FOREST RESEARCH REPORT

Nova Scotia Department of Natural Resources
Forest Management Planning

Tolerant Softwood & Mixedwood Management Guide

Tim McGrath
Timber Management Group
Truro, Nova Scotia

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Introduction

Uneven-aged management is increasingly being considered as a management option in Nova Scotia. Recently the province has published an Ecological Land Classification (ELC) and Forest Ecosystem Classification (FEC) that identify natural disturbance patterns for Nova Scotia Forests (NSDNR, 2006; Neily et al., 2011). As part of these classifications, gap and infrequent disturbance regimes are identified as natural for many forest stands. Nova Scotia has adopted the use of ecosystem based management, and plans to implement it on crown land (NSDNR, 2008) by practicing "natural disturbance silviculture" (Roe and Ruesink, 2005) on a portion of the forest (Stewart and Neily, 2008) to enhance biodiversity. One tool that can be used to meet both biodiversity and timber production goals is uneven-aged management through the use of selection management systems. Up until recently, forest management guides for Nova Scotia have only included even-aged recommendations (NSDNR, 1993). To fill this void, guides have been produced for tolerant hardwoods (McGrath, 2007) that include selection management as an option. This report publishes management keys that identify the conditions where selection management is appropriate for softwood and mixedwood stands along with even-aged prescriptions.

Use of the Keys

These keys were developed for shade tolerant softwood and mixedwood stands located in Nova Scotia. In this case, tolerant softwood and mixedwood stands are defined as being dominated by long lived species with a significant shade tolerant component. This includes vegetation types found in the Mixedwood and Spruce Hemlock Forest Groups of the Forest Ecosystem Classification for Nova Scotia as defined in Neily et al. (2011). The tolerant hardwood guide (McGrath, 2007) should be used when the Tolerant Hardwood Forest Group is encountered.

The Tolerant Softwood/Mixedwood Guide consists of four separate keys. Users start at the Main key (Key M) working their way through a series of questions concerning current stand conditions to arrive at a recommended prescription. To reach a recommendation, the user may be referred to one of three sub-keys. The sub-keys include Selection (Sub-Key S), Tending (Sub-Key T), and Regeneration (Sub-Key R).

In the keys, any text outlined by a diamond and shaded in grey is a question that must be answered. Depending on the answer to these questions the designated path is followed until a rectangle is encountered. These rectangles refer to either a sub-key (shaded in yellow), a management prescription (shaded in green), or recommendation to wait and re-evaluate later or referral to another guide (shaded in red). If a sub-key is indicated, it is followed until arriving at a prescription.

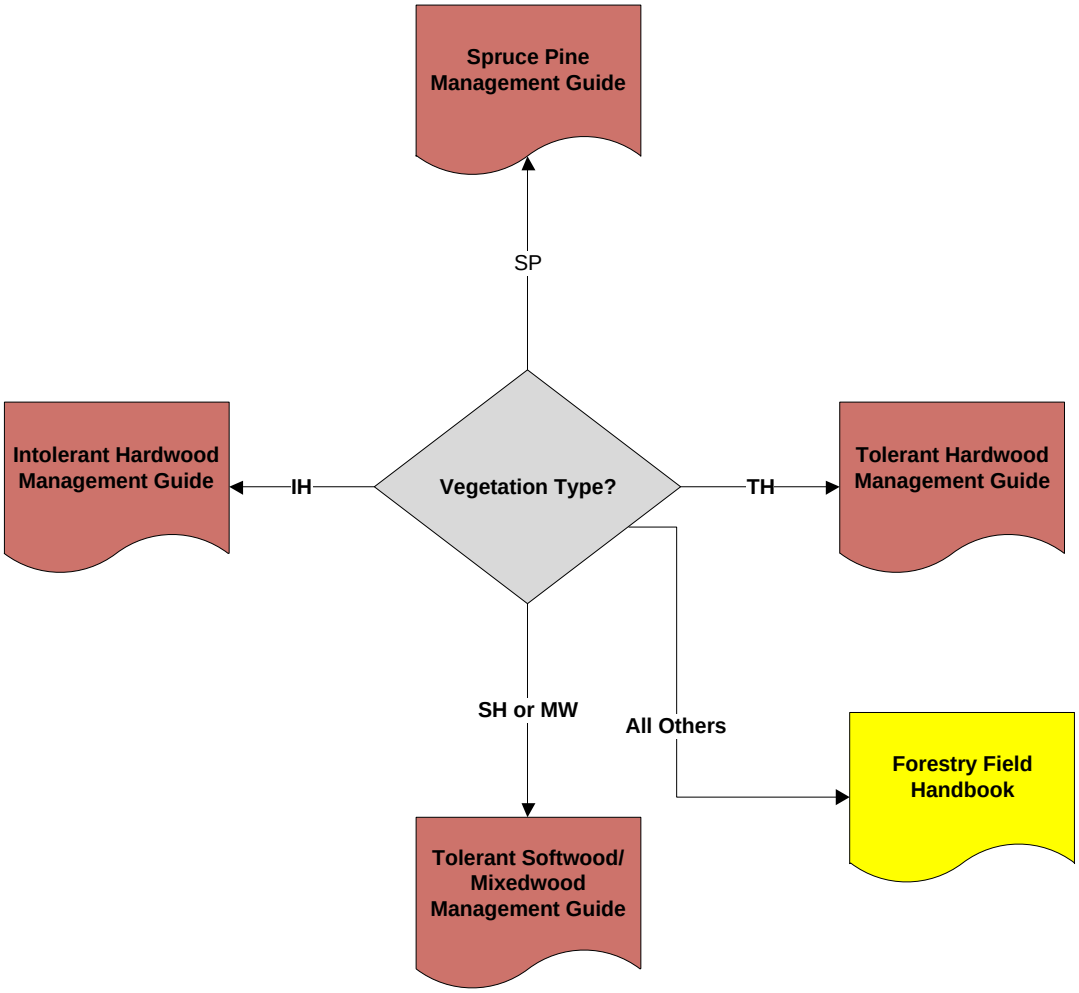
When prescribing partial harvesting systems in Nova Scotia, the potential for blowdown of residual trees is of concern. Thus, this guide incorporates an assessment of windthrow hazard as an important consideration when prescribing treatments. This windthrow hazard rating (Low, Medium or High) depends on the wind exposure and soil characteristics of the site. The soil characteristic component of windthrow hazard can be directly determined from soil type, per Keys et al. (2011). Windthrow hazard also depends on exposure of the stand to winds due to topography, slope position, proximity to the coast and to cut edges (Stathers et al., 1994). An evaluation of the wind exposure rating (Table 2) must be completed to combine with soils characteristics to determine overall windthrow hazard as shown in Table 1.

