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## 1. INTRODUCTION

Tree marking is essential to implement the selection and uniform shelterwood silvicultural systems, and to retain seed and wildlife trees in the clearcut system. Marking directions will vary, within limitation of the chosen system, due to local site variations, tree species and quality. It is important that all stand conditions are taken into consideration to insure proper marking technique. Tree marking is also essential to maintain and promote the forest for other uses.

Tree markers must be trained in recognizing site and stand potential, and be able to implement marking directions to achieve a combination of objectives. Maintenance of species diversity, aesthetics, environmental protection, maintenance or enhancement of wildlife habitat, and emulation of natural disturbances are key goals of carrying out any marking prescription. The selection, uniform shelterwood, and clearcut silvicultural systems are designed to promote natural regeneration.

## 2 GENERAL INSTRUCTIONS

The following instructions will apply to all tree marking prescriptions for the Algonquin Park Forest:

1. Mark trees such that paint extends above the stump height and ends in a depression between the roots.
2. Retain ten live cavity-nesting trees per hectare if present. Cavity trees must exceed 25 cm DBH, and at least one should be greater than 40 cm DBH. Live, high quality, large-diameter (>25 cm) cavity trees, or trees with the potential to form cavities must be retained according to the following priority (further description in the *Forest Management Guidelines for the Provision of Pileated Woodpecker Habitat*):
  - ▶ Pileated woodpecker roost trees (live or dead\*)
  - ▶ Pileated woodpecker nest trees
  - ▶ Other woodpecker nest trees or natural nest or maternal den cavities
  - ▶ Escape cavities
  - ▶ Woodpecker feeding excavations
  - ▶ Potential cavities

\*Dead roost trees must have a tree length reserve applied to meet Occupational Health and Safety Act requirements.
3. Retain ten mast trees per hectare if present. Greater numbers may be required in bear and deer feeding areas. Priority for mast trees should be given to dominant or codominant oak, beech, black cherry, or basswood over 25 cm diameter (preferably 40 cm+), with large, well rounded, vigorous crowns. The above species with poor crown position and/or poor crown condition as well as ironwood over 10 cm diameter can be kept as mast trees in the absence of higher quality mast trees (refer to *A Silvicultural Guide for the Great Lakes - St. Lawrence Forest in Ontario* for more information about mast trees).
4. Retain one supercanopy tree per four hectares if present. Supercanopy trees should be healthy, large diameter trees (> 60 cm DBH) whose crowns extend well above the main

canopy of the stand.

5. Retain at least ten large conifers per hectare (0.5-2 m<sup>2</sup>/ha) in hardwood stands. Retain large ( $\geq 25$ cm dbh), long lived species such as hemlock, red or white pine, red or white spruce, or cedar where available. Retain clumps of three or more conifers when available.
6. In final removal cuts where regeneration is  $> 6$  metres in height retain 10 veteran trees/ha that will become the supercanopy trees of the future. Veteran trees should be healthy, long-lived species (Pw, Pr, Or, tolerant hardwoods, Sw, and He) that are likely to persist for the rotation period. These trees should reflect the pre-disturbance stand composition. On other final removal cuts NDPE instructions apply.
7. Silvicultural systems will be modified where necessary to ensure:
  - ▶ site and stand protection
  - ▶ maintenance of wildlife habitat
  - ▶ maintenance of the natural pre-harvest diversity of tree species,
  - ▶ maintenance of structural legacy of the initial forest
  - ▶ maintenance of genetic diversity
  - ▶ emulation of natural disturbances
8. Good quality white birch trees or patches of trees that have potential for Algonquin traditional birch bark use will be identified with blue paint and the symbol "ALGFN". The location of these trees will be communicated to MNR who will be responsible for communication to the Algonquins.

### **3 SPECIFIC INSTRUCTIONS IN OLD STRIP CUT AREAS**

The objective of tree marking in old strip cut areas is to return these areas to a natural forest condition in order to emulate natural disturbance and landscape patterns. This involves marking practices that eliminate the strip effect over time.

- ▶ Clearcut System - Marking techniques work towards a more even appearance of tree sizes across full stands. Strive for heavy removal of larger trees in the original leave strips, and maintain trees of similar size and number as much as possible on both the original cut and leave strips.
- ▶ Shelterwood System - The original strip cuts are subject to normal marking when regeneration standards are met (e.g. final removal when white pine regeneration exceeds 6 metres in height). Old strip cuts will likely have an abundance of younger trees, compared to the leave strips. Most of the original leave strips have received a shelterwood harvest from 1975 to 2005. These areas should now be regenerated. Marking techniques involve maintaining more larger trees in the strip cuts and heavier removal of larger trees in the leave strips. Removal of the overstory in a single removal cut is an approved technique. Increase crown spacing beyond one crown as risk to regeneration decreases (i.e. adequate stocking and low weevil damage).

