

Appendix 6: Reforestation Strategy Stocking Standards and Crop Tree Requirements



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1.1 Introduction

The Landscape Level Reforestation Strategy proposes alternate “applicable performance standards” for *FSJPP Regulation* Sections 32 (4),(5),(6),(8), and (from Schedule F), Section 98 and Section 99 for coniferous and deciduous areas logged after November 15, 2001. The strategy also applies to coniferous and deciduous areas with commencement dates before November 15, 2001 if a Participant currently carries reforestation liability and submits a statement to the District Manager that the cutblock(s) will be subject to the SFMP under Section 42 of the *FSJPPR*.

This Appendix is intended to summarize the key stocking standards and crop tree requirements for deciduous, coniferous and mixedwood areas for the term of the SFMP. The following changes to requirements apply to coniferous and deciduous areas:

1.2 Crop Tree Requirements and Vegetative Competition

For the purposes of Section 42 of the *FSJPPR* for coniferous areas in which the Reforestation landscape level strategy applies, the following will be used to determine if a crop tree is well growing at the reforestation assessment (Indicator 29, Section 6.29):

A). A crop tree that is at least 100% of the height of all herbaceous competition (e.g. grass), and 150% of the height of brush and deciduous competition within a one metre radius cylinder is well growing.

If the crop tree does not meet the criteria in (A) above, it must meet the following criteria:

B). A crop tree is well growing if it is taller than vegetation excluding aspen and cottonwood (but including birch and brush species), in three of four quadrants in the one metre radius cylinder, and.

C). it is taller than countable aspen and/or cottonwood in at least three of four quadrants of the one metre radius cylinder and the number of countable aspen or cottonwood in the plot does not exceed two. Quadrants may be aligned to minimize the number of quadrants with vegetation taller than the crop tree. A ‘countable’ aspen or cottonwood is considered to be a tree that is greater than the median height of all potentially well growing trees within the 3.99 metre radius plot and

D) it is at least 100% of the height of all herbaceous competition. ⁴²

Any vegetation assessment for final reforestation assessments cannot be completed until at least one growing season following chemical brushing, and three growing seasons following manual brushing.

For the purposes of Section 42 of the *FSJPPR* for deciduous areas the following standard will be used to determine if a crop tree is well growing at the reforestation assessment:

⁴² Replaces S 32(6)(c)

A . A well growing deciduous crop tree is defined as one that meets the minimum height criteria in Table C, and is at least 100% of the height of all herbaceous competition (e.g. grass) within a one metre radius cylinder.

Both conifer and deciduous crop trees must be healthy enough that they can reasonably be expected to reach maturity. Qualified registered professionals will be responsible for establishing and updating crop tree health criteria to use for reforestation assessments. The criteria will be developed using the best information available, (e.g. the “Free- Growing Damage Criteria” found in the “Establishment to Free Growing Guidebook”) and in consultation with forest health professionals and /or the MFLNRO.

1.3 Minimum Inter-Tree Distance

Coniferous Areas: The minimum inter tree spacing (MITD) at establishment will be 1.5 metres for coniferous areas. Reductions to a 1.0 metre minimum will be allowed where conditions warrant (e.g. plantable spots are limited), as noted in a foresters rationale, which will be documented and retained by the Participant.⁴³. MITD does not apply at the final reforestation assessment survey under the landscape level strategy.

Deciduous Areas: The minimum inter tree spacing (MITD) at establishment, and for areas assessed prior to full implementation of the LLS, will be 0.5 metres⁴⁴ for standard well spaced surveys. MITD will not apply for MSQ surveys at either the establishment phase or at the final reforestation assessment survey under the landscape level strategy.

Mixedwood Areas: Mixedwoods will be assessed using MSQ surveys using the standards specified in Section 1.4.3 of this Appendix, consequently there will be no specific MITD for mixedwoods.

1.4 Stocking Requirements

For the purposes of Section 42 of the *FSJPPR* for areas to which the Reforestation landscape level reforestation assessment process applies, the Stocking Standards in Section 1.4.1 will apply as follows:

1. The target stocking standard (TSS) as set out in Table A is required for the SLP and for a landscape level calculation of Maximum Predicted Merchantable Volume (MPMV) at the time of the reforestation assessment (Section 6.29). It is otherwise not used in the final legal assessment of coniferous reforestation success under the Reforestation LLS, as the assessment is based on the cumulative results for all blocks.

2. The minimum stocking standard (MSS) as set out in Table A is required for the SLP and determination of Establishment Delay (Section 6.30). It is otherwise not used in the final legal

⁴³ Replaces requirements of S 32(6)(d)

⁴⁴ This is unchanged from the FSJPPR

assessment of reforestation success under the Reforestation LLS, as the assessment is based on the cumulative results for all blocks.

1.4.1 Stocking Standards for Coniferous Areas:

Table A below provides a standard for Site Level Plans and determining Establishment Delay (Section 6.30). The Participants may, at their discretion, choose to use an MSQ survey, utilizing the equivalent MSQ numbers included in Table B, to determine establishment delay.