In this guide, partial harvests are not recommended in high windthrow hazard situations, but are recommended in low hazard conditions. The decision to proceed in medium hazard situations comes with increased risk of elevated harvesting cost and revenue loss due to windthrow.

Table 1. Windthrow Hazard Rating Categories Based on Exposure and Soils.					
Soil Type (Keys et al., 2011)	**Exposure Class**				
	Sheltered	***Moderately Sheltered***	***Moderate***	***Moderately Exposed***	***Exposed***
1, 1-G, 2, 2-G, 2-L, 8, 8-C					
Stony phases					
3, 3-G, 3-L, 5, 9, 9-C, 11					
Stony phases					
6, 12					
Stony phases					
All wet, organic, moist shallow, and talus soil types (ST4, ST7, ST10, ST13, ST14, ST16, ST18, ST19)					
Dry shallow soil types (ST15, ST17) with 0-15 cm depth or stony (S) phase					
Dry shallow soil types (ST15, ST17) with 16-30 cm depth and non-stony phase					
Windthrow Hazard Rating	**Low**	**Moderate**	**High**		

Table 2. Exposure[1] Definitions Adopted from Keys et al. (2011).		
Class	**Description**	**Code**
Sheltered	The most extreme category of protection from wind and atmospheric drought stress, best illustrated by lower slopes of deep valleys where protection is provided on all sides.	**S**
Moderately Sheltered	Intermediate between Moderate and Sheltered. Includes middle slopes between high ridges and broad basins which are afforded some wind protection from one or more directions	**MS**
Moderate	The topographically neutral category. Includes broad flats, lower and middle slopes of strong ridges (plus sheltered upper slopes), and upper slopes of gentle relief in a flat landscape.	**M**
Moderately Exposed	Intermediate between Exposed and Moderate. Includes upper slopes of inland ridges or hills, except where sheltered by a larger hill.	**ME**
Exposed	Sites with extreme exposure. Includes upper slopes of moderate ridges immediately along the coastline and steep upper slopes of uplands open to winds from two or more directions.	**EX**
[1]Exposure refers to the relative openness of a site to weather conditions, particularly wind.		

Management Guides by Vegetation Group
Key VT – Vegetation Types



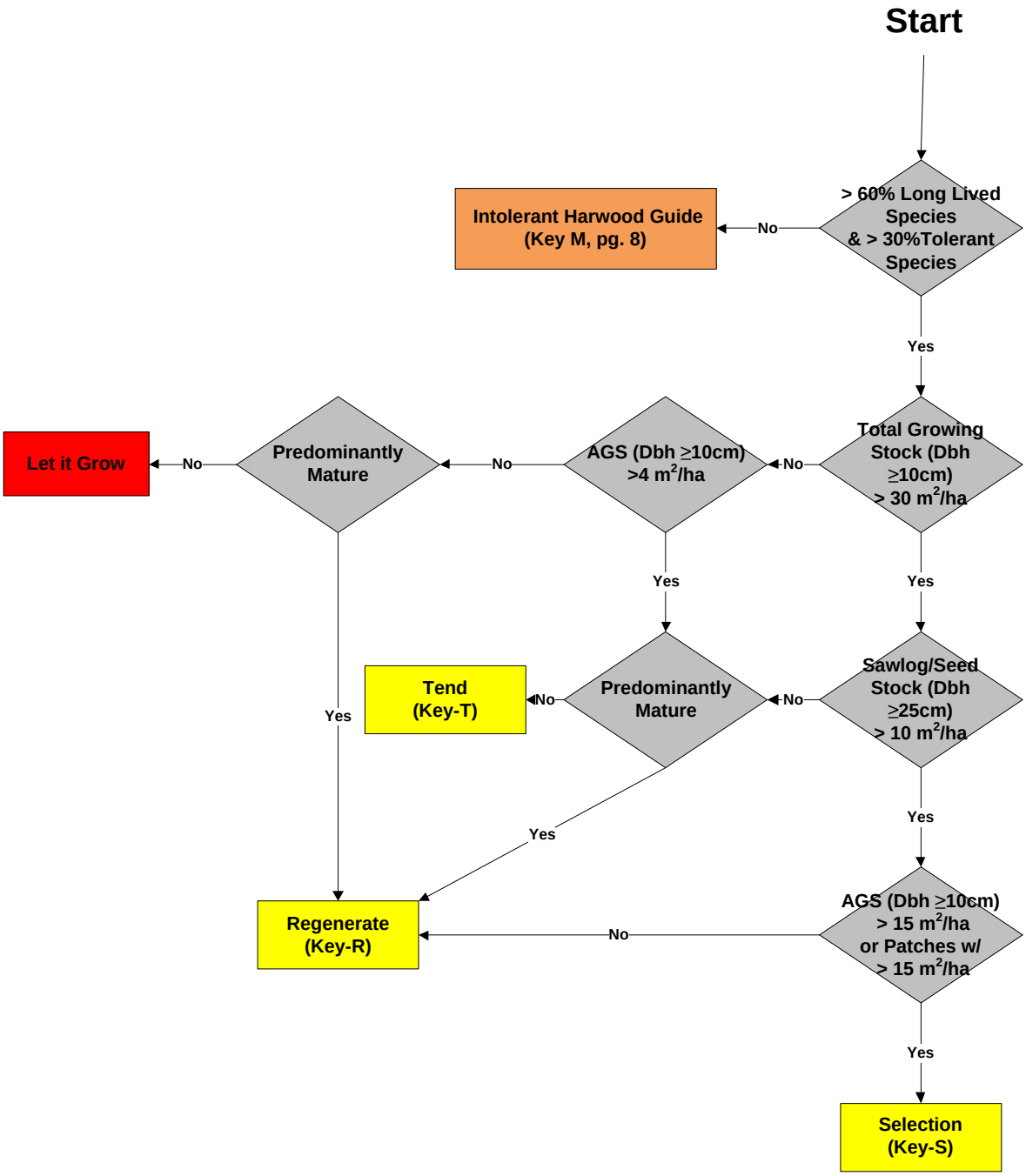
KEY - VT - Vegetation Types

Instructions and Definitions for:

