2023-2028 Tactical Integrated Forest Management Plan

Nord-du-Québec Region

Management Unit 087-62, 087-63 and 087-64

Management Unit Quevillon (107)

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1. Sustainable Forest Management Objectives

Sustainable forest management seeks a balance between a quality of life for present and future generations, healthy forest ecosystems and a dynamic and prosperous economic sector. This complex environment brings its share of challenges for which directions, objectives and actions have been defined in the *Sustainable Forest Management Strategy* (SFMS). The *Regulation respecting the sustainable development of forests in the domain of the State* (RSDF) establishes the minimum standards with which compliance is mandatory in forests in the domain of the State. Other mechanisms, including ecosystem management, the regional timber production strategies, the local integrated land and resource management panels (TLGIRT) and separate consultation of the Indigenous communities, have been deployed to capture the issues raised at the regional or local level or for which improvements to the conditions in place are necessary.

According to section 40 of the Sustainable Forest Development Act (SFDA) (chapter A-18.1), the Minister may also impose different forest development standards than those ordered by regulation. The nature of the derogations applicable to the PAFIT are defined in Appendix.

1.1 SUMMARY OF FOREST MANAGEMENT ISSUES AND OBJECTIVES

The issues are assessed and documented in the companion document “Analysis of Issues”. When selected, they are translated into sustainable forest management objectives to be taken into account in forest planning. The forest management objectives are tracked in the form of targets[1] associated with a given indicator or actions to perform. Table below presents all of the issues selected for the Management Unit and the objectives to be achieved.

To learn more, consult:
PAFIT

1 The term “target” refers to the desired future situation or condition for a variable related to this issue. It may be an intention, such as the intention to reduce or increase a value, relative to an initial state, with the aim of tending toward that value, or thresholds to be respected.

Table 1 : Summary Table of Forest Management Objectives by Issue

Issues	Objectives	Indicator/Action	Target	Scale	Periodicity
Ecological issues					
Age Structure	Ensure that the age structure of the managed forests is similar to the one that existed in the natural forest.	Area occupied by TAUs showing a low or moderate degree of alteration.	> 80% in 2023-2028	MU	Quinquennial
Spatial organization	See derogation for the MU of the adapted forestry regime (RFA) in appendix				
Vegetation Composition	Ensure that the vegetation composition of the managed forests approaches that of the natural forest.	Rate of alteration of the area occupied by type of cover. For more details on the means to achieve the objective, see the attached issue-solution sheets 1.01.1 (action to constrain leaf thinning), 1.01.2 (Forest Development Strategy for mixed stands), 1.01.3 (promoting White Spruce).	Maintain or gradually attain a low or moderate degree of alteration (±60% of the baseline level)	MU	Quinquennial
Internal Structure	Ensure that the internal structure of the managed forests is similar to that of the natural forest and maintain attributes of complexity.	Rate of alteration of the area occupied by irregular stands. For more details about the means to achieve the objective, see attached issue-solution sheet 1.02.1	Maintain or gradually attain a low or moderate degree of alteration (> 30% of the baseline level)	MU	Quinquennial
		Area treated by retention harvesting of at least 5% of the merchantable volume. For more details about the means to achieve the objective, see attached issue-solution sheet 1.03.1	> 40% of the clearcuts (CT)	MU	Annual
		10-to-25-year area that has received training treatment in the past five years without special conditions. For more details about the means to achieve the objective, see attached issue-solution sheet 1.04,1,	< 50%	Unit of analysis (hexagon)	Annual
Riparian Environments	Present the rare types of natural communities and a representative portion of riparian diversity	Area of the completely protected riparian environment. For more details about the means to achieve the objective, see attached issue-solution sheet 1.08.2.	> 15%	MU	Quinquennial

Issues	Objectives	Indicator/Action	Target	Scale	Periodicity
Wetlands	See to the maintenance of the ecological function of high-value wetlands and isolated wetlands.	Area of the wetlands included in a protected area, administrative protection or an area proposed as wetlands of interest (WLI). For more details about the means to achieve the objective, see attached issue-solution sheet 1.08.1.	1%	MU	Quinquennial
Timber Production Issues					
Accessibility	Maintain or develop accessible roads allowing to increase the areas dedicated to development	Regional allowable cuts/volumes with permits for plants in the region.	Status (monitoring) indicator	Region	Quinquennial
		Areas of silvicultural work of the Forest Development Strategy.	Ha per treatment	MU	Quinquennial
Mortality	Reduce the risk of mortality associated to natural disturbances and climate changes	Regional allowable cuts/volumes with permits for plants in the region.	None	Region	Quinquennial
		Percentage of annual monitoring operations on the schedule of the tactical plans.	100%	MU	Quinquennial
		Percentage of managed areas according to an intensive silviculture gradient.	10%	Management Unit (UG)	Quinquennial
		Areas of silvicultural work of the Forest Development Strategy.	Ha per treatment	MU	Quinquennial
Productivity in desired species	Maintain or increase forest yields Achievement of the targeted prodution objectives	Regional allowable cuts/volumes with permits for plants in the region.	None	Region	Quinquennial
		Percentage of annual monitoring operations on the schedule of the tactical plans.	100%	MU	Quinquennial
		Percentage of managed areas according to an intensive silviculture gradient.	10%	Management Unit (UG)	Quinquennial
		Areas of silvicultural work of the Forest Development Strategy.	Ha per treatment	MU	Quinquennial
Characteristic quality sought	Maintain or increase the composition and quality of the stands	Consumption of plants in the region/Regional allowable cut	None	Region	Quinquennial
		Percentage of annual monitoring operations on the schedule of the tactical plans.	100%	MU	Quinquennial

Issues	Objectives	Indicator/Action	Target	Scale	Periodicity
		Percentage of managed areas according to an intensive silviculture gradient.	10%	Management Unit (UG)	Quinquennial
		Areas of silvicultural work of the Forest Development Strategy.	Ha per treatment	MU	Quinquennial
Financial Profitability	Increase the value of harvested wood and control dispersal costs	Consumption of plants in the region/Regional allowable cut	Status (monitoring) indicator	Region	Quinquennial
		Percentage of managed areas according to an intensive silviculture gradient.	10%	Management Unit (UG)	Quinquennial
		Areas of silvicultural work of the Forest Development Strategy.	Ha per treatment	MU	Quinquennial
Regional of Local Issues					
Ericaceous Plant:	Maintain the productivity of the forest ecosystems susceptible to invasion by ericaceous plants.	Ratio of harvested stands susceptible to invasion by ericaceous plants that underwent a forestry operation adapted to the issue. For more details about the means to achieve the objective, see attached issue--solution sheet 2.01.1.	60%	MU	Quinquennial
Wildlife Habitats	Consider the habitat needs of the species sensitive to forest management.	For more details about the means to achieve the objective, see attached issue-solution sheets 1.07.1, 1.05.1 and 3.02.2.			

1.2 SYNERGIES AMONG THE ISSUES DEPENDING ON THE SOLUTIONS ADOPTED

Different means may be used to favour the achievement of forest management objectives. During their management choices, the forest managers must pay attention to the opportunities for synergy, allowing them to respond to several issues simultaneously and maximize the benefits of this action. In the manner of a multicriteria analysis, this exercise allows them to orient their efforts by considering the advantages and disadvantages in their entirety. The conditions applicable to each issue for the solution envisioned are presented to capture their potential contribution to the forest management strategy.

Table 2 : Synergies between the issues according to the selected solutions

Issues	Exclusion	Spatial and temporal distribution			Adapted silvicultural treatments					Operation	Roads	Forest monitoring:
		Spatial distribution (TAU)	Mixedwood stands strategy	Revolution lengthening	Partial cut	Retention harvesting	Artificial regeneration	Land preparation	Training treatment			
	Ecological issues											
Age structure	X	X	X	X	X				X			
Spatial organization	X	X			X							
Vegetation composition	X		X	X	X	X	X	X	X			
Internal structure	X	X	X		X	X			X			
Riparian environments	X		X		X							
Wetlands	X				X							
	Timber Production Issues											
Accessibility											X	
Mortality				X	X		X	X	X			X
Productivity				X	X	X	X	X	X			X
Timber quality				X	X	X	X		X			X
Financial profitability				X	X		X	X	X		X	
	Regional or Local Issues (Assumption)											
Woodland caribou	X	X									X	
WSI	X				X					X	X	
Water quality (erosion)										X	X	
Water quantity		X										

Issues	Exclusion	Spatial and temporal distribution			Adapted silvicultural treatments					Operation	Roads	Forest monitoring:
		Spatial distribution (TAU)	Mixedwood stands strategy	Revolution lengthening	Partial cut	Retention harvesting	Artificial regeneration	Land preparation	Training treatment			
Loss of production area										X	X	
Rutting										X		
Long-term productivity			X						X	X		
SBW		X			X	X			X			
Climate change			X				X				X	
Certification (exotic species, distribution limit, HCVF)	X				X		X		X			
Landscape			X		X	X						
Coexistence (ambiance, road safety)										X		
Structured wildlife area limit			X								X	
Access to the territory											X	
Moose	X		X	X		X						

1.2.1 EXCLUSION

The preservation of forests allows the ecological processes to proceed freely and the natural attributes to perpetuate or recreate themselves over time. Territories listed in the Register of Protected Areas, inaccessible sectors or sites subject to regulatory provisions constitute the provincial reference. Additional areas may be granted administrative protection due to their special interest or their sensitivity to certain issues. Table 3 presents sites for which complete protection is granted.

Table 3 : Exclusion Types

Issues	Provincial exclusion	Additional exclusion
Age structure	Protected areas Regulatory provision (RSDF) TVLS protective measure Inaccessible sectors	
Spatial organization		
Composition		Cedar stand on ecological type RC38.
Internal structure		
Wetlands		Prioritized wetlands of interest

Issues	Provincial exclusion	Additional exclusion
Riparian environments		Strip of woodland 20 m wide on the edge of an open bog with a pond, a marsh, a riparian shrubby swamp, a lake or a permanent watercourse. Rare riparian type beyond the first 20 m.
Fish		Prioritized wildlife sites of interest
Paludification		Paludified sectors without profitable operational solutions.

1.2.2 ADAPTED SILVICULTURAL TREATMENTS

The silvicultural actions make it possible to act on the composition, structure and quality of stands and see to the maintenance of key attributes (dead wood, seed producers, fruit trees)[1]. Silviculture contributes to maintenance of a continuous flow of timber and meet multiple objectives, whether economic, social or ecological.

The following tables specify the conditions that may influence the choice of treatment during the silvicultural diagnosis.

Table 4: Types of cuts

Issues	Partial cut	Clearcut (with or without variable retention)
Age structure	Maintenance of old-growth forests over time - Maximum 50 % of old-growth forests / TAU. Preserve certain key attributes of old-growth forests or favour their faster recruitment (e.g. heavy timber, stumps).	
Spatial organization	Maintenance of closed-canopy forest - spruce stand: managed perennial forest massif, prohibited in residual forests as a block or parcel.	
Composition	Maintenance of increasingly rare species (White Spruces and Eastern White Cedar). Reduction of abundance of intolerant hardwoods.	Reestablishment of increasingly rare species (White Spruces and Eastern White Cedar).
Internal structure	Maintenance or creation of irregularly structured. Preserve certain key attributes such as large diameter living trees.	Preserve certain key attributes where biological legacies are absent or unrepresentative: - live trees of large diameter Maintenance or creation of irregularly structured softwood stands (cutting with protection of small merchantable stems (CPPTM)).
Timber quality	Cultivate high-quality hardwood and mixedwood	Restore depleted or degraded forests
Forest productivity	Use partial cutting in softwood forests	
Natural disturbance	Avoid stands vulnerable to SBW and windfall (epidemic period)	Adapt retention according to vulnerability to SBW and windfall

[1] For more information on the treatments adopted in the silvicultural strategy, see the definitions in the appendix.

Table 5: Site and Artificial Regeneration Treatments

Issues	Land preparation	Uniform planting	Fill planting
Composition	Introduction or reestablishment of increasingly rare species (Eastern White Pine, Spruces, Eastern Hemlock/Tamarack, Eastern White Cedar, Yellow Birch) Reduction of abundance of intolerant hardwoods and Balsam Fir	Reconstitution or full introduction of increasingly rare species (Eastern White Pine, Red Pine, White Spruce and Northern Red Oak)	Reconstitution or partial introduction of increasingly rare species (Eastern White Pine, Red Pine, White Spruce and Northern Red Oak)
Timber quality		Potential for intensive silviculture (smaller branches, less tapering, higher wood density).	
Forest productivity		Increase forest area. Optimize the station's production capacity for the desired species (full afforestation).	Manage the lack of regeneration. Optimizes the production capacity of the station (full afforestation).

Table 6: Stand Tending Treatments

Issues	Clearing/Cleaning	Pre-commercial thinning	Commercial thinning
Age Structure	Maintenance of long-lived species (potential recruitment of old-growth forest)		
Composition	Survival and growth of increasingly rare species (White Spruces and Eastern White Cedar). Reduction of the abundance of invasive species (intolerant hardwoods ans Balsam Fir).		
Internal structure	Locally change the density of stems and the distribution of some floristic species. Remove only competing species within a specific radius of the desired species. Priority according to the intensity gradient of the silvicultural scenario and the tolerance of species during a period of oppression.	Locally change the density of stems and the distribution of some floristic species. Skylight variant removes only stems within a defined radius of selected trees. Specific guidelines for the retention of fruit trees or the preservation of patches of unprocessed productive areas.	
Timber quality		Potential for intensive silviculture. Concentrate production on a predetermined number of higher quality trees forming a predominant part of the stand or its entirety.	Potential for intensive silviculture. Concentrate production on a predetermined number of higher quality trees (vigour and diameter).

1.2.3 SPATIAL AND TEMPORAL DISTRIBUTION OF INTERVENTIONS

Distributing the silvicultural work over space and time allows for the maintenance of implementation of attributes at different scales of perception on the territory. The territorial analysis unit (TAU), for example,

allows the achievement of different management objectives at the landscape scale. For the adapted forest regime (AFG), since there is no spatial unit determined at the timber or disturbance scale, some issues are monitored at the trapline scale despite the fact that the average size of these is larger than what is observed in natural disturbances in the black spruce – feather moss domain. Other issues are monitored at the large landscape scale via the management unit which allows a certain spatialization given the small size of it on the territory of the RFA

Table 7: Spatial and Temporal Conditions

Issues	Trapline	Territorial unit of analysis (TAU)	Management unit	Lengthening of the revolution or the rotation
Age structure		Degree of alteration of old-growth forests and regenerating forest (restoration periods[1]).		Maintenance of recruitment of old-growth forests.
Spatial organization	In compliance to the adapted forest regime			
Composition				Maintenance of increasingly rare species (White Spruces and Eastern White Cedar).
Internal structure	Maintenance of biological legacies.		Irregular shelterwood cutting.	
Woodland caribou				Precautionary approach for woodland caribou.
Landscape			Virsual modalities around sensitive sites recognized by the TGIRT.	
Natural disturbance				Maintenance of residual forest in bured areas.

2. Integrated Forest Development Strategy

The forest management strategy translates all of the means adopted to satisfy the sustainable forest management objectives. Its writing is part of an iterative process conducted in collaboration with the Bureau du forestier en chef, allowing identification of the best choice for a given area, considering the environmental, social and economic impacts. The forest management targets and the means adopted are determined at the end of this process.

2.1 WILDLIFE HABITAT MANAGEMENT GUIDELINES

Under the Paix des braves forestry regime (Schedule C-3, Part D), the Minister shall develop, in close collaboration with the Cree Nation Government, the Wildlife Habitat Management Guidelines (Guidelines). The Guidelines will aim to introduce strategies into the forest management planning process that take into account the protection and development of wildlife habitats. These will be based on the approach of integrating wildlife issues into forest planning (see document in support of the development

[1] The time to reach these targets is established according to the theoretical natural evolution of the forest and the ecological, economic and social consequences.

of tactical integrated forest management plans – Analysis of Issues). Work is underway to document the needs of the species and compare them to the land use strategy applied. Ultimately, the Guidelines will cover the habitats of species of importance identified in section 3.10.1 of the adapted forestry regime and will provide a guide to assist managers and members of the joint working groups in maintaining critical wildlife habitats in the developed territory. The deadline for finalizing the Guidelines is December 31, 2023.

See the Issues-Solutions sheet 1.07.1 for more information.

2.2 MIXEDWOOD STANDS DEVELOPMENT STRATEGY

A mixedwood stands development strategy (Strategy) has been developed in accordance with Chapter 3 of the ANRQC (Schedule C-3, Part C). The Strategy is the result of close collaboration with the Cree Nation Government and was released in February 2021. One of the objectives is to maintain and recruit mature mixedwood stands. Another goal is to keep diverse and dense young mixedwood stands at all times (notably by spreading educational treatments over time and space). Finally, the Strategy also aims to optimize the development of the forest resource associated with mixedwood stands.

To learn more, refer to:

Mixedwood Stands Development Strategy
Appendix D – Issues-Solutions Sheet for the Nord-du-Québec Region

2.3 HARVEST DISTRIBUTION

The decision-making process regarding the distribution of harvesting interventions. The degree of alteration concerned for each TAU and the SOCs selected as forest areas will dictate the maximum threshold of regenerating stands and the minimum thresholds of old-growth stands and stands 7 m or taller to be maintained in the respective entities. The TAUs in restoration (variance between their current state and their target condition) will be more restrictive regarding the type of quantity of harvesting that can be performed.

2.4 SILVICULTURAL STRATEGY

Regarding the silvicultural strategy, the stands and sites that present similar characteristics are first grouped and analyzed to produce a silvicultural diagnosis. This diagnosis helps determine the possible silvicultural scenarios for each of the grouped strata. These things are done not only according to the forest management objectives, but also with the assistance of the silvicultural guides that recommend silviculture adapted to the ecology of the sites. This helps make the most of what the forest can produce while respecting the production capacity of the forest ecosystems and their forest management constraints (windthrow risks, susceptibility to insects and diseases, trafficability, etc.).

The silvicultural scenario defines the guidelines (the silvicultural objectives) that the forest manager wishes to apply to a given group of strata and the sequence of treatments to achieve this. They are developed on the basis of the target composition, the regeneration process according to the desired

structure, and the potentially applicable intensity gradient. Analyses pertaining to the economic profitability of the silvicultural scenarios, the risks that can limit the achievement of the forest management objectives and the impact of the silvicultural choices on maintenance of the allowable cuts in the long term are also produced in view of guiding forest engineers in their decisions, depending on the means at their disposal (budget, operational capacity, etc.).

For a good understanding of the concept of silvicultural scenario, the main inputs serving for the preparation of a scenario, but also its selection during operational planning are presented below.

Target composition

The target composition specifies the species expected in the main forest canopy at maturity. To guide the decisions according to the forest management objectives pursued and diversity of the basket of forest products, 3 categories of species have been defined. They will serve to direct the renewal and development of the stand according to the station's potential. The expression “desired species” includes the species to be promoted or acceptable species.

Categories	Description[1]	Species
To be promoted	Species for which an increase in proportion is sought in a stand during silvicultural interventions. The group includes the star species and species that have declined relative to the natural forest (increasingly rare species). The scenarios may be extensive, basic or intensive.	Black Spruce, White Spruce, Jack Pine, Eastern White Cedar.
Acceptable	Species that do not undergo any silvicultural intervention to change their proportion, because they do not hinder the optimum development of a species to be promoted.	Jack Pine, Balsam Fir, Trembling Aspen, Paper Birch, Eastern Larch (Tamarack).
To be controlled	Species for which a decrease in proportion is sought in a stand during silvicultural interventions.	Trembling Aspen, Paper Birch

Regeneration Processes

Regeneration processes are harvest treatments designed to free growth space or create conditions favourable to the establishment and development of the regeneration cohort. It may involve a single treatment or a sequence of treatments leading the stands to regular, irregular or selection structure. This choice is mainly influenced by the shade tolerance of the desired species, the conditions necessary for the establishment and growth of seedlings, the current composition (species longevity, density) and the natural dynamics of disturbance. The description of the cutting families and the strata groups for which they are generally employed are presented in the following table.

[1] Source: MFFP, Glossaire forestier [Online], [http://glossaire-forestier.mffp.gouv.qc.ca/] (consulted in February 2022).

Cutting family	Description	Stratum group
Clearcutting	Regeneration processes harvesting all or almost all of the trees of commercial value. The variants are distinguished by the size of the stems present on the cutover.	Spruce stands Jack Pine stands Mixed-softwood stands
Shelterwood cutting	Regeneration processes with the goal of establishing or developing natural regeneration cohorts under a partial forest canopy containing mature seedlings during a given period. A time interval between cuts > 1/5 of the revolution will cause the stand to evolve to an irregular structure (composed of 2 to 4 age classes). The harvest phases may involve a series of partial cuts (permanent cover) or end in a final cut to offer full sunlight conditions to the new stand (temporary cover).	Spruce stands Mixed-softwood stands

Silvicultural Intensity Gradient

The silvicultural intensity gradient allows the silvicultural treatments and scenarios to be ordered according to the efforts necessary to their performance. Extensive silviculture and basic silviculture are applied to most of the territory while intensive silviculture, which requires a greater quantity of work (data collection, monitoring) and invested capital, is applied in territories where profitability justifies it. The choice of gradients depends on the silvicultural objectives pursued and the needs to intervene on the establishment, composition, structure, growth, quality or health of the stands. In general, silvicultural intensity evolves according to the wealth of the site (potential vegetation) and the presence of constraints to forest management. The description of the degrees of intensity and the associated treatments are presented in the following table.

Intensity Gradient	Description[1]	Associated Treatments[2]
Extensive	The stand is managed exclusively by means of natural regeneration with regeneration processes of the clearcutting family. The predetermined regeneration is protected by natural seeding on appropriate germination beds, created during the harvest and during land preparation.	Clearcutting Scarification
Basic	The interventions are oriented to management of the composition of the stand. To increase the yield of desired species, canopy management treatments may be used. Resorting to reforestation or artificial seeding only occurs when natural regeneration is insufficient or when the regeneration present is not part of the desired species. The subsequent silvicultural efforts have the goal of favouring the species to be promoted and managing the species to be controlled, without resorting to phytocides. There may also be sanitation to improve the health of a stand.	Shelterwood cutting Fill planting Basic planting Clearing Cleanup
Intensive	Interventions for the purpose of increasing growth and improvement of the characteristics (quality) of selected trees of desired species. Intensive silviculture is also distinguished from basic silviculture by management of intraspecific competition over time (e.g. regularize the spacing between the crop trees of the same species).	Intensive planting Precommercial thinning Commercial thinning

2.4.1 ECONOMIC PROFITABILITY ANALYSES

The economic profitability analysis is a decision help tool that allows consideration of the economic aspect in forest management. Its objective is to assess whether a specific investment is profitable for society. It

[1] Source: MRN (2013), Le guide sylvicole du Québec, tome 2. Les concepts et l'application de la sylviculture, collective work under the supervision of C. Larouche, F. Guillemette, P. Raymond and J.-P. Saucier, Les Publications du Québec, 744 p.
[2] For more information on the treatments adopted in the silvicultural strategy, see the definitions in the appendix.

is interested in the total revenues and costs for all economic agents of society, without a concern for knowing who pays and who receives. In the forest management context, the economic profitability analysis seeks to measure the wealth creation level generated by an investment in different silvicultural scenarios.

To learn more, consult:
Guide d'analyse économique appliquée aux investissements sylvicoles

2.4.1.1 Economic Profitability Analyses Results

This section summarizes the results of the analyses conducted and their consideration in the development of the silvicultural strategy.