Table A- Coniferous Stocking Standards for Establishment Delay and Max PMV determination

TYPE OF AREA	SITE	MINIMUM # OF TREES/HA (MSS) *	TARGET # TREES/HA (TSS)*	COUNTABLE SPECIES BWBS/ESSF/SWB
CONIFEROUS	XERIC-SUBXERIC	500	1000	SW,PL, BL
CONIFEROUS	SUBMESIC-MESIC	700	1200	Sw,PL, BL, SB
CONIFEROUS	SUBHYGRIC	500	1000	SW,PL, BL,SB,LT
CONIFEROUS	HYGRIC-SUBHYDRIC	400	800	SW,PL, BL,SB,LT

*well spaced trees/ha(see Table B for equivalent MSQ values)

No Specific Minimum heights- adequate height determined in “ Crop Tree Requirements and Vegetative Competition”

Minimum strata size is 2 ha contiguous, or 20% of the area in blocks less than 10 ha

Reforestation Assessment completed 15 growing seasons after harvest commencement

Table B - MSQ/Well Spaced Conversions



MSQ Value	# Well Spaced /ha Equivalent
0.0	0
0.3	100
0.7	200
1.2	300
1.7	400
2.1	500
2.5	600
2.8	700
3.1	800
3.3	900
3.5	1000
3.6	1100
3.7	1200
3.8	1300
3.9	1400
3.9	1500
3.9	1600
3.9	1700
4.0	1800

For the purposes of Section 42 of the *FSJPPR* for areas to which the Reforestation landscape level reforestation assessment process applies, the Stocking Standards in Section 1.4.2 will apply as follows:

1. The target stocking standard (TSS) as set out in Table A is required for the SLP and for a landscape level calculation of Maximum Predicted Merchantable Volume (MPMV) at the time of the reforestation assessment (Section 6.29). It is otherwise not used in the final legal assessment of coniferous reforestation success under the Reforestation LLS, as the assessment is based on the cumulative results for all blocks.

2. The minimum stocking standard (MSS) as set out in Table A is required for the SLP and determination of Establishment Delay (Section 6.30). It is otherwise not used in the final legal assessment of reforestation success under the Reforestation LLS, as the assessment is based on the cumulative results for all blocks

1.4.2 Stocking Standards for Deciduous Areas

Well Growing and Forest Health Acceptability Criteria for Deciduous Crop Trees

- Live aspen tree and the tree pith must not be laterally displaced more than 30 cm from the root crown pith location
- Aspen tree must not originate from a cut stump
- Aspen tree must have at least one live leader
- Aspen tree stem must not have a wound that is greater than 10% of the stem circumference, or is greater than 10% of the total length of the stem
- Aspen tree stem must not have any fungal infections or insect infestations affecting tissues below the bark surface, visible without destructive sampling
- Aspen tree must not be browsed to such a significant degree so as to limit its ability to become a crop tree

Table C below provides a standard for Site Level Plans and determining Establishment Delay (Section 6.30). The Participants will choose to use an MSQ survey, utilizing the equivalent MSQ numbers included in Table D, to determine establishment delay.

Table C- Deciduous Stocking Standards for Establishment Delay and Max PMV determination⁴



Type of Area	Site	Min. # of Trees/ha (MSS) *	Target # of Trees/ha (TSS) *	Minimum Height
Deciduous	Xeric-Submesic	1200	4000	1.4 m
Deciduous	Mesic-Subhydric	1200	4000	1.4 m

*well spaced trees/ha (see Table D for equivalent MSQ values)

Minimum strata size is 2 ha contiguous, or 20% of the area in blocks less than 10 ha

Reforestation Assessment completed 10 growing seasons after harvest commencement

Well growing block assessments can be completed at anytime from 5 growing seasons to 15 growing seasons after harvest commencement⁴⁵ - disallowed

Specific establishment delay requirements only – A quadrant is considered stocked if there are 3 acceptable At or Ct or any combination therein over 1m in height. The stratum is considered stocked if there are a minimum of 2000 countable stems.

Specific year 6 or 7 survey requirements. A quadrant is considered stocked if there are 3 acceptable At or Ct or any combination therein over 1.4 metres in height, The stratum is considered stocked if there a minimum of 2000 countable stems.

Countable trees are considered as those trees suitable for selection as crop trees, and are within a minimum of 20% of the height of tallest crop trees selected in the plot.

Table D - MSQ/Well Spaced Conversions Deciduous

MSQ	Well Spaced Equivalent	MSQ	Well Spaced Equivalent	MSQ	Well Spaced Equivalent	MSQ	Well Spaced Equivalent
		1	146	2	430	3	1149
0.1	10	1.1	167	2.1	473	3.1	1288
0.2	21	1.2	188	2.2	519	3.2	1453
0.3	34	1.3	211	2.3	571	3.3	1653

⁴⁵ New Applicable Performance Standard to replace 9 yr minimum in S 32 (4) and (S 32(6)(e)(ii) – disallowed)



0.4	48	1.4	236	2.4	627	3.4	1902
0.5	62	1.5	263	2.5	690	3.5	2224
0.6	77	1.6	291	2.6	760	3.6	2658
0.7	93	1.7	322	2.7	839	3.7	3289
0.8	109	1.8	355	2.8	929	3.8	4324
0.9	127	1.9	391	2.9	1031	3.9	6535

Table E provides the applicable performance standard for stocking requirements to assess the establishment during the reforestation period of a well growing stand of crop trees on deciduous areas that are outside of the landscape strategy population as a result of being 11 growing seasons or more from harvest commencement.

