

# Mixedwood Stands Management Strategy

For forested lands covered by the Adapted Forestry  
Regime of La Paix des braves

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS



**Coordination:**

Sophie Dallaire, biol. M. Sc., Direction de la gestion des forêts Nord-du-Québec

**Writing and editing:**

Sophie Dallaire, biol. M. Sc.; Catherine Dion, biol. M. Sc., Direction de la gestion des forêts Nord-du-Québec;

Elaine Cyr, ing.f., Unité de gestion Mont-Plamondon

**With the participation of:**

Cree Nation Government

Stephane Ouellet, ing.f., Emily Sinave, biol., Geoff Quaile, Nadia Saganash, biol., Tania Couture, biol.

Ministère des Forêts, de la Faune et des Parcs

Rostand Azegue, ing.f., Sylvain Béliveau, tech. f., Annie Belleau, biol. Ph. D., Étienne Boileau, ing.f., Jean-François Caron, ing.f., Christine Casabon ing.f. M. Sc., Virginie Cayer, ing.f., Charles-Éric Décloître, ing.f., Justine Drolet, biol., Christine Lambert, biol., Marie-Ève Larouche, ing. f., Sébastien Leduc, ing.f., Karine Létourneau, tech. f., Sabrina Morissette, ing.f. Valérie Pellerin, ing.f., Julien Second, biol. M. Sc., Véronique Simard, biol. M. Sc., Simon St-Georges, ing.f., Émilie Tarroux, ing.f., Jean-François Tremblay, ing.f., Marco Trudel, directeur régional et Marie-Andrée Vaillancourt, biol. M. Sc.

Members of the Cree communities concerned

Cree land users, tallymen, members of joint working groups, and other members of the communities concerned

**Translation:**

Christine Gervais, Traductions Papyrus

**Photographs:**

Title page: Global Forest Watch

**For more information:**

Ministère des Forêts, de la Faune et des Parcs

Direction générale du secteur Nord-Ouest

[nord-du-quebec.foret@mffp.gouv.qc.ca](mailto:nord-du-quebec.foret@mffp.gouv.qc.ca)

The integral version of this document is accessible on the following web site:

<https://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/planification-forestiere/plans-damenagement-forestier-integre/nord-du-quebec/>

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Ministère des Forêts, de la Faune et des Parcs

Legal deposit - Bibliothèque et Archives nationales du Québec, 2020

ISBN (PDF): 978-2-550-88269-5

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# Introduction

The Agreement Concerning a New Relationship Between le Gouvernement du Québec and the Crees of Quebec, commonly referred to “La Paix des braves”, provides for the development, by the MFFP, of a strategy for the management of mixedwood stands as part of its Adapted Forestry Regime (see wording of relevant sections in Appendix 4, page 35).

Under La Paix des braves, the Mixedwood Stands Management Strategy must be elaborated in close collaboration with the Cree Nation Government (CNG). It must also consider the importance of these stands as wildlife habitats in the area covered by the agreement.

Furthermore, La Paix des braves requires that residual forests must be relocated in priority in mixedwood stands, given their important role as wildlife habitats (Part II – C-2, section d). The Mixedwood Stands Management Strategy helps take this requirement into account.

This document presents the Mixedwood Stands Management Strategy, which complements the integrated forest management plan (tactical). Developing the Strategy involved consulting the Crees on many occasions. The information thus gathered allowed for modifications to the Strategy.

## 1- Mixedwood stands

### 1.1 What is a mixedwood stand?

A “mixedwood stand” is defined as a stand composed of a blend of softwood (coniferous/resinous) and hardwood (broad-leaved) trees. According to the Quebec forest mapping standards, softwood trees occupy 25% to 75% of the basal area of mixedwood stands<sup>a</sup>.

It is important to tell the difference between “mixedwood” and “mixed” stands; a “mixed” stand is defined as a stand composed of more than one (1) tree species<sup>b</sup>. It has a broader meaning, because mixed stands can be composed of 100% hardwood or 100% softwood.

In Chapter 3 of La Paix des braves, stands referred to as “mixed” refer in fact to stands composed of softwood and hardwood species. Scientific studies stressing the importance of mixedwood stands for wildlife habitats in the area covered by Chapter 3 also identify stands composed of a blend of hardwood and softwood species<sup>6, 4, 11</sup>.

While the French version of La Paix des braves speaks of “mixed” stands, this document points out that it in fact refers to a management strategy for mixedwood stands. The current nomenclature specifies

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<sup>a</sup> From “Glossaire forestier du MFFP”: “peuplement mixte”: <http://glossaire-forestier.mffp.gouv.qc.ca/terme/1375>

<sup>b</sup> From “Glossaire forestier du MFFP”: “peuplement mélangé”: <http://glossaire-forestier.mffp.gouv.qc.ca/terme/1044>

that “mixedwood” (also written “mixed-wood”) is the proper expression for the stands that present particular interest to the Crees.

## 1.2 Cree vision

Mixedwood stands are more than just food for Moose. They vary from being softwood dominated to being hardwood dominated, creating many different habitat conditions for many different species. In mountainous areas, they are important wildlife habitat and a source of food. Near waterbodies, they serve beavers well as are also used as traveling corridors and cover by many other species. This is why the tallymen request to protect these areas and to increase the buffers alongside waterways.

Mixedwood forests also represent invaluable sources of materials, resources and medicine for the Cree. Tamarack, Spruce, Jack Pine, Birch, and others are all used to make different tools and have different cultural signification. Birch is used as a firestarter, moose call, cover, art material, containers. Spruce is used for firewood and tent frames, and tools. Bark is used to smoke food, the gum from trees is used as both a gum and sealant. Cedar is used for canoes and other transportation frames. Tamarack can be used for snowshoe frames and decoys. Poplar is used for firewood, while rotted wood is used for smoking pelts. These are only but a few examples; all tree species are used by the Cree for many different purposes. It is therefore very important to preserve these areas to maintain these functions.

Mixedwood forest stands, because they are rare, are also used as landmarks for the Cree tallymen, indicating where they were on the land. Many unique names were given to such areas. They are often associated with first kills. Many young hunters remember the mixedwood forest where they hunted their first moose. Mixedwood stands are part of Cree culture. They are Language. Memories. Sacredness. The Cree way of life (Eeyou Pimatseewin) must be integrated in the planning process. When protecting these areas, we are protecting the Cree way of life.

The forest is changing rapidly, mainly due to logging. The land users are trying to adapt but it is difficult; these changes affect their capacity to continue living their way off of the land. Every living creature in the ecosystem have to adapt to changes on the land. The more the Cree way of life is respected, the more the tallyman and land users will benefit. This is why a Mixedwood Stands Management Strategy is needed. Guidelines will not solve all problems, but it's a start; it will help ease the impacts of forestry within Eeyou Istchee.

## 1.3 Important role of mixedwood stands as habitats

In the boreal forest, mixedwood stands play a key role, providing diversified and rare habitats in the forest matrix. Mature and old-growth mixedwood stands constitute areas of high ecological value given their particular features<sup>4</sup>:

- Larger mean diameter;
- Higher structural diversity;
- Wider diversity of species; intermingling of softwood and hardwood species;
- Large basal area of hardwood trees.

These features make these stands critical habitats for many wildlife species, including sensitive species of interest affected by forest management at provincial scale<sup>7</sup>: Northern flying squirrel, American marten, and pileated woodpecker. Other species affected by forest management also require those features: yellow-bellied sapsucker<sup>4</sup>, ovenbird<sup>10</sup>, Northern long-eared bat, and little brown bat<sup>9</sup>. Wildlife species presenting high interest for the Crees, i.e., moose<sup>11</sup> and snowshoe hare<sup>12</sup>, also use these stands, which provide shelter and food.

Studies<sup>4, 6</sup> reveal that mature mixedwood stands provide quality habitat once they reach the 60-year milestone<sup>c</sup>. Table 1 lists wildlife species associated with stands that have reached that age.

The interest for young mixedwood stands is due mainly to the presence of young hardwood trees, which are a natural source of food for wildlife, lateral canopy and species diversity. Wildlife of interest associated with this type of environment include moose<sup>11</sup>, snowshoe hare<sup>12</sup>, ruffed grouse<sup>8</sup>, American beaver<sup>13</sup> and olive-sided flycatcher<sup>1</sup>.

**Table 1. Features of mixedwood stand habitats and associated wildlife species**

Habitat	Key feature	Sensitive species/Species of interest
Young mixedwood forest	10-25 years More than 4 m Dense/species diversity <ul style="list-style-type: none"> <li>• Hardwood component: food</li> <li>• Softwood component: shelter</li> </ul>	<ul style="list-style-type: none"> <li>• Snowshoe hare</li> <li>• Moose</li> <li>• American marten</li> <li>• Ruffed grouse</li> <li>• American beaver</li> <li>• Black bear</li> <li>• Olive-sided flycatcher</li> </ul>
Mature and old-growth mixedwood forest	60 years + <ul style="list-style-type: none"> <li>• Diversified structure</li> <li>• Large trees (chiefly trembling aspen)</li> </ul>	<ul style="list-style-type: none"> <li>• Moose</li> <li>• American marten</li> <li>• Snowshoe hare</li> <li>• Woodpecker (pileated, yellow-bellied)</li> <li>• Northern flying squirrel</li> <li>• Ovenbird</li> <li>• Small brown bat &amp; Northern long-eared bat</li> </ul>

In general, species associated with mature mixedwood stands avoid environments that have been disturbed recently (example: recent logging sites). In a disturbed landscape, they use riparian environments and residual forest to move. A number of them – such as the American marten and ovenbird – prefer large patches containing forest interior. Most of them are not affected by partial harvest operations with a low removal rate (maximum 40%).

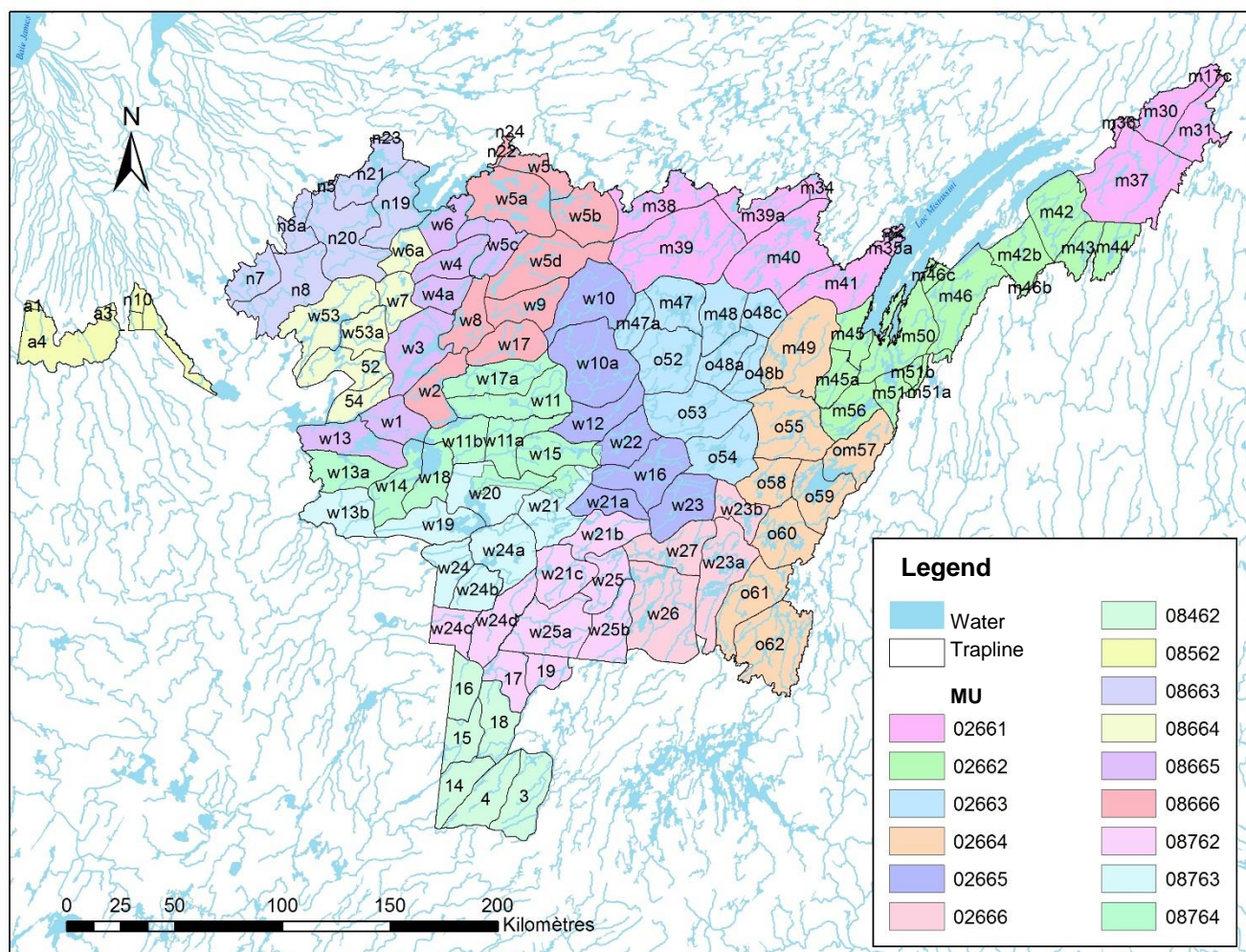
Wildlife species associated with young mixedwood stands are affected in the short-term by tending treatments. In the medium term, these habitats become adequate again. For example, the snowshoe hare returns four (4) years after tending<sup>2</sup>.

