2023-2028 Tactical integrated forest management plans

Outaouais Region
Management Units 071-51, 071-52, 072-51, 073-51, 073-52 and 074-51

MINISTÈRE DES RESSOURCES NATURELLES ET DES FORÊTS

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Table of Contents

List of Tables

List of Figures

List of Annexes

Introduction

These tactical integrated forest management plans (PAFITs) include the most important aspects of forest management guidelines. It will help managers choose the right forestry measures to implement for the 2023–2028 period for all management units (MUs) in the Outaouais region. The Tactical Integrated Forest Management Plans present the summary of the forest management issues and objectives, the silvicultural strategy, the allowable cuts, the forest management levels and the forest monitoring by MU.

Some topics are covered only briefly. The references at the end will help readers learn more about specific concepts they may be interested in. Moreover, PAFITs are accompanied by supporting documents: 1) Legal and Administrative Context, 2) The Land and its Occupants and 3) Analysis of the issues.

Finally, tactical planning is a process that is carried out continuously, which means that certain components of the strategy could be modified or improved during the PAFITs validity period.

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 Development Strategy[1] The Regulation respecting the sustainable development of forests in the domain of the State[2] (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*[3] (SFDA) (chapter A-18.1), the Minister may also impose different forest management standards than those ordered by regulation. The nature of the derogations applicable to the PAFITs are defined in Appendix B.

1.1 Synergies between the Issues according to the Selected Solutions

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 envisaged are presented to capture their potential contribution to the forest management strategy. These conditions are deployed on three solution axes: exclusion, silvicultural treatments and spatial and temporal distribution of interventions.

1.1.1 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 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.

[1] MINISTÈRE DES FORÊTS, DE LA FAUNE ET DES PARCS (MFFP) (2015).

[2] GOUVERNEMENT DU QUÉBEC (2017).

[3] GOUVERNEMENT DU QUÉBEC (2017).

1.1.2 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).[4] Silviculture contributes to maintenance of a continuous flow of timber and meet multiple objectives, whether economic, social or ecological.

1.1.3 Spatial and Temporal Distribution of Interventions

Distributing the silvicultural work in space and time makes it possible to see to the maintenance of deployment of attributes on different scales of perception of the territory. Subdivisions of the Management Unit have been established to ensure complementarity of management of forest resources on the disturbance and landscape scales. These are the territorial analysis unit (TAU) and the spatial organization compartment (SOC). These spatial entities are inspired by the dynamics of typical disturbances (nature, size, frequency) of each bioclimatic domain and serve to achieve the different forest management objectives.

1.2 Summary of the Forest Management Issues and Development Objectives

The issues are evaluated, then 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[5] associated with one or more of the given indicators or actions to perform. The following section summarizes the issues and objectives chosen. All issues apply to all MUs in the region, except by indication. To learn more about each issue, consult the document “Analysis of the Issues”.

1.2.1 Ecological Issues

Ecosystem-based management is an approach that seeks to preserve healthy and resilient ecosystems by focusing on reducing the gap between managed forest and natural forest. Keeping managed forests in a more natural state ensures the survival of most species, preserves ecological processes, and, as a result, supports the long-term productivity of the forest environment.

To concretize the implementation of ecosystem management, the analysis of the ecological issues on the local scale provided in the Sustainable Forest Development Strategy is presented in the document “Analysis of the Issues”. The actions chosen are based on knowledge of the dynamics of natural disturbances, climate and the physical environment and their effects on the natural forest.

For each issue (excluding species requiring special attention to ensure their maintenance), a sidebar presents the forest management objectives pursued and the chosen indicators and targets.

[4] For more information on the silvicultural treatments, consult section 2.1 Silvicultural Strategy.

[5] 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.

1.2.1.1 Age Structure

The forest age structure issue refers to the relative proportion of stands in the various age groups, measured across a fairly wide area (hundreds or thousands of km^2). In natural forests, age structure is primarily determined by the natural disturbance patterns specific to each region. Areas where severe disturbances are common generally have a lower proportion of old-growth forests and therefore more forests undergoing regeneration. The proportion of the various age groups is an important characteristic of forest ecosystems and is likely to have a significant impact on biodiversity and ecological processes.

Issue	**Scarcity of old-growth forests and overabundance of stands undergoing regeneration**
Management objective	Ensure that the age structure of managed forests resembles that of natural forests.
Indicator and target	The sum of the area of the TAUs that have a low or medium degree of alteration must represent at least 80% of the territory of the MU.

When the state of the forest age structure of a Management Unit does not allow the immediate achievement of the established threshold, a restoration plan must be drawn up. This plan will first involve avoiding aggravating the situation in the short term by seeking to maintain the natural attributes and achieve the objective over a realistic period. For the 2023–2028 period, no restoration plan is planned in the Outaouais region because the state of the forest age structure for each management unit meets the established threshold.

Each management unit has flexibility in the number of UTAs that can change the degree of alteration over time while meeting provincial targets. A resolution from the Table régionale de gestion intégrée des ressources et du territoire public de l'Outaouais (TRGIRTO/Outaouais Regional Integrated Land and Resource Management Panel) will guide the choice of UTAs that can change the degree of alteration. This resolution states that, to the extent possible, an UTA should not reach a "strongly altered" situation and that an attempt should be made to avoid aggregating multiple UTAs in a "strongly altered" situation.

1.2.1.2 Spatial Organization (applicable for MU 073-52 and 074-51 only)

The spatial organization of forests refers to the layout of stands at different scales of perception. How the stands are organized on the land affects the preservation of biodiversity and the operation of ecological processes. For the purposes of ecosystem-based management, the goal is to maintain a spatial organization similar to that found in unmanaged forests. In managed forests, the forest mosaic is much more fragmented.

On the landscape scale, the territorial analysis unit has been defined as the "equilibrium area", where the forest characteristics are stabilized relative to the size and frequency of the natural disturbances. On the disturbance scale, the compartment of spatial organization is intended as a means of reproducing the size of the total or severe natural disturbances. The special scales of the TAUs and SOCs follow suit to ensure complementarity for management of forest resources. For more information, consult annex B.

Issue	**Variance between the spatial attributes of the natural forest and those created by block cutting and regeneration cutting with soil protection and regeneration (CMO-CPRS) in Balsam Fir bioclimatic domains.**

Management objectives	Maintain or restore the key attributes related to the spatial organization of natural forests of the Balsam Fir bioclimatic domains on two spatial scales, the landscape scale and the disturbance scale. Tactical planning of the spatial organization of Balsam Fir bioclimatic domains seeks the following three forest management objectives: • Maintain or restore a forest matrix dominated by closed-canopy forests; • Favour the concentration of closed-canopy forests in large forest areas; • Ensure a sufficient presence of residual forests in disturbances by cutting.
RSDF/ guidelines	The SOCs must include at least 30% of their productive forest area in stands 7 m or taller. The TAUs must not include more than 30% of their productive forest area in Type 0 SOCs (SOCs with an area occupied less than 30% by closed-canopy forest) or Type 1 (SOCs with an area occupied 30% to 50% by closed-canopy forest.). The TAUs must include at least 60% of their productive forest area in stands 7 m or taller.
Indicators and targets	At least 20% of the productive forest of a SOC must be in forests 7 m or taller organized in blocks.[6] At least 80% of the reference area of a SOC must be located within 600 m of the limit of a block or a residual forest parcel. At least 98% of the reference area of a SOC must be located within 900 m of the limit of a block or a residual forest parcel. After planning the harvest, the stands 7 m or taller present in a SOC must contain at least 20% of the proportion of each of the major forest cover types (softwood, mixed and hardwood). At least 20% of the productive forest area of a SOC must be composed of forest 7 m or taller which has not been harvested for at least 25 years.

1.2.1.3 Vegetation Composition

Plant composition refers to the diversity and proportion of tree species in forests and plays an important role in how ecosystems function, both in the landscape and in stands. The type of vegetation affects the availability of resources, food, and habitats for wildlife as well as the internal temperature of stands, the nutrient cycle, and natural disturbances. Therefore, the silvicultural practices that modify the plant composition of forests may affect certain species and certain ecological process and are therefore likely to have repercussions on the preservation of biodiversity and the viability of ecosystems.

The increasingly rare species chosen for the Outaouais region are Bur Oak, Swamp White Oak, White Oak, Red Oak, Eastern White Pine and Red Pine. Yellow Birch is considered to be a declining species relative to its historical profile.

Issue	**Increasingly rare or declining forest species**
Management objective	Maintain or increase the proportion of increasingly rare or declining forest species.
Targeted species	• White pine • Red pine • Oaks (Bur Oak, Swamp White Oak, White Oak, Red Oak) • Yellow birch
Indicators and Targets	In each MU, maintain or increase the areas containing one or more increasingly rare or declining species.

[6] "Blocks of residual forest" must be of at least 25 ha in a single block and must be at least 200 metres wide. A "residual forest patch" is covering an area of at least 5 ha in a single block, and at least 200 metres wide.

	In stands that include one or more increasingly rare species, prescribe the treatments indicated in the regional filter[7] in 95% of the cases.
	Number of seedlings of Increasingly rare species planted for the entire Region: 250,000 seedlings/year of Eastern White Pine, 280,000 seedlings/year of Red Pine, 60,000 seedlings/year of Red Oak.
	Monitor 100% of the reforestation forest management area (which contain at least one increasingly rare planted species) for which monitoring is planned.

Offsetting Measures – Increasingly rare Species

In addition to the objectives and targets relating to the vegetation composition issue, additional directions are adopted to respond to the issue of increasing scarcity of Butternut, Black Ash and Eastern White Cedar.

- Butternut

The butternut or white walnut is on the list of vascular plants likely to be designated as threatened or vulnerable in Quebec and is also a designated endangered species listed in Appendix 1 of Canada's *Species at Risk Act*. Canker disease is attacking butternut throughout the entire distribution area. Because of their status, healthy Butternut trees are neither marked nor cut when they are identified during the performance of any forest management work. In addition to conserving the healthy stems, the forest canopy may be opened to favour their regeneration. However, the main Butternut stems bearing cankers or displaying a crown mortality rate over 50% must be cut. It is also recommended to dispose of the infected material appropriately to limit the propagation of the disease.

- Black Ash

Black Ash is a species found in wetlands, an environment where there is practically no logging. The Black Ash-Balsam Fir stands are not targeted for harvesting. No reforestation is done for this species due to the aggressive character of the Emerald Ash Borer. The measure adopted is the protection of the stands on MF18 ecological type (Black Ash-Balsam Fir stand on organic deposit, hydric drainage, minerotrophic, with presence of Eastern White Cedar).

- Eastern White Cedar

Currently, Eastern White Cedar stands on ecological type RC38 (Boggy Cedar-Balsam Fir stand on organic deposit, hydric drainage, minerotrophic) are removed from the areas eligible for harvesting due to the difficulty of increasing the proportion of Eastern White Cedar by natural or artificial regeneration. Moreover, these sites are even less favourable due to their fragility and low traficability, which prevent their restoration to production.

In addition, Eastern White Cedar are excluded from management in White-tailed Deer Yards to protect this type of forest with high shelter potential.

[7] THE REGIONAL FILTER CONSISTS OF A DECISION-MAKING KEY FOR THE PURPOSE OF SELECTION OF THE RIGHT SILVICULTURAL TREATMENT IN THE RIGHT PLACE ACCORDING TO SEVERAL FACTORS, SUCH AS THE POTENTIAL VEGETATION OF THE SITES, THE STAND COMPOSITION AND STRUCTURE, THE STATE OF REGENERATION, THE STAND DENSITY, THE COMPANION OR COMPETING SPECIES, ETC.

1.2.1.4 Internal Structure

Internal structure of forest stands refers to the layout in space and time of the live and dead plant composition of a stand. The internal structure of stands affects microclimatic conditions (temperature, humidity, light availability, etc.) and available habitats (composition of plant species, lateral coverage, extent of the canopy gap, stand height, dead wood, etc.). Studies have shown that forests with a highly complex structure also support a greater variety of species or functional groups. Dead wood and residual trees that have withstood a disturbance add to the diversity of the internal structure.

In a managed environment, many factors affect the presence of dead wood and modify its natural dynamics. Certain forestry operations limit recruitment, partially eliminate dead wood, modify the representativeness of decomposition classes, and helps lower the density of large-diameter dead wood.

Whether standing (snags) or on the ground (wood debris), dead wood is essential for forest ecosystems to function properly. As well as creating a habitat that many organisms need in order to survive, dead wood plays a role in the regeneration of certain plant species and is a major factor in a variety of biogeochemical processes such as carbon sequestration and the nutrient cycle. Of all types of dead wood, large standing dead wood is naturally scarcer because a smaller proportion of dead trees reach that stage. In addition, the length of harvesting cycles means stands cannot develop dead wood attributes comparable to those found in natural old-growth forests. It is the only type of wood that is of use to large vertebrates. It is also an ideal laying ground for wood-eating insects and is home to a wide variety of nonvascular and fungous species. In hardwood forests, dead wood on the ground does not seem to be a limiting factor.

Issues	**1) The trend towards an increase in partial cutting with substantial removal, as well as the selection of harvesting cycle periods, suggest a significant reduction in the abundance of old-growth stands with a complex structure, and, as a result, of large dead wood and its recruitment dynamic.** **2) In areas subject to total cut, an adequate number of biological legacies, including, for example, residual trees and dead wood, must be maintained to allow for the continuity of ecological processes at the start of succession and thus speed up the development of a more diverse structure in the future stand.**
Management objectives	Increase the number of biological legacies in total cuts.
	Maintain complex structure attributes in stands subject to partial cutting.
Indicators and Targets	In all the Management Units, plan at least 20% variable retention harvesting, which includes conditions of retention of at least 5% of the merchantable volume. Ideally, favour large cutovers for the application of retention.
	In the partial cuts, apply retention of at least 1 m^2/ha of basal area (BA) of stems classified[8] "M" and "S" of large DBH[9] (≥ 36 cm, if possible ≥ 40 cm).

[8] IN REFERENCE TO THE QUÉBEC MSCR CLASSIFICATION SYSTEM, WHICH ALLOWS ASSESSMENT OF THE VIGOUR AND QUALITY OF THE TREES OF A STAND. M (MORTALITY), S (SURVIVAL), C (CONSERVE), R (RESERVE).

[9] DIAMETER OF BREAST HEIGHT.

1.2.1.5 Second-Growth Forests

After regeneration cutting, intermediate treatments might be carried out in large areas of forest. The large-scale implementation of these treatments is likely to have resulted in the simplification and standardization of the internal structure of second-growth forests.

Although intermediate treatments are beneficial for maintaining the desired composition and properly managing competing vegetation, a number of concerns have been raised about the following:

- Standardization of tree density and spatial distribution;
- Simplification of vertical stand structure;
- Reduction in lateral coverage;
- Scarcity of fruit trees;
- Scarcity of dense sapling stages.

At this stage of development, wildlife is diverse and species are abundant. The systematic use of intermediate treatments could have significant consequences on wildlife and on biodiversity in general, because the sapling stage is important for many key species in the ecosystem.[10] The main biodiversity issues associated with intermediate treatments are shown the box below.

Issues	**1) Scarcity of young stands of dense saplings and, over time, of dense stands at various stages of development (complex structure).** **2) Less cover for shelter.** **3) Significant scarcity of available food in the short term.** **4) Loss of heterogeneity over large areas.** **5) Desertion of the treated areas by many animal species.**
Forest Management Objective	Conserve dense sapling stands and spatially distribute the treated areas.
Indicators and Targets	For naturally regenerated stands: Treat no more than 50% of the productive forest areas at the regeneration and sapling stages in a territorial reference unit (TRU) or a SOC. Conserve intact 10% of any block treated in precommercial thinning that has an area over 40 ha.

[10] BUJOLD ET COLL. (2004).

1.2.1.6 Riparian areas

Riparian areas carry out many ecological functions essential to terrestrial and aquatic ecosystems and for maintaining biological diversity and forest productivity. They are defined as the intermediate zone between the aquatic and terrestrial environments. Riparian areas include a wide variety of areas with characteristics that vary depending on the type of wetland, the pedologic and hydrologic properties of the riparian area, and the terrestrial environment.

Numerous activities have the potential to affect the integrity of riparian areas and aquatic habitats. Forest drainage, road construction and maintenance, and logging operations near or in these environments are especially likely to have significant repercussions. These practices can result in an accumulation of sediment in watercourses and lakes, damaging aquatic habitats and lowering water quality.

The regulatory protection granted to riparian areas includes the maintenance of a wooded border of a predetermined width and a ban on forest machinery.

These regulatory provisions seek to preserve the water's physical chemistry. Other ecological functions are also worth considering beyond the limits of what is currently defined as a riparian area according to the regulation. It is beneficial to preserve a representative portion of the riparian area. Forestry operations near these areas must be carried out so as to minimize their impact.

Riparian forest strip areas (0-20 m) have been removed from the 2023-2028 allowable cut calculations. For the 2023-2028 period, the regional direction is to no longer conduct forest planning in the riparian forest strips identified in section 27 of the RSDF[11].

Issue	**Preservation of the integrity of riparian areas.**
Management objective	Conserve a representative portion of the riparian areas
Indicator and Target	Remove from forest planning 100% of riparian forest strips (0-20 m) identified in section 27 of the RSDF

[11] RSDF, SECTION 27: A STRIP OF WOODLAND AT LEAST 20 M WIDE MUST BE PRESERVED ALONGSIDE A PEAT BOG WITH A POND, A MARSH, RIPARIAN SHRUB SWAMP, LAKE OR PERMANENT WATERCOURSE.

1.2.1.7 Wetlands

Wetlands and riparian areas are known for their great biological diversity because of the wide variety of species and the wide range of habitats found there. These complex environments carry out many ecological functions that are essential to terrestrial and aquatic ecosystems and for maintaining biological diversity and forest productivity. They are some of the most biologically productive ecosystems and are an important component of biodiversity.

In order to complete the protection in place (ex. protected areas and provisions are included in the RSDF) and to alleviate human pressure on the most vulnerable or remarkable types of wetlands, additional sites have been identified as wetlands of interest (WOI). They have been added to ensure better distribution across the territorial units of analysis. This breakdown protects wetlands across the entire reference area and thus improves the spatial distribution of WOIs.

When possible, a 60 m wide full-protection belt has been added around the WOIs to lessen the edge effect and foster exchanges between wetlands and terrestrial environments. This protection belt is the same as the one used around wildlife sites of interest in wetlands.

WOIs were selected according to their intrinsic ecological value (diversity, scarcity, surface area, and integrity) and their added value (presence of a threatened or vulnerable species (TVLS), presence of a certain wildlife habitat, connection to a lake).

Issue	**More protection for wetlands of significant ecological interest.**
Management objective	Grant increased protection to a group of sites specifically targeted according to various ecological criteria.
Indicators and Targets	Protect an area equivalent to 17% of the wetlands in the territory of reference.
	Protect 100% of the identified wetlands of interest.

Table 1 Summary of the Forest Management Objectives for the Ecological Issues

Issues	Objectives	Indicator/Action	Target	Scale	MU(s) concerned	Periodicity
Age Structure	Ensure that the age structure of the managed forests is similar to the one that existed in the natural forest	Percentage of the territory with the forest age structure presents a low and moderate degree of alteration relative to the baselines of the natural forest	The sum of the area of the TAUs that have a low or medium degree of alteration must represent at least 80% of the territory of the MU	MU	All	Annual
Spatial organization in Balsam Fir bioclimatic domains	Maintain or restore the key attributes related to the spatial organization of the natural forests	Proportion of the productive area in stands 7 m or taller	> 60%	TAU	073-52 and 074-51	Annual Quinquennial
		Proportion of the productive area occupied by Type 0 or 1 SOCs	< 30%	TAU	073-52 and 074-51	Quinquennial
		Proportion of the productive area in stands 7 m or taller	> 30%	SOC	073-52 and 074-51	Annual
		Proportion of the productive area in stands 7 m or taller organized in residual forest blocks	> 20%	SOC	073-52 and 074-51	Annual
		Proportion of the reference area located within 600 m of the limit of a residual forest parcel or block	> 80%	SOC	073-52 and 074-51	Annual
		Proportion of the reference area located within 900 m of the limit of a residual forest parcel or block	> 98%	SOC	073-52 and 074-51	Annual
		Proportion of the productive area after harvesting in stands 7 m or taller of each major type of forest cover	> 20%	SOC	073-52 and 074-51	Annual
		Proportion of the productive area that has not been harvested or given silvicultural treatment for at least 25 years	> 20%	SOC	073-52 and 074-51	Annual
Vegetation Composition	Maintain or increase the proportion of increasingly rare or declining forest species	Decennial evolution of areas that contain one or more increasingly rare or declining forest species	In each MU, maintain or increase the areas containing one or more increasingly rare or declining forest species	MU	All	Decennial
		Percentage of stand prescriptions achieved in stands that contain one or more increasingly rare or declining forest species in compliance with the regional filter of silvicultural treatments	In stands that include one or more increasingly rare or declining forest species, prescribe the treatments indicated in the regional filter in 95% of the cases	MU	All	Annual
		Number of seedlings of increasingly rare species planted for the entire region	250,000 seedlings/year of Eastern White Pine 280,000 seedlings/year of Red Pine	Regional	All	Annual

Issues	Objectives	Indicator/Action	Target	Scale	MU(s) concerned	Periodicity
			90,000 seedlings/year of Red Oak			
		Proportion of reforestation forest management area monitored (which contain at least one increasingly rare planted species) for which monitoring is planned	Monitor 100% of the reforestation forest management area (which contain at least one increasingly rare planted species) for which monitoring is planned	Regional	All	Annual
Internal structure of forest stands	Maintain complex structure attributes in the stands treated by partial cutting	Residual basal area (m^2/ha) of stems classified “M” and “S”	In the partial cuts, apply retention of at least 1 m^2/ha of stems classified “M” and “S” of large diameter (≥ 36 cm of DBH, if possible ≥ 40 cm)	Compilation unit	All	Annual
	Increase of quantity of biological legacies in the clearcuts	Proportion of the area of clearcuts in variable retention harvesting that have conditions of retention of at least 5% of the merchantable volume	Plan at least 20% variable retention harvesting. Ideally, favour large cutovers for the application of retention	MU	All	Annual
Simplification and standardization of second-growth forests	Conserve dense sapling stands and spatially distribute the treated areas	For naturally regenerated stands, proportion of the productive forest area treated with intermediate treatments at the regeneration and sapling stages.	Treat no more than 50% of the productive forest areas at the sapling stage in a TRU or a SOC	TRU or SOC	All	Annual
		For naturally regenerated stands, proportion of the area left intact during a intermediate treatment	Conserve intact 10% of each block treated that has an area over 40 ha	Forest management area	All	Annual
Riparian areas	Conserve a representative portion of the riparian areas	Proportion of riparian forest strips removed from forest planning	Remove from forest planning 100 % of riparian forest strips (0-20 m) identified in section 27 of the RSDF	MU	All	Annual
Wetlands	Grant increased protection to a selection of sites specifically targeted according to different ecological criteria	Proportion of wetlands protected in the territory of reference	Protect an area equivalent to 17% of the wetlands in the territory of reference	MU	All	Annual
		Proportion of identified wetlands of interest protected	Protect 100% of the identified wetlands of interest	MU	All	Annual

1.2.2 Timber Production Issues

The 3 main issues chosen in the Regional Timber Production Strategy are those related to the productivity, composition and health of forests. These issues combine 11 objectives to which different forest management conditions or actions to be taken are identified.

For each issue, a sidebar presents the forest management objectives pursued and the chosen means. The indicators and the targets are presented in the summary table at the end of this section.

1.2.2.1 Forest Productivity

The primary objective of the Québec Timber Production Strategy[12] is to increase timber production with the desired characteristics. The Regional Timber Production Strategy restates this objective and identifies silvicultural solutions influencing these characteristics for the star species identified (Sugar maple, Yellow birch, Red oak, White spruce, Black spruce and Poplars), such as volumes per hectare, tree size and timber quality. The issue is presented separately for softwoods and hardwoods.

- Softwood Component

After a first harvest in softwood stands, changes in forest composition risk occurring. Softwood reduction may result from the combined effect of the decrease in seed bearers after logging and the relative scarcity of favourable germination beds, without taking provisions to ensure regeneration.

Larger stems can ensure a diversity of interesting products for transformation and reduction of chip production. Larger-diameter stems present a greater proportion of lumber. Moreover, larger-diameter timber production has a downward influence on operating costs by reducing the harvesting effort, given the distribution of the total equivalent volume over a smaller number of stems.

- Hardwood Component

Le portrait de la forêt feuillue et mixte à feuillus durs au Québec: Survol historique[13] reports that in the past, targeted harvesting of certain species and certain partial cutting impoverished or degraded multiple forest stands in southern Québec. These harvests change the composition of the stands and lowered the number of vigorous quality stems composing them. The rehabilitation of these stands will contribute to increase productivity by improving the composition and quality of the residual stems.

In most regions, low-quality standing timber surplus constitute a real hindrance to hardwood silviculture. Thus, the timber production strategy seeks to increase the value of hardwood forests by increasing production of valuable species and the quality of the stems produced.

[12] MFFP (2020).

[13] BOULET (2015).

Issue	**Improve forest productivity.**
Management objectives	- Maintain production of star softwood species. - Increase production of star hardwood species. - Increase the average volume per stem of spruces. - Increase production of quality lumber. - Rebuild the forest capital of impoverished and degraded forests.
Means adopted and actions to take	**Softwood component:** Carry out basic or intensive planting of Spruce. These treatments can increase timber production per surface unit, compared to that of the natural forest. Intermediate treatments will be necessary to allow the seedlings planted to remain free to grow, which will ensure long-term yields.
	In softwood stands resulting from plantations or that have benefited from precommercial thinning, perform commercial thinning. This allows concentration of growth on a limited number of stems, thus providing increased growing space that allows an increase in diameter of the thinned stems.[14] It also allows maintenance of the vigour of the trees and reduces the mortality rate in the residual stand.
	Respect the maturity ages by forest type and by bioclimatic domain according to the growth potential of the stands (see Table 2).
	Hardwood component: In the tolerant hardwood stands, perform site preparation, fill planting or intermediate treatments with the aim of fostering growth and regeneration of Sugar Maple, Yellow Birch and Red Oak.
	Perform selection cutting, commercial thinning or differentiation thinning in tolerant hardwood stands presenting the best potential for sustained production of quality lumber.
	Define the conditions of application of the commercial or differentiation thinning treatments for tolerant and intolerant hardwood stands.
	In the tolerant hardwood stands, conserve a sufficient residual basal area in desired quality species after cutting for commercial thinning, differentiation thinning, selection cutting and continuous cover irregular shelterwood cutting to ensure the sustainability of lumber production.[15]
	Follow a harvesting cycle schedule before intervening in the stands treated by partial cutting (selection cutting and continuous cover irregular shelterwood cutting).[16]
	Review the criteria associated with regeneration (seedlings and sapling stands) before cutting.
	Analyze the combination of treatments performed in relation to the composition sought, which does not achieve the success criteria in forest monitoring and identify the possible solutions.
	Monitor the sustainability indicators[17] and determine targets subsequently.
	Develop an identification key and a strategy for impoverished and degraded strata to characterize them and complete the profile of the state of the forest of each MU.