Table E. Stocking Standards for Deciduous Areas Outside of the Landscape Level Population

Type of Area	Site	Min. # of Trees/ha (MSS) *	Minimum Height	Countable species BWBS/ESSF
Deciduous	Xeric-Submesic	4000	1.4 m	At (Pli max 15%)
Deciduous	Mesic-Subhydric	4000	1.4 m	At, Ac, (Birch, Sx, Pli max 15%)

These standards replace the requirements of Section 32(4), (5), (6), and Section 98(1), (2) and (3) as they applied to deciduous areas.

1.4.3 Stocking Guidelines for Mixedwoods in the BWBS

Mixedwood harvested areas that are stratified into discrete conifer and deciduous strata will be managed according to Sections 1.4.1 and 1.4.2 respectively.



The following stocking guidelines utilized Peace District Manager's standards as a guide for intimate mixtures.

Establishment Delay Guidelines

Species	Target MSQ	Minimum MSQ	Regen /Est. Delay
At, Ac, Sw, Pli	3.7	2.8	3

- "Healthy trees" and "competition from plants, shrubs or other trees" as current standards.
- At Establishment delay only, a quadrant should only be considered as stocked with At or Ac if it has at least 3 acceptable At or Ac over 1 m in height.
- There is no minimum inter tree distance requirements for MSQ based establishment delay surveys.
- Regeneration/Establishment delay assessments should include an inventory label so that potential land classification trajectories can be determined.

Well Growing Guidelines

Species	Target MSQ	Minimum MSQ	Early Well Growing (Yrs)	Late Well Growing (Yrs)
At, Ac, Sw, Pli	3.7	2.8	15	20

- "Healthy trees" and "competition from plants, shrubs or other trees" as current standards
- For this assessment At & Ac requirements are 1 or more per quadrant
- These standards replace the requirements of Section 32(4), (5), (6), and Section 98(1),(2) and (3) as they applied to mixedwood areas.

Well Growing Criteria

For Aspen

- Aspen top height must be at least 66% of the tallest tree within the plot For intimate mixtures⁴⁶ only:
 - Deciduous basal area (BA) must not exceed 8 m² /ha for Sw and 5 m²/ha for Pli at the Well Growing Assessment as determined from information collected within the plot radius ,or
 - 1/3 of the coniferous crown must be within the deciduous canopy at the Well Growing Assessment and

⁴⁶ Definitions of Intimate mixtures and successional mixtures are located in Appendix 10 "FSJPP Mixedwood Management Guidelines"

- **Sw Coniferous Relative-Height-in-the-Canopy (RHC) must exceed 0.5. (i.e. Sw must be at least 50% of the way through the aspen canopy) and Pli RHC must exceed 0.75.**

For successional mixtures only:

- **Sw height must be 2 m or greater**
- **Sw leader length over the past 3 complete growing seasons must be 20 cm or greater, and**
- **Sw Height Diameter Ratio (HDR) must be 1.0 or less**
- **For all other mixedwood categories :**
 - **Sw and Pli must be 5 m stem-to-stem in 2 adjacent quadrants and 2 m stem-to-stem in the other 2 quadrants from any At or Ac stems.**

Land Status Classification

- **The target Well Growing mixedwood land status classification will be based upon the classification that characterizes the stand at the time of harvest. The process for classifying areas and tracking forest types over time is included in Appendix 10 “Mixedwood Management Guidelines”.**

Survey Guidelines

- **Stocking guidelines are to be evaluated on a plot basis and reported for the block area declared as a mixedwood.**
- **Strata must be clearly mapped.**
- **One (1) plot per hectare (approximately) will be established.**
- **Consistent with the *FSJPPR*, the minimum strata size is two ha, and must be classed as either C, CD, DC, or D.**

1.4.4 Modifying Stocking Standard Requirements

The qualified registered professional may modify target and minimum stocking requirements, however decreases in TSS and MSS require a documented rationale specifying the field conditions that would justify a lower or higher target stocking. Site conditions such as a poor site with a low preharvest stocking, a wet site with limited suitable microsites, are examples of conditions that would justify reduced TSS. These modified target and minimum stocking requirements would require the approval of the District Manager.

If the qualified registered professional who prepared the SLP for the area is of the opinion that the area in the cutblock in which reforestation is required is a complex of different types of sites interspersed, then the minimum and target stocking requirements for the complex are the number of trees per hectare determined by the following procedure:

- (i) Estimate the amount of area in each type of site.

(ii) For each type of site, multiply the amount of area of that type by the stocking requirement for that type of site, in accordance with Table A.

(iii) Add the total number of well spaced trees required for all types of sites as determined in (ii).

(iv) Divide the total number of trees required for the complex by the total area of the cutblock.