Before continuing with the interpretation of the results, it is important to remember that:

- The economic revenues do not allow capture of all the revenues and costs associated with forest goods and services, particularly those related to landscape conservation, ecological services or any other value not associated with timber production. On the one hand, because the current knowledge does not allow quantification of the impact of different silvicultural choices on these factors and, on the other hand, because some of these factors are intangible, their value is subjective and variable. It is therefore possible for the economic profitability of a silvicultural scenario to be negative or lower than that of another scenario, but for it to be chosen in the silvicultural strategy to meet forest management objectives that are difficult to quantify economically.
- The yield assumptions used correspond to the average yield of the stands composing them. In the context of this economic exercise, the growth curve prepared by the Bureau du forestier en chef (BFEC) for the allowable cut calculations for the 2015-2018 period were used. Although they were designed to support an allowable cut calculation and not for economic analysis purposes, the absence of alternatives to the growth curves rendered their use unavoidable.
- The analyses were produced with the best financial information available at the time the analyses were performed. This information may be variable from one region to another, particularly in terms of effects of treatment and forest yield.
- The economic profitability analyses are produced on the hectare scale and not on the Forest Management Unit scale as in the silvicultural strategy. Thus, during the development of the silvicultural strategy, forest managers must also consider the impact of a silvicultural choice on the social and community issues and on the timber flow and products generated. An economically profitable silvicultural scenario could be preferred, because it responds better to all the issues to be considered.

Thus, for the above-mentioned reasons, prudence is essential regarding the conclusions to be drawn from the results indicated in this section. They represent major trends in terms of economic profitability by type of silvicultural scenario on the regional scale.

The results of the economic analyses are presented according to the EI and the NPVp/Cp ratio. They have been grouped into a class for ease of understanding and to avoid misinterpretation. The Table 8 presents an overall assessment of the results.

Table 8: Classification of Indicator Values

Indicator values	Class
-0.6 and under	---
-0.3 to -0.59	--
-0.1 to -0.29	-
-0.09 to 0.09	0
0.1 to 0.29	+
0.3 to 0.59	++
0.6 and over	+++

Both for the EI and for the NPVp/Cp ratio, the results obtained for Class “0” are considered to be in the area of uncertainty in the vicinity of the breakeven point.

The following table presents the results obtained by type of silvicultural scenario provided in the silvicultural strategy on the regional scale.

Table 9 : Summary Assessment of Economic Profitability Analyses by Type of Silvicultural Scenario

Type of silvicultural scenario analyzed	NPVp/Cp	EI
Slow regeneration irregular shelterwood cutting	+	-
SCA-ENS-CPRS	-	-
SCA-PL-CPRS	+++	++
SCA-PL-DEG-CPRS	++	+
SCA-PL-DEG-EC-CPRS	++	++
SCA-PL-EC-CPRS	+++	+++

As presented in Table 9, the results obtained by the types of silvicultural scenarios most representative on the regional scale show that, overall, the EI of the scenarios provided in the integrated forest development strategies analyzed is positive or equal to the breakeven point.

Moreover, the results obtained for the NPVp/Cp ratio show that the majority of the silvicultural scenarios provided in the strategies allow generation of revenues greater than or equal to the costs in all of the MUs.

This means that the silvicultural scenarios provided in the integrated forest development strategies are mostly non-deficit and economically profitable scenarios.

The silvicultural scenarios associated with the seeding and partial cutting scenarios present the lowest overall results relative to the other scenarios analyzed.

Nonetheless, the partial cuts remain within the profitability threshold. This trend is explained by the fact that these types of scenarios necessitate significant investments to obtain a low additional yield, particularly in comparison to the natural forest. Although several treatments contained in these scenarios have a timber production objective concerning additional volumes and quality (density management, full afforestation, etc.), these scenarios may also be used to respond to other issues, particularly the issues of composition and social acceptability. It is therefore relevant to maintain the performance of these treatments and scenarios to respond to the issues for which the services and revenues are not currently captured in the economic profitability analysis tools for the above-mentioned reasons.

However, the results must be interpreted prudently, because they are an average of all the scenarios analyzed and our knowledge of the real effects on the yields and quality of timber produced by certain treatments is still limited.

The main findings of the economic analyses pertained to:

- Scheduling of silvicultural scenarios in different stands. For example, this makes it possible to:
    - prioritize and choose the scenarios based on their profitability;
    - identify the stands most conducive to profitable intensification of silviculture;
    - prioritize budget allocation.
- The importance of the choice (considering risk management) of the planting density and the size of the seedlings.
- The importance of the “intensive” gradient and commercial thinning for value creation.
- The impact of species without buyers that favour the scenarios with non-commercial silvicultural treatments.
- The economic profitability radii in different MUs for certain silvicultural scenarios.

Depending on the potentials and constraints of the forestry sectors, to which the order of economic priority is added, the forester may select the best silvicultural scenario. The silvicultural scenarios that are less profitable must be prescribed when there is only one scenario to solve an issue or achieve an objective. They may therefore be retained in the Forest Development Strategy even if economic profitability is negative.

2.4.2 RISK ASSESSMENT

Several factors of natural or anthropogenic origin may affect the health of forests, timber production and forest yields. It is therefore important to do a good analysis of the risks that may hinder the achievement of the forest management objectives and to propose mitigation measures, as needed, to mitigate the potential effects of these risks.

Many knowledge acquisition projects regarding the risks are in progress, particularly in the context of implementation of the Climate Change Adaptation Strategy for Forest Management. They will be incorporated gradually into the risk assessment methodology and considered during the preparation of future integrated forest management plans.

2.4.2.1 Risk evaluation

To govern the risk assessment, the MRNF has developed a matrix based on the probability of occurrence of a risk and its impact on the anticipated forest yields. The analyses performed with this matrix allow assessment of the necessity to deploy mitigation measures and ensure risk monitoring over time. The following table presents the risk matrix adopted by the MRNF.

Table 10: Assessment of Probabilities of Occurrence of a Risk

Class	Description
Practically certain	It is practically certain that the event will occur (80% or more probabilities of occurrence).
Very high probability	The event will occur with a very high probability (between 50% and 80% probabilities of occurrence).
High probability	The event very probably will occur (between 25% and 50% probabilities of occurrence).
Probable	It is probable that the event will occur (between 10% and 25% probabilities of occurrence).
Rare	The event might occur in exceptional circumstances (less than 10% probabilities of occurrence).

Table 11: Assessment of the Impact of a Risk on Timber Production

Class	Description
Minor	10% decrease in anticipated volumes in the allowable cut
Moderate	10% to 25% decrease in anticipated volumes in the allowable cut
Significant	25% to 50% decrease in anticipated volumes in the allowable cut
Major	50% to 80% decrease in anticipated volumes in the allowable cut
Catastrophic	Decrease of 80% or more in anticipated volumes in the allowable cut

Table 12: Risk Categories

Category	Description
Extreme	Extreme risk: immediate mitigation measures are required.
High	High risk: mitigation measures should be taken.
Moderate	Moderate risk: actions should be taken to monitor the risk.
Low	Low risk: acceptable risk level.

Table 13: Risk Assessment Matrix

Probability of occurrence	Impact of a risk on timber production				
	Minor	Moderate	Significant	Major	Catastrophic
Practically certain	Moderate	High	High	Extreme	Extreme
Very high	Moderate	Moderate	High	Extreme	Extreme
High	Low	Moderate	High	High	Extreme
Probable	Low	Moderate	Moderate	High	High
Rare	Low	Low	Moderate	Moderate	High

The following risks were assessed for the main silvicultural scenarios identified in the silvicultural timber production strategy and applicable to all MUs to various degrees. The following paragraphs and Table 14 present a regional summary of this analysis. When necessary, mitigation or monitoring measures have been identified.

Table 14: Summary of the Risks Associated with Timber Production and Mitigation or Monitoring Measures

Risk	Description of the risk	Silvicultural Intensity gradient	Risk assessment	Mitigation measure/Monitoring
Change of vocation of the territory (public forest)	Increase in constraints to intensive forest management (protected areas, ecosystem management).	Extensive, basic and intensive	High	Do impact assessments and propose mitigation solutions
Wind gust, windthrow	Partial or total in partial cuts	Basic and intensive	High	Cutting improvement methods
SBW epidemic (partial)	Planting or fill planting work	Basic and intensive	Moderate	Monitor the evolution of the SBW situation.
	Precommercial thinning work	Intensive	High	Avoid doing precommercial thinning in the most vulnerable SOCs
Fire	Forest fire in the FSPL extensive work	Extensive	Extreme	SOPFEU firefighting in FSPL extensive work plan and recovery.
	Forest fire in the hardwood and mixed canopies and partial cuts.	Extensive, basic and intensive (M-CP)	High	SOPFEU firefighting plan (F-M-CP).
	Forest fire in FSPL silvicultural work	Intensive	Extreme	Dispersion of work (FSPL).
Inability to perform all the work of the scenario on the targeted areas	Operational constraints. Accessibility. Labour or machinery Availability of budgets.	Basic and intensive	Moderate	Economic analysis prioritizing the silvicultural scenarios. Concentrates the forestry interventions limiting the costs of dispersion. Prioritize maintenance before establishing new treatments if there are budget constraints Use of the improvement program for multipurpose roads.
Social unacceptability of interventions	Evolution of social acceptability of interventions leading to blocking of interventions.	Basic and intensive	High	Favour harmonization solutions.
Anticipated forecast not achieved	Loss of habitat or productivity by misadaptation of species due to climate change.	Extensive, basic and intensive	High	Understand and classify the priority issues in relation to climate change (La Paix des braves, caribou, paludification, winter road, non-commercial silvicultural work, etc.) Identify and assess the risks related to climate change for each issue. Propose mitigation solutions

For each of the silvicultural scenarios provided in the regional Forest Development Strategy, the risks with the highest probability of occurrence were analyzed. Mitigation measures were determined in all cases.

2.4.2.2 Social unacceptability of interventions

This risk is considered in the “intensive” planting silvicultural gradient scenarios. The precommercial thinning scenario also appears there. The probability of occurrence of the risk of social unacceptability is classified as “rare”, but the impacts this risk may pose are qualified as major. The risk is therefore “high”. Mitigation requires the application of harmonization measures. These measures should not compromise the expected yields resulting from the application of the work.

Social acceptability is often considered on the individual scale (Brunson 1996). However, in her dissertation, Roxann Germain mentions that: “Sagoff (1988) states that planning decisions should be made on the basis of organized social norms and values rather than on the basis of individual preferences that do not necessarily reflect the collective viewpoint”[1].

2.4.2.3 Anticipated forecast not achieved

This risk concerns loss of habitat or productivity by misadaptation of species due to climate change. The probability of occurrence of the risk is classified as “rare”, but the impacts this risk may pose are qualified as major. The risk is therefore “high” in terms of mitigation measures, understanding and classifying the priority issues in relation to climate change (La Paix des braves, caribou, paludification, winter road, non-commercial silvicultural work, etc.), identifying and assessing the impacts related to climate change for each of these issues and proposing mitigation solutions.

2.4.2.4 Change of vocation of the territory (public forest)

Two types of change of vocation of the territory are distinguished. First, a change of vocation that reduces the area intended for forest production, for example, creation of a new protected area. Its impact is immediate on the allowable cut and on the timber production targets.

Secondly, a change of vocation related to the constraints applicable to the areas intended for forest production. The residual areas will be affected by stronger spatiotemporal constraints or, for example, where cover 7 metres or taller must be maintained at all times.

This risk concerns all of the scenarios. The probability of occurrence corresponds to the “rare” class, but the impacts fall within the “catastrophic” class. This results in a risk classified as “high”. As a mitigation measure, assess the impact that would be created by the change of vocation of a given territory and propose solutions that would allow offsetting of the impacts.

2.4.2.5 Wind gust, windthrow

This risk attributable to the forces of nature is considered in the partial cut scenarios. The “possible” probability of occurrence combined with the “moderate” impact generates the high risk. The mitigation

[1] Germain, R., (2012). Acceptabilité sociale de l'aménagement forestier écosystémique : le point de vue des Algonquins de Pikogan, Mémoire de maîtrise, p. 17, 205 p

measure involves improving the cutting methods and considering the vulnerability to windthrow (Topex maps).

2.4.2.6 SBW epidemic

The Spruce Budworm, the insect most destructive of coniferous stands in North America, mainly consumes the annual foliage of Balsam Fir, White Spruce and, to a lesser degree, Red Spruce and Black Spruce. Balsam Fir is more vulnerable to Spruce Budworm than Spruces because its foliage is less abundant, and also because this insect's development is better synchronized with the development of new shoots. However, with a warmer climate, a better synchronism between the emergence of SBW larvae and the Black Spruce budburst would render this species more vulnerable.

The cycle of appearance of SBW is about 30 years, which constitutes a high occurrence. The vulnerability of Balsam Fir and Spruce to the Spruce Budworm temporarily increases after all the silvicultural treatments that modify the forest cover. This occurs in young stands, during precommercial thinning work, and in older stands, during partial cutting or when the risk is high. The elimination of part of the forest canopy results in changes in the environment of the trees (quantity of light, temperature, humidity, water table, etc.). These changes generate stress for the residual trees for a few years, for the time it takes them to adapt to the new environmental conditions. In the presence of SBW, there is loss of mature volume, redistribution of age classes, loss of silvicultural investment and loss of growth.

This risk concerns the “basic” and “intensive” silviculture gradient scenarios. The probability of occurrence of the risk is classified as "possible", but the impacts that this risk may pose depending on the silvicultural treatment used are in the "moderate" or "high" class. The risk is therefore “moderate” for planting or fill planting work and “high” for precommercial thinning work.

As mitigation measures, in endemic periods, the application of preventive silviculture would make it possible to control susceptible or vulnerable species in order to favor more resistant species. During an epidemic period, the harvesting of affected wood is possible in order to minimize the loss of wood substance linked to mortality.

2.4.2.7 Fire

This risk is omnipresent in the Nord-du-Québec region, and the occurrence period of fires is 260 years on the average for the Quévillon management unit (107).

When such fires occur, the impacts are fairly devastating and are felt on several levels. First, there is the loss of mature volume. These losses are not total, because a large part of the burned forests is salvaged under special salvage plans. Secondly, fires not only destroy mature forest, but also all the silvicultural investments (plantations and precommercial thinning, for example). Finally, with the effect of redistributing the age classes in a territory, fire has a negative effect in the context of the allowable cut calculations.

All the scenarios of the Forest Development Strategy are therefore the subject of a risk assessment. The risk is extreme. The probability of occurrence falls within the “possible” class and the impact falls within

the “catastrophic” class. Apart from the special salvage plans that are elaborated, dispersing the silvicultural interventions turns out to be the mitigation measure to prefer in order to reduce the impacts.

2.4.2.8 Inability to perform all the work of the scenario on the targeted areas

This risk represents the share of uncertainty related to the annual budget allocations, the operational constraints, and the accessibility and availability of labour and machinery. The probability of occurrence is “improbable” and the impact is “moderate”. Therefore, the risk is “moderate". Such constraints would lead to the application of a mitigation measure that would involve giving priority to maintenance of the existing work compared to the startup of new work, the use of the multipurpose road improvement program, and the rationalization of silvicultural scenarios to prioritize those with the highest economic profitability.

2.4.3 SILVICULTURAL SCENARIOS AND FOREST MANAGEMENT LEVELS

The approach described in the previous sections was designed to allow forest engineers to make informed choices and prescribe the right treatment, in the right place. It results in a filter offering a variety of silvicultural scenarios supporting strategic planning and orienting operational planning. Although it covers the majority of the stands typical of the region, this does not prevent treatments or scenarios not appearing in the filter below from being performed to account for particularities in the silvicultural prescription.

The scenarios presented in Table 15 are those that served to generate the allowable cuts in effect for the 2023-2028 period.

Table 15: Silvicultural Scenarios Chosen in the Forest Management Scenario (R15.0)[1]

Forest cover types	Forest station group	Forest types	Species to be promoted	Extensive	Basic					Intensive		
				CPRS	CPIL-CT	NET-CPRS	SCA-PLb-CPRS	SCA-PLb-DEG-CPRS	SCA-REG-CPRS	SCA-REG-NET-CPRS	(EPC)-EC-CPRS	SCA-PLi-DEG-EC-CPRS	SCA-PLi-EC-CPRS
F	RFiF	BpFx	BpFx	X									
		PeFx	PeFx	X									
	RFiM		PeFx	X									
MF	RFiF	BpRx	BpFx	X									
			SbFx			X							
			BpRx	X									
		PeRx	PeRx	X									
			SbFx			X							
	RFiM	BpRx	BpRx	X									
			EpFx							X			
		PeRx	EpFx			X							
			PeRx	X									

[1] The references to the silvicultural treatment acronyms appear in Appendix A - List of Silvicultural Treatments Chosen in the Silvicultural Strategy

Forest cover types	Forest station group	Forest types	Species to be promoted	Extensive	Basic					Intensive		
				CPRS	CPIL-CT	NET-CPRS	SCA-PLb-CPRS	SCA-PLb-DEG-CPRS	SCA-REG-CPRS	SCA-REG-NET-CPRS	(EPC)-EC-CPRS	SCA-PLi-DEG-EC-CPRS	SCA-PLi-EC-CPRS
MR	RESR0		EpFx	X									
	RFiF	EpFx	Ep					X*					
			Epb									X*	
			EpFx		X								
			EpRx			X							
			SbFx	X									
		PgFx	Ep									X*	
		SbFx	Ep					X					
			Epb									X*	
			SbFx	X									
			SbRx			X							
	RFiM	EpFx	Ep					X*				X*	
			EpFx	X	X								
			EpRx			X							
		PgFx	Ep									X*	
			EpFx	X									
			EpRx			X*							
		SbFx	Ep									X*	
			SbFx	X									
			SbRx			X							
O	RESR	Ep	Ep	X	X		X						
		EpRx	Ep	X			X						
			EpRx		X								
		Pg	Ep	X									
			Pg				X						
		PgRx	Ep	X									
			Pg				X						
	RESR0	Ep	Ep	X									
		EpRx	Ep	X									
		PgRx	Ep	X									
	RESR1		Pg				X						
	RESRH	Ep	Ep	X			X**						
		EpRx	Ep				X**						
			EpRx	X									
		SbRx	Ep				X**						
			EpRx	X									
	RESRL	PgRx	Ep	X									

Forest cover types	Forest station group	Forest types	Species to be promoted	Extensive	Basic					Intensive		
				CPRS	CPIL-CT	NET-CPRS	SCA-PLb-CPRS	SCA-PLb-DEG-CPRS	SCA-REG-CPRS	SCA-REG-NET-CPRS	(EPC)-EC-CPRS	SCA-PLi-DEG-EC-CPRS	SCA-PLi-EC-CPRS
	RFiF	Ep	Ep	X	X			X	X			X	
		EpRx	Ep	X				X		X		X	
			EpRx		X								
		Pg	Ep	X									
			Pg					X				X	
		PgRx	Ep	X									
			Pg					X				X	
		Sb	Ep					X					
			Epb									X	
			SbRx	X									
		SbRx	Ep					X					
			Epb									X	
			EpRx			X							
			SbRx	X									
	RFiM	Ep	Ep	X	X		X				X	X	
		EpRx	Ep				X					X	
			EpRx	X	X						X		
		Pg	Ep	X									
			Pg				X				X	X	
		PgRx	Ep	X									
			Pg				X					X	
		Sb	EpRx			X							
			SbRx	X									
		SbRx	EpRx			X							
			SbRx	X									

* In the territory of La Paix des braves, the silvicultural scenarios that only promote one softwood species, for which the forest station naturally allows the establishment of mixed stands, will be subject to a special Forest Development Strategy for mixed stands (ENRQC, Chap. 3, Schedule C-3, section C). Indeed, this strategy provides that minimum thresholds of mixed stands 60 years and older are applied on the scale of each trapline. Thus, on some traplines, certain scenarios that only promote one softwood species would be capped to the benefit for scenarios that promote a mixed composition.

** Given the very high cost of the work and the uncertain silvicultural results, reforestation on sites that are paludified or in the process of paludification will be limited, in particular, to the accessible sectors and those considered to have the best potential for success. Reflections are still in progress on the long-term viability of forest management on these sites and the best conditions of intervention, as the case may be.

Forest station group	Potential vegetation	Appellation
RES_R	RS2	Balsam Fir-Black Spruce stand, mesic or subhydric
	RE2	Black Spruce stand, mesic or subhydric
RES_R0	MS2	Balsam Fir-White Birch stand on very thin deposit
	RE2	Black Spruce stand on very thin deposit
	RE1	Black Spruce-lichen stand on very thin deposit
	RS2	Balsam Fir-Black Spruce stand on very thin deposit
RES_RH	RS3	Balsam Fir-Black Spruce and Sphagnum stand
	RE3	Black Spruce-Sphagnum stand
RES_RL	RE1	Black Spruce-lichen stand, mesic or subhydric
RFi_F	ME1	Black Spruce-Trembling Aspen stand, mesic or subhydric
	MS2	Balsam Fir-White Birch stand, mesic or subhydric
RFi_M	RS2	Balsam Fir-Black Spruce stand, mesic or subhydric

Forest types			
BpFx	White Birch-hardwood stands	Pg	Jack Pine stands
BpRx	White Birch-softwood stands	PgFx	Jack Pine-softwood stands
Ep	Spruce stands	PgRx	Jack Pine-softwood stands
EpFx	Spruce-hardwood stands	Sb	Balsam Fir stands
EpRx	Spruce-softwood stands	SbFx	Balsam Fir-softwood stands
PeFx	Poplar-hardwood stands	SbRx	Balsam Fir-softwood stands
PeRx	Poplar-softwood stands		

Silvicultural treatments			
CPIL	Slow regeneration irregular shelterwood cutting	EC	Commercial thinning
CPRS	Shelterwood cutting with regeneration and soil protection	Pli	Intensive planting
CT	Clearcutting	PLb	Basic planting
DEG	Clearing	REG	Fill planting
NET	Cleanup	SCA	Scarification
EPC	Precommercial thinning		

The areas to be developed annually with commercial and non-commercial work to achieve the forest planning objectives are the result of optimization and are established in accordance with the silvicultural scenarios. They are based on a treated average of the next 25 years schedule in the allowable cut calculation and account for the performance rates of the previous periods, the operational capacity, the available budget and the impact on the allowable cut.

These levels are adjusted from those incorporated into the allowable cut calculation in some MUs to account for the removal of harvested areas from stands with predominantly unwanted species. Also, you will find a complementary table with specific targets for commercial thinning and intensive planting from the wood production strategy. These increased targets are higher than those included in the allowable cut calculation.

Table 16: Distribution of Silvicultural Work Areas of the Forest Development Strategy 2023-2028 Period – MU 2023-2028 R16.0

	8762		8763		8764	
Commercial treatments	**(ha)**	**(%) of CR***	**(ha)**	**(%) of CR***	**(ha)**	**(%) of CR***
Cutting with protection of regeneration and soils (without retention)	1266	N/A	1494	N/A	1386	N/A
Cutting with protection of regeneration and soils (with variable retention)**	844	40%	996	40%	924	40%
Total for régénération cutting (CR) *	**2210**	**N/A**	**2490**	**N/A**	**2310**	**N/A**
Commercial thinning	0	N/A	40	N/A	0	N/A
Irregular shelterwood	90	N/A	110	N/A	130	N/A
Total for partial cutting (CP)	**90**	**N/A**	**150**	**N/A**	**130**	**N/A**
Total for commercial treatments (harvest)	**2200**	**N/A**	**2640**	**N/A**	**2440**	**N/A**
Non commercial treatments						
Partial scarification	10	0%	20	1%	20	1%
Full scarification	820	36%	910	37%	820	35%
Total for field preparation	**830**	**37%**	**930**	**37%**	**840**	**36%**
Ligniculture (fast growing species)	0	0%	0	0%	0	0%
Intensive tree planting (2 000 trees/ha)	0	0%	70	3%	0	0%
Basic tree planting (1 600 trees/ha)	820	36%	840	34%	820	35%
Tree planting infilling (regarni)	0	0%	0	0%	0	0%
Total for tree planting	**820**	**36%**	**910**	**37%**	**820**	**35%**
Cleaning and brush cutting in natural regeneration stand	10	N/A	10	N/A	90	N/A
Precommercial thinning	0	N/A	0	N/A	0	N/A
Plantation clearing	140	N/A	200	N/A	120	N/A
Pruning (élagage)	0	N/A	0	N/A	0	N/A
Total for tending treatments	**150**	**N/A**	**210**	**N/A**	**210**	**N/A**
Total for non commercial treatments	**1800**	**N/A**	**2050**	**N/A**	**1870**	**N/A**

* Achievement of the target of variable retention harvesting, planting and field preparation is evaluated according to a proportion of the area treated on the regeneration section (CR)-the forest stands with a majority of species without an industrial taker are removed from total.
** The VOIT related to dead wood has a target of 40% per trapline or by cutting agglomeration according to the current regime (Paix des Braves or ecosystem-based management). The information presented here by MU is a complement info for the dead wood VOIT.