<sup>c</sup> 60 is the lower limit of the 70-year age class (60 to 79 years).

## 2- Portrait of the territory

### 2.1 Territory of application

The Mixedwood Stands Management Strategy ensuing from the Adapted Forestry Regime of La Paix des Braves applies to the fifteen (15) management units (MU) located in the area covered by La Paix des Braves: 026-61, 026-62, 026-63, 026-64, 026-65, 026-66, 084-62, 085-62, 086-63, 086-64, 086-65, 086-66, 087-62, 087-63, and 087-64.



**Map 1. Territory of application of the Mixedwood Stands Management Strategy**

The landbase used to evaluate targets and statistics corresponds to that defined in Appendix 5 of this document (page 40). In short, it consists of the traplines found within the perimeter of the aforementioned management units, except for large protected areas. Biological refuges, forested areas of wildlife interest (25%) and sites of interest (1%), for instance, are considered in the statistics.

## 2.2 Mixedwood stand dynamics

### Favorable sites

Mixedwood stands grow in certain types of specific environments, including well drained hills. They cannot be found in other environments such as black spruce swamps. In the area covered by La Paix des braves, sites where mixedwood stands can develop are dispersed if not scarce in a large number of traplines. Potential vegetation types help to identify most favorable sites to the development of mixedwood stands<sup>d</sup>. Potential vegetation “balsam fir-white birch” (MS2) and “black spruce- aspen” (ME1) are most favorable sites<sup>e</sup>. Mixedwood stands also grow, to a lesser extent, in potential vegetation “balsam fir-black spruce” (RS2). These sites are gathered in the family of softwood with intolerant hardwood stations (RFi stations).

Because of the scarcity of these favorable sites, mixedwood stands often form patches of species richness in a large forest dominated by black spruce and jack pine. In the southernmost zones of the territory, mixedwood stands and stations prone to the development of mixedwood stands are more abundant at landscape level.

### Forest dynamics

Forest sites that are prone to the development of mixedwood stands can be composed of hardwood, mixedwood or softwood species. Their composition depends on a number of factors, including the time elapsed since the most recent severe disturbance, the presence of hardwood or softwood species prior to the most recent disturbance, and the size of the openings, if any, in the forest canopy of the stand.

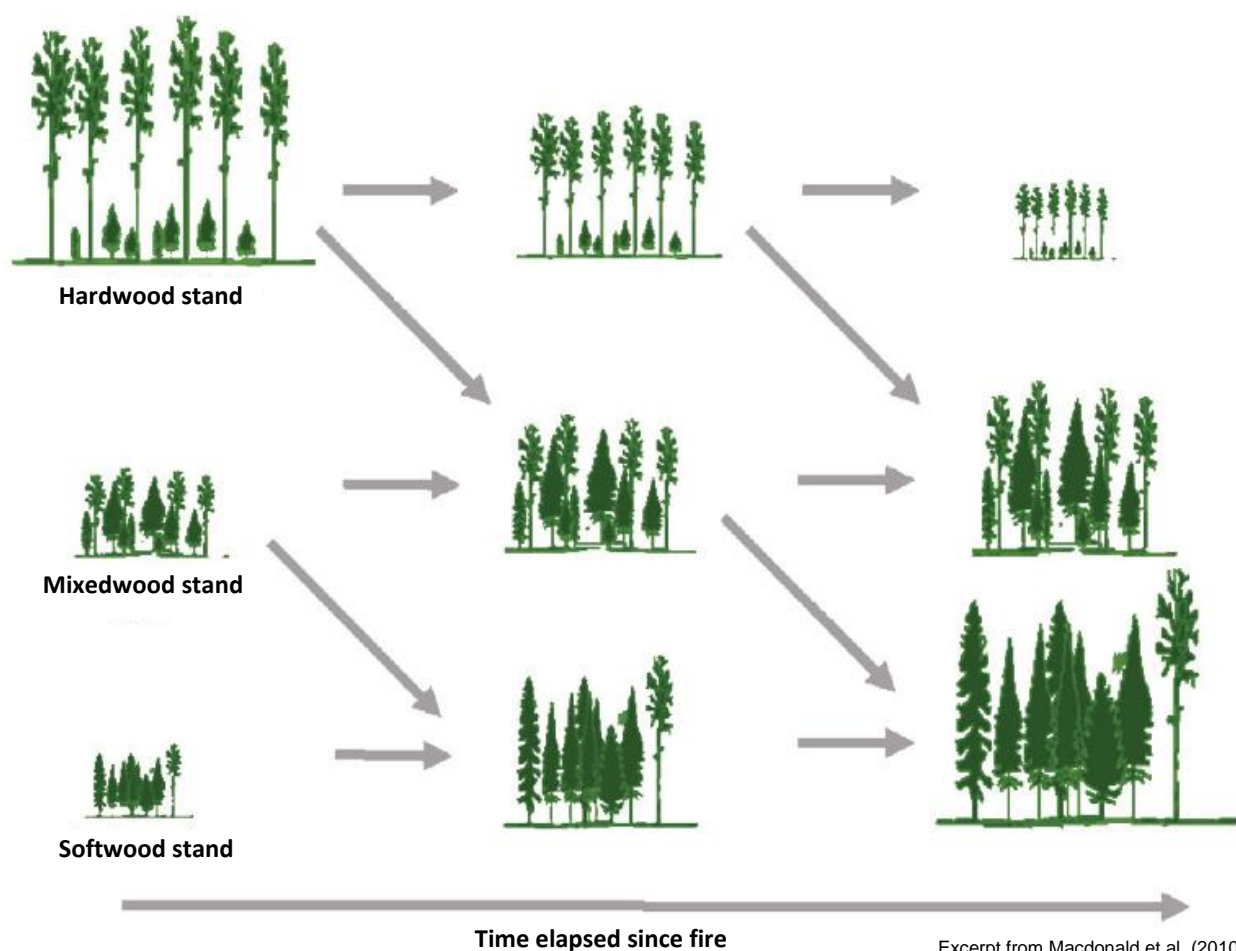
Following a severe natural disturbance (fire), mixedwood forest sites can become colonized by hardwood (e.g.: paper birch or trembling aspen) and/or softwood (e.g.: black spruce, jack pine) species. Balsam fir and white spruce would tend more to emerge at a later stage. The composition of mixedwood stands would begin to change during the transition period: the first trees to become established following a natural disturbance begin to decline and be replaced<sup>5</sup>. Depending on the size of the gaps that form after partial disturbances in stands, shade-tolerant (small gaps) and intolerant (large gaps) species are advantaged. These larger gaps ensure the presence of hardwood species in old-growth mixedwood stands.

Mixedwood stands in the boreal forest evolve over time and space. Forest sites with mixedwood stands follow various pathways. The most common pathway consists in the transition from hardwood-dominated canopy to shade-tolerant softwood-dominated canopy. Add to that other contexts leading to hardwood or mixedwood continuum. Without severe disturbance, the hardwood component in the landscape decreases (Figure 1).

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<sup>d</sup> For more information about potential vegetation, consult the Guide sylvicole du Québec, Tome I, Chapter 4 <https://mffp.gouv.qc.ca/les-forets/connaissances/le-guide-sylvicole-du-quebec/>

<sup>e</sup> They cover a little more than 4% the productive forest area of land covered by the Agreement (see Table 3).



**Figure 1. Spatial and temporal variation in stand canopy composition in the boreal mixedwood stands.**

## 2.3 Reference proportion of mature mixedwood stands

### Mature mixedwood stands

When they reach the 60-year milestone, mixedwood stands become valuable habitats for American martens and woodpeckers (Table 1). While preferring mature mixedwood stands, moose are also attracted by slightly younger stands. The important role of mixedwood stands of 60 years of age and older as rich wildlife habitats explains why the Strategy defines the maturity age of mixedwood stands on the basis of this age. More details on criteria for selecting these stands with the ecoforest map are provided on page 12.

### Determining the reference proportion for each trapline

Reference proportions are used to establish management thresholds for the Strategy. They serve as reference to evaluate the amount of mature mixedwood stands needed to maintain wildlife populations of interest associated with them. Proportions vary from one trapline to the other, depending on natural amount of these stands on each trapline.

Two elements of information were analyzed to determine the reference proportion for each trapline: 1)

the current proportion (2018); and 2) the estimated natural proportion of mature mixedwood stands. These elements were assessed, and then compared.

### **Current proportion in each trapline**

Because logging operations in the area started less than 60 years ago, today's mixedwood stands of 60 years of age and older are of natural origin. For each trapline, the proportion of productive forest area covered by mixedwood stands of 60 years of age and older is evaluated.

### **Estimated natural proportion by trapline**

The proportions of natural mature mixedwood stands were estimated on the basis of two key elements: (1) the ratio of environments prone to the growth of mixedwood stands in a trapline (RFi stations); and (2) natural disturbance patterns (frequency of forests fire)<sup>f</sup>. The estimated proportion was also validated using the first ten-year forest inventory maps (maps from the 1970's)<sup>g</sup>. During this period, forest management operations were not carried out in a major part of the area.

Estimating the proportion of natural mature mixedwood stands is a method of evaluating what would have been the proportion of mature mixedwood stands had no forest harvesting operations been carried out in the area. This estimate is especially useful if the forest within a given trapline has been harvested significantly in the past decades.

### **Choice of reference proportion**

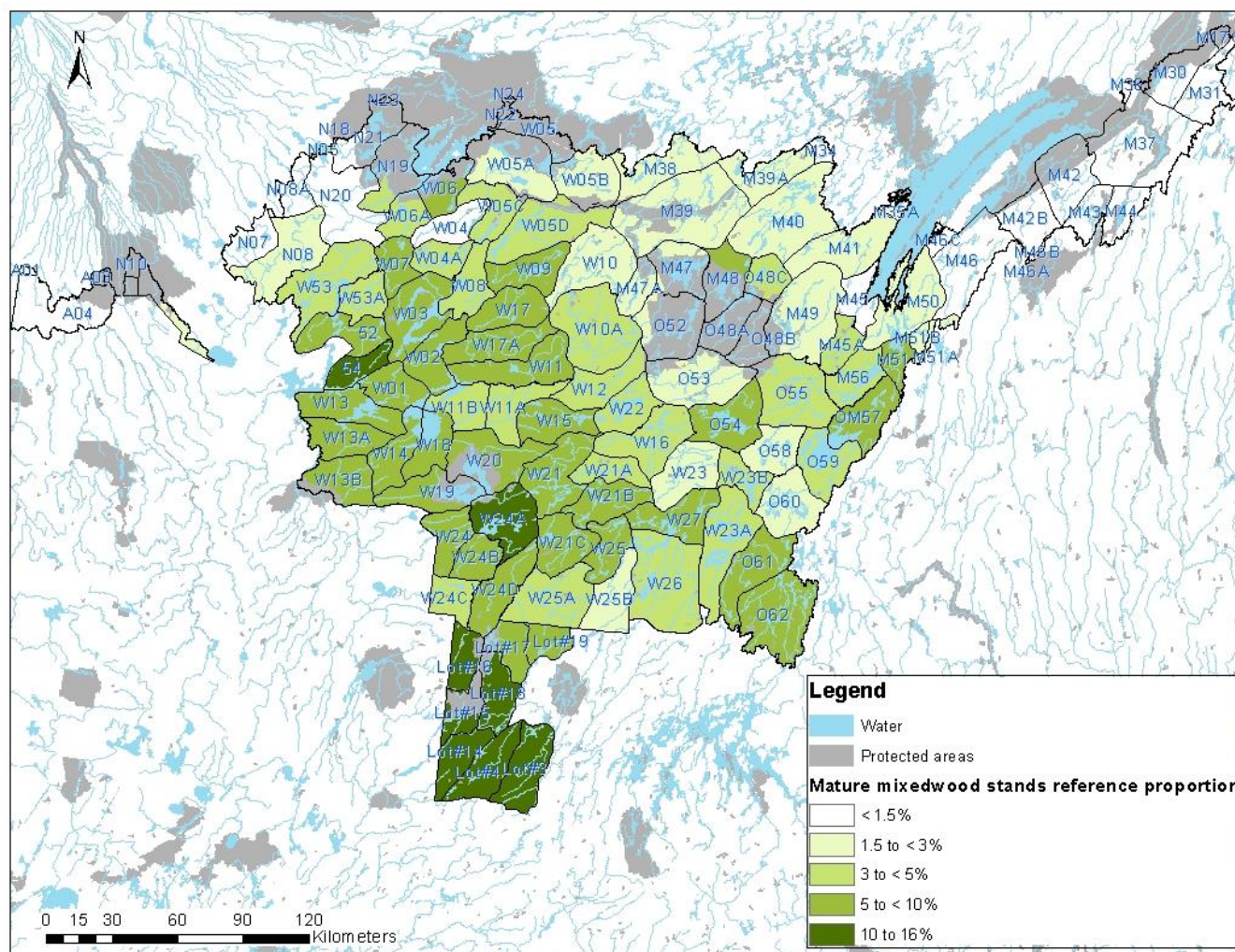
The reference proportion is defined as the highest value between the current proportion of mature mixedwood stands and the estimated natural proportion. Once determined, the reference proportion for each trapline is constant throughout the application of the Strategy. Appendix 1 (page 25) presents the evaluation of the reference proportion in details.