Decision Diamond

Vegetation Type – What vegetation type (Neily *et al*., 2011) are you in ? If in a Tolerant Hardwood **v**egetation type refer to McGrath (2007). If in a Spruce Hemlock (SH) or Mixedwood (MW) vegetation type refer to this guide (McGrath, 2010). If in an Intolerant Hardwood (IH) vegetation type refer to McGrath *et al*. (2015). If in a Spruce-Pine Vegetation Type (SP) refer to Neily, Quigley and McGrath (2014). If in any other vegetation type refer to the Forestry Field Handbook (NSDNR, 1993).

Tolerant Softwood/ Mixedwood Management Key
Key M - Main



KEY - M - Main

Instructions and Definitions for:

Decision Diamonds

- **> 60% Long Lived Species & Tolerant Species > 30%** – Is the stand made up of more than 60% long lived species including red spruce, eastern hemlock, white pine, sugar maple, yellow birch, red oak and white ash and does stand consist of more than 30% tolerant species, including red spruce, eastern hemlock and sugar maple (as a % of stand basal area) ?
- **Total Growing Stock (Dbh ≥ 10 cm) > 30 m^2/ha** – Is the total basal area of all trees greater than or equal to10 cm (4 inches) in diameter at breast height greater than 30 m^2/ha (130 ft^2/acre)?
- **Predominantly Mature** – Is the overstory predominantly mature in terms of being able to produce adequate seed for regeneration
- **Sawlog/Seed Stock (Dbh ≥ 25 cm) > 10m^2/ha** – Is there a minimum of 10 m^2/ha (44 ft^2/acre) of sawlog quality trees with diameter (at breast height) of greater than or equal to 25 cm (10 inches)?
- **AGS** – **A**cceptable **G**rowing **S**tock - Trees that have the quality and vigour to potentially grow into sawlogs or already have sawlog quality and size and will not degrade into a lower quality sawlog or worse within 15 years. Trees that have small live crowns (<1/3 live crown ratios) or are spindly (Height (m) to Dbh (cm) ratios > 80 (McGrath and Ellingsen, 2009)) are not considered AGS as they would be prone to wind damage or slow to respond when stand partially harvested.
- **AGS (Dbh ≥ 10 cm) > 15 m^2/ha** – Is the basal area of trees greater than or equal to 10 cm (4 inches) in diameter at breast height and judged to be Acceptable Growing Stock greater than 15 m^2/ha (65 ft^2/acre)?
- **Patches w/ AGS (Dbh ≥ 10 cm) > 15 m^2/ha** – Does the stand have patches of mature trees to be harvested intermixed with patches in different areas of smaller Acceptable Growing Stock worthy of tending? The amount of AGS greater than or equal to 10 cm (4 inches) in diameter at breast height in the unharvested patches must be at least 15 m^2/ha (65 ft^2/acre).

Management Prescriptions

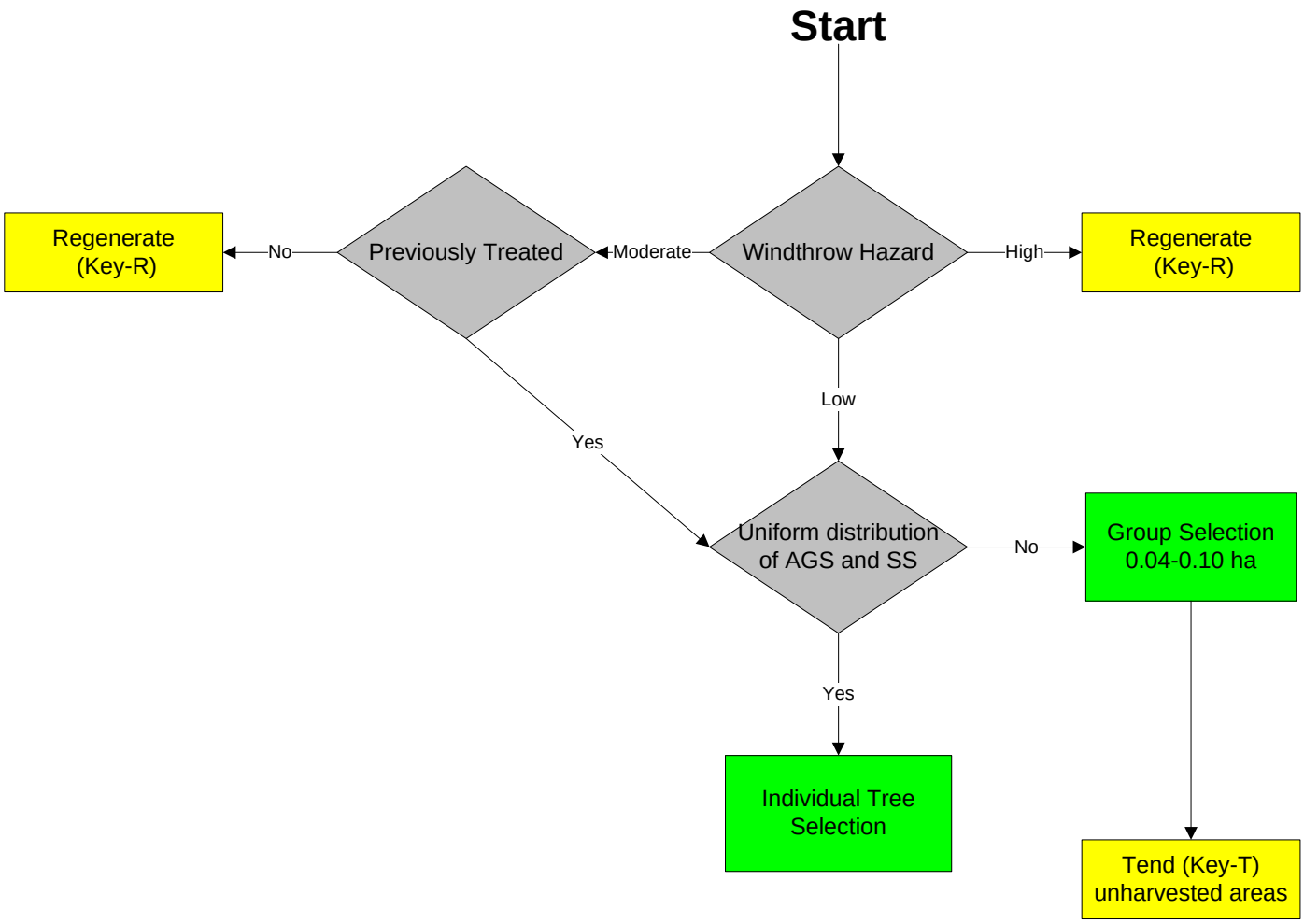
- **Let it grow** – Let the stand grow and re-evaluate at a later date.