[14] LATREMOUILLE AND LAROUCHE (2014).

[15] SEE SUBSECTION "MAINTENANCE OF COHORTS OF CROP STEMS TO ENSURE A CONSTANT FLOW OF QUALITY TIMBER.

[16] SEE SUBSECTION "HARVESTING CYCLE AND HARVESTING LEVELS OF HIGH-VALUE LUMBER.

[17] SEE SUBSECTION "SUSTAINABILITY OF HARDWOOD AND MIXED (PREDOMINANTLY HARDWOOD) FOREST MANAGEMENT.

	Improve the decision logigrams for the silvicultural treatments to be applied in Maple and Yellow Birch stands (hardwood and mixed) according to the advancement of the new knowledge and review the conditions of application of slow regeneration irregular shelterwood cutting.
	Continue the documentation approaches for Sugar Maple coloration and mineralization.
	Perform precommercial thinning in Poplar-hardwood stands and Poplar-softwood stands.
	Target poplar stands aged 90 years and over for an increased harvest from 2023 in MUs 071-51, 071-52 and 074-51 in order to avoid significant losses of areas in poplar production. This increased harvest should favour a return to poplar to the detriment of a natural succession dominated by balsam fir and paper birch.

- Maturity of Stands

Mature and old-growth stands can be defined simply as stands for which volume growth is declining, either nil or negative, from year to year.

The maturity is used to determine the minimum harvesting age for stands with an even-aged structure, mainly boreal softwood stands (Spruce stands, Balsam Fir stands, Jack Pine stands and Larch stands), intolerant hardwood stands, mixed-intolerant hardwood stands and temperate softwood stands (Eastern White Pine stands and Red Pine stands).

The maturity table by forest type[18] was produced for the Maple-Yellow Birch and Balsam Fir-Yellow Birch bioclimatic domains by integrating the notions of stand growth potential and station quality index.

Table 2 Maturity Ages for Implementation of the 2023-2028 Strategy Applicable to All MUs

Forest type	Potential[19]	Bioclimatic subdomain	
		Maple forest	Balsam Fir forest
- White Birch stands (predominantly intolerant hardwoods) - White Birch-softwood stands (where Balsam Fir represents over 50% of the softwoods)	High	55	65
	Medium	60	70
- Balsam Fir-intolerant hardwood stands (where Paper Birch represents over 60% of the intolerant hardwoods) Balsam Fir-softwood stands (where Balsam Fir represents 50% or more of the softwoods)	Low	65	75
- Poplar stands (predominantly intolerant hardwoods) - Balsam Fir stands	High	45	50
- Poplar-softwood stands (where Balsam Fir represents 50% or more of the softwoods)	Medium	50	60
- Balsam Fir-intolerant hardwood stands (where Poplars represent 40% or more of the intolerant hardwoods)	Low	55	65
- Poplar-softwood stands (where Balsam Fir represents less than 50% of the softwoods)	High	55	60
	Medium	60	70
- Poplar stands (predominantly tolerant hardwoods)	Low	65	75

[18] The notion of "forest types" is presented in Appendix C.

[19] Forest growth potential based on site characteristics (surficial deposit, soil texture and forest drainage) and forest management constraints (practicability, fragility, and vulnerability to certain diseases).

Forest type	Potential[19]	Bioclimatic subdomain	
		Maple forest	Balsam Fir forest
- Spruce stands - Spruce-intolerant hardwood stands - Spruce-softwood stands - White Birch stands (predominantly tolerant hardwoods) - White Birch-softwood stands (where Balsam Fir represents less than 50% of the softwoods) - Eastern Larch stands	Very high	60	65
	High	70	75
	Medium	80	90
	Low	90	100
- Jack Pine stands (with hardwood or softwood)	High	50	60
	Medium	55	65
	Low	60	70
- Eastern White Pine stands (with hardwood or softwood)	High	70	80
	Medium	80	90
	Low	120	130

- Financial Maturity Diameter

The notion of financial maturity diameter is used to guide production and harvesting of high-value lumber. This notion allows financial distinction of mature trees from trees presenting a potential for an increase in their value during the next harvesting cycle. In 2016, the Direction de la recherche forestière (DRF, Forest Research Department) published a research note[20] on this subject for Sugar Maple and Yellow Birch. Thus, vigorous and good-quality Sugar Maple and Yellow Birch stems may be considered financially mature for lumber production, when they reach a diameter ranging from 43 to 47 cm depending on the species, the geographic location and the projected duration of the harvesting cycle. At these diameters, the stems of a stand have reached their maximum financial value and the losses of value related to their degradation and mortality are not offset by their growth. This notion is relatively new and is integrated into the silvicultural diagnosis of the stands during the analysis of lumber production in the hardwood partial cuts.

Financial maturity diameters were also calculated for other species[21] and their integration into the stand prescriptions is under analysis.

- Maintenance of Cohorts of Crop Stems to Ensure a Constant Flow of Quality Timber

The Comité sur l'impact des modalités opérationnelles des traitements en forêt feuillue (CIMOTFF/Committee on the impact of operating conditions of hardwood forest treatments)[22] insisted on the necessity of conserving enough quality stems (poles, small and medium timber) after cutting to ensure sustained harvests of quality timber over time. To achieve this, the Direction générale de la gestion des forêts du sud-ouest determines the thresholds for 10 to 22 cm poles and 24 to 44 cm CO and RO quality stems[23] in desired species (for hardwood stands: Sugar Maple, Yellow Birch, Oaks, Paper Birch; for

[20] GUILLEMETTE (2016).

[21] GUILLEMETTE (IN PREPARATION).

[22] SAUCIER AND AL. (2014).

[23] C (CONSERVE), R (RESERVE), O (QUALITY: LUMBER).

mixed-Yellow Birch stands: add Spruce and Eastern White Cedar) to consider during the silvicultural diagnosis.

Thus, sufficient initial basal area proportions allow orientation of the choice of silvicultural treatment to apply.

Considering the potential losses related to injuries and harvesting and hauling operations, residual basal area thresholds were identified to ensure that a minimum of these stems remain standing after cutting.

- Sustainability of Hardwood and Mixed (Predominantly Hardwood) Forest Management

In partial cutting, when the characteristics of the stand (regeneration, pole stand, small and medium timber) allow sustained production of high-value lumber, it is possible to give priority to harvesting stems containing high-value lumber that is distressed or that has reached its financial maturity. However, partial cutting must be done so that the characteristics of the residual stand reach the fixed thresholds for the forest sustainability indicators. These indicators can ensure a favourable environment for regeneration, to harvest what the stand can produce, manage the stand's residual composition or limit anticipated mortality losses. To do this, the Ministère des Ressources naturelles et des Forêts (MRNF) has developed a method based on 7 indicators to allow balancing of the harvesting conditions in partial cutting in hardwood or predominantly hardwood mixed forests.

- Indicator 1 allows setting of the harvesting level of trees with high-value lumber according to what the stand can produce.

Indicators 2 to 6 seek to maintain star species and species to promote composition within stands treated by partial cutting.

- Indicator 2 concerns the proportion of the basal area harvested for American Beech with a DBH of 18 to 38 cm. The objective is to harvest at least 80% of this group, or reduce it to less than 1 m^2 in basal area per hectare. This indicator corresponds to one of the harvesting conditions provided in the silvicultural strategy to limit the invasion of the Maple stands by American Beech and reduce the risks of losses associated with Beech Bark Disease (BBD). For American Beech trees with a larger DBH (40 cm and over), the strategy capitalizes on their high probability of mortality to reduce their abundance instead of on harvesting, in the absence of a sufficient market for this wood. This approach also retains stems producing beechnuts, important to the diet of several wildlife species in the hardwood forest.

- Indicator 3 concerns the proportion of the basal area harvested for Red Maple with a DBH of 24 to 38 cm and an MO and SO harvesting priority[24]. The objective is to harvest at least 80% of this group, or reduce it to less than 1 m^2 in basal area per hectare. Red Maple is an unwanted species for the sawmill industry (or without buyers) and when conserved as standing timber, leads to a degradation of the composition of the stand and does not allow maintenance of the sustainability of high-value harvests, according to the work of the Committee on the impact of operating conditions of hardwood forest treatments.[25]

[24] M (MORTALITY), S (SURVIVAL), O (QUALITY: LUMBER).

[25] SAUCIER AND AL. (2014).

- Indicator 4 concerns the proportion of the residual basal area of Sugar Maple. The objective is to increase the relative abundance of Sugar Maple in the residual stand.
- Indicator 5 concerns the proportion of the residual basal area of Yellow Birch. The objective is to maintain the relative abundance of Yellow Birch at over 96% of its relative abundance before cutting.
- Indicator 6 concerns the proportion of the residual basal area of companion species in the Maple domain (Basswood, Eastern Hemlock and Eastern White Cedar). The objective is to maintain the relative abundance of the companion species within an interval of plus or minus 4% of its relative abundance before cutting.
- Indicator 7 concerns the proportion of the residual basal area of trees at high risk of mortality. The objective is to limit the relative abundance of this group to 25% after cutting. Work in progress tends to show that, depending on the importance of this group, it could restrict the growth of the basal area of the stand.

The forest engineer responsible for the stand prescriptions will apply professional judgement to develop a harvesting directive that can remedy the situations for which indicators are not reached.

Moreover, to ensure an environment favourable to regeneration in partial cutting, conditions are identified to maintain growth conditions appropriate to the ecological requirements of the desired species.

Table 3 Harvesting and Residual Basal Area Conditions

Treatment	Residual basal area		Harvesting in basal area	
	Minimum locally[26]	Average after cutting between	Maximum locally	Average after cutting
Selection cut	16 m^2/ha	18 to 20 m^2/ha	10 m^2/ha	25 to 30%
Continuous cover irregular shelterwood cutting	14 m^2/ha	16 to 18 m^2/ha	10 m^2/ha	30 to 40%
Slow regeneration irregular shelterwood cutting	10 m^2/ha	12 to 14 m^2/ha	10 m^2/ha	35 to 45%

- Harvesting cycle and Harvesting Levels of High-Value Lumber

The harvesting cycle period between two partial cutting interventions is a determining factor in harvesting on the basal area or volume harvesting of high-value lumber. This harvesting cycle will be longer if the harvest is abundant in high-value lumber, because this residual volume will be even lower and the time will be even longer to regain the initial volume before the first harvest. For this purpose, the Office of the Chief Forester (BFEC in French), responsible for determining the allowable cut, recalled the importance of this period in “Analyse de la durabilité des stratégies d’aménagement en forêt feuillue – Régions Laurentides et Outaouais” (Analysis of sustainability of hardwood forest management strategies - Laurentides and Outaouais regions).[27] In this analysis, it is recommended to comply with a harvesting cycle schedule of at least 30 years before intervening in stands treated by partial cutting since 1993. This

[26] ON THE SCALE OF THE MARKER OR A PRISM READING.

[27] CHIEF FORESTER (2022).

period was modelled in the context of the 2023-2028 calculation of allowable cuts for the management units of the Outaouais region.

1.2.2.2 Forest Composition

The different tree species composing the forests do not have the same economic value associated with their processing. The increase or presence of certain less desired species is an issue in timber production for star species and species to be promoted.

- Fir and Hardwood Invasion of Softwood Stands

In softwood stands, the fir and hardwood invasion that generally follows clearcut harvesting, hinders the development of Spruces:

- Although Balsam Fir is an “acceptable” species, it is less in demand and has lower value relative to Spruce. Its proportion influences the processing costs (upward) and the value of the basket of products (downward).
- In softwood stands, the hardwood invasion, combined with a low predetermined regeneration, has hindered the development and maintenance of softwood stands. The intolerant hardwood invasion depends on the harvest type and season, the composition before cutting, the ongoing regeneration and the frequency of natural and anthropogenic disturbances.

In a context of climate change according to which the proportion of hardwoods tends to increase, the objective is therefore to concentrate dedicated investments on softwood management on the best sites for production of these species. Also, it is important to distinguish southern softwood (Eastern White Pine, Red Pine, Eastern Hemlock and Eastern White Cedar) from boreal softwoods (Jack Pine, Balsam Fir and Spruce). Overall, boreal softwoods are more sensitive to climate change than southern softwoods.

The identification of adapted stations makes it possible to provide for selection of sites conducive to reforestation in the context where only a portion of the areas harvested in the even-aged strata is subject. The identification of these sites also allows some predictability for the accesses required and to be maintained for the application of such silvicultural scenarios.

- Invasion by American Beech

Maple stands presenting 15% or more of their basal area in American Beech in the upper canopy are considered at high risk of American Beech invasion and mortality losses associated with Beech Bark Disease. At this 15% level, generally abundant regeneration of American Beech (seedlings and sapling stands) is observed. It is often overrepresented relative to the desired species, including Sugar Maple.[28] These Maple stands are likely to suffer the most damage caused by Beech Bark Disease, since degradation of the timber begins before the death of the stems.

The American Beech invasion of the undergrowth is also a major issue for medium and long-term productivity of lumber from desired species.

For these Maple stands, the silvicultural strategy provides for different treatments and harvesting conditions than other stands dominated by Sugar Maple and tolerant hardwoods, with emphasis on sanitation to fight the invasion and reduce the damage associated with Beech Bark Disease.

[28] BILODEAU-GAUTHIER AND AL. (2021).

From 2014 to 2019, a special salvage plan was implemented to fight the invasion of the undergrowth by American Beech and salvage the stems already or likely to be damaged by Beech Bark Disease.

- Sugar Maple Coloration and Mineralization Zone

The Sugar Maple's growth conditions are more difficult near the northern limit of its range, which results in the development of lower-quality logs. Heartwood coloration in the Sugar maple is a natural process linked to crown injuries (slow scarring of broken branches, faulty pruning) and trunk injuries (crack, frost damage and logging damage).

A Sugar Maple coloration and mineralization zone was designated beyond which selection cutting is not recommended due to the poor quality of the Sugar Maple stems and the limited potential for production of quality Sugar Maples.

This zone corresponds to MU 073-52 and 074-51. Work is in progress for the revision of the southern limit of the zone, the better to circumscribe this Sugar Maple coloration and mineralization zone.

The Sugar Maples found there are lower quality due to the importance of heartwood coloration that develops and the increase in mineralization traces. Management of these Maple stands poses profitability challenges for forest industry operators due to the lower quality of the Maples and the long transportation distances to the markets.

In this zone, on the stations conducive to Yellow Birch, the objective is to increase the proportion of this species in these stands by favouring the use of irregular and regular shelterwood cuts. Yellow Birch was more abundant previously in these territories.

- Proliferation of Red Maple

The proliferation of Red Maple is also identified as problematic in the tolerant hardwood stands due to its great capacity for regeneration under the canopy and after disturbance.

Issue	**Improve forest composition.**
Management objectives	- Increase the proportion of Spruce relative to Balsam Fir in the managed stands. - Maintain predominantly Spruce stands on the optimum stations for the species. - Increase the proportion of Yellow Birch in the mineralized Maple zone. - Reduce the proportion of American Beech in the tolerant hardwood stands. - Reduce the proportion of Red Maple in the tolerant hardwood and tolerant hardwood-softwood stands.
Means adopted	Carry out basic or intensive planting of Spruce. Planting allows an increase in timber production per surface unit, compared to that of the natural forest. Maintenance work will be necessary to allow the seedlings planted to remain free to grow, which will ensure a high proportion of Spruce on these areas.
	In the tolerant hardwood stands, perform non-commercial work intended to favour Sugar Maple, Red Oak and Yellow Birch and reduce the quantity of American Beech after treatment: site preparation, fill planting, release, cleaning, girdling and precommercial thinning.
	Perform slow regeneration irregular shelterwood cutting[29] in the Maple-American Beech and American Beech stands to salvage the mortality associated with BBD within the next 20 years (in a context with a pulpwood buyer).

[29] BECAUSE OF THE INCREASED HARVESTING DURING THE SLOW REGENERATION IRREGULAR SHELTERWOOD CUTTING APPLIED IN THE CONTEXT OF BEECH INVASION IN THE UPPER CANOPY ALLOWS FOR THE RECOVERY OF BEECH.

	In tolerant hardwood and tolerant hardwood-Softwood stands treated by partial cutting, reduce the proportion of Red Maple and American Beech after cutting.
Actions to take	Define a strategy for management of Sugar Maple, Red Maple and Yellow Birch in the mineralized zone.
	Continue the documentation approaches for Sugar Maple coloration and mineralization.

1.2.2.3 Forest Health

Two main disturbance agents currently affect forest health: Spruce Budworm and Beech Bark Disease.

- Spruce Budworm

A Spruce Budworm (SBW) epidemic is currently raging in Québec and affects over 12 million ha, according to the summer 2021 surveys. In the region, the epidemic has progressed rapidly since 2018, reaching more than one million ha in 2021, affected to various degrees of defoliation.[30]

Issue	**Maintain forest health.**
Management objective	Reduce the risk associated with the Spruce Budworm.
Means adopted	Plan preventive harvesting of the strata most vulnerable to or affected by SBW. The harvesting of these strata will allow lowering of the territory's overall vulnerability to SBW.
	Apply a moratorium on systematic precommercial thinning and commercial thinning in the natural mixed and softwood stands.
	Depending on the severity of the epidemic, prepare special salvage plans to harvest distressed timber.

- Preventive Harvesting

In the pre-epidemic period and at the beginning of the epidemic, preventive harvesting of the most vulnerable stands, such as mature Balsam Fir stands, allows reduction of the risk of losing softwood volumes. Indeed, mortality of Balsam Fir and, to a lesser degree, of Spruce, generally begins around the fourth year of severe defoliation of annual shoots.

To limit mortality losses, it is recommended to concentrate the harvesting operations in the very high and high vulnerability class stands. However, these classes only represent 2% to 7% of the productive forest areas of the region and are disseminated throughout the territory. The medium vulnerability class represents 15% of the productive forest areas of the region and was also added to the salvage priority profiles due to potential losses.

[30] MFFP (2021).

Table 4 Prioritization for Harvesting by Forest Type in an SBW Epidemic Context

Forest types	Harvest prioritization
Yellow Birch-hardwood stands Oak stands Oak-softwood stands Red Maple-hardwood stands Sugar Maples stands Sugar Maple-hardwood stands Sugar Maple-American Beech stands Jack Pine stands Jack Pine-softwood stands Eastern hemlock stands	**Non-priority** for distressed softwood harvesting
Yellow Birch-softwood stands White Birch stands White Birch-softwood stands Red Maple-softwood stands Sugar Maple-softwood stands Eastern White Pine-hardwood stands Eastern White Pine-softwood stands Poplar-hardwood stands Poplar-softwood stands Eastern White Cedar-hardwood stands	**Lower priority** for distressed softwood harvesting
Spruce stands Spruce-intolerant hardwood stands Spruce-softwood stands	**Lower priority** for harvesting than Balsam Fir stands
Balsam Fir stands (Sb) Balsam Fir tolerant hardwood stands (SbFt) Balsam Fir-intolerant hardwood stands (SbFx) Balsam Fir-softwood stands (SbRx)	**Priority** for harvesting The order of priority of Balsam Fir stand salvage is as follows: Sb > SbRx > SbFx > SbFt. Balsam Fir tolerant hardwood stands (SbFt) are lower priority, because tolerant hardwood will be able to take up more space after mortality of Balsam Fir and Spruce. Five-year prematurity is possible for stands targeted by preventive harvesting.

- Preventive Strategy for Young Natural Stands

The vulnerability of natural stands at the sapling and pole stages (young and premature with Balsam Fir and/or Spruce) is generally classified as low or medium. However, the change in brightness after certain silvicultural treatments stresses the residual stems and makes them more vulnerable, given that they take about 3 years to recover. Moreover, the decrease in density of the stand caused by these treatments favour concentration of individuals and egg laying on a more limited number of trees. Thus, in an SBW epidemic context, these silvicultural treatments are to be limited. To do this, a zone for application of a moratorium on this work is defined and updated annually. It corresponds to the defoliation zone of the past few years, to which is added a buffer zone reflecting the theoretical progression of the epidemic for the next 3 years. The work concerned by the moratorium in this zone is as follows:

1. Systematic precommercial thinning treatments in predominantly softwood natural softwood or mixed stands, except for Pine stands (all Pine species);
2. Commercial thinning treatments in stands with more than 40% Balsam Fir. Also, commercial thinning is prohibited when Balsam Fir and Spruce show signs of defoliation.

Several types of non-commercial work remain possible in the moratorium zone. For example, for stands from plantations, intermediate treatments remain possible.

- Special Development Plans

According to section 60 of the SFDA, the Minister may, with the participation of the local integrated land and resource management panel concerned, prepare a special development plan to ensure that the timber is salvaged and that the appropriate silvicultural treatments are applied.

Generally starting in the epidemic phase with mortality, special development plans are implemented for harvesting of stands with a high probability of mortality. The objective of this harvesting is to salvage the merchantable value of the trees killed or weakened by the insect before timber quality degrades too much for lumber and pulp and paper.

- Beech Bark Disease

Beech Bark Disease has been present in Outaouais since 1998. This disease is preceded by the passage of a Beech Scale epidemic front. This exotic insect, present exclusively on Beech trees, causes multiple microscopic injuries by feeding on tree bark. These injuries allow the spores of two indigenous fungi to penetrate the tissues of the tree and cause cankers, which ultimately girdle the tree and cause its death. This disease has a considerable impact on American Beech, and therefore on the dynamics of forest stands. Beech Bark Disease, which affects Beech stems, does not generally allow an expectation of producing quality stems for this species.

Issue	**Maintain forest health.**
Management objective	Reduce the risk associated with Beech Bark Disease.
Means adopted	In the tolerant hardwood stands, perform non-commercial work intended to favour Sugar Maple, Red Oak and Yellow Birch and reduce the quantity of American Beech after treatment: site preparation, fill planting, release, cleaning, girdling and precommercial thinning by light shaft, training size.
	In tolerant hardwood and tolerant hardwood-Balsam Fir stands treated by partial cutting, reduce the proportion of American Beech after cutting.

The following table presents all of the indicators, targets and actions chosen in the wood production strategy to respond to the timber production objectives and the actions to be taken during the 2023-2028 period.

Table 5 Summary of the Forest Management Objectives for the Wood Production Issues

Issues	Objectives	Indicator/Action	Target	Scale	MU(s) concerned	Periodicity
Production of value and forest volumes	1 Maintain or increase production of star species	1.1 Decennial evolution of gross standing volume of: a) Spruces; b) Sugar Maple, Yellow Birch and Red Oak; c) Poplar.	-	Regional	All	Decennial
		1.2 Basic and intensive Spruce plantation area that meets the success criteria on the optimum stations for Spruce.	2,175 ha/year	Regional	071-52, 073-51, 073-52, 074-51	Annual
		1.3 Percentage basic or intensive planting of Spruce that meet the success criteria of the first forest monitoring operation (Monitoring operation 1).	90%	Regional	All	Annual
		1.4 Percentage basic or intensive planting of Spruce in 2013 and subsequent years that meet the success criteria of the second forest monitoring operation (Monitoring operation 2).	90%	Regional	All	Annual
		1.5 Area produced in site preparation, fill planting or training work (release, cleaning, precommercial thinning, training) favouring Sugar Maple, Red Oak and Yellow Birch in tolerant hardwood stands.	2,295 ha/year	Regional	All	Annual
		1.6 Areas planned in intensive commercial work (commercial thinning, differentiation thinning and selection cutting) in tolerant hardwood stands.	915 ha/year	Regional	071-51, 071-52, 072-51, 073-51	Annual
		1.7 Area produced in precommercial thinning in Poplar-hardwood stands and Poplar-softwood stands.	300 ha/year	Regional	073-51, 073-52, 074-51	Quinquennial
		1.8 Follow the harvesting cycle schedule before intervening in the stands treated by partial cutting (selection cutting and continuous cover irregular shelterwood cutting).	30 years	Regional	071-51, 071-52, 072-51, 073-51	Quinquennial
		Action 1 - Review the criteria associated with regeneration (seedlings and sapling stands) before cutting.	-	-	All	-
		Action 2 - Analyze the treatment/composition combination concerned that do not meet the success criteria and identify the possible solutions.	-	-	All	-
		Action 3 - Monitor the sustainability indicators over 2 years of implementation and determine targets subsequently.	To come	MU	071-51, 071-52, 072-51, 073-51	-
		Action 4 - Monitor over 2 years the proportion of compilation units that presents a sufficient basal area of desired residual species stems after partial cutting (differentiation thinning, selection cutting, continuous cover irregular shelterwood cutting) by treatment in tolerant hardwood stands in view of determining a target to be met.	To come	MU	071-51, 071-52, 072-51, 073-51	

Issues	Objectives	Indicator/Action	Target	Scale	MU(s) concerned	Periodicity
	2 Increase the average volume per Spruce stem	2.1 Commercial thinning area in intensive planting of Spruce or Jack Pine or after precommercial thinning of natural softwood regeneration.	235 ha/year	Regional	All	Annual
		2.2 Respect the maturity ages by forest type and by bioclimatic domain according to the growth potential of the stands (table 2).	-	-	All	-
	3 Increase production of quality lumber	Idem as Indicator 2.1 for softwood and Indicators 1.5, 1.6, 1.8 and actions 3 and 4 for tolerant hardwoods.	-	-	-	-
		3.1 Quinquennial report of lumber volume DF1F2F3 and quality lumber DF1F2 of standing Sugar Maple, Red Oak, Yellow Birch and Paper Birch in the forest management area in the RATF[31] by partial cutting in the tolerant hardwood stands.	-	Regional	All	Quinquennial
		3.2 Quinquennial report of the proportion of the lumber volume harvested by quality class A, B and C for Sugar Maple, Red Oak, Yellow Birch and Paper Birch out of the total volume harvested.	-	Regional	All	Quinquennial
		Action 5 - Continue the documentation approaches for Sugar Maple coloration and mineralization.	-	-	All	-
		Action 6 - Define the conditions of application of the commercial or differentiation thinning treatments for tolerant and intolerant hardwood stands.	-	Regional	071-51, 071-52, 072-51, 073-51	-
	4 Rebuild the forest capital of impoverished and degraded forests	Action 7 - Develop an identification key for impoverished and degraded strata and defined a strategy for them.	-	Regional	All	-
		Action 8 - Improve the decision logigrams for the silvicultural treatments to be applied in Maple and Yellow Birch stands (hardwood and mixed) according to the advancement of the new knowledge and review the conditions of application of slow regeneration irregular shelterwood cutting.	-	Regional	All	-
		Idem as Indicators 1.2 to 1.6.	-	-	-	-
Forest composition	5 Increase the proportion of spruce versus fir	5.1 Evolution of the proportion of standing gross volume of Balsam Fir relative to Spruces.	-	Regional	All	Decennial
		Idem as Indicators 1.2, 1.3 and 1.4.	-	-	-	-
	6 Maintain predominantly Spruce stands on optimum stations for the species	6.1 Evolution of area classified in predominantly Spruce forest types on optimum stations for Spruce.	-	Regional	All	Decennial
		Idem as Indicators 1.2, 1.3 and 1.4.	-	-	-	-
	7 Increase the proportion of Yellow	7.1 Evolution of the standing gross volume of Yellow Birch in the Maple mineralized.	-	Mineralized zone	073-52 and 074-51	Decennial

[31] TECHNICAL AND FINANCIAL ACTIVITY REPORTS.