Wood production strategy - Potential specific targets

	8762		8763		8764	
Commercial treatments	**(ha)**	**(%) of CR***	**(ha)**	**(%) of CR***	**(ha)**	**(%) of CR***
Commercial thinning	**410**	N/A	**430**	N/A	**245**	N/A
Intensive tree planting (2 000 trees/ha)	**270**	12%	**315**	13%	**125**	5%
Basic tree planting (1 600 trees/ha)					**750**	32%

You will also find the completion assessment for the 2018-2023 period in the following table:

Table 17: Assessment of Distribution of Quinquennial Silvicultural Work Areas of the Forest Development Strategy – 2018-2023 Period (R16.0)

	8762			8763			8764		
Commercial treatments	Target (ha)	Done (3 yrs*) (ha)	Done / Traget (%)	Target (ha)	Done (3 yrs*) (ha)	Done / Traget (%)	Target (ha)	Done (3 yrs*) (ha)	Done / Traget (%)
Cutting with protection of regeneration and soils (without retention)	7287	4534	62%	7115	3255	46%	7658	5512	72%
Cutting with protection of regeneration and soils (with variable retention)**	4858	2241	46%	4744	1845	39%	5105	2498	49%
*Cutting with protection of regeneration and soils (2012 à 2017)****	NA	6079	0%	NA	5702	0%	NA	8609	0%
Total for régénération cutting (CR) *	12145	6775	56%	11859	5100	43%	12763	8010	63%
Commercial thinning	653	0	0%	402	0	0%	56	0	0%
Irregular shelterwood	674	378	56%	645	315	49%	675	268	40%
Total for partial cutting (CP)	1 327	378	28%	1 047	315	30%	731	268	37%
Total for commercial treatments (harvest)	13 472	7 153	53%	12 906	5 415	42%	13 494	8 278	61%
Non commercial treatments									
Field preparation	5235	3934	75%	5292	1591	30%	5470	3019	55%
Tree planting	4874	3275	67%	4725	2228	47%	5003	1814	36%
Tending treatments (travaux d'éducation)	1150	746	65%	3400	182	5%	2900	339	12%
Total for non commercial treatments	11 259	7955	71%	13417	4001	30%	13373	5172	39%

* Update made with 2018, 2019 and 2020 annual reports. The area DOES NOT include the planned unharvested area but includes natural disturbance harvesting.

** The VOIT related to dead wood has a target of 40% per trapline or by cutting agglomeration according to the current regime (Paix des Braves or ecosystem-based management). The information presented here by MU is a complement info for the dead wood VOIT.

***This result corresponds to the actual harvest 2017, 2018, 2019. It serves to put into perspective the result of the return to production

The distribution of the costs incurred by the State for the execution of the Forest Development Strategy of 4,687,728 million dollars a year. It is taken from the allowable cut calculation determination booklets (https://forestierenchef.gouv.qc.ca/possibilites-forestieres/periode-2023-2028/)

MU 08762: Annual silvicultural budget for the 2023-2028 period: $1,426,999

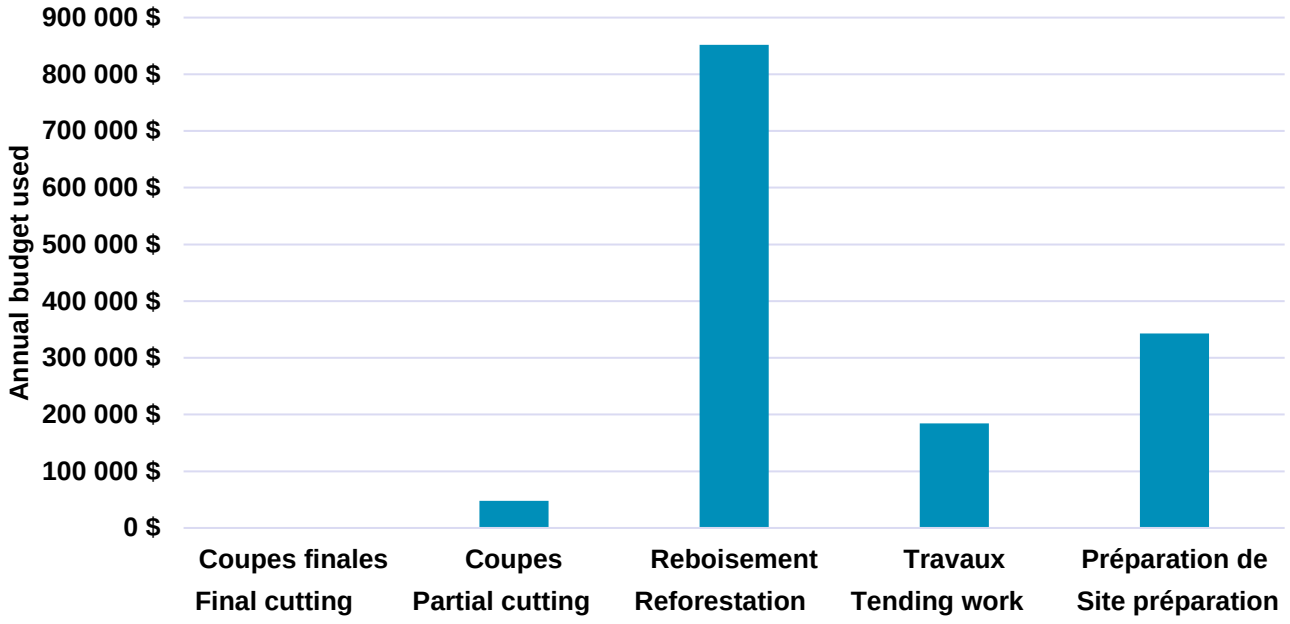


Figure 1: Distribution of the Annual Budget Used for the 2023-2028 Period – MU 08762

MU 08763: Annual silvicultural budget for the 2023-2028 period: $1,733,755

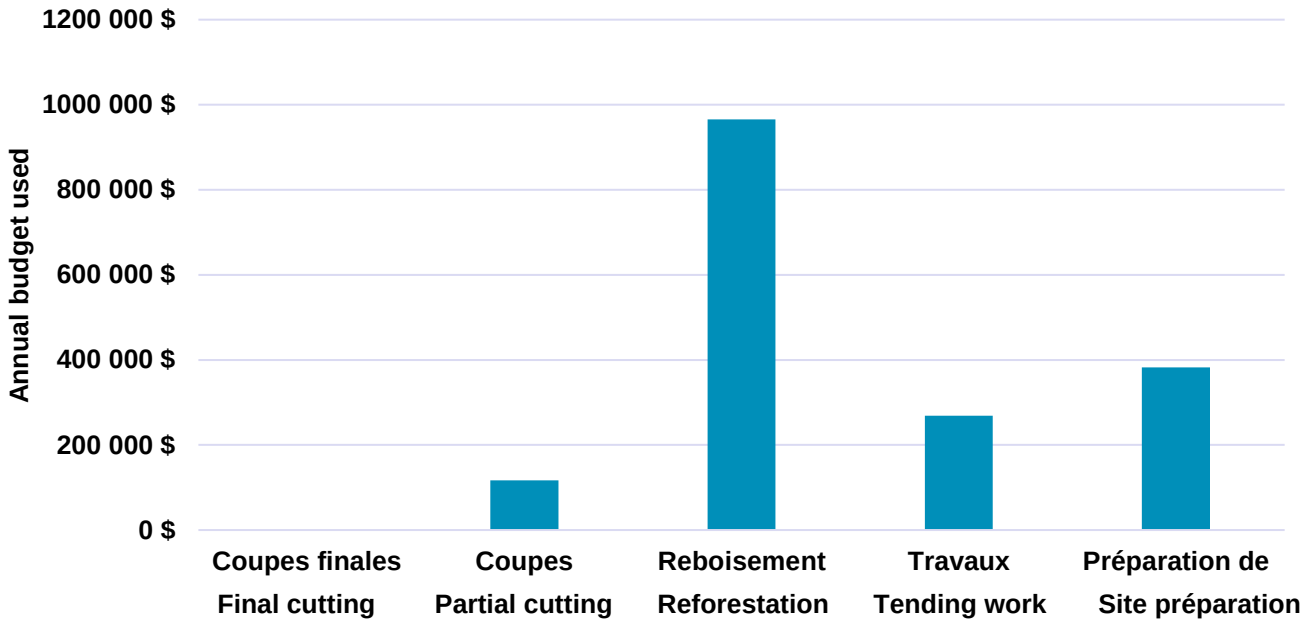


Figure 2: Distribution of the Annual Budget Used for the 2023-2028 Period – MU 08763

MU 08764: Annual silvicultural budget for the 2023-2028 period: $1,526,974

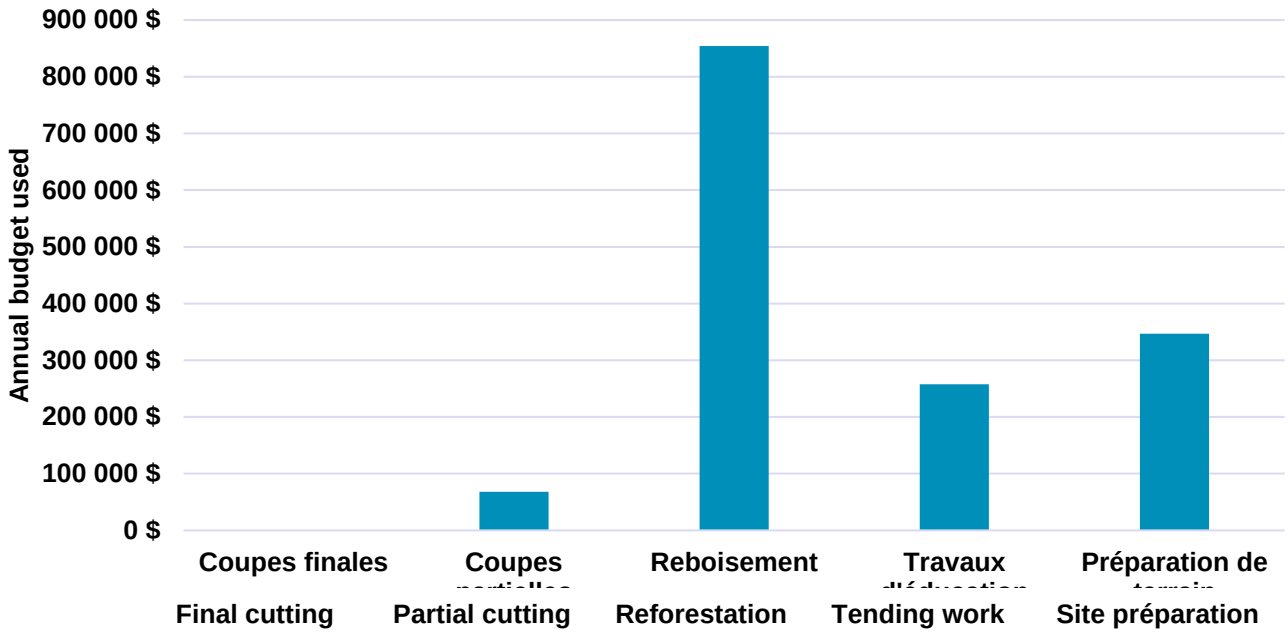


Figure 3: Distribution of the Annual Budget Used for the 2023-28 Period – MU 08764

2.4.4 AREAS OF INCREASED TIMBER PRODUCTION

Section 36 of the Sustainable Forest Development Act specifies that the Minister sets criteria for identifying areas of high forestry potential where increased timber production may be seriously considered The SFDA also provides in section 50 that the areas of increased timber production (AITP) are an integral part of the tactical plan for integrated forest development.

In accordance with the principles established by the MRNF, AITPs must be identified in a sustainable forest management perspective, considering the concerns of the various forest stakeholders. The purpose of the AITPs is to:

- protect and continue past silvicultural investments;
- concentrate intensive and elite silviculture on sites with high timber production potential and maximize the economic and financial profitability of silvicultural investments;
- facilitate monitoring of silvicultural treatments and, when necessary, the application of special protective measures against insects, diseases and forest fires;
- concentrate investments on sites where the risks limiting the achievement of timber production objectives are low;
- reduce the potential land use conflicts with the other stakeholders.

It is important to specify that the silviculture applied in the AITPs seeks intensive timber production while integrating harmoniously into the objectives of ecosystem management and integrated management of resources and land.

For the Forest Management Units of the Nord-du-Québec region, as permitted by the Québec Timber Production Strategy, a flexible approach regarding intensification if silviculture has been deployed to meet

the expectations of the regional partners. In this Tactical Integrated Forest Management Plan (PAFIT), there are no AITPs identified, but rather potential silviculture intensification areas serving to assist in decision-making for forest managers. The forest users will be able to share their concerns regarding the intensification of forest management annually in the Operational Integrated Forest Management Plans (PAFIO). This increased flexibility should also be advantageous in dealing with certain uncertainties, such a\s natural disturbances or the effects of climate change.

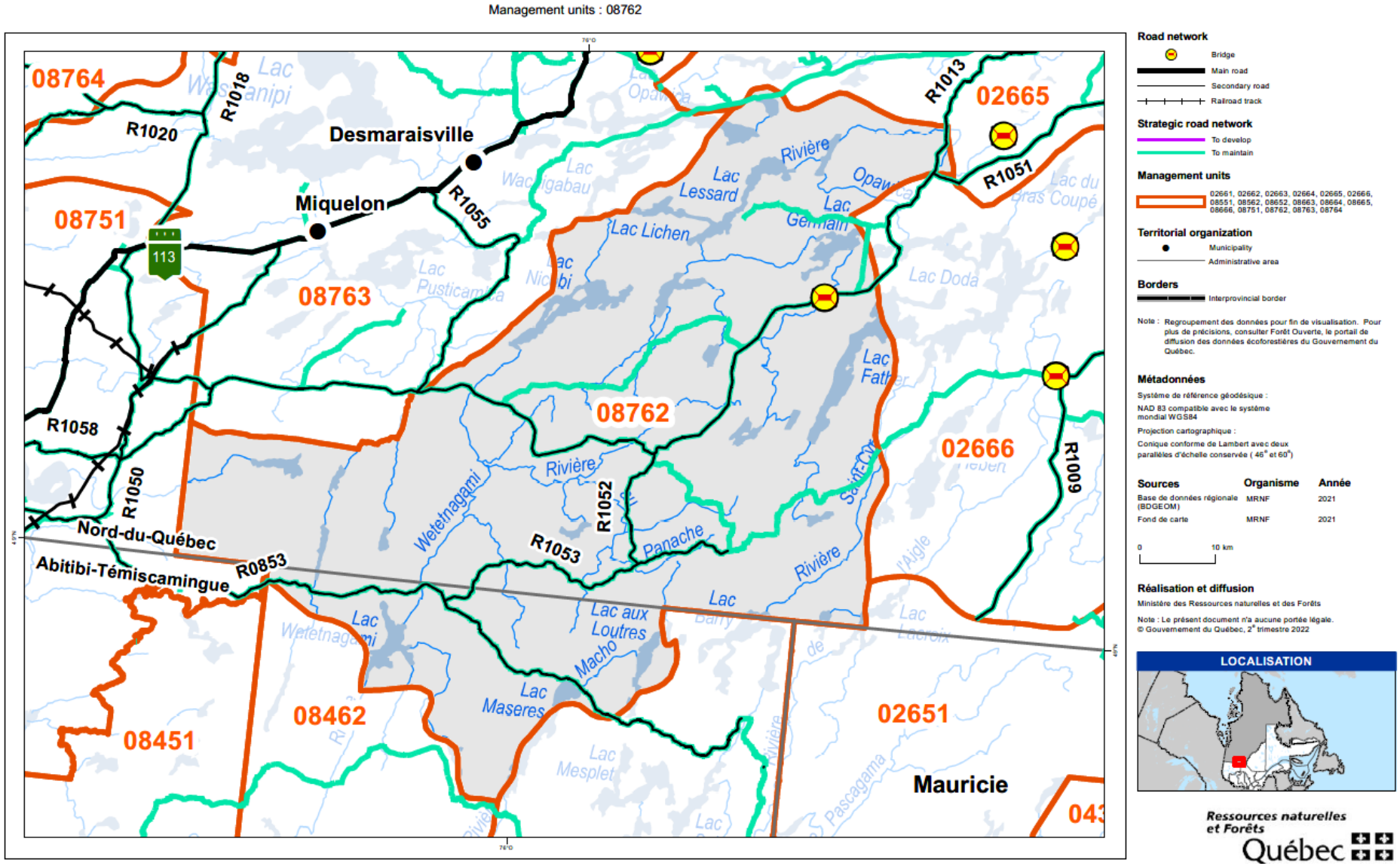
For the distribution of potential areas of intensification of silviculture in the Nord-du-Québec region, consult the layer of potential areas of intensification of silviculture:
https://operationsregionales.mffp.gouv.qc.ca/APPLICATIONSWEB/R10/017_CI_juillet_2019_ccqf/

2.5 INFRASTRUCTURES AND MAIN ROADS TO DEVELOP AND MAINTAIN

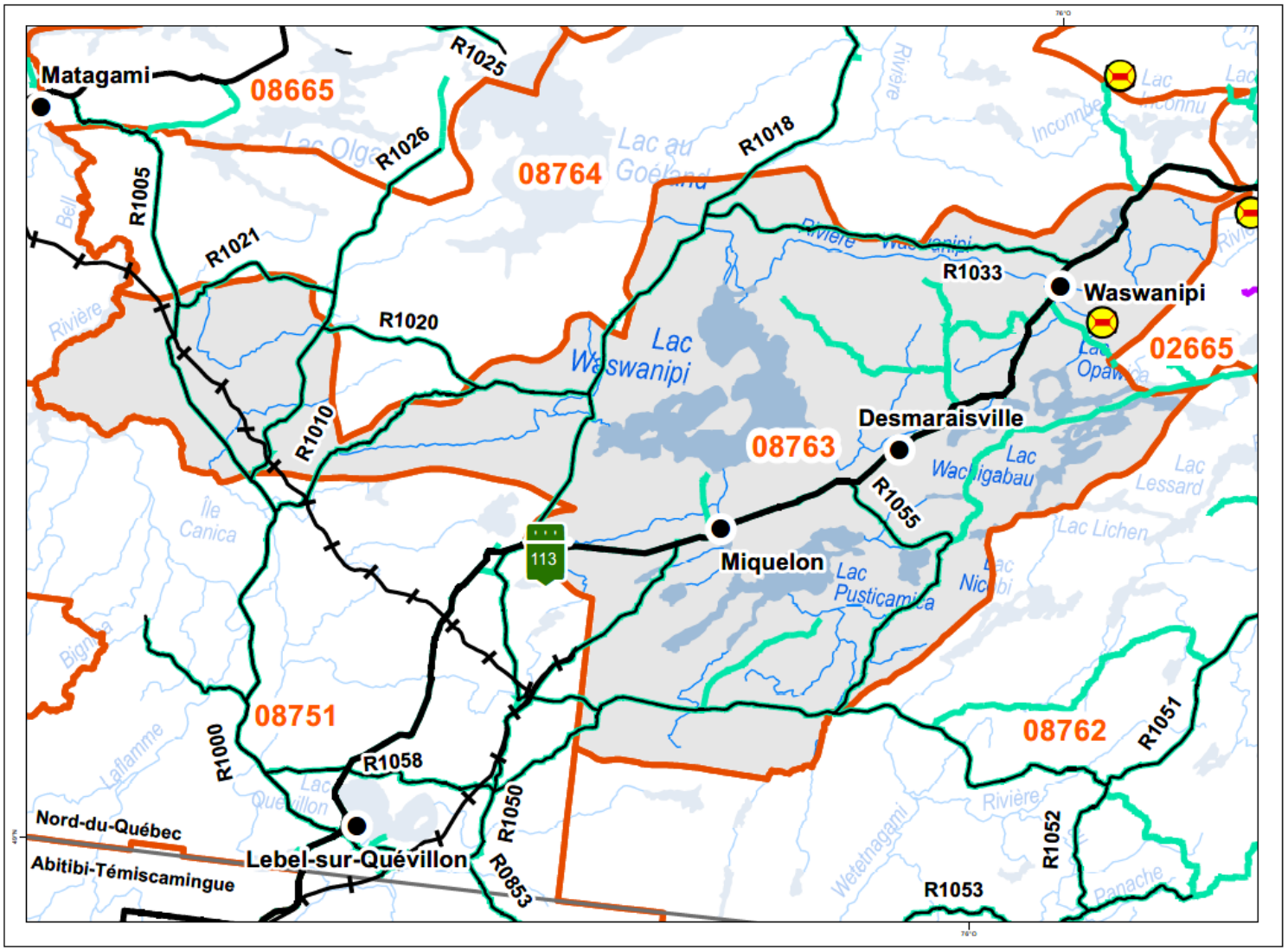
The main infrastructure and roads to be developed and maintained are located in collaboration with the various stakeholders of the forest environment. This exercise makes it possible to identify the access constraints and provide for connection of the future roads planned with the goal of enhancing all the resources of the forest environment.

In addition to enabling the industry to harvest timber resources and transport them to the plants, the strategic road network allows the other stakeholders of the environment to have access to the forest to engage in their activities.

Map 1 : Digital Layers of Infrastructures and Main Roads to Develop and Maintain (R11).



Management units : 08763



Road network

- Bridge
- Main road
- Secondary road
- Railroad track

Strategic road network

- To develop
- To maintain

Management units

02661, 02662, 02663, 02664, 02665, 02666, 08551, 08562, 08652, 08663, 08664, 08665, 08666, 08751, 08762, 08763, 08764

Territorial organization

- Municipality
- Administrative area

Borders

- Interprovincial border

Note : Regroupement des données pour fin de visualisation. Pour plus de précisions, consulter Forêt Ouverte, le portail de diffusion des données écoforestières du Gouvernement du Québec.