Crown spacing guide for strip cuts			
crown spacing	one crown	two crown	removal
regeneration height in metres	>0.3	>3	>5
pre marking basal area	20	17	<14
competition	heavy	medium	light

#### 4 SPECIFIC INSTRUCTIONS FOR CLEARCUTS AND SHELTERWOOD FINAL REMOVALS

The following instructions shall apply to all stands with clearcut and shelterwood final removal prescriptions (where the regenerated new stand is < 6 m height). These areas are classified as a “disturbance” in accordance with the *Forest Management Guide for Natural Disturbance Pattern Emulation (NDPEG), 2001*.

1. Peninsular and insular patches will be left according to the Annual Work Schedule and planning maps received from Area Foresters, but tree markers will verify that they adequately represent likely residual patches according to the following standards;

- a) patches should include tree species that are most likely to be left after a fire, according to the following priority;

High	Tolerant Hardwoods (Mh, Be, Or)
↓	Intolerant Hardwoods (Po, Bw)
↓	Boreal Mixedwoods
↓	Conifer Lowlands (Sb, Ce, La)
↓	GL-SL Mixedwood
↓	GL-SL Pines (Pw, Pr)
Low	Upland Conifers (Pj, Sp, Bf)

- b) If the tree species in the prescribed patches (that are not AOC’s) do not adequately reflect what would likely occur naturally, tree markers have the option to relocate the patch to a more suitable location. The alternate patch is not required to be of equal size, as long as the total area of residual patches within the disturbance remains the same.

2. A minimum average of 25 well spaced, individuals or small groups of trees of various sizes will be retained per hectare. Ten trees >25cm dbh, and additional residual trees at least 10 cm dbh or greater than 3 metres in height will be retained, according to the following guidelines:

- a) The residuals should be a range of sizes and will be kept according to fire tolerance, i.e. Bf < upland Sp/Pj < Bw < lowland Sp < Po/Mh/Be/Oak < PwPr when super-dominants (according to the *Forest Management Guide for Natural*

*Disturbance Pattern Emulation.*)

- b) Trees kept to satisfy requirements in “General Standards” count toward the 25 trees/ha. Large wildlife trees will be a mix of living cavity trees, supercanopy trees, veteran trees, mast trees and safe dead trees.

The NDPE Guide generally does not affect selection stands. Tree markers may sometimes encounter situations where small portions of selection or shelterwood stands are more suitable to be managed as a clearcut. In these cases, the single tree residual targets must be followed. If it is felt that leaving one or two insular patches would best meet the intent of the guide, then this can be done as well. In most cases, the area of clearcut operations will be small with surrounding selection and/or shelterwood harvest operations and area of concern reserves providing necessary residual patch requirements. Small areas of final removal shelterwood with regeneration less than 6 m height will be treated similarly.

## **5 AREA OF CONCERN PRESCRIPTIONS**

Specific Area of Concern (AOC) prescriptions are determined through FMP planning and are detailed in table FMP-17 “Operational Prescriptions for Areas of Concern” of the approved Forest Management Plan. Reserve and modified prescription boundaries for each AOC are identified on 1:15,840 FMP maps and are noted in the stand listings for each operating unit. Ensure that only the maps labelled “confidential” are used for operational layout. The “public” maps do not include all AOC’s.

### Marking Directions for Modified Areas Protecting Aesthetic Values

- i. Identify trees for removal within modified cutting areas. Mark trees with an "X" on the side away from the feature (i.e. canoe route, road, etc.) on which the Area of Concern is established.
- ii. Except in the case of clear cut forest units, the tree marking prescription in the area being marked will apply in adjacent modified areas. Within the modified portion of the AOC, 18 m<sup>2</sup>/ha will be retained in stems 10 cm dbh and larger for tolerant hardwood stands (selection) and a minimum of 50% canopy cover will be retained in conifer (shelterwood) stands (refer to AOC prescription for specific modified conditions). Clearcut forest units will be marked using the White Pine Uniform Shelterwood prescription. Regardless of the silvicultural prescription being employed, tree marking and subsequent harvesting within modified areas must not detract from an undisturbed forest appearance of the area, when viewed from the feature upon which the Area of Concern is established.