Issues	Objectives	Indicator/Action	Target	Scale	MU(s) concerned	Periodicity
	Birch in the mineralized Sugar Maple zone	Action 9 - Define a strategy for management of Sugar Maple, Red Maple and Yellow Birch in the mineralized zone.	-	Mineralized zone	073-52 and 074-51	-
		Idem as Indicator 1.5.	-	-	-	-
	8 Reduce the proportion of American beech in the tolerant hardwood stands	8.1 Evolution of areas by American Beech class in the upper canopy in the territory of reference.	-	Regional	071-51, 071-52, 072-51, 073-51	Decennial
		8.2 Planned area in slow regeneration irregular shelterwood cutting in the Maple-American Beech and American Beech stands to salvage the mortality associated with BBD within the next 20 years (in a context with a pulpwood buyer).	1,525 ha/year	Regional	071-51, 071-52, 072-51, 073-51	Annual
		Idem as Indicator 1.5 and Action 3 for tolerant hardwoods.	-	-	-	-
	9 Reduce the proportion of Red Maple in the tolerant hardwood and tolerant hardwood-softwood stands	Idem as Indicator 1.5 and Action 3 for tolerant hardwoods.	-	-	-	-
Forest health	10 Reduce the risk related to the Spruce Budworm	10.1 Evolution of the area vulnerable to SBW (medium, high and very high vulnerability classes) in the territory of reference.	N/A	Regional	All	Decennial
		10.2 Proportion of planned areas in fir stands and mixed fir forest types relative to the planned total area.	25% UA 073-52 10% UA 074-51	MU	073-52 and 074-51	Annual
		10.3 Do not perform systematic precommercial thinning and commercial thinning in natural mixed and softwood stands in the zone under moratorium.	100%	Zone under moratorium	All	Annual
		Action 10 - Depending on the severity of the epidemic, prepare special salvage plans to harvest distressed timber.	-	-	All	-
	11 Reduce the risk related to beech bark disease	Idem as Indicators 1.5, 8.1, 8.2 and Action 3.	-	-	-	-

1.3 Local and Regional Issues

1.3.1 Issues of the Table régionale de gestion intégrée des ressources et du territoire public de l'Outaouais

The forest management strategy translates all the solutions chosen to respond optimally to the various issues. To this effect, a first exercise is performed to identify the component of the forest management strategy that cover the issues raised by the TRGIRTO applicable to all MUs in the region. The results of this exercise are presented in the following table.

Table 6 Issues Raised by the TRGIRTO and Means Adopted Applicable to all MUs in the Region

Themes	Issues	Means
Ecosystem management	Forest age structure	Indicator and targets relating to the issue of age structure (see section 1.2.1.1).
	Spatial organization	Indicators and targets relating to the issue of spatial organization of forests (see section 1.2.1.2).
	Vegetation composition	Indicators and targets relating to increasingly rare or declining species (see section 1.2.1.3). Silvicultural strategy (see section 2.1.3.3).
	Internal structure and dead wood	Indicators and targets relating to the issue of internal structure (see section 1.2.1.4). Indicators and targets relating to the issue of second-growth forests (see section 1.2.1.5).
	Wetlands and riparian areas	Indicators and targets relating to the issue of wetlands of interest (see section 1.2.1.7). Indicators and targets relating to the issue of riparian areas (see section 1.2.1.6). Conditions relating to wildlife sites of interest (see section 1.4.2). Conditions relating to TVLS (see document "The Land and Occupants").
	Threatened or vulnerable species	Conditions relating to TVLS (see document "The Land and Occupants"). Conditions relating to Butternut (see section 1.2.1.3).
	Protection of wildlife sites of interest	Conditions relating to wildlife sites of interest (see section 1.4.2).
	Impact on forest soil	Conditions provided in the RSDF. Regional control plans.
	Connectivity of landscapes	To be developed.
Special wildlife habitats	Fur-bearing animal habitat	Treated indirectly by the indicators and targets related to the issues of age structure and internal structure (see sections 1.2.1.1 and 1.2.1.4). Validation of the forest management targets of the ecological issues with sensitive spaces (see document Analysis of issues, section "Species in need of special attention to ensure their survival").

Themes	Issues	Means
	Moose habitat	The TRGIRTO's discussions showed that the real issue instead is the ambiance sought by the hunter. Population monitoring (aerial inventory, sex-age ratio, monitoring of harvesting by hunting).
	Fish habitat	Conditions relating to wildlife sites of interest (see section 1.4.2). Roadwork prohibition dates in watercourses depending on the species present. Direction adopted to limit the number of crossing and maximize use of the existing road network. Knowledge acquisition project in small forest watercourses Conditions provided in the RSDF.
	Small game habitat	Indicators and targets relating to the issue of second-growth forests (see section 1.2.1.5). Monitoring of harvesting by hunters.
	White-tailed Deer yards	Conditions relating to white-tailed deer yards (see section 1.4.1).
Forest landscapes	Quality of landscapes in the forest environment	Application of the regional agreement on visual settings agreed in the TRGIRTO. Conditions provided in the RSDF.
Coexistence of all users	Quality of forest experience	Schedule of operations included in the operational directives.
	Operational harmonization process	An operational harmonization process has been in place for a few years now and discussions are underway at the TRGIRTO to improve it.
	Hunter's ambiance	Schedule of operations included in the operational directives.
	Territorial limits of structured wildlife territories	Application of the resolution on compliance with the limits of the structured wildlife territories and construction of new accesses.
Timber supply	Supply in volume and quality	Indicators and targets relating to the issues of the wood production strategy (see section 1.2.2). Financial indicators (see section 1.3.4).
	Supply costs	Financial indicators (see section 1.3.4).
	Impact of forest harvesting machinery on regeneration and soil in partial cutting treatments	As a result of the CERFO study and recommendations, the MNRF and the forest industry are preparing an action plan.
Local communities and workers	Creation and sharing of wealth to the benefit of the communities and forest workers	To be developed at the TRGIRTO.
Road network	Accessibility of natural resources via a sustainable strategic road network	To be developed with the TRGIRTO.
Global changes	Climate change	To be developed with the TRGIRTO.

Themes	Issues	Means
Integrated management of resources and land	Development of a TRGIRTO vision	In discussion at the TRGIRTO.
Enhancement of forest resources	Enforcement of maple syrup production potential	To be developed with the TRGIRTO.

1.3.2 Issues of Indigenous Communities

An exercise is performed to identify the components of the forest management strategy that cover the issues raised by the Indigenous communities. As needed, additional means to respond to the issues raised applicable to all MUs in the region, except on indication, may also be determined between the MRNF and the Indigenous communities concerned.

Table 7 Issued Raised by the Indigenous Communities and Means Adopted Applicable to All MUs in the Region

Issues	Means
Intensification of forest management	Ongoing issue (see section 2.2).
Protection of Eastern White Pine	Indicators and targets relating to increasingly rare or declining forest species (see section 1.2.1.3). Silvicultural strategy (see section 2.1.3.3).
Protection of Eastern White Cedar (MU 073-52 and 074-51)	Eastern White Cedar stands on ecological type RC38 removed from the area eligible for harvesting. Application of the solution elements agreed with the community concerned.
Access to White Birch for handicraft use	Application of the harmonization sheet on the subject.
Protection of riparian areas and wetlands	Indicators and targets relating to the issue of wetlands of interest (see section 1.2.1.7). Indicators and targets relating to the issue of riparian areas (see section 1.2.1.6). Conditions relating to wildlife sites of interest (see section 1.3.2). Conditions relating to TVLS (see document “The Land and Occupants”). Conditions provided in the RSDF. Ongoing issue with the communities concerned.
Adapted Operational Integrated Forest Management Plans (PAFIO) consultation schedule	Application of the consultation schedule agreed with the community concerned.
Maintain and protect old-growth forests	Indicator and targets relating to the issue of age structure (see section 1.2.1.1). Indicators and targets relating to the issue of internal structure (see section 1.2.1.4). Ongoing issue with the community concerned.

Issues	Means
Diversity and complexity of forest composition and internal structure at the stand and landscape scale	Ongoing issue with the community concerned.
Protection of moose habitat	Conditions provided in the RSDF. Ongoing issue with the communities concerned.
Protection of fur-bearing animal habitat	Treated indirectly by the indicators and targets related to the issues of age structure and internal structure (see section 1.2.1.4). Validation of the forest management targets of the ecological issues with sensitive spaces (see document Analysis of issues, section “Species in need of special attention to ensure their survival”). Ongoing issue with the community concerned.
Rare plants and wildlife species	Conditions relating to TVLS (see document “The Territory and Occupants”).
Identification of protection of cultural areas used by community members	Conditions provided in the RSDF. Ongoing issue with the communities concerned.

1.3.3 Issue Relating to Volume Management

To Integrate the variance between the rights holders' needs and the forest's capacity to meet these needs sustainably and plan harvests throughout the territory, while considering the costs of transportation to the processing plants, zones have been defined in collaboration with the main forest industry operators in the region. These zones have been simplified on the strategic scale to be integrated into the forest management strategy and the allowable cut calculation. These simplified zones, located in MU 071-51, 071-52, 073-52 and 074-51, allow the application of a different strategy for remote zones and identification of the volumes coming from these zones so that it is not harvested elsewhere in the Management Unit. These zones will be used during different stages of the operational planning and volume management process to improve the fit between the rights holders' applications and the forest's capacity to respond to these requests sustainably.

1.3.4 Issues Relating to Forest Planning

Determination of Financial Indicators

To respond to the industrial issues, the operational panels have adopted indicators directly or indirectly expressing the financial profitability of forest planning. They allow the MRNF and the forest industry to account better for provincial and regional economic issues in forest planning. The indicators are monitoring tools in the production of a forest plan that is profitable and sustainable over time. This issue applies to all MUs.

Deployment of a Collaborative Planning Pilot Project

This ambitious project, a first in Québec, has the goal of deploying a collaborative forest planning model adapted to the regional forest context and to the reality of the Outaouais hardwood and mixed forest.

The pilot project also has the goal of simplifying, modifying and optimizing the current operational planning process to reduce its costs, improve predictability, increase the harvesting rate and increase the satisfaction rate for all stakeholders, all while ensuring forest sustainability in a concern for social, economic and environmental balance.

1.3.5 Management of Maple Syrup Potential to Be Prioritized

The only silvicultural treatments eligible in these areas are those ensuring the preservation of maple potential. This work also allows the extraction of a certain volume to supply the factories of the region, in particular from hardwoods. For the areas under permit, the permit holder could also keep wood for personal use of his operation, as stipulated in the conditions of the permit.

Lastly, the Sustainable Forest Development Regulation contains several articles concerning the management of areas under permit, in particular Section 71, which also provides that the maximum width of the right-of-way of a road located within the limits of a maple grove operated for maple purposes or having a maple potential to be prioritized is 20 m.

1.4 Conditions of Intervention or Protective measures associated with the Wildlife Habitats

1.4.1 Measures Applicable to Deer Wintering Areas

The Guide d'aménagement des ravages de cerfs de Virginie[32] (Guide to Managing White-tailed Deer Yards) makes recommendations for maintaining stands for shelter, food and shelter, and food within a white-tailed deer yard. These recommendations are based on key features of the deer's habitat. The management target is to maintain the habitat quality in the white-tailed deer yards present in MU 071-51, 072-51 and 073-51.

The White-tailed Deer Yards management plans must not only be based on these recommendations but must be reconcilable with the various ways in which land is used. In terms of silviculture, it is important to optimize forestry output by carrying out the right forest regimes in the right place at the right time, in order to comply with the PAFITs strategy. In terms of socioeconomics, profitable, suitable, and well-planned forestry operations will encourage activities to develop white-tailed deer (observation, sampling, and so on) and the continuation of economically viable silvicultural activities. Such operations will also allow production to resume appropriately in the treated strata in order to regenerate the species needed to maintain a good-quality deer habitat and maintain wood production in these stands.

White-tailed deer yard management plans

The management strategy was established on a compartmental basis in the white-tailed deer yards based on habitat deficiencies, the ecology of the developed sites, and harvesting potential. Decision-making keys were developed to help silviculturists choose the right commercial and noncommercial silvicultural treatments.

Forestry observations in each white-tailed deer yard in the region will be included in the white-tailed deer yard intervention plans.

In maple-yellow birch bioclimatic subdomains, it is recommended to aim for a proportion of 15% shelter stands and 25% food/shelter stands or a total of the two when targets cannot be reached independently. The shelter target is reduced to 7% for maple-linden and maple-hickory stands. So, the total for shelter and food/shelter should be 32%.

It should be noted that cedar and hemlock are excluded from harvesting in the white-tailed deer yards to protect these species with high shelter potential.

Small deer yards

For small white-tailed deer yards on public land that are not included in a management plan, the RSDF is applied using a characterization of white-tailed deer yards based on the interpretive key in the deer damage Guide d'aménagement des ravages de cerfs de Virginie and a brief deficiency analysis of shelter and food/shelter stands. The selected silvicultural treatments are aimed at meeting regional objectives regarding shelter and food/shelter stands.

[32] HÉBERT AND AL. (2013).

Peripheral Zone of the White-tailed deer yards

The Regulation respecting wildlife habitats does not protect parts of white-tailed deer yards on private land or areas where the deer normally feed in winter but that do not meet the conditions set by the regulation.

Requirements must be applied in the area within 1 km of white-tailed deer yards when possible, especially in sensitive areas for deer habitat. These consist of avoiding agglomerations of regeneration cuts. Forest managers must consider the spatial distribution of regeneration cuts around the deer yard, including parts on private land. More targeted management of regeneration cuts is required in this peripheral zone, and special operational requirements may apply. As is the case for the entire forest plan, scheduled interventions are submitted to management team biologists for analysis. The biologists may suggest changes or adaptations based on issues specific to the area.

1.4.2 Wildlife Sites of Interest

Various provisions in Québec law (the *Act respecting the conservation and development of wildlife*, the Regulation respecting wildlife habitats, the Regulation respecting the sustainable development of forests in the domain of the State and the *Act respecting threatened or vulnerable species*) protect wildlife heritage. However, some sites of regional importance for wildlife merit additional attention and protection. A wildlife site of interest is defined as a specific location comprising one or more biological or physical factors conducive to the maintenance or development of a wildlife population or community whose biological or social value renders it remarkable in the local or regional context.

The protection measures for each wildlife site of interest category can limit or govern various aspects of how land is used both in time and space. Access to the area, forest management, forest roads, regional planning, or any other type of land use may be subject to restrictions such as a full-protection belt, compliance with dates when work can be carried out, or special mandatory procedures. The goal is to ensure that use of the land and its resources is compatible with the protection of environments of recognized ecological value.

The conditions of protection of wildlife sites of interest in all MUs in the region are recorded in the forest uses and taken into account in forest planning.[33] The conditions applicable for wildlife sites of interest located in the portion of MU 073-52 and 074-51 that overlaps the Abitibi-Témiscamingue administrative region are those developed for this same region.

1.4.3 Threatened and vulnerable species

All species of flora and fauna have their own characteristics and are important, whether for their ecological, scientific, nutritional, economic, medicinal, cultural, or social value. Through the Act respecting threatened or vulnerable species, the Québec government is committed to preserving all genetic biodiversity in the province[34].

The protection of threatened and vulnerable species, and of species liable to become threatened is part of the forest development process. In Quebec, threatened and vulnerable species in public forests used

[33] MFFP (2019).

[34] HTTPS://WWW.ENVIRONNEMENT.GOUV.QC.CA/BIODIVERSITE/ESPECES-DESIGNEES-SUSCEPTIBLES/ESPECES-FLORISTIQUES-MENACEES-VULNERABLES.HTM

for forest development are protected either by law or by an administrative agreement that is in place between the MRNF and the MELCCFP.

The list of threatened and vulnerable species within the region's territory and the approach to ensuring their adequate protection and their habitats outlined in the departmental directions on ecological issues is presented in the supporting document “The territory and its occupants” in the “Territory that is protected or has special terms and conditions” section.

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 BFEC, 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. This strategy applies to all MUs in the region, except by indication.

2.1 Silvicultural Strategy

The silvicultural strategy is based on silvicultural guides and provincial and regional expertise. Under ecosystem-based management, silvicultural strategy is based on the various disturbance regimes affecting the region. For example in the maple bioclimatic domain, the silvicultural strategy is based on a partial disturbance regime (with disturbances varying from light-to-moderate in intensity). In the balsam fir-yellow birch and balsam-white birch bioclimatic domains, silvicultural strategies are based on partial and total disturbance regimes (with disturbances varying from moderate-to-high in intensity).

The silvicultural strategy proposes various scenarios aimed at implementing the right treatment sequence(s) in the right areas based on site productivity, the autoecology of the species to be produced, and the quality of the standing timber. It also includes certain provisions related to risks associated with climate change.

The result is a silvicultural treatment filter with a variety of treatments and scenarios to cover most of the stands typical of the region. Like the decision-making key, the filter helps silviculturalists choose the right operation based on criteria such as:

- Potential vegetation on the sites
- Stand composition and structure
- Regeneration status
- Density
- Companion or competitor species, etc.

2.1.1 Classification of Species

As presented in the document “Analysis of the Issues”, the notion of “star” species is an important factor in the development of wood production strategy, because it allows targeting of the species that constitute sure values. A general assessment of all the species found in the region was produced regarding different criteria to identify these species.

The other species are classified in three categories: species to promote, acceptable species and species to control. It should be noted that the same species may be classified in more than one category, depending on the station or the planning objectives are pursued.

In some circumstances, the term “desired species” is used to simplify the instructions and combine the star species, species to promote or acceptable species.

Star Species, Species to be Promote, Acceptable Species and Species to be Controlled	
Sugar maple Yellow birch Red oak White spruce Black spruce Poplars [35]	**Star species** Production goals for them have been identified and production efforts will be aimed at increasing yield.
White pine Red pine	**Species to promote** These are species for which silvicultural treatments should be used to increase their numbers in stands. Silvicultural scenarios can be extensive, basic, intensive, or elite.
Balsam fir Paper birch Jack pine Ash Other noble hardwoods[36] American larch Eastern hemlock Eastern white cedar	**Acceptable species** In a given stand or at a given site, “acceptable” species will receive no silvicultural treatments to decrease their numbers because they do not hamper optimal growth of species that we want to promote. Extensive or basic silvicultural scenarios are mainly used for these species.
American beech Red maple	**Species to control** These are species for which silvicultural treatments should be used to decrease their numbers in stands. There are no production goals for these species.

2.1.2 Silvicultural Treatments and Scenarios

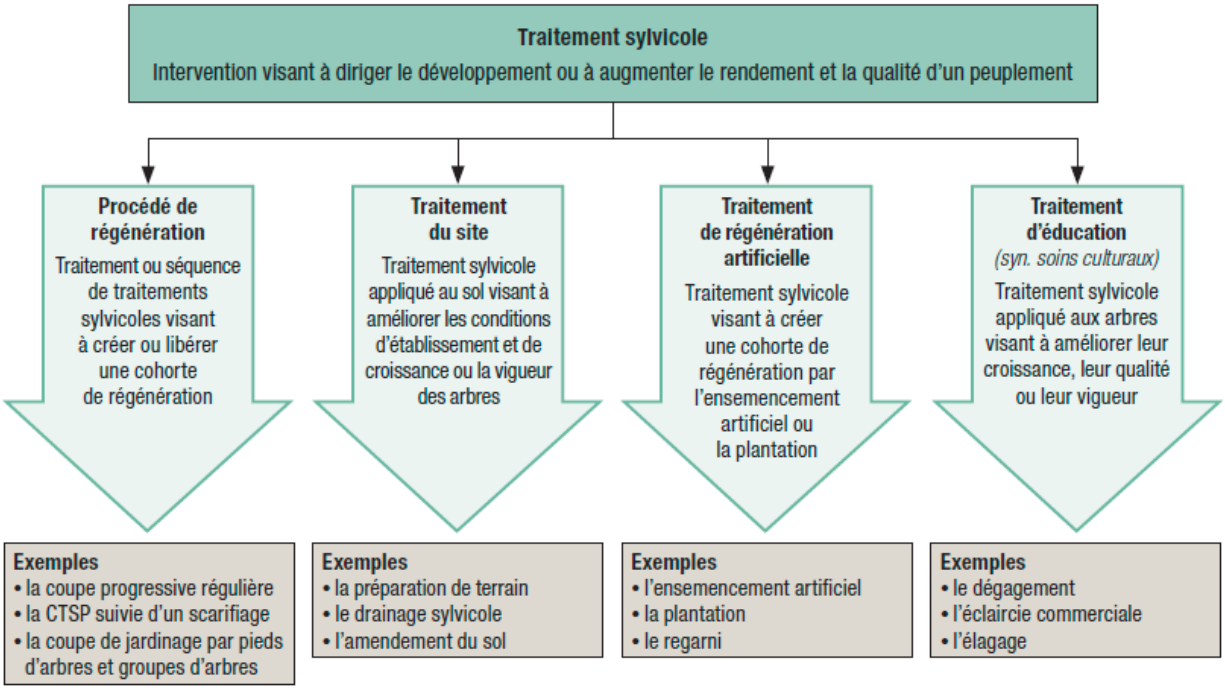
As presented in Guide sylvicole du Québec tome 2[37] and illustrated in Figure 1, silvicultural treatments can be classified in four categories, depending on the main silvicultural objective pursued by the intervention.

[35] Poplars are star species in the Balsam Fir-Yellow Birch and Balsam Fir-White Birch subdomains.

[36] Other noble hardwoods: Hickory, Black Cherry, Elm, Eastern Hop-hornbeam, Butternut, Oak and Basswood.

[37] MRN (2013).

Figure 1 Silvicultural Treatments Classified According to the Main Silvicultural Objective (French only)[38]



The silvicultural scenarios and treatments chosen have the primary purpose of managing forests while ensuring their renewal by protecting the predetermined natural regeneration or creating conditions favourable to its establishment.

2.1.3 Commercial Silvicultural Treatments Applicable to All MUs

The silvicultural treatments chosen are divided according to two main types of stand structure: regular and irregular stands.

Regular stands are characterized by trees that can be combined in the same age class (±20 years) and that have similar dimensions. Silvicultural scenarios associated with clearcutting are generally used to maintain stands with a regular structure. The irregular stands are characterized by trees which can be grouped in two to four different age classes. Irregular structures generally can be maintained by a series of partial cuts spaced over time.[39]

A summary of the regional silvicultural strategy is presented below, by major type of structure and for the following combinations of stands:

1. Boreal softwood stands (spruce, balsam fir, and jack pine stands)
2. Tolerant hardwood and mixed with tolerant hardwoods stands
3. Intolerant hardwood and mixed with intolerant hardwoods stands
4. Temperate softwood stands (white and red pine, hemlock, and cedar stands)

[38] CTSP = Unprotected clearcut.

[39] For more details on these concepts, refer to Guide sylvicole du Québec, tome 2, Part 1.

2.1.3.1 Silvicultural strategy for boreal softwood stands

Forest management in a regular structure is favoured in these stands, based on moderate to severe disturbances that usually affect them (Spruce Budworm epidemics, fires and total windthrow). Forest management in a irregular structure is favoured in these stands on the basis of the slight to moderate disturbances (small surface fires, epidemics and partial windfall) they experience.

Regular Structure	
Cutting with protection of regeneration and soils (CPRS) Cutting with protection of high regeneration and soils (CPHRS)	These treatments consist of harvesting all or almost all trees of commercial value in the stand in one operation while preserving new growth and the soil. New growth is mainly composed of seedlings when CPRS is used, and saplings in the case of CPHRS. Stands treated by cutting with soil protection and regeneration not presenting sufficient regeneration in desired species, may be reforested.
Cutting with protection of small merchantable trees	This treatment consists of harvesting trees with DBHs greater than 13, 15, or 17 cm and protecting as many softwood trees with DBHs under this threshold (seedlings, saplings, and small merchantable trees). This treatment reduces the harvesting cycle of the future stand. It is recommended for stands dominated by black spruce, balsam fir, and white spruce with a density of C or D and containing enough small merchantable trees and saplings.
Commercial thinning	The purpose of this partial cut treatment is to harvest some of the merchantable trees in a planted or natural stand at the premature stage of a regular age structure to distribute the production potential over a limited number of well spaced trees. This increases the growth of the residual trees, enabling them to reach a greater size at maturity. Commercial thinning should be practiced in planted or natural stands that have undergone precommercial thinning in the past.
Irregular Structure	
Irregular shelterwood cutting with slow regeneration	This treatment consists of a series of two or three partial cuts spread out over more than a fifth of the planned harvesting cycle. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the harvesting cycle, when the regrowth is well established. The treatment is used mainly in softwood stands with a greater quantity of red spruce, eastern white cedar, white spruce, and black spruce. Since the risk of windfalls is higher after a partial cut in boreal softwood stands, potential sites and their exposure to wind must be carefully analyzed before prescribing this treatment.

2.1.3.2 Silvicultural strategy for tolerant hardwood and mixed with tolerant hardwoods stands

Forest management in a regular structure is favoured in stands that only present one cohort or in stands impoverished by previous interventions. For other stands, treatments favouring an irregular structure are preferred.

Regular Structure	
Regular shelterwood cutting	This treatment aims to quickly regenerate a stand (in less than a fifth of the harvesting cycle) with a series of two or three partial cuts over a short period of time. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made once the regrowth is well established.
Seed cutting	This treatment consists of a total cut that preserves 10 to 30 well spaced seed trees per hectare in order to naturally reseed the treated area. The seed trees are conserved as a biological legacy as they will not be harvested.
Cutting with protection of regeneration and soils	This treatment is used only in cases where the stand does not have enough good quality trees to ensure the maintenance of a permanent canopy but where there is abundant regeneration of desirable species. It removes only the overstory and must ensure adequate protection of the regrowth.
Commercial thinning or differentiation thinning	This treatment seeks to harvest a portion of the merchantable stems at the prematurity stage in order to distribute the production potential over a number of well-distributed individual stems. Thinning makes it possible to increase quality and favour the growth in diameter of residual stems. Thinning can be practiced according to an intensive silviculture scenario in hardwood stands with a regular structure (commercial thinning) or to convert stands with a regular or irregular structure to a selection stand (differentiation thinning).
Irregular Structure	
Selection cutting	This intensive treatment consists of a series of partial cuts made at regular intervals in a stand with an irregular or balanced structure. Trees to be harvested are chosen individually, in groups, or by patch in order to achieve or maintain a balanced diameter structure. This supports long-term production of high quality timber. This type of cut is used in maple stands and stands dominated by sugar maple with persistent and tolerant or semi-tolerant hardwood or softwood species. These are high quality stands with a structure that has enough trees in small or medium-sized patches to allow sustained harvesting of high quality timber. Selection cutting is appropriate for high-density stands on deep, fertile soils. Selection cutting (includes selection cutting by tree feet, tree feet and tree group and sugar bush forestry selection cutting)
Irregular shelterwood cutting with permanent cover	This treatment consists of a series of partial cuts spread out over more than a fifth of the planned harvesting cycle. The cuts are designed to harvest, regenerate, tend, and improve the stand and regrowth. These partial cuts must permanently preserve the forest cover (40% cover or more with trees of merchantable size), and there is no final cut. This cutting is practiced in stands dominated by long-lived, tolerant or semi-tolerant hardwood or softwood species with a structure that can support periodic harvesting of quality lumber.
Irregular shelterwood cutting with slow regeneration	This treatment consists of a series of two or three partial cuts spread out over more than a fifth of the planned harvesting cycle. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the harvesting cycle, when the regrowth is well established.