Reference to Management Guide

- **Intolerant Hardwood Guide (Key M, pg. 8)** – Go to Key M on page 8 of the Intolerant Hardwood Management Guide (McGrath, 2015).

Tolerant Softwood/ Mixedwood Management Key

Sub-Key S - Selection



SUB-KEY S - Selection

Instructions and Definitions for:

Decision Diamonds

- **Windthrow Hazard (refer to Table 1 on page 3)**
  - **High –** Exposed ***or*** rooting depth < 30 cm ***or*** Imperfect to Very Poor Drainage[1]
  - **Moderate –** Moderately Exposed ***and*** rooting depth ≥ 30 cm ***and*** Moderately Well to Rapid Drainage[2]
  - **Low –** Moderate to Sheltered ***and*** rooting depth ≥ 30 cm ***and*** Moderately Well to Rapid Drainage[2]
- **Previously Treated –** Has the stand been pre-commercially thinned, commercially thinned or had a previous partial harvest?
- **Uniform distribution of AGS and SS –** Is the Acceptable Growing Stock and the **S**awlog /Seed **S**tock intermixed uniformly throughout the stand?

Management Prescriptions

- **Individual Tree Selection** – Individual Tree Selection involves a thinning across all size classes throughout the stand. This is done to create a diameter class distribution suitable for sustaining a periodic harvest of suitable trees over relatively short harvesting cycles (10-20 years). The objective is to create conditions suitable for regeneration of preferred species at each entry while also improving the growing stock by releasing the highest quality immature trees. Basal area removals of 30% are recommended, especially where regenerating shade tolerant species is desired. Trail widths should be kept to a minimum and distance between trails maximized to avoid windthrow. Regeneration, tolerant of shade, such as red spruce, eastern hemlock and sugar maple are favored.
- **Group Selection** – Group Selection involves identifying areas within the stand that are suitable for harvesting or regeneration because they are predominately mature or contain non-commercial trees. These areas are to be cleared to create conditions suitable for preferred regeneration. Areas predominately consisting of AGS are to be left. They can be tended using pre-commercial thinning, commercial thinning or crop tree release methods. Intermediate shade tolerance regeneration of white pine, yellow birch and red oak are favored.

Harvest Patch Dimensions.					
Area		**Circular Radius**		**Square Side Length**	
(ha)	**(acre)**	**(m)**	**(ft)**	**(m)**	**(ft)**
0.04	**1/10**	**11**	**37**	**20**	**66**
0.10	**1/4**	**18**	**59**	**32**	**104**

