MNRF Silvicultural Assessment Validation Check

Objective

The intent of the MNRF silvicultural assessment at establishment is to confirm the accuracy of the stand description reported by the forest manager. The stand parameters derived from MNRF's silvicultural assessment program will be used to validate the stand attributes reported by the SFL. The validation process will compare the stand parameters collected by the MNRF to those collected by the SFL to determine whether to accept or reject the SFL results.

The following survey methodology is intended for silvicultural assessments in even-aged silvicultural systems only.

Establishment Assessment Details

- MNRF will assess a 10% random sample with probability proportional to area (i.e., 100 ha area has 10x the chance of being picked over a 10 ha area) of the establishment surveys submitted by the SFL.
- Minimum block size for sampling >= 8 ha; if areas < 8 ha are only splits from a larger area (e.g.,10 ha area that was split into two 5 ha areas because a lowland swale ran down the middle of the 10 ha area), these can be included
- Sample size will depend on whether MNRF is validating the same year as the SFL or the following year
- The sampling intensity associated with the size of the area for each silviculture stratum is provided in Table 1.

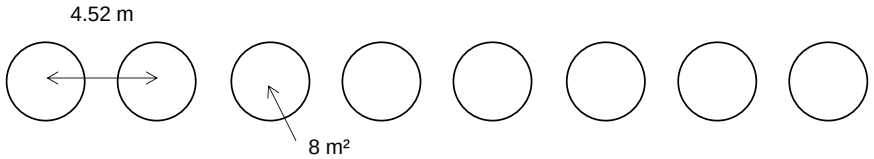
Table 1. Sampling intensity required for validating silviculture assessments

Validation the same year as the SFL	
Stand area (ha)	**# of clusters**
8-30	30 (minimum)
>30	1 cluster/ha
Validation the year after the SFL assessment	
Stand area (ha)	**# of clusters**
8-30	30 (minimum)
>30 to <=60	1 cluster/ha
>60	30 + 1 cluster/2 ha of the entire area (e.g., 70 ha stand = 30 clusters + 70/2 clusters, total of 65 clusters)

Cluster and Plot Layout

A sample cluster contains a string of eight, 8 m^2 circular plots with a radius of 1.6 m with each circular plot at a distance of 4.52 m (2 x 2.26 m; Figure 1). In efforts to align with systematic random sampling, the layout of each cluster should follow the direction of travel toward the next cluster.

Figure 1. Cluster layout



Stand Attributes Measured

Stand attributes measured in each plot will be the same for both a density regulated plantation and a non-density regulated stand. Depending on the stand type, record the following at each plot:

Conifer, Birch, Mixedwoods

a. The species of the dominant (tallest) trees above minimum height that are free of competition (see *competition rules*), to a maximum of 3 trees. This rule applies for all stand conditions except in a pure poplar stand.

Pure Poplar

b. The species of the dominant trees above minimum height that are free of competition (see *competition rules*), to a maximum of 6 trees.

A stand with one tree tallied for every plot = 100% site occupancy or 1250 well distributed stems/ha. Site occupancy targets listed under the regeneration standards in an SGR are typically associated with target/crop trees (or acceptable trees with older SGRs). The additional trees tallied in each plot contribute toward effective density; site occupancy and effective density work together to help characterize the growing conditions of the regenerating trees.

Process

Step 1. Planning and preparation for field sampling

a. Using the total area submitted by the SFL for establishment/FTG surveys, run a random sample generator to determine the 10% sample area that MNRF will be

required to validate on the management unit. In relation to overlapping districts on a management unit, it is suggested that the lead district run the random sampler and distribute the work among the associated districts accordingly.

b. Establish a grid pattern cluster layout for each block/silviculture stratum using the sampling intensity rules outlined in table 1. This is typically done as a GIS exercise using fishnet …
c. Upload the cluster network to a GPS or tablet to help locate clusters accurately in the field. A printed paper map will assist in planning the direction of travel and provide a backup in the event of GPS failure.