2.1.3.3 Silvicultural strategy for intolerant hardwood stands and mixed stands with intolerant hardwoods

Forest management in a regular structure is favoured in these stands, which generally originate from major disturbances (clearcut, Spruce Budworm, fire and total windthrow). Forest management in an irregular structure is possible when tolerant hardwoods or tolerant softwoods are present in sufficient quantity.

Regular Structure	
Cutting with protection of regeneration and soils	This treatment consists of harvesting all or almost all trees of commercial value in the stand in one operation while preserving the regrowth and soil.
Irregular Structure	
Irregular shelterwood cutting with slow regeneration	This treatment consists of a series of two or three partial cuts spread out over more than a fifth of the planned harvesting cycle. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the harvesting cycle, when the regrowth is well established. The treatment is used in intolerant hardwood stands with sufficient quantities of tolerant hardwoods or softwoods (yellow birch, sugar maple, red oak, white pine, eastern white cedar, and spruce). Less persistent species can also be harvested, while leaving the more persistent species for a future harvest.

2.1.3.4 Silvicultural strategy for temperate softwood stands

In the case of white or red pine stands, silvicultural treatments applicable to regular or irregular structures can be used only when cedar and hemlock stands are managed according to an irregular structure.

Regular structure (Eastern White Pine and Red Pine stands)	
Commercial thinning	With this treatment, some merchantable trees that are still premature are harvested to spread the production potential over a number of well spaced residual trees. Commercial thinning increases the quality of the remaining trees and the future stand and simplifies the species composition so it achieves the desired composition. Commercial thinning should be practiced in planted or natural stands that have undergone precommercial thinning in the past.
Regular shelterwood cutting	This treatment aims to quickly regenerate a stand (in less than a fifth of the harvesting cycle) with a series of two or three partial cuts over a short period of time. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in an appropriate forest environment. A final cut is made once the regrowth is well established.
Seed cutting	This treatment consists of a total cut that preserves 10 to 30 well spaced seed trees per hectare in order to naturally reseed the treated area. The seed trees are conserved as a biological legacy as they will not be harvested.
Irregular structure	
Irregular shelterwood cutting with slow regeneration	This treatment is used in white and red pine stands and cedar stands. It consists of a series of two or three partial cuts spread out over more than a fifth of the planned harvesting cycle. The purpose of the first partial cut is to establish the regrowth and harvest mature trees. Another cut between the initial and final cuts may also be done if there is a need to partially release the regrowth from a forest cover that is too closed and to allow it to grow in a forest environment. A final cut is made after a fifth of the harvesting cycle, when the regrowth is well established.

Irregular shelterwood cutting with permanent cover	This treatment is used in cedar and hemlock stands. This treatment consists of a series of partial cuts spread out over more than a fifth of the planned harvesting cycle. The cuts are designed to harvest, regenerate, tend, and improve the stand and regrowth. These partial cuts must permanently preserve the forest cover (40% cover or more with trees of merchantable size), and there is no final cut.

2.1.4 Non-commercial Silvicultural Treatments Applicable to All MUs

2.1.4.1 Softwood Stand: Site and Regeneration Treatments

Site treatments apply to the soil and seek to improve the conditions of establishment and growth of trees or their vigour, while artificial regeneration treatments seek to complete or replace natural regeneration.

Following Regeneration Cutting in a Softwood Stand	
Site preparation	This treatment, after cutting, allows creation of an environment favourable to the establishment of regeneration. Site preparation adequately mixes the soil while favouring the creation of a sufficient number of microsites favourable to natural or artificial regeneration. It also has the advantage of managing vegetation that competes with regeneration and improving the survival and growth of the desired regeneration.
Enrichment	This treatment allows planting of seedlings (in a stand) to introduce, reintroduce or increase the abundance of a desired increasingly rare or more valuable species. Generally, this treatment is applied in the understory.
Fill planting	This treatment allows planting of seedlings of a desired species to mitigate an excessively low density and fully use the site's production capacity.
Basic plantation	This treatment allows planting of seedlings of a desired species according to regular spacing of 1,600 stems per hectare (stems/ha). Its main objective is to increase the site's forest yield. Generally, this treatment is associated with a basic silviculture gradient.
Intensive plantation	This treatment allows planting of seedlings of a desired species according to regular spacing of 2,000 stems per hectare (stems/ha). Its main objective is to increase the site's forest yield and produce higher-quality stems. In the prematurity period, plantations necessitate commercial thinning to harvest a portion of the trees, in order to distribute the production potential over a well-distributed number of residual trees. Generally, this treatment is associated with an intensive silviculture gradient.

2.1.4.2 Softwood Stand: intermediate treatment

Intermediate treatments are applied to trees and seek to improve their growth, quality, vigour and composition.

Natural Origin	
Release	At the seeding stage, this treatment helps control the competing vegetation in order to release the desired species. It has the advantage of ensuring the survival and growth of the desired species, while ensuring a desired composition of the next stand.
Cleaning	At the sapling stage, this treatment allows for the control of competing vegetation in order to release the desired future stems. It has the advantage of ensuring the survival and growth of the desired species, while ensuring a desired composition of the next stand.
Precommercial thinning	At the sampling stage, this treatment can favour the growth of desired crop stems by cutting competing stems according to a regular spacing. Precommercial thinning stimulates growth in diameter of residual stems, while ensuring a desired composition of the next stand.
Plantation Origin	
Release	At the seeding stage, this treatment helps control the competing vegetation in order to release the desired species. It has the advantage of ensuring the survival and growth of the desired species, while ensuring a desired composition of the next stand.
Cleaning	At the sapling stage, this treatment allows for the control of competing vegetation in order to release the desired future stems. It has the advantage of ensuring the survival and growth of the desired species, while ensuring a desired composition of the next stand.
Phytosanitary pruning (Eastern White Pine)	This treatment helps prevent white pine mortality in a blister rust context. It is intended to cut the low branches of reforested plants that may be infected. The action is carried out in the first few years after planting and varies depending on the site's vulnerability to rust.
Pruning for quality purposes	This treatment produces timber without knots and improves the lumber grade of the butt log by cutting the branches on the lower part of the tree stem. Pruning is usually in an elite silvicultural scenario following commercial thinning.

2.1.4.3 Tolerant or Intolerant Hardwood Stands: Site and Intermediate Treatments

As in the case of the softwood stands, the site and intermediate treatments in hardwood stands seek the same objectives on the scale of the stand. They are divided into three main forest types: Maple-Yellow Birch stands (and Yellow Birch stands), Maple-American Beech stands, for which the strategy is developed to fight the American Beech invasion, and Poplar (hardwood and softwood) stands.

In Maple-Yellow Birch or Yellow Birch Stands	
Site preparation	After opening of the upper canopy by partial cutting, this treatment allows the creation of germination beds, between 300 and 400 beds per hectare. Regeneration with desired species is absent or insufficient, less than 30% well-distribution seeds and saplings.
In Maple-American Beech Stands	
Site preparation	After opening of the upper canopy by partial cutting, this treatment allows the creation of germination beds, about 300 to 400 beds per hectare. Regeneration with desired species is absent or insufficient, less than 30% well-distribution seedlings and saplings. The treatment also allows local elimination of American Beech seedlings and saplings.
Cleaning	This treatment can free regeneration with desired species by eliminating American Beech saplings one metre or taller. Regeneration with desired species over one metre tall must be sufficient, at more than 1,000 stems/ha well distributed, but dominated by American Beech saplings, over 500 stems/ha taller than one metre.
Girdling (In development)	This treatment can free growth spaces, which will be applied to the benefit of the desired species by eliminating the American Beech stems between 10 and 22 cm. This treatment may be performed when the desired species pole stand represents over 1.6 m^2/ha and is in competition with American Beech pole stand (over 2 m^2/ha).
Poplar-Hardwood and Softwood Stands	
Precommercial thinning	At the sapling stage, this treatment can favour the growth of desired crop stems by cutting competing stems according to a regular spacing. Precommercial thinning stimulates growth in diameter of residual stems, while ensuring a desired composition of the next stand.
Hybrid poplar plantation	This treatment allows planting of the seedlings of a desired species in intensive cultivation for optimized timber production over short revolutions. The use of exotic species in plantations is a sensitive topic in forest certification. The primary goal is to boost timber production in certain well-defined areas of the region. According to the Invasive Species Specialist Group (ISSG), the exotic species used in plantations in Québec are not considered invasive. According to data from the electronic system for monitoring plant orders, since 2002 only the hybrid poplar has been subject to reforestation on public land. Since 2000 the total surface area of hybrid poplar plantations has stood at 2,000 ha, mostly in MU 073-51, with smaller quantities in MUs 071-51, 071-52, and 073-52. The regional strategy provides for 30 ha of hybrid Poplar plantations for 2023. The scenario is not renewed for the subsequent years.

2.1.5 Silvicultural intensity gradient

The silvicultural intensity gradient is composed of four levels: extensive, basic, intensive and elite. The definitions in the box are from Guide sylvicole du Québec[40].

Silvicultural Intensity Gradient	
Extensive silviculture	Stand management is based on natural regeneration using cutting with protection of regeneration and soils, seed cutting, and cutting with protection of small merchantable trees. Advance regeneration is protected where regrowth establishment is assisted by natural seeding on good quality seedbeds created at harvesting or during site preparation.
Basic silviculture	Operations are aimed at managing stand composition i.e., interspecific competition. To increase the yield of desired species, competitor species are controlled through cleaning, tree release, and if required, artificial regeneration.
Intensive silviculture	Operations are aimed at increasing growth and improving the characteristics of selected trees of one or more desired species. A series of operations spread out over time are used to select and encourage the best trees. Intensive silviculture also differs from basic silviculture in that interspecific competition is managed through precommercial and commercial thinning.
Elite silviculture — indigenous species	Operations are aimed at increasing growth and improving the characteristics of selected trees of one or more desirable native species in short or pre-established harvesting cycles. It differs from intensive silviculture in that site conditions (e.g., drainage and fertilization) are improved and tree characteristics enhanced through pruning or shaping.
Elite silviculture — exotic or hybrid species	Operations are aimed at increasing growth and improving the characteristics of selected trees of one or more desired, fast-growing exotic or hybrid species in very short pre-established harvesting cycles. Competitor species are controlled on an ongoing basis and special attention is paid to site conditions (e.g., drainage and fertilization) and improving tree characteristics through pruning or shaping.

The intensity of the silvicultural scenarios is determined when the tactical and operational integrated forest management plans are drawn up. It will also be integrated during the writing of the stand prescriptions, where it particularly allows better orientation of the collection of data during the diagnostic process and during monitoring of efficiency[41] (quantity and level of precision required).

Extensive silviculture and basic silviculture are used in most of the region's forests. Intensive silviculture and elite silviculture, which require more operations over time, are used in areas where the profitability level justifies their use. These areas are usually limited in size, clearly defined, and very productive.

Table 8 Objectives According to the Silvicultural Intensity Gradient

Extensive	Basic	Intensive/Elite
Harvesting and production equivalent to that of the natural forest	Harvesting and production higher than that of the natural forest	Optimal harvesting and production
Establishment and protection of natural regeneration	Establishment and protection of natural or artificial regeneration	Establishment and protection of natural or artificial regeneration
	Management of forest composition and structure of the residual stand	Fine tuning of the forest composition, spacing between trees, and the structure of the residual stand
		Growth optimization

[40] MRN (2013).

[41] MRN (2013).

2.1.6 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 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.

The economic revenues considered in the economic analyses performed are associated with two categories in the analyses presented, depending on whether they are associated with the timber harvesting and processing sectors and the non-commercial silvicultural treatments sector. Costs are the sum of all expenses incurred to complete the silvicultural treatments associated with the completion of the management scenario or strategy.

Preliminary analyses were performed for different silvicultural scenarios. The investments correspond to the amounts allocated for the performance of silvicultural work.

Thus, the analyses presented allow confirmation whether utilization of the budget generates returns on investment. In this context, only the scenarios necessitating an investment are analyzed. Extensive regeneration cutting with soil protection and regeneration (without investment) thus is not part of the results presented.

The economic results serve to inform decision-making to favour the economic profitability in the silvicultural strategies provided in the integrated forest management plans and influence the allowable cut calculations.

It is important to specify that the acquisition of new knowledge allows continuous improvement of the analysis methodology, adjustment of forest yields and update of the economic costs and revenues considered. Therefore, this may influence the economic profitability level of the silvicultural scenarios over time.

The approach on which the economic profitability analyses are based integrates several concepts, including the baseline scenario, the scenario horizon, the costs and revenues, the forest yields and the discount rate. The analytical approach is found in Appendix D.

To learn more, consult:
Guide économique - Bureau de mise en marché des bois

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 Chief Forester 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 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 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. A less 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.

2.1.6.1 Results of Economic Profitability Analyses

This section summarizes the results of the analyses produced and their consideration during the development of the silvicultural strategy.

Scenarios Applicable in Forest with a Regular Structure

The following table presents an overall assessment of the results of the economic analysis produced for the main types of silvicultural scenario applicable in stands with a regular structure and slow regeneration irregular shelterwood scenario with final cutting in the softwood stands. The indicators calculated are the ratio of the net present value in perpetuity (NPV_p) to the cost in perpetuity (C_p) of a scenario and the economic indicator (EI). More details on these units of measure are found in Appendix D.

Table 9 Summary Assessment of Economic Profitability Analyses by Type of Silvicultural Scenario (Regular Structure)

MU	Type of silvicultural scenario analyzed	NPV_p/C_p	EI
071-51	Basic plantation (2 maintenance operations)	++	+
	Basic plantation (1 maintenance operation)	++	++
	Training of natural stands	++	++
	Regular shelterwood cutting	+++	+++
071-52	Basic plantation (2 maintenance operations)	++	++
	Basic plantation (1 maintenance operation)	+++	+++
	Basic plantation (without maintenance)	+++	+++
	Training of natural stands (cleaning)	++	-
	Regular shelterwood cutting	+++	+++
	Slow regeneration irregular shelterwood cutting with final cutting	+++	+++

MU	Type of silvicultural scenario analyzed	NPV_p/C_p	EI
072-51	Basic plantation (2 maintenance operations)	++	0
	Basic plantation (1 maintenance operation)	++	++
	Regular shelterwood cutting	++	++
073-51	Basic plantation (2 maintenance operations)	+	0
	Basic plantation (without maintenance)	+++	+++
	Training of natural stands (cleaning)	++	+
	Regular shelterwood cutting	+++	+++
	Slow regeneration irregular shelterwood cutting with final cutting	+++	+++
073-52	Basic plantation (2 maintenance operations)	++	+
	Basic plantation (1 maintenance operation)	++	++
	Basic plantation (without maintenance)	+++	+++
	Training of natural stands (cleaning)	+	-
	Fill planting (2 maintenance operations)	-	-
	Regular shelterwood cutting	+++	++
	Slow regeneration irregular shelterwood cutting with final cutting	+++	++
074-51	Basic plantation (2 maintenance operations)	++	+
	Basic reforestation (1 maintenance operation)	++	++
	Basic plantation (without maintenance)	++	++
	Training of natural stands (cleaning)	0	-
	Fill planting (2 maintenance operations)	0	-
	Fill planting (1 maintenance operation)	-	-
	Regular shelterwood cutting	+++	++
	Slow regeneration irregular shelterwood cutting with final cutting	+++	+

Among the **Plantation** scenarios, the one without maintenance is the most profitable. This type of scenario mainly applies to “Spruce stand” potential vegetation (RE2), due to the low competition rate. The scenarios that require maintenance work (because of the degree of competition due to the productivity of the sites) obtain fewer results, although they are generally positive. The scenarios with 2 maintenance operations apply generally to “Yellow Birch-Balsam Fir stand” potential vegetation (MJ) or “Balsam Fir-White Birch stand” potential vegetation (MS), while the scenarios with 1 maintenance operation are generally performed on potential “Balsam Fir-Spruce” potential vegetations (RS2 and RS5).

The **cleaning** scenarios of natural regeneration are less interesting with regard to the economic indicator. NPV_p/C_p is slightly positive.

The **fill planting** scenarios are the less interesting, in view of the investment effort required for a yield equivalent to the natural forest.

In the case of **regular shelterwood cutting**, the high value of the indicators can be explained by the fact that seed cutting, which can be preceded by commercial thinning, generates an earlier capitalization in the scenario and is less affected by discounting.

The **slow regeneration irregular shelterwood** scenario with final cutting in the softwood stands also present economic profitability. However, this type of scenario is little used in softwood stands.

Other factors influence the results, such as the revolution and the period between interventions, the geographic location and the choice of potential vegetation for which the degree of competition and productivity differ. The factor that seems the most influential is the direct connection between the value of the investments required and the value of the products generated.

Scenarios Applicable in Forest with an Irregular Structure

Since the last exercise of the 2018-2023 Tactical Integrated Forest Management Plan, workshops have shed light on the avenues for improvement of the methodology developed for the production of economic analyses regarding the partial cutting scenarios in forests with an irregular structure. The methodology then will be reviewed, which explains the absence of results for the scenarios applicable in forests with an irregular structure.

2.1.7 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 an 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.

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.

Table 10 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 strategy and applicable to all MUs to various degrees. The following paragraphs and Table 11 present a regional summary of this analysis. When necessary, mitigation or monitoring measures have been identified.

Impossibility of Disposing of Certain Products on the Markets

This risk is defined by the inability to find buyers for products or species for which the demand is fluctuating or absent.

In regular stands, the risk of not disposing of Paper Birch and Red Maple from cutting in intolerant hardwood and mixed stands, where these species are predominant, is already known and its impact is major. The significant increase in Balsam Fir in the softwood and mixed stands is also problematic due

to a lower demand for this species relative to Spruce. This situation is less problematic in predominantly Poplar or Spruce stands due to the presence of buyers for these species in the region.

The silvicultural scenarios with commercial thinning in the Pine and Spruce stands, for which the timber generated is in smaller dimensions, are risky, but more moderate.

In the tolerant hardwood forest, the risk is also major and known for the difficulty of disposing of pulpwood and lower-quality stems or species in less demand, such as American Beech and Red Maple, in the partial cutting scenarios. Commercial thinning in the hardwood forest leads to harvesting of smaller-diameter stems, which could generate more pulpwood that would hinder their performance. However, the performance of these scenarios is currently marginal. The selection cutting and continuous cover irregular shelterwood cutting scenarios are less risky due to the higher proportion of quality Maple they generate.

Inability to Perform all the Work of the Scenario on the Targeted Areas

Some constraints may partially or totally hinder the performance of the interventions of a silvicultural scenario to achieve the objectives concerned.

For commercial thinning, the lack of adapted machinery and skilled labour to perform them presents a significant hindrance to designing the silvicultural scenarios that provide for these interventions.

The labour shortage and the problems of maintenance in good condition of the road network and access to the forest management area to perform the work of restoration to production are the main obstacles to ensuring the success of the scenarios that require these interventions (fill planting or plantation planting, maintenance (release and/or cleaning of natural regeneration plantations, phytosanitary pruning in the case of Easter White Pine). The labour shortage may also limit the performance of the site preparation work indicated in certain partial cutting scenarios.

The labour shortage also affects the transportation sector. The industries locally processing Poplar and softwood prioritize transportation of their products to their plants. The shortage of carriers then poses a problem for transportation of hardwood pulp from regeneration cutting or partial cutting, which may affect their performance. Indeed, hardwood pulp transportation over long distances mobilizes trucks that then are no longer available for transportation of other products. This risk is considered low for extensive scenarios with the aim of production of Poplar and the Fir, Spruce, Jack Pine and Larch group (SEPM in french).

Fires

This risk depends on the anticipation of an increased timber loss related to the increased probability and recurrence of fires.

The fire risks are high for the scenarios concerning production of softwood, such as SEPM and Pine. Although the probability of occurrence is lower and the size of the areas should not be too great due to the mix of the neighbouring stands, the major damage on a local scale makes this a high risk. Fire is less risky for mixed to softwood strata, since the hardwood component mitigates the risk. In hardwood forests, the risk is low.

The fire risk is increased in an SBW epidemic situation, because of the dead trees that are more likely to burn quickly. Drought episodes or conditions will also have an upward influence on this risk.

Insects and Diseases

In the short term (3-5 years), precommercial thinning and commercial thinning increase the vulnerability of the stands to the Spruce Budworm. The risks of loss of returns on investment thus are high in a Spruce Budworm epidemic situation.

In the case of the scenarios identified for management of Eastern White Pine, the risk is also high, due to its great vulnerability to the White Pine Weevil, White Pine Blister Rust and White Pine Needle Disease. The same is true for Jack Pine, which is very vulnerable to Western Gall Rust.

In sugar bush operations, one of the risks is associated with beech bark disease. This disease affects the quality of American beech wood and the sustainability of American beech crops due to premature stalk death. This issue is identified in the timber production strategy (see section 1.2.2.3 of this document as well as the “Selected Timber Production Issues” section of the “Issues Analysis” support document).

Other insects present lower risks for management of tolerant hardwoods, such as Forest Tent Caterpillar Moth, Sugar Maple Borer and European Gypsy Moth. Oak Wilt presents a future threat for this species, because it is present in the northeastern United States. A risk related to Annosus Root Rot is present for Red Pine management, but relatively low due to treatment of the roots, which is provided during work performed outside of winter season.

Other Natural Disturbances

The risks associated with the other disturbances are mainly due to climate conditions or factors, such as high winds or tornadoes causing total or partial windthrow, freezing rain, drought, freeze-thaw episodes, etc.

Regardless of the silvicultural scenario, management of predominantly Spruce and Jack Pine stands presents a higher risk of loss of growth or mortality due to drought. However, these species are less vulnerable to freezing rain. The scenarios including commercial thinning may temporarily increase the vulnerability of these stands to windthrow.

Poplars and tolerant hardwoods, such as Yellow Birch, Sugar Maple and, to a lesser degree, Red Oak, are vulnerable to drought and freezing rain. Their susceptibility to windthrow depends on their location and high wind or tornado episodes.

Eastern White Pine and Red Pine are less at risk in relation to these conditions.

Change of Vocation of the Territory

The risk associated with the loss of manageable areas by the assignment of new vocations or other constraints to forest management is probable, regardless of the silvicultural scenario or the anticipated production.

The designation and projects of protected areas, identification of sites, such as exceptional forest ecosystems, wildlife habitats or other changes of vocation are possible and difficult to anticipate. Moreover, modification of the existing allocation contours may lead to a loss of manageable areas or removal of a portion of the Management Units.

Table 11 Summary of the Risks Associated with Timber Production and Mitigation or Monitoring Measures Applicable to all MUs

Risk	Description of the risk	Risk assessment	Mitigation/monitoring measure
Impossibility of disposing of products on the markets	• **Lack of buyer** for certain species; • Lack of buyer for hardwood and softwood **pulpwood**; • Low industrial demand for **lower-quality** timber; • Low industrial demand for trees of certain species of **smaller dimensions**; • Low demand for **Balsam Fir** in predominantly hardwood mixed stands and hardwood stands. • Disposal of **Balsam Fir volumes** of SEPM stands, if it is the dominant species. The risk is accentuated in Spruce Budworm epidemic context.	High or extreme risks Moderate risk	• Explore options to dispose of timber of species or products without a buyer or less desired; • Assistance in transporting pulpwood (short-term measure); • Explore silvicultural conditions to improve composition in species and/or stem quality; • Performance of work of restoration to production favouring the desired species.
Inability to perform all the work of the scenario on the targeted areas	• **Labour** shortage for performance of site preparation, regeneration maintenance and/or commercial thinning work; • Shortage of **adapted machinery** for performance of commercial thinning; • Shortage of **transportation** of pulpwood; • Access to the **sites** for the duration of the planting scenarios.	High or moderate risks	• Develop better predictability of the work to be performed; • Prioritization of the work to be performed; • Define zoning for the application of more intensive work.
Fire	• For softwood species (SEPM) and Pines, the fire risks are high, involving major damage; however, the size of the areas should not be too great because of the mix of neighbouring stands; • The risk is lower in mixed stands.	High risks Moderate risk	• Dispersion of non-commercial work; • Surveillance and firefighting by Société de protection des forêts contre le feu (SOPFEU); • Reduce the quantity of combustible materials via salvage of dead wood or dying timber in an SBW epidemic situation.

Risk	Description of the risk	Risk assessment	Mitigation/monitoring measure
Insects and Diseases	• Balsam Fir and Spruce mortality in a **Spruce Budworm** epidemic context; • Eastern White Pine damage and mortality due to **White Pine Weevil**, **White Pine Blister Rust** and **White Pine Needle Disease**; • Western Gall Rust in Jack Pine; • Beech Bark Disease. • Annosus Root Rot in Red Pine; • Forest Tent Caterpillar Moth; • Sugar Maple Borer; • To be monitored : European Gypsy Moth and Oak Wilt in Red Oak.	High or extreme risks Moderate risks	SBW: • Deployment of the moratorium on precommercial thinning and commercial thinning in an epidemic context; • Spruce Budworm epidemic management strategy or special plan to harvest vulnerable or affected stands. Eastern White Pine: Choice of site, maintenance and phytosanitary pruning, mixed reforestation; Jack Pine: Limit Jack Pine reforestation on the sites where the species is present. North American beech: Procedures or treatments to reduce the proportion of beech or a special plan to harvest beech affected by beech bark disease.
Other Natural Disturbances	• For softwood species (SEPM), significant risk of loss of growth or mortality due to **drought**; • For hardwood species, high risk of **freezing rain** for Poplar, Sugar Maple, Yellow Birch and Paper Birch. *For softwoods* • Windthrow in a commercial thinning context; • Freezing rain; • Vulnerability to drought of Eastern White Pine and Red Pine *For hardwoods:* • Windthrow for Yellow Birch, Sugar Maple and Red Oak; • Drought: for Yellow Birch, Sugar Maple, Red Oak, Red Maple and Paper Birch; • Impact on species of freeze/thaw cycles	High risks Moderate risks Other risks to monitor	• Target the low-risk sites regarding drought for softwood reforestation; • Review certain forest management conditions in view of reducing windthrow risks.