Map 2 below presents the reference proportion of mature mixedwood stands for each trapline. The map illustrates the variation in mature mixedwood stand proportions throughout the territory. Natural mixedwood stands are more abundant in the southwestern portion of the territory, but are rarer in the northeastern portion.

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<sup>f</sup> More details in Appendix 1 (page 25).

<sup>g</sup> The first ten-year forest inventory was conducted between 1970 and 1983 in Quebec. <https://mffp.gouv.qc.ca/forets/inventaire/historique.jsp>



**Map 2. Reference proportion of mature mixedwood stands in accordance with the productive forest area of each trapline included in the MU.**

## 2.4 Forest characteristics

### Forest cover types

The ecoforest map is used to produce a portrait of mixedwood stands. The field defining the canopy type (TYPE\_COUV) includes three values: **M** for mixedwood; **H** for hardwood; and **R** for softwood. In this field, there is no value attributed to areas without defined canopy type.

This territory is dominated by “pure” softwood stands. Stands where the canopy type is not identified come second, followed by mixedwood stands then hardwood stands (Table 2).

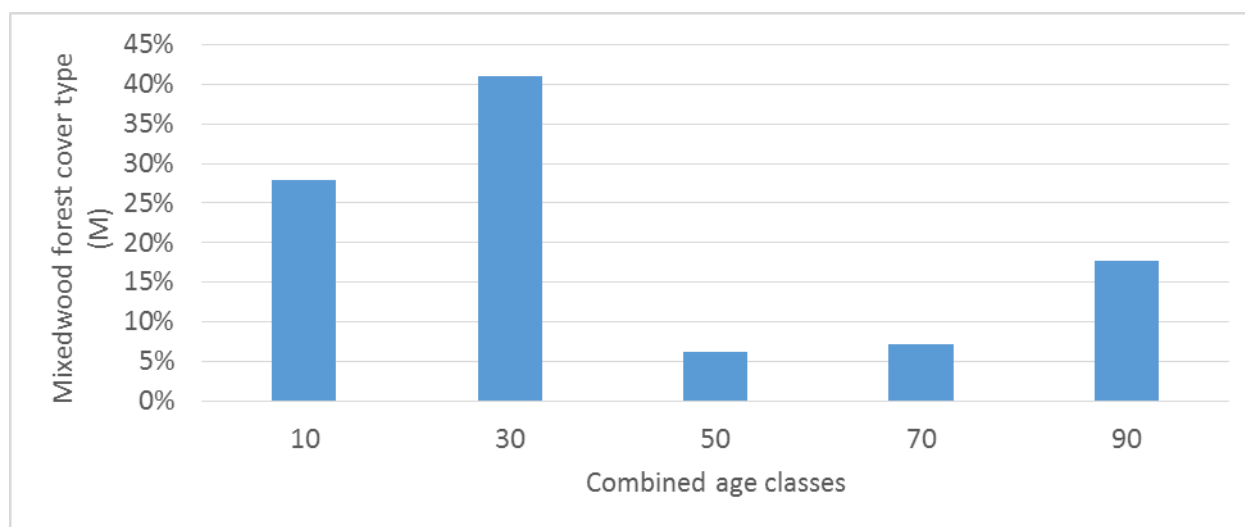
**Table 2. Proportion of hardwood, mixedwood and softwood stands of all ages in the whole of the territory.**

Cover type	Area (ha)	Ratio (%)
No cover	898,605	19.7
Hardwood	110,149	2.4
Mixedwood	514,034	11.3
Softwood	3,044,779	66.7

### Mixedwood stand age

To be considered mature to play their role as wildlife habitats, mixedwood stands must have reached the 60-year milestone. On ecoforest maps, these stands are identified according to their age class (CL\_AGE): 70, 90, 120, young irregular and young uneven-aged stands (JIR or JIN), old irregular and old uneven-aged stands (VIR or VIN)<sup>h</sup>.

Past forest management operations and forest fires have regenerated the forests. Forest harvesting in the territory started some 50 years ago (in southernmost areas). Thus, stands that are currently 60 years of age and older are of natural origin. Figure 2 shows that the proportion of young mixedwood stands is superior to that of older stands.

**Figure 2. Portrait of mixedwood stands per combined age class throughout the territory<sup>i</sup>.**

### Forest station families

The distribution of forest station families reveals that the two forest stations with greatest species richness (MS2 and ME1) cover less than 5% of the productive forest area of the territory. Type RS2 potential vegetation, home to mixedwood stands to a lesser extent, is much more abundant (Table 3).

<sup>h</sup> Two-storied stands dominated by age classes 70, 90 or 120 are also included in the 60 years old + group.

<sup>i</sup> JIN and JIR are combined in the 70-year class; the 120-year old stands, VIN and VIR are included in the 90-age class.

RFi stations is the family referred to in this strategy. Mixedwood stands do not or hardly occur naturally in the other families of forest stations.

**Table 3. Forest station families in the territory of application**

Station families	Potential vegetation	Surface area (ha)	Ratio of productive forest area
<b>RES (Softwood family)</b>	RE1	54,986	1.4%
	RE2	1,589,913	41.1%
	RE3	695,603	18.0%
	RS3	33,320	0.9%
	RS4	34	0.0%
<b>RFi (Softwood with hardwood family)</b>	ME1	39,152	1.0%
	MS2	129,591	3.4%
	RS2	1,322,084	34.2%
<b>Tho (white cedar family)</b>	RC3 et RS1	48	0.0%
<b>Total</b>		3,864,736	100.0%

## 2.5 Economic contribution of mixedwood stands

Mixedwood stands have special appeal in terms of forest resource, for they often are of greatest species richness, with a larger volume of trees, including softwoods. In certain parts of the territory, broad-leaved trees are so rarely seen that they are of very marginal economic interest.

# 3- Strategy purpose and objectives

## 3.1 Purpose

Maintain habitats associated with mixedwood stands while allowing forest management.

## 3.2 Objectives

- Maintaining an amount of mature mixedwood stands in each trapline.
- Ensuring mixedwood stand renewal.
- Maintaining young dense and diversified mixedwood stands.
- Limiting impacts on hardwood and softwood annual allowable cut.

## 4- Management strategy

### 4.1 Threshold of mature mixedwood stands, per trapline

#### Critical habitat threshold

The Strategy uses trapline as the basic planning scale. Each trapline is allocated a maintenance threshold for mature mixedwood stands. The maintenance threshold represents the proportion of the productive forest area to be maintained in mature mixedwood stands.

The maintenance threshold is based on the concept of critical habitat threshold for species that are sensitive to forest management. According to this concept, wildlife species do tolerate loss of habitat up to a certain extent, known as “critical habitat threshold”. The threshold varies from one species to another, depending on their level of vulnerability and whether they are generalist or specialist species. According to Rompré et al. (2010)<sup>15</sup>, critical habitat threshold of sensitive species to forest management varies from 30 to 40%. This is higher than the critical habitat threshold of generalist species.

#### Threshold types

The Strategy provides for three (3) types of threshold. The choice in threshold type is influenced by the relative scarcity of mixedwood stands in a given trapline. The appropriate threshold is applied to the reference proportion of each trapline (Table 4).

The first type of threshold is set at 40% of the reference proportion of mature mixedwood stands. This threshold is consistent with the critical habitat threshold and is selected to avoid significant drops in populations associated with mature mixedwood stands. It is used for all traplines whose reference proportion is 3% or more.

The second type of threshold corresponds to 50% of mature mixedwood stands. It applies to reference proportions between 1.5% and 3%. Mature mixedwood stands are naturally unusual in these traplines and the 50% threshold allows for a prudent approach.

In traplines with a very low reference proportion (1.5% or less of productive forest area), a maintenance threshold type is applied. Should the proportion of mature mixedwood stands increase significantly in the next decades (as a result of recruitment), part of surplus mixedwood stands could be harvested. It is possible that recruitment in very few traplines reaches a level far superior to the reference proportion (see example in Appendix 1, page 25).

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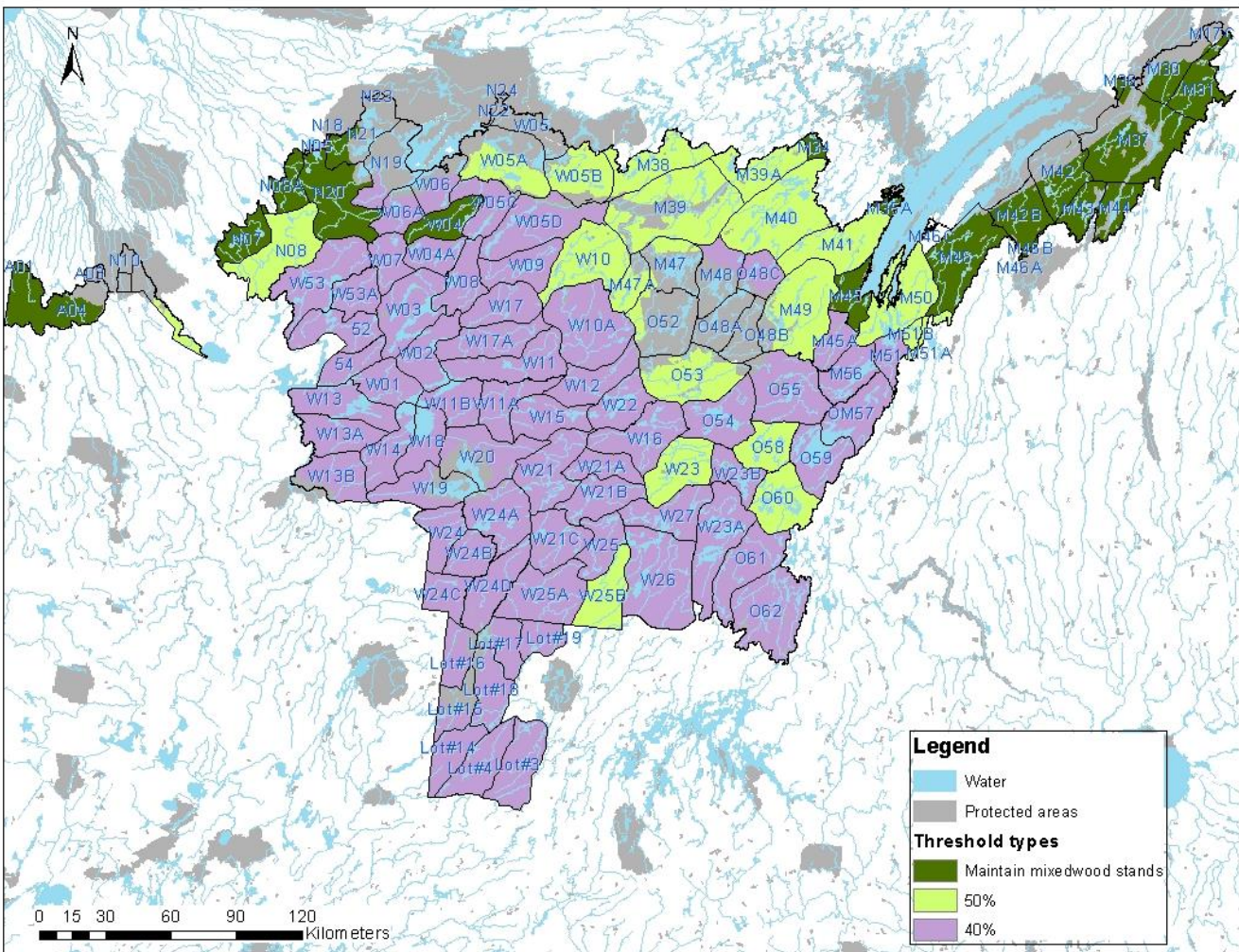
<sup>15</sup> If the proportion of mature mixedwood stands increases to more than twice the reference proportion and exceeds 1.5% the productive forest area.