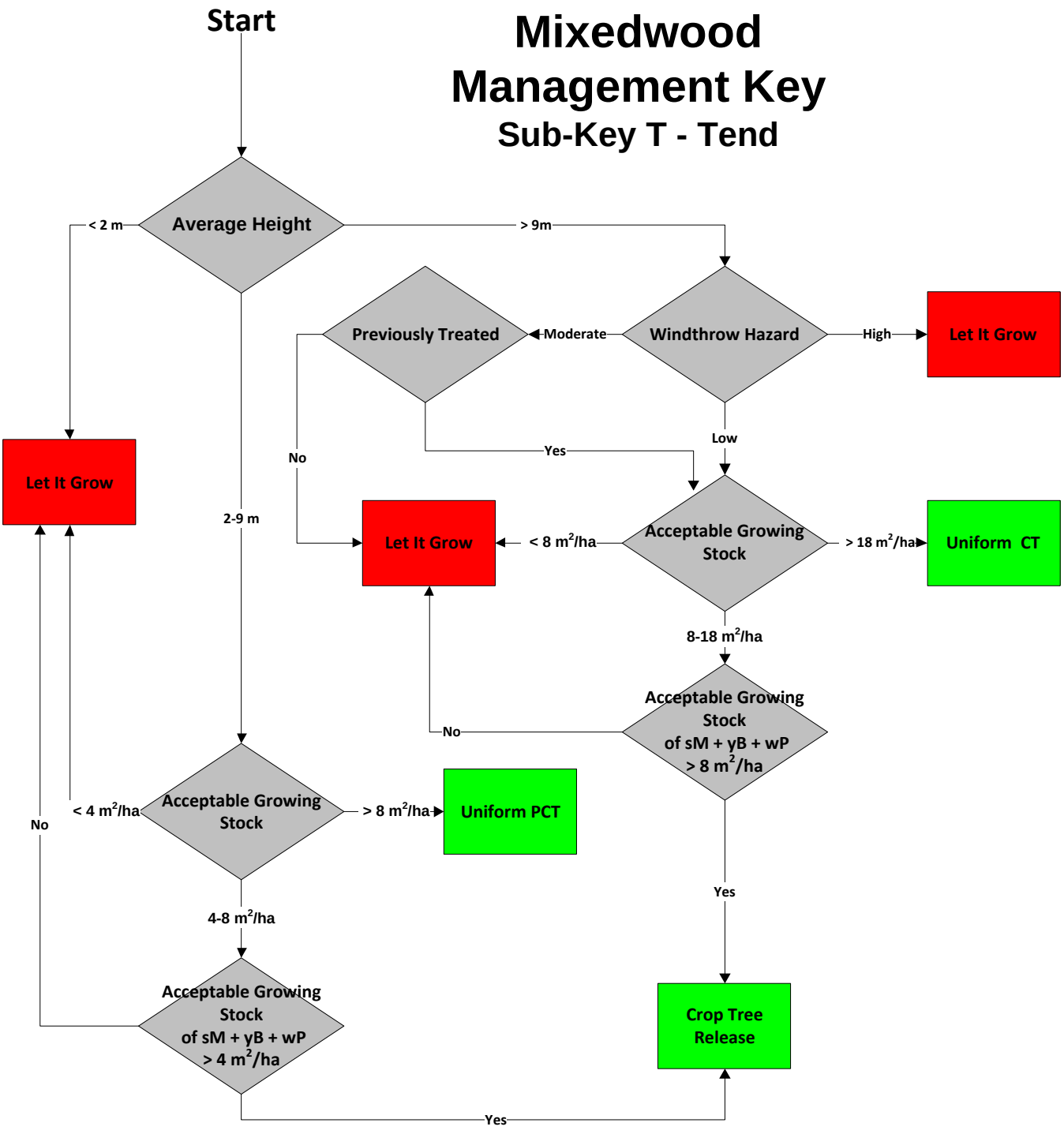
Post Treatment Criteria

- Acceptable Growing Stock (of trees ≥ 10 cm Dbh) must be greater than 10 m^2/ha following treatment
- 90% of residual stand basal area must not have damaged boles (trees with exposed cambium exceeding 100 cm^2 resulting from harvest) or crowns where greater than 1/3 of crown is damaged by harvest activities.
- The Percent of Acceptable Growing Stock by basal area must be higher following harvest.

[1] As an alternative to rooting depth and soil drainage, soil type (Keys et al., 2011) can be used to determine windthrow hazard due to soils (see Table 1 on page 3).

Tolerant Softwood/ Mixedwood Management Key

Sub-Key T - Tend



SUB-KEY T - Tend

Instructions and Definitions for:

Decision Diamonds

- **Average Height –** What is the average height of the stand in metres? Is it less than 2 m, between 2 and 9 m or greater than 9 m.
- **Acceptable Growing Stock** – What is the basal area of **A**cceptable **G**rowing **S**tock. For stands averaging between 2 and 9 m tall, is it less than 4 m^2/ha, between 4 and 8 m^2/ha or greater than 8 m^2/ha. For stands greater than 9 m tall, is it less than 8 m^2/ha, between 8 and 18 m^2/ha or greater than 18 m^2/ha. **AGS** are trees that have the quality and vigour to potentially grow into sawlogs or already have sawlog quality and size and will not degrade into a lower quality sawlog or worse within 15 years. Trees that have small live crowns (<1/3 live crown ratios) or are spindly (Height (m) to Dbh (cm) ratios > 80, (McGrath and Ellingsen 2009)) are not considered AGS as they would be prone to wind damage or slow to respond when stand partially harvested.
- **Acceptable Growing Stock (AGS) of sM + yB + wP > 4 m2/ha** – Is the basal area of Acceptable Growing Stock of sugar maple, yellow birch and white pine greater than 4 m2/ha.
- **Acceptable Growing Stock (AGS) of sM + yB + wP > 8 m2/ha** – Is the basal area of Acceptable Growing Stock of sugar maple, yellow birch and white pine greater than 8 m2/ha.
- **Windthrow Hazard (refer to Table 1 on page 3)**
  - **High –** Exposed ***or*** rooting depth < 30 cm ***or*** Imperfect to Very Poor Drainage[2]
  - **Moderate –** Moderately Exposed ***and*** rooting depth ≥ 30 cm ***and*** Moderately Well to Rapid Drainage[3]
  - **Low –** Moderate to Sheltered ***and*** rooting depth ≥ 30 cm ***and*** Moderately Well to Rapid Drainage[3]
- **Previously Treated –** Has the stand been pre-commercially thinned, commercially thinned or had a previous partial harvest?