For a detailed analysis of stand conditions and prescription setting, reference should be made to the following silvicultural guides: “*A Silvicultural Guide for the Tolerant Hardwood Forest in Ontario, A Silvicultural Guide for the Great Lakes-St. Lawrence Conifer Forest In Ontario and A Silvicultural Guide to Managing for Black Spruce, Jack Pine and Aspen on Boreal Forest Ecosites in Ontario (Northeast Site Types)*”.

## 6 PRESCRIPTIONS

### 6.1 SELECTION SYSTEM FOR TOLERANT HARDWOOD FORESTS (HDSEL)

This prescription applies to predominantly good quality, well stocked maple stands which may be managed in operable blocks under a cyclic system of harvest, renewal, and tending. These maple stands usually contain other valuable associated species, which may not be ideally suited to the single tree selection system. These associated species may be perpetuated as stand components on suitable sites by proper marking and harvesting. In some cases, site preparation is also desirable (i.e. yellow birch).

Tree species present in the selection forest unit are listed by their level of occurrence and are rated by their tolerance to shade.

- ▶ hard maple (tolerant)
- ▶ beech (tolerant)
- ▶ hemlock (tolerant) and red spruce (tolerant)
- ▶ ironwood (tolerant)
- ▶ red maple (intermediate)
- ▶ yellow birch (intermediate)
- ▶ white pine (intermediate)
- ▶ white spruce (intermediate)
- ▶ red oak (intermediate)
- ▶ black cherry (intolerant)
- ▶ white ash (intermediate)
- ▶ basswood (intermediate)

Intolerants such as poplar and white birch are occasional associates in tolerant hardwood stands. Balsam fir may be present as a suppressed species throughout stands of moist moisture regime.

A single or group tree selection prescription is applicable for management of hard maple, beech, hemlock and red spruce on suitable sites. Group selection may be used to favour yellow birch, white pine, white spruce, red oak, black cherry, white ash, and basswood, on favourable sites.

#### General Marking Directions

1. Mark trees for removal.
2. Retain crop quality trees over unacceptable growing stock. Refer to Section 7.1, Tolerant Hardwood Tree Classification.
3. Wherever stands with a good diameter distribution of high quality trees exist, trees should be retained up to the ideal growing stock of 20.0 m<sup>2</sup>/ha of basal area 10 cm+, while permitting thinning where density of stems would inhibit growth. Where stand quality is not sufficient to retain the ideal, the minimum acceptable residual basal area is 14 m<sup>2</sup>/ha (10 cm+).
4. A rule of thumb is the **average** basal area removed should be 30-35%, but openings for species intermediate in tolerance should be created where necessary. Refer to Table 9.1.1

in section 9.1.4 of A Silvicultural Guide for the Tolerant Hardwood Forest in Ontario for further information.

5. Create openings in the dominant-codominant canopy at least 1.5 and to up to 2 times the diameter of the surrounding stand height (36-50m openings) when marking for intermediate species such as white pine, white spruce, red oak, basswood, white ash and black cherry (approximate residual basal area is 9 m<sup>2</sup>/ha). For yellow birch, openings should normally average the height of the stand, and should not exceed 0.2 ha (22-50m openings).
6. Directly competing trees of equal quality will be removed based on either maintaining and managing the most valuable species on suitable sites, or objectives of other uses.
7. Directly competing trees of equal quality will be retained based on the following priority:
  - i. hemlock and red spruce
  - ii. yellow birch
  - iii. red oak, black cherry, white ash, basswood
  - iv. hard maple
  - v. beech
  - vi. other hardwoods
  - vii. other conifer (>10 conifers to be retained, when possible)
8. When reproduction of valuable minor species is desired (red oak, white ash, white pine, etc.), several (not individual) good stems should be maintained to ensure adequate pollination.
9. Trees infected with Eutypella or Nectria cankers will have priority for removal over other class 3 and 4 trees. All infected trees 10 cm and larger will be marked, subject to minimum residual stocking levels.

#### Specific Marking Directions - Subject to General Direction 1 through 9:

- ▶ Class 3 trees of the above species have top priority for removal to capture the medium to high quality products prior to further decline in value.
- ▶ Mark class 3 and competing class 4 trees of the above species, plus competing balsam, white birch, poplar and ironwood 10 cm dbh and larger. Non-competing class 4 trees plus white birch, poplar, balsam and ironwood should be marked if a viable market exists.
- ▶ Class 1 and 2 trees which have reached the following dbh should be considered for removal before decline in quality begins:
  - 61 cm for By, Mh, Or, and Pw
  - 51 cm for Be, Sw and Sr
  - 41 cm for Ms, Cb, Bd and Aw
- ▶ Between the above stated maximum dbh limits by species and 10 cm dbh, mark only class 1 and 2 trees directly competing with other class 1 or 2 trees of equal or better quality, unless the prescription specifies otherwise.
- ▶ Super size trees, exceeding 80 cm in diameter, should be considered for retention, to maintain this feature of old growth forests and provide for large snags and downed woody debris.
- ▶ In designated cases, all balsam, ironwood, white birch and/or poplar may be cut as

encountered without being marked.