**Table 4. Types of thresholds for mature mixedwood stands and associated trapline characteristics**

Threshold type	Reference proportion in traplines (% of productive forest area)
40% of the reference proportion	3% and more
50% of the reference proportion	1.5% to less than 3%
Maintenance of mixedwood stands (until the reference proportion doubles)	Less than 1.5%

The possibility to harvest mixedwood stands is determined on the basis of the threshold type, the productive forest area and the current proportion of mature mixedwood stands. The threshold type and corresponding surface area for each trapline is provided in Appendix 3 (Table 12). Map 3 shows the distribution of the various threshold types across the territory.

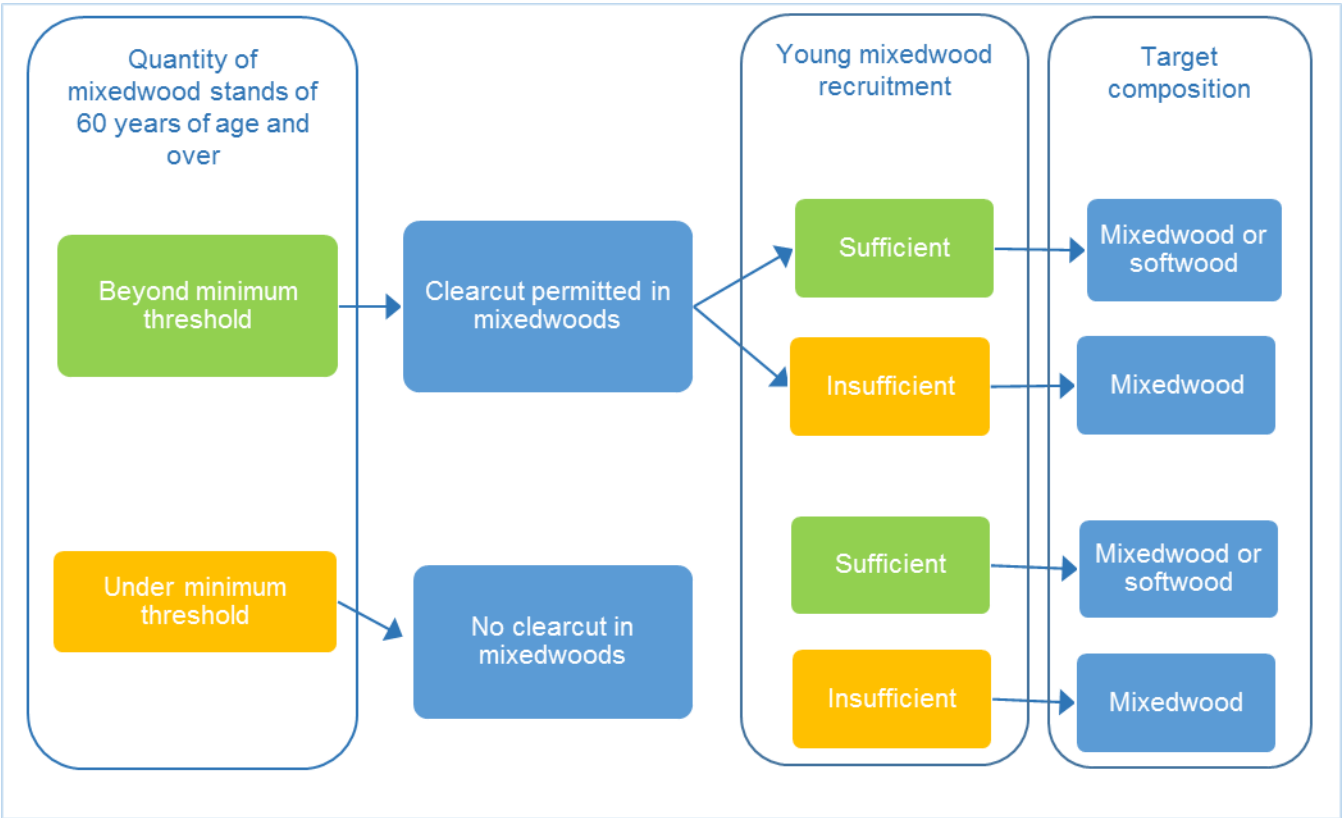
Of course, should protection methods overlap thresholds for maintaining mixedwood stands, protection methods do predominate. Map 5 in Appendix 3 shows the layering of interim protection measures for woodland caribou and thresholds to maintain mixedwood stands.



**Map 3. Threshold types applied for maintaining mature mixedwood stands.**

## 4.2 Silvicultural objectives

With the forest profile of each trapline, it is possible to identify their respective silvicultural objectives in terms of mixedwood stands. Two indicators are used to determine these objectives: proportion of mixedwood stands of 60 years old and over; and abundance of young mixedwood stands in the family of RFi stations (Figure 3).



**Figure 3. Identification of silvicultural objectives according to stands and land issues.**

### Proportion of mature mixedwood stands

If the current proportion of mature mixedwood stands in a trapline is inferior to the minimum identified threshold, clearcut<sup>k</sup> in mixedwood stands of 60 years of age and older cannot be carried out. The current proportion must be maintained until the minimum threshold is exceeded over time. This is considered a situation of habitat restoration (Figure 3).

If the current proportion of mature mixedwood stands exceeds the minimum threshold, harvesting can be carried out in mixedwood stands, but the minimum threshold must be observed at all times.

<sup>k</sup> There are four regeneration processes in the clearcut family: cutting with regeneration and soil protection (CPRS), cutting with high regeneration and soil protection (CPHRS), cutting with reserve seed trees (CRS) and total cutting without protection. Mosaic cutting is an organisation of clearcuts and residual forest blocks.

Recruitment of young mixedwood stands

The Strategy is designed to ensure the renewal of mixedwood stands, whether or not they are scheduled for harvest. In the absence of mixedwood harvesting, regeneration present on sites belonging to the family of RFI stations may be assigned a target mixedwood or softwood composition, depending on the portrait of the trapline. Silvicultural work on these stations will be adapted according to the objectives set.

To ensure stand renewal, a ratio for young mixedwood stands is determined for each trapline. This ratio is based on the reference proportion of mixedwood stands in each one of the traplines. Sites belonging to the family of RFI stations, which can support mixedwood stands, are the basis for calculating the ratio for young mixedwood stands.

This ratio is defined as follows:

*Sum of areas covered by mixedwood stands in the 10- and 30-age classes on RFI stations*

*Productive forest area in trapline*

X 100

= Ratio of young mixedwood stands

To guarantee sufficient recruitment over time, the aim is to attain a ratio of young mixedwood stands equal or superior to 60% of the reference proportion of mature mixedwood stands.

Evaluation of young mixedwood stand abundance (sufficient or insufficient recruitment):

<i>Ratio of young mixedwood stands</i>	<i>&gt;=</i>	<i>0.6 x Reference proportion of mature mixedwood stands</i>	<i>→</i>	<i>Sufficient recruitment</i>
<i>Ratio of young mixedwood stands</i>	<i>&lt;</i>	<i>0.6 x Reference proportion of mature mixedwood stands</i>	<i>→</i>	<i>Insufficient recruitment</i>

The comparison between the actual ratio of young mixedwood stands on RFI stations and the reference proportion of mature mixedwood stands will have influence on the silvicultural objectives which will guide the preferred silvicultural scenarios for the trapline. If recruitment is significant or high compared to the proportion of natural mixedwood forest, part of the silvicultural scenarios could be geared toward a softwood composition (Figure 3). However, if recruitment is insufficient, the recruitment of younger mixedwood stands will have to be evaluated and all silvicultural scenarios will need to be adjusted to target maintenance of a mixture of hardwood and softwood trees. An example calculation is provided in Appendix 2 (page 30).

4.3 Silvicultural scenarios and treatments

Silvicultural scenarios

The choice of adequate silvicultural scenarios is determined on the basis of stand features, potential vegetation and analysis results in Figure 3.

In many cases, it is necessary to carry out tending treatments<sup>1</sup> to attain stand composition objectives. Depending on the post-harvest condition of the forest canopy and stand composition objectives at the trapline level, the forest manager can choose to not carry out tending treatments and let the stand transform into a mixedwood canopy (e.g., Table 5 – Scenario 1.1), or to carry out tending treatment aimed at generating a mixedwood or softwood canopy. If the target is mixedwood stands, the tending treatments outlined in the following tables could be adjusted to needs. For example, treatments patterns could be adjusted in order to leave untreated patches or strips.

The family of RFI forest stations includes a diversity of stations with variable broad-leaved tree potential. Silvicultural scenarios are elaborated for sub-families of stations. More fertile stations with a high hardwood tree productivity level (type MS2 and ME1 potential vegetation) will be differentiated from less fertile RFI stations (type RS2 potential vegetation).

Table 5 lists the main silvicultural scenarios that apply to very fertile stations, i.e., with type ME1 and MS2 potential vegetation. Hardwood competition is more important in those stations. Tending treatments may be required to ensure return to a mixed composition rather than a shift towards a pure hardwood composition. Possible scenarios are therefore slightly more intense in these stations compared to those for forest stations with type RS2 potential vegetation.

**Table 5. Main proposed silvicultural scenarios developed according to target composition in type MS2 and ME1 potential vegetation.**

Target composition	Is clear cutting in mixedwood possible?	No.	Scenario
1.Mixedwood	Yes	1.1	Mixedwood forest → Clearcut → Mixedwood forest
		1.2	Mixedwood forest → Clearcut → Cleaning → Mixedwood forest
		1.3	Mixedwood forest → Clearcut → Partial site preparation (as required) → Fill planting → Clearing → Cleaning → Mixedwood forest
2.Softwood	Yes	2.1	Mixedwood forest → Clearcut → Site preparation → Reforestation → Clearing → Cleaning → Softwood forest
3.Mixedwood	No	3.1	Young mixedwood stand → Mixedwood forest
		3.2	Softwood forest → Clearcut → Mixedwood forest
		3.3	Softwood forest → Clearcut → Cleaning → Mixedwood forest
		3.4	Softwood forest → Clearcut → Partial site preparation (as required) → Fill planting → Clearing → Cleaning → Mixedwood forest
4.Softwood	No	4.1	Young mixedwood stand → Cleaning → Resinous forest

Table 6 lists the main silvicultural scenarios applicable to less fertile forest stations, i.e., with type RS2

<sup>1</sup> Tending treatments are mainly: clearing, cleaning and precommercial thinning.

potential vegetation, where successive tending treatments aiming at softwood-dominated stands are very likely to lead to pure softwood stands. An intensive sequence of tending treatments is probably not required when the target is mixedwood stand.

**Table 6. Main proposed silvicultural scenarios developed according to target stand composition with type RS2 potential vegetation.**

Target composition	Is clear cutting in mixedwood possible?	No.	Scenario
1.Mixedwood	Yes	1.1	Mixedwood forest → Clearcut → Mixedwood forest
		1.2	Mixedwood forest → Clearcut → Cleaning (can be partial) → Mixedwood forest
		1.3	Mixedwood forest → Clearcut → Partial site preparation (as required) → Fill planting → Clearing (as required) → Mixedwood forest
2.Softwood	Yes	2.1	Mixedwood forest → Clearcut → Site preparation → Reforestation → Clearing → Mixedwood forest
3.Mixedwood	No	3.1	Young mixedwood stand → Mixedwood forest
		3.2	Softwood forest → Clearcut → Mixedwood forest
		3.3	Softwood forest → Clearcut → Partial site preparation (as required) → Fill planting → Clearing (as required) → Mixedwood forest
4.Softwood	No	4.1	Young mixedwood stand → Cleaning → Softwood forest

#### Mitigation of silvicultural treatment impact on habitat

Treatments modify the main features that make young stands habitats presenting particular interest for many wildlife species (Table 1). However, according to studies conducted on hare habitat<sup>2, 3</sup>, the effects on habitat subside gradually until they disappear 5 years after the treatment.

To maintain young mixedwood stands dense and diverse, the following measures are recommended:

- Ensuring that young stands at the sapling stage (about 10 to 25 years old) on RFI stations are not treated simultaneously in a given trapline. The aim is to prevent treatments in the past five (5) years from covering more than 50% of young stands.
- Preserving fruit bearing shrubs and hardwood in treated areas, as provided for in Chapter 3 of La Paix des braves (Appendix C-3 A<sup>m</sup>).
- Applying silvicultural scenarios for ensuring mixedwood composition in certain areas (Table 5, Table 6 and Figure 3).

