M3 edatopes with reedgrass has resulted in approximately 4% mortality in the first year after planting with subsequent mortality of 2% per year for the next 3 years for a cumulative mortality of 10%. Mortality after the first four years has been approximately 5% in total to year 14. Because coniferous seedlings will be expected to dominate areas where deciduous stocking is patchy a final density of 1400 stems per ha for these areas will be desired while a coniferous density of 400 stems per ha is desired where deciduous is present. Using the stocking density calculator gives planting densities of 1610 per ha for the areas deciduous stocking is likely to be poor, and 460 per ha where deciduous stocking is likely to be good.

Review the deciduous facilitation assessment process – you will find that deciduous facilitation potential varies from fair to very good. Because deciduous facilitation potential is variable planting stock should be selected for the higher competitive potential associated with very good facilitation potential, thus medium to large stock should be selected. Because of the reedgrass competition potential, summer stock is recommended to ensure early focus on seedling root growth.

Review the Establishment Phase stand tending flowchart. Because the objective is deciduous-leading mixedwood and the deciduous propagule potential is “FAIR” an aggregated structural objective is most attainable. Therefore, patch or spot tending that targets areas with high herbaceous vegetation pressure (particularly bluejoint reedgrass) while avoiding treating aspen is the preferred tending treatment. Monitoring for tending should be prompt, i.e. within two years of planting with treatment following within a growing season of monitoring.

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#### STAND TWO – CONIFEROUS-LEADING MIXEDWOOD OBJECTIVE

Refer to the generic prescription flowchart for CD stand on edatope M 1-2. The flowchart indicates that a mixedwood objective is feasible with a DPP rating of “GOOD”. Furthermore, the flowchart indicates little likelihood of herbaceous competition consistent with the species observed in the understory of the stand. Therefore, an intimate aggregation objective is chosen.

The winter injury thought tool suggests there is little likelihood of winter injury, while the deciduous facilitation thought tool suggests a high potential for facilitation. Thus, straight planting of medium sized stock is recommended. Either spring or summer stock can be used.

A coniferous density of 800 stems per ha is desired across the site. Previous experience has shown mortality of 6% over the first four years and subsequent mortality to age 14 of 4%. The density calculator gives a planting density of 880 stems per ha.

The Establishment phase flowchart suggests that the low likelihood of herbaceous competition means that the site should be monitored 3 or 4 years after planting for deciduous competition. If, as is likely, deciduous competition is high, single stem tending may be considered using either single stem herbicide application (basal bark treatment) or motor manual tending. Alternatively, by monitoring 2 years after planting a broadcast herbicide application of glyphosate may be used ***provided application occurs in the third year after planting, at the latest.***