Métadonnées

Système de référence géodésique :

NAD 83 compatible avec le système mondial WGS84

Projection cartographique :

Conique conforme de Lambert avec deux parallèles d'échelle conservée (46° et 60°)

Sources	Organisme	Année
Base de données régionale (BDGEOM)	MRNF	2021
Fond de carte	MRNF	2021

0 10 km

Réalisation et diffusion

Ministère des Ressources naturelles et des Forêts

Note : Le présent document n'a aucune portée légale.
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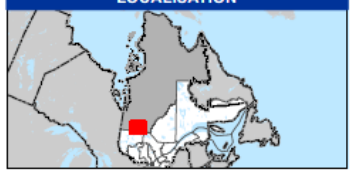
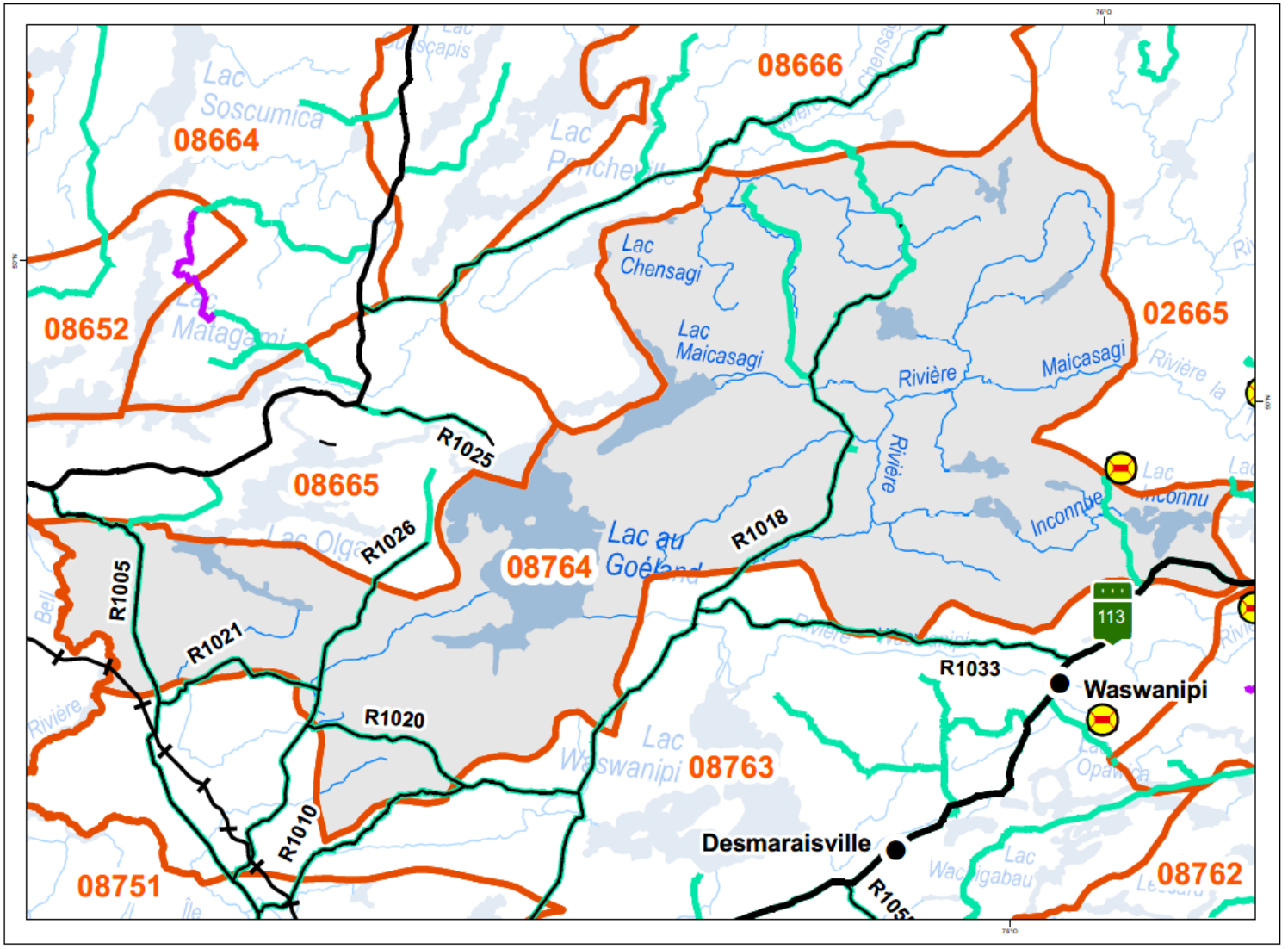
LOCALISATION



Ressources naturelles et Forêts Québec

Management units : 08764



Road network

- Bridge
- Main road
- Secondary road
- Railroad track

Strategic road network

- To develop
- To maintain

Management units

02661, 02662, 02663, 02664, 02665, 02666, 08551, 08562, 08652, 08663, 08664, 08665, 08666, 08751, 08762, 08763, 08764

Territorial organization

- Municipality
- Administrative area

Borders

- Interprovincial border

Note : Regroupement des données pour fin de visualisation. Pour plus de précisions, consulter Forêt Ouverte, le portail de diffusion des données écoforestières du Gouvernement du Québec.

Métadonnées

Système de référence géodésique :

NAD 83 compatible avec le système mondial WGS84

Projection cartographique :

Conique conforme de Lambert avec deux parallèles d'échelle conservée (46° et 60°)

Sources	Organisme	Année
Base de données régionale (BDGEOM)	MRNF	2021
Fond de carte	MRNF	2021

0 10 km

Réalisation et diffusion

Ministère des Ressources naturelles et des Forêts

Note : Le présent document n'a aucune portée légale.

LOCALISATION

Ressources naturelles et Forêts Québec

Management of access roads is a key factor for reduction of the environmental impacts associated with forest management. Indeed, the forest road network influences, in particular, the quality of fish habitat and wildlife habitats, particularly that of Woodland Caribou. However, the preparation and implementation of an access road management plan represents a complex and colossal task. To obtain public adherence by a common understanding of the values and issues related to the forest road network, progress will be gradual and will necessitate the collaboration of all MRNF partners and their partners. Given the gradual implementation of the Strategy for Woodland and Mountain Caribou, announced in April 2019, the priority will be given to the territory used by this species. Over the years of collective work, the forests attributable for the Nord-du-Québec region will be covered completely by an access road management plan.

The preparation of the access road management plan will be organized around values of the public and the MRNF's partners. For the time being, the forest management values and objectives related to the forest road network, presented in the table below were identified from the discussions of the Local Integrated Resource Management Planning Panels (TLGIRT), consultation and harmonization meetings and the 2018-2023 PAFIT consultation.

In the territory of application of the adapted forest regime of La Paix des braves, the development of the road access network has been very important since the beginning of the Agreement. Several rules already apply, which are described in Chapter 3 of the Agreement. These rules will also be taken into consideration in the preparation of the access road management plan.

The information presented in this table is subject to improvement. The PAFIT exercise is an opportunity to add values and/or refine the forest management objectives.

Table 18: Community Values Associated with the Access Road Network and Forest Management Objectives Related to These Values

Values	General forest management objectives
Public safety	A forest road network ensures and acceptable level of public safety.
Fish habitat	A forest road network with watercourse crossings that do not hinder the free passage of fish.
Protection of spawning grounds	Planning long enough in advance to allow consultation and verifications in the field.
Water quality	A forest road network that limits erosion and sedimentation events.
Maintain the Woodland Caribou habitat	A forest road network of limited extent in the Woodland Caribou habitat, which limits fragmentation of habitats and the disturbance rate.
Traditional way of life	A network of forest roads that allows First Nations to carry out important activities, including traditional ones.
Optimum access	A forest road network that ensures the accessibility of the region's various attractions without presenting redundancy.
Economic development	A forest road network that favours forest, mining, energy, hunting, fishing, trapping, NTFP harvesting and ATV activities.
Predictability of operations	Know the harvesting operations to come in the medium term (5 years) in order to invest when a return on investment will be possible.
Visual quality of landscapes	A forest road network that maintains the visual quality of the landscape during hiking, canoeing or other activities.

A detailed action plan was written to specify the approach the MRNF will follow for the preparation and implementation of its Access Road Management Plan. The pivotal actions of the approach are:

- identification of the basic network, access roads necessary for maintenance of land rights (vacation properties, land occupancy) and economic activity related to natural resources (forestry, energy, mining, NTFP);
- identification of zones in relation to the territory's values and association of specific road network development objectives.
- identification of road closing opportunities and opening scenarios, followed by closing to limit expansion of the network.

Each closing project then will follow the normal process, as provided in the guide to multipurpose road closing requests.

At each stage, a presentation to the TLGIRTs is planned to favour regional cohesion. For the time being, the action plan does not address network maintenance. This factor may be explored in a 2nd phase, if necessary.

2.6 ALLOWABLE CUTS

Under section 46 of the Sustainable Forest Development Act, the function of the Chief Forester is determining allowable cuts for forest development units, local forests and certain residual forest territories, given the provincial, regional and local sustainable forest development objectives.

The allowable cuts correspond, for a given Forest Management Unit, to the maximum volume of annual timber harvests by species or species group that can be harvested, while ensuring the renewal and evolution of the forest based on the applicable sustainable forest development objectives, including those concerning:

- The sustainability of the forest environment;
- The impact of climate change on the forests;
- The natural dynamics of the forests, particularly their composition, age structure and spatial distribution;
- The maintenance and improvement of forest production capacity;
- The diversified use of the forest environment;

One of the Chief Forester's mandates is also preparing a manual to be used for determining allowable cuts, which specifies how the allowable cuts are established and shows how they take into account:

- The applicable sustainable forest development objectives, coming from section 48 of the Sustainable Forest Development Act;
- The directions and objectives of the Sustainable Forest Management Strategy (SFMS);
- The provisions of the RSDF;
- The regional and local forest management objectives.

To learn more, consult:
Manuel de determination 2023-2028

Thus, according to the Integrated Forest Development Strategy and the forest management objectives established by the Direction de la gestion des forêts du Nord-du-Québec, the Chief Forester proceeded in December 2021 to determine the allowable cuts of the MU 08760. This plan, in section 2.4.3, specifies silvicultural work levels in concordance with the allowable cut calculation performed by the Chief Forester. It should also be noted that a new allowable cut calculation was not produced for MU 085-62, 086-52 and 087-51. These allowable cuts are based on the previous period and received updates and adjustment recommendations.

For more details, the allowable cuts (R33.0) determined by the Chief Forester are available at the following Web address:

Allowable cuts - Bureau du Forestier en chef (gouv.qc.ca)
https://forestierenchef.gouv.qc.ca/possibilites-forestieres/periode-2023-2028/regions-forestieres-2023-2028/nord-du-quebec-2023-2028/.

To maintain the economic value of the allowable cut over time, the BFEC also provides the Directions régionales des forêts with various reports and inputs allowing the allowable cut to be broken down by operational characteristics. These characteristics include the major forest types, the operational characteristics and the stem size. This breakdown is presented below in the results (R22) in the form of quinquennial targets that must be respected during preparation of the operational integrated forest development plans and the annual programs.

Also the annual silvicultural work areas with harvesting to be performed by type of operational constraint are presented in the table below.

Table 19: Distribution of Annual Silvicultural Work Areas with Harvesting to be Performed by Operational Constraint Type in 2023-2028 (R22.0)

		8762		8763		8764	
	Unit	Target	(%) harvested area*	Target	(%) harvested area*	Target	(%) harvested area*
MAJOR FOREST TYPES							
Softwoods	ha	2090	95%	2000	76%	2170	89%
Hardwoods	ha	110	5%	240	9%	140	6%
Mixed stands with a dominance of hardwood	ha	0	0%	230	9%	90	4%
Mixed stands with a dominance of softwood	ha	0	0%	170	6%	40	2%
OPERATIONAL CONSTRAINTS							
Visual framing	ha	0	0%	70	3%	0	0%
Orphan stand	ha	830	38%	820	31%	769	32%
Steep slopes	ha	0	0%	0	0%	11	0%
Riparian buffer**	ha	NA	NA	NA	NA	NA	NA
Wood dimension (SEPM) lower 85 dm³/stem	ha	291	13%	205	8%	316	13%
HARVESTED AREA*							
Harvested area (CR+CP)	ha	2200	N/A	2640	N/A	2440	N/A

* Major forest types and operationnal constraints targets acheivement are evaluated according to a proportion of the harvested area on the total harvested areas (partial and regeneration). The harvested areas include planned put unharvested areas.
** Riparian buffer harvesting is not allowed on the Paix des Braves territory (provision 3,12,1a)

You will also find the completion assessment for the 2018-2023 period in the following table:

Table 20: Assessment of Distribution of Annual Silvicultural Work Areas with Harvesting to be Performed by Operational Constraint Type in 2018-2023 (R22.0)

		8762			8763			8764		
	Unit	Target	Done (3 yrs)*	Done / Target (%)	Target	Done (3 yrs)*	Done / Target (%)	Target	Done (3 yrs)*	Done / Target (%)
MAJOR FOREST TYPES										
Softwoods	ha	12286	6471	53%	10857	4130	38%	12166	6416	53%
Hardwoods	ha	1186	421	36%	2049	425	21%	1328	175	13%
Mixed stands with a dominance of hardwood	ha	0	36	0%	0	25	0%	0	11	0%
Mixed stands with a dominance of softwood	ha	0	29	0%	0	14	0%	0	12	0%
OPERATIONAL CONSTRAINTS										
Visual framing	ha	33	0	0%	462	73	16%	49	99	201%
Orphan stand	ha	5356	2122	40%	2718	1134	42%	2764	1387	50%
Steep slopes	ha	16	4	25%	17	1	6%	52	2	4%
Wood dimension (SEPM) lower 85 dm^3/stem	ha	306	0	0%	0	0	0%	750	0	0%
HARVESTED AREA*										
Harvested area (CR+CP)	ha	13471	7082	53%	12906	4630	36%	13494	6684	50%

* From 2018-19, 2019-20, 2020-21 annual reports and BMMB annual declaration. It excludes 2013-2018 unharvested volume (VNR) associated harvested areas.

**The harvested area (CR+CP) ratio over target allows to assess each individual results (operationnal constraints and Major forest types. For example, if 50% of CR+CP is realized, it is adaquate that only 50% of the hardwoods target is reached.

Finally in the territory of La Paix des braves, a quinquennial harvest target per trapline is identified to maximize the allowable cut by distributing the harvest over the territory. These targets are proportional to the volume available for harvesting and, for example, allow risk reduction to “close” a trapline to harvesting when it is disturbed more than 40% over a 20-year period. A minimum harvest in territories of wildlife interest for the Crees is also fixed to distribute the harvest over these territories over time. This additional breakdown is presented below in the results (R22.1).

Table 21: Quinquennial Breakdown of Harvesting by Trapline in the Territory of La Paix des braves – 2023-2028 Period (R22.1).

		Trapline	Wildlife interest area (25%)	
MU	**Traplines**	**Target** m³	**Minimum** m³	**%**
08762	L17	38 887	0	0%
08762	L19	63 962	0	0%
08762	W24C	163 328	54 993	34%
08762	W24D	100 481	0	0%
08762	W21B	176 763	63 016	36%
08762	W21C	116 854	50 171	43%
08762	W25	125 924	42 877	34%
08762	W25A	147 697	0	0%
08762	W25B	121 807	40 051	33%
08762	**TOTAL**	**1 055 703**	**251 109**	**24%**
08763	W13B	164 470	54 071	33%
08763	W19	134 066	63 612	47%
08763	W20	110 841	30 034	27%
08763	W21	301 798	92 723	31%
08763	W24	106 578	31 299	29%
08763	W24A	355 257	129 926	37%
08763	W24B	136 356	44 018	32%
08763	**TOTAL**	**1 309 366**	**445 682**	**34%**
08764	W11B	58 936	27 399	46%
08764	W13A	143 971	25 088	17%
08764	W14	149 960	51 823	35%
08764	W18	68 002	21 678	32%
08764	W11	205 752	57 334	28%
08764	W11A	205 409	57 622	28%
08764	W15	112 269	27 540	25%
08764	W17A	187 584	56 765	30%
08764	**TOTAL**	**1 131 883**	**325 249**	**29%**

2.7 MONITORING

Monitoring and observance of the targets relating to the forest management objectives and the integrated forest development strategy are achieved through technical and operational planning processes.

However, it must be mentioned that several factors beyond the MRNF's control, such as market demand, the industrial structure and the availability of labour, may limit the achievement of the targets of the development strategy.

Moreover, as specified in the document *Plan d'aménagement forestier intégré tactique 2023-2028 – Contexte légal et administratif*, several types of monitoring are used by the MRNF to:

- Acquire new knowledge for a better understanding of the effect of silvicultural treatments on the ecosystems, wildlife, plant life, and timber production;
- ensure the compliance of the silvicultural work, particularly regarding the conditions provided in the silvicultural prescription and the standards established in the RSDF;
- assess whether the means deployed during silvicultural interventions allow achievement of the silvicultural objectives pursued;
- Improve forest practices continuously.

Although all types of forest monitoring are important, this section concentrates on effectiveness monitoring, which seeks to validate the achievement of the silvicultural objectives provided in the silvicultural prescription and thereby has an indirect impact on the implementation in operational planning of the silvicultural scenarios provided by the forest development strategy and the monitoring operations provided in the adapted forest regime.

To govern the performance of forest monitoring, a monitoring schedule was developed based on the type of intervention, the silvicultural intensity gradient, the maximum monitoring period and the thresholds to consider that the silvicultural objectives are achieved. Below is the table 22 developed:

Table 22: Effectiveness Monitoring Schedule (R15.1)

		Assessment of regeneration following silvicultural treatment	
Gradient	**Treatment**	**First Monitoring** (Establishment of Regeneration)	**Second Monitoring** (State pf Regeneeration)
Extensive	Regeneration cut (CR)	1-10 years	N/A
	CPI (partial cut with objective of regeneration)	1-10 years	N/A
	Natural disturbance	4-10 years	N/A
Basic	Regeneration cut	1-5 years	5-15 years
	Artificial regeneration (REB, REG, ENS)	1-5 years	5-15 years
	CPI (partial cut with objective of regeneration)	3-5 years	N/A

Gradient	Treatment	Assessment of regeneration following silvicultural treatment	
		First Monitoring (Establishment of Regeneration)	**Second Monitoring** (State pf Regeneeration)
Intensive including areas of increased timber production (AITP)	Regeneration cut	3-5 years	5-10 years
	Artificial regeneration (REB, REG, ENS)	3-5 years	5-10 years
	CPI (partial cut with objective of regeneration)	3-5 years	N/A

In most cases, follow-up is carried out the year following harvest to determine the initial state of regeneration and to carry out silvicultural actions as required. This follow-up is mandatory for the intensive gradient.

Table 23 illustrates the minimum targets according to the type of monitoring and the silvicultural intensity gradient concerned.

The actions to be taken when the target is not reached may translate into prescriptions for scarification, fill planting, clearing, cleanup and precommercial thinning.

Table 23: Minimum Targets (Basic Criteria of Forest Monitoring Operation R44.0)

1st effectiveness monitoring operation	Silvicultural intensity gradient		
	Extensive (Target density of 1200 well-distributed stems/ha)	**Basic** (Target density of 1600 well - distributed stems/ha)	**Intensive** (Target density of 2000 well -distributed stems/ha)
Methods	Classification of aerial images and/or photo-interpretation or field reconnaissance	Classification of aerial images and/or photo-interpretation and/or field reconnaissance	Production of an inventory
Minimum targets	50% distribution coefficient in commercial species	60% distribution coefficient in desired species	75% distribution coefficient in desired species
Actions to be taken if the target is not achieved	Actions required, if possible	Actions required, if possible	Actions required

2nd effectiveness monitoring operation	Silvicultural intensity gradient		
	Extensive	**Basic** **(target density of 1600 well distributed stems/ha)**	**Intensive** **(target density of 2000 well distributed stems/ha)**
Methods	N.A.	Classification of aerial images and/or photo-interpretation and/or field reconnaissance and if actions are required: Intervention inventory	Production of an inventory
Minimum targets	N.A.	60% distribution coefficient in desired species free to grow	75% distribution coefficient in thinned desired species

2nd effectiveness monitoring operation	Silvicultural intensity gradient		
	Extensive	Basic (target density of 1600 well distributed stems/ha)	Intensive (target density of 2000 well distributed stems/ha)
Actions to be taken if the target is not achieved	N.A.	Actions required, if possible	Actions required

The assessments and feedback of the monitoring operations allowing validation and of the silvicultural scenarios and forest development strategies. In case the objectives are not achieved, the forest manager analyzes the treatment possibilities that would allow achievement of the targets and doors to action if the conditions permit. Adjustment of the sociocultural scenarios may also result.

2.7.1 MONITORING PROVIDED IN THE ADAPTED FOREST REGIME

Chapter 3 of La Paix des braves and its schedules propose several monitoring levels. Some of them may be associated with the different types of monitoring detailed in the previous sections of the PAFIT. For example, the annual monitoring of the forest interventions described in sections 34 to 42 of Schedule C-4 of the Agreement falls into the category of compliance monitoring, while the monitoring of forest evolution presented in sections 43 to 50 pertains to effectiveness monitoring.

In the two types of monitoring, the adapted forest regime provides for involvement of the joint working groups (JWG). However, this involvement of the JWGs is variable depending on the monitoring conditions. At the present time, the JWGs are mainly involved in monitoring of the harmonization measures for which they are addressed in their everyday work. The MRNF members of the different JWGs make sure to obtain the most up-to-date information regarding the performance of the harmonization measures. This information may be collected thanks to monitoring of the operations sites, the representatives of the forest companies, and field visits conducted by the JWGs (Cree and MRNF members).

Schedule C-4 (s. 50) of the Agreement also provides that the joint working groups may inform the Cree-Québec Forestry Board and formulate recommendations once they recognize that forest management activities are not compliant with the PAFIT and the PAFIO in effect or the other standards of the adapted forest regime.

3. Professional and Administrative Signatures

Ressources naturelles et Forêts Québec

(Only the original French version is signed)

Professional and Administrative Signature Form

Tactical Integrated Forest Management Plan

Forest Management Unit 087-62, 087-63 and 087-64

Professional responsibility

This Tactical Integrated Forest Management Plan (PAFIT) was produced under my professional responsibility based on all the relevant information available to date and in compliance with the legislation and regulations in force. I recommend its approved by the Minister's representative

_____ Date _____

Paul-Maxime Otye-Moto, ing.f.no de permis 14-015
Coordonnateur des plans d'aménagement forestier intégré tactiques

J'atteste également que les ingénieurs forestiers suivants ont contribué à son élaboration pour les travaux cités ci-dessous :

_____ Date _____

Sabrina Morissette, ing.f. no de permis 05-020
Coordonnatrice aux affaires autochtones

_____ Date _____

Sébastien Leduc, ing.f. no de permis 03-031
Coordonnateur régional de la planification forestière

_____ Date _____

David Gagnon, ing.f. no de permis 11-010
Aménagiste pour la planification commerciale

_____ Date _____

Charles-Éric Décloître, ing.f. no de permis 17-022
Aménagiste pour la planification non-commerciale

I also certify that the following biologists contributed to its preparation for the work cited below.

_____ Date _____

Sonia Légaré, biologiste PH.D.

Administrative responsibility

Approval of the Tactical Integrated Forest Management Plans (PAFIT) for the Ministère des Ressources naturelles et des Forêts (MRNF).

_____ Date _____

Christine Morin, directrice régionale par intérim
Direction de la gestion des forêts du Nord-du-Québec

4. Appendix

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APPENDIX A – LIST OF SILVICULURAL TREATMENTS USED IN THE SILVICULTURAL STRATEGY

Silvicultural treatments are actions taken in a forest stand to guide its composition and structure. The following text presents the main silvicultural treatments used for the Nord-du-Québec region.

Silvicultural treatment	Description[1]
Scarification (SCA)	Site treatment that involves disturbing the humus layer and low competing vegetation to expose and turn the mineral soil and mix it with organic matter.
Planting (PL)	Artificial regeneration treatment that involves placing seedlings, young plants or cuttings in the ground to create a stand.
Fill planting (REG)	Artificial regeneration treatment that involves planting trees to fill voids on an area where regeneration, natural or artificial, has not achieved adequate density or distribution coefficient.
Enrichment (PL_ENR)	Artificial regeneration treatment that involves planting trees in a stand to introduce, reintroduce or increase the abundance of a scarce or higher value species.
Clearing (DEG)	Educational treatment that involves cutting competing vegetation to free up regeneration for desired species.
Cleaning (NET)	Educational treatment that involves cutting competing vegetation, regardless of stage of stand development. This term is generally used to describe a clearing at the sapling stage, and to distinguish it from a clearing at the seedling stage.
Pre-commercial thinning (EPC)	Educational treatment that involves cutting trees of non-market size to decrease the intensity of competition on promising trees and to improve their growth.
Commercial thinning (EC)	Educational treatment that involves harvesting a portion of market-sized trees in a regular structure stand at the age of prematurity, to promote the development of promising trees.
Cutting with protection of regeneration and soils (CPRS)	Regeneration process that involves harvesting all market commercial trees while protecting sub-floor regeneration and forest soil. Regeneration, which was established naturally under the cover of mature trees, is cleared, thus allowing its development under conditions of full light.
Cutting with protection of high regeneration and soils (CPHRS)	Regeneration process that involves harvesting all market commercial trees while protecting high regeneration (saplings) installed in the sub-floor and forest soil. It should be preferred, particularly when the risk of invasion by competing vegetation is very high.
Cutting with seed tree stock (CRS)	Regeneration process that preserves seed trees (5 to 30 seed trees per hectare) on the cutting floor. They are distributed evenly to ensure the regeneration of the desired species.
Cutting with small market stems protection (CPPTM)	Regeneration process of harvesting trees in the diameter at chest height (dhp) greater than the boundary diameter, while protecting a sub-floot of softwood composed of saplings and small market stems.