- ▶ In designated cases, white birch with veneer potential may be retained.

## 6.2 HEMLOCK SELECTION (HeSEL)

This prescription will be applied in stands containing a component of hemlock in order to develop an all-aged stand made up of a mosaic of patches representing a variety of ages and size classes. Group selection will be used to favour hemlock regeneration over competing hardwoods while still providing valuable wildlife cover.

GENERAL: Do not remove hemlock less than 25 cm or greater than 64 cm except as necessary to regenerate the stand.

### General Marking Directions

1. Mark trees for removal.
2. Group openings will be uniformly distributed over the cut block and will not cover more than 20% of the block at each cut. Light thinning between group openings is allowed. Where significant areas of tolerant hardwoods are present within the stand, the tolerant hardwood selection prescription will be applied.
3. The maximum size of group openings is equal to the height of the stand (20 - 30 m). The intent is to provide enough light for new or advanced hemlock regeneration to become established/recruited.
4. Group openings will be placed on a "worst first" basis:
  - ▶ to release established regeneration under hemlock overstory or adjacent hardwoods
  - ▶ to encourage establishment of hemlock regeneration
  - ▶ adjacent to existing regenerated openings so as not to create inoperable narrow strips between openings.
5. Retain trees using the following priority directions:
  - i. dominant-codominant hemlock or red spruce
  - ii. intermediate hemlock or red spruce
  - iii. dominant-codominant class 1 and 2 and 3 yellow birch, and good quality white pine
  - iv. dominant-codominant class 1 and 2 hardwoods
  - v. other conifers including suppressed hemlock
  - vi. dominant-codominant class 3 hardwoods
  - vii. intermediate class 1 and 2 hardwoods
  - viii. intermediate class 3 and 4 hardwoods
  - ix. suppressed class 1,2,3 and 4 hardwoods

Directly competing trees of equal quality within the "hardwood" species group will be retained on the following priority:

- 1 yellow birch
- 2 red oak, black cherry, basswood, white ash
- 3 hard maple
- 4 beech
- 5 soft maple



6. In designated cases, all balsam fir, ironwood, white birch and/or poplar may be cut as encountered without being marked.

Special situations:

a) *Patches of hemlock less than .04 ha in size in all forest units:*

Mark from edges to maintain shelter value of patch for deer and moose. A minimum of three hemlock should be retained.

b) *Stands of forest units other than hemlock with an understory of hemlock polewood:*

Removal of the overstory to liberate the hemlock polewood may be considered subject to 'General Instructions' in Section 2

### **6.3 HARDWOOD UNIFORM SHELTERWOOD (HDUS)**

This prescription applies to stands of mid-tolerant hardwood species, and tolerant hardwood stands that are more suited to mid-tolerant or low quality even aged tolerant hardwood management. These stands may contain or be well suited to the management of a component of associated conifers.

Tree-marking for shelterwood is based on percent residual crown closure and not on basal area. Basal area is not a good indicator of canopy closure from species to species in stands with a range of diameters (OMNR, 1998). Actual crown closure targets will vary depending upon the light requirements of the desired species.

Tree species are indicated by their level of occurrence in this forest unit:

- ▶ hard maple (tolerant)
- ▶ yellow birch (intermediate)
- ▶ beech (tolerant)
- ▶ hemlock (tolerant) and red spruce (tolerant)
- ▶ ironwood (tolerant)
- ▶ red maple (intermediate)
- ▶ white pine (intermediate)
- ▶ white spruce (intermediate)
- ▶ red oak (intermediate)
- ▶ black cherry (intolerant)
- ▶ white ash (intermediate)
- ▶ basswood (intermediate)

Poplar and white birch are occasional associated intolerants. Balsam fir may be present as a suppressed species throughout stands of moist moisture regime.