<sup>m</sup> See Appendix 4 (page 35) for full wording.

## 4.4 Integration of traditional knowledge and maintenance of wildlife habitats

### Consultation meetings

The importance of traditional knowledge integration was raised by many. The primary means to do this is to ask the tallymen concerned to identify the most important mixedwood stands according to their knowledge. This information will guide the planning officers as they plan harvesting operations. Every five (5) years or so, upstream of the operational planning process, the tallymen will be asked to update their selection of most important mixedwood stands. These sites are likely to change over time, because forest and stand characteristics change as well.

The identification by tallymen of important mixedwood stands will contribute to point out the most valuable habitats to be preserved in a given area for a given period.

### Mature mixedwood stands used as wildlife habitat

It is important to maintain mature mixedwood stands. However, in order for these stands to keep their value as wildlife habitats, it is equally important to plan their configuration and connectivity with the surrounding forest cover and nearby watercourses. Maintaining a level of intermingling of mixedwood and softwood forests is key to ensure that wildlife can use mixedwood stands to their full potential. In this regard, Cree and scientific knowledge converge. Therefore, planning officers are asked to foster connectivity between mixedwood stands and coniferous forest cover.

### Application of the Strategy in forest areas of wildlife interest (25%)

The Mixedwood Stands Management Strategy applies to the entire territory of the adapted forestry regime. However, special attention must be given to mixedwood stands located in forest areas of wildlife interest (25%). The Paix des braves agreement provides that specific protection must be given to forest areas of wildlife interest to improve the level of harmonization between forest management activities and traditional activities including hunting, fishing and trapping (section 3.10.1). Mixedwood stands, whether young or mature, constitute significant habitats for wildlife species (e.g., moose, beaver, marten and grouse) that are important to the Crees (Table 1). Consultations on forest areas of wildlife interest and Cree land use maps can help planning officers target locations where it is particularly important to maintain and renew mixedwood stands.

### Wildlife Habitat Directives

The Wildlife Habitat Directives will provide additional indications on how to foster maintenance of wildlife habitats associated with mixedwood stands. The directives will discuss in greater detail the issues of maintaining moose, marten and hare habitat; and maintaining connectivity between mixedwood stands and other significant habitats.

Together, the planning officers, the members of the joint working group and the tallymen concerned will be able to organize the forest planning in such a way that maintained mixedwood stands can keep a

high value and continue to be used by wildlife.

Maintaining the minimum proportion of mature mixedwood stands per trapline prescribed under the Mixedwood Stands Management Strategy will be respected by the Boreal and Mountain caribou strategy although it is being developed and its territory of application is not officially delimited.

## 4.5 Operational implementation

Preservation of mixedwood stands beyond the minimum threshold must not infer with the implementation of operational forest planning. In other words, the Strategy must provide for sufficient flexibility to attain objectives while fostering harmonious practical application. To this end, the following is provided:

- It is possible to construct a forest road in a mixedwood stand<sup>n</sup>.
- It is possible to harvest a small area of a mixedwood stand if landlocked or if it blocks access to forest resources. To be considered small, a surface area must be inferior to 4 hectares.
- If the surface area of mature mixedwood stands is inferior to the threshold but recruitment in the 50-year age class (40 to 59 years) will allow to exceed this threshold, harvesting mixedwood stands that belong to the 50-year age class may, exceptionally, be possible. However, this could be possible only exceptionally and provided that enough mixedwood stands are maintained to meet the threshold limit without causing additional delays.

While the above situations are possible, the forest manager will try to preserve as much as possible mixedwood stands to respect defined thresholds. One example of adaptation would be to maintain small landlocked mixedwood stands by planning (mixedwood) patch-retention harvesting.

In all cases, the tallymen will be consulted and the situation explained by the forest manager.

## 4.6 Monitoring and adaptive management

Different monitoring activities are conducted for ensuring successful implementation of the Strategy. Integrated forest management plans (tactical)<sup>o</sup> (PAFIT) provide a description of all monitoring activities carried out in the management units, in particular effectiveness monitoring of silvicultural operations and monitoring mechanisms provided for in the Adapted Forestry Regime of La Paix des braves (see PAFIT, section 9).

### Effectiveness monitoring of silvicultural operations

Effectiveness monitoring of silvicultural operations aims to assess whether, through silvicultural

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<sup>n</sup> For example, if avoiding a mixedwood stand would significantly restrain access to other areas.

<sup>o</sup> To view integrated forest management plans online: <https://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/planification-forestiere/plans-damenagement-forestier-integre/nord-du-quebec/> and <https://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/planification-forestiere/plans-damenagement-forestier-integre/pafi-abitibi-temiscamingue/>.

prescription, the mechanisms implemented during work execution have helped attain objectives. Minimally, the establishment and growth of regeneration and the target stand composition are monitored in the first five years. The need for subsequent additional monitoring efforts is determined on the basis, for instance, of the intensity gradient, silvicultural treatment type (or natural disturbance) and target composition.

In the context of this Strategy, the effectiveness monitoring mechanisms that the MFFP has implemented allow the following:

- To detect potential problems in a timely manner.
- To provide for the appropriate corrective measures needed to achieve objectives.

### Monitoring of the Adapted Forestry Regime

Observance of Strategy thresholds is tracked via the mechanisms outlined in the Adapted Forestry Regime of La Paix des braves. The statistical tables set up for each trapline list the current thresholds and proportions of all mixedwood stands, whether mature or young. These monitoring mechanisms make it possible for planning officers and members of joint working groups to ensure observance of thresholds laid down in the Strategy and forecast the impact of planned operations.

### Monitoring of tending treatments

Distribution of tending treatments over time and space is monitored on an annual basis.

### Wildlife monitoring

The Direction de la gestion de la faune (MFFP) is responsible for wildlife monitoring. It conducts knowledge acquisition projects such as telemetric monitoring of moose and habitat selection. As they accumulate, new elements of knowledge will further inform the Strategy and be used for developing an adaptive management framework.

### Adaptive management

The Mixedwood Stands Management Strategy is elaborated according to a principle of adaptive management, and therefore can be modified as knowledge or expertise evolve during the years it is enforced.

## Conclusion

The Mixedwood Stands Management Strategy allows for mixedwood stands in each trapline to be maintained, based on their ecology. The use of critical habitat thresholds is a proven approach that fosters preservation of species associated with those stands.

## References cited

1. Anctil, A., H. M. Johansen and J. A. Tremblay. 2017. Écologie de nidification du moucherolle à côté olive dans un paysage sous aménagement forestier de la forêt boréale de l'Est. *Le Naturaliste Canadien*, 142 (2): 53-60.
2. Blanchette, P., Desjardins, S., M. Poirier, J. Legris and P. LaRue. 2003. Utilisation par le lièvre d'Amérique de peuplements traités par éclaircie précommerciale dans le domaine de l'érablière à bouleau jaune et de la pessière à mousses. *Société de la faune et des parcs du Québec*, Direction de la recherche sur la faune. 63 p.
3. Breton, E. 2000. Les éclaircies précommerciales : Rapport d'une étude de deux ans et stratégies d'intervention proposées afin d'atténuer les impacts sur la faune. *Le Territoire Populaire Chénier*, la Société de la Faune et des Parcs du Québec, Produits forestiers Alliance-Guérette inc. and ministère des Ressources naturelles du Québec. 69 pages and appendices.
4. Cadieux, P. and P. Drapeau. 2017. Are old boreal forests a safe bet for the conservation of the avifauna associated with decayed wood in eastern Canada? *Forest Ecology and management*, 385: 127-139.
5. Chen H.Y.H. et R.V. Popadiouk. 2002. Dynamics of North American boreal mixedwoods. *Environmental Review* 10: 137-166. DOI: 10.1139/A02-007
6. Cheveau, M. 2010. Effets multiscalaires de la fragmentation de la forêt par l'aménagement forestier sur la martre d'Amérique en forêt boréale de l'Est du Canada. Under the direction of Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, Canada. 226 p.
7. Cheveau, M. 2015. Démarche ayant mené à la sélection des espèces sensibles à l'aménagement forestier d'intérêt provincial, ministère des Forêts, de la Faune et des Parcs du Québec, Direction générale de l'expertise sur la faune et ses habitats, Gouvernement du Québec, 16 p.
8. Collin, L. 1996. La Gêlinotte huppée - Chapter 2. Adapted from Ferron et al. 1996. *Manuel d'aménagement des boisés privés pour la petite faune*. Fondation de la faune du Québec, 6 p.
9. Fabianek, F., Simard, M. A., Racine, E. B. and A. Desrochers. 2015. Selection of roosting habitat by male *Myotis* bats in a boreal forest. *Can. J. Zool.* 93: 539–546.
10. Girard, C., M. Darveau, J.-P. L. Savard, et J. Huot. Are temperate mixedwood forests perceived by birds as a distinct forest type? *Canadian Journal of Forest Research*, 34: 1895-1907.

11. Jacqmain, H., C. Dussault, R. Courtois et L. Bélanger. 2008. Moose-habitat relationships: integrating local Cree native knowledge and scientific finding in northern Quebec. *Canadian Journal of Forest Research*, 38: 3120-3132.
12. Jacqmain, H., L. Bélanger, S. Hilton et L. Bouthillier. 2007. Bridging native and scientific observations of snowshoe hare habitat restoration after clearcutting to set wildlife habitat management guidelines on Waswanipi Cree land. *Canadian Journal of Forest Research*, 37: 530-539.
13. Labbé, J. 2009. Modélisation de l'utilisation de l'habitat par le castor dans le Québec forestier. Under the direction of Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, Canada, 69 p.
14. Macdonald, S.E., N. Lecomte, Y. Bergeron, S. Brais, H. Chen, P. Comeau, P. Drapeau, V. Lieffers, S. Quideau, J. Spence et T. Work. 2010. Ecological implications of changing the composition of boreal mixedwood forests. A State of Knowledge report. Sustainable Forest Management Network, Edmonton, Alberta. 52 p.
15. Rompré, G., Y. Boucher, L. Bélanger, S. Côté and W. D. Robinson. 2010. Conserving biodiversity in managed landscapes: The use of critical thresholds for habitat. *The Forestry Chronicle*, 86 (5): 589-596.

## Appendix 1. Example of threshold calculation, per trapline

### 1. Determining reference proportions, per trapline

The threshold to maintain mature mixedwood stands in every trapline can be assessed on the basis of the reference proportion of mixedwood stands. Here's how to evaluate the reference proportion.

#### 1.1 Current proportion, per trapline

Proportion of mixedwood stands in 2018 = Area of mixedwood stands in 2018/ productive forest area

Proportion of mixedwood stands in 2018 = (70.0 ha/1,050 ha)

Proportion of mixedwood stands in 2018 = 6.7%

#### 1.2 Estimated natural proportion, per trapline

This proportion is based on the various forest stations in the territory, natural disturbance cycle and forest composition of mature stands in a given trapline.

The probability that a mixedwood stand develops in a given area varies with forest station type (Table 7). This information is provided as a guideline only, but is not included directly in the calculation.