[1] Source: MRN (2013), Le guide sylvicole du Québec, tome 2. Les concepts et l'application de la sylviculture, collective work under the supervision of C. Larouche, F. Guillemette, P. Raymond and J.-P. Saucier, Les Publications du Québec, 744 p.

Silvicultural treatment	Description[1]
Remediation cutting (CAS)	Remediation treatment that involves harvesting trees that are dead, vulnerable or damaged by insects or infectious diseases in order to prevent the spread of parasites or pathogens and thereby improve the health of the stand.
Improvement cutting (CA)	Remediation treatment that involves harvesting defective, noxious or undesirable trees to improve the composition and vigour of a stand at the pole or high forest stage.
Selection cutting (CJ)	Family of regeneration processes that involve periodic cutting into an uneven-aged stand, harvesting its production while helping it achieve or maintain a balanced structure.
Shelterwood (CPR)	Regeneration process that involves harvesting the stand in a series of partial cuts spread over less than 1/5 of the revolution, in order to establish a regeneration cohort under the protection of a forest canopy containing mature seed trees.
Irregular shelterwood (CPI)	Regeneration process that involves harvesting the stand in a series of partial cuts spread over less than 1/5 of the revolution, in order to establish one or more regeneration cohorts under the protection of a forest canopy containing mature seed trees.

APPENDIX B – LOCAL ISSUES AND OBJECTIVES RAISED DURING THE TLGIRTS (R12)

Lebel-sur-Quévillon

Table de Gestion Intégrée des Ressources et du Territoire (TGIRT) de Lebel-sur-Quévillon

Tableau des enjeux

Gouvernement régional d'Eeyou Istchee Baie-James
Eeyou Istchee James Bay Regional Government

Table de GIRT			Indicateur	Cible/objectif	Échéance / en continu	Responsable	MFFP	
Problématique / enjeu (valeur)	Besoin (objectif)	Moyen ou action					Suivi	VOIC
Compétitivité de l'industrie forestière en région	Assurer la rentabilité des usines de transformation du bois	* Maintenir les approvisionnements ligneux en quantité, en qualité et à des coûts raisonnables	Non applicable	Non applicable			En continu	Non
Populations d'orignaux (UA 087-62)	Maintenir ou augmenter les populations d'orignaux	* Maintenir les peuplements feuillus et mixtes	Proportion des blocs de forêts résiduelles mixtes et feuillues (réf. Article 3.10.4.)			Maîtres de Trappe	Stratégie d'aménagement des peuplements mixtes – Février 2021	
		* Maintenir la connectivité des habitats fauniques	Proportion des corridors de déplacement des orignaux (60 mètres et plus) entre les peuplements mixtes et feuillus			MFFP		
		* Maintenir les bandes riveraines						
Conservation des habitats fauniques	Protéger les frayères	* Répertorier les frayères	Proportion des frayères répertoriées, protégées			MFFP et Groupes de travail conjoints	Directives sur les habitats fauniques	En analyse
	Préserver la qualité de l'eau						Rapport projet lacs stratégiques et qualité de l'eau – Rapport final juin 2019	
Gestion du réseau routier	Optimisation du réseau routier forestier					Table de GIRT (comité technique) et MFFP	Ajouter des éléments visuels pour faciliter la compréhension sur le projet de VOIC concernant les FHVC et les HVC établies dans le cadre de la certification forestière Barrette-Chapais.	Incertain
Harmonisation des différents usages	Connaitre la programmation des travaux forestiers à venir	* Les utilisateurs doivent demander aux BGA d'être ajoutés à la liste de diffusion	Non applicable	Non applicable	En continu		En continu	

Waswanipi

Table de Gestion Intégrée des Ressources et du Territoire (TGIRT) de Waswanipi

Tableau des enjeux

Gouvernement régional d'Eeyou Istchee Baie-James
Eeyou Istchee James Bay Regional Government

Problématique / enjeu	Besoin	Moyen	Indicateur	Cible / objectif	Responsable	Suivi	VOIC
Équilibre entre les aspects économiques et ceux liés à la nature	Réduire l'impact des activités forestières et minières sur la faune					En continue	
Compétitivité de l'industrie forestière en région	Assurer la rentabilité des usines de transformation du bois	* Maintenir les approvisionnements ligneux en quantité, en qualité et à des coûts raisonnables	Proportion des attributions de l'année en cours par rapport à ceux des années précédentes en regard des volumes attribués, de la qualité des bois et du coût de la fibre			En continue	
	Maintenir la possibilité forestière						
	Maintenir les certifications FSC						
Encadrement visuel	Maintenir la qualité des paysages aux lieux stratégiques pour le tourisme, notamment les chalets et les plans d'eau identifiés	* Établir une cartographie des lieux considérés stratégiques pour le tourisme	Cartographie adoptée par la table de GIRT			Rencontre Nibiischii – MFFP avant fin novembre 2021. Point d'observation paysages et analyse 3D. Comme il n'y a aucune infrastructure de la réserve faunique Assinica dans les aires de trappe W5B, W10 et W10A, il n'y aura aucun point d'observation de proposé pour l'instant.	
		* Définir des modalités de protection des lieux considérés stratégiques pour le tourisme et les mettre en œuvre	Modalités convenues par la table de GIRT et prises en compte dans les PAFI et dans le cadre des opérations forestières			Proposition de modalités à la TGIRT suite à l'analyse 3D du MFFP	
Qualité de l'eau et intégrité des habitats aquatiques	Minimiser les impacts causés par les opérations forestières (sédimentation, température de l'eau, frayères, sentiers utilisés)	* Établir une cartographie des lacs et des cours d'eau à protéger * Définir des modalités de protection des lacs et des cours d'eau sensibles et les mettre en œuvre			Table de GIRT (comité technique)	Rapport projet lacs stratégiques et qualité de l'eau – Rapport final juin 2019	

Problématique / enjeu	Besoin	Moyen	Indicateur	Cible / objectif	Responsable	Suivi	VOIC
Conservation des habitats fauniques	Maintenir les peuplements feuillus et mixtes	* Établir une cartographie des sites sensibles, prévoir des modalités pour ces sites	Proportion des blocs de forêts résiduelles mixtes et feuillues (réf. Article 3.10.4.)			Stratégie d'aménagement des peuplements mixtes Février 2021	En analyse
	Maintenir la connectivité des habitats fauniques	* Analyser les milieux riverains et les modalités pour assurer leur protection	Proportion des corridors de déplacement des orignaux (60 mètres et plus) entre les peuplements mixtes et feuillus		MFFP		
	Protéger les frayères	* Répertorier les frayères	Proportion des frayères répertoriées, protégées		MFFP et Groupes de travail conjoints		En analyse
	Maintenir ou accroître la population de caribous forestiers						
	Maintenir l'habitat du castor	Mieux connaître les comportements du castor pour assurer son maintien					
Accès au territoire	Limiter l'expansion du réseau routier	* Réaliser un plan de gestion des chemins multi ressources et une évaluation des effets cumulatifs potentiels causés par la construction de nouveaux chemins			MFFP	Ajouter des éléments visuels pour faciliter la compréhension sur le projet de VOIC concernant les FHVC et les HVC établie dans le cadre de la certification forestière Barrette-Chapais.	Incertain
	Réduire la redondance du réseau routier (éviter de faire des chemins en parallèle)						Incertain
	Maintenir la qualité des principaux accès et remettre en production les chemins n'ayant plus aucune utilité multi-usagers	* Adopter le plan de gestion des chemins multi ressources et le mettre en œuvre					Incertain
Acces au territoire pour tous les utilisateurs	Connaître les raisons qui justifieraient la mise en œuvre d'un lien VHR interrégional						
Harmonisation des différents usages	Connaitre la programmation des travaux forestiers à venir	* Diffuser un calendrier des opérations au moins 15 jours à l'avance. Les personnes intéressées doivent demander aux BGA pour être ajoutés à leurs listes de diffusion			BGA		

Suggéré par le coordonnateur, à être validé par la table de GIRT

Révision par la T.GIRT :

APPENDIX C – DEROGATION FROM THE SPATIAL ORGANIZATION IN SPRUCE-MOSS STANDS IN THE TERRITORY OF THE ENRQC

Dérogation au Règlement sur l'aménagement durable des forêts du domaine de l'État pour la période de 2023 à 2028

Unités d'aménagement 026-61, 026-62, 026-63, 026-64, 026-65, 026-66, 085-62, 086-63, 086-64, 086-65, 086-66, 087-62, 087-63,087-64 - Région Nord-du-Québec

1er août 2022

MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS

Votre gouvernement

Québec

Approbation

Directeur régional de la gestion des forêts :

Christine Morin
Directrice régionale par intérim
1er août 2022

Photographie de la page de couverture :
Ministère des Forêts, de la Faune et des Parcs

Liste des sigles et acronymes

CBJNQ : convention de la Baie-James et du Nord québécois

CMO : coupe en mosaïque

CPRS : coupe avec protection de la régénération et des sols

DGFo : direction de la gestion des forêts

ENRQC : entente concernant une nouvelle relation entre le gouvernement du Québec et les Cris du Québec

LADTF : loi sur l'aménagement durable du territoire forestier

MFFP : ministère des Forêts, de la Faune et des Parcs

RATF : rapport d'activité technique et financier

UA : unité d'aménagement

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Introduction

En vertu de la Loi sur l'aménagement durable du territoire forestier (L.R.Q., c. A-18.1, article 40)[1], le ministre peut à la demande d'une communauté autochtone ou de sa propre initiative après consultation d'une telle communauté, imposer des normes d'aménagement forestier différentes, en vue de mettre en œuvre une entente que le gouvernement ou un ministre conclut avec une telle communauté.

Afin de mettre en œuvre l'Entente concernant une nouvelle relation entre le gouvernement du Québec et les Cris du Québec (ENRQC)[2], ratifiée le 7 février 2002, il faut déroger aux articles du Règlement sur l'aménagement durable des forêts du domaine de l'État (RADF)[3] applicables au domaine bioclimatique de la pessière à mousses.

Ainsi, en vertu de l'article 40[4] de la LADTF, les éléments suivants seront décrits dans le présent document :

- Les mesures de substitution proposées aux normes d'aménagement forestier édictées par voie réglementaire;
- Le territoire d'application de l'approche de substitution;
- Les normes réglementaires faisant l'objet de substitution;
- Les mécanismes de suivi prévus pour assurer l'application de l'approche de substitution;
- Les amendes prévues en cas d'infraction.

Il est à noter que, pour toute disparité de lecture ou de compréhension entre le présent document et le texte légal, ce sont les documents officiels sur Légis Québec[1,2] qui constituent les références.

[1] Consulter la Loi sur l'aménagement durable du territoire forestier à http://legisquebec.gouv.qc.ca/fr/pdf/cs/A-18.1.pdf.
[2] L'ENRQC est disponible en ligne : http://www.autochtones.gouv.qc.ca/relations_autochtones/ententes/cris/20020207.htm
[3] Consulter le Règlement sur l'aménagement durable des forêts du domaine de l'État à https://www.legisquebec.gouv.qc.ca/fr/document/rc/A-18.1,%20r.%200.01.
[4] Consulter l'article 40 de la LADTF à https://www.legisquebec.gouv.qc.ca/fr/version/lc/a-18.1?code=se:40&historique=20220426#20220426.

1 Mesures de substitution proposées

L'entrée en vigueur de l'ENRQC a été convenue entre les Cris du Québec et le gouvernement du Québec, le 7 février 2002. Les modalités de l'ENRQC liées à la foresterie sont décrites au chapitre 3 (foresterie) ainsi qu'à l'annexe C de l'Entente. Ces modalités constituent le régime forestier adapté[1].

L'ENRQC stipule que : « Les dispositions de cette Entente relatives à la foresterie ont, entre autres, pour but de mettre en place un régime forestier adapté, lequel viendra fixer des règles et procédures particulières applicables pour le Territoire dans la poursuite des objectifs d'une prise en compte améliorée des activités de chasse, de pêche et de trappage des Cris et une harmonisation accrue des activités forestières avec ces activités ».

Le régime forestier adapté tel que décrit dans l'ENRQC est basé sur une approche de coupes en mosaïque. Cependant, comme l'ENRQC ne décrit pas l'ensemble des normes associées à la coupe en mosaïque, la norme de substitution imposée ici comprend aussi certains articles du RADF (tableau 1, annexe 1). Ces articles sont habituellement appliqués dans le domaine bioclimatique de la sapinière, mais le seront sur le territoire de l'Entente qui se situe dans le domaine bioclimatique de la pessière à mousses. Cette interversion de modalités en fonction du domaine bioclimatique constitue l'essence de la dérogation.

Cependant, concernant l'article 139, l'alinéa 4 est remplacé par le libellé suivant :

« 4° être constitué de peuplements ayant une densité du couvert forestier supérieure à 40 % sur au moins 80 % de sa superficie et de 25 à 40 % sur sa superficie restante. Elle peut aussi être constituée de peuplements forestiers ayant une densité du couvert forestier de 25 à 40 % sur plus de 20 % de sa superficie, à la condition que la superficie de densité supérieure à 40 % soit égale ou supérieure à celle des peuplements présentant une telle densité et qui sont situés dans les forêts de 7 m ou plus de hauteur du chantier de récolte en mosaïque avant intervention. »

[1] L'organisation spatiale prévue dans ce régime forestier adapté consiste principalement en de la coupe en mosaïque, telle que décrite dans le RADF, à laquelle on applique des seuils différents prévus dans l'ENRQC, accompagnée de certaines autres conditions.

Cet ajustement qui permet le même niveau de conservation des peuplements de densité supérieure à 40 % dans les forêts résiduelles permet, dans le cas d'une identification de superficie de forêt résiduelle supérieure à celle de la récolte, de ne pas avoir à ajuster la forêt résiduelle en retirant simplement les peuplements de densité de 25 à 40 % (D) de la forêt résiduelle. Cette pratique crée des peuplements enclavés ou orphelins au cœur de la forêt résiduelle.

Tableau 1 - Approche de substitution.

Norme de substitution[1]	Sujet
Chapitre 3 et annexe C de l'ENRQC	Régime forestier adapté
Articles 136 et 137 du RADF	Coupe totale autre que la coupe en mosaïque
Articles 138, 139 (à l'exception de l'alinéa 4), 140, 141, 142 et 143 du RADF	Coupe en mosaïque

2 Territoire d'application de l'approche de substitution

L'approche de substitution va s'appliquer aux 14 unités d'aménagement (UA) visées par l'ENRQC : 085-62, 086-63, 086-64, 086-65, 086-66, 087-62, 087-63, 087-64, 026-61, 026-62, 026-63, 026-64, 026-65 et 026-66, qui sont situées dans la région Nord-du-Québec (figure 1). Ces UA sont localisées entre les latitudes 48°44'5" N et 51°38'4" N, et les longitudes 79°31'4" O et 71°41'8" O. Les superficies touchées par la dérogation sont inscrites au tableau 2.

[1] L'organisation spatiale prévue dans ce régime forestier adapté consiste principalement en de la coupe en mosaïque, telle que décrite dans le RADF, à laquelle on applique des seuils différents prévus dans l'ENRQC, accompagnée de certaines autres conditions.

Figure 1 : carte des UA de la région Nord-du-Québec concernées par la dérogation

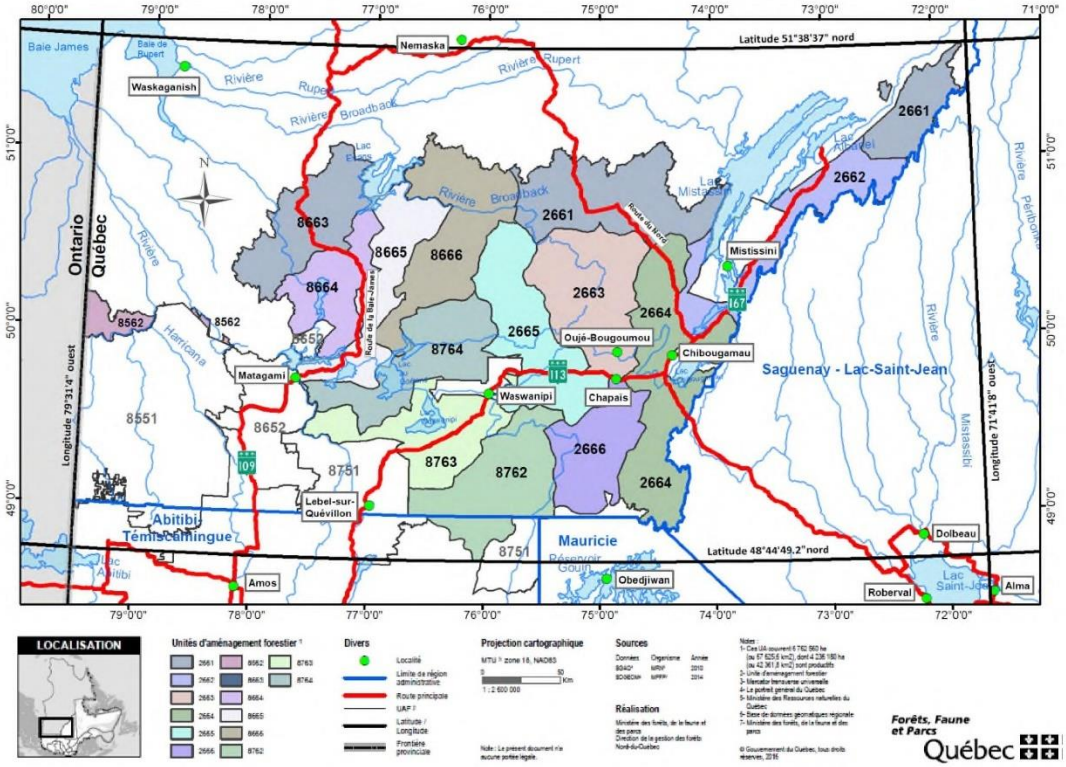


Tableau 2. Tableau des superficies productives et des superficies totales des UA

UA	Superficie destinée à l'aménagement forestier (ha)	Superficie totale (ha)
085-62	2 350	181 230
086-63	40 400	387 480
086-64	102 280	290 430
086-65	182 180	358 490
086-66	182 200	507 600
087-62	265 940	466 390
087-63	233 400	401 070
087-64	249 620	420 540
026-61	298 200	784 260
026-62	166 800	428 280
026-63	99 390	482 190
026-64	311 440	628 930
026-65	258 960	487 500
026-66	161 600	319 000
Total 14 UA	**2 554 760**	**6 143 390**

Source : Forestier en chef. Rapports détaillés des calculs pour les unités d'aménagement de la région du Nord-du-Québec, possibilités forestières 2023-2028.

3 Normes réglementaires faisant l'objet de l'approche de substitution

Les normes réglementaires faisant l'objet de l'approche de substitution se trouvent à la section III du RADF, « Dispositions particulières applicables au domaine bioclimatique de la pessière à mousses », du chapitre VI, soit les articles 144, 145 et 146. Le règlement est disponible en ligne[1] et les articles concernés par la dérogation sont transcrits à l'annexe 2 de ce document.

[1] Consulter le RADF à https://mffp.gouv.qc.ca/RADF/guide/.

Mécanismes de suivi prévus pour assurer l'application de l'approche de substitution

Le suivi des modalités applicables à l'ENRQC est réalisé chaque fois qu'un nouveau plan d'aménagement forestier est produit et lorsqu'il y a une modification apportée à l'un de ces plans. Le suivi consiste à vérifier toutes les modalités de l'ENRQC et à consigner les renseignements à l'intérieur d'un tableau. La section 4 de l'annexe C-4 de l'ENRQC mentionne comment effectuer les suivis des plans d'aménagement forestier. Ces suivis sont réalisés conformément à l'Entente, par des listes de contrôle comprenant toutes les modalités de substitution imposées. Ces listes sont remplies par les aménagistes. Elles permettent notamment de vérifier l'atteinte des cibles par le modèle de répartition des interventions proposées.

Amendes prévues en cas d'infraction

Quiconque contrevient à l'une des modalités de substitution prévues dans la présente dérogation aux articles du RADF commet une infraction et est passible de l'amende prévue au paragraphe 3 de l'article 246 de la LADTF[1] (chapitre A-18.1) qui est de 2 000 $ à 10 000 $ par hectare ou partie d'hectare qui fait l'objet de l'infraction.

Comme les normes prévues pour la répartition spatiale dans la sapinière s'appliqueront sur la zone faisant l'objet de la dérogation, les dispositions pénales associées seront utilisées en cas de non-respect des normes imposées (numérotation en lien avec l'ANNEXE 1. ARTICLES DU RADF CONSTITUANT L'APPROCHE DE SUBSTITUTION).

- Toute personne autorisée à récolter du bois sur le territoire forestier du domaine de l'État ou le tiers à qui cette personne a confié la réalisation des travaux liés à la récolte qui contrevient à l'une des dispositions de l'article 136, à l'exception du troisième alinéa et de l'article 137 commet une infraction et est passible de l'amende prévue au paragraphe 1 de l'article 246 de la Loi sur l'aménagement durable du territoire forestier (chapitre A-18.1).
- Quiconque contrevient à l'une des dispositions du troisième alinéa de l'article 136 et des articles 138 à 140 commet une infraction et est passible de l'amende prévue au paragraphe 4 de l'article 246 de la Loi sur l'aménagement durable du territoire forestier (chapitre A-18.1). Commets également une infraction et est passible de la même peine toute personne ayant le droit de réaliser une activité d'aménagement forestier ou le tiers à qui cette personne a confié la réalisation de cette activité qui contrevient aux articles 141 à 143.

En cas de non-respect des seuils spécifiques de l'Entente, les mécanismes de celle-ci s'appliquent.

[1] Consulter l'article 246 de la LADTF à https://www.legisquebec.gouv.qc.ca/fr/version/lc/a-18.1?code=se:246&historique=20220426#20220426.

Annexe 1 Articles du RADF faisant partie de l'approche de substitution

136. « Une lisière boisée d'un seul tenant doit être conservée entre les aires de coupe totale autre que la coupe en mosaïque, jusqu'à ce que la régénération des aires de coupe ait atteint une hauteur moyenne de 3 m. La lisière boisée entre deux aires de coupe doit être d'une largeur d'au moins 60 m lorsque chaque aire de coupe couvre une superficie inférieure à 100 ha ou d'une largeur minimale de 100 m lorsque l'une de ces deux aires de coupe couvre une superficie de 100 à 150 ha.

Cette lisière boisée doit être constituée d'arbres, d'arbustes ou de broussailles de plus de 3 m de hauteur et doit servir notamment d'écran visuel et de corridor pour le déplacement de la faune.

Il est interdit de circuler avec un engin forestier dans cette lisière boisée, sauf lors de la construction ou de l'amélioration d'un chemin ».

137. « Toute coupe totale est interdite dans la lisière boisée visée à l'article 136 jusqu'à ce que la régénération soit établie dans les aires de coupe conformément au premier alinéa de cet article.

138. « Les aires de coupe d'une coupe en mosaïque doivent être de superficie et de forme variables. »

139. (modifié à l'alinéa 4) « La forêt résiduelle d'une coupe en mosaïque doit posséder les caractéristiques suivantes :

1° avoir, à l'intérieur de la limite du chantier de récolte en mosaïque, une superficie au moins équivalente à celle des aires de coupe d'une coupe en mosaïque;

2° avoir une largeur d'au moins 200 m;

3° être constituée dans une proportion d'au moins 80 % de peuplements forestiers de 7 m ou plus de hauteur et, dans une proportion n'excédant pas 20 % de sa superficie, de peuplements forestiers de 4 m à moins de 7 m de hauteur;

4° être constituée de peuplements ayant une densité de couvert forestier supérieure à 40 % sur au moins 80 % de sa superficie et de 25 à 40 % sur sa superficie restante. Elle peut aussi être constituée de peuplements ayant une densité de couvert forestier de 25 à 40 % sur plus de 20 % de sa superficie, pourvu que la superficie de densité supérieure à 40 % soit égale ou supérieure à celle des peuplements présentant une telle densité et qui sont situés dans les forêts de 7 m ou plus de hauteur du chantier de récolte en mosaïque avant intervention;

5° être constituée de peuplements forestiers qui sont en mesure de produire en essences commerciales un volume de bois marchand brut à maturité d'au moins 50 m^3/ha ou, lorsqu'ils ne sont pas en mesure de produire un tel volume, être constituée de peuplements forestiers équivalents en composition et en superficie à ceux récoltés;

6° être constituée de peuplements forestiers appartenant dans une proportion d'au moins 20 % au même type de couvert forestier que ceux récoltés;

7° ne pas avoir fait l'objet, au cours des 10 dernières années de récolte, d'une récolte commerciale autre qu'un traitement sylvicole visé au deuxième alinéa de l'article 142 ».