Step 2. Starting a cluster

a. Locate starting point or first cluster using GPS
b. Mark the centre of plot 1 with flagging tape
c. Note the direction of travel to layout plots within the cluster in the direction of travel to the next cluster

Step 3. First consideration in assessing plot for renewal

Is the plot over-topped with residual trees with crown closure of > 30% (for aspen or birch residual see *Residual Stand Structure Measures for Aspen and Birch Stands*; for other species or mixedwoods see *crown closure comparison*)?

- If “yes”, go to the next plot (trees are not free of competition).
- If “no”, proceed to step 4.

Step 4. Assessing renewal

a. Only consider trees in the plot that are above the minimum height specified in the associated Silvicultural Ground Rule (usually 0.8-1 m) and are in a healthy condition.
    - Do not consider residual trees (trees left behind after the harvest and have little potential of growing as part of the dominant canopy in the future stand) as renewal
    - Do not consider trees where the terminal shoot shows no sign of responding to release (stunted terminal growth).
b. Determine the number of trees/plot that are free of competition (see *competition rules* or refer to ‘?’ in SO_iSTARS), based on the concept of the competition cylinder. Trees that are free of competition must also be >= 1.2 m distance from each other. If trees are < 1.2 m from each other, only record one tree.
c. Determine the tree species; record up to 3 trees maximum/plot unless the stand type is pure poplar (maximum 6 trees/plot)

d. If there are trees present, but no tree is free of competition, record as barren AND add a comment (‘not FTG’)
e. You are not required to record the competition index; however, you need to consider the competition rules to determine if the tree is free of competition
f. If the plot does not contain renewal
    - Record the reason by the categories of: 1) not able to be regenerated (e.g., rock, wet, landing, ruts); 2) potential for regeneration but impeded by operational constraints (e.g., slash); and 3) potential for regeneration but trees are absent (barren or void).
g. Note that primary roads are accounted for by a reduction in the landbase within the FMP. If a road or landing is not considered as a reduction in the FMP, then this condition is considered as having potential for regeneration but impeded by operational constraints. *If there are more than the maximum number of trees/plot free of competition of the same height, refer to *species preference*.

Step 5. After the 8th Plot

- Was this the last cluster?
- If “yes”, tap the ‘close’ button; go to the next project or begin data compilation
- If “no” tap the button at the bottom of the screen to go to the next cluster
- Proceed to the next cluster and start back at step 1

Important Concepts

- The competition assessment area, or *competition cylinder*, is based upon a 1.13 m radius cylinder centred at the tip of a potential crop tree and extending 2 m above the tree. The *competition index score* (CI score) is the number of competition cylinder quadrants containing stems or branches of neighbouring trees or woody brush. The competition score only needs to be considered to determine if a tree is free of competition. For shade intolerant tree species (jack pine, larch, and aspen) CI = 0. For white spruce and black spruce CI ≤ 1. Balsam fir is allowed CI ≤ 2. Overtopped trees may not survive to the time of crown closure.

Competition Rules

Maximum number of quadrants within the cylinder that can have foliage from competing species taller than the crop tree to be considered free of competition. Applies when the management intensity is non-density regulated (extensive or basic). (modified from SO_iSTARS manual)

Very shade intolerant 0 quadrants	**Shade intolerant** 1 quadrant	**Intermediately shade intolerant** 2 quadrants	**Shade tolerant** 3 quadrants
Jack pine	White birch	White pine	Eastern white cedar
Red pine	Black spruce	White spruce	Balsam fir
Trembling aspen			
Balsam poplar			
Larch			

Effective Density Targets

Maximum number of trees/8 m² plot counted to allow for some limited clumping depending on the effective density specified in the relevant Silvicultural Ground Rule. Plot size = 8 m². 100% site occupancy = 1250 well-distributed stems/ha

Pure Aspen

Effective density (stems/ha)	# trees/plot to meet effective density	**Maximum # trees/plot counted**
10,000	8	**12**
5,000	4	**6**

Conifer, Birch, Mixedwoods

Effective density (stems/ha)	# trees/plot to meet effective density	**Maximum # trees/plot counted**
2,500	2	**3**
1,700	1	**2**
1,500	1	**2**