#### Marking Directions

*Seed Cut:*

1. Trees must be retained according to the following priority:
  - i. dominant-codominant class 1,2 and 3 yellow birch, red oak, black cherry, basswood,

- white oak, Red Spruce and Hemlock.
  - ii. dominant-codominant class 1 and 2 other hardwoods and acceptable conifers.
  - iii. dominant-codominant class 3 other hardwoods
  - iv. intermediate class 1 and 2 of above species
  - v. intermediate class 3 and 4 of above species
  - vi. suppressed class 1,2,3, and 4 of above species
2. Yellow Birch - Retain 50-60 percent canopy closure..
  3. Sugar Maple - Thin from below to retain 60 percent canopy closure. Trees to be retained should be large dominants, free from defects.
  4. White Ash, White Pine and Basswood - Retain 40-50 percent canopy closure
  6. Black Cherry - Retain 30-40 percent canopy closure
  7. Red Oak -If understory competition is low, reduce canopy closure to 50 percent. If understory competition is abundant, canopy closure should be 70 percent to reduce understory competition. Several (not individual) good stems should be maintained to ensure adequate pollination.
  8. Trees infected with Eutypella or Nectria cankers will have priority for removal over other class 3 and 4 trees. All infected trees 10 cm and larger will be removed, subject to canopy closure targets.
  9. Class 3 trees of the above species have top priority for removal to capture the medium to high quality products prior to further decline in value.
  10. Super size trees, exceeding 80 cm in diameter, should be considered for retention, to maintain this feature of old growth forests and provide for large snags and downed woody debris.
  13. In designated cases, all balsam, ironwood, white birch and/or poplar may be cut as encountered without being marked.

#### *Final Removal Cut*

Overstory removal when 50 percent stocking to acceptable regeneration greater than or equal to 1.8 m for hardwoods and 1 m for conifers is achieved. Retain trees as required to meet "General Instructions" in Section 2 and 4.

#### **6.4 WHITE PINE UNIFORM SHELTERWOOD (PwUS)**

This prescription applies to white pine stands, mixed white and red pine stands, or other stands (i.e. poplar) containing a significant concentration of white pine in the overstory or understory which may be managed for white pine.

Application of this prescription normally employs four cutting stages: preparation, seeding, and two removal harvests.

The preparation cut applies to immature stands, usually with tight, poorly developed crowns, and no or insufficient advanced pine regeneration.

The seeding cut applies to stands that have reached their average growth potential for the site and in which trees have well developed crowns, but tighter than one-half crown spacing, and no or insufficient advanced pine regeneration.

The first removal harvest applies to mature+ residual stands with over 50 percent stocking to acceptable regeneration.

The final removal harvest applies to mature residual stands with pine regeneration which meets stocking standards and is greater than 6 metres in height.

It is important to note that stocking has a greater influence on the stage of management than does age in determining the stage of harvest.

### Marking Directions

#### *Pine Uniform Shelterwood - Preparatory Cut*

##### *61 - 80 year old stands*

1. Thin from below in order to maximize future growth on the highest quality stems and develop future seed producers. It is important to maintain adequate crown closure in the overstory so as to discourage the regeneration of shade tolerant species and maintain wind-firmness. Spacing may vary from one sided crown release to full crown spacing depending on the size crown size of trees to be retained..
2. Trees must be marked to be retained according to the following priority list of crown class and species group:
  - i. dominant white and red pine
  - ii. dominant oak and codominant white pine
  - iii. codominant red pine, red oak
  - iv. dominant-codominant spruce
  - v. dominant-codominant jack pine
  - vi. dominant-codominant other species
  - vii. intermediate-suppressed white pine, red pine, jack pine, spruce
  - viii. intermediate-suppressed other species
3. Directly competing trees within the same crown class and species group in direction 2. should be marked to retain the best quality tree. Quality assessment should be based upon the following factors.

Trees to be retained should:

- a) have a live top and no evidence of white pine blister rust infection.
- b) be of good form and relatively free of defects such as butt scars, crook or extensive sweep.
- c) have an approximately symmetrical crown.
- d) have a live crown ratio of approximately 40%.

#### *Pine Uniform Shelterwood - Seeding Cut*

##### *80 - 100 year old stands*

1. Retain half crown spacing between residual trees to achieve 40 to 50 percent crown closure.
2. Trees must be marked to be retained according to the following priority list of crown class

and species group:

- i. dominant white pine\*
- ii. codominant white pine
- iii. dominant-codominant red pine, red oak
- iv. dominant-codominant spruce
- v. dominant-codominant jack pine
- vi. dominant-codominant other species
- vii. intermediate-suppressed white pine, red pine, jack pine, spruce
- viii. intermediate-suppressed other species

\* If small areas (i.e. less than 1 ha) with a significant red pine component are encountered, marking should be adjusted to favor the retention of red pine at 1 to 1.5 crown spacing. Larger areas with a significant red pine component should be marked according to the PRCC prescription.