140. « Chaque chantier de récolte en mosaïque doit être indiqué au plan d'aménagement forestier intégré. Il en est de même de la forêt résiduelle d'une coupe en mosaïque.

Une fois indiquée au plan, la forêt résiduelle d'une coupe en mosaïque ne peut servir de nouveau de forêt résiduelle tant que la récolte ne peut s'y effectuer conformément aux dispositions du premier alinéa de l'article 142 ».

141. « Une superficie forestière composée d'arbres, d'arbustes ou de broussailles d'une hauteur moyenne de 3 m ou plus doit être conservée en périphérie d'une aire de coupe d'une coupe en mosaïque. Sa largeur doit être d'au moins 200 m ou d'au moins 100 m si l'aire de coupe a moins de 25 ha.

Le premier alinéa ne s'applique pas pour la partie du périmètre d'une aire de coupe adjacente à une lisière boisée conservée en bordure d'un lac ou d'un cours d'eau dont la largeur, mesurée au niveau de la limite supérieure des berges, excède 35 m.

Une superficie forestière composée d'arbres, d'arbustes ou de broussailles d'une hauteur moyenne de 3 m ou plus d'une largeur d'au moins 200 m doit également être conservée entre une forêt résiduelle et les aires de coupe d'une coupe en mosaïque de même qu'entre une forêt résiduelle et les autres aires de coupe totale, afin de servir de corridor pour le déplacement de la faune.

Les superficies forestières visées au présent article doivent être conservées jusqu'à ce que la régénération dans les aires de coupe en mosaïque atteigne une hauteur moyenne de 3 m ou plus ».

142. « La forêt résiduelle d'une coupe en mosaïque doit être conservée à l'intérieur de la limite du chantier de récolte jusqu'à ce qu'elle puisse être récoltée. Elle ne peut l'être qu'à l'expiration d'un délai de 10 ans à compter de la date où s'est effectuée la coupe en mosaïque ou, si la régénération n'a pas encore atteint après ce délai une hauteur moyenne de 3 m, tant que cette régénération n'a pas atteint une telle hauteur.

Les dispositions du premier alinéa ne s'appliquent pas aux traitements sylvicoles suivants réalisés dans une forêt résiduelle :

1° une éclaircie commerciale ou une coupe de jardinage effectuée selon les prescriptions sylvicoles applicables;

2° une coupe partielle, dans un peuplement d'arbres ayant atteint son âge de maturité ou qui l'atteindra dans moins de 15 ans, où l'on récolte au plus 35 % de la surface terrière marchande du peuplement à la condition cependant de maintenir, après récolte, une surface terrière marchande d'au moins 15 m^2/ha d'arbres bien espacés, et ce, en essences et en proportion semblable à celles du peuplement initial.

Une forêt résiduelle d'une coupe en mosaïque peut être traversée par un chemin dont la largeur de déboisement n'excède pas la largeur de l'emprise prévue à l'annexe 6 pour la classe de chemin à laquelle il appartient ou encore par un cours d'eau dont la largeur aux limites de l'écotone riverain n'excède pas en moyenne 35 m. Toutefois, au moment d'indiquer une forêt résiduelle au plan d'aménagement forestier intégré, ni la superficie ni la largeur du chemin ou du cours d'eau ne peuvent être considérées dans le calcul de la superficie et de la largeur de la forêt résiduelle aux fins de l'application des paragraphes 1 et 2 de l'article 139 ».

143. « Au cours d'une année de récolte, au moins 60 % de la superficie totale des aires de coupe totale d'une unité d'aménagement ou d'un autre territoire forestier du domaine de l'État doit être planifiée et réalisée selon les dispositions du présent règlement applicables à la coupe en mosaïque. »

Annexe 2 Articles du RADF visés par la demande de dérogation

144. « Dans les unités d'aménagement ou dans les unités territoriales de référence situées dans le domaine bioclimatique de la pessière à mousses visé à l'annexe 1, les interventions forestières sont réalisées sur la base d'une approche comprenant des agglomérations de coupes et des massifs forestiers ».

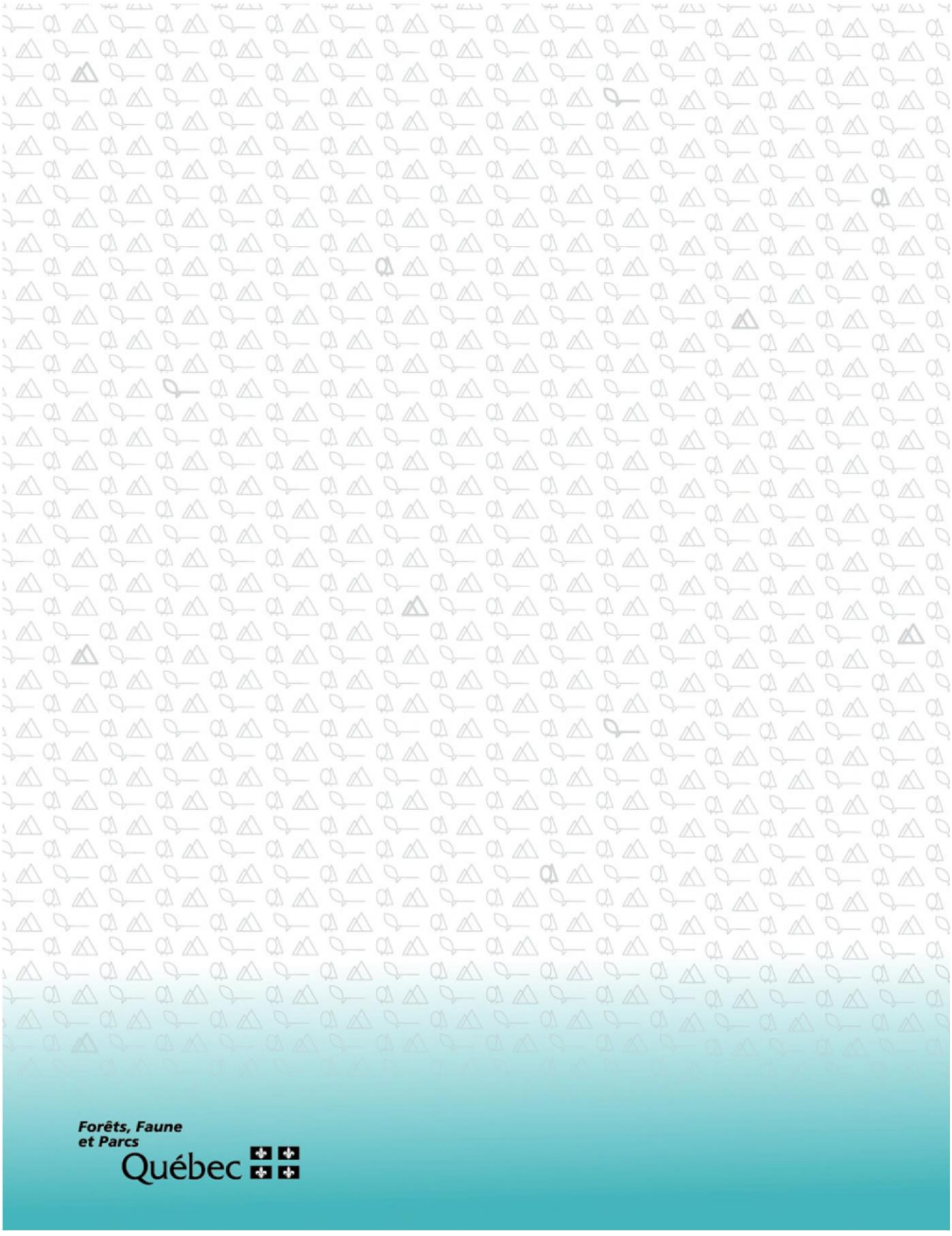
145. Un minimum de 30 % de la superficie forestière productive en peuplements forestiers résiduels de 7 m ou plus de hauteur doit être maintenu en tout temps dans une agglomération de coupes où la récolte d'arbres est réalisée et cette superficie doit être bien répartie dans l'agglomération ».

146. Les massifs forestiers doivent occuper au moins 20 % de la superficie d'une unité d'aménagement et être bien répartis dans l'unité ».

Bibliographie

QUÉBEC. *Loi sur l'aménagement durable du territoire forestier* (RLRQ, chapitre A-18.1), Éditeur officiel du Québec (à jour au 10 décembre 2020) [En ligne] [http://legisquebec.gouv.qc.ca/fr/ShowDoc/cs/A-18.1].

QUÉBEC. *Règlement sur l'aménagement durable des forêts du domaine de l'État* (RLRQ, chapitre A-18.1, r. 0.01), Éditeur officiel du Québec (à jour au 10 décembre 2020) [En ligne] [http://legisquebec.gouv.qc.ca/fr/ShowDoc/cr/A-18.1,%20r.%200.01/].


Forêts, Faune
et Parcs
Québec

APPENDIX D – ISSUES-SOLUTIONS SHEET FOR THE NORD-DU-QUÉBEC REGION

Objective number : 1.01.1

Name of objective : Minimizing gap between managed and natural forests - To limit hardwood expansion

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Changes in forest composition
Issue clarification :	The term “forest composition” refers to the variety and proportion of tree species in a forest. Composition plays a major role in ecosystem functions, at both landscape and stand level. The type of vegetation affects the availability of resources, food and habitats for wildlife, as well as internal stand temperatures, the nutrient cycle and natural disturbances. Consequently, silvicultural practices that alter forest composition can affect certain species and certain ecological processes in the forest, and are therefore likely to have repercussions for biodiversity maintenance and ecosystem viability.
Objective :	Halt hardwood encroachment to ensure that the composition of managed forests is similar to that of natural forests. Hardwood encroachment in a softwood or mixedwood stand occurs after a severe disturbance (fire, logging), especially when hardwood species are established before the disturbance. Some ecological types are more susceptible to hardwood encroachment than others. Targeted silvicultural actions can help maintain a species composition similar to that found in the natural forest. Control of hardwood encroachment can help maintain mixedwood stands that might otherwise be converted into hardwood stands.
Connection with other objectives :	Hardwood encroachment can be halted while maintaining the habitats associated with young mixedwood and hardwood stands. The objective for the internal structure of young stands (1.04.1) is to divide forestry work over time and space, to ensure that sufficient habitats are maintained at all times.

Chosen strategy and expected effects

1. Scarification with double pass harrowing

Encourage double pass harrowing followed by reforestation. This type of scarification lengthens the time before hardwoods grow back.

2. Reforestation (planting or fill planting)

Reforestation and fill planting help restore production to sites containing few desired species or sites with limited productivity.
Reforestation and fill planting promote full afforestation and help maintain productivity in the management unit’s forests.
Combined with tending of young stands, they also help to maintain a composition of desired species (e.g. by countering hardwood encroachment).

3. Clearing and cleaning

Clearing or cleaning of stands of softwood or mixed origin that are susceptible to hardwood encroachment.
Clearing and cleaning should help to preserve the softwood or mixed composition of the stand and hence counter encroachment.

4 . Irregular shelterwood cut

Irregular shelterwood cutting will be planned over an area equal to at least 5% of the planned regeneration cutting area throughout the integration zone. The ultimate target per management unit is established in hectares.
Irregular shelterwood cuts that remove 40% or less are those that are best suited to achieving the objective of maintaining or developing old-growth forest and habitat attributes. Partial cuts with harvest rates that are not too high will preserve the principal characteristics of the habitats, which will therefore continue to be used by the American marten, for example. Irregular shelterwood cuts with permanent tree cover are an example of this type of cut.
Regardless of whether the aim is to maintain the cover type or transition to a softwood-dominated stand, irregular shelterwood cutting is a relevant approach, especially in potential vegetation where tending of regenerating stands would require costly treatments. To maintain white spruce, stands with white spruce components could be given priority in scenarios involving partial cuts such as irregular shelterwood cuts.
The use of irregular shelterwood cutting should help to:
- Reduce hardwood encroachment
- Maintain old-growth stands with irregular structures
- Foster the development of the white spruce component in stands where white spruce is present
- Better maintain old-growth forest structures and reduce the quantity of regenerating stands
- Promote the maintenance of habitats associated with mature forests

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Site research for stand tending work directed towards stands of softwood or mixed origin with ME1, MS2, RS2 potential vegetation.	Forest manager	All year long
2	Select area that needs to be treated. Only sites where encroachment is ongoing are treated, regardless of ecological types	Forest manager	All year long
3	Silvicultural prescriptions likely to limit hardwood encroachment in stands of softwood or mixed origin with ME1, MS2 and RS2 potential vegetation.	Forest manager	All year long

Indicator number:	1.01.1.B	Indicator type:	Performance indicator

Indicator: Ratio of the area covered by silvicultural treatments limiting hardwood expansion on harvested area susceptible to hardwood expansion.

Scale: Management unit

Indicator clarifications:
Silvicultural actions limiting hardwood expansion are:
- Clearing, pre-commercial thinning and cleaning
- Irregular shelterwood cutting
- Preventive scarification

The sites to be considered in the indicator are softwood or mixed stands (at the time of logging) that may be invaded by hardwood species as a result of breaching the canopy. The sites that are most susceptible to hardwood encroachment are potential vegetations ME1, MS2 and, to a lesser extent, RS2. Site visits will confirm whether or not the risk of hardwood encroachment is real.

Useful definitions:
Pre-commercial thinning: cutting of trees that hinder the growth of crop trees in a young stand, by standardizing spacing.
Mechanical clearing: control of competing species to facilitate growth of natural or artificial regeneration of desired species, using mechanical means.
Cleaning: control of competing species to facilitate growth of natural or artificial regeneration of desired species, using mechanical means.
Preventive scarification: double pass harrowing helps prevent hardwood growth.

Frequency: Five-yearly

Breakdown by: Year

Target: 60%

Deviation: None.

Target and results for each MU

MU 087-62 Target 60% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	12,4 %	Red
	6,5 %	Red
	143,2 %	Green
	44,7 %	Green
	28,2 %	Yellow
	62,2 %	Green

MU 087-63 Target 60% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	33,7 %	Yellow
	36,9 %	Yellow
	40,5 %	Green
	39,3 %	Yellow
	17,0 %	Red
	31,0 %	Yellow

MU 087-64	Target 60%	Deviation	0 %

Reference period	Value	Evaluation
Review 2013-2018	37,4 %	Yellow
	25,0 %	Yellow
	0,0 %	Red
	0,4 %	Red
	0,4 %	Red
	0,2 %	Red

Information on target: It is important to identify the sites at risk of hardwood encroachment in order to apply the treatments in the right places. When a risk is confirmed, the action target to limit hardwood encroachment is 100%.
Maintenance of mixedwood stand characteristics also helps to halt hardwood encroachment because it preserves the softwood component of the stand.

Timeframe: None.

Documentation: Le guide sylvicole du Québec (only available in French) that address hardwood encroachment and the applicable silvicultural strategies:
Ministère des Ressources naturelles (2013). Le guide sylvicole du Québec, Volume 1, Les fondements biologiques de la sylviculture, collective work under the supervision of B. Boulet et M. Huot, Les Publications du Québec, 1044 p.
Ministère des Ressources naturelles (2013). Le guide sylvicole du Québec, Volume 2, Les concepts et l'application de la sylviculture, collective work under the supervision of B. Boulet et M. Huot, Les Publications du Québec, 752 p.

Indicator monitoring program:

Every year, the areas covered by silvicultural treatments designed to limit hardwood encroachments in stands that were originally softwood stands or composed of a combination of ME1, MS2 and RS2 potential vegetation will be counted. Similarly, logged areas in softwood stands or in stands with a combination of ME1, MS2 and RS2 potential vegetation stands will also be counted.

The indicator can then be calculated and forest managers will see whether or not the target has been achieved. If not, adaptations can be made to ensure that the target is achieved by the end of the five-year period.

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.01.2

Name of objective : Maintaining habitats associated with mixedwood stands

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Changes in forest composition
Issue clarification :	The term “forest composition” refers to the variety and proportion of tree species in a forest. Composition plays a major role in ecosystem functions, at both landscape and stand level. The type of vegetation affects the availability of resources, food and habitats for wildlife, as well as internal stand temperatures, the nutrient cycle and natural disturbances. Consequently, silvicultural practices that alter forest composition can affect certain species and certain ecological processes in the forest, and are therefore likely to have repercussions for biodiversity maintenance and ecosystem viability.
Objective :	Maintain habitats associated with mixed stands. This is achieved at the same time as the objective of developing the forest resource. The main objectives are to maintain dense, diverse young, old-growth or mature stands while taking stand recruitment into account. Mixed stands play a major role in the boreal forest. They provide a variety of unusual habitats within the forest matrix. They are scarce within the area and they provide habitats for wildlife, and these two factors alone provide ample justification for the need to consider them when managing the forest. Mixed stands are important at every stage of their development, regardless of whether they are young, mature or old-growth. Mature mixed stands are important mainly because of the importance of the hardwood component for nutrients, the presence of large-diameter trees (e.g. trembling aspen) able to serve as nesting sites for cavicolous wildlife, and the presence of large softwood trees providing protective cover. Young mixed stands are important mainly because of the presence of young hardwood trees providing fodder for wildlife, and the importance of lateral cover and species diversity.
Connection with other objectives :	The objective of maintaining mixedwood stands may contradict the objective of halting hardwood encroachment. These two objectives have therefore been harmonized. The objective relating to the internal structure of young stands (1.04.1) also plays a role in dividing stand tending treatments over time and space, to maintain young mixed stand habitats.

Chosen strategy and expected effects

1. Mixed stand management strategy

The Mixed Stand Management Strategy aims to maintain and recruit mature mixed stands. It allows the maintenance of habitats associated with mature and young mixed forests, while enhancing the forest resource.

2. Adapted stand tending treatments

Adapted stand training treatments will be applied to some young stands, whether they are natural or produced by planting. These treatments will encourage the survival of fruit bushes and/or a range of commercial species.
In the Nord-du-Québec region, fruit bushes must be protected during all stand tending treatments. The requirement applies to the following plants: sorb, elderberry, juneberry, hazel, arrowwood and cherry. These plants must, as far as possible, be preserved throughout the treated area. In addition, a fruit bush that grows within the radius required by a measured tree will not penalize the tree.
The use of adapted treatments will help to maintain quality habitats for species associated with young, dense stands. Preservation of fruit bushes will also help to maintain interesting habitats for wildlife species associated with young stands.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Annually monitor mature mixed stands and their renewal via the mechanisms of the adapted forest regime of La Paix des braves (Annex C4, Article 49).	Forest manager	All year long

Issues and Solutions Sheet prepared by : Sonia Légaré

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.01.3

Name of objective : Maintaining or increasing white spruce abundance

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Changes in forest composition
Issue clarification :	The term “forest composition” refers to the variety and proportion of tree species in a forest. Composition plays a major role in ecosystem functions, at both landscape and stand level. The type of vegetation affects the availability of resources, food and habitats for wildlife, as well as internal stand temperatures, the nutrient cycle and natural disturbances. Consequently, silvicultural practices that alter forest composition can affect certain species and certain ecological processes in the forest, and are therefore likely to have repercussions for biodiversity maintenance and ecosystem viability.
Objective :	Maintain or increase the white spruce component in managed forests. The white spruce is a companion species in many stands in Northern Québec. The short forest rotation, combined with winter logging and CPRS without retention of biological legacy are not conducive to natural regeneration of the species. The lack of post-logging germination beds appears to be the main cause of its decline, which is especially visible in the fir and fir-spruce forests. However, conditions are conducive to balsam fir regeneration, thereby amplifying the problem of white spruce regeneration. It is important to maintain white spruce in Northern Québec’s forests, even though the species is not abundant. Maintenance of a less usual species is a vital element in a biodiversity maintenance strategy.
Connection with other objectives :	Variable retention cutting (objective 1.03.1) and partial cutting (objective 1.02.1) both encourage the maintenance and natural regeneration of white spruce when it is present in a stand.

Chosen strategy and expected effects

1 . Reforestation or fill planting with white spruce

In the case of rich potential vegetation (MS2 and RS2 rich), or in sectors where the 4th ten-year inventory showed white spruce, fill planting or reforestation using white spruce may be an appropriate strategy.
Reforestation or fill planting with white spruce on favourable sites will help maintain the presence of white spruce in the management unit.

2. Irregular shelterwood cut

Irregular shelterwood cutting will be planned over an area equal to at least 5% of the planned regeneration cutting area throughout the integration zone. The ultimate target per management unit is established in hectares.
Irregular shelterwood cuts that remove 40% or less are those that are best suited to achieving the objective of maintaining or developing old-growth forest and habitat attributes. Partial cuts with harvest rates that are not too high will preserve the principal characteristics of the habitats, which will therefore continue to be used by the American marten, for example. Irregular shelterwood cuts with permanent tree cover are an example of this type of cut.
Regardless of whether the aim is to maintain the cover type or transition to a softwood-dominated stand, irregular shelterwood cutting is a relevant approach, especially in potential vegetation where tending of regenerating stands would require costly treatments. To maintain white spruce, stands with white spruce components could be given priority in scenarios involving partial cuts such as irregular shelterwood cuts.
The use of irregular shelterwood cutting should help to:
- Reduce hardwood encroachment
- Maintain old-growth stands with irregular structures
- Foster the development of the white spruce component in stands where white spruce is present
- Better maintain old-growth forest structures and reduce the quantity of regenerating stands
- Promote the maintenance of habitats associated with mature forests

3. CPRS with retention by clumps

CPRS with retention by clumps is a form of variable retention cutting in which residual mechantable trees are organized into small clumps evenly spread over the cutting area. Where necessary, it is followed by scarification, reforestation and/or clearing, but not in the clumps.
To encourage the maintenance of white spruce, CPRS with retention by clumps may be a good choice of variable retention cut in MS2 and RS2 rich potential vegetation or in sectors where most of the stands have a white spruce component. CPRS with retention by clumps is a good choice because it helps to maintain seed trees and high calibre stems that will provide germination sites in the medium term.
CPRS with retention by clumps would help to:
- Preserve merchantable trees and dead trees throughout the cutting area
- Provide an environment conducive to natural regeneration of white spruce when seed trees are present in the clump
- Maintain large trees in young, forming stands, thereby creating habitats for caviculous species among others

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Order white spruce plants for reforestation or fill planting.	Non commercial treatments forest manager	Each year, to plan the following one
2	Prescription of areas for reforestation or fill planting with white spruce.	Non commercial treatments forest manager	All year long
3	Prescribe silvicultural actions likely to foster the presence of white spruce (CPRS with retention by clumps, irregular shelterwood cutting, fill planting or reforestation with white spruce) in stands conducive to this.	Prescriptions forest manager	All year long

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.02.1

Name of objective : Maintaining sufficient old-growth stands with irregular structure

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Irregular old-growth forest
Issue clarification :	Natural stand dynamics in the boreal forest mean that internal stand structure changes over time. The longer the interval between severe disturbances, the greater the chance that the stand will develop a complex structure. Following clear-cutting, a single tree cohort is reconstituted and will form a regular-structured stand. In addition, given that forest rotations are shorter than natural disturbance cycles, stands do not have time to re-develop complex structures. The logging rate is therefore likely to result in a scarcity of stands with complex structures at landscape level. Old-growth stands with irregular structures account for a significant percentage (25% or more) of the natural forest in the Northern Québec region, and some of these stands have been affected by logging.
Objective :	Ensure that the percentage of old-growth stands with complex internal structures in managed forests is similar to that in the natural forest. One of the main solutions to this issue is to carry out a larger percentage of partial cuts. An action target will therefore be established because the region does not have much expertise in partial cutting. This will be done based on the management unit's forestry potential for partial cutting, the regional teams' operation potential for this type of treatment and the minimum amount required to justify the acquisition of this type of expertise by the region.
Connection with other objectives :	Stands treated with irregular shelterwood cuts rather than clear-cuts help achieve the age structure target.