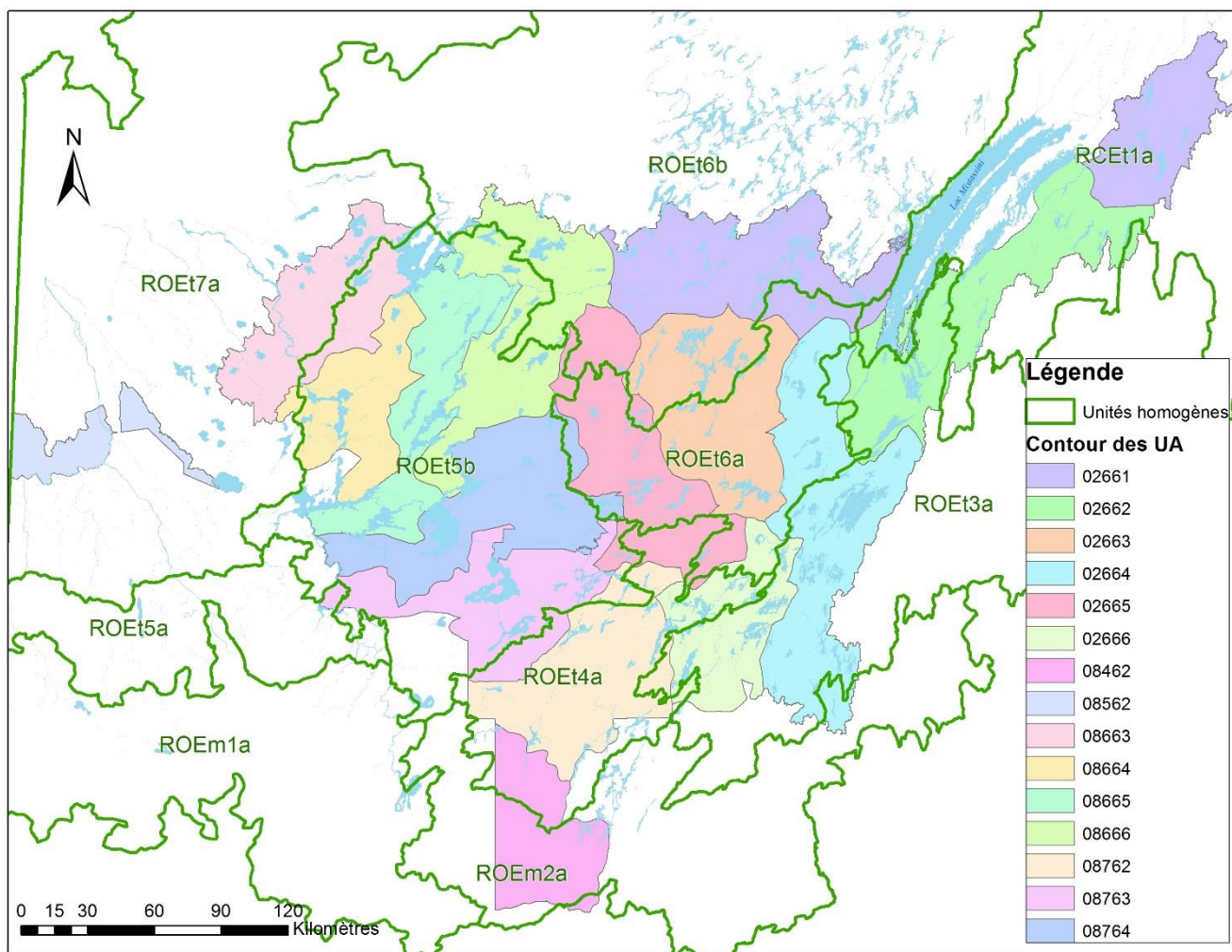
**Table 7. Distribution of canopy type potential in stands of 60 years old and over, per forest station group (global average for the whole of the territory)**

Group of forest stations	Potential vegetation	Hardwood	Mixedwood	Softwood
ME1_3	ME1 on mesic site (ME13)	21%	<b>33%</b>	46%
ME1_6	ME1 on wet site (ME16)	13%	<b>24%</b>	63%
MS2	MS2	37%	<b>52%</b>	19%
RE_RS134	RE1; RE2; RE3; RS1; RS3; RS4; RC3	0%	<b>0%</b>	100%
RS2	RS2	2%	<b>14%</b>	84%

The potential for mixedwood stands in a trapline depends on its geographical location, i.e., the homogenous unit in which it is situated (Table 8; Map 4). For instance, type RS2 stations in the western part of the territory present a potential for mixedwood stands (ROEt7a) superior to that in the eastern part (RCEt1a). This information will be included in the calculation of natural proportion of mixedwood stands.

**Table 8. Variation in potential presence of mixedwood stands of 60 years old and over, per group of forest stations, according to the homogenous unit**

Group of forest stations	RCEt1a	ROEm2a	ROEt3a	ROEt4a	ROEt5b	ROEt6a	ROEt6b	ROEt7a	Weighted average
<b>ME1_3</b>	-	-	-	-	30%	-	-	53%	<b>33%</b>
<b>ME1_6</b>	-	-	-	-	24%	-	-	30%	<b>24%</b>
<b>MS2</b>	22%	51%	31%	37%	32%	27%	26%	47%	<b>45%</b>
<b>RE_RS134</b>	0%	0%	0%	0%	0%	0%	0%	0%	<b>0%</b>
<b>RS2</b>	2%	14%	10%	17%	16%	20%	12%	23%	<b>14%</b>



**Map 4. Distribution of management units (MU) of the territory, per homogenous unit.**

### 1.2.1 Estimated potential for mature mixedwood stands (60 years +) for a fictitious trapline that has not experienced natural disturbance

**Table 9. Surface area of the groups of forest stations in a fictitious trapline and their respective proportions of mixedwood stations for homogenous unit ROEt5b.**

Group of forest stations	Area (ha)	Mixedwood proportion
ME1_3	100	30%
ME1_6	150	24%
MS2	75	32%
RE_RS134	500	0%
RS2	225	16%
<b>TOTAL</b>	<b>1,050</b>	

Potential of mixedwood stands =

(area of ME1\_3 \* Mixed prop. ME1\_3) + (area of ME1\_6 \* Mixed prop. ME1\_6) +  
 (area of MS2 \* Mixed prop. MS2) + (area of RE\_RS134 \* Mixed prop. RE\_RS134) +  
 (area of RS2 \* Mixed prop. RS2)

Potential of mixedwood stands =

100 ha \* 30% + 150 ha \* 24% + 75 ha \* 32% + 500 ha \* 0% + 225 ha \* 16%

Potential of mixedwood stands = 126.0 ha

### 1.2.2 Estimated natural proportion, i.e., estimation that takes into consideration the natural disturbance cycle in mixedwood stands of 60 years old and over, in a fictitious trapline

In a natural forest with a fire cycle of 150 years, 67% of the forests have attained the 60-year milestone. To calculate the natural proportion of mixedwood stands, this factor must be taken into consideration.

Natural surface area of mixedwood stands = Potential of mixedwood stands \* 67%

Natural surface area of mixedwood stands = 126.0 ha \* 67%

Natural surface area of mixedwood stands = 84.4 ha

Natural proportion of mixedwood stands = Natural surface area of mixedwood stands/Productive forest area

Natural proportion of mixedwood stands = (84.4 ha/1,050 ha)

Natural proportion of mixedwood stands = 8.0%

## 1.3 Choice of reference proportion

We must then compare the natural proportion and the proportion of mixedwood stands aged 60 and over in 2018. If the proportion in 2018 is superior to the estimated natural proportion, the

proportion in 2018 is the reference proportion. If the natural proportion is superior or equivalent to the proportion in 2018, the natural proportion is the reference proportion.

### 1.3.1 Example where the reference proportion is the estimated natural proportion

Natural proportion of mixedwood stands > Proportion of mixedwood stands in 2018 =  
8.0% > 6.7%

Reference proportion = 8.0%

### 1.3.2 Example where the reference proportion is the proportion in 2018

Natural proportion of mixedwood stands < Proportion of mixedwood stands in 2018 =  
8.0% < 10.5%

Reference proportion = 10.5%

## 2. Choice of threshold type

The choice of threshold type for a given trapline is made on the basis of the reference proportion.

**Table 10. Types of threshold for mature mixedwood stands and associated trapline features**

Threshold type	Reference proportion in traplines (% of productive forest areas)
40% of reference proportion	3% and more
50% of reference proportion	1.5% to less than 3%
Maintenance of mixedwood stands (until the reference proportion doubles)	Less than 1.5%

For instance, where the reference proportion of mixedwood stands is 8.0%, the applicable threshold type is 40%.

In a trapline with a reference proportion of 1.0%, the maintenance threshold must apply.

In a trapline where the reference proportion is 2.6%, the threshold type that applies is 50%.

## 3. Calculation of the threshold for mature mixedwood stands in a fictitious trapline

### 3.1 Example - 40% threshold

Threshold for mixedwood stands = Reference proportion for mixedwood stands (3% and +) \* appropriate threshold type (40%)

Threshold for mixedwood stands = 8.0% \* 40% (or 84.4 ha \* 40%)

Threshold for mixedwood stands = 3.2% (or 33.8 ha)

### 3.2 Example – 50% threshold

Threshold for mixedwood stands = Reference proportion for mixedwood stands (1.5% to < 3%) \* appropriate threshold type (50%)

Threshold for mixedwood stands = 2.6% \* 50% (or 27.3 ha \* 50%)

Threshold for mixedwood stands = 1.3% (or 13.7 ha)

### 3.3 Example – “Mixedwood maintenance” threshold

The following is used to calculate the “mixedwood maintenance” threshold:

The proportion to maintain is the highest value between 1.5% of the productive forest area and twice the reference proportion of mature mixedwood stands.

Case 1: Reference proportion = 0.9%

Threshold to maintain = the highest value between  $(0.9\% \times 2 = 1.8\%)$  and 1.5%

Threshold to maintain = 1.8%

Case 2: Reference proportion = 0.4%

Threshold to maintain = the highest value between  $(0.4\% \times 2 = 0.8\%)$  and 1.5%

Threshold to maintain = 1.5%

### 3.4 Example – “Mixedwood maintenance” threshold and significant recruitment of young mixedwood stands

Case 3: Reference proportion = 0.7%

Threshold to maintain = the highest value between  $(0.7\% \times 2 = 1.4\%)$  and 1.5%

Threshold to maintain = 1.5%

Figure 4 (below) shows the age structure of this trapline. In the future, recruitment from stands in the 10-year age class will cover 4.2% of the productive forest area. This by far exceeds the value to be maintained. Harvest of mixedwood stands may become possible when this cohort reaches the 60-year milestone (70-year age class).

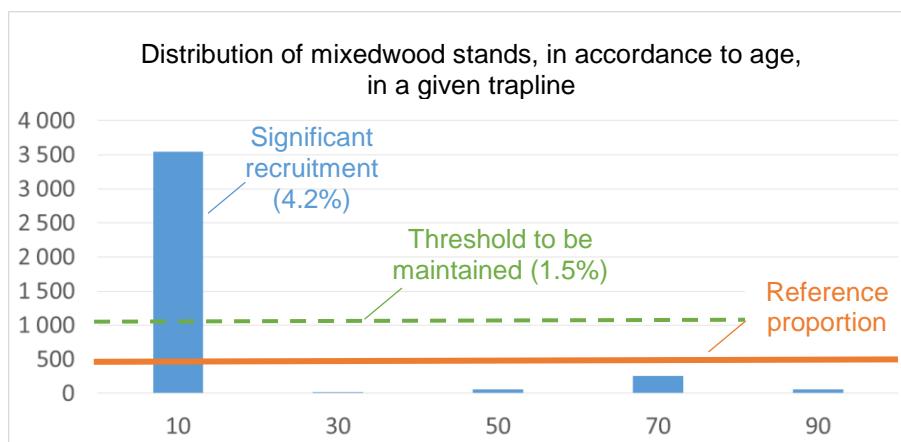


Figure 4. Age structure of a trapline with very high recruitment of young mixedwood stands.

## Appendix 2. Example of calculation for recruitment of young mixedwood stands

To ensure stand renewal, a ratio for young mixedwood stands is defined for each trapline.

**Table 11. Information required to assess recruitment in a fictitious trapline.**

Information on trapline	Example
Productive forest area	60,000 ha
Reference proportion	2.2%
Threshold for mature mixedwood stands	1.1%
Surface area of mixedwood stands on RFi stations in the 10- and 30-year age classes	1,000 ha

The ratio of young mixedwood stands is calculated on the basis of the above information. The ratio is calculated as follows:

$\frac{\text{Sum of areas covered by mixedwood stands in the 10- and 30-age classes on RFi stations}}{\text{Productive forest area in trapline}} \times 100 = \text{Ratio of young mixedwood stands}$
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Example of calculation of the ratio of young mixedwood stands in a fictitious trapline

$\frac{1,000 \text{ ha}}{60,000 \text{ ha}} \times 100 = 1.7\%$
---

To guarantee sufficient recruitment over time, the aim is to attain a ratio of young mixedwood stands equal or superior to 60% of the reference proportion of mature mixedwood stands. Young mixedwood stand abundance (sufficient or insufficient recruitment) is evaluated as follows:

Ratio of young mixedwood stands	$\geq$	60% x Reference proportion of mature mixedwood stands	→	Sufficient recruitment
Ratio of young mixedwood stands	$<$	60% x Reference proportion of mature mixedwood stands	→	Insufficient recruitment

Example of evaluation of young stand abundance (sufficient or insufficient) in a fictitious trapline

1.7%	$\geq$	1.32% (60% x 2.2%)	→	<b>Sufficient recruitment</b>
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Once the recruitment is evaluated, consult Figure 3, page 16, to identify applicable silvicultural objectives.