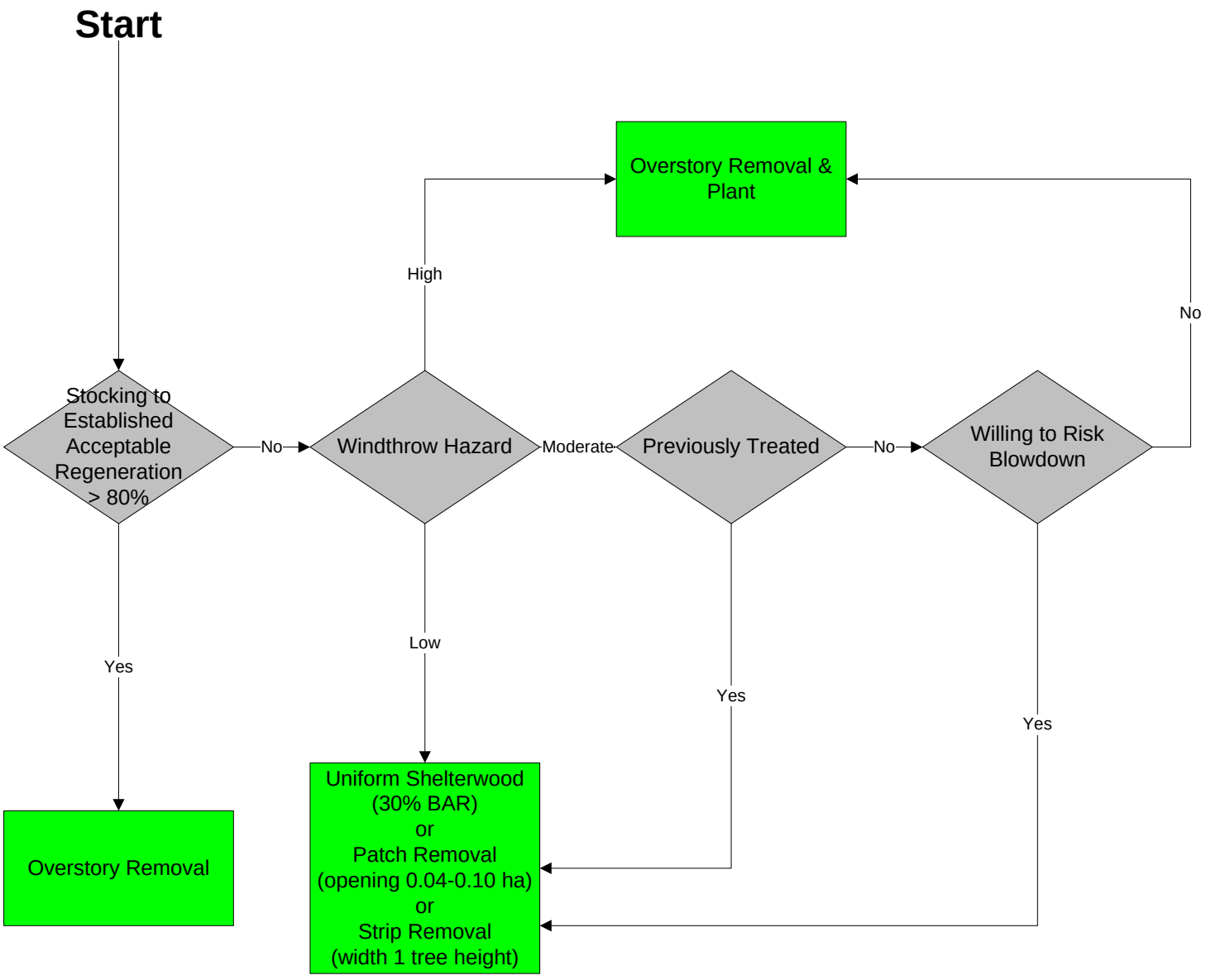
Management Prescriptions

- **Crop Tree Release –** Where moderate levels of sugar maple, yellow birch or white pine AGS exist, release only the best quality trees on at least three sides so that no trees are touching or overtopping the crowns of the released trees. The released trees must be vigorous, of good form and have high value potential. Trees must be self pruned for at least the length of one sawlog or be manually pruned. Released trees must be at least 10 m (30 ft) apart. Only trees touching the crowns of crop trees are to be cut, remaining trees to be left standing.
- **Pre-commercial Thinning (PCT) –** Where high levels of AGS exist uniformly distributed throughout the stand (on average at most every 3 m (10 ft)), a uniform pre-commercial thinning is appropriate.
- **Commercial Thinning (CT) –** Where the stand contains mostly merchantable trees of AGS uniformly distributed throughout the stand a uniform commercial thinning is prescribed. The objective of this treatment is not to regenerate the stand. It is intended to increase the growth of the trees with the highest potential value.
- **Let it grow** – Where low levels of AGS exist, let the stand grow and re-evaluate at a later date.

[2] As an alternative to rooting depth and soil drainage, soil type (Keys et al., 2011) can be used to determine windthrow hazard due to soils (see Table 1 on page 3).

Tolerant Softwood/Mixedwood Management Key

Sub Key R - Regenerate



SUB-KEY R - Regenerate

Instructions and definitions for:

Decision Diamonds

- **Stocking to Established Acceptable Regeneration > 80%** – Is the stocking to acceptable regeneration of commercial species[3] exceeding 0.3 m (1 ft) in height greater than 80%? Only include trees < 10 cm Dbh.
- **Windthrow Hazard (refer to Table 1 on page 3)**
  - **High –** Exposed ***or*** rooting depth < 30 cm ***or*** Imperfect to Very Poor Drainage[4]
  - **Moderate –** Moderately Exposed ***and*** rooting depth ≥ 30 cm ***and*** Moderately Well to Rapid Drainage[9]
  - **Low –** Moderate to Sheltered ***and*** rooting depth ≥ 30 cm ***and*** Moderately Well to Rapid Drainage[9]
- **Previously Treated –** Has the stand been pre-commercially thinned, commercially thinned or had a previous partial harvest?
- **Willing to Risk Windthrow –** Is the landowner willing to accept risk of losing leave trees to windthrow before regeneration established?

Management Prescriptions

- **Overstory Removal** – Release regeneration by removing overstory. Use methods that protect advanced regeneration.
- **Overstory Removal & Plant**– Remove overstory and plant if adequate regeneration not present after two growing seasons. Legacy tree clumps, special management zones and coarse woody debris must be left to meet Wildlife Habitat and Watercourse Protection Regulations (NSDNR, 2001).
- **Uniform Shelterwood** – Uniformly thin overstory to produce light conditions suited for desired species. The remaining overstory must be harvested when suitable regeneration is established to sufficient stocking. Thirty percent of the basal area is to be removed. If windfirm species such as white pine predominates and windthrow hazard is low (Table 1) up to 40% Basal Area can be removed.
- **Systematic Patch Removal** – Small groups of trees are cut uniformly throughout the stand without tending the unharvested areas, as there is not sufficient immature Acceptable Growing Stock. The main objective is to create the conditions to regenerate the desired species and to harvest the Sawlog Stock before it becomes overmature. Openings are to be 0.04-0.1ha (1/10 – 1/4 acre) and up to 30% of the area is to be harvested in patches.
- **Strip Removal** – Harvest strips to produce shade requirements necessary to regenerate desired species. Leave at least 2 strips unharvested between harvested strips. Strips are to be 1 tree height in width.
- **Let it grow** – Let the stand grow and re-evaluate the stand at a later date.

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[3] red pine, white pine, jack pine, black spruce, white spruce, red spruce, balsam fir, eastern larch, eastern hemlock, trembling aspen, large-tooth aspen, yellow birch, white birch, read oak, sugar maple, red maple and white ash

[4] As an alternative to rooting depth and soil drainage, soil type (Keys et al., 2011) can be used to determine windthrow hazard due to soils (see Table 1 on page 3).

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Pre-Treatment Assessment (PTA) procedures and tally sheets

To be able to use the Forest Management Guides, information must be collected on the stands of interest. The required stand information includes:

- Species
- Size class
- Stem quality
- Patchiness of the stand (uniformity)
- Existing regeneration
- Exposure
- FEC Vegetation Type(s)
- FEC Soil Type(s)
- FEC Ecosite(s)
- Height
- Health issues
- Maturity
- Previous Treatments
- Existing Blowdown

Cruising Instructions

Take a minimum of 1 prism point every 2 hectares with a minimum of 3 prism points and a maximum of 50. Enough data must be collected to enable prescribing a unique prescription on 2-hectare portion of a block.