Risk	Description of the risk	Risk assessment	Mitigation/monitoring measure
Change of vocation of the territory	Change of vocation that induces a reduction of the area intended for forest production, for example: • New projects or designation of protected areas; • Any other new vocation in the territory or modification of existing limits; • Operational constraints.	Probable risk	• Identification of increased timber production areas

2.1.8 Silvicultural Scenarios Applicable to All MUs

The silvicultural strategy offers 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 tables below from being performed to account for particularities stand prescription.

Table 12 Possible Silvicultural Scenarios According to the Intensity of Silviculture— Main Boreal Forest Types[42]

Major forest types	Forest planning intensity		
	Extensive scenarios	Basic scenarios	Intensive or elite scenarios
White Birch-stands and White Birch-softwood stands	CPRS	CPRS-SCA-PLb-DEG CPRS-DEG-(NET) CPIRL-(SCA)-(REG)	CPRS-SCA-PLi-DEG-NET-EC Plantations: Spruce and Pine
Spruce stands	CPRS CPPTM	CPRS-DEG-(NET) CPRS-SCA-PLb-(DEG)-(NET) CPHRS-REG-(DEG)-(NET) CPIRL-(SCA)-(REG)-(DEG)	CPRS-SCA-PLi-DEG-(NET)-EC EC (for stands already trained) CPRS-(EPC)-EC
Poplar stands and Poplar-softwood stands	CPRS	CPIRL-(SCA)-(REG)	CPRS-SCA-PL_PEH
Jack Pine stands	CPRS	CPRS-(DEG)-(NET) CPRS-SCA-PLb-(DEG)-(NET)	CPRS-SCA-PLi-(DEG)-(NET)-EC EC (trained stands)
Softwood-hardwood stands	CPRS	CPRS-DEG-(NET) CPRS-SCA-PLb-DEG-(NET) CPIRL-(SCA)-(REG)-(DEG)	CPRS-SCA-PLi-(DEG)-(NET)-EC
Balsam Fir stands	CPRS CPPTM	CPRS-DEG-(NET) CPRS-SCA-PLb-DEG-(NET) CPHRS-REG-(DEG)-(NET)	CPRS-SCA-PLi-(DEG)-(NET)-EC

[42] French silvicultural treatment acronyms: Cutting with high generation and soil protection (CPHRS); Slow regeneration irregular shelterwood cutting (CPIRL); Cutting with protection of small merchantable stems (CPPTM); Cutting with regeneration and soil protection (CPRS); Release (DEG); Commercial thinning (EC); Precommercial thinning (EPC); Cleaning (NET); Intensive planting at 2,000 seedlings/ha (PLi); Elite hybrid poplar planting (PL_PEH); Scarification (SCA); Basic reforestation at 1,600 seedlings/ha (PLb); Fill planting (REG).

Table 13 Possible Silvicultural Scenarios According to Silvicultural Intensity: Major Temperate Forest Types[43]

Major forest types	Forest planning intensity		
	Extensive scenarios	Basic scenarios	Intensive or elite scenarios
Red Maple stands	CPRS	CPIRL-(SCA)-(REG/ENR)-(DEG)-(NET) CPRS-SCA-PLb-DEG-(NET) CPRS-DEG-(NET)	CPRS-SCA-PLi-DEG-NET-EC
Tolerant hardwood stands	CRS-SCA CPRS	CPICP CPIRL-(SCA)-(ENR)-(DEG)-(NET) CPR-(SCA)-(REG/ENR)-(DEG)-(NET) CRS-(SCA)-DEG-NET CPRS-DEG-NET	CJ CJT-SCA CPR-(SCA)-(REG/ENR)-(DEG)-(NET)-(EPC)-EC-(ELA) EC-(ELA) CRS-(EPC)-EC-(ELA) CPRS-(DEG)-(NET)-(EPC)-EC-(ELA) CPIRL-(DEG)-(NET)-(EPC)-EC-(ELA)
Tolerant hardwood-softwood stands	CPRS CRS-SCA	CPICP CPIRL-(SCA)-(ENR)-(DEG)-(NET) CPR-(SCA)-(DEG)-(NET) CRS-(SCA)-(DEG)-(NET) CPRS-(DEG)-(NET)	CPR-(SCA)-(DEG)-(NET)-(EPC)-(EC)-(ELA) EC-(ELA) CPRS-(DEG)-(NET)-(EPC)-EC-(ELA) CPIRL-(DEG)-(NET)-(EPC)-EC-(ELA)
Eastern White Pine stands	CRS-SCA	CPIRL CPIRL-(DEG)-(ELAPH)-(NET) CRS-SCA-PLb-DEG-(ELAPH)	EC-(ELA) CPR-SCA-REG/ENR-DEG-(ELAPH)-(NET)-EC-(ELA) CPR-EC-(ELA) CRS-SCA-REB-DEG-(ELAPH)-(NET)-EC-(ELA) CRS-(EPC)-EC-(ELA) CPIRL-SCA-REG/ENR-(DEG)-(ELAPH)-(NET)-EC-(ELA) CPIRL-(DEG)-(NET)-(EPC)-EC-(ELA)
Eastern Hemlock stands		CPICP-(SCA) CPIRL-(SCA)-(ENR)-(DEG)-(NET)	
Cedar stands		CPICP-(SCA) CPIRL-(SCA)-(ENR)-(DEG)-(NET)	

[43] French silvicultural treatment acronyms: Slow regeneration irregular shelterwood cutting (CPIRL); Continuous cover irregular shelterwood cutting (CPICP); Cutting with regeneration and soil protection (CPRS); Regular shelterwood cutting (CPR); Seed cutting (CRS); Selection cutting (CJ); Patch-selection cutting (CJT); Release (DEG); Commercial thinning (EC); Precommercial thinning (EPC); Cleaning (NET); Intensive plantation at 2,000 seedlings/ha (PLi); Scarification (SCA); Basic reforestation at 1,600 seedlings/ha (PLb); Fill planting (REG); Enrichment (ENR); Pruning (ELA); Phytosanitary pruning (ELAPH).

2.2 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 (AIPL in french) are an integral part of the tactical integrated forest management plans.

To increase production of targeted species and quality lumber, it is possible to dedicate certain portions of the territory to increased timber production. These territories, known as “areas of increased timber production”, ultimately must be quantified and located in the integrated forest management plans. An AIPL is defined as:

> “A territory mainly intended for timber production on which silvicultural work seeks to increase the value of the timber supply. This increase in value may be reflected by an increase in volume per surface unit, volume per stem or quality of stems, by production of desired species or by a combination of these various production objectives. “

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

- protect 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 AIPL seeks intensive timber production while integrating harmoniously into the objectives of ecosystem management and integrated management of resources and land.

These areas could be circumscribed on one or more portions of the Management Units. Access must be adequate for the deployment of priority silvicultural efforts and performance of monitoring.

Given the mixed character of the Outaouais forest, there may be developments in the same area both in the even-aged forest regime and the uneven-aged forest regime. Past work will be considered if it presents desired characteristics and good growth potential.

In the context of regional wood production strategy and depending on the forest stations present, priority is given to star species and to promote.

A regional approach is initiated with the TRGIRTO via a working committee on areas of increased timber production. This committee's mandate is to support the MRNF in its approach on the AIPL in Outaouais and come back to the TRGIRTO with a recommendation.

The work plan includes:

- Presentation of the AIPL concept;
- Collection of concerns and winning conditions;
- Presentation and discussion of the eligible work according to the silviculture intensity gradients;
- Discussion on the compatibility of activities and uses in areas of increased timber production.
- A presentation and discussion on basic mapping;
- Discussion of the implementation targets and the horizon;
- Preparation of recommendations to the TRGIRTO.

The TRGIRTO is expected contribution thus is to agree on the eligible work, identify the AIPL location guidelines and agree on the implementation targets and a horizon to achieve these targets. In a first stage, and throughout the process, identification of the AIPL related concerns is documented.

An approach is also initiated with the Indigenous communities in the region on the areas of increased timber production for the MUs concerned.

The work plan includes:

- Presentation of the AIPL concept;
- Collection of concerns and winning conditions;
- A presentation and discussion of the eligible work according to the silviculture intensity gradient degrees;
- Discussion on the compatibility of activities and uses in areas of increased timber production.
- A presentation and discussion on basic mapping;
- A discussion on the implementation targets and the horizon;
- Agree on accommodation measures, as needed.

By this approach, it is desired that the AIPL be implemented in accordance with the interests, values and needs of the Indigenous communities and that they can influence the eligible work in the AIPL, the AIPL location guidelines, the implementation targets and the horizon to achieve these targets.

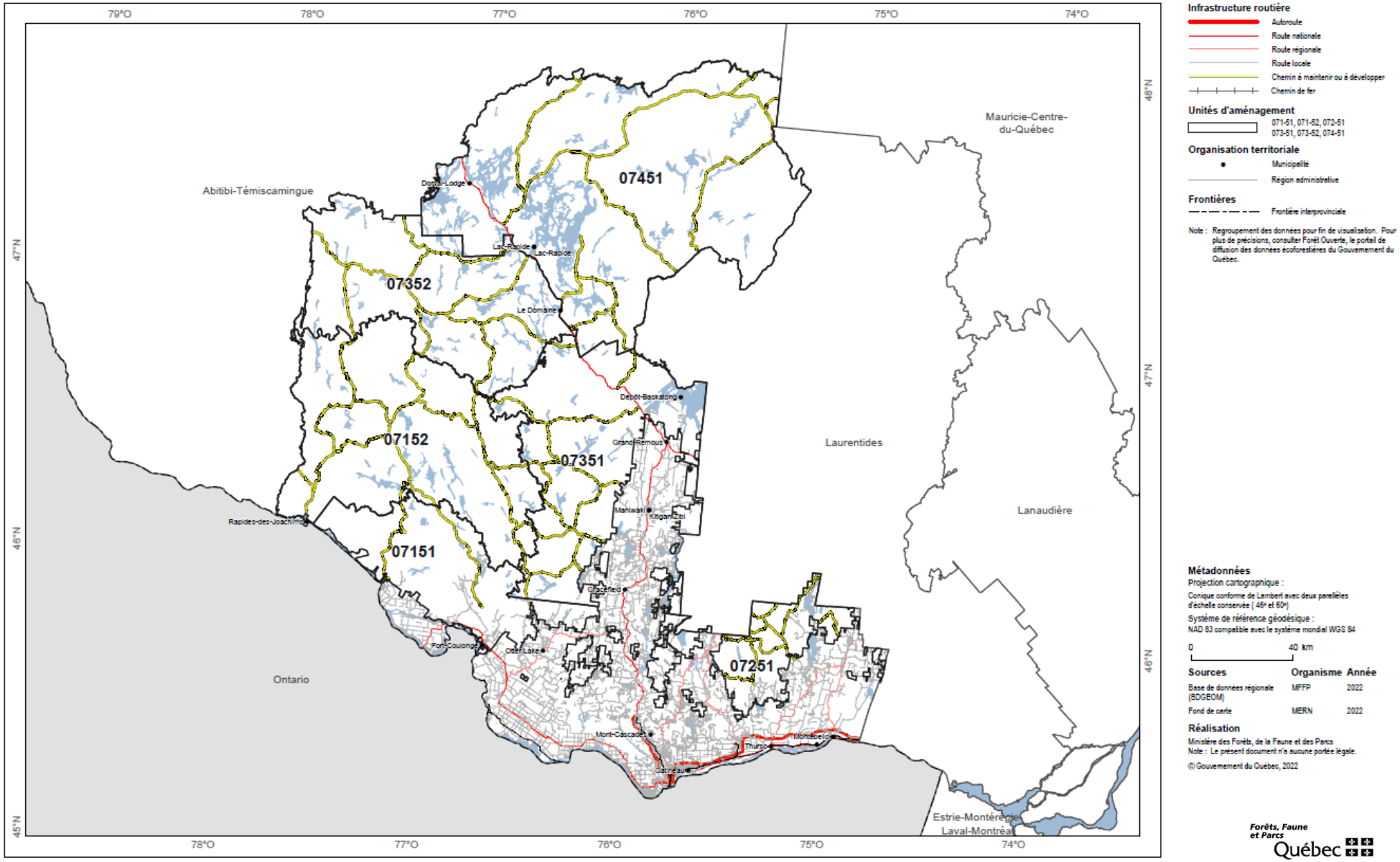
2.3 Infrastructures and Main Roads to be Developed and Maintained

The main infrastructures (roads, bridges, culverts) form a strategic network allowing access to the territory with the goal of enhancement of all resources of the forest environment. The main network of the region presented in the following map all already exist, although some necessitate significant rehabilitation work. Moreover, since the current network already offers good coverage of the territory, no new construction of main access roads is anticipated in the short or medium term.

The main network, in its current state, necessitates significant investments for its upgrade, because several sections are in poor condition. Certain financial assistance programs or measures in the past few years have allowed rehabilitation of certain roads, and rebuilding of bridges and culverts in these areas. Thus, Chemin Lépine-Clova, Chemin Cameronian-Taylor, Chemin Maniwaki-Témiscamingue, Chemin Landron, Sunshine, and Chemin du Bois-Franc are some examples where significant investments were made.

The demand for quality roads is growing, because the forest is increasingly used by users other than forest industry operators alone. The magnitude of the work required for rehabilitation means that the investments must be amortized over several years. Funding to defray a significant portion of the costs related to this work is generally possible via the programs and measures offered by the MRNF, but the issue of coordination versus responsibility for each section is posed for their management, in a user-pay context. Indeed, it frequently happens that there is more than one regular user for the same section, or conversely that there is none. Forest industry operators and other entrepreneurs in silvicultural work use certain sections periodically. The same issue of responsibility also exists in annual maintenance of these main roads, while the various uses, such as forest industry operators, structured wildlife territory managers, vacationers, etc. often coexist on the same roads.

Figure 2 Infrastructures and Main Roads to be Developed and Maintained (French only)



2.4 Allowable Cuts

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

The allowable cuts correspond, for a given 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 management objectives, including those concerning:

- The sustainability of the forest environment;
- 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 account for:

- The applicable sustainable forest management objectives, coming from section 48 of the *Sustainable Forest Development Act.*
- The directions and objectives of the Sustainable Forest Development Strategy.
- The provisions of the RSDF.
- The regional and local forest management objectives.

To learn more, consult:
Accueil - Bureau du Forestier en chef (gouv.qc.ca)

Thus, depending on the integrated forest management strategy and the management objectives established by the Direction de la gestion des forêts de l'Outaouais (DGFo-07, Outaouais Forest Management Department), the Chief Forester proceeded to determine the allowable cuts of MU 071-51, 071-52, 072-51, 073-51, 073-52, 074-51. The results are available on the Chief Forester's website. The allowable cuts broken down by type of operational constraint and the budgets required for the performance of the silvicultural work are also found on this website.

Table 14 Allowable cuts for the 2023-2028 period in gross commercial volume (m^3/year) by species or groups of species.

SEPM	Eastern White Cedar	Eastern Hemlock	White and Red Pines	Poplars	Paper Birch	Yellow Birch	Maples	Other hardwoods	Total
1 433 600	67 000	16 400	154 900	655 600	796 400	304 300	531 100	192 400	4 151 700

The allowable cuts determined by the Chief Forester are available at the following Internet address:
Outaouais - Bureau du Forestier en chef (gouv.qc.ca)

2.5 Forest management levels

The Chief Forester also presents MU forest management levels, i.e. the annual areas of commercial and non-commercial silvicultural work that support the allowable cut. The guidelines for some of these levels were set by the forest management strategy transmitted by DGFo-07 to the Chief Forester the context of production of the allowable cut calculation. It nonetheless remains that some levels may be adjusted in the Tactical Integrated Forest Management Plan to account for factors not considered or that occurred after the production of the allowable cut calculation, such as certain regional issues not captured or certain regional or local realities. In addition, the final choice of silvicultural treatments applied on site depends on the conditions encountered (see Section 2.1 – Silvicultural Strategy).

Thus, the following tables present the areas to be completed annually in commercial or non-commercial work by MU in view of achieving forest management objectives. The levels presented for commercial work are based on the results of the allowable cut calculation. These annual areas will be ajusted after the exercise of determining the attributable volumes. The annual areas of the non-commercial work and commercial thinning correspond to the regional targets established under the regional wood production strategy.

Table 15 Distribution of Silvicultural Work Areas of the Management Strategy – MU 071-51

Silvicultural treatments	Average annual area (ha/year)	Estimated proportion (%)
Cutting with regeneration and soil protection	751	17%
Variable retention harvesting	-	0%
Cutting with protection of small merchantable stems	-	0%
Total final cuts	**751**	**17%**
Commercial thinning	-	0%
Regular shelterwood cutting	1,681	39%
Slow regeneration irregular shelterwood cutting		
Continuous cover irregular shelterwood cutting	443	10%
Selection cutting		
Total partial cuts	**2,124**	**49%**
Totally commercial work	**2,875**	**67%**
Full scarification	130	3%
Partial scarification	120	3%
Total site preparation	**250**	**6%**
Planting	-	0%
Fill planting	210	5%
Total reforestation work	**210**	**5%**
Release of plantations/fill planting	210	5%
Release of natural regeneration	-	0%
Cleaning	640	15%
Precommercial thinning	-	0%
Phytosanitary pruning	130	3%
Total training work	**980**	**23%**
Total non-commercial work	**1,440**	**33%**
Total silvicultural treatments	**4,315**	**100%**

Table 16 Distribution of Silvicultural Work Areas of the Management Strategy – MU 071-52

Silvicultural treatments	Average annual area (ha/year)	Estimated proportion (%)
Cutting with regeneration and soil protection	3,983	40%
Variable retention cutting	57	1%
Cutting with protection of small merchantable stems	-	0%
Total final cuts	**4,040**	**41%**
Commercial thinning	8	0%
Regular shelterwood cutting	1,961	20%
Slow regeneration irregular shelterwood cutting		
Continuous cover irregular shelterwood cutting	1,161	12%
Selection cut		
Total partial cuts	**3,130**	**32%**
Totally commercial work	**7,170**	**72%**
Full scarification	575	6%
Partial scarification	140	1%
Total site preparation	**715**	**7%**
Planting	435	4%
Fill planting	160	2%
Total reforestation work	**595**	**6%**
Release of plantations/fill planting	595	6%
Release of natural regeneration	-	0%
Cleaning	695	7%
Precommercial thinning	-	0%
Phytosanitary pruning	140	1%
Total training work	**1,430**	**14%**
Total non-commercial work	**2,740**	**28%**
Total silvicultural treatments	**9,910**	**100%**

Table 17 Distribution of Silvicultural Work Areas of the Management Strategy – MU 072-51

Silvicultural treatments	Average annual area (ha/year)	Estimated proportion (%)
Cutting with regeneration and soil protection	151	8%
Variable retention harvesting	25	1%
Cutting with protection of small merchantable stems	-	0%
Total final cuts	**176**	**9%**
Commercial thinning	23	1%
Regular shelterwood cutting	450	23%
Slow regeneration irregular shelterwood cutting		
Continuous cover irregular shelterwood cutting	858	45%
Selection cut		
Total partial cuts	**1,330**	**69%**
Totally commercial work	**1,506**	**78%**
Full scarification	-	0%
Partial scarification	65	3%
Total site preparation	**65**	**3%**
Planting	-	0%
Fill planting	45	2%
Total reforestation work	**45**	**2%**
Release of plantations/fill planting	45	2%
Release of natural regeneration	-	0%
Cleaning	265	14%
Precommercial thinning	-	0%
Phytosanitary pruning	-	0%
Total training work	**310**	**16%**
Total non-commercial work	**420**	**22%**
Total silvicultural treatments	**1,926**	**100%**

Table 18 Distribution of Silvicultural Work Areas of the Management Strategy – MU 073-51

Silvicultural treatments	Average annual area (ha/year)	Estimated proportion (%)
Cutting with regeneration and soil protection	1,766	24%
Variable retention harvesting	-	0%
Cutting with protection of small merchantable stems	-	0%
Total final cuts	**1,766**	**24%**
Commercial thinning	81	1%
Regular shelterwood cutting	1,671	22%
Slow regeneration irregular shelterwood cutting		
Continuous cover irregular shelterwood cutting	1,079	14%
Selection cut		
Total partial cuts	**2,830**	**38%**
Totally commercial work	**4,596**	**62%**
Full scarification	355	5%
Partial scarification	200	3%
Total site preparation	**555**	**7%**
Hybrid poplar plantation (for 2023 only)	30	0%
Planting	225	3%
Fill planting	200	3%
Total reforestation work	**455**	**6%**
Release of plantations/fill planting	425	6%
Release of natural regeneration	-	0%
Cleaning	1,025	14%
Precommercial thinning	300	4%
Phytosanitary pruning	100	1%
Total training work	**1,850**	**25%**
Total non-commercial work	**2,860**	**38%**
Total silvicultural treatments	**7,456**	**100%**

Table 19 Distribution of Silvicultural Work Areas of the Management Strategy – MU 073-52

Silvicultural treatments	Average annual area (ha/year)	Estimated proportion (%)
Cutting with regeneration and soil protection	2,673	44%
Variable retention harvesting	-	0%
Cutting with protection of small merchantable stems	-	0%
Total final cuts	**2,673**	**44%**
Commercial thinning	12	0%
Regular shelterwood cutting	1,176	20%
Slow regeneration irregular shelterwood cutting		
Continuous cover irregular shelterwood cutting	50	1%
Selection cut		
Total partial cuts	**1,238**	**21%**
Totally commercial work	**3,910**	**65%**
Full scarification	470	8%
Partial scarification	200	3%
Total site preparation	**670**	**11%**
Planting	435	7%
Fill planting	35	1%
Total reforestation work	**470**	**8%**
Release of plantations/fill planting	470	8%
Release of natural regeneration	-	0%
Cleaning	470	8%
Precommercial thinning	-	0%
Phytosanitary pruning	35	1%
Total training work	**975**	**16%**
Total non-commercial work	**2,115**	**35%**
Total silvicultural treatments	**6,025**	**100%**

Table 20 Distribution of Silvicultural Work Areas of the Management Strategy – MU 074-51

Silvicultural treatments	Average annual area (ha/year)	Estimated proportion (%)
Cutting with regeneration and soil protection	8,005	54%
Variable retention harvesting	-	0%
Cutting with protection of small merchantable stems	-	0%
Total final cuts	**8,005**	**54%**
Commercial thinning	65	0%
Regular shelterwood cutting	1,684	11%
Slow regeneration irregular shelterwood cutting		
Continuous cover irregular shelterwood cutting	25	0%
Selection cut		
Total partial cuts	**1,774**	**12%**
Totally commercial work	**9,779**	**66%**
Full scarification	1,210	8%
Partial scarification	220	1%
Total site preparation	**1,430**	**10%**
Planting	1,210	8%
Fill planting		0%
Total reforestation work	**1,210**	**8%**
Release of plantations/fill planting	1,210	8%
Release of natural regeneration	-	0%
Cleaning	1,085	7%
Precommercial thinning	-	0%
Pruning	-	0%
Total training work	**2,295**	**16%**
Total non-commercial work	**4,935**	**34%**
Total silvicultural treatments	**14,714**	**100%**

Table 21 Breakdown of harvest areas by operational constraint (ha and %)

UA		Without constraints	Structured wildlife territories	Landscapes	Fragmented forests	Steep slopes	Other
071-51	Area (ha)	1 541	920	65	88	144	117
	%	**54%**	**32%**	**2%**	**3%**	**5%**	**4%**
071-52	Area (ha)	4 041	2 160	13	368	224	364
	%	**56%**	**30%**	**0%**	**5%**	**3%**	**5%**
072-51	Area (ha)	480	565	55	57	157	206
	%	**32%**	**37%**	**4%**	**4%**	**10%**	**14%**
073-51	Area (ha)	1 028	2 393	93	311	176	469
	%	**23%**	**54%**	**2%**	**7%**	**4%**	**10%**
073-52	Area (ha)	1 279	2 025	20	233	47	465
	%	31%	50%	0%	6%	1%	11%
074-51	Area (ha)	2 206	5 293	81	483	246	1 470
	%	**23%**	**54%**	**1%**	**5%**	**3%**	**15%**

2.6 Monitoring

To implement the contents of the PAFITs starting in 2018, it is important to make sure to have a management strategy that will be based on consensus factors that can be achieved in the field. In this perspective, the unified management team of the Direction générale de la gestion des forêts du sud-ouest prepares the major management directions and proceeds with a consultation of the operational teams and the Direction, who approve the content.

The implementation of the forest management strategy represents the best assurance of respect for sustainable forest yield.

The following factors are monitored:

1 Compliance with the allowable cuts and timber supply guarantees;

2 Forest management levels;

3 Harvest levels according to the operational difficulties (major constraints);

4 Monitoring of the harvest levels by TAU (age structure);

5 Monitoring of the indicators and targets determined for all of the issues identified.

Thus, monitoring and observance of the targets relating to the forest management objectives and the integrated forest management strategy are achieved through tactical 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 management strategy.

Moreover, as specified in the document “Legal and Administrative Context”, 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 stand 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.

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.

Table 22 Schedule of Forest Monitoring Applicable to All MUs in the Region

					Monitoring years				
Intervention to monitor	**Regeneration type**	**Intensity gradient**	**Limit to reach the threshold**	**Threshold to obtain --- Stocking**	**2023-24**	**2024-25**	**2025-26**	**2026-27**	**2027-28**
Regeneration cutting (RC) and artificial regeneration planting (Monitoring operation 1)	Natural regeneration	Extensive	10 years after harvesting	≥ 50% commercial species	RC 2013	RC 2014	RC 2015	RC 2016	RC 2017
		Basic	5 years after harvesting	≥ 60% desired species	RC 2018	RC 2019	RC 2020	RC 2021	RC 2022
		Intensive/ Elite		≥ 75% desired species					
	Artificial regeneration	Basic		≥ 60% desired species					
		Intensive/ Elite		≥ 75% desired species					
Partial cuts (PC) (Monitoring operation 1)	Natural regeneration	Extensive	10 years after the last regeneration intervention	≥ 50% commercial species	PC 2013	PC 2014	PC 2015	PC 2016	PC 2017
		Basic	5 years after the last regeneration intervention	≥ 60% desired species	PC 2018	PC 2019	PC 2020	PC 2021	PC 2022
		Intensive/ Elite		≥ 75% desired species					
Natural disturbances (Monitoring operation 1)	Natural regeneration	Extensive	10 years after the disturbance	≥ 50% commercial species	Disturbances 2013	Disturbances 2014	Disturbances 2015	Disturbances 2016	Disturbances 2017
Artificial regeneration (Follow-up 2)	Artificial regeneration (Plantation)	Basic	15 years after planting	≥ 60% desired species free to grow	Planting 2008	Planting 2009	Planting 2010	Planting 2011	Planting 2012
		Intensive/ Elite		≥ 75% thinned desired species					
	Artificial regeneration (Fill planting)	Basic		≥ 60% desired species free to grow					
		Intensive/ Elite		≥ 75% thinned desired species					
	Artificial regeneration (Seeding)	Basic		≥ 60% desired species free to grow					
		Intensive/ Elite		≥ 75% thinned desired species					

Professional and Administrative Signatures

Ressources naturelles et Forêts Québec

Professional and Administrative Signatures Form

Tactical Integrated Forest Management Plans

Management Units 071-51, 071-52, 072-51, 073-51, 073-52 and 074-51

Professional responsibility

Tactical Integrated Forest Management Plans 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.