## Appendix 3. Thresholds, per trapline

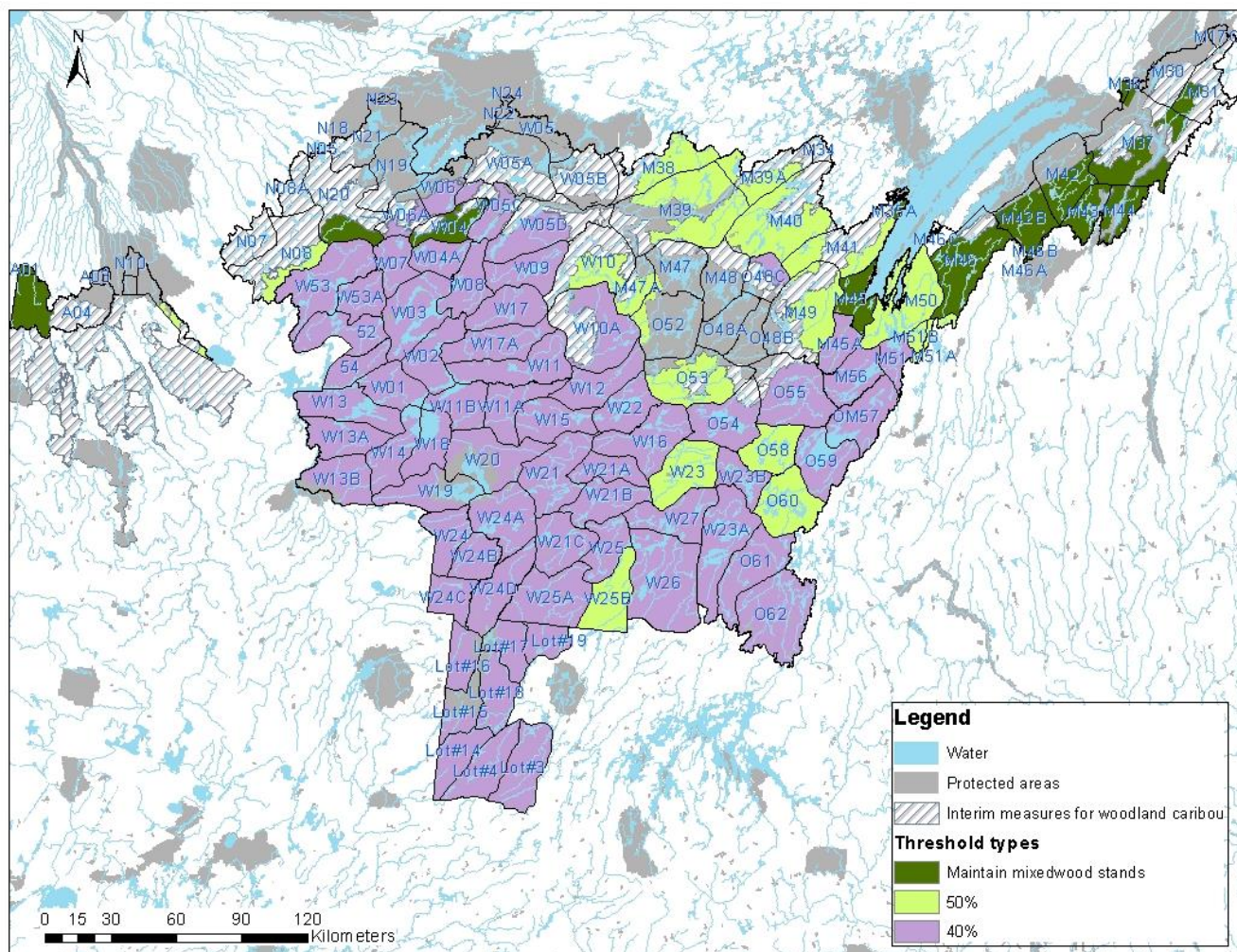
The following table only lists traplines where forest management can occur.

**Table 12. Thresholds of mature mixedwood stands (60 years old and +), per trapline. The surface areas are those included in the statistics compiled for La Paix des braves (see appendix 4).**

Trapline	MU	Productive forest area in trapline (ha)	Mixedwood stands of 60 years old and +					
			Natural proportion (%)	Proportion in 2018 (%)	Reference proportion (%)	Threshold type	Threshold (%)	Threshold area (ha)
52	08664	31 716	5.1%	7.1%	<b>7.1%</b>	40%	2.8%	899
54	08664	20 938	4.9%	11.6%	<b>11.6%</b>	40%	4.7%	974
A01	08562	886	0.3%	0.0%	<b>0.3%</b>	Maintain	1.5%	13
A04	08562	33 049	1.2%	1.3%	<b>1.2%</b>	Maintain	2.4%	804
Lot#14	08462	35 045	15.5%	10.9%	<b>15.5%</b>	40%	6.2%	2 168
Lot#15	08462	14 341	14.8%	8.6%	<b>14.8%</b>	40%	5.9%	851
Lot#16	08462	25 731	10.5%	6.0%	<b>10.5%</b>	40%	4.2%	1 074
Lot#17	08762	25 834	7.8%	1.5%	<b>7.8%</b>	40%	3.1%	802
Lot#18	08462	36 071	14.3%	9.3%	<b>14.3%</b>	40%	5.7%	2 065
Lot#19	08762	21 286	6.3%	3.3%	<b>6.3%</b>	40%	2.5%	537
Lot#3	08462	49 216	11.8%	7.4%	<b>11.8%</b>	40%	4.7%	2 318
Lot#4	08462	43 310	10.1%	5.6%	<b>10.1%</b>	40%	4.0%	1 746
M30	02661	21 463	0.8%	0.2%	<b>0.8%</b>	Maintain	1.5%	325
M31	02661	41 887	1.0%	1.0%	<b>1.0%</b>	Maintain	2.0%	817
M34	02661	4 974	1.4%	0.0%	<b>1.4%</b>	Maintain	2.8%	138
M35A	02661	4 606	0.8%	0.1%	<b>0.8%</b>	Maintain	1.6%	73
M36	02661	2 668	0.1%	0.3%	<b>0.1%</b>	Maintain	1.5%	40
M37	02661	84 621	0.7%	0.4%	<b>0.7%</b>	Maintain	1.5%	1 269
M38	02661	42 636	1.8%	0.9%	<b>1.8%</b>	50%	0.9%	379
M39	02661	89 986	1.9%	0.5%	<b>1.9%</b>	50%	1.0%	869
M39A	02661	42 018	2.5%	0.6%	<b>2.5%</b>	50%	1.2%	521
M40	02661	88 946	2.9%	1.0%	<b>2.9%</b>	50%	1.4%	1 268
M41	02661	50 589	2.5%	2.1%	<b>2.5%</b>	50%	1.3%	635
M42	02662	28 752	0.6%	0.6%	<b>0.6%</b>	Maintain	1.5%	431
M42B	02662	37 057	0.5%	0.4%	<b>0.5%</b>	Maintain	1.5%	556
M43	02662	20 712	1.4%	0.0%	<b>1.4%</b>	Maintain	2.7%	565
M44	02662	20 607	0.3%	0.0%	<b>0.3%</b>	Maintain	1.5%	309
M45	02662	18 830	0.9%	0.9%	<b>0.9%</b>	Maintain	1.8%	338
M45A	02662	18 466	3.4%	1.0%	<b>3.4%</b>	40%	1.4%	249
M46	02662	39 119	0.8%	0.2%	<b>0.8%</b>	Maintain	1.6%	610
M46A	02662	183	0.2%	0.0%	<b>0.2%</b>	Maintain	1.5%	3
M46B	02662	1 808	0.3%	0.4%	<b>0.3%</b>	Maintain	1.5%	27
M47	02663	11 378	1.9%	1.0%	<b>1.9%</b>	50%	1.0%	108
M47A	02663	14 879	2.4%	1.2%	<b>2.4%</b>	50%	1.2%	179

Trapline	MU	Productive forest area in trapline (ha)	Mixedwood stands of 60 years old and +					
			Natural proportion (%)	Proportion in 2018 (%)	Reference proportion (%)	Threshold type	Threshold (%)	Threshold area (ha)
M48	02663	15 422	3.9%	5.3%	<b>5.3%</b>	40%	2.1%	330
M49	02664	71 680	2.9%	1.5%	<b>2.9%</b>	50%	1.5%	1 039
M50	02662	5 436	2.2%	0.9%	<b>2.2%</b>	50%	1.1%	61
M51	02662	13 791	6.9%	0.2%	<b>6.9%</b>	40%	2.8%	381
M51A	02662	6 821	1.5%	0.3%	<b>1.5%</b>	50%	0.8%	52
M51B	02662	6 400	1.5%	0.0%	<b>1.5%</b>	50%	0.8%	49
M56	02662	28 765	4.2%	1.8%	<b>4.2%</b>	40%	1.7%	483
N05	08663	978	3.0%	0.0%	<b>3.0%</b>	40%	1.2%	12
N07	08663	17 691	1.3%	0.1%	<b>1.3%</b>	Maintain	2.6%	459
N08	08562-08663	58 637	2.5%	2.3%	<b>2.5%</b>	50%	1.2%	723
N08A	08663	14 796	0.9%	0.1%	<b>0.9%</b>	Maintain	1.7%	253
N18	08663	26	0.1%	0.0%	<b>0.1%</b>	Maintain	1.5%	0
N19	08663	7 950	1.7%	3.1%	<b>3.1%</b>	40%	1.2%	98
N20	08663	57 939	1.2%	0.4%	<b>1.2%</b>	Maintain	2.4%	1 379
N21	08663	8 354	0.2%	0.0%	<b>0.2%</b>	Maintain	1.5%	125
O48C	02663	21 135	3.4%	1.2%	<b>3.4%</b>	40%	1.4%	291
O52	02663	8 597	2.5%	0.4%	<b>2.5%</b>	50%	1.3%	108
O53	02663	51 241	2.1%	1.7%	<b>2.1%</b>	50%	1.0%	534
O54	02663	33 180	3.7%	5.5%	<b>5.5%</b>	40%	2.2%	726
O55	02664	57 769	3.8%	1.6%	<b>3.8%</b>	40%	1.5%	876
O58	02664	32 829	2.5%	2.1%	<b>2.5%</b>	50%	1.3%	413
O59	02664	32 445	3.3%	0.9%	<b>3.3%</b>	40%	1.3%	433
O60	02664	42 650	2.4%	0.8%	<b>2.4%</b>	50%	1.2%	501
O61	02664	56 171	3.5%	5.9%	<b>5.9%</b>	40 %	2.3%	1 316
O62	02664	83 242	6.5%	3.4%	<b>6.5%</b>	40%	2.6%	2 152
OM57	02664	42 779	5.5%	2.3%	<b>5.5%</b>	40%	2.2%	933
W01	08665	35 878	9.4%	5.8%	<b>9.4%</b>	40%	3.7%	1 342
W02	08666	40 081	7.6%	4.4%	<b>7.6%</b>	40%	3.1%	1 223
W03	08665	56 289	5.6%	4.3%	<b>5.6%</b>	40%	2.3%	1 269
W04	08665	24 659	1.3%	2.4%	<b>1.3%</b>	Maintain	2.6%	641
W04A	08665	26 282	4.1%	2.1%	<b>4.1%</b>	40%	1.6%	432
W05A	08666	31 628	2.0%	0.4%	<b>2.0%</b>	50%	1.0%	311
W05B	08666	33 717	2.0%	1.2%	<b>2.0%</b>	50%	1.0%	332
W05C	08665	34 351	4.1%	3.7%	<b>4.1%</b>	40%	1.6%	558
W05D	08666	66 420	3.4%	1.7%	<b>3.4%</b>	40%	1.4%	901
W06	08665	15 772	3.2%	6.0%	<b>6.0%</b>	40%	2.4%	378
W06A	08664	18 933	2.1%	3.4%	<b>3.4%</b>	40%	1.4%	261
W07	08664	26 559	5.6%	8.1%	<b>8.1%</b>	40%	3.2%	861
W08	08666	34 073	4.5%	0.4%	<b>4.5%</b>	40%	1.8%	614