- Use a BAF 2 prism.
- Evenly distribute these points throughout the stand.
- Tally trees into at least three Dbh classes (< 10 cm, ≥ 10 cm and < 25 cm, ≥ 25cm for all Vegetation types except ≥ 35 cm for tolerant hardwoods). Where more refined estimates of volume and prescriptions are desired tallying in 2 or 5 cm DBH classes would be preferred.
- If volume estimates are required, take at least one height, from the tree of average basal area (average co-dominant tree), for each product class at each point (e.g. pulpwood, studwood, sawlog).
- The following information will be calculated from the pre-treatment assessment to use with management keys to determine a recommended prescription:
    - Growing Stock (Total Basal Area of trees ≥ 10 cm Dbh class)
    - Basal Area of **A**cceptable **G**rowing **S**tock (all trees)
    - Basal Area of Sawlog/Seed trees (≥ 25 cm Dbh,class – all vegetation types except (≥35 cm Dbh class – TH stands)
    - Regeneration stocking in %
    - Windthrow Hazard (L, M or H)
    - Average height of stand (m)
    - Species composition (% by basal area)
    - FEC ecosite(s) (Neily et al., 2013)

Pre Treatment Tree Assessment Tally Sheet Date:_*June 25, 2008*__ Prism Factor:_*2*__ **********SAMPLE**********

Loc:_*Milton*____Co:__*Queens*_____ BL:__*1*___ST:__*1*___ # Plots:___6____ Cruiser:___*TM*_____ Page:_*1*__ of _*1*___

Sp	RS						EH						WP						RM							
TC	UU	AU	UP	AP	US1	AS1	UU	AU	UP	AP	US1	AS1	UU	AU	UP	AP	US1	AS1	UU	AU	UP	AP	US2	AS2	US3	AS3
Dbh																										
5																					1					
10			1						3			1														
15					3				2				2		1						1	1				
20					3	4					1						1					1				
25						6					1	8					2				1					
30						2					2	11						9								
35					1	1					2	6						10								
40											1	10						12								
45											3	3					1	6								
50											2	5						6								
55																		1								
70											2															
90												1														

Pre-Treatment Site Assessment Tally Sheet. Loc:____Milton_____ Co:___Queens_____Block:_QU123456_____Section:__A___

Plot	ST	VT	EX	BD	MAT	PT	WET	TF	WT	WF	Patch	Regeneration	Heights/age/notes
1	***2***	***SH3***	***M***	***2***	***M***	***N***	***_***	***_***	***_***	***_***	***U***	***50% (all) 5% (LL)***	
2	***2***	***SH3***	***M***	***0***	***M***	***N***	***_***	***_***	***–***	***–***	***M***	***50% (all) 50% (LL)***	***1***
3	***3***	***SH1***	***M***	***0***	***M***	***N***	***_***	***_***	***–***	***–***	***U***	***0 %***	***2***
4	***2***	***SH3***	***M***	***1***	***M***	***N***	***_***	***_***	***–***	***–***	***U***	***80% (all) 80% (LL)***	
5	***2***	***SH3***	***M***	***0***	***M***	***N***	***_***	***_***	***–***	***–***	***U***	***10% (all) 10% (LL)***	
6	***2***	***SH3***	***M***	***0***	***M***	***N***	***_***	***_***	***–***	***–***	***U***	***0%***	

Comments: ***1: on Knoll 2: In Depression***

Sample Cruise Summary & Prescription

Based on the sample cruise, the stand characteristics are as follows:

Vegetation Type……..SH3 – Red spruce-Hemlock/Wild lily-of the-valley (50%)
Long Lived Species……***96 %*** (Eastern Hemlock=45%, White Pine = 36%, Red Spruce = 15%)
Tolerant Species……..***60%*** (Eastern Hemlock=45%, Red Spruce = 15%)
Total Growing Stock (≥ 10cm Dbh)……...***47 m^2/ha***
Sawlog Stock (≥ 25 cm Dbh)……....***38 m^2/ha***
Acceptable Growing Stock (≥ 10cm Dbh)….***35 m^2/ha***
Windthrow Hazard……***Low*** (Moderate Exposure, Soil Type = ST2, Fresh, Medium to Coarse-Textured)
Uniform Distribution……..***83%***

Recommended Stand Prescription according to Tolerant Softwood and Mixedwood Guide based on cruise summary above:

Individual Tree Selection

Pre-Treatment Tree Assessment Tally Sheet Date:_____ Prism Factor:_____ Page:___ of ____

Loc:_____Co:_____ BL:_____ST:_____ # Plots:_____Cruiser:_____

Sp																										
TC																										
Dbh																										

Pre-Treatment Tree Assessment Tally Sheet

Sp= Species, **Dbh=**Diameter (at breast height) classes

TC=Tree Codes**:** Depending on the information required from the PTA, a one letter Tree Code may be sufficient (U=UGS or A=AGS). When product information is desired, the second letter code can be used to calculate volume by product.

Softwoods:

1st letter U or A:

U- Unacceptable Growing Stock (UGS) - will not make a sawlog or studwood quality stem in the future, or has stud or sawlog quality stem now, but tree will degrade in quality within 15 years. If tree vigor is low due to reasons such as broken/dead top, insect/disease damage, small crown etc., (which make it a poor candidate to leave growing as a future crop tree) it should be called UGS.

A - Acceptable Growing Stock (AGS) - will make a studwood or sawlog quality stem in the future or is one now and will still have studwood or sawlog quality 15 years in the future.

2nd letter C, P or S:

C - Cull - Does not have any merchantable products in the stem at present, **P** - Pulp – Existing pulp log, **S1** – Softwood Sawlog – Existing Studwood or better

Hardwoods:

1st letter (U or A):

U- Unacceptable growing Stock (UGS) - will not make a sawlog quality stem in the future, or has sawlog quality stem now, but will degrade in quality within 15 years. If tree vigor is low due to reasons such as broken/dead top, insect/disease damage, small crown etc., (which make it a poor candidate to leave growing as a future crop tree) it should be called UGS.