_____ _____

Isabelle Paquin, F. Eng. Date

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

_____ _____

Sébastien Meunier, F. Eng. Date

Responsible for 2.1.3 and Appendix C
Collaborator: 1.2, 1.3, 2.1, 2.2, 2.4, 2.5.

_____ _____

Anouk Pohu, F. Eng. Date

Collaborator: sections 1.2, 2.1, 2.2 and 2.6

_____ _____

François Boucher, F. Eng. Date

Collaborator: 1.2.2 and 2.1

Solajo Couturier, F. Eng. Date

Responsible for Section 2.3

Administrative responsibility

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

Rachelle Bélanger, F. Eng. Date
Directrice de la gestion des forêts
Direction de la gestion des forêts de l'Outaouais

Annex A Participants and Specialists who Contributed to Writing the PAFITs

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Martine Paré	(Layout and revision)

Annex B Departure from the Regulation respecting the sustainable development of forests in the domain of the State for the period 2023 to 2028

Departure from the Regulation respecting the sustainable development of forests in the domain of the State for the period 2023 to 2028

Management Units 073-52, 074-51 – Outaouais Region
August 31, 2022

MINISTÈRE DES RESSOURCES NATURELLES ET DES FORÊTS

Votre gouvernement

Québec

Approval
Regional Forest Manager:

_____

Pierre Labrecque, DFGO, p.i.
August 31, 2022

Courtesy translation (Original text in French)

Cover page photographs:
Ministère des Ressources naturelles et des Forêts

List of Acronyms

SOC :	Spatial organization compartment
MRNF :	Ministère des Ressources naturelles et des Forêts
PAFIO :	Integrated operational forest management plan
PAFIT :	Integrated tactical forest management plan
RSDF :	Regulation respecting the sustainable development of forests in the domain of the State
MU :	Management unit
TAU :	Territorial analysis unit

Please note that the expression “aménagement forestier” is translated in this document as “forest management”, whereas it is called “forest development” in the law and regulation translations. We have chosen to use the expression “forest management” because its use is more widespread. It is also translated this way in the “Glossaire forestier”: glossaire-forestier.mffp.gouv.qc.ca

Table of Contents

List of Figures

List of Tables

List of Appendices

Introduction

Under the *Sustainable Forest Development Act* (R.S.Q. c. A-18.1, section 40)[1], the minister may impose, on persons or bodies subject to a management plan, forest management standards that are different from those prescribed by government regulation. This is the case, among other things, when existing government standards do not provide adequate protection for all the forest's resources. The minister may also authorize a departure from the regulatory standards if it is shown that the substitute measures proposed by persons or bodies subject to a management plan offer equivalent or superior protection for forest resources and the forest environment.

Therefore, pursuant to section 40[2] of the *Sustainable Forest Development Act*, this document will set out:

- The measures proposed as substitutes for the forest management standards prescribed by regulation.
- The area in which the substitute approach will apply.
- The regulatory standards that will be replaced.
- Evidence that the substitute measures will provide equivalent or superior protection for forest resources and the forest environment.
- The monitoring mechanisms provided to ensure that the substitute approach will be enforced.
- The fines proposed for offences.

If a disparity should arise between the reading or understanding of this document and the legal text, the official documents posted on LEGIS Québec[3] will serve as the reference texts.

[1] Consult the *Sustainable Forest Development Act* at: http://legisquebec.gouv.qc.ca.

[2] Consult section 40 of the *Act* at: https://www.legisquebec.gouv.qc.ca/Act - Section 40

[3] Consult the Regulation respecting the sustainable development of forests in the domain of the State at: https://www.legisquebec.gouv.qc.ca/RSDF

Departure from block cutting and total cutting other than block cutting

The forestry regime in force since April 1, 2013, attaches great importance to ecosystem-based management as the preferred way of implementing sustainable forest management. When the Regulation respecting the sustainable development of forests in the domain of the State (RSDF)[4] was enacted on April 1, 2018, only the provisions relating to the spatial organization of forests in the spruce-moss domain were considered. However, in its Sustainable Forest Management Strategy (SFMS)[5], the ministère des Ressources naturelles et des Forêts (MRNF) undertook to establish a new distribution model for cutting in the balsam fir-white birch and balsam fir-yellow birch domains. The preliminary spatial organization guidelines for fir forests have been tested since 2011 in different regions of Québec. Based on the conclusive results obtained from different experimental projects, the minister has announced that spatial organization guidelines for forests in the bioclimatic domains of the fir forest will come into force in the 2023-2028 integrated forest management plans.

This departure from current regulatory standards explains the protection measures that will replace the sections of the RSDF concerning block cutting and total cutting other than block cutting in the bioclimatic domains of the fir forest. The information on the current state of the tactical-level spatial organization indicators used in the substitute approach is presented in the “Analysis of Issues” document, as a supplement to this departure request. The operational-level indicators will be assessed when the operational plan is prepared.

1 Proposed substitute measures

The substitute approach is described in notebook 3.2.1 “Organisation spatiale des forêts dans les domaines bioclimatiques de la sapinière – Orientations pour la planification tactique et opérationnelle”. They are also summarized in the document entitled “Analysis of Issues” in this tactical plan. Notebook 3.2.2, “Organisation spatiale des forêts dans les domaines bioclimatiques de la sapinière – Fondements de l’approche” explains the ecological foundations.

The main objective of the substitute approach is to maintain or restore key attributes of the spatial organization of natural forests of the bioclimatic domains of the fir forest at different perceptual scales. The specific objectives of the spatial organization approach are summarized in Table 1.

[4] Consult the Regulation at: RSDF Guide.

[5] Consult the Strategy at: Stratégie d'aménagement durable des forêts.

Table 1 Particular issues and objectives of the spatial organization approach

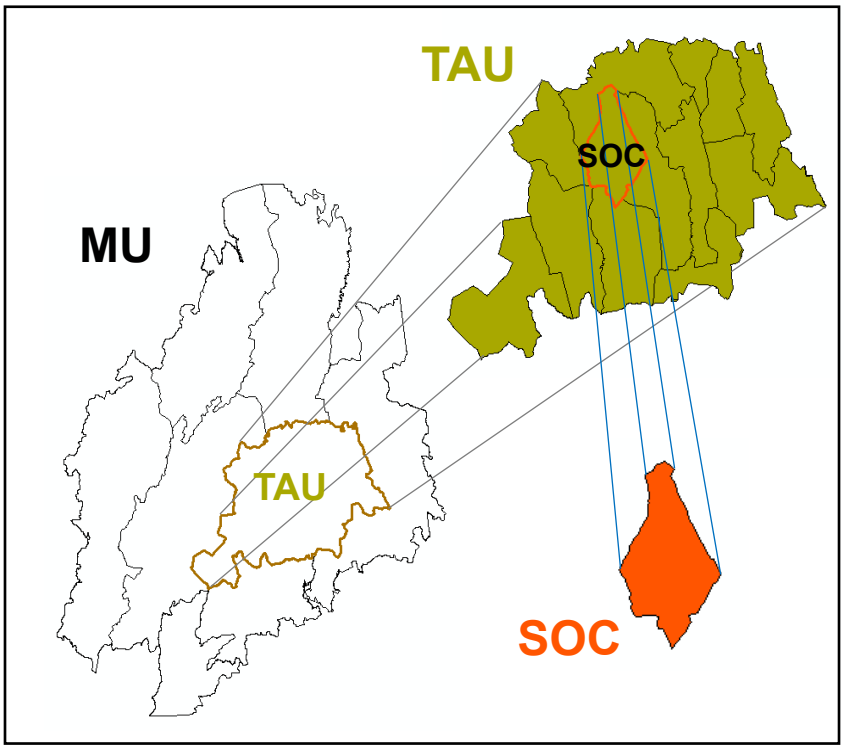
Scale	Issue	Objective
Landscape	Connectivity between closed canopy forests.	Maintain or restore a forest matrix dominated by closed canopy forests.
	The presence of large closed canopy forest stands.	Promote concentrations of closed canopy forests in large forest tracts.
	The presence of closed canopy forests with interior forest.	Ensure the presence of sufficient residual forests in areas disturbed by cutting.
Disturbance	The presence of residual forests with interior forest.	Ensure a significant presence of residual forests including interior forest.
	Connectivity between residual forests.	Ensure connectivity between residual forests.

Management unit subdivisions have been established to ensure that these attributes are managed in a complementary way at the disturbance and landscape levels (Table 2 and Figure 1). The subdivisions in question are the territorial analysis unit (TAU) and the spatial organization compartment (SOC). These spatial entities are used to achieve the approach's various objectives and to take into account the characteristics of the environment that are specific to the bioclimatic domains of the fir forest and their disturbance regime. The indicators and targets associated with each objective are established by the guidelines on the spatial organization of the bioclimatic domains of the fir forest, presented in Appendix 1 and described in detail in the comparison with the RSDF in the section entitled Demonstration of equivalent or superior protection for forest resources and the forest environment of this document.

Table 2 Spatial entities used to achieve the approach's objectives

Spatial scale	Spatial entity	Size	Bioclimatic domain
Landscape	Territorial analysis unit	500 km^2 maximum	Balsam fir-yellow birch
		1 000 km^2 maximum	Balsam fir-white birch
Disturbance	Spatial organization compartment	20 km^2 average	Fir

Figure 1 Territorial analysis scales with ecosystem-based management



The departure from block cutting also leads to a modification of article 8 of the RSDF which targets the strip of woodland around the road corridor.

Sections of the RSDF amended by the departure

8. A strip of woodland at least 30 m wide must be preserved around the following places and territories:

1° a sugar bush;

2° a landfill;

3° a burial site.

A strip of woodland at least 30 m in width must also be kept on each side of the following roads and trails:

1° a road identified as a road corridor, unless the sylvicultural treatment carried out where the road is located is total cutting carried out according to the conditions of ~~block cutting~~ spatial organization of forests in the fir bioclimatic domains or partial cutting;

2° a hiking trail forming part of an ecological or nature interpretation centre or a concentrated network of hiking trails;

3° an access trail to a scenic outlook, an outlying circuit of a concentrated network of hiking trails or an interregional trail, specifically deforested for those purposes;

4° a portage trail included in a canoe-kayak-camping course, specifically deforested for those purposes;

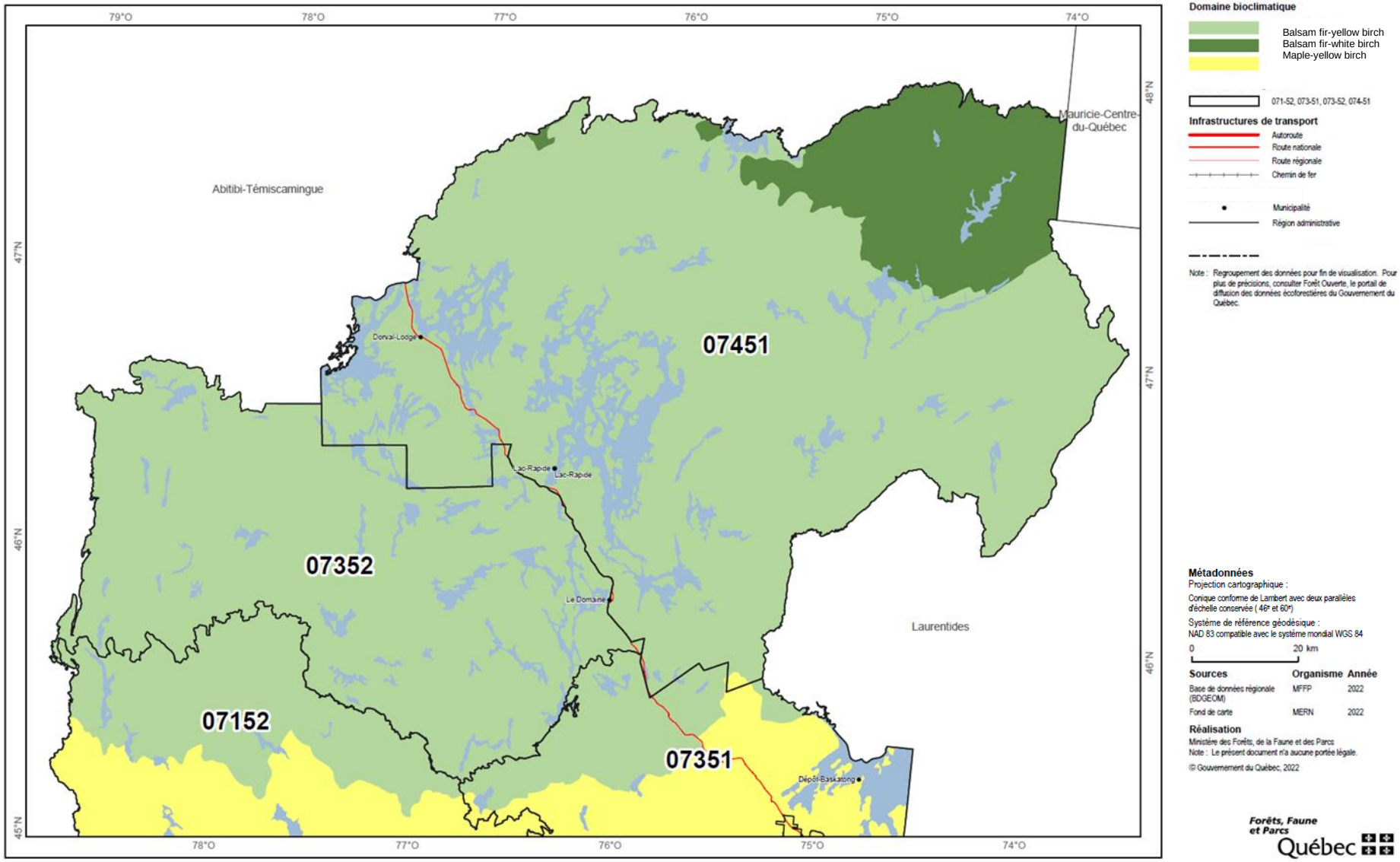
5° a developed trail.

The strip of woodland of a road identified as a road corridor must be maintained until regeneration is established in the cutting area adjacent to that strip of woodland and has reached an average height of 3 m.

2 Area to which the substitute approach applies

The substitute approach applies to the management units located in the balsam fir-white birch and balsam fir-yellow birch bioclimatic domains, namely 073-52 and 074-51 (figure 2). They are situated between latitudes 46º41’44’’N and 47º58’44’’N, and longitudes 75º98’28’’O and 77º55’04’’O.

Figure 2 Location of the area targeted by the departure (French only)



2.1 Zones excluded from the departure application

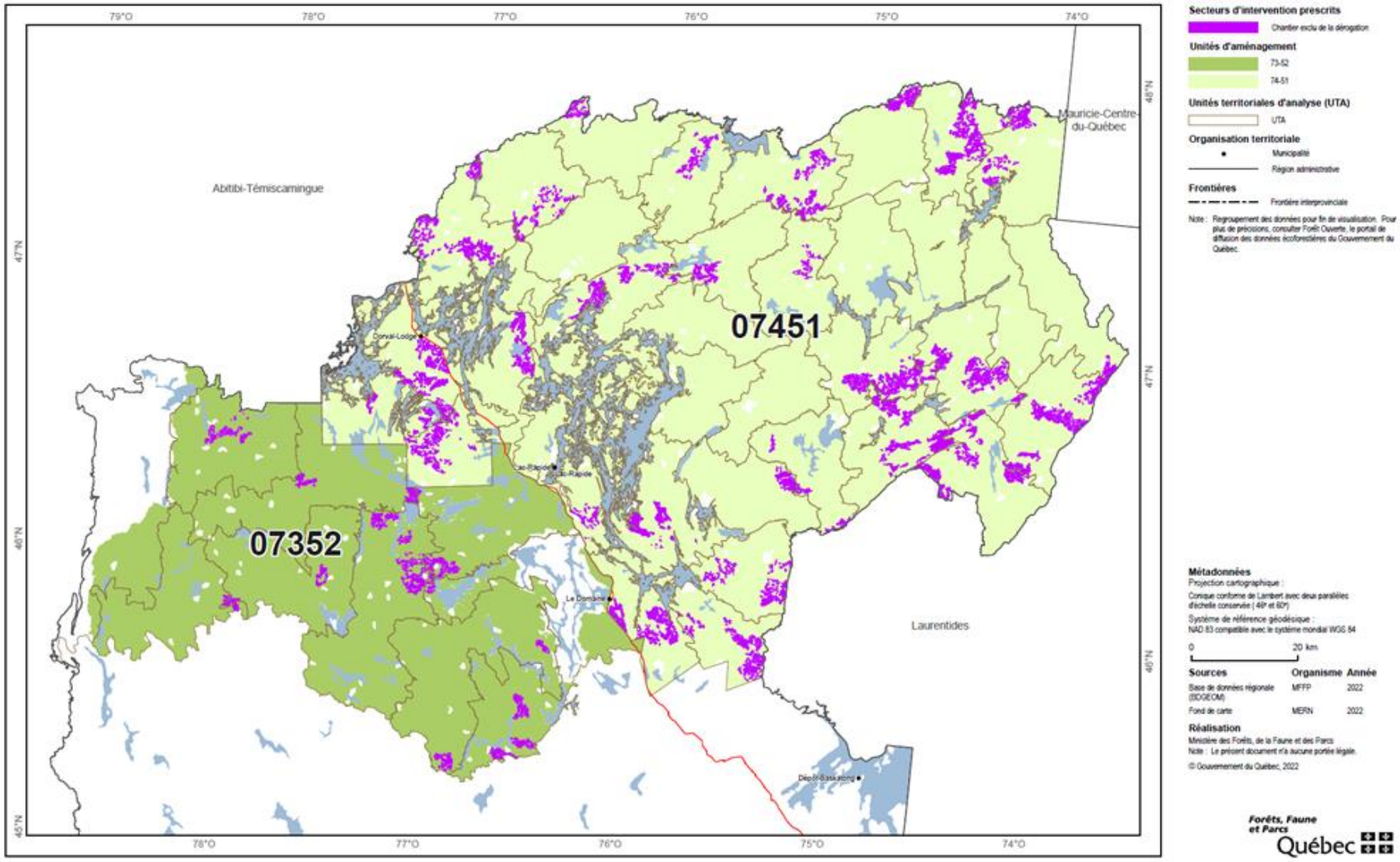
The worksites shown in Figure 3 and Appendix 3 include forest operations sectors that have already been prescribed and harmonized or at which harvesting has begun in accordance with the RSDF standards for block cutting and total cutting other than block cutting (Appendix 1). For one or more of these reasons, all these worksites will be excluded from the departure application. The excluded zones are shown in Figure 3.

It should be noted that any plan added to a given SOC must comply with the terms and conditions of the departure from current regulatory standards.

In addition, although these worksites are excluded from the departure application, they were planned before the distribution method was changed and the following guidelines must therefore still be upheld:

- At least 60% of the productive area of the TAUs must be composed of stands of 7 metres or more in height.
- At least 30% of the productive area of the SOCs must be composed of stands of 7 metres or more in height.

Figure 3 Forest operations zones prescribed in compliance with block cutting-total cutting other than block cutting standards for the worksites concerned and excluded from the departure application (French only)



3 Regulatory standards to which the substitute approach applies

The regulatory standards to which the substitute approach will apply are in Division II, “Special conditions applicable to the bioclimatic domains of the maple forest and the balsam fir forest”, of Chapter IV, i.e. sections 134 to 143 of the RSDF.

The departure from block cutting also leads to a modification in Division I, “General”, of Chapter I, i.e. section 8 of the RSDF.

The text of the RSDF is available online[6] and the sections concerned by the departure application are reproduced in Appendix 2 of this document.

4 Demonstration of equivalent or superior protection for forest resources and the forest environment

This section compares the substitute approach with the RSDF standards governing block cutting and total cutting other than block cutting. It demonstrates that the protection offered by the spatial organization approach in the bioclimatic domains of the balsam fir forest is equivalent or superior to that offered by the regulatory standards. Notebook 3.2.2, “Organisation spatiale des forêts dans les domaines bioclimatiques de la sapinière – Fondements de l’approche” also sets out the ecological benefits of the new approach.

The sections for which a departure is required are summarized in the following tables. Where these texts differ from the text of the Regulation, the text of the Regulation takes precedence.

4.1 Dimensions of total cutting areas, size and shape of block cutting areas

The RSDF imposes a maximum size on single block total cutting areas (150 ha in the fir forest) along with maximum areas per size category. Sections 134, 135 and 138 of the RSDF focus on this aspect.

Table 3 Summary of the sections of the RSDF concerning the size of total cutting areas and the size and shape of block cutting areas

Section	Summary
134	In the bioclimatic domains of the balsam fir, distribution of total cutting areas. 70% must be less than or equal to 50 ha, 90% must be less than or equal to 100 ha and 100% must be less than or equal to 150 ha.
135	The cutting areas to which section 134 applies are those indicated in the integrated forest management plan and whose planned harvest is carried out during a harvest year.
138	The cutting areas of a block cutting must be of variable size and shape.

[6] See the text of the Regulation here: https://mffp.gouv.qc.ca/RADF/guide/.

In the substitute approach, no maximum size has been set for total cutting areas, but there are requirements for the percentage, size and distribution of residual forests within the SOCs (Table 4, Table 5 and section 4.2).

Table 4 Typology of SOCs used to manage management targets for the spatial organization of forests in the bioclimatic domains of the fir forest

Type of SOC	Percentage of productive forest area in the SOC with closed canopy
0[a]	0 to less than 30 %
1	30 to less than 50 %
2	50 to less than 70 %
3	70 to 100 %

a. It is prohibited to plan Type 0 SOCs. This type of SOC results from natural disturbances or logging history.

Table 5 Summary of new guidelines for the size and distribution of residual forests between cutting areas

Number	Guideline
1	The target size of a spatial organization compartment (SOC) is 20 km^2 (2,000 ha).
2	At least 60% of the productive forest area in a TAU must be composed of forests of 7 metres or more in height
3	In a TAU, no more than 30% of the productive forest area should be composed of Type 0[a] or Type 1 SOCs. In these types of SOCs, less than 50% of the productive forest area is composed of stands of 7 metres or more in height.
4	At least 30% of the productive forest area of the SOCs must be composed of forests of 7 metres or more in height.

a. Planning is not permitted in Type 0 SOCs. This type of SOC results from natural disturbances or logging history.

The percentage of residual forests left in the SOCs affects the size of the cutting areas. Target percentages have been calculated for each type of SOC in the landscape. As a result, most of the territory must be occupied by SOCs dominated by forests of 7 metres or more in height (i.e. Types 2 and 3). SOCs where less than 30% of the productive forest area is composed of forests of 7 metres or more in height (i.e. Types 0 and 1) must not occupy more than 30% of the productive forest area of a TAU. The possibility of concentrating a certain percentage of cutting areas in a predetermined way spatially and over time offers a number of advantages. The primary aim is to foster the maintenance and creation of large blocks of forests in the landscape. By concentrating logging in specific locations, it is possible to avoid harvesting new blocks. The targets for forests of 7 metres or more in height in each TAU also helps to foster the maintenance of large blocks of forests. Concentrating the harvest should also help to reduce the spread of roads needed to harvest the timber, thereby also reducing operating costs.[7] Slowing the

[7] For additional information please see the foundation notebook – Section on the influence of current development rules on the spatial characteristics of developed forests.

spread may also have beneficial impacts for aquatic ecosystems, by reducing the number of bridges and culverts to be built. A broader spread of small block cutting areas causes fragmentation of the forest matrix.

In each planned SOC, at least 30% of the total area must always be composed of forests of 7 metres or more in height. The rules governing distribution of the residual forest (table 9, section 4.2) indirectly limit the size of cutting areas by requiring that the residual forests not be too far from one another. This approach allows for more flexibility in organizing the residual forest and will produce a less artificial landscape than that created by linear cut separators.

4.2 Strips of woodland between two cutting areas, residual forest characteristics and strips of woodland around cutting areas

The strips of woodland between total cutting areas prescribed in sections 136 and 141 of the RSDF allow for connectivity between habitats and neighbouring residual forests. This is also the case for residual forests constituted pursuant to section 139. Sections 139, 140 and 141, which are specific to block cutting, are intended to ensure the maintenance of the components of the forest canopy that serve as shelter for wildlife, and to divide cutting areas and residual forest areas both spatially and over time (table 6).

Table 6 Summary of the sections of the RSDF concerning the residual forest

Section	Summary
136	A strip of woodland measuring 3 metres or more in height must be kept between total cutting areas other than block cutting, until the regeneration of the cutting areas has reached an average height of 3 metres The strip of woodland must be 60 metres wide if all the cutting areas are 100 ha or smaller, and 100 metres wide if one of the cutting areas is 100 ha or larger.
139	Characteristics of the residual forest for a block cutting area: - have, inside the limit of the block cutting harvest site, an area at least equivalent to the area of the cutting areas of a block cutting; - have a width of at least 200 metres; - be composed of stands of 7 metres or more in height over at least 80% of the productive forest area; - be composed of forest stands made up of commercial species; comply with the rules governing the density and representativeness of canopy types; - not have been the subject of a commercial harvest in the last 10 years, other than harvesting referred to in the second paragraph of section 142.
140	Each block cutting harvest site must be indicated in the integrated forest management plan. The residual forest of a block cutting may not be used again as residual forest for as long as the harvesting cannot be carried out.
141	A forest area must be preserved on the perimeter of a block cutting area: average height of 3 metres or more and at least 200 metres wide (or 100 metres if the cutting area is less than 25 ha). These areas must be preserved until the regeneration in the block cutting areas reaches an average height of 3 metres or more.

In the substitute approach, linear cutting separators are replaced by blocks and patches of forest of 7 metres or more in height, composed of interior forests that are better adapted to the needs of different species. To enable these forests to play their ecological role, measures to guide their configuration, composition and distribution have been established at SOC level (tables 7, 8 and 9).

Table 7 Summary of new guidelines for the configuration of the residual forest

Number	Guideline
5	At least 20% of the productive forest area of a SOC must be composed of forests of 7 metres or more in height, organized in blocks. These “blocks of residual forest” must be of at least 25 ha in a single block, and must be at least 200 metres wide.
6	Where necessary, stands measuring less than 7 metres in height (height classes 5, 6 and 7) or unproductive stands (wet bare soil [DH], dry bare soil [DS] and alder stands [AL]) within blocks of residual forest, without exceeding 10% of the block’s area.
7	A “residual forest patch” is composed of stands of 7 metres or more in height, covering an area of at least 5 ha in a single block, and at least 200 metres wide.
8	A residual forest block or patch is not considered to be a single block when a main road (existing or to be developed) runs through it.

Table 8 Summary of new guidelines for the composition of the residual forest

Number	Guideline
9	After a harvest has been planned, residual forest of 7 metres or more in height, in a SOC, must contain at least 20% of each of the major forest canopy types (softwood, mixedwood and hardwood) present in the SOC before the harvest was planned. However, if composition issues exist (e.g. hardwood encroachment) or if the forest is vulnerable to spruce budworm, the solutions prepared to address them must be applied as priorities.
10	At least 20% of the productive forest area of a SOC must be composed of forests of 7 metres or more in height that have not been harvested in the last 25 years.