Trapline	MU	Productive forest area in trapline (ha)	Mixedwood stands of 60 years old and +					
			Natural proportion (%)	Proportion in 2018 (%)	Reference proportion (%)	Threshold type	Threshold (%)	Threshold area (ha)
W09	08666	42 508	6.3%	3.0%	<b>6.3%</b>	40%	2.5%	1 073
W10	02665	60 053	2.1%	2.2%	<b>2.2%</b>	50%	1.1%	655
W10A	02665	83 559	5.0%	1.8%	<b>5.0%</b>	40%	2.0%	1 663
W11	08764	62 254	5.3%	1.6%	<b>5.3%</b>	40%	2.1%	1 308
W11A	08764	39 769	4.5%	2.7%	<b>4.5%</b>	40%	1.8%	709
W11B	08764	34 062	4.5%	0.5%	<b>4.5%</b>	40%	1.8%	612
W12	02665	41 919	4.2%	1.9%	<b>4.2%</b>	40%	1.7%	703
W13	08665	45 476	9.6%	4.9%	<b>9.6%</b>	40 %	3.9%	1 752
W13A	08764	43 537	9.1%	3.5%	<b>9.1%</b>	40%	3.7%	1 589
W13B	08763	45 151	7.7%	1.7%	<b>7.7%</b>	40%	3.1%	1 388
W14	08764	36 348	6.4%	3.0%	<b>6.4%</b>	40%	2.6%	935
W15	08764	28 154	5.8%	4.4%	<b>5.8%</b>	40%	2.3%	658
W16	02665	54 807	3.2%	3.1%	<b>3.2%</b>	40%	1.3%	709
W17	08666	44 458	6.3%	2.1%	<b>6.3%</b>	40 %	2.5%	1 124
W17A	08764	51 630	5.1%	0.5%	<b>5.1%</b>	40%	2.0%	1 056
W18	08764	29 664	9.0%	4.9%	<b>9.0%</b>	40%	3.6%	1 065
W19	08763	36 140	8.1%	3.2%	<b>8.1%</b>	40%	3.2%	1 169
W20	08763	32 948	6.2%	1.8%	<b>6.2%</b>	40%	2.5%	812
W21	08763	50 220	8.8%	3.4%	<b>8.8%</b>	40%	3.5%	1 759
W21A	02665	28 340	3.1%	1.0%	<b>3.1%</b>	40%	1.2%	347
W21B	08762	42 620	7.1%	6.5%	<b>7.1%</b>	40%	2.8%	1 211
W21C	08762	42 108	6.1%	4.7%	<b>6.1%</b>	40%	2.4%	1 031
W22	02665	27 969	3.1%	4.6%	<b>4.6%</b>	40%	1.8%	514
W23	02665	45 696	2.8%	2.7%	<b>2.8%</b>	50%	1.4%	635
W23A	02666	59 200	3.5%	3.5%	<b>3.5%</b>	40%	1.4%	828
W23B	02666	22 051	2.6%	3.5%	<b>3.5%</b>	40%	1.4%	305
W24	08763	35 254	8.1%	4.0%	<b>8.1%</b>	40%	3.2%	1 143
W24A	08763	53 900	8.7%	12.7%	<b>12.7%</b>	40%	5.1%	2 735
W24B	08763	29 894	6.4%	6.8%	<b>6.8%</b>	40%	2.7%	813
W24C	08762	27 197	4.4%	2.0%	<b>4.4%</b>	40%	1.8%	481
W24D	08762	48 259	5.2%	1.4%	<b>5.2%</b>	40%	2.1%	1 006
W25	08762	29 846	5.2%	6.1%	<b>6.1%</b>	40%	2.4%	723
W25A	08762	62 597	4.5%	1.3%	<b>4.5%</b>	40%	1.8%	1 127
W25B	08762	35 054	2.9%	1.9%	<b>2.9%</b>	50%	1.5%	509
W26	02666	93 283	4.2%	2.1%	<b>4.2%</b>	40%	1.7%	1 581
W27	02666	40 839	5.0%	3.3%	<b>5.0%</b>	40%	2.0%	817
W53	08664	8 259	4.4%	1.6%	<b>4.4%</b>	40%	1.8%	1 026
W53A	08664	20 139	4.1%	4.7%	<b>4.7%</b>	40%	1.9%	382



**Map 5. Types of threshold for mature mixedwood stands with layering of protected areas and interim measures for woodland caribou.**

## Appendix 4. Sections of La Paix des braves dealing with mixedwood stands

### 3.11 Maintaining forest cover in the whole of each trapline

3.11.1 The following measures are taken to ensure the protection of a residual forest cover:

- g) use silvicultural practices that foster the maintenance of diversified habitats, in particular by avoiding the elimination of hardwood trees (see Schedule C-3);
- h) develop a separate forest management approach for mixed stands (see Schedule C-3).

### Part II (C-2) -- MOSAIC CUTTING WITH PROTECTION OF REGENERATION AND SOILS

#### B) Evaluation criteria

- d) The residual stands to be preserved must be located in priority in mixed forests, as they are relatively rare and play an important role as wildlife habitats;

### Part III (C-3) -- MAINTENANCE OF A FOREST COVER

#### A) Hardwood Component in the Whole of each Cree Trapline

In pre-commercial thinning and stand release operations, special attention is given to the conservation of different habitats. For example, it is possible to:

- Preserve a certain number of small fruit trees such as sorb and cherry trees;
- Preserve hardwood trees in open spaces where there are no coniferous trees;
- Provide for operations to be spread over two phases, two or three years apart, in sectors where large regenerated areas are the object of such work;
- On certain rich sites conducive to good hardwood growth, promote the maintaining of enough hardwood trees to ensure the development of mixed forests.

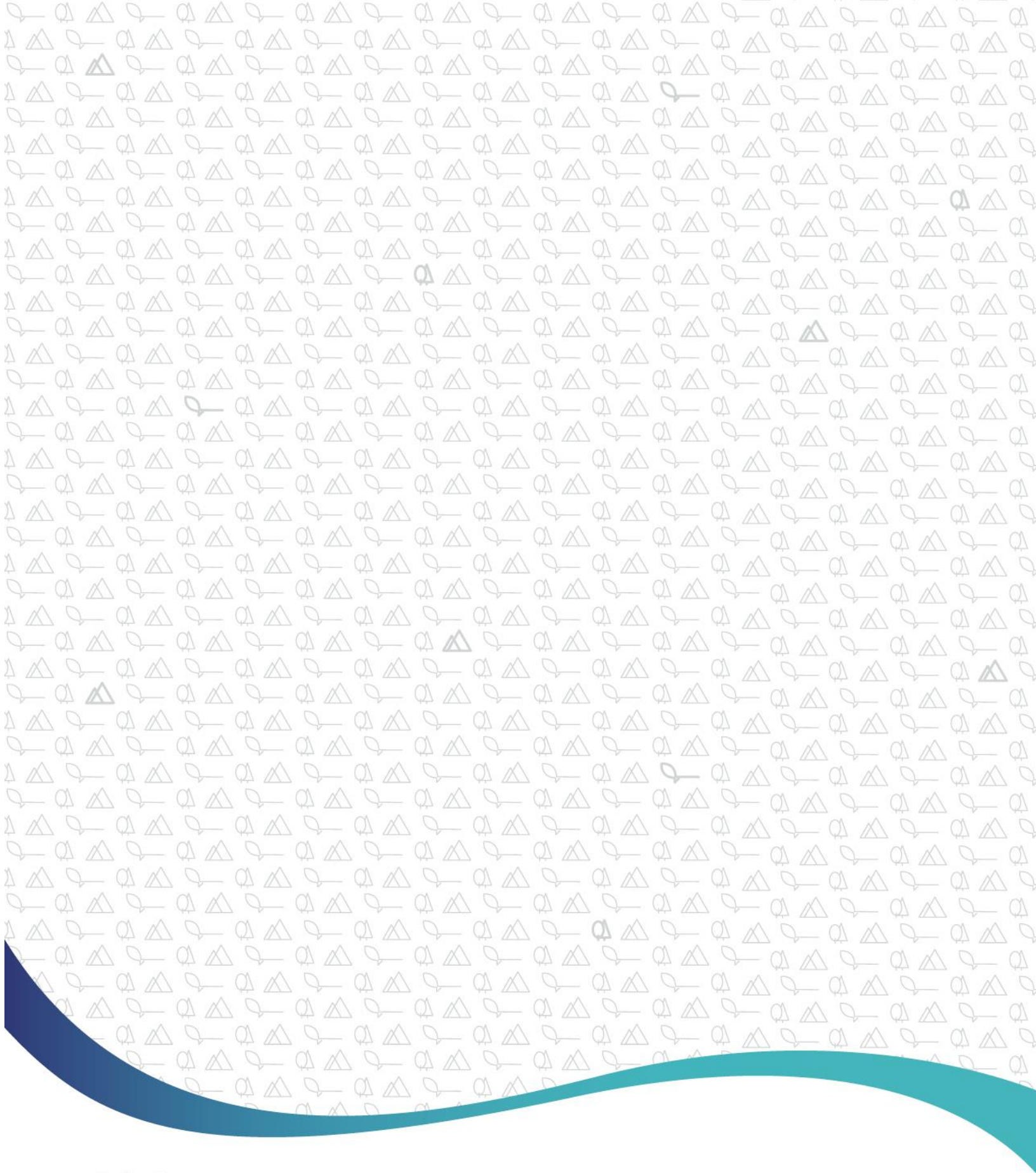
#### C) Mixed Forest Stands Management Strategy

Given the importance of mixed stands as wildlife habitats and their rarity in the Territory, it is necessary to develop a distinct management approach for these stands. To this effect, a management guide applicable specifically to the mixed forests is elaborated by the Ministre in close collaboration with the CNG prior to April 1st, 2018. The wildlife and forest-related management objectives will be described, as well as the operational methods required to maintain and renew these stands (logging techniques, features of the stands to be preserved, etc.). A copy of the management guide is forwarded to the Cree-Québec Forestry Board for comment and recommendation.

## Appendix 5. Territorial management modes considered included or excluded from the management unit

Code	Description	Included/ Excluded	Comment
01	Management unit (MU)	INCLUDED	
02	Forest reserve free of rights south of the northern limit	INCLUDED	
03	Forest reserve with lease	EXCLUDED	
04	Surveyed forest reserve	INCLUDED	
05	Forest reserve w. forest management contract	EXCLUDED	
06	Experimental forest in a forest management unit	INCLUDED	
07	Research and teaching forest	EXCLUDED	
08	Forest station	INCLUDED	
09	Forest-blueberry operation (mixed production) in a forest management	INCLUDED	
10	Sugar bush (mixed production) in a forest management unit	INCLUDED	
11	Intra-municipal lot	EXCLUDED	
12	Alcan lease	EXCLUDED	
13	Forest reserve w. forest management contract and territorial management agreement	EXCLUDED	
14	Forest reserve w. territorial management agreement	EXCLUDED	
15	Exceptional designated forest ecosystem	INCLUDED	
16	Transitional forest reserve	INCLUDED	
17	Intra-municipal lot w. forest management contract	EXCLUDED	
18	Forest reserve w. territorial management agreement and alienation reserve	EXCLUDED	
19	Forest reserve in a zone of non-commercial forest	EXCLUDED	
20	Small private property	EXCLUDED	
21	Patent letter assigned to a municipality	EXCLUDED	
22	Large private property	EXCLUDED	
23	Patent mining claim w. forest improvement contract	EXCLUDED	
24	Large private proper (non-holder of a TSFMA)	EXCLUDED	
26	Category 1B lands	EXCLUDED	
27	Private mining claim	EXCLUDED	
28	Public mining claim in forest management unit	INCLUDED	
29	Patent mining claim w. forest management contract	EXCLUDED	
30	Vacant MAPAQ land and agricultural lease	EXCLUDED	
32	Agricultural lease	EXCLUDED	
33	Conditional sale (location ticket)	EXCLUDED	
40	Quebec national park	EXCLUDED	Particular exclusion agreed with CNG
41	Other MRNF land (Wildlife and SEPAQ)	EXCLUDED	
50	Ecological reserve	INCLUDED	
51	Vacant MDDEP land	EXCLUDED	
52	Watercourse (major lakes, rivers and reservoirs)	EXCLUDED	
53	Aquatic reserve	EXCLUDED	Particular exclusion agreed with CNG
54	Biodiversity reserve	EXCLUDED	Particular exclusion agreed with CNG (including expansion of Wetetnagami BR

Code	Description	Included/ Excluded	Comment
			– not decreed as at 12 DEC 2017)
55	Biological refuge project	INCLUDED	
56	Ecological reserve and biological refuge	INCLUDED	
57	Exceptional designated forest ecosystem and Biological refuge	INCLUDED	
58	Experiment forest and Biological refuge	INCLUDED	
59	Designated biological refuge	INCLUDED	
60	Other vacant land	INCLUDED	
62	Mining lease	EXCLUDED	
63	Mining lease w. common areas	EXCLUDED	
66	Experiment forest in a forest reserve	INCLUDED	
68	Public mining claim in a forest reserve	INCLUDED	
70	Forest reserve north of the northern limit and east of management units (MU)	EXCLUDED	
71	Mixed lot	EXCLUDED	
80	Sugar bush in a forest reserve	INCLUDED	
81	Conventional blueberry operation in a forest reserve	INCLUDED	
82	Area presenting interest for the Crees (1%)	INCLUDED	
89	National marine conservation area	EXCLUDED	
90	Indian reserve and category 1A land	EXCLUDED	
91	Federal national park	INCLUDED	
92	Other federal land	EXCLUDED	
93	Indian settlement	EXCLUDED	
94	Federal airport	EXCLUDED	
95	National wildlife reserve	INCLUDED	
96	Federal experimental farm	EXCLUDED	
97	National historical site	EXCLUDED	
99	Watercourse (river)	EXCLUDED	
Other	Projected biodiversity reserves associated w. the Agreement to resolve the Baril-Moses forestry dispute	EXCLUDED	Particular exclusion agreed with CNG



**Forêts, Faune  
et Parcs**

**Québec**