A - Acceptable Growing Stock (AGS) - will make a sawlog quality stem in the future or is one now and will maintain or improve in quality by the next harvest.

2nd letter (C, P, L or H):

C - Cull - Does not have potential for any merchantable products, **P** - Pulp - Potential for Pulp log at best,

S2 - Low Grade Sawlog – Existing low grade sawlog (must have better than pallet log potential) – G 3

S3 - High Grade Sawlog – Existing high grade sawlog (high end sawlog or veneer log) – G2 or better

Examples

UC - Unacceptable growing stock without current merchantable products

AC – Acceptable growing stock without current merchantable products

UP - Unacceptable growing stock with current pulp product

AP – Acceptable growing stock with current pulp product

US2 - Unacceptable growing stock with current low grade hardwood sawlog quality stem now but will degrade by the next harvest.

US3 - Unacceptable growing stock with high grade hardwood sawlog quality stem now, but will degrade by the next harvest.

AS2 - Acceptable growing stock with existing low grade hardwood sawlog quality stem - will not degrade by the next harvest.

AS3 - Acceptable growing stock with existing high grade hardwood sawlog quality stem - will not degrade by the next harvest.

US1 - Unacceptable growing stock with studwood or sawlog quality softwood stem, but will degrade by the next harvest.

AS1 - Acceptable growing stock with studwood or sawlog quality softwood stem - will not degrade by the next harvest.

Pre-Treatment Site Assessment Tally Sheet. Loc:_____ Co:_____Block:_____Section:_____

Plot	ST	VT	EX	BD	MAT	PT	WET	TF	WT	WF	Patch	Regeneration	Heights/age/notes

Comments:

Pre-Treatment Site Assessment Tally Sheet:

Codes

ST- FEC soil type (Neily et al., 2013)
VT- FEC vegetation type (Neily et al., 2013)
EX – Exposure: **E** = Exposed; **ME** = Moderately Exposed; **M** = Moderate; **MS** = Moderately Sheltered; **S** = Sheltered
BD - % of Basal Area Blowndown
MAT – Maturity: **I =** Immature, **M** = Mature, **O** = Overmature
PT – Previously treated? PCT or Plantation or Commercial Thinning: **Y** = Yes, **N** = No
WET – Non mapped wetlands: **V** = Vernal Pools, **S**= Springs, **ST** = Streams
T.F. – Topographic Features: **K**=Karst, **R** = Ravine, **O** = Rock Outcrop/Boulder fields, **C**= Caves
W.T. – Wildlife Trees: **CT**=Cavity Trees (trees greater than 20 cm dbh with existing cavity of size suitable for nesting), **N**=Nests (raptors, heron colonies), **M**= Mast (oak, beech or witch hazel with mast)
W.F. – Wildlife Features: **D**=Deer Wintering Areas, **W**=Wildlife Concentrations, **SR**=Species at Risk/concern (http://www.gov.ns.ca/natr/wildlife/biodiversity/species-recovery.asp), **U**=Unique features (specify in comments).
Patch: - is the area around the sample plot dominated by **M** - mature to over mature trees, **I** - Immature AGS , **R**- Advanced regeneration of preferred species, or **U**- Uniform mix of all age classes
Regeneration: Species, Cover (%), Average Height (m) e.g.: rS/30/0.3 - red spruce, 30% cover, 30cm tall
Heights/ages: Heights for volume calculations (Tree of average basal area) and/or Land Capability determination (breast height age and height of Dominant free growing trees)

Post-Treatment Information Requirements – Selection

In order to meet quality specifications for Selection Harvest the following information must be collected:

- Basal area remaining after harvest
- Basal area of trees damaged during harvest activities with exposed cambium exceeding 100 cm^2 (4"x4") in area, or with damage to more than 1/3 of the crown
- Basal area of Acceptable Growing Stock (AGS) after harvest.

Instructions

- Take 1 prism point per hectare with a minimum of 5 prism points and a maximum of 50.
- Use a BAF 2 prism.
- Evenly distribute these points throughout the stand.
- When tallying basal area, do so by AGS, UGS and damaged trees (HD). If species specific information is necessary, also tally by species
- AGS - Acceptable Growing Stock
    - **Softwoods**: Trees that will make a studwood or sawlog quality stem in the future or has one now and will still have studwood or sawlog quality within 15 years. These trees must not have been scarred by harvesting activities with scars of exposed wood exceeding 100 cm^2 in area, or have greater than 1/3 of their live crowns damaged by harvesting activities.
    - **Hardwoods**: Trees that have the potential for producing sawlog quality logs of better than pallet quality and will not degrade within 15 years. These trees must not have been scarred by harvesting activities with scars of exposed wood exceeding 100 cm^2 in area or have greater than 1/3 of their crowns damaged by harvesting activities.
- UGS – Unacceptable Growing Stock
    - **Softwoods**: Trees that will not make studwood or sawlog quality stem in the future, or has stud or sawlog quality stem now but tree will degrade in quality within 15 years. If tree vigor is low due to reasons such as broken/dead tops, insect/disease damage, small crowns (< 1/3 live crown ratio) etc. which make it a poor candidate to leave growing as a future crop tree it should be called UGS.
    - **Hardwoods**: Trees that do not have the potential to produce a better than pallet quality sawlog or one with a sawlog now but that will degrade within 15 years. If tree vigor is low due to reasons such as broken/dead tops, insect/disease damage, small crowns (< 1/3 live crown ratio) etc. which make it a poor candidate to leave growing as a future crop tree it should be called UGS.
- HT = Average height in metres of the species tallied, only if required.
- HD = Trees with harvesting damage of exposed wood exceeding 100 cm^2 in area or crown damage exceeding 1/3 of the live crown
- Calculate the following: % and basal area of acceptable growing stock in m^2/ha, % and basal area that is damaged in m^2/ha

Selection Post Treatment Cruise (8/2010)					Location												
Cruiser		County			Stand #		Date Assessed			Treatment Year				Treatment Area			
		Species			Species			Species			Species			Species			
Line	Plot	AGS	UGS	HT	AGS	UGS	HT	AGS	UGS	HT	AGS	UGS	HT	AGS	UGS	HT	HD
Total (pg)																	
Total (all)																	
Average:																	
Comments:																	