Table 9 Summary of new guidelines for the distribution of the residual forest

Number	Guideline
11	At least 80% of the reference area of a SOC must be located less than 600 metres from the boundary of a residual forest block or patch as defined in guidelines 5 and 7.
12	At least 98 % of the reference area of a SOC must be located less than 900 metres from the boundary of a residual forest block or patch as defined in guidelines 5 and 7.
13	The reference area is the internal area of the SOC covered by a 900 metres zone around the SOC’s potential residual forest patches.

Shape of the residual forest

Unlike the cut separators that are used mainly for movements of species to adjacent forests, the substitute approach is designed to ensure that unharvested areas play a greater role in species maintenance. The use of residual forests by species depends on their sensitivity to the strip effect caused by cutting, and on interior forest conditions.[8] The linear shape of the separators does not offer interior forest conditions because they are not wide enough (between 60 and 100 metres). The edge effect to which many species are sensitive is felt at an average distance of 75 metres. The minimum width retained for residual forest patches and blocks is therefore 200 metres (Table 7). This allows interior forest areas to be maintained within these forests.

In addition to being wide enough to contain interior forest, the residual forest must be present in sufficient quantities, and must be big enough, in each SOC. The substitute approach ensures that at least 20% of the productive forest area in a SOC is 7 metres more in height and is in blocks of at least 25 ha in a single block. From this point, a block contains a large enough percentage of interior forest to maintain communities of certain forest-dwelling birds and small mammals. The stated percentage in blocks form must be maintained at all times.

Block cutting requires that a sufficiently wide residual forest (200 metres) be maintained. However, it is maintained only for a 10-year period, or until it has reached 3 metres in height (see the next section).

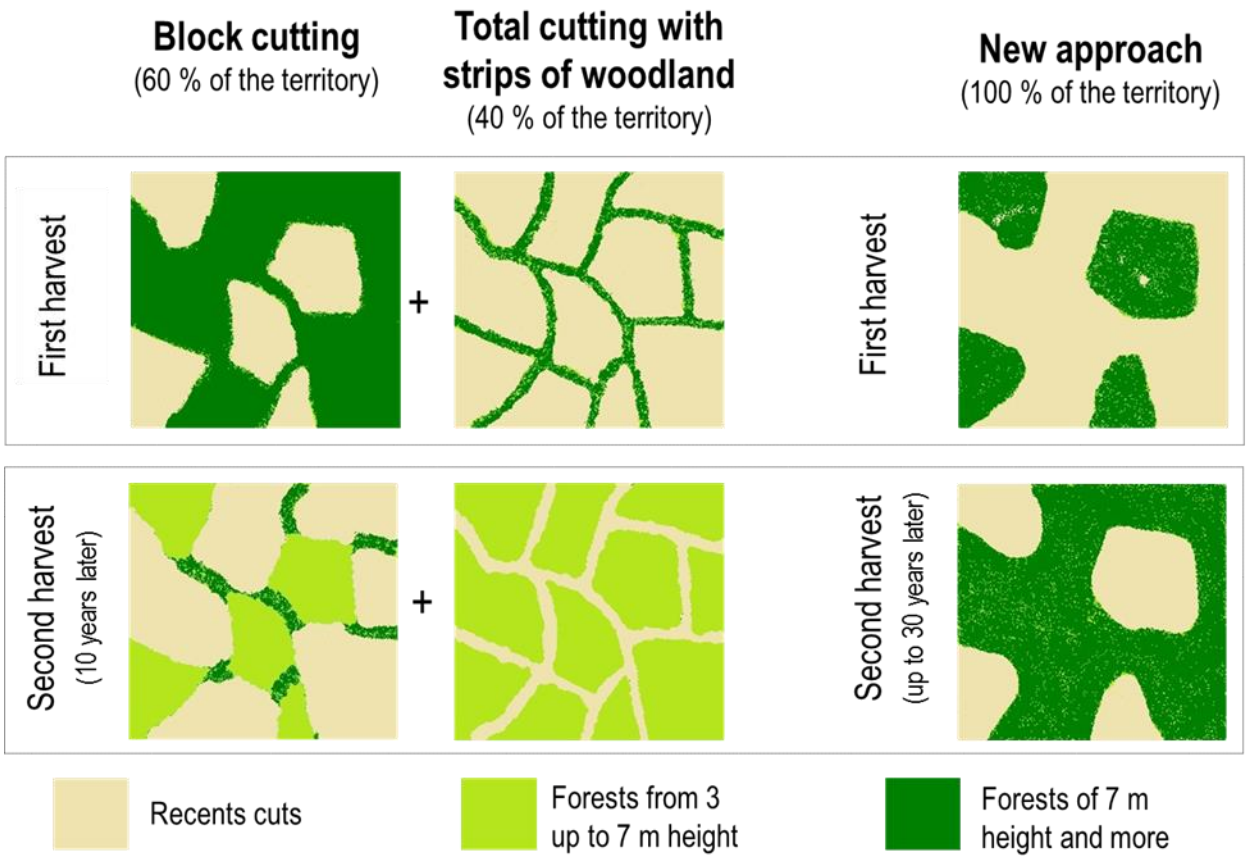
Maintenance of the residual forest

Residual forests from block cutting and cutting separators can be harvested when regeneration reaches 3 metres or more in height, or after ten years. It is precisely at this time that previously harvested areas become of interest to many game species. As a result, the quality of these species' habitats is reduced, since they need a combination of shelter (forests that are 7 metres or more in height) and food (young stands). This approach also creates landscapes in which forests of 7 metres or more in height are fragmented and have no interior forest components (figure 4).

Given that stands only begin to offer favourable habitat conditions to species requiring a closed canopy environment when they have reached 7 metres in height, the substitute approach requires at least 30 % of the forest in every SOC to be of that height. It is also important to note that, in addition, the minimum percentage is higher where the plan applies to a type 2 or type 3 SOC, and that these types of SOC must cover at least 70% of the landscape (TAU).

[8] For additional information please see the foundation notebook – Section on the needs of the wildlife species selected in connection with the spatial organization of forests.

Figure 4 Comparison of spatial organization approaches



Representativeness of the residual forest

As is the case for block cutting, the new approach requires the residual forest to be representative. The rule here ensures that at least 20% of the initial area of each type of canopy is maintained, unless composition-related issues must take priority (table 8).

Distribution of the residual forest

The distribution of the residual forests within SOC is primarily aimed at maintaining connectivity between them. The objective is to promote the dispersal of the biodiversity associated with these habitats as well as the recolonization of nearby cutting areas. The distribution of residual forest also makes it possible to attenuate the visual effects of logging area. The approach aims for at least 80% of the reference area of a SOC to be within 600 m of the boundary of a residual forest block or patch (Guideline 11), and that at least 98% of the reference area of a COS is within 900 m of the boundary of such block or patch (Guideline 12). Residual forest blocks and patches are defined in guidelines 5 and 7.

4.3 Strip of woodland on each side of a road identified as a road corridor

The RSDF indicates a strip of woodland at least 30 m in width must be kept on each side of a road identified “road corridors”, unless the silvicultural treatment carried out where the road is located is done according to the conditions of block cutting. In the same way as block cutting, the substitution approach includes measures to guide the configuration and distribution of the block of residual forest. The exception for harvesting the strip of woodland on the road corridor will also apply to the substitution approach.

The configuration and distribution of forests of 7 metres or more in height will limit the fragmentation of residual forests. They will promote better connectivity between wildlife habitats and help reduce linear shape. These rules are applicable to each SOC.

The new guidelines for the distribution of the residual forest will make it possible to limit the visual impact of the cuts:

1) At least 80% of the reference area of a SOC must be located less than 600 metres from the boundary of a residual forest block or patch;

2) At least 98% of the reference area of a SOC must be located less than 900 metres from the boundary of a residual forest block or patch.

This management of landscape signals makes it possible to be equivalent or superior to block cutting conditions and is added to the regulatory standards for visual setting of the RSDF.

4.4 Cutting and deforestation of roads in strips of woodland between two cutting areas and forest management activities in the residual forest

Partial cutting and road construction or improvement work in cut separators or residual forests are permitted on certain conditions, which are set out in sections 137 and 142 of the Regulation, to allow for harvesting of timber and certain forest management activities.

Table 10 Summary of the sections of the RSDF concerning harvesting and roads in residual forests

Section	Summary
137	Any total cutting is prohibited in the strip of woodland between two total cuttings other than block cuttings, until it is permitted as referred to in section 136. Partial cutting is permitted on certain conditions. Road construction is permitted in the strip of woodland under certain conditions.
142	The residual forest of a block cutting must be preserved for ten years from the date on which the block cut took place or, if the regeneration has not yet grown to an average height of 3 metres by that time, until that regeneration has reached such a height. However, partial cutting is permitted. A residual forest may be crossed by a road or watercourse on certain conditions.

In the substitute approach, partial cuts are also permitted in a forest that is 7 metres or more in height and allow the forest to maintain its “closed canopy”. On the other hand, a forest harvested by partial cutting is not considered to offer interior forest conditions. Therefore, the substitute approach stipulates that at least 20 % of the productive area of each SOC must not have undergone any recent partial cuts (guideline 10 – Table 8).

Residual forest blocks and patches are not considered to be in a single block if they contain a main road. This limits the fragmentation of residual forests.

4.5 Block cutting

Section 143 regulates the use of block cutting in the forest to achieve the goal of distributing cutting areas and residual forest areas spatially and over time.

Excerpt from the Regulation

143. *During a harvest year, at least 60% of the total area of the total cutting areas of a management unit or other forests in the domain of the State must be planned and carried out in accordance with the provisions of this regulation applicable to block cutting.*

The substitute approach, rather than imposing a percentage of block cutting, sets a maximum percentage of type 0 or type 1 SOCs in the TAU. At least 70% of the TAU must be covered by type 2[9] or type 3 SOCs where more than 50% of the area is composed of closed canopy forests (7 metres or more in height).

The target of 60% of the area of the TAU in forests of 7 metres or more in height also helps to maintain more closed canopy forests in the landscape than is the case under the current regulatory framework. Table 11 shows that, in theory, for a landscape (TAU) planned entirely according to minimum targets for block cutting and other total cutting or minimum targets for spatial organization in the fir forests, spatial organization of fir forests is twice as demanding in terms of maintaining the quantity of residual forests of 7 metres or more in height.

[9] This type of SOC is similar to the results of a first-pass harvest in a block cutting worksite (Notebook 3.2.1 Spatial organization of forests in the bioclimatic domains of the balsam fir forest – Guidelines for tactical and operational planning).

Table 11 Demonstration of the minimum quantity of residual forest for a TAU in block cutting and cutting with separators compared to the application of spatial organization of fir forests

Methods	Quantity of method in the TAU* (%)	Minimum target		Applied to the TAU		Total in the TAU	
		Residual forest of 3 metres or more in height (%)	Residual forest of 7 metres or more in height (%)	Forest of 3 metres or more in height (%)	Forest of 7 metres or more in height (%)	Residual forest of 3 metres or more in height (%)	Residual forest of 7 metres or more in height (%)
Block cutting	60	50	50	30	30	36,3	30***
Cutting with separators	40	15,7*	-	6,3	-		
Spatial organization	100	60	60	60	60	60	60

*For demonstrator purposes, the percentage in the MU is brought back to the TAU percentage

**Calculated in accordance with section 134 (maximum percentage of the height in total cutting areas) and section 136 (strip of woodland 60 metres wide for cutting areas of less than 100 ha and 100 metres wide for cutting areas of between 100 ha and 150 ha).

***In addition, at least 30 % of the area of the TRU must be covered by forests of 7 metres or more in height, meaning that it is not possible to drop below that percentage even when harvesting the residual forest, after 10 years or when regeneration has grown to 3 metres in height.

4.6 Current status of ecological indicators used in the substitute approach

The current status of the various tactical ecological indicators used in the substitute approach for the area concerned is presented in the “Spatial Organization” section of the “Analysis of Issues” document.

Departure from current regulatory standards to replace targets for territorial reference units by targets for territorial analysis units and spatial organization compartments

The territorial reference units (TRUs) were included in the Regulation respecting standards of forest management for forests in the domain of the State in 1996 and were maintained in the Regulation respecting the sustainable development of forests in the domain of the State (RSDF). They were used as forest subdivisions for the maintenance of forest canopy used as shelter by wildlife, and for the distribution of cutting areas spatially and over time within the management units.

With the implementation of ecosystem-based management, new ecological targets were established at different spatial scales, namely territorial analysis units (TAUs) and spatial organization compartments (SOCs). In terms of size, the TAUs are similar to or larger than the TRUs, whereas the SOCs are smaller. The ecosystem-based management targets at these various spatial scales are equivalent or more ambitious than those for the TRUs.

Currently, under the RSDF and management guidelines for the inclusion of ecological issues in forest plans, it must be shown that these targets have been achieved at every analysis scale. The entities are therefore superimposed (TRUs TAUs and SOCs), creating additional complexity in the planning process without providing any additional protection.

1 Proposed substitute measure

It is proposed that section 16 should be amended by replacing the reference to TRUs by a reference to TAUs, and that sections 131 and 132 should be repealed.

Sections of the RSDF amended by the departure

***16**. At least 30% of the productive forest area constituted of stands of 7 m or more in height must be preserved at all times in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary.*

In addition, at least 30% of the productive forest area constituted of stands of 7 m or more in height must be preserved in the following territories or portions of territory:

1. in each territorial ~~reference~~ analysis unit or portion thereof at least 30 km² included in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary and situated in the bioclimatic domains of the maple forest and fir forest;

2. in each aggregated cut block or part thereof at least 30 km² included in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary and situated in the bioclimatic domain of the spruce-moss forest.

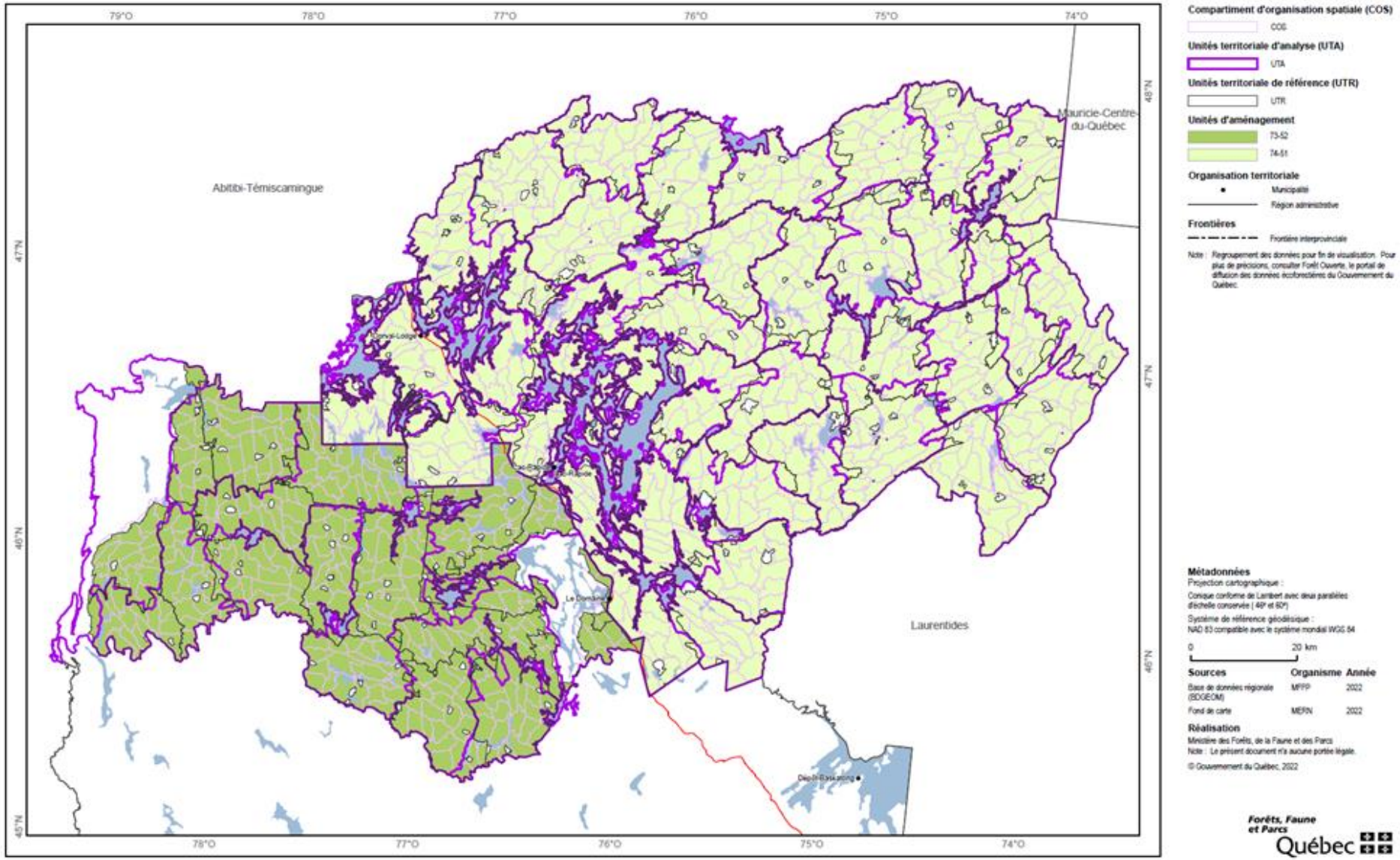
~~***131.*** *A minimum of 30% of the productive forest area in residual forest of 7 m or more in height must be maintained at all times in a territorial reference unit where harvesting is carried out. Where the limits of a territorial reference unit are changed, in particular following a change of the limits of a management unit, the first paragraph applies to the new territorial reference unit.*~~

~~***132.*** *The provisions of section 131 do not prevent deforestation carried out in order to build, improve or repair a road giving access to another territorial reference unit.*~~

2 Territory to which the substitute approach applies

The replacement of TRU targets applies to the management units situated in the bioclimatic domains of the fir forest where an approach is applied in order to maintain forests of 7 metres or more in height over 30% of the SOC. More specifically, the territory in question is that of MU 073-52 and 074-51 (figure 2). These areas are situated between latitudes 46º41’44’’N and 47º58’44’’N, and longitudes 75º98’28’’O and 77º55’04’’O.

Figure 5 Map of the MU(s) with TRU contours and map with TAU and SOC contours (French only)



3 Regulatory standards to which the substitute approach applies

The sections in question are those that make reference to TRUs, namely sections 16, 131 and 132 of the RSDF (appendix 1).

4 Demonstration of equivalent or superior protection for forest resources and the forest environment

Ecosystem-based management is designed to ensure the preservation of biodiversity and the viability of ecosystems by reducing the differences between developed and natural forests (R.S.Q. c. A-18.1, section 4). The spatial entities known as TAUs and SOCs are formed on the basis of disturbance dynamics (nature, size, frequency) that are typical in each bioclimatic domain, to ensure complementary management of forest resources at disturbance and landscape levels. The TRUs, which fall between the TAUs and the SOCs in terms of scale (Table 12), are delimited using administrative criteria and are consequently outdated.

The ecosystem-based management guidelines for spatial organization are structured in the notebooks prepared for the bioclimatic domains of the spruce-moss forest (notebook 3.1.1) and the fir forest (notebook 3.2.1). Their implementation is presented in the *Analysis of Issues* document and is accompanied by a departure from block cutting and total cutting other than block cutting for the bioclimatic domains of the fir forest and the maple forest.

Table 12 Spatial scales and associated areas by bioclimatic domain

Bioclimatic domains	SOC	TRU	TAU
Fir-yellow birch	Average of 20 km^2	300 km^2 max	500 km^2 max
Fir-white birch	Average of 20 km^2	300 km^2 max	1 000 km^2 max

The following sections demonstrate that the substitute rules provide equivalent or superior protection to that provided by the regulatory standards being replaced.

4.1 Equivalent protection at TRU level

In all MUs where spatial organization guidelines are applied, forests of 7 metres or more in height must be maintained over 30% of the area of each SOC at all times. Given that a TRU contains several SOCs and that the 30% requirement applies to all of them, the proposed protection is at least equivalent to that provided by section 131, in terms of maintaining closed canopy forests, and the forests will be better distributed spatially. The SOCs where less than 30% of the productive forest area measures 7 metres or more in height are closed to harvesting.

Table 13 Management indicators and targets to be imposed at SOC level

Spatial scale	Spatial entity	Indicator	Target
Disturbance through cutting	SOC	Percentage of the SOC's productive forest area composed of stands of 7 metres or more in height	≥ 30 %

4.2 Superior or equivalent protection at MU level

In the bioclimatic domains of the fir forest, it is possible, by maintaining a forest matrix dominated by closed canopy forests, to foster connectivity within the landscape and free circulation of species between habitats. A management target has been set at TAU level for this, with a requirement to maintain forests of 7 metres or more in height over 60% of the productive area (guideline 2 – Table 5).

Another target allows for control over the percentage of SOCS in which less than 50% of the productive forest area is covered by stands of 7 metres or more in height in the TAU, to avoid over-concentration of harvesting (guideline 3 – Table 5). In addition to providing additional protection, the fact of maintaining a significant percentage of closed canopy forests in each TAU, and concentrating harvesting in SOCs, helps to form forest stands.

Table 14 Management indicators and targets to be imposed at TAU level

Spatial scale	Spatial entity	Indicator	Target
Landscape	TAU	Percentage of the TAU's productive forest area in stands of 7 metres or more in height	≥ 60 %
Landscape	TAU	Percentage of the TAU's productive forest area in SOCs where less than 50% of the productive forest area is covered by stands of 7 metres or more in height	≤ 30 %

The profile of the MU area covered by forests of 7 metres or more in height, if minimal targets are applied in the TAU, shows that the protection afforded to the MU is equivalent or superior in the fir bioclimatic domains.

Table 15 Profile of the MU with forests of 7 metres or more in height with the application of minimal targets via division into TRUs or TAUs

MU	Minimum target per:	MU-wide target	Area included* (ha)	Area included, 7 metres or more (ha)	% Area included of 7 metres or more
073-52	UTR	30 % of the included area	371 152	111 346	30
	UTA/COS	60 % of the included area	371 464	197 712	53
074-51	UTR	30 % of the included area	931 951	279 585	30
	UTA/COS	60 % of the included area	934 027	551 281	59

*The area is calculated from a common base by removing areas excluded from management (e.g. biological refuge). Areas excluded from management are used to calculate ecosystem-based management targets. For the profile, these forest areas are defined as being necessarily 7 metres or more in height. For example, a TAU where 20 % of the area is covered by a protected area will have a minimum target of 40 % to be covered by forests of 7 metres or more in height, instead of 60%, and its area will be counted in the MU area.

Other targets favourable to canopy maintenance

In addition to these measures, targets relating to forest age structure have also been included to provide protection at TAU level. These targets limit the percentage of regenerating forests and ensure a minimum level of old-growth forests.[10]

4.3 Protection of structured wildlife territories

Section 16 of the RSDF is intended to maintain wildlife habitats and the species that use them, and to limit the impacts of logging on hunting and recreational tourism activities. These paragraphs ensure that portions of structured wildlife territories will be covered with forests of 7 metres or more in height.

Excerpt from the RSDF

16. *At least 30% of the productive forest area constituted of stands of 7 m or more in height must be preserved at all times in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary.*

In addition, at least 30% of the productive forest area constituted of stands of 7 m or more in height must be preserved in the following territories or portions of territory:

(1) in each territorial reference unit or portion thereof at least 30 km^2 included in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary and situated in the bioclimatic domains of the maple forest and fir forest;

(2) in each aggregated cut block or part thereof at least 30 km^2 included in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary and situated in the bioclimatic domain of the spruce-moss forest.

The first paragraph is maintained, as is subparagraph (2) of the second paragraph, because the SOC scale is already considered. Subparagraph (1) of the second paragraph must be amended to replace the reference to the TRU by a reference to another spatial unit in addition to the SOCs in the bioclimatic domains of the fir forest (i.e. the TAU). The new wording of section 16 is presented in the section entitled Proposed substitute measure.

Table 16 presents a comparative summary of the portions of structured wildlife territories divided into TRUs or TAUs for domains of the fir forest. This profile shows a slightly different division for the management of structured wildlife territories portions of 30 km^2 or more into TAUs. Nevertheless, the division into TAUs combined with substitute approach by COS is not more permissive than the division into TRUs. Indeed, with the substitute approach, at least 30% of the area of every SOC in the structured wildlife area must be covered by forests of 7 metres or more in height (table 13).

[10] For additional information, see "Integration of ecological issues in the 2018-2023 integrated forest development plans, notebook 2.1, Issues relating to forest age structure", on the following page: Cahier 2.1 - Enjeux liés à la structure d'âge des forêts

Table 16 Profile of the MU with forests of 7 metres or more in height with the application of minimal targets via division into TRUs or TAUs/SOCs

MU	Division into TRUs		Division into TAUs	
	Number of structured wildlife territories portions of 30 km^2 or more	< 30% of 7 metres or more	Number of structured wildlife territories portions of 30 km^2 or more	< 30% of 7 metres or more
073-52	19	0	15	0
074-51	51	0	58	0

Monitoring mechanisms to enforce the application of the substitute approach

The management targets included in the substitute approach will be monitored when the integrated tactical forest management plans (PAFIT) and the integrated operational forest management plans (PAFIOs) are prepared. To carry out monitoring, the forest planners must prepare lists of minimum requirements that can then be used to ensure compliance with tactical and operational management targets.

Lastly, for each SOC in which harvesting is planned during the period that the departure from current regulatory standards is in force, monitoring will also be carried out when the annual logging plan is prepared and the technical and financial activity report is examined, once again to ensure compliance with tactical and operational management targets.

Fines for offences

Every person that contravenes any of the substitute rules provided for in this departure document to the sections of the RSDF commits an offence and is liable to the fine provided for in paragraph (3) of section 246 of the *Act respecting sustainable forest development*[11] (chapter A-18.1), i.e. from $2,000 to $10,000 per hectare or part of a hectare in which the offence occurs.

[11] See section 246 of the Act at: Legisquebec.gouv.qc.ca -Act - Section 246

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Appendix 1 Tactical and operational management targets for spatial organization in the fir forest

Table 17 Management targets for tactical planning of spatial organization of forests in the fir bioclimatic domains

Element	Guideline	Indicator	Mandatory target
Spatial organization compartment (SOC)	**1**	Target size	The target size of a spatial organization compartment is 20 km^2 (2,000 ha).
Territorial analysis unit (TAU)	**2**	Percentage covered by stands of 7 m or more in height	At least 60% of the productive forest area of a TAU must be covered by forests of 7 m or more in height.
	3	Percentage in type 0[a] or type 1 SOCs	No more than 30% of the productive forest area of a TAU must be composed of type 0[a] or type 1 SOCs. In these types of SOCs, less than 50% of the productive forest area is covered by stands of 7 m or more in height.
Spatial organization compartment (SOC)	**4**	Percentage covered by stands of 7 m or more in height	In a SOC, at least 30% of the productive forest area must be covered by forests of 7 m or more in height.

a. Planning is not permitted for type 0 SOCs. These SOCs are a product of natural disturbances or logging history.