3. Directly competing trees within the same crown class and species group in 2. should be marked to retain the best quality tree. Quality assessment should be based upon the following factors.

Trees to be retained should:

- a) have a live top and no evidence of white pine blister rust infection.
- b) be of good form and relatively free of defects such as butt scars, crook or extensive sweep.
- c) have an approximately symmetrical crown.
- d) have a live crown ratio of approximately 40%.

Retention of the best quality tree may necessitate retention of a lower priority crown class and species group.

### *Pine Uniform Shelterwood - Removal Cuts*

#### *First Removal Cut*

1. Retain trees to provide 20-35% crown closure (full crown spacing) to shade white pine regeneration less than six m. in height. Acceptable regeneration should be over 0.3 m in height and at densities at or above 825 stems per ha before the first removal takes place. If competition is present, its level must be noted on tree marking maps and stand listings, and communicated to the AFA tree marking supervisor, in order to ensure required tending treatments occur promptly after the removal harvest.
2. Trees must be marked to be retained according to the following priority list of crown class and species group:
  - i. dominant white or red pine
  - ii. codominant white or red pine
  - iii. dominant-codominant red oak
  - iv. dominant-codominant spruce
  - v. dominant-codominant jack pine
  - vi. dominant-codominant other species
  - vii. intermediate-suppressed white pine, red pine, jack pine, spruce

- viii. intermediate-suppressed other species
- 2. Conifer trees will be retained over hardwoods (if any hardwoods were previously retained for spacing) to maximize weevil protection, while ensuring cavity and mast tree retention targets are met.

#### *Final Removal Cut*

Overstorey removal to be undertaken when the stand is at least 50% stocked to acceptable species, primarily over 6 m in height. Retain trees as required to meet “General Instructions” in Section 2 and 4.

### **6.5 MIXEDWOOD UNIFORM SHELTERWOOD (MWUS)**

These are poplar and white birch working group stands that do not meet the requirements of the intolerant forest unit, typically have some level of conifer present in the stand, but do not meet criteria for the white pine forest unit.

#### *Seeding Cut*

1. Use appropriate prescription for species on site.
2. Retain half crown spacing between residual trees to achieve 40 to 50 percent crown closure.
3. Trees must be marked to be retained according to the following priority list of crown class and species group:
  - i. dominant white pine
  - ii. codominant white pine
  - iii. dominant-codominant red pine, red oak
  - iv. dominant-codominant spruce
  - v. dominant-codominant other species
  - vi. intermediate-suppressed white pine, red pine, jack pine, spruce
  - vii. intermediate-suppressed other species

#### *Final Removal Cut*

Overstorey removal when 50 percent stocking to acceptable regeneration greater than or equal to 1.8 m for hardwoods and 1 m for conifers is achieved. Retain trees as required to meet “General Instructions” in Section 2 and 4.

#### *Group Shelterwood*

The group shelterwood method involves the progressive opening of the canopy in concentric bands, and may be employed in mixedwood stands that require at least two distinct levels of overstorey retention due to variable stand conditions. This approach may be utilized in situations where patches of advanced regeneration requiring release are interspersed with areas requiring a seeding cut, or areas with patches of intolerant and mid-tolerant overstorey requiring distinct levels of removal to create adequate conditions to initiate regeneration.

## **6.6 RED OAK UNIFORM SHELTERWOOD (OrUS)**

This prescription applies to stands dominated by red oak with site quality for sawlog development, and/or oak stands with low quality off site hardwoods. For tolerant hardwood selection stands use group selection for mid-tolerant species.

Select crop trees to retain. Retain 50-70% crown closure, increase crown closure as unfavourable competition increases. Crop tree quality is more important than a rigid spacing rule.

### Marking Directions

#### *Seed Cut:*

1. Trees must be retained according to the following priority:
  - i. dominant-codominant class 1 and 2 red oak
  - ii. dominant-codominant class 1,2 and 3 yellow birch, black cherry, basswood, and white oak
  - iii. dominant-codominant class 1 and 2 other hardwoods and hemlock
  - iv. dominant-codominant class 3 other hardwoods
  - v. intermediate class 1 and 2 of above species
  - vi. intermediate class 3 and 4 of above species
  - vii. suppressed class 1,2,3, and 4 of above species

#### *Final Removal Cut*

Overstory removal when 50 percent stocking to acceptable regeneration greater than or equal to 1.8 m for hardwoods and 1 m for conifers is achieved.

Retain trees as required to meet "General Instructions" in Section 2 and 4.