Crown Closure Comparison

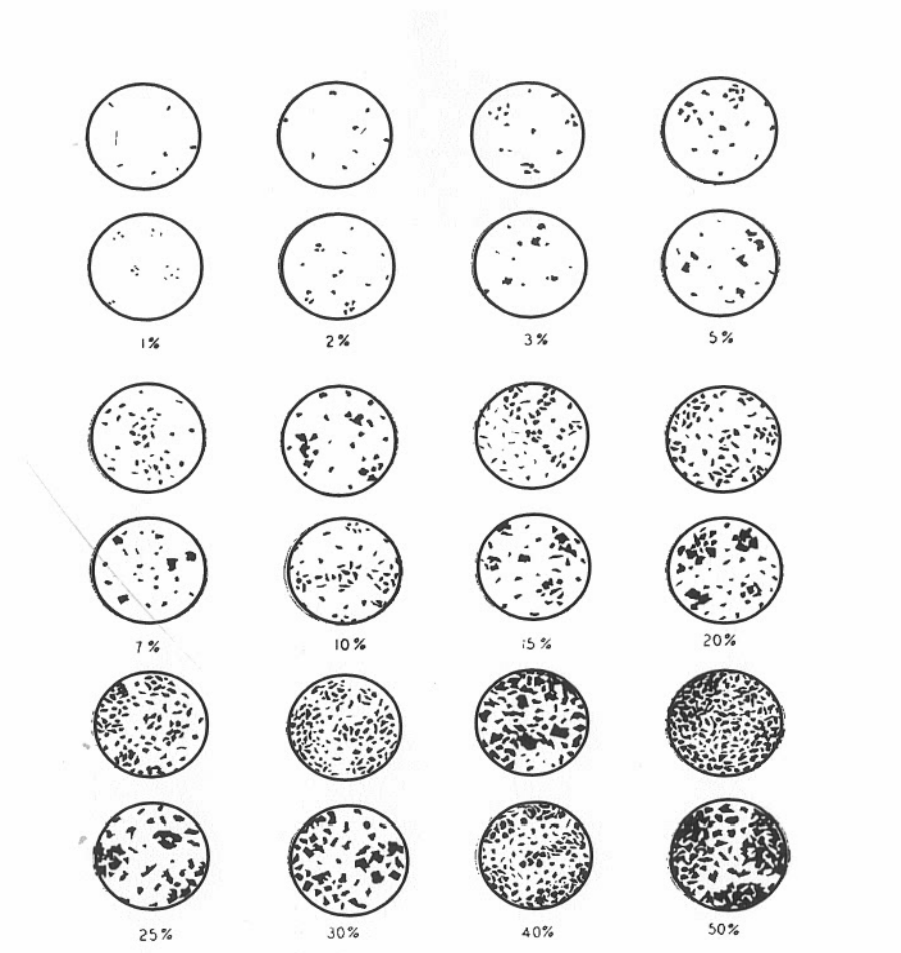


FIGURE 3.2. Comparison charts for visual estimation of foliage cover.

Species Preference

Assessment of renewal involves a competition assessment in each plot. The direction for conifer, birch or mixedwood stands is to record a maximum of 3 trees/plot that are free of competition. In plots where > 3 trees are free of competition and the height of these trees is the same, give preference to tree species in the order provided below.

Species Preference
1. poplar
2. white birch
3. jack pine, red pine, white pine
4. white spruce
5. black spruce
6. balsam fir

Residual Stand Structure Measures for Aspen and Birch Stands

Researchers from the Ontario Forest Research Institute (OFRI) have developed an operational model to assist forest practitioners with boreal mixedwood management. The models developed can be used to estimate the appropriate post-harvest residual stand structure, BA and N, to distinguish a clearcut harvest from a partial harvest. If birch residual has BA > 5 m^2/ha or density > 161 stems/ha, then the condition is considered overtopped. If aspen residual has BA > 10.1 m^2/ha or density >172 stems/ha then the condition is considered overtopped (Parker and Sharma, 2018).