Table 18 Management targets for operational planning of spatial organization of forests in the fir bioclimatic domains

Element	Guide-line	Indicator	Mandatory target	Recommended target
Configuration of the residual forest	**5**	Percentage of the residual forest in block form	At least 20 % of the productive forest area of a SOC must be composed of forest of 7 m or more in height, organized into blocks. These blocks of residual forest must cover an area of at least 25 ha in a single block, and must be at least 200 m wide.	Encourage the maintenance of blocks of residual forest covering an area of at least 50 ha in a single block and at least 200 m wide.
	6	Inclusion in blocks of residual forest	Where necessary, it is possible to enclave stands less than 7 metres in height (height classes 5, 6 and 7) or unproductive stands (bare wet soil [DH], bare dry soil [DS] and alder groves [AL]) within residual forest blocks, although such areas should not exceed 10% of the total area.	N.A.
	7	Definition of residual forest patches	A residual forest patch is composed of stands of 7 metres or more in height, covering an area of at least 5 ha in a single block, and at least 200 m wide.	N.A.
	8	Roads	A residual forest patch or block is not considered to be in a single block if it is crossed by a main road that either exists or will be developed.	Encourage the maintenance residual forest blocks and patches that have no roads at all, independently of class.
Composition of the residual forest	**9**	Percentage of main types of forest canopy present before planning	After a harvest has been planned, residual forest of 7 metres or more in height, in a SOC, must contain at least 20% of each of the major forest canopy types (softwood, mixedwood and hardwood) present in the SOC before the harvest was planned. However, if composition issues exist (e.g. hardwood encroachment) or if the forest is vulnerable to spruce budworm, the solutions prepared to address them must be applied as priorities.	N.A.
	10	Percentage of the residual forest that has not been harvested recently	At least 20% of the productive forest area of a SOC must be composed of forests of 7 m or more in height that have not been harvested for at least 25 years.	N.A.
Distribution of the residual forest	**11**	Distribution of the residual forest in the SOC	At least 80 % of the reference area of a SOC must be situated less than 600 m from the boundary of a residual forest block or patch as defined in guidelines 5 and 7.	Analyze the distribution of the residual forest by using only “residual forest blocks” as defined in guideline 5.
	12		At least 98% of the reference area of a SOC must be located less than 900 metres from the boundary of a residual forest block or patch as defined in guidelines 5 and 7.	
	13	Definition of the reference area	The reference area is the area inside the SOC that is covered by a 900 metre zone around potential residual forest patches in the SOC.	N.A.

Appendix 2 Sections of the RSDF affected by the departure request

8. *A strip of woodland at least 30 m wide must be preserved around the following places and territories:*

1° a sugar bush;

2° a landfill;

3° a burial site.

A strip of woodland at least 30 m in width must also be kept on each side of the following roads and trails:

1° a road identified as a road corridor, unless the sylvicultural treatment carried out where the road is located is total cutting carried out according to the conditions of block cutting or partial cutting;

2° a hiking trail forming part of an ecological or nature interpretation centre or a concentrated network of hiking trails;

3° an access trail to a scenic outlook, an outlying circuit of a concentrated network of hiking trails or an interregional trail, specifically deforested for those purposes;

4° a portage trail included in a canoe-kayak-camping course, specifically deforested for those purposes;

5° a developed trail.

The strip of woodland of a road identified as a road corridor must be maintained until regeneration is established in the cutting area adjacent to that strip of woodland and has reached an average height of 3 m.

16. At least 30% of the productive forest area constituted of stands of 7 m or more in height must be preserved at all times in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary.

In addition, at least 30% of the productive forest area constituted of stands of 7 m or more in height must be preserved in the following territories or portions of territory:

1. in each territorial reference unit or portion thereof at least 30 km² included in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary and situated in the bioclimatic domains of the maple forest and fir forest;

2. in each aggregated cut block or part thereof at least 30 km² included in an outfitting operation with exclusive rights, in a controlled zone or in a wildlife sanctuary and situate din the bioclimatic domain of the spruce-moss forest.

131. A minimum of 30% of the productive forest area in residual forest of 7 m or more in height must be maintained at all times in a territorial reference unit where harvesting is carried out.

Where the limits of a territorial reference unit are changed, in particular following a change of the limits of a management unit, the first paragraph applies to the new territorial reference unit.

132. The provisions of section 131 do not prevent deforestation carried out in order to build, improve or repair a road giving access to another territorial reference unit.

133. In the management units or in the territorial reference units located in the bioclimatic domains of the sugar bush referred to in Schedule 1, the total cutting areas must:

1. have a size less than or equal to 25 ha over at least 70% of the harvested area for that type of cutting;

2. have a size less than or equal to 50 ha over at least 90% of the harvested area for that type of cutting;
3. have a size less than or equal to 100 ha over 100% of the harvested area for that type of cutting.

134. In the management units or in the territorial reference units located in the bioclimatic domains of the balsam fir stand referred to in Schedule 1, the total cutting areas must:

4. have a size less than or equal to 50 ha over at least 70% of the harvested area for that type of cutting;
5. have a size less than or equal to 100 ha over at least 90% of the harvested area for that type of cutting;
6. have a size less than or equal to 150 ha over 100% of the harvested area for that type of cutting.

135. The total cutting areas to which sections 133 and 134 apply are those indicated in the integrated forest development plan and whose planned harvest is carried out during a harvest year.

136. A strip of woodland in a single block must be maintained between the total cutting areas other than block cutting, until the regeneration of the cutting areas has reached an average height of 3 m. The strip of woodland between 2 cutting areas must be at least 50 m wide where each cutting area covers an area of less than 100 ha or at least 100 m wide where one of the cutting areas covers an area of 100 to 150 ha.

The strip of woodland must be composed of trees, shrubs or brush over 3 m in height and must be used as a visual screen and a corridor for the movement of wildlife.

The travel of logging machines is prohibited in that strip of woodland, except during the construction or improvement of a road.

137. Any total cutting is prohibited in the strip of woodland referred to in section 136 until the regeneration is established in the cutting areas in accordance with the first paragraph of that section.

Partial cutting is allowed on 25% of the total length of the strips of woodland referred to in section 136 included in a management unit or in another forest territory in the domain of the State. However, the strip of woodland that is partially cut between two total cutting areas must be at least 75 m wide where each cutting area covers an area less than 100 ha or a minimum width of 125 m where one of the cutting areas covers an area of 100 to 150 ha.

After partial cutting, the strip of woodland that must be used as a visual screen and a corridor for the movement of wildlife, must be composed, per hectare, of not less than 1,500 standing live trees of commercial species having a diameter of 2 cm or more, as measured at 1.3 m above the highest ground level.

For carrying out the partial cutting referred to in the second paragraph, the deforestation of felling or hauling trails must be carried out over a width less than 1.5 times the width of the logging machine used.

The construction or improvement of a road crossing the strip of woodland is allowed to the extent that the deforestation carried out for that purpose does not exceed the width of the right-of-way provided for in Schedule 4 for the class of road to which it belongs.

138. The cutting areas of a block cutting must be of variable size and form.

139. The residual forest of a block cutting must have the following characteristics:

1. have, inside the limit of the block cutting harvest site, an area at least equivalent to the area of the cutting areas of a block cutting;
2. have a width of at least 200 m;

3. be composed of forest stands 7 m or more in height over at least 80% of its area and forest stands of at least 4 m in the remaining area;
4. be composed of stands having a forest cover density greater than 40% over at least 80% of its area and from 25 to 40% over its remaining area. It may also be composed of stands having a forest cover density of 25 to 40% over more than 20% of its area, provided that that proportion is equal to or less than the proportion of the stands with such a density that are located in forests 7 m or more in height of the block cutting harvest site before the operation;
5. be composed of forest stands that can produce in commercial species a volume of mature rough merchantable timber of at least 50 m^3/ha or, where they cannot produce such a volume, be composed of forest stands equivalent in composition and in area to those harvested;
6. be composed of forest stands belonging in a proportion of at least 20% to the same type of forest cover as those harvested;
7. not have been the subject, in the last 10 years of harvesting, of a commercial harvest other than a sylvicultural treatment referred to in the second paragraph of section 142.

140. Each block cutting harvest site must be indicated in the integrated forest development plan. The foregoing also applies to the residual forest of a block cutting. Once indicated in the plan, the residual forest of a block cutting may not be used again as residual forest for as long as the harvesting cannot be carried out in accordance with the first paragraph of section 142.

141. A forest area composed of trees, shrubs or brush having an average height of 3 m or more must be preserved on the perimeter of a cutting area of a block cutting. Its width must be at least 200 m or at least 100 m if the cutting area is less than 25 ha 25 ha.

The first paragraph does not apply to the part of the perimeter of a cutting area adjacent to a strip of woodland preserved along a lake or a watercourse whose width, measured at the level of the upper limit of the shores or banks, exceeds 35 m.

A forest area composed of trees, shrubs or brush having an average height of 3 m or more that is at least 200 m wide must also be preserved between a residual forest and the cutting areas of a block cutting and between a residual forest and the other total cutting areas in order to be used as a corridor for the movement of wildlife.

The forest areas referred to in this section must be preserved until the regeneration in the block cutting areas reaches an average height of 3 m or more.

142. The residual forest of a block cutting must be preserved inside the limit of the harvest site until it may be harvested. It may be harvested only on the expiry of a 10-year period after the date on which block cutting was carried out or, if the regeneration has not yet reached after that period the average height of 3 m, until that regeneration has reached such a height.

The first paragraph does not apply to the following sylvicultural treatments carried out in a residual forest:

1. a commercial thinning or selection cutting carried out according to the applicable sylvicultural prescriptions;
2. a partial cutting in a mature tree stand or in a stand that will reach maturity in less than 15 years where not more than 35% of the marketable basal area of the stand is harvested, provided that after harvesting, a marketable basal area of at least 15 m^2/ha of well-spaced trees composed of species and proportions similar to those of the initial stand, is maintained.

A residual forest of a block cutting may be crossed by a road whose deforestation width does not exceed the width of the right-of-way provided for in Schedule 4 for the class of road to which it belongs or by a watercourse whose width at the limits of the riparian ecotone does not exceed on average 35 m. At the time of indicating a residual forest in the integrated forest management plan, neither the area nor the width of the road or the watercourse may be considered in calculating the area and the width of the residual forest for the purposes of paragraphs 1 and 2 of section 139.

143. During a harvest year, at least 60% of the total area of the total cutting areas of a management unit or other forests in the domain of the State must be planned and carried out in accordance with the provisions of this Regulation applicable to block cutting.

Appendix 3 Zones excluded from the departure application

Table 19 Zones excluded from the departure application

MU	Forest operations zones excluded
073-52	Bardais, Blavincourt, Briquet1, Cantuel, Carpe, Fablier, Fitzegerald2, GaleCP, Gamain, Gardner, Gestel, Harcy, KondiaronkB, Myon, Redan, Sholiao
074-51	Akos, Anthere, Bank_Geoffrion, Barbiez, Bassan, Bassan1, Bassan2, Bassan3, Bliss, Branchies, Butcher, Cabonga1, Cabonga2, Cawatose, Ceisur, Cendrillon, Choate, Clive, Complot, Cousson, Culbertson, Daneau, Dea, Des_fossiles, Dorothe, Echouani, Eisenhower, Ember, Enclave, Erables, Ervin, Fericy, Feu332,Fooz, Ginger, Godson, Gusanne, Gull Sud, Hanna, Holton, Houde, Huit, Jay, Jude, Kitchener, Kumel, Labatt, Labaye, Légende, Legende2, Lenz, Lilian, Litron, Locre, Loisel, Lussier2, Maxime, Milletiere, Montour, Nanouatan3, Odelein, Ovocyte, Pageot, Palette, Patricia-Lizzie, Pawley, Peckam, Picard, Rachel, Rastel, Rebecca, Reid, Robert2, Robert sud, Rowe1, Roy, Roy2, Sadillac, Seaman, Seigneurs, Seillon, Shoe, Sloe2, Snake, Somers, Tedder, Teddy, Toad-Geoffrion, Toney, Tooke, Touchette, Turner, Vallica, Vomer, Warren

Ressources naturelles et Forêts
Québec

Annex C Forest Types

In the forest, the arrangement of forest species vary according to different conditions encountered (climate, altitude, slope, soil, drainage and previous disturbances). To simplify the multitude of possible forest compositions, the notion of "forest type" was developed to characterize the forest stands. Since the implementation of silvicultural treatment differs according to the autecology of the species present and desired for the future production of the stands, the notion of forest type was influenced by the forest management objectives.

The classification of forest types adopts the main lines of the classification of species groups of the Québec Ecoforest Inventory system for distribution among softwood, hardwood and mixed stands. The predominant species of the stands then serve to name the forest type. Certain species that present special forest management issues (issue of composition or invasion) also orient determination of the forest types.

The BFEC presents the classification of forest types adopted in the allowable calculations. This is very similar to the one adopted for the Outaouais region. The Chief Forester's table is available on his website. The main forest types are presented by forest cover type in the following table.

Table 23 Main Forest Types by Forest Cover Type

Cover	Forest type	Code
Hardwood	Yellow Birch-hardwood stands	BjFx
	White Birch stands	BpFx
	Oak stands	Ch
	Red Maple-hardwood stands	EoFx
	Sugar Maple stands	Es
	Sugar Maple-hardwood stands	EsFx
	Sugar Maple-Beech stands	EsHg
	Poplar stands	PeFx
Predominantly hardwood mixed	Yellow Birch-softwood stands	BjRx
	White Birch softwood stands	BpRx
	Oak-softwood stands	ChRx
	Red maple-softwood stands	EoRx
	Sugar Maple-softwood stands	EsRx
	Poplar-softwood stands	PeRx
Predominantly softwood mixed	Spruce-intolerant hardwood stands	EpFx
	Eastern White Pine-hardwood stands	PbFx
	Eastern Hemlock stands	PuFx
	Balsam Fir tolerant hardwood stands	SbFt
	Balsam Fir-intolerant hardwood stands	SbFx
	Cedar-hardwood stands	ToFx
Softwood	Spruce stands	Ep
	Spruce-softwood stands	EpRx
	Eastern White Pine-softwood stands	PbRx
	Jack Pine stands	Pg
	Jack Pine-softwood stands	PgRx
	Balsam Fir stands	Sb
	Balsam Fir-softwood stands	SbRx
	Cedar-softwood stands	ToRx

Annex D Economic Profitability Analysis Approach

Dimension of the Analysis Performed in the PAFITs Context

The scale of the analysis adopted in the PAFITs is the strata group (group of similar strata to which the same silvicultural scenarios may apply). The strata groups targeted to perform the exercise are the most significant in terms of representation according to the Chief Forester's model for determining the allowable cut for the 2013-2018 period of each MU.

The use of the strata groups and yields associated with the allowable cut treatments make it possible to benefit from trends curves of forest stands, also known as "treatment effect curves". With these curves, it is possible to estimate the baskets of products for each harvest action of a given scenario.

Baseline Silvicultural Scenario

The economic analysis of silvicultural investments must consider the fact that even without investment, the forest produces volumes of marketable wood or has an intangible value. The reference case aims to capture this value generated by the volume of marketable wood produced in natural forests (without forest intervention). The quantity and quality gains resulting from the investment are deducted from this "natural" timber supply. The reference therefore makes it possible to isolate the real effects of investments

Horizon of the Silvicultural Scenario

The horizon corresponds to the duration of the silvicultural scenario, namely the number of years necessary to perform all the treatments. Because the duration of the silvicultural scenarios differs for each and the objective is to compare them and schedule them according to their profitability level, the analysis is repeated in perpetuity, in a context of continuous reuse of the soil.

Costs and Revenues

The costs correspond to the expenses incurred for the performance of the silvicultural treatments associated with a scenario. The economic revenues correspond to the net earnings for society:

- the merchantable value of the standing timber, which corresponds to the royalty paid to the State to acquire the resource ($/m^3);
- the salary benefit, which corresponds to the supplementary portion of the silvicultural and timber processing sector workers' salaries ($/m^3), relative to the salary they could obtain in other fields based on their experience, their training and the economic text (total salary minus opportunity salary);
- the net earnings before corporate taxes, which corresponds to corporate revenues, including harvesting and processing operations (primary and secondary) minus the operating costs ($/m^3).

Given that a scenario generates revenue over a time horizon, the economic revenues must be assessed so as to obtain a forecast over time. To do this, a trend value is generated to obtain an expected value, which accounts for the historical behaviour and minimizes the variations associated with the significant fluctuations of the economic climate.

Forest Yields

To analyze the economic profitability of a silvicultural scenario, it is necessary to estimate the characteristics of the timber resulting from the silvicultural treatments. To upgrade the forest and capture

the effect of silvicultural treatments on forest yields, the growth curves developed by the Chief Forester, the growth models of the DRF and the scientific and regional knowledge of the effects of treatments are used.

Discount Rate

One of the fundamental principles of the profitability analysis is the importance attached to the timing difference between realization of the investments and generation of the revenues. This aspect is taken into account by the discount rate, which translates the consumers' preference for the present, risk aversion and intergenerational equity.

Indicators

To allow scheduling of the economic profitability level of major silvicultural scenarios (investment level) and variable terms ((horizon of the scenarios), while considering the forest opportunity cost (forest production without investment), an **economic indicator (EI)** has been developed. This indicator represents the wealth gain in perpetuity for each dollar invested, over the entire time horizon of the silvicultural scenario. It is expressed by the following formula:

$$\textbf{Economic indicator} = (NPV_{pSc} - NPV_{pBase}) / C_{pSc}$$

where $\mathbf{NPV_{pSc}}$**:** Discounted revenues in perpetuity – discounted costs in perpetuity of the scenario analyzed

$\mathbf{NPV_{pBase}}$**:** Discounted revenues in perpetuity – discounted costs in perpetuity of the baseline scenario

$\mathbf{C_p}$: Discounted costs in perpetuity of the scenario analyzed

The ratio $\mathbf{NPV_p/C_p}$ is also assessed. This ratio corresponds to the ratio of the net present value of the scenario with the investment repeated in perpetuity relative to the discounted costs generated without accounting for a baseline scenario.

$$\textbf{Gross economic value} = NPV_p/C_p$$

where $\mathbf{NPV_p}$**:** Discounted revenues in perpetuity – discounted costs in perpetuity

$\mathbf{C_p}$: Discounted costs in perpetuity

When the EI is positive, this means the investment generates more wealth in terms of timber production and processing than what would be obtained without investment (baseline scenario). Conversely, a negative EI means the scenario generates a loss relative to the baseline scenario.

The NPV_p/C_p ratio of the scenario analyzed may also be an indicator to consider, particularly when the EI is negative. It corresponds to the ratio of the net present value of the investment relative to the cost generated in perpetuity. It allows assessment of whether or not the investment creates a deficit, without considering its opportunity cost. For example, if the EI is negative and the NPV_p/C_p ratio of the scenario analyzed is positive, we can conclude that our investment does not generate more wealth than the forest produces on its own, but nonetheless generates a positive net income. Thus, this investment could be justified, even though it does not create additional wealth relative to the situation without investment.

Analysis Tool

The tool used to produce the economic profitability analyses of the scenarios is the Modèle d'évaluation de la rentabilité des investissements silvicoles (MERIS - Silvicultural investment profitability assessment model)). It allows measuring of the economic benefits of production and processing of timber generated by the silvicultural scenarios. It is made available by the MRNF's Bureau de mise en marché des bois (BMMB - Timber Marketing Board) on its website.

https://bmmb.gouv.qc.ca/analyses-economiques/outils-d-analyse/.

The version used for the preparation of the integrated forest development strategies presented in the 2023-2028 PAFITs and the Regional Timber Production Strategy is version 2.2.1.

Glossary

Glossary	
Maple Syrup Production	Cultivation and operation of a sugar bush in view of the harvesting, treatment and processing of maple sap.
Windthrow	Tree or group of trees uprooted or broken at the base of the trunk under the effect of weather events or age, expanse of land or part of a forest where there are many trees uprooted or broken at the base of the trunk under the effect of weather events or age.
Climate change	Observable change in climate variables persisting over time and attributable to natural variability or human activities.
ABCD classification	Classification grid for timber quality assessment according to the Manuel de mesurage des bois récoltés sur les terres du domaine de l'État. (Manual for scaling timber harvested on the lands in the domain of the State). Reference: MFFP (2022).
MSCR classification	Québec classification system that allows assessment of the vigour and quality of the trees of a stand. The classes of the MSCR system are M (mortality) for trees that are doomed to die within 20 years; S (survival) for distressed trees at risk of degradation, but whose survival is not compromised within 20 years; C (conserve) for defective trees to be conserved, whose wood is not affected by decay; and R (reserve) for healthy and vigorous trees to be kept in reserve.
Spatial organization compartment	Subdivision of the Management Unit in which the age structure of the forest is relatively homogeneous, created to manage the distribution of aggregated cut blocks and the presence of forest areas.
Densities C and D	Density classes expressed as a percentage determined by projection of the crown canopy into the soil. The density is 40% to 59% of the canopy for code C and 25% to 39% of the canopy for code D.
Silvicultural diagnosis	Description and analysis of the condition of a stand or a set of stands, allowing development of a stand prescription.
Diameter at breast height	Diameter of a tree measured at 1.30 metres above ground level.
Even-aged	Said of a stand or a forest in which the trees belong to the same age class.
Sapling	Immature tree larger than a seedling, but smaller than a pole, with a stem that is still relatively week.
Sapling stand	Stand with a regular structure mainly composed of saplings.
Station quality index	Numerical values characterizing the timber productivity of a species in a stand.
Uneven-aged	Said of a stand or a forest in which the trees belong to more than one age class.
Biological legacy	Forest component coming from a previous forest ecosystem that was altered following a natural or anthropogenic disturbance.
Strip of woodland	Strip of woodland conserved at the time of a cut, on the edge of certain places or settings.
Ligneous material	Generic appellation designating wood as a harvestable substance extracted from the forest.
Maturity	Age corresponding to the harvestable stage of an even-aged stand.
Wetland	Set of lands flooded or saturated by water during a long enough period to influence the nature of the soil and the composition of the vegetation.
Riparian environment	Transition zone between an aquatic ecosystem and a terrestrial ecosystem.
Pole	Immature tree with a rigid stem, bigger than a sapling and small than a mature tree.
Pole stand	Stand with a regular structure mainly composed of poles.
Stand prescription	Formal silvicultural treatment recommendation to be applied in a given forest stand.
Quality DF1F2F3	Hardwood log classification, developed in Québec by Petro and Calvert (1976). Classes F1, F2 and F3 correspond to the Petro classes coming from the hardwood log classification, and Class F4 corresponds to the addition, by the Ministère des Ressources naturelles et de la Faune, of a "short-log" class during bucking studies conducted in December 2000.

Glossary	
Harvesting cycle	Space of time between two partial cuts in the same stand.
Silvicultural scenario	Planned sequence of silvicultural treatments to be applied to a stand or a set of stands during a given period based on forest management objectives.
Sapling stage	Second stage of development of a stand with a regular structure, characterized by the predominance of saplings.
Seedling stage	First stage of development of a stand with a regular structure, characterized by the predominance of immature trees whose size corresponds of that of seedlings.
Irregular structure	Structure of a stand composed of more than one crown stage corresponding to trees of different age classes and dimensions.
Regular structure	Structure of a stand composed of a single crown stage corresponding to trees of the same age class and similar dimensions.
Basal area	Area, measured at breast height, of the cross section of a tree trunk or sum of the area of the cross section of the tree trunks of a stand.
Silviculture	Science that can govern the establishment, growth, composition, health and quality of forest stands and the productivity of stations and art of applying this science to meet specific objectives.
Ecological type	Ecological classification unit that describes a portion of the territory on the local scale by means of a combination of potential vegetation and type of physical environment.
Potential vegetation	Classification unit that synthesizes the characteristics of the vegetation present or likely to be established in a place, in the absence of disturbances.
Management Unit	Territorial unit that serves as the basis for the allowable cut calculation and planning of interventions in the forest environment.
Territorial analysis unit	Subdivision of a Management on the basis of which the forest age structure targets are established.
Territorial reference unit	Management Unit or other forest land in the domain of the State or subdivision of these lands, which are contiguous, on which management of forest resources is performed.

List of Acronyms and abbreviations

Acronyms or abbreviations	Definition
$/m^3	Dollars per cubic metre
AIPL	Area of increased timber production
BA	Basal area
BBD	Beech Bark Disease
BMMB	Bureau de mise en marché des bois (Timber Marketing Board)
BFEC	Bureau du Forestier en chef (Office of the Chief Forester)
CIMOTFF	Comité sur l'impact des modalités opérationnelles des traitements en forêt feuillue (Committee on the impact of operating conditions of hardwood forest treatments)
CM	Centimetre
CMO	Block cutting
C_p	Costs in perpetuity
CPHRS	Cutting with high regeneration and soil protection
CPRS	Cutting with regeneration and soil protection
CTSP	Unprotected clearcut.
DBH	Diameter at breast height
DC	Distribution coefficient
DGFO-07	Direction de la gestion des forêts de l'Outaouais (Outaouais Forest Management Department)
DRF	Direction de la recherche forestière (Forest Research Department)
EI	Economic indicator
ha	Hectare
ha/year	Hectares per year
ISSG	Invasive Species Specialist Group
m	Metre
m^2	Square metre
m^2/ha	Square metres per hectare
MERIS	Modèle d'évaluation de la rentabilité des investissements silvicoles (Silvicultural investment profitability assessment model)
MFFP	Ministère des Forêts, de la Faune et des Parcs
MRN	Ministère des Ressources naturelles
MRNF	Ministère des Ressources naturelles et des Forêts
MSCR-OP	M (mortality), S (survival), C (conserve), R (reserve), O (lumber quality), P (pulp quality)
MU	Management Unit
NPV_p	Net present value in perpetuity
PAFIT	Plan d'aménagement forestier intégré tactique (Tactical Integrated Forest Management Plan)
PC	Partial cut
RATF	Rapport d'activité technique et financier (Technical and financial activity report)
RC	Regeneration cut
RSDF	Regulation respecting the sustainable development of forests in the domain of the State
SBW	Spruce Budworm
SEPM	Species group (Balsam Fir, Spruce, Jack Pine and Eastern Larch)
SFDA	Sustainable Forest Development Act

Acronyms or abbreviations	Definition
SOC	Spatial Organization Compartment
SOPFEU	Société de protection des forêts contre le feu
Stem/ha	Stems per hectare
TAU	Territorial unit of analysis
TRGIRTO	Table régionale de gestion intégrée des ressources et du territoire de l'Outaouais (Outaouais Regional Integrated Land and Resource Management Panel)
TRU	Territorial reference unit
TVLS	Threatened or vulnerable species or species likely to be designated threatened or vulnerable
WOI	Wetland of interest

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