## **6.7 SPRUCE - FIR UNIFORM SHELTERWOOD (SFUS)**

### Marking Directions

#### *Seed Cut:*

1. Retain 40-50% crown closure ( $\frac{1}{2}$  crown spacing) in dominant and codominant white spruce, white pine, hemlock and yellow birch. .
2. Discriminate against poor quality of the above species, plus balsam fir, red maple, ironwood, poplar and white birch.

#### *Final Removal Cut*

Overstory removal when 50 percent stocking to acceptable regeneration greater than or equal to 1.8 m for hardwoods and 1 m for conifers is achieved. Retain trees as required to meet "General Instructions" in Section 2 and 4.

### *Group Shelterwood*

The group shelterwood method involves the progressive opening of the canopy in concentric bands, and may be employed in spruce-fir stands where patches of advanced regeneration requiring release are interspersed with areas requiring a seeding cut to initiate regeneration.

## **6.8 LOWLAND CONIFER UNIFORM SHELTERWOOD (LCUS) (Cedar and Larch)**

### *Seeding Cut*

1. Retain 60% crown closure. Retain trees using the following priority directions:
  - i. dominant-codominant cedar and larch
  - ii. intermediate cedar and larch
  - iii. dominant-codominant class 1 and 2 and 3 yellow birch, hemlock, red spruce
  - iv. dominant-codominant class 1 and 2 hardwoods
  - v. other conifers
  - vi. dominant-codominant class 3 hardwoods
  - vii. intermediate class 1 and 2 hardwoods
  - viii. intermediate class 3 and 4 hardwoods
  - ix. suppressed class 1,2,3 and 4 hardwoods

### *Final Removal Cut*

Overstory removal when 50 percent stocking to acceptable regeneration greater than or equal to 1.8 m for hardwoods and 1 m for conifers is achieved. Retain trees as required to meet "General Instructions" in Section 2 and 4.

### *Group Shelterwood*

The group shelterwood method involves the progressive opening of the canopy in concentric bands, and may be employed in lowland conifer stands where patches of advanced regeneration requiring release are interspersed with areas requiring a seeding cut to initiate regeneration. The group shelterwood method may also be employed to create larger openings (minimum twice the height of stand) for the establishment of patches of shade intolerant Larch.

## **6.9 INTOLERANT CLEARCUT (INTCC) (Poplar and White birch)**

These forest units are managed under the clearcut forest management system, but often contain significant advanced white pine regeneration or show greater potential to be managed as mixedwoods, and are therefore referred to as Intolerant Clearcut succeeding to Mixedwood " and are subject to the INTCC-MW silvicultural ground rule.

### *Marking Directions*

1. Patches of residual pine greater than .04 hectare will be marked as prescribed in the white

pine uniform shelterwood seeding cut prescription.

2. Scattered pine will be designated for cutting only if tops are dead or white pine blister rust is present.
3. If stocking of white pine regeneration is greater or equal to 50% and over 0.3 m in height, follow the White Pine Uniform Shelterwood prescription for first removal. If stocking of white pine regeneration is greater or equal to 50% and primarily over 6 m in height, follow the White Pine Uniform Shelterwood prescription for final removal.
4. Retain trees as required to meet “General Instructions” in Section 2 and 4.

#### **6.10 RED PINE CLEARCUT (PrCC)**

80+ year old stands.

##### Marking Directions

1. On low competition sites that are suitable for scarification or rocky sites that will be difficult to site prepare before planting, retain good quality dominant red pine seed trees spaced no further apart than a distance equal to the height of residual trees in the stand (Clearcut with Seed Trees).
2. On high competition sites that will be mechanically site prepared and planted with red pine, retain a mixture of white and red pine as veterans (Clearcut with Standards)
3. Retain trees as required to meet “General Instructions” in Section 2 and 4.

#### **6.11 JACK PINE CLEAR CUT (PjCC)**

80+ year old stands.

##### Marking Directions

1. Retain trees as required to meet “General Instructions” in Section 2 and 4.

#### **6.12 BLACK SPRUCE CLEAR CUT (SbCC)**

100+ year old stands

##### Marking Directions

1. Retain trees as required to meet “General Instructions” in Section 2 and 4.
2. Trees to be retained may be in small clumps in order to increase wind-firmness.

#### **6.13 RED SPRUCE - not a forest unit**

There are no red spruce stands identified in forest resource inventory. The procedures used for management of spruce-fir can be used for red spruce with the following exceptions.



1. Retain red spruce as a priority over other species.
2. Scattered individual red spruce trees, remote from concentrations of red spruce, will be treated the same as quality class #1 hardwood.