Chosen strategy and expected effects

1. Irregular shelterwood cut

Irregular shelterwood cutting will be planned over an area equal to at least 5% of the planned regeneration cutting area throughout the integration zone. The ultimate target per management unit is established in hectares.
Irregular shelterwood cuts that remove 40% or less are those that are best suited to achieving the objective of maintaining or developing old-growth forest and habitat attributes. Partial cuts with harvest rates that are not too high will preserve the principal characteristics of the habitats, which will therefore continue to be used by the American marten, for example. Irregular shelterwood cuts with permanent tree cover are an example of this type of cut.
Regardless of whether the aim is to maintain the cover type or transition to a softwood-dominated stand, irregular shelterwood cutting is a relevant approach, especially in potential vegetation where tending of regenerating stands would require costly treatments. To maintain white spruce, stands with white spruce components could be given priority in scenarios involving partial cuts such as irregular shelterwood cuts.
The use of irregular shelterwood cutting should help to:
- Reduce hardwood encroachment
- Maintain old-growth stands with irregular structures
- Foster the development of the white spruce component in stands where white spruce is present
- Better maintain old-growth forest structures and reduce the quantity of regenerating stands
- Promote the maintenance of habitats associated with mature forests

2. Elongation of rotation in targeted stands

In operational planning, the choice of stands of conservation interest when selecting residual forest blocks can, for example, help elongate the rotation period. These stands of interest may be old-growth forests, mature mixed stands, irregular stands or other habitats of interest.
Elongation of rotations in certain stands should help to:
- Maintain and create irregular structured old-growth stands while applying the principle of precaution
- Help maintain the structures of old-growth forests and reduce the over-abundance of regenerating stands, while reducing the impact on allocations
- Allow white spruce trees to acquire the maturity required for regeneration to become established before final cutting

3. Targeted degree of alteration by UTA

Every management unit is divided into territorial analysis units (UTAs). For each UTA, targets have been established for old-growth forests and the maximum quantity of regenerating forests. This is the targeted degree of alteration (low, moderate or high). These restrictions on forest age force rotations to become longer in UTAs with too many regenerating forests or not enough old-growth forests, compared to their targets.
This requirement helps to ensure that old-growth forests are distributed throughout the management unit. The application of a requirement at TAU level helps to foster the presence of old-growth forests throughout the management unit.
The management strategy, by preserving a percentage of old-growth forests and limiting the percentage of regenerating forests, reduces the risk of biodiversity loss at UTA level.

4. Protected area

Protected areas, biological refuges and exceptional forest ecosystems within an area help to protect old-growth forests and also limit logging.
Maintenance of areas unaffected by logging should help to:
- Improve the maintenance of old-growth forest structures
- Reduce the over-abundance of regenerating stands
- Protect high conservation value elements such as essential habitats

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Site research for stands suitable for irregular shelterwood cutting.	Forest manager	All year long
2	Apply the strategy (plan for 5 % of irregular shelterwood cutting per MU or group of MU.	Forest manager	All year long

Indicator number:	1.02.1.B	Indicator type:	Performance indicator

Indicator: Ratio of the area covered by irregular shelterwood compared to the whole harvested area in the management unit (MU) or a group of MU.

Scale: Management unit

Indicator clarifications: The indicator is the ratio of area harvested by means of irregular shelterwood cutting to the area harvested by means of regeneration cutting and irregular shelterwood cutting by management unit (MU) or group of MU. Of all the shelterwood cuts, the irregular shelterwood cut with permanent cover is the form that best allows for sufficient cover and characteristics to be left behind to maintain habitats and mature and old-growth forest characteristics.

Useful definitions: Irregular shelterwood cutting with permanent cover is a regeneration process under which the stand is harvested, regenerated, tended and improved through a series of partial cuts spread over more than one-fifth of the rotation. It is done with the aim of maintaining, coverting or restoring an irregular structure (usually two to four age classes) without a final cut.
Irregular shelterwood cutting with slow regeneration is a regeneration process under which the stand is harvested, regenerated, tended and improved through a series of partial cuts spread over more than one-fifth of the rotation. It is done with the aim of restoring an irregular structure (two-storey) or converting a regular structure into an irregular structure.

Frequency: Five-yearly

Breakdown by: Year

Integration zone (groups of MU)

Target 5%

Deviation:

Target and results for each MU

MU 087-62 Target 5% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	2,0 %	Red
	0,0 %	Red
	6,0 %	Green
	2,3 %	Red
	10,7 %	Green
	3,3 %	Yellow

MU 087-63 Target 5% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	1,7 %	Red
	7,9 %	Green
	5,5 %	Green
	6,2 %	Green
	3,9 %	Yellow
	5,3 %	Green

MU 087-64	Target 5%	Deviation	0 %

Reference period	Value	Evaluation
Review 2013-2018	4,6 %	Yellow
	0,0 %	Red
	0,0 %	Red
	0,0 %	Red
	9,5 %	Green
	2,7 %	Red

Information on target: The target is set by a group of MU, although a fair division between management units is desirable. The amount of irregular shelterwood cuts should be roughly 5% in all management units.

Timeframe: None.

Documentation: Decision support tool for silvicultural treatments in Québec: https://mffp.gouv.qc.ca/publications/forets/entreprises/fiches-aide-decision-traitement_sylvicole.pdf

Indicator monitoring program:

After each year, all irregular shelterwood areas in the group of MU will be counted. The indicator can then be calculated and forest managers will see whether or not the target has been achieved for each year. If not, adaptations can be made to ensure that the target is achieved by the end of the five-year period.

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.03.1

Name of objective : Minimizing gap between managed and natural forests - deadwood rarefaction

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Biological legacies in clearcuts
Issue clarification :	Deadwood accumulates in variable quantities in the natural forest, depending on stand age. In the Northern Québec region, significant quantities of deadwood accumulate after major disturbances such as fires. Mortality can occur up to ten years after a fire, thereby ensuring recruitment and a significant volume of deadwood shortly after the fire. As the stand ages, the deadwood decomposes and quantities decrease. The amount of debris and snags will start to increase during the canopy transition phase, i.e. with the onset of mortality of the first cohort established after the fire. If undisturbed, mature stands will become old-growth stands, with deadwood recruitment occurring as a result of the gaps in the canopy resulting from tree senescence. Fallen deadwood and snags are key attributes for biodiversity maintenance. Many species depend on these attributes at one time or another in their life cycle. Researchers in Québec have identified 60 species of vertebrates (amphibians, reptiles, mammals and birds) that use deadwood. In addition to being used by wildlife, dead trees are also important for forest productivity: a large percentage of the organic matter restored to circulation in the ecosystem comes from these structures. They also serve as germination environments for numerous plant species, which take root in the wood and bark in order to extract water and nutrients. In the managed forest, final cutting leaves very few merchantable trees in the logging area. This is a major difference from the natural forest. Scarcity of biological legacies has been identified as one of the main issues to be taken into account in the application of ecosystem-based management.
Objective :	Ensure that biological legacies are sufficiently present in a significant part of the cutblocks. The aim is to reduce the difference between the quantity of biological legacies (large dead or living trees) in the managed and natural forests, and to maintain an even distribution of good quality biological legacies in sufficient quantities. The quality of a biological legacy is assessed from the size of the remaining trees (the larger they are, the better it is), their stage of deterioration (living, recent dead, older dead) and species (trembling aspen is especially favourable, for example).
Connection with other objectives :	Variable retention cuts help maintain white spruce (objective 1.01.3) when seed trees are present in the stand. Retention of biological legacies is also very important in maintaining species that are sensitive to forest management.

Chosen strategy and expected effects

1 . 40 % of variable retention cutting (Paix des braves)

In order to preserve legacies and foster the maintenance of biological diversity, variable retention cutting that retains at least 5% of the stand’s merchantable volume should be applied to at least 40% of the area harvested. Variable retention cuts should be spread throughout the management unit, not grouped into a single sector. This means aiming for at least 20% of variable retention cuts in each planned trapline.
There should be a certain amount of diversity in the forms of retention practised in each trapline. Within the 40% target, a balance should be achieved between the various forms of retention (small clusters, large blocks (1 to 5 ha), individual trees). Each form has advantages and disadvantages for conservation of biodiversity and landscape aesthetics.

Stand type and internal structure, type of environment and harmonization requirements will all influence the choice of treatment.
Variable retention cutting will help to:
- Maintain a certain volume of standing timber that will age
- Foster the creation of germination beds associated with deadwood
- Maintain biodiversity at disturbance (harvest) level. For example, large trees left standing in logging areas will provide perches for birds that hunt in open areas

2. CPRS with retention by clumps

CPRS with retention by clumps is a form of variable retention cutting in which residual mechantable trees are organized into small clumps evenly spread over the cutting area. Where necessary, it is followed by scarification, reforestation and/or clearing, but not in the clumps.
To encourage the maintenance of white spruce, CPRS with retention by clumps may be a good choice of variable retention cut in MS2 and RS2 rich potential vegetation or in sectors where most of the stands have a white spruce component. CPRS with retention by clumps is a good choice because it helps to maintain seed trees and high calibre stems that will provide germination sites in the medium term.
CPRS with retention by clumps would help to:
- Preserve merchantable trees and dead trees throughout the cutting area
- Provide an environment conducive to natural regeneration of white spruce when seed trees are present in the clump
- Maintain large trees in young, forming stands, thereby creating habitats for caviculous species among others

3. CPRS with retention of large individual stems

CPRS with retention of large individual stems involves preserving individual trees with a breast height diameter of more than 20 cm throughout the cutting area. Caviculous species prefer trembling aspen, and this species should also be favoured when selecting the trees to be retained in the field. Planned retention for stands is 30 stems per hectare. This type of cutting can be followed by clearing if necessary.
Maintaining large trees in the cutting area helps to:
-Preserve habitats for caviculous species
-Ensure recruitment of large deadwood for the future stand

4. CPRS with patch retention

CPRS with patch retention involves protecting large clusters of trees covering areas of 1 to 5 hectares able to contain interior forest. These clusters or patches cover 5% of the harvestable area and are compact (fairly wide) in terms of shape. A patch can be left around an inaccessible area or small wetland. However, only the productive forest area in the patch counts towards the 5% retention target.
This type of retention is particularly favourable to the maintenance of moss and hepatica plants. These small species need humidity and shade, and can subsist within the cutting area thanks to the presence of the patches.
CPRS with patch retention helps to:
- Maintain forest clusters containing interior forest, thereby contributing to the survival, in cutting areas, of species associated with interior forests
- Preserve merchantable trees and dead trees at cutting sites

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	In every annual program, plan for variable retention cutting in 40% of the logged area of a spatial organization compartment or trapline.	Forest manager	When producing the annual plan (PRAN)
2	Verification of compliance with operational directives.	Forest manager	When producing the annual plan (PRAN)

Indicator number:	1.03.1.A	Indicator type:	Performance indicator

Indicator: Ratio of the area covered by variable retention compared to regeneration cutting area.

Scale: Landscape

Indicator clarifications: This indicator measures the area of the management unit covered by variable. retention cutting. The following indicator measures the fair distribution of these variable retention areas within the management unit (among the COS or traplines).

Useful definitions: Variable retention cutting: cutting that provides for methods of retaining at least 5% of the stand's merchantable volume in the form of individual trees, clumps or patches.
Cutting with protection of regeneration and soils with retention by clumps, cutting with protection of regeneration and soils with retention by patches and cutting with protection of regeneration and soils with retention by stems are all counted in the area covered by variable retention cutting.

Frequency: Five-yearly

Breakdown by: Year

Management unit

Target 40%

Deviation: None.

Target and results for each MU

MU 087-62 Target 40% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	27,5 %	Yellow
	8,7 %	Red
	36,0 %	Yellow
	18,1 %	Red
	50,0 %	Green
	23,4 %	Red

MU 087-63 Target 40% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	15,8 %	Red
	31,0 %	Yellow
	34,9 %	Yellow
	33,7 %	Yellow
	39,3 %	Yellow
	36,0 %	Yellow

MU 087-64 Target 40% Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	22,1 %	Red
	30,3 %	Yellow
	23,4 %	Red
	26,6 %	Yellow
	37,7 %	Yellow
	29,7 %	Yellow

Information on target:	The 40% target applies to the management unit as a whole. It is preferable to distribute variable retention cuts among all the traplines. Indicator 1.03.1.B is used to measure the distribution of variable retention cuts in each trapline.
Timeframe:	None.
Documentation:	Internal stand structure notebook: https://mffp.gouv.qc.ca/wp-content/uploads/cahier_5_1_structure_interne.pdf Regional information sheet on maintenance of biological legacies: available on request.

Indicator monitoring program:

After each year, all areas to which variable retention cuts have been applied will be counted. The indicator can then be calculated and forest managers will see whether or not the target has been achieved for each year. If not, adaptations can be made to ensure that the target is achieved by the end of the five-year period.

Indicator number:	1.03.1.B	Indicator type:	Performance indicator

Indicator: Proportion of COS or traplines whose ratio of the area covered by variable retention compared to regeneration cutting area is equal or over 20%.

Scale: Landscape

Indicator clarifications: The overall retention cutting target per management unit is 40%. This indicator is complementary to 1.03.1.A and is used to ensure that variable retention cuts are evenly distributed throughout the management unit.

Useful definitions:

Frequency: Five-yearly

Breakdown by: Year

Spatial organization compartment or trapline

Target: 100% of the traplines

Deviation: None.

Target and results for each MU

MU 087-62 Target 100% of the traplines Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	62,5 %	Yellow
	42,9 %	Red
	100,0 %	Green
	37,5 %	Red
	100,0 %	Green
	62,5 %	Yellow

MU 087-63 Target 100% of the traplines Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	14,3 %	Red
	33,3 %	Red
	50,0 %	Red
	62,5 %	Yellow
	75,0 %	Yellow
	60,0 %	Yellow

MU 087-64 Target 100% of the traplines Deviation 0 %

Reference period	Value	Evaluation
Review 2013-2018	57,1 %	Red
	62,5 %	Yellow
	33,3 %	Red
	62,5 %	Yellow
	50,0 %	Red
	87,5 %	Yellow

Information on target: It is preferable for the target of 40% variable retention cuts to be achieved in each trapline, as far as possible. This indicator is used to measure the percentage of traplines that are close to achieving this target.

Timeframe: None.

Documentation: Internal stand structure notebook: https://mffp.gouv.qc.ca/wp-content/uploads/cahier_5_1_structure_interne.pdf
Regional information sheet on maintenance of biological legacies: available on request.

Indicator monitoring program:

After each year, all areas to which variable retention cuts have been applied will be counted for each trapline. The indicator can then be calculated and forest managers will see whether or not the target has been achieved for each year. If not, adaptations can be made to ensure that the target is achieved by the end of the five-year period.

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.04.1

Name of objective : Limiting internal structure simplification in young second-growth stands

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Young forest structure and composition
Issue clarification :	In the Northern Québec region, young stands between 10 and 25 years of age provide habitats with a sapling-rich habitat that is beneficial to small wildlife species such as the ruffed grouse and snowshoe hare. The lateral cover is ideal to provide food and protection from predators. Other species such as the moose and black bear also appreciate these young stands, as sources of food. Stand tending treatments such as pre-commercial thinning, stand cleaning and stand release, are appropriate to maintain the desired composition and control competing vegetation. Silvicultural actions such as these alter the structure and composition of the young stands that are treated. Alterations may include homogenization of tree density and spatial distribution of trees, simplification of the vertical structure, reduction of lateral cover, depletion of fruit trees and depletion of dense sapling stands. Stand tending treatments in this type of habitat change its characteristics and spoil it for up to five years. After that time, shelter cover and food are present in sufficient quantities to meet the needs of most of the species that use these environments. This issue requires particular attention in order to provide an adequate supply of young, dense, diversified stands.
Objective :	Limit simplification of internal stand structure in young second-growth stands. The aim is to provide an adequate supply of young, dense, diversified stands. Forest managers therefore wish to avoid simplifying or standardizing the layers resulting from clearcutting over a given period, and to use mitigation measures in the areas most at risk.
Connection with other objectives :	This objective helps to preserve young habitats for the snowshoe hare, moose and American marten (objective 1.07.1).It could be in opposition to the issue on the hardwood encroachment (1.01.1). To ensure the achievement of both objectives, mitigation measures must be promoted in educational work.

Chosen strategy and expected effects

1 . Limit the percentage of stand tending treatments

Aim to have at least 50% of young stands between 10 and 25 years of age that have not undergone stand tending treatments for at least five years, in 6,000 hexagon units. Stand tending treatments such as pre-commercial thinning, clearing and cleaning reduce species density and diversity in young stands and hence diminish wildlife habitat quality for a period of up to five years.
By spreading stand tending treatments over time in young, dense habitats suitable for small wildlife, it is possible to ensure that sufficient quantities of these habitats are available at all times.

2. Adapted stand tending treatments

Adapted stand training treatments will be applied to some young stands, whether they are natural or produced by planting. These treatments will encourage the survival of fruit bushes and/or a range of commercial species.
In the Nord-du-Québec region, fruit bushes must be protected during all stand tending treatments. The requirement applies to the following plants: sorb, elderberry, juneberry, hazel, arrowwood and cherry. These plants must, as far as possible, be preserved throughout the treated area. In addition, a fruit bush that grows within the radius required by a measured tree will not penalize the tree.
The use of adapted treatments will help to maintain quality habitats for species associated with young, dense stands. Preservation of fruit bushes will also help to maintain interesting habitats for wildlife species associated with young stands.

3. Harmonize the distribution of stand tending treatments according to need

Distribute stand tending treatments so as to foster continued use (especially small game hunting and trapping), depending on the stakeholders' needs.
By spreading this type of work out, an ongoing supply of quality habitats can be maintained for the harvested species.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	When planning stand tending work in a given sector (hexagon), aim to achieve at least 50% of untreated young stands (by including the last five years).	Forest manager	All year long

Indicator number:	1.04.1.A	Indicator type:	Performance indicator

Indicator: Proportion of hexagons whose ratio of the area covered by tending treatmentsfor the last 5 years (precommercial thinning and clearing) compared to the area of young stands (10 to 25 years of age) is less than or equal to 50%.

Scale: Landscape

Indicator clarifications: Since tending treatments have a negative impact on wildlife habitats in the sapling layer for five years at most, only treatments in the five years preceding the reference year are included.
The base units (6,000 ha hexagons) are used to assess this aspect in areas that are smaller than the management unit, the trapline or the COS. This allows for identification of gaps located in specific places.

Useful definitions: Second-growth forest: Forest or stand established (naturally or artificially) after a regeneration cut or severe natural disturbance.
Sapling stage: young stand composed mainly of saplings. Saplings are young trees at least one metre tall with a DBH of between 1 cm and 9 cm. For analysis, stands aged between 10 and 25 years are considered to be sapling stands.
Pre-commercial thinning: Cutting of trees that hinder the growth of crop trees in a young stand, by standardizing spacing between trees.
Mechanical clearing: control of competing species to facilitate the growth of natural or artificial regeneration of desired species, using mechanical means.
Cleaning: control of competing species to facilitate growth of natural or artificial regeneration of desired species, using mechanical means.

Frequency: Yearly

Breakdown by: 6,000 ha hexagons

Target: 100%

Deviation: If units exceed 50%, mitigation measures should be considered.

Target and results for each MU

MU 087-62 Target 100% Deviation 0 %

Reference period	Value	Evaluation
Year of reference: 2013	100,0 %	Green
Year of reference: 2017	100,0 %	Green
	100,0 %	Green
	100,0 %	Green

MU 087-63 Target 100% Deviation 0 %

Reference period	Value	Evaluation
Year of reference: 2013	100,0 %	Green
Year of reference: 2017	100,0 %	Green
	100,0 %	Green
	100,0 %	Green

MU 087-64 Target 100% Deviation 0 %

Reference period	Value	Evaluation
Year of reference: 2013	100,0 %	Green
Year of reference: 2017	100,0 %	Green
	100,0 %	Green
	100,0 %	Green

Information on target: Throughout the territory, forest managers must plan to avoid treatment rates of more than 50% among sapling stage habitats in each hexagon. The treatment rate indicator should be measured every five years, or more frequently if necessary.
Mitigation measures must be applied in hexagons where the rate is close to or

above 50%. These measures are described in the actions required to achieve the target.

Timeframe: None.

Documentation: Internal stand structure notebook: https://mffp.gouv.qc.ca/wp-content/uploads/cahier_5_1_structure_interne.pdf
Chief Forester's report on stand tending of sapling layers: http://forestierenchef.gouv.qc.ca/wp-content/uploads/2013/01/08385_MDPF_Education.pdf
Decision support sheets for sylvicultural treatments in Québec: https://mffp.gouv.qc.ca/publications/forets/entreprises/fiches-aide-decisiontraitement_sylvicole.pdf

Indicator monitoring program:

Monitor the indicator during planning of silvicultural work. To do this, calculate the overall rate for stands 10 to 25 years of age that have undergone tending treatments in the five years preceding the reference year and compare the result to that for stands 10 to 25 years of age in a given reference year.

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.05.1

Name of objective : Maintaining attributes specific to forests naturally disturbed at the landscape scale and in areas affected by special management plans

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Naturally-disturbed forest attributes
Issue clarification :	Forests that have been disturbed naturally by fire, insects or wind are very important to wildlife. Among other things, they are a major source of deadwood and provide a diverse structure and favourable range of vegetation by encouraging regeneration. Most of the naturally-disturbed forests in the region are the result of fires. Some burned forests have attributes that increase their value. They include mature forests (larger diameter trees), forests that were less severely burned and burned forests situated near forests that were not burned. Windfall environments are conducive to regeneration and provide an internal structure of interest to wildlife. They are also conducive to the creation of shelters and dens for species including the American marten, black bear and winter wren.
Objective :	To ensure the maintenance of attributes specific to naturally-disturbed forests at broader landscape level and in areas covered by special management plans.
Connection with other objectives :	Maintenance of species sensitive to forest management (1.07.1) is connected to this objective. The black-backed woodpecker and three-toed woodpecker, two species that are sensitive to management, need naturally-disturbed forests in order to maintain their presence in the area.

Chosen strategy and expected effects

1. Application of salvage rules for wood damaged by natural disturbances (Paix des braves)

A guide has been produced under Chapter 3 of the Paix des Braves agreement, concerning salvage activities and restoration of production to forests following natural disturbances.
These activities must be carried out so as to:
- mitigate ecological and environmental impacts
- mitigate impacts for animal populations
- mitigate impacts for the traditional Cree lifestyle
- have positive economic consequences for Cree and non-Cree employment
- mitigate negative impacts on timber supplies

Five guidelines have been proposed to maintain the ecological integrity of ecosystems following salvage work:
1. Maintenance of biodiversity:
   a. Maintain sufficient diversity in disturbed stands
   b. Reproduce the footprint left by the natural disturbance with respect to the natural forest's attributes
2. Protection of forest soils and water quality
3. Development of natural regeneration
4. Social acceptability
5. Compliance with the Agreement's principles

Source: Schedule C – Part V (C-5) Guide to the preparation of special development plans for the salvage of wood damaged by natural disturbances. Chapter 3, Paix des Braves.
This will ensure that sufficient quantities of disturbed and undisturbed residual forests are preserved in order to maintain the species associated with the habitats they provide.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	When planning to salvage wood following a natural disturbance, include ways of maintaining disturbed and undisturbed residual forest.	Operational forest manager	After a natural disturbance

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.07.1

Name of objective : Considering sensitive species habitat needs in forest management

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Sensitive species
Issue clarification :	The forest serves as the habitat for many wildlife and plant species. Consequently, forest management activities, by altering forest attributes, can have a significant impact on these species' abundance, distribution and survival. The efforts made by ecosystem-based management of forests is the first step in ensuring maintenance of habitats and biodiversity. However, some species have particular needs that cannot necessarily be met by ecosystem-based management. This is why it is so important to incorporate the needs of species at risk and sensitive species in forest management. The aim of this issue is to ensure that the habitat needs of species at risk and species sensitive to forest management are considered during forest planning.
Objective :	To consider the habitat needs of sensitive species in the forest management process, in order to ensure that their needs are considered and that management targets and solutions are adapted accordingly.
Connection with other objectives :	This objective is connected to all the other objectives. For example, species sensitive to forest management are encouraged by setting targets for variable retention cutting (1.03.1) and partial cutting (1.02.1). They are also encouraged by age structure targets, which control the maintenance of old-growth forests and limit the number of very small stands. Distribution, in time and space, of stand tending treatments in young stands (1.04.1) helps to maintain the habitat of the snowshoe hare, a key species. Maintenance of naturally-disturbed forests (1.05.1) is advantageous to woodpeckers and black bear. Maintenance of wetlands and riparian environments (1.08.2) is also advantageous to sensitive species.