## **7 CRITERIA FOR EVALUATION OF FUTURE POTENTIAL OF TOLERANT HARDWOOD FOREST UNIT**

For selection management, the current species, quality and stocking must have potential to develop into an ideal basal area of 20 m<sup>2</sup>/ha of good quality tolerant hardwood species in diameters 10 cm dbh and larger, over a period of two cutting cycles of 25 years each (total 50 years).

The minimum required to achieve this objective is 7 m<sup>2</sup>/ha of good quality, tolerant hardwood species in diameters 25 cm dbh and larger, plus an additional 2 m<sup>2</sup>/ha of poorer quality classes to maintain spacing.

Forest stands with less than the minimum stocking described above may be managed under the selection system, but it will take a longer time frame to reach the ideal stand structure.

Reference must be made when evaluating tolerant hardwood forest unit stands, to the Silvicultural Guide for the Tolerant Hardwood Forest in Ontario, 1998.

### **7.1 TOLERANT HARDWOOD TREE CLASSIFICATION**

#### Class 1:

*10 cm dbh+*

No major defects allowed - contain or have potential to develop high quality products. These trees are considered to be crop or potential crop trees and will maintain their present quality for a 25 year period.

#### Class 2:

*10 cm dbh+*

May contain value-affecting defects, contain or have potential to produce medium quality products (sawlogs). These trees are considered to be crop or potential crop trees and will maintain their present quality for a 25 year period.

#### Class 3:

*25 cm dbh+*

Contain decline causing defects but contain medium to high quality products. These trees are expected to decline in value over the next 25 year period.

#### Class 4:

*10 cm dbh+*

Contain severe value-affecting defects or decline causing defects. Contain or have potential to produce - at best, low quality products. This class also includes trees which are

unmerchantable according to the Scaling Manual.

Defects:

Value-affecting defects are mechanical or form defects. These defects limit or reduce the value of products which can be recovered from a tree but will not cause continued deterioration or decline. Size and position of these defects determines the degree to which they affect value.

(Examples - wounds, cracks, seams, holes, dead limbs, branch stubs, live branches, twisted grain, bumpy surface, sweep, crook, forks, burls and lean).

Decline-causing defects are severe mechanical or pathological defects. These defects cause continued deterioration of products which may be recovered from a tree. They also may severely limit the potential of a tree to produce anything better than low value products (i.e. pulpwood, poker poles, bolt logs or fuelwood).

(Examples: rot or decay when associated with value-affecting defects or when indicated by the presence on conks, fruiting bodies, cankers, barrelling, etc. Severe mechanical defects such as a broken top, excessive lean or severe sugar maple borer damage will cause decline or cause the tree to be a high risk).

## **8 OLD GROWTH CONDITIONS IN UNEVEN-AGED MANAGED STANDS**

In addition to normal selection harvest practices, old growth conditions will be maintained in appropriate uneven-aged managed stands in the HDSEL and HeSEL forest units. These stands should have a minimum initial basal area of at least 32 m<sup>2</sup>/ha for HDSEL stands and 42 m<sup>2</sup>/ha for the HeSEL stands, have significant representation of large trees (>50 cm DBH) and a multi-layered canopy.

Old growth conditions will be maintained by:

- ▶ Retaining a minimum residual basal area of 20 m<sup>2</sup>/ha for HDSEL stands and 30m<sup>2</sup>/ha for HeSEL stands;
- ▶ Adjusting stand structure targets in HDSEL stands to increase average stem size as follows:

Size Class	Residual Basal Area (m <sup>2</sup> /ha)
Poles (10-24 cm dbh)	5
Small logs (26-36 cm dbh)	5
Medium logs (38-48 cm dbh)	5
Large logs (50-60 cm dbh)	3
X-large logs (> 60 cm dbh)	2

- ▶ Applying the HDSEL-TOL OG silvicultural ground rule (table FMP-5) to these tolerant hardwood stands and applying the HeSEL-OG silvicultural ground rule to suitable hemlock stands;
- ▶ Creating some group openings from 0.02 to 0.20 ha (8-25 metre radius) to create variability in canopy gap size. This is normal practice under the group selection system in the HeSEL forest unit;
- ▶ Increase the cutting cycle to achieve higher stocking and longer periods without disturbance (should be based on site, 25-40 years);
- ▶ Double the normal cavity tree requirements (12/ha) preferably >40 cm DBH;
- ▶ Retain some dead and dying trees (subject to OHSA) and encourage cull stems to be left or returned to the stand.