Chosen strategy and expected effects

1. Development and implementation of wildlife habitat directives

The directives will be designed to introduce strategies into the forest management planning process that will take the protection and development of wildlife habitats into account. These strategies will be based on the integration of wildlife issues into forest planning.
A workshop on Cree wildlife issues took place in April 2016 in order to begin work leading to the preparation of wildlife habitat directives. Since then, additional work has been undertaken to document species-specific needs and compare them to the management strategy in force in the area concerned. Ultimately, the directives will become a decision support tool.
The directives will be a tool that will help forest managers and joint working group members to maintain essential wildlife habitats in areas under management.

2. Analysis of management plans by the Direction de la gestion de la Faune

All operational forest management plans are analyzed by biologists and wildlife technicians at the Direction de la gestion de la Faune. This ensures that potential impacts on wildlife habitats are detected, and that the plans are adapted where necessary. It provides an additional safety net to help preserve biodiversity in areas under management.

3. Mixed stand management strategy

The Mixed Stand Management Strategy aims to maintain and recruit mature mixed stands. It allows the maintenance of habitats associated with mature and young mixed forests, while enhancing the forest resource.

4. Protected area

Protected areas, biological refuges and exceptional forest ecosystems within an area help to protect old-growth forests and also limit logging.
Maintenance of areas unaffected by logging should help to:
- Improve the maintenance of old-growth forest structures
- Reduce the over-abundance of regenerating stands
- Protect high conservation value elements such as essential habitats

5. Limit the percentage of stand tending treatments

Aim to have at least 50% of young stands between 10 and 25 years of age that have not undergone stand tending treatments for at least five years, in 6,000 hexagon units. Stand tending treatments such as pre-commercial thinning, clearing and cleaning reduce species density and diversity in young stands and hence diminish wildlife habitat quality for a period of up to five years.
By spreading stand tending treatments over time in young, dense habitats suitable for small wildlife, it is possible to ensure that sufficient quantities of these habitats are available at all times.

6. Adapted stand tending treatments

Adapted stand training treatments will be applied to some young stands, whether they are natural or produced by planting. These treatments will encourage the survival of fruit bushes and/or a range of commercial species.
In the Nord-du-Québec region, fruit bushes must be protected during all stand tending treatments. The requirement applies to the following plants: sorb, elderberry, juneberry, hazel, arrowwood and cherry. These plants must, as far as possible, be preserved throughout the treated area. In addition, a fruit bush that grows within the radius required by a measured tree will not penalize the tree.
The use of adapted treatments will help to maintain quality habitats for species associated with young, dense stands. Preservation of fruit bushes will also help to maintain interesting habitats for wildlife species associated with young stands.

7. 40 % of variable retention cutting (Paix des braves)

In order to preserve legacies and foster the maintenance of biological diversity, variable retention cutting that retains at least 5% of the stand’s merchantable volume should be applied to at least 40% of the area harvested. Variable retention cuts should be spread throughout the management unit, not grouped into a single sector. This means aiming for at least 20% of variable retention cuts in each planned trapline.
There should be a certain amount of diversity in the forms of retention practised in each trapline. Within the 40% target, a balance should be achieved between the various forms of retention (small clusters, large blocks (1 to 5 ha), individual trees). Each form has advantages and disadvantages for conservation of biodiversity and landscape aesthetics. Stand type and internal structure, type of environment and harmonization requirements will all influence the choice of treatment.
Variable retention cutting will help to:
- Maintain a certain volume of standing timber that will age
- Foster the creation of germination beds associated with deadwood
- Maintain biodiversity at disturbance (harvest) level. For example, large trees left standing in logging areas will provide perches for birds that hunt in open areas

8. Targeted degree of alteration by UTA

Every management unit is divided into territorial analysis units (UTAs). For each UTA, targets have been established for old-growth forests and the maximum quantity of regenerating forests. This is the targeted degree of alteration (low, moderate or high). These restrictions on forest age force rotations to become longer in UTAs with too many regenerating forests or not enough old-growth forests, compared to their targets.
This requirement helps to ensure that old-growth forests are distributed throughout the management unit. The application of a requirement at TAU level helps to foster the presence of old-growth forests throughout the management unit.
The management strategy, by preserving a percentage of old-growth forests and limiting the percentage of regenerating forests, reduces the risk of biodiversity loss at UTA level.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Identification of regional wildlife needs.	Sophie Dallaire	Done
2	Identification of critical habitat thresholds and ways of analyzing habitat quality.	Sophie Dallaire	Done
3	Analyze the quality of the area's habitats and the management strategy's effectiveness in maintaining good quality habitats.	Sonia Légaré	Fall 2022
4	Identification of solutions to the main issues associated with wildlife species.	Sonia Légaré	April 2023
5	Preparation of wildlife habitat directives in close collaboration with the Cree Nation Government.	Sonia Légaré	April 2023
6	Have the proposed Wildlife Habitat Directives approved by the MRNF and Cree Nation Government authorities.	Sonia Légaré	December 2023
7	Implement the Wildlife Habitat Directives.	All employees	As soon as possible
8	Prepare a monitoring indicator for the Wildlife Habitat Directives.	Sonia Légaré	December 2023

Issues and Solutions Sheet prepared by : Sonia Légaré

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.08.1

Name of objective : Protecting wetlands

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Ecological functions fulfilled by wetlands and riparian areas
Issue clarification :	Wetlands and riparian areas provide habitats that are especially rich due to the biodiversity they support and the ecological functions they protect. Care is therefore needed when performing forestry work in the vicinity of these areas, so as to keep the impacts to a minimum. These complex environments ensure a number of essential environmental, social and economic functions: - Habitats for wildlife and plants, and in particular for threatened or vulnerable species - Connectivity of aquatic and terrestrial habitats - Regulation of the drainage pattern and control of shoreline erosion - Groundwater recharge and water retention - Water filtering, sediment retention and maintenance of a quality aquatic environment - Maintenance of visual landscape quality and level of attraction for recreational and tourism activities - Contribution to the production of wood, wildlife and halieutic resources
Objective :	To protect wetlands because of their significant ecological roles. Current regulations provide basic protection for wetlands, but do not always allow managers to address the objectives in a specific way. Conservation of wetlands of special interest for their high conservation value has therefore been implemented.
Connection with other objectives :	This objective is mainly connected with the maintenance of species sensitive to forest management (1.07.1). Many species use wetlands during their annual life cycle.

Chosen strategy and expected effects

2 . Additional protection for wetlands

Wetland protection needs to be improved in management units where less than 12% of wetlands are protected. In these cases, the aim is to add protected wetland areas equivalent to 1% of the management unit’s total area. When identifying the wetlands to be protected, it is important to give priority to rare wetlands and those sheltering species at risk. Additional wetland protection will help to maintain some of these important ecosystems.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Identify the additional wetlands to be protected if there are gaps.	Christiane D'Elia	April 2023

Indicator number:	1.08.1.A	Indicator type:	Performance indicator

Indicator: Areas of wetlands protected by a wetland of interest (MHI).

Scale: Management unit

Indicator clarifications: This indicator aims to identify wetlands of interest (MHI) that will protect the equivalent of 1% of the area of the MU in wetlands.

Useful definitions: Marsh: a habitat composed of a shallow tract of stagnant water invaded by herbaceous vegetation growing on a mineral substrate that is partially or completely submerged during the growth season. A marsh is usually riparian (adjacent to a lake or watercourse).
Swamp: a stretch of land that is permanently saturated or covered by water and is occupied by woody, shrub or tree vegetation growing on mineral soil. A swamp is subject to seasonal flooding or is characterized by a high water table and circulation of water enriched with minerals. A swamp may be riparian or isolated.
Peat bog: wetland plant formation resulting from an accumulation of partially decomposed organic matter. The organic matter is poorly drained and accumulates to a thickness of more than 40 cm. A peat bog may be open (unwooded) or wooded (trees more than 4 metres high and a cover equal to or in excess of 25%). A peat bog with a pond is composed of one or more isolated bodies of water forming one or more ponds of various shapes.
Wet barren area: a treeless area in a wetland location. This term is more generic and may include the types of wetlands described above.
For map analysis purposes, wetlands have been defined by selecting the following attributes from the ecoforest map: types of drained wet physical environments (ecological types ending with 7, 8 or 9); - wet barren areas; - alder groves.

Frequency: Five-yearly

Breakdown by: Management unit

Target: Area that allows to reach the equivalent of 1% of the MU total area, in protected wetlands.

Deviation: None

Target and results for each MU

MU	Target	Deviation
087-62	Area that allows to reach the equivalent of 1% of the MU total area, in protected wetlands.	0 ha

Reference period	Value	Evaluation
PAFIT 2018	0,0 ha	Red

MU	Target	Deviation
087-64	Area that allows to reach the equivalent of 1% of the MU total area, in protected wetlands.	0 ha

Reference period	Value	Evaluation
PAFIT 2018	0,0 ha	Red

Information on target: The target will protect an area of wetlands equivalent to 1% of the area of the management unit. This is in addition to other areas already protected within the management unit.
However, if 12% or more of the wetland areas in the management unit are located in protected areas and therefore already benefit from protection, it is not necessary to add others and the target is achieved for that management unit.

Timeframe: The MU 087-62 and 087-64 did not achieve the target. A postponement to April 2023 is acceptable, to identify wetlands for which synergy with other conservation efforts would be of interest.

Documentation: Notebook of wetland issues:
http://www.intranet/forets/grands-dossiers/amenagementecosys/documents/Cahier_6.2_Milieux_humides.pdf

Indicator monitoring program:

The indicator will be follow until the target is reached.

Issues and Solutions Sheet prepared by : Christiane D'Elia

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 1.08.2

Name of objective : Diversifying management of riparian environments

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Biological diversity
Issue (value) :	Ecological functions fulfilled by wetlands and riparian areas
Issue clarification :	Wetlands and riparian areas provide habitats that are especially rich due to the biodiversity they support and the ecological functions they protect. Care is therefore needed when performing forestry work in the vicinity of these areas, so as to keep the impacts to a minimum. These complex environments ensure a number of essential environmental, social and economic functions: - Habitats for wildlife and plants, and in particular for threatened or vulnerable species - Connectivity of aquatic and terrestrial habitats - Regulation of the drainage pattern and control of shoreline erosion - Groundwater recharge and water retention - Water filtering, sediment retention and maintenance of a quality aquatic environment - Maintenance of visual landscape quality and level of attraction for recreational and tourism activities - Contribution to the production of wood, wildlife and halieutic resources
Objective :	Diversify management of riparian environments. To do this, map and analyze the management unit's riparian environments in order to maintain a representative portion of them and ensure that rare elements are preserved. Riparian environments perform a number of ecological functions that are essential to terrestrial and aquatic environments, maintenance of biodiversity and maintenance of forest productivity. Since they act as an interface between the aquatic and terrestrial environments, they are among the most productive ecosystems from a biological standpoint. Water and soil interact in a way that is conducive to the presence of living organisms.
Connection with other objectives :	This objective is connected mainly to the maintenance of species sensitive to forest management (1.07.1). Riparian environments form part of the habitats of many aquatic and terrestrial species.

Chosen strategy and expected effects

1. Diversify the management of riparian areas

Moderate management of certain riparian strips of high interest to the general public or for conservation purposes. This can be done, for example, by widening the strips in certain places, or by applying partial cuts in areas adjacent to riparian strips. A number of rules currently in force help to diversify management of riparian areas.

2 . Development and implementation of wildlife habitat directives

The directives will be designed to introduce strategies into the forest management planning process that will take the protection and development of wildlife habitats into account. These strategies will be based on the integration of wildlife issues into forest planning.
A workshop on Cree wildlife issues took place in April 2016 in order to begin work leading to the preparation of wildlife habitat directives. Since then, additional work has been undertaken to document species-specific needs and compare them to the management strategy in force in the area concerned. Ultimately, the directives will become a decision support tool.
The directives will be a tool that will help forest managers and joint working group members to maintain essential wildlife habitats in areas under management.

3 . Protection of riparian forests (Paix des braves)

Protection of forests adjacent to watercourses and lakes is provided for in article 3.12 of the Paix des braves.
Three measures in particular are prescribed:
a) A protective strip twenty (20) metres wide must be preserved on each side of all permanent watercourses and lakes.
b) To address concerns regarding the maintenance of a range of wildlife habitats in the vicinity of the largest rivers and along rivers more than five (5) metres wide, forest stands must be maintained on one of the two shores over a width of at least two hundred (200) metres. Logging must be distributed alternately on both shores of these rivers. Only mosaic cutting can therefore be carried out inside a strip measuring two hundred (200) metres wide on each shore of these rivers.
c) To maintain the aesthetic quality of landscapes around large lakes covering an area of more than five square kilometres (5 km2), only mosaic cutting is permitted in forests visible from the shore of the lake, to a distance of one point five kilometres (1.5 km).
These requirements help to diversify management of riparian areas.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Map and profile the riparian environment.	Sonia Légaré	December 2022
2	Estimate the percentage of the riparian environment that is fully protected or partially protected, and prepare a report.	Sonia Légaré	December 2022
3	Establish guidelines for the management of riparian areas, based on current protection levels and the areas' needs. The guidelines will form part of the Wildlife Habitat Directives.	Sonia Légaré	April 2023

Issues and Solutions Sheet prepared by : Sonia Légaré

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 2.01.1

Name of objective : Maintaining the productivity of forest ecosystems susceptible to ericaceous invasion

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Ecosystem condition and productivity
Issue (value) :	Forest productivity and sustainability
Issue clarification :	
Objective :	Maintain the productivity of forest stands at risk of ericaceous invasion. The allowable cut calculations performed by the office of the Chief Forester take into account the impacts of heaths and adjustments to the productivity of these forest layers are made depending on the sylvicultural strategies that are applied. The strategies applied will therefore have impacts on the allowable cut calculation.
Connection with other objectives :	This objective is connected with the objective of maintaining the productivity of forest ecosystems susceptible to paludification (2.01.2) and with section 59 of the RSDF which prohibits forest management activities in open mossy spruce stands.

Chosen strategy and expected effects

1. Scarification

Scarification followed by reforestation.
Scarification should help to:
-Limit hardwood encroachment
-Limit invasion by ericaceous heaths for the time required to allow regeneration to become established
-Reduce the thickness of the organic layer, which may help counter the phenomenon of paludification and hence promote the site's productivity.

2. Reforestation (planting or fill planting)

Reforestation and fill planting help restore production to sites containing few desired species or sites with limited productivity.
Reforestation and fill planting promote full afforestation and help maintain productivity in the management unit's forests.
Combined with tending of young stands, they also help to maintain a composition of desired species (e.g. by countering hardwood encroachment).

3. Cutting with protection of high regeneration and soils

Cutting with protection of high regeneration and soils involves cutting all merchantable trees while paying particular attention to the maintenance of high regeneration.
In areas invaded by heath plants, small softwood stems have limited access to nutrient elements and light until they grow to a height of 1 metre. When high regeneration is present and is dense enough to form the next stand, this type of cutting helps to reduce or avoid growth delays due to the presence of heath plants.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Site research for adapted forest treatments directed towards ecological types RE12, RE20, RE21, RE22, RE37.	Forest manager	All year long

2	Adapted forest treatments prescriptions in targeted ecological types.	Forest manager	All year long
3	Annual review of harvested stands that are at risk of being invaded by ericaceous heaths.	Forest manager	Following annual report deposit
4	Annual review of harvested stands that are at risk of being invaded by ericaceous heaths and have undergone adapted forest treatment.	Forest manager	Following annual report deposit

Indicator number:	2.01.1.A	Indicator type:	Performance indicator

Indicator: Ratio of the area covered by silvicultural treatments limiting ericaceous shrubs expansion on harvested area susceptible to ericaceous shrubs expansion.

Scale: Management unit

Indicator clarifications: The ecological types considered susceptible to invasion by ericaceous vegetation are: RE12, RE20, RE21, RE22 and RE37.
Ecological type RE37 is associated with the problems of ericaceous vegetation and paludification. For management units also targeted by the objective concerning paludification (UA 086-52, 086-64, 086-65), ecological type RE37 will not be included in the analysis for ericaceous vegetation.
Ecological type RE12, associated with ericaceous plants and forest stands with lichen, is the subject of a section of the Regulation respecting the sustainable development of forests in the domain of the State (RSDF) which prohibits forestry work if the site in question is located in an area covered by the woodland caribou restoration plan developed by Québec's woodland caribou restoration team. When calculating the allowable cut, the Chief Forester excludes all areas covered by regulatory or legal provisions prohibiting forest operations. Accordingly, a management strategy will not be recommended for this ecological type when it is located in an area covered by the caribou restoration plan. However, the type may be managed when it is located outside such an area.

Useful definitions: Ericaceous vegetation: name given to a family of shrubs or bushes with bell-shaped flowers, growing on acid ground, such as blueberries, cranberries, sheep-laurel and Labrador tea.

Frequency: Five-yearly

Breakdown by: Year

Target: 60%

Deviation: None

Target and results for each MU

MU 087-62	Target 60%	Deviation	0 %
Reference period	Value		Evaluation
	64,3 %		Green
	40,0 %		Yellow
	57,0 %		Green
	81,8 %		Green
	53,0 %		Green

MU 087-63	Target 60%	Deviation	0 %
Reference period	Value		Evaluation
	149,0 %		Green
	19,0 %		Red
	45,9 %		Green
	15,0 %		Red
	59,9 %		Green

MU 087-64	Target 60%	Deviation	0 %
Reference period	Value	Evaluation	
	10,2 %	Red	
	48,9 %	Green	
	32,4 %	Yellow	
	58,1 %	Green	
	57,1 %	Green	

Information on target:

Timeframe: None

Documentation: Chief Forester's information sheet : http://forestierenchef.gouv.qc.ca/wp-content/uploads/2013/01/201-206_MDPF_Ericacees.pdf

Ministère des Ressources naturelles. 2013. Le guide sylvicole du Québec, Tome1, Les fondements biologiques de la sylviculture, collective work under the supervision of B. Boulet and M. Huot, Les Publications du Québec, 1044 p.

Indicator monitoring program:

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

Objective number : 3.02.2

Name of objective : Protecting fish habitat, especially spawning grounds

Management unit(s) : 087-62, 087-63, 087-64

Criteria :	Soil and water
Issue (value) :	Water quality and aquatic ecosystem integrity
Issue clarification :	It is generally agreed that the road network and its associated disturbances are the main anthropic cause of soil erosion in managed forests. When erosion occurs on or alongside a road, or along or in a watercourse bed, it can cause sediment inflows into the water system. The sediments are likely to cause degradation of aquatic habitats in general and have a particular impact on spawning grounds, invertebrate populations and the free flow of fish. Erosion can also have a detrimental effect on access routes.
Objective :	Protect fish habitats in general and spawning grounds in particular.
Connection with other objectives :	This objective is connected with the objective of maintaining species sensitive to forest management (1.07.1).

Chosen strategy and expected effects

1. Inclusion of newly identified spawning grounds in forest plans

Inclusion of newly identified spawning grounds in forest plans requires good communication and monitoring. New identifications may be made via reporting or consultations. When new identifications are received, they are sent to the Direction de la gestion de la faune, for verification. Habitat protection rules are applied in the meantime, until the results of the verification are known.
Inclusion of newly identified spawning grounds in forest plans helps to protect these sensitive habitats. The interim protection process ensures that the habitat is preserved until it appears on the digital information layers used for forest planning.

2. Apply watercourse standards

Apply the current regulations (RSFM/RSFD) shown in the contractual harvesting requirements and monitor compliance of operations.
Compliance with current regulations should help reduce the impacts of forestry operations on aquatic ecosystems. Annual monitoring will also enable immediate remedial action to be taken when a probable case of erosion is found, and will also help ensure that there are no recurrent sediment inflows into watercourses.

3. Analysis of management plans by the Direction de la gestion de la Faune

All operational forest management plans are analyzed by biologists and wildlife technicians at the Direction de la gestion de la Faune. This ensures that potential impacts on wildlife habitats are detected, and that the plans are adapted where necessary. It provides an additional safety net to help preserve biodiversity in areas under management.

4 . Development and implementation of wildlife habitat directives

The directives will be designed to introduce strategies into the forest management planning process that will take the protection and development of wildlife habitats into account. These strategies will be based on the integration of wildlife issues into forest planning.
A workshop on Cree wildlife issues took place in April 2016 in order to begin work leading to the preparation of wildlife habitat directives. Since then, additional work has been undertaken to document species-specific needs and compare them to the management strategy in force in the area concerned. Ultimately, the directives will become a decision support tool.
The directives will be a tool that will help forest managers and joint working group members to maintain essential wildlife habitats in areas under management.

Significant activities for the implementation of the strategy:

Step	Significant activities	Responsible	Timeline
1	Forward reports of habitats (especially spawning areas) received during consultations to the Direction de la gestion de la faune.	Management unit planners	All year long
2	Apply the conditions set out in the RSFD for habitats until the report has been verified by the Direction de la gestion de la faune.	All employees	All year long
3	Include valid habitats (especially spawning grounds) on the layers used by forest planners.	Geomatic department	After validation

Indicator number:	3.02.2.A	Indicator type:	Performance indicator

Indicator: Ratio of the reported spawning sites that were submitted to the validation process and temporary protected.

Scale: Site

Indicator clarifications: The public consultations and harmonization sessions are used to convey important information on wildlife habitats. There are many habitats whose existence is not known.
It is important for any information received on spawning grounds to be sent to the Direction de la gestion de la faune, so that it can be verified.
While the information is being verified, the rules contained in the RSFD must be applied to the site in question. When the verification findings are known, confirmed sites are entered in the list of forest uses, and unconfirmed sites are removed from the list. No special rules are applied to unconfirmed sites.

Useful definitions:

Frequency: Yearly

Breakdown by:

Target: 100% of the spawning sites reported

Deviation: None

Target and results for each MU

MU 087-62	Target 100% of the spawning sites reported	Deviation	0	%
MU 087-63	Target 100% of the spawning sites reported	Deviation	0	%
MU 087-64	Target 100% of the spawning sites reported	Deviation	0	%

Information on target:

Timeframe:

Documentation:

Indicator monitoring program:

Issues and Solutions Sheet prepared by : Rija Herman Rapanoela

Approved by : Eric Labelle Date : 2022-05-11

5. References

Ministère des Ressources naturelles (2013). *Le guide sylvicole du Québec, tome 2. Les concepts et l'application de la sylviculture*, collective work under the supervision of C. Larouche, F. Guillemette, P. Raymond and J.-P. Saucier, Les Publications du Québec, 744 p.

Ministère des Forêts, de la Faune et des Parcs. *Glossaire forestier*, [Online], [http://glossaire-forestier.mffp.gouv.qc.ca/] (consulted on March 8, 2022).

Germain, R., (2012). Acceptabilité sociale de l'aménagement forestier écosystémique : le point de vue des Algonquins de Pikogan, Master's thesis, p. 17, 205